



AMITY INSTITUTE OF  
FOOD TECHNOLOGY



# 7<sup>th</sup> AMIFOST 2024

AMITY CONFERENCE  
OF FOOD SCIENTISTS  
AND TECHNOLOGISTS

INTERNATIONAL CONFERENCE ON

*“Recent Advances and  
Future Prospects in Formatting a  
Healthier Food System”*

CONFERENCE PROCEEDINGS

19<sup>th</sup> - 20<sup>th</sup> March, 2024

(ISBN : 978-93-91535-81-0)

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# AMIFOST 2024

Global food systems have changed during the past 50 years, moving from primarily rural to industrialized and consolidated systems. This change has had an influence on livelihoods, diets, nutrition and health, and environmental sustainability. Over the past few decades, the food sector has experienced a number of changes that have affected the climate and the environment. Ensuring equitable access to food security and nutritious meals for the global population is the paramount objective shared by all governments. In order to make this feasible, we must create new technologies for value creation, minimize waste, and utilize novel food components in the design of healthy food production systems. These advancements have led to the creation of novel foods, which are crucial in ensuring that everyone has access to sustainable and healthy food.

India has made economic gains over the past 20 years, yet issues with hunger, food insecurity, and regional inequality still exist. A future public health emergency is foreshadowed by trends in overweight and obesity as well as nutritional deficiencies. Using a "Food Systems Approach (FSA)" as a lens, we investigate the mutually reinforcing relationships between nutrition

and food production. We examine numerous obstacles and prospects to get a future secure in terms of nutrition. In order to address challenges and set up an interconnected system for health, nutrition, and economic development, this conference will compile the most recent data on the development processes in the food sector. It will also highlight the nature of the challenges facing the food system, identify trends and threats to progress, and emphasize the need for institutional and policy interventions.

The conference's main focus is on how food systems must change in order to accomplish the Sustainable Development Goals (SDGs) and address a number of deeply ingrained and interconnected challenges, including hunger, malnutrition, health, inequality, rising living expenses, climate change, biodiversity, war, and energy. The food sector needs innovative concepts in the areas of nutrition, sustainable food production, and food processing to fulfill this challenge. Amity Institute of Food Technology announces AMIFOST-2024 on "Recent Advances and Future Prospects in formulating a Healthier Food System" on March 19–20, 2024, in light of the topic's significance

## "HEALTHIER FOOD SYSTEM: UNRAVELLING RECENT ADVANCES & FUTURE PROSPECTS."

The purpose of the International Conference on "Recent Advances and Future Prospects in formulating a Healthier food system" is to provide a platform for researchers, scientists, food technologists, together and discuss the latest advancements and research findings in the field of food science and Technology, nutrition, health, and lifestyle. The conference aims to promote collaboration and exchange of knowledge between participants from diverse backgrounds and regions, with the goal of advancing the understanding

of the complex interrelationships between the recent advances and future prospects in healthier food systems. By facilitating dialogue and sharing of best practices, the conference aims to contribute to the development of research projects, programs, and interventions that can help address the global challenges related to Food Safety, Food Security, Hidden Hunger, Nutri-cereals, Sustainable Food Production, and other New interfaces.



## **International Conference on**

### *Recent Advances and Future Prospects in formatting a Healthier Food System*

**7<sup>th</sup> AMIFOST 2024 (19<sup>th</sup> - 20<sup>th</sup> March 2024)**



## **CONFERENCE PROCEEDINGS**

### **EDITORS:**

Dr. V K Modi  
Dr. Monika Thakur

### **Co - EDITORS:**

Dr. Sunayan Sharma  
Dr. Niharika Sharma  
Dr. Renu Khedkar  
Mr. Puneet Sharma

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**Website:** <https://amity.edu/aift/AMIFOST2024/> ; **e-mail:** [amifost@amity.edu](mailto:amifost@amity.edu)



## FOUNDER PRESIDENT'S MESSAGE

It is a matter of great pride that Amity Institute of Food Technology (AIFT), Amity University Uttar Pradesh (AUUP) is organizing **7<sup>th</sup> Amity International Conference of Food Scientists and Technologists (AMIFOST 2024)** on the theme “**Recent Advances and Future Prospects in formulating a Healthier Food System**” from Tuesday, 19<sup>th</sup> March to Wednesday, 20<sup>th</sup> March, 2024.

Food systems have enabled enough food to be grown to keep pace with the rapidly increasing population, but far greater are the challenges of malnutrition, urbanization and rising lifestyle diseases apart from the climate crisis. These challenges can be dealt with by adopting environmentally sustainable systems with a focus on nutrition. I am sure the conference will address these issues and chalk out a roadmap for achieving the objectives of the conference.

I extend my hearty welcome to all eminent leaders from the Food Processing Sector, distinguished scientists, nutritionists, subject experts and other worthy participants from the industry, various national and international universities, institutions and research establishments. I am sure that their deliberations on such an important theme will be an enriching experience for brilliant faculty members, scientists, research scholars, students and other worthy participants. The conference will pave the way for forging bonds, mutual cooperation, undertaking joint projects and joint publications for achieving long-term goals and establishing long-term contacts for mutual benefits.

My sincere appreciation to all the distinguished members of the Advisory Board for their valuable advice. I compliment Dr. V.K. Modi, Director, AIFT together with the Convener, Dr. Monika Thakur, Organizing Secretary, Dr. Renu Khedkar as well as members of Organising Committee, the dedicated faculty members, brilliant and vibrant students, research scholars and staff who under the valuable guidance of Prof. (Dr.) Balvinder Shukla, Vice Chancellor, AUUP, have made praiseworthy efforts in ensuring the success of this conference. The most strategic and visionary leadership of Dr. Atul Chauhan, Chancellor, AUUP and President, Ritnand Balved Education Foundation (RBEF), would lead to outcome based and result oriented success of the Conference.

I extend a warm welcome to all the participants of **AMIFOST 2024** and convey my best wishes for the success of the event.

(Dr. Ashok K. Chauhan)

Founder President

Ritnand Balved Education Foundation (RBEF)

(The Foundation of Amity Institutions and the Sponsoring Body of Amity Universities)

A handwritten signature in blue ink, which appears to read 'Ashok K. Chauhan'.



## Message by Chancellor Sir

Advocating for a sustainable food system is not only crucial for individual well-being but also for the sustainability of our planet. WHO is leading the charge in advocating a healthier food systems that are driven by sustainable practices, technological integration, and with focus on nutrition. As the future prospects holds a greater potential, with continued advancements in agriculture, food technology, and nutrition education. By embracing these advancements and envisioning a future with a focus on health, we pave the way for a more resilient and nourishing food system for generations to come.

It gives me immense pleasure to know that Amity Institute of Food Technology is organizing a two day International Conference – 7<sup>th</sup> AMIFOST 2024 on 19<sup>th</sup> and 20<sup>th</sup> March 2024 with the theme “Recent Advances and Future Prospects in formatting a healthier food system”. The conference will be a culmination of bright minds deliberating upon strategies in creating sustainable ways for building healthy food systems. With the deliberations on it, the entire society will attain benefits with the knowledge exchange during various sessions in the Conference and will provide meaningful insights for future endeavors.

I extend my best wishes to the organizing team for successful conduct of 7<sup>th</sup> AMIFOST 2024.

**Dr. Atul Chauhan**  
**Chancellor, Amity University**  
**President, Ritnand Balved Education Foundation**  
**CEO, AKC Groups of Companies**



March 02, 2024

डॉ. भास्कर नारायण एमएफएससी, पीएचडी

Dr. Bhaskar Narayan MFS<sub>c</sub>, PhD

एफएसएबी, एफएसएफटी, एफएनएबी, एफएसएफटी, एफएनएएस

FSAB, FAFST, FNAB, FSFT, FNAAS

निदेशक

Director



## Message

It is indeed a pleasure to note that Amity Institute of Food Technology, Amity University Noida is organizing the conference on the "Recent Advances and Future Prospects in Formatting a Healthier Food System". The theme of the conference resonates deeply in a world where the global food system faces unprecedented challenges, from nutritional deficiencies to environmental degradation, and from insecurity to the rise of non-communicable diseases.

In recent years, there has been a growing awareness of the need to reformulate our food system to prioritize health, sustainability, and equity. We have witnessed remarkable advancement in scientific research, technology innovation and policy intervention aimed at promoting healthier diets and more sustainable food production practices. Despite these advancements, significant challenges remain. We continue to grapple with the issues where access to nutritious food is limited, especially in case of the marginalized communities. We also confront the paradox of hunger and obesity coexisting within the same population, highlighting the complexities of our current food system.

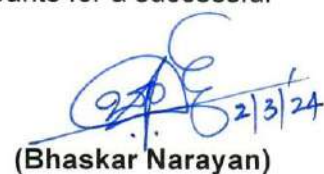
Moreover, the environmental footprints of our current food production and consumption patterns are unsustainable. Addressing these challenges require holistic approach that integrates principles of health, sustainability and social justice without affecting the environment into our food system.

With this conference, comes a collective responsibility to leverage our expertise, resources and networks to drive a positive change. I am sure that the conference shall foster interdisciplinary collaboration that transcend traditional boundaries and bring together stakeholders from diverse sectors, including academia, industry, government and civil society.

It can only be said that this is an opportunity that can be seized to exchange knowledge, share best practices, and chart a course towards a healthier, more equitable and sustainable food future. I am sure, the conference will bring out the challenges and embrace the promise of healthier food system for all.

I extend my warm greetings and best wishes to the organizers and the participants for a successful event.

Jai Hind !



(Bhaskar Narayan)



## MESSAGE

I am pleased to learn about the 7th International Conference AMIFOST-2024 on important theme **“Recent Advances and Future Prospects in formatting a healthier food system”** being organized by Amity Institute of Food Technology (AIFT), Amity University, Noida, Uttar Pradesh during 19-20 March, 2024. The Conference is focused on objectives solutions for food safety, security and healthy diets; innovations in technology for novel foods; strategies in food production & processing to meet food security and research and developments in Healthier Food Systems.

It is appreciative of the Organizers of International Conference for having included various important Themes such as Novel foods and novel food ingredients, Valorization of food by-products, Food for health and well being, Next generation foods, Millets- magical sustainable crops, Food regulation and policies, Food Safety, Sustainable food production, Food in Conflict zone & Emergencies, Exploiting new interfaces in Food Science & Nutrition and Biodiversity in Foods which are relevant to Food Technology and Food processing which is now emerging field.

Globally, food security and food safety concerns are being addressed by all countries. The last few decades saw the emergence of obesity and chronic diseases like diabetes all over the world. The changes in lifestyle and dietary patterns have cascaded effect on the health of the population. Healthier food systems focus on improving the nutritional quality of the food along the food chain thus building healthier food environment.

This Conference with the participation of Subject Experts and speakers would benefit the participants to have the best of knowledge and exposure to Healthier food systems in the present scenario. On this occasion, I congratulate the Institute for recognizing the need and holding an International conference on such an important subject. I am hopeful that the deliberations and suggestions made in this conference shall benefit all stakeholders.

I extend my good wishes to all the guests, speakers, participants and students for an enriching experience during this important event.

I wish the conference a great success.

**Dr. Sridevi Annapurna Singh**

Director, CSIR-CFTRI, Mysore

**Prof. Narendra Mohan**

Ex-Director

National Sugar Institute, Kanpur, India



### **Message by National Sugar Institute, Kanpur**

National Sugar Institute, Kanpur always feels happy being a part of “AMIFOST” organized by Amity Institute of Food Technology, Amity University, Uttar Pradesh, Noida. It is a pleasure to learn that this year also the same is being organized on 19<sup>th</sup> & 20<sup>th</sup> March 2024, providing opportunities to experts, innovators, academicians and in-fact all stake holders to discuss on various contours of healthier food systems.

Due to increase in income pattern, growing urbanization and sedentary life style, the food habits have changed a lot over the years. Although due to this and with entry of many overseas food brands, there is shift in food preferences, yet the growing health issues have necessitated a serious debate on intake of food which is nutritious, natural and safe. The focus is thus on providing healthier food conforming to quality standards in safe packaging. While we celebrate Aazadi ka Amrut Mahotsav, when food security remains high on agenda for the government, the topic is considered very apt.

We at the sugar industry are also aware of the growing concerns and speak loud on myths associated with sugar consumption and health. However, to cater to the changing market requirement there is intense focus of production of superior quality sugar including low GI, fortified and natural sugars.

I wish the conference a great success and hope that the deliberations shall provide a vision for the sustainable food sector as a whole.

Yours Sincerely

(Narendra Mohan)





## Message by Vice Chancellor

I am pleased to share that Amity Institute of Food Technology is organizing its 7<sup>th</sup> International Conference AMIFOST-2024 on the theme “*Recent Advances and Future Prospects in formattting a healthier food system*” from 19-20<sup>th</sup> March 2024 at Amity University Uttar Pradesh, Noida. This conference is a step towards achieving our vision of becoming a world class academic and research institution in the field of Food technology.

Over the last fifty years, food systems have seen a drastic change worldwide, impacting diets, nutrition, health, livelihoods and environmental sustainability. These food systems are falling short of delivering optimal nutrition and health outcomes. They face new challenges, mainly with climate change, ecosystem resilience and deepening inequity. There is a need to transform the systems that are sustainable and facilitate fair and equitable livelihoods, social justice and respect for cultural values.

I extend my sincere gratitude to the Advisory board, members, session chairs, keynote speakers and industry sponsors for their valuable support in organizing the conference.

I would also like to congratulate Amity Institute of Food Technology for their commitment and drive in organizing this conference. It is commendable that a conference is being held on such an important topic. I hope conference would induce innovative ideas among the participants paving the way for new innovations and technologies towards attaining healthy world.

I wish the delegates, eminent speakers and the participants a fruitful experience in the conference.

My best wishes for the grand success of AMIFOST 2024!

**Prof. (Dr.) Balvinder Shukla**

**Co-Patron, AMIFOST 2024**

**Professor – Entrepreneurship, Leadership & IT  
Vice Chancellor, Amity University Uttar Pradesh**



**DR. W. SELVAMURTHY, Ph.D., D.Sc.**

FAMS, FABMS, FIMSA, FIANS, FIAY

**President**

Amity Science, Technology and Innovation Foundation (ASTIF),  
Amity Foundation for Science, Technology & Innovation Alliances (AFSTIA) **Director General**, Amity Directorate of Science & Innovation (ADSI) **Chancellor**, Amity University Chhattisgarh and **Chair Professor** for Life Sciences (Former Distinguished Scientist and Chief Controller R&D(LS), DRDO) Tel: 91(0)120-4392160 / 91-9871372441 / 91-9818801028; wselvamurthy@amity.edu



### MESSAGE BY DR. SELVAMURTHY

It is my great pleasure to welcome you all to the 7<sup>th</sup> International Conference on Advances in Food Science and Technology (AMIFOST-2024) being organized by Amity Institute of Food Technology at Amity University Uttar Pradesh, Noida during March 19-20, 2024.

This year, our conference is centered around the theme "Recent Advances and Future Prospects in Formatting a Healthier Food System". The significance of this theme cannot be overstated, especially considering the pivotal role that a sustainable and nourishing food system plays in the well-being of individuals and communities worldwide.

The conference will address challenges faced by our global food system and will also hold discussions towards charting a path towards a healthier and more sustainable future. It will showcase presentations, discussions, and collaborations which will undoubtedly contribute to shaping the trajectory of the global food industry. By delving into the latest advancements and contemplating prospects, we aim to foster innovation, enhance food security, and promote the overall health and welfare of our global population.

Throughout the conference, I encourage you to engage in meaningful dialogue, share your expertise, and forge connections with fellow researchers, academics, industry professionals, and policymakers. The diversity of perspectives and experiences gathered here will undoubtedly lead to a richer understanding of the challenges and opportunities within the realm of food science.

I would like to express my sincere appreciation to the organizing committee, sponsors, and all contributors for their dedication and hard work in making AMIFOST-2024 a reality. Your commitment to excellence has set the stage for a conference that promises to be intellectually stimulating and impactful.

I look forward to witnessing the exchange of knowledge, fostering collaborations, and witnessing the birth of groundbreaking ideas that will emerge during the course of the conference. May AMIFOST-2024 be a source of inspiration, learning, and networking for all participants.

My blessings and best wishes for the success of the event and hope that the same results in achieving tangible and fruitful outcomes.

**Dr. W. Selvamurthy**



**Prof. V K Modi.** Ph. D. (Food Technology), PDF (UK), UNUF, FAFST  
Head of Institute  
*Former Chief Scientist, Professor  
AcSIR and Head  
CSIR-Central Food Technological  
Research Institute, Mysore*



### **Message by Head of Institute**

I am delighted to welcome you all to the 7<sup>th</sup> International Conference AMIFOST-2024 on the theme “*Recent Advances and Future Prospects in formatting a healthier food system*” from 19-20<sup>th</sup> March 2024 at Amity University Uttar Pradesh, Noida.

Healthier food systems include sustainable food production practices and affordable healthy diets. Food systems are important links for food security, nutrition, and human health, the viability of ecosystems, climate change, and social justice. Agricultural policies tend to focus mostly on food supply. For Sustainable Development, the agriculture and food system policies need to be transformed and aligned with the SDG goals. The systems should enable people to have nutritious and healthy food, with sustainable agricultural production and food value chains. It should also mitigate climate change and build resilience. There is a need to find new food sources and food production systems that are more sustainable than those available conventionally.

I am sure that this conference will provide opportunity to explore innovative ideas, approaches and techniques to issues related to the theme.

I am grateful to the Patron-in-Chief, Hon’ble founder President, Dr. A. K. Chauhan, Patron, Chancellor Dr. Atul Chauhan, Co-Patron, Vice-Chancellor Dr.(Mrs.) Balvinder Shukla and Advisory committee for encouragement and guidance. I also thank Speakers and Sponsors for their support in organizing the conference.

**Dr. V K Modi**

Amity Institute of Food Technology Amity  
University Uttar Pradesh – 201303



**Dr. Monika Thakur**  
*Associate Professor*  
Amity Institute of Food Technology  
Amity University Uttar Pradesh



### **Message by Convener**

I am happy to welcome you all to the 7th edition of **International Conference AMIFOST-2024** on the theme of importance “***Recent Advances and Future Prospects in formatting a Healthier Food System***” on 19<sup>th</sup> and 20<sup>th</sup> March 2024.

The conference assumes significance in face of the fact that the prevalent food systems fail to deliver healthy food for all. Increasing population is driving the rise in food production. However, agriculture is contributing to the climatic problem, straining available resources, and lowering the nutritional value and crop yield of the main cereals. In terms of transformation, these food systems have the potential to achieve the Sustainable Development Goals (SDGs) of the UN by eradicating all kinds of hunger, malnutrition, and food insecurity. I think there will be a thorough and productive exchange of knowledge about technological advancements in the more modern food systems throughout the conference.

Food sustainability is a matter for both present and future generations around the globe. It is a window into whether society will provide for itself now, but also its future later. **International Conference 7th AMIFOST- 2024 on “Recent Advances and Future Prospects in formatting a Healthier Food System”** plans to address the issues, strategies and solutions relevant to the topic and help in creating a Healthier Food System.

We are sure that the deliberations and discussions made in the conference would be beneficial to all the stakeholders. We are thankful to the esteemed speakers and participants from all over the globe to have shown great interest in the conference.

*monika.*

**Dr. Monika Thakur**  
Amity Institute of Food Technology Amity  
University Uttar Pradesh – 201313

[Mthakur1@amity.edu](mailto:Mthakur1@amity.edu)



International Conference on  
**"Recent Advances and Future Prospects in formatting a Healthier  
Food System"**  
 19<sup>th</sup> – 20<sup>th</sup> March, 2024

**7<sup>th</sup> AMIFOST**  
 2024 | AMITY CONFERENCE  
 OF FOOD SCIENTISTS  
 AND TECHNOLOGISTS |

**DAY 1 (Tuesday, 19<sup>th</sup> March 2024)**  
**Timing as per Indian Standard Time (IST) Venue: I2 Block, Moot Court**

Joining Link - [https://amity-  
edu.zoom.us/meeting/register/tZ0udemqjpj8jH9NJzpyGn5Ylr6YuKhH74iQo](https://amity-edu.zoom.us/joining/register/tZ0udemqjpj8jH9NJzpyGn5Ylr6YuKhH74iQo)

INAUGURAL SESSION	
Venue: I-2, Block Auditorium, Amity University Campus, Sector-125, Noida, India	
9:00 am -10:30am	REGISTRATION & NETWORKING TEA
10:30 am – 10:35am	Welcome address by <b>Dr. Monika Thakur</b>  Convener, Amity Institute of Food Technology, Amity University Uttar Pradesh, Noida, India
10:35am-10:40am	Lighting of lamp & Saraswati Vandana
10:40am– 10:45am	Introduction to the theme by – <b>Dr. V K Modi</b> Professor & HoI, Amity Institute of Food Technology, AUUP
10:45am – 10:50am	Address by <b>Prof. Narendra Mohan</b> , Ex-Director, National Sugar Institute, Kanpur, India

**DAY 1 (Tuesday, 19<sup>th</sup> March 2024)**  
**Timing as per Indian Standard Time (IST)**

10:50am – 11:00am	Address by <b>Dr. W. Selvamurthy</b>	Joining Link -
<b>INAUGURAL SESSION</b>		
<b>Venue: I-2, Block Auditorium, Amity University Campus, Sector-125, Noida, India</b>		
11:00am – 11:15am	REGISTRATION & NETWORKING TEA	
11:15am – 11:30am	Hon'ble Vice Chancellor, Amity University Uttar Pradesh, India	
11:30am – 11:45am	KEYNOTE ADDRESS	
11:45am – 12:00pm	Welcome address by <b>Dr. Monika Thakur</b> <b>Prof. Tuba Esatbeyoglu</b> Convener, Amity Institute of Food Technology, Amity University Uttar Pradesh, Noida, India Professor, Institute of Food Science and Human Nutrition, Hannover, Germany.	
12:00pm – 12:15pm	ADDRESS BY GUEST OF HONOUR	
12:15pm – 12:30pm	Lighting of lamp & Saraswati Vandana <b>Prof. Corinne MALPUECH-BRUGERE</b> Professor, Clermont Auvergne University (UCA), France	
12:30pm – 12:45pm	Introduction to the theme by – <b>Dr. V K Modi</b>	
12:45pm – 1:00pm	INAUGURAL ADDRESS BY CHIEF GUEST <b>Dr. A.K. Tyagi</b> Executive Director, Haldiram Snacks Ltd., Ghaziabad, UP, India	
1:00pm – 1:15pm	SHARING OF THOUGHTS	
1:15pm – 1:30pm	<b>Dr. Ashok K Chauhan</b> , Ritnand Balved Education Foundation & Chairman, AKC Group of Companies, India	
1:30pm – 1:45pm	Release of <b>Souvenir – 7<sup>th</sup> AMIFOST 2024</b>	
1:45pm – 2:00pm	Vote of Thanks <b>Dr. Renu Khedkar</b> Organizing Secretary, Amity Institute of Food Technology, Amity University Uttar Pradesh, Noida, India	

12:45pm- 1:45pm	<b>NETWORKING LUNCH</b>
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<b>DAY 1 (Tuesday, 19<sup>th</sup> March 2024)</b>	
<b>Venue: I-2 Block, Moot Court</b>	
<b>Joining Link: <a href="https://amity-edu.zoom.us/joining/register/tZ0udemqpi8jH9NJzpyGn5Ylr6YuKhH74iQo">https://amity-edu.zoom.us/joining/register/tZ0udemqpi8jH9NJzpyGn5Ylr6YuKhH74iQo</a></b>	

<b>Technical Session -1</b>	
<b>Theme - Novel foods and novel food ingredients</b>	
<b>INVITED SPEAKERS</b>	
1:45pm- 2:00pm	<b>Session Chair: Dr. G.S.C. Rao</b> Founder & Managing Director, Global Cane sugar Services Pvt Ltd.
2:00pm – 2:15pm	<b>Mr. R. L. Tamak</b> Executive Director & CEO Sugar Business, DCM Shriram Ltd., Delhi, India

2:15pm – 2:30pm	<b>Dr. Himjyoti Dutta</b> Assistant Professor, Mizoram University, Aizawl, Mizoram , India
2:30pm – 2:35pm	<b>Q&amp;A Session</b>
<b>Technical Session - 2</b> <b>Theme - Valorization of food by-products</b>	
<b>INVITED SPEAKERS</b>	
2:35pm-2:50pm	<b>Session Chair: Dr. Sunil Pareek</b> Professor, National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Kundli, Haryana, India
2:50pm -3:05pm	<b>Prof. Liviu Giurgiulescu,</b> Associate Professor, Technical University of Cluj Napoca, North Universitary Center of Baia Mare, Romania
3:05pm – 3:10pm	<b>Q&amp;A Session</b>

<b>Technical Session -3</b> <b>Theme – Food for health and well being</b>	
<b>INVITED SPEAKERS</b>	
3:10pm-3:20pm	Sharing of thoughts <b>Mr. Eiji Amano</b> Managing Director, Yakult-Danone India Pvt.Ltd., Delhi
3:20pm-3:35pm	<b>Session Chair: Dr. Neerja Hajela</b> Head Science, Yakult- Danone India Pvt Ltd, Delhi
3:35pm - 3:50pm	<b>Dr. Karuna Singh</b> Professor & Dean, Department of Health & Allied Sciences, Sharda University, Greater Noida, India
3:50pm – 3:55pm	<b>Q&amp;A Session</b>
3:55pm – 4:15pm	<b>NETWORKING TEA</b>
<b>Technical Session- 4</b> <b>Theme- Food in Conflict zone &amp; Exploiting new Interfaces in Food Science</b>	
<b>INVITED SPEAKERS</b>	
4:15pm– 4:30pm	<b>Session Chair: Prof. Srinivas Jana Swamy</b> Associate Professor, Dairy & Food Science, South Dakota State University, United States
4:30pm – 4:45pm	<b>Dr. Pradeep Singh Negi,</b> Chief Scientist & Head, Fruits& Veg. Tech. Department, CSIR-Central Food Technological Research Institute, Mysore , India
4:45pm – 4:50pm	<b>Q&amp;A Session</b>

<b>Oral Presentations (Physical Mode) Venue - I3 Block, Seminar Hall</b>	
2:00pm -5:00pm	All Themes (1 – 11)

<b>Oral Presentations (I) (Online Mode)</b> <b>Joining Link - <a href="https://meet.google.com/xtf-bxfb-yau">meet.google.com/xtf-bxfb-yau</a></b>	
2:00pm -5:00pm	Theme 1: Novel foods and novel food ingredients Theme 2: Valorization of food by-products Theme 3: Food for health and well- being & Theme 4: Next generation foods
<b>Poster Presentation (Physical Mode) Venue - Venue I2 Foyer</b>	
19 <sup>th</sup> March 2024 (2:00pm -5:00pm)	Theme 1: Novel foods and novel food ingredients Theme 2: Valorization of food by-products Theme 3: Food for health and well-being Theme 4: Next generation foods

<b>e- Poster Presentation (Online Mode)</b> <b>Joining Link- <a href="https://meet.google.com/nqx-wfyg-tcf">meet.google.com/nqx-wfyg-tcf</a></b>	
19 <sup>th</sup> March 2024 (2:00pm -5:00pm)	Theme 1: Novel foods and novel food ingredients Theme 2: Valorization of food by-products Theme 3: Food for health and well-being Theme 4: Next generation foods

<p align="center"><b>DAY – 2 (Wednesday, 20<sup>th</sup> March 2024)</b>  Timing as per Indian Standard Time (IST)  Venue: I-2 Block Moot Court  Joining Link: <a href="https://amity-edu.zoom.us/meeting/register/tZ0udemqjp8jH9NJzpyGn5Ylr6YuKhH74iQo">https://amity-edu.zoom.us/meeting/register/tZ0udemqjp8jH9NJzpyGn5Ylr6YuKhH74iQo</a></p>
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<b>Technical Session 5 &amp; 6</b> <b>Themes- Next Generation Foods &amp; Millets- magical sustainable crops</b>	
<b>INVITED SPEAKERS</b>	
10:00am - 10:15am	<b>Session Chair: Prof. Nate Blum</b> CEO, Sorghum Limited, USA
10:15am - 10:30am	<b>Mr. Parminder Singh Joshi</b> , Category Technical Expert, Nestle India Pvt.Ltd., New Delhi
10:30am - 10:45am	<b>Dr. K.N. Ganapathy</b> Principal Scientist, ICAR- IIMR, Hyderabad, India
10:45am - 11:00am	<b>Dr.Soumya Ranjan Purohit</b> , Assistant professor, Tezpur University, Tezpur, India



11:00am - 11:15am	<b>Dr. Mudasir Ahmad Shagoo</b> Assistant Professor, NIT, Srinagar, J&K, India
11:15am – 11:20am	<b>Q&amp;A Session</b>
11:20am- 11:40am	<b>NETWORKING TEA</b>
<b>Technical Session 7</b> <b>Theme – Sustainable Food Production&amp; Biodiversity in Foods</b>	
<b>INVITED SPEAKERS</b>	
11:40am – 12:10pm	<b>Session Chair: Dr. Mahesh Gupta,</b> Chief Scientist, IHBT, CSIR, Palampur, HP, India
12:10pm - 12:40pm	<b>Dr. Swati Sethi,</b> Scientist, CIPHET, ICAR Ludhiana, Punjab, India
12:40pm - 12:45pm	<b>Q&amp;A Session</b>
12:45pm - 1:45pm	<b>NETWORKING LUNCH</b>
<b>Technical Session 8</b> <b>Theme - Food regulations, policies and Food Safety</b>	
<b>INVITED SPEAKERS</b>	
1:45pm - 2:00pm	<b>Session Chair: Dr. Ana Sanches Silva</b> Professor, National Institute for Agricultural and Veterinary Research (INIAV), Portugal
2:00pm - 2:15pm	<b>Mr. Sunil Adsule,</b> Asst. Vice President, Regulatory Affairs, Reliance Retail Ltd., Bangalore, India
2:15pm - 2:30pm	<b>Dr. A. K. Chauhan,</b> Sr. Professor and Head, Department of Dairy Sci. & Food Tech. , Institute of Science, BHU, Varanasi, India
2:30pm - 2:35pm	<b>Q&amp;A Session</b>
<b>Technical Session 9</b> <b>Theme – Research &amp; Entrepreneurship opportunities in Food Science &amp; Nutrition</b>	
<b>INVITED SPEAKERS</b>	
2:35pm - 2:50pm	<b>Dr. Anthony Fardet,</b> Senior research Scientist in Healthy and Sustainable Diets, INRAE Clermont-Ferrand, France
2:50pm - 3:05pm	<b>Dr. Parthiban Marimuthu,</b> Preclinical & Clinical Research Scientist, Founder of Preclinical GLP Lab Life science Intelligentsia, New Delhi
3:05pm - 3:20pm	<b>Dr. Rituja Upadhyay,</b> Associate Professor, Karunya University, Coimbatore, TN, India
3:20pm - 3:30pm	<b>Q&amp;A Session</b>

<b>Oral Presentations (Online Mode)</b> <b>Joining Link - <a href="https://meet.google.com/pst-tfzh-bek">meet.google.com/pst-tfzh-bek</a></b>	
20 <sup>th</sup> March 2024 (10:00am-1:00pm)	Theme 5: Millets- magical sustainable crops Theme 6: Food regulation and policies Theme 7: Food Safety Theme 8: Sustainable food production Theme 9: Food in Conflict zone & Emergencies Theme 10: Exploiting new interfaces in Food Science & Nutrition Theme 11: Biodiversity in Foods
<b>Poster Presentation (Physical Mode) Venue I2 Foyer</b>	

20 <sup>th</sup> March 2024 (11:00am-1:00pm)	Theme 5: Millets- magical sustainable crops Theme 6: Food regulation and policies Theme 7: Food Safety; Theme 8: Sustainable food production Theme 9: Food in Conflict zone & Emergencies Theme 10: Exploiting new interfaces in Food Science & Nutrition Theme 11: Biodiversity in Foods
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e - Poster Presentation (Online Mode) Joining Link - <a href="https://meet.google.com/ssp-txmr-tqn">meet.google.com/ssp-txmr-tqn</a>	
20 <sup>th</sup> March 2024 (10:00am-1:00pm)	Theme 5: Millets- magical sustainable crops Theme 6: Food regulation and policies Theme 7: Food Safety Theme 8: Sustainable food production Theme 9: Food in Conflict zone & Emergencies Theme 10: Exploiting new interfaces in Food Science & Nutrition Theme 11: Biodiversity in Foods

VALIDATORY SESSION Joining Link- <a href="https://amity-edu.zoom.us/joining/register/tZ0udemqj8jH9NJzpyGn5Ylr6YuKhH74iQo">https://amity-edu.zoom.us/joining/register/tZ0udemqj8jH9NJzpyGn5Ylr6YuKhH74iQo</a>	
20 <sup>th</sup> March 2024	
I-2 Moot Court, Amity University Uttar Pradesh, Noida	
3:30pm – 5:00pm	Conference Report – Dr. Monika Thakur, Convener AMIFOST 2024
	Guest of Honor – Dr. Mahesh Gupta (IHBT, CSIR) & Prof. Corinne (UCA, France)
	Sharing of Thoughts – Dr. Tommaso Montanari, Frontiers Journal, Switzerland
	Award distribution (Best Oral & Poster presentations)
	Blessings by Hon'ble Founder President - Dr. Ashok K Chauhan, Prof. (Dr.) Balvinder Shukla – Vice Chancellor & Dr. W. Selvamurthy DirectorGeneral- ADSI, Amity University Uttar Pradesh
	Concluding remarks by Dr. V K Modi, HoI, Amity Institute of Food Technology, Amity UniversityUttar Pradesh
	Vote of Thanks – Organizing Secretary – Dr. Renu Khedkar, Amity Institute of Food Technology, Amity University Uttar Pradesh, India
	GROUP PHOTOGRAPH followed by HIGH TEA

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# Lectures by Invited Speakers

## **Bioactivity-guided fractionation of anthocyanin-enriched foods**

**Prof. Dr. Tuba Esatbeyoglu**

Institute of Food Science and Human Nutrition, Hannover, Germany

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Polyphenols are known as health-improving secondary metabolites that occur in foods. Mainly extracts generated from fruits and vegetables were analyzed for their health-promoting effects. Still, the contribution of different groups of compounds, e.g., anthocyanins, “pigments” (polyphenols without anthocyanins), or polymeric compounds, is unknown. Therefore, in this presentation, a possible way how to separate the polyphenols from fruit, i.e., pomegranate and lingonberry, and vegetable, i.e., purple potato and red carrot, extracts into an anthocyanin and copigment fraction using adsorptive membrane chromatography, will be shown. The phenolic compounds were characterized by HPLC–PDA and HPLC–ESI–MS/MS. The possible biological effects of the generated extracts and their fractions were determined on the one hand with spectrophotometric assays, like TEAC, and on the other hand, the free radical scavenging activity was evaluated by electron spin resonance (ESR) spectroscopy, cell culture studies analyzing the antioxidant, geno-protective and antidiabetic effects were evaluated. In summary, our results suggest that synergistic effects of different subgroups influence biological activities.

**Keywords:** *polyphenols, pigments, HPLC-PDA, anthocyanin*



## Recent Advances and Future Prospects in Formatting a Healthier Food System

**Corinne Malpuech-Brugère and Edmond Rock**

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The number of individuals will need food by 2050 is estimated to be more than 9 billion. Agricultural production will need to increase to in the face of this population growth, but it will also have to adapt to dietary changes related to changes in living standards. Dietary patterns have never been constant and have been prone to changes due to a variety of factors including climate, geographical location, politics, cultural influences and religious practices. In this context, “nutrition transition” proposed by Popkin in the 1990s describes the shifts in dietary consumption and energy expenditure that coincide with economic, demographic and epidemiological changes.

More than 1 billion people in the world are living with obesity (the Lancet, 2022). Worldwide, obesity among adults has more than doubled since 1990, and has quadrupled among children and adolescents (5 to 19 years of age). Obesity, and overweight are malnutrition forms, included also undernutrition (wasting, stunting, underweight), inadequate vitamins or minerals. Undernutrition is responsible for half of the deaths of children under 5 and obesity can cause noncommunicable diseases such as cardiovascular diseases, diabetes and some cancers. The goal of ending all forms of malnutrition remains a challenge, since vulnerabilities forming in food systems have been identified. Indeed, major drivers such as conflict, climate variability and extremes, and economic slowdowns are involved in the recent rises in hunger and slowing progress in reducing all forms of malnutrition. They impacted the food security and nutrition.

Transforming food systems is needed to increase the affordability of healthy diets. The food produced should be more affordable, convenient, safe, nutritious and sustainable. It is important to be able to understand what can be done to make food systems conducive to healthy diet and better nutrition. Efforts are already done to promote healthy dietary patterns, to design foods to improve their healthiness and sustainability, by decreasing the level of “unhealthy” food components (saturated fat, salt and sugar), incorporating bioactive compounds, “healthy “nutrients. In another side, future foods developed like molecular synthesis and production of food components, cell-culture meat, 3D food printing are presented as a possible solution to the global food supply, but need to be evaluated towards the impact of processes on health outcomes, as presently proposed for ultra-processed foods.

The challenge is to achieve zero hunger, healthy diets, and a food demand compatible with addressing planetary environmental boundaries. It is important, as FAO, IFAD, UNICEF, WFP and WHO in 2021 recently proposed, to strengthen food environments at production, processing and retailing the foods together with changing consumer behavior to promote food with positive impacts on all living beings under the concept of One Health.

**Keywords:** *healthier food system, climate variability, malnutrition*

## **Innovations in Novel Indian Ingredients: A Call from Mystical Mizoram**

**Dr. Himjyoti Dutta**

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The Indian traditional and modern food systems are known across the globe for being unique. The said ‘uniqueness’ primarily owe to the exclusive inclusion of certain raw materials, spices, herbs and semi-processed ingredients. These ingredients impart characteristic physicochemical, sensory and nutritional status in the foods that cumulatively hold the pride of an outstanding status of “Indian Foods” in the world gastronomy scenario. With growing attention towards the peculiar socio-cultural and biological diversity of the North-Eastern region of India, academic and research institutes located in the region have been largely encouraged to explore the ethnic food practices and upscale those to the mainstream local and global markets. The state of Mizoram, which shares multiple international borders, food research has recently budded and is currently accelerating to create opportunities for local industrialization as well as cross-border trade. Innovative tribal food practices, nutraceutical potential of wild ingredients, their functional properties to meet current industry needs are being largely explored with research aids. In this talk, the status of a few such researches is being discussed.

***Keywords:*** *unique, tradition, tribal foods*

## **Red light chromatic treatment effect on chemical and microbiological properties of tomatoes during preservation**

**Prof. Liviu Giurgiulescu**

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By exposing tomatoes to red light for one month, there was an increase in lycopene content, and a decrease in yeast and mold infestation on the external surface of tomatoes. The use of red light in storage facilities can provide an alternative for the preservation of tomatoes by prolonging shelf life, decreasing technological losses and reducing food waste.

***Keywords:*** *tomato storage, chromatic, lycopene*

## **Dietary Energy Density and Body Composition Analysis: Tool for Obesity Management**

**Prof. Karuna Singh**

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Measuring body composition, especially energy needs and nutritional status, is very important due to its important clinical applications, particularly in the assessment and management of obesity and its related comorbidities. Body composition is a valuable tool to measure the prevalence of obesity, which is associated with the growth of chronic degenerative diseases. Indicators such as percentage body fat (PBF), fat mass index (FMI), fat-free mass (FFM), and total body composition score are more stable parameters in determining obesity than in body mass index (BMI) or body weight indices. The role of the dietary energy density (DED; in kcal/g) of the diet in promoting overweight and obesity has received increasing attention. The study aimed to investigate the association of body composition components and DED among young adults (18-25 years), where a lot of lifestyle changes occur, which further influence their dietary intake, patterns, and even the activities they engage in, leading to a high trend of obesity. A cross-sectional study on 304 young adults (18-25 years) was conducted, and data was collected for a period of six months (September 2022-February 2023). Body composition was measured using multifrequency bioimpedance analysis. Daily energy intake was assessed using a 24-hr diet recall method and dietary energy density was calculated. Results indicate a significant difference between dietary energy density among the three groups underweight, normal-weight, and overweight/ obesity among the studied subjects ( $M=1.73$ ,  $SD=0.12$  vs.  $M= 1.86$ ,  $SD=0.43$  vs.  $M= 2.10$ ,  $SD=0.43$ ,  $p=.002$ ). It was also found that dietary energy density was associated with BMI ( $\beta=0.981$ ,  $CI\ 95\%=0.412, 1.632$ ;  $p=.0030$ ), fat mass percentage ( $\beta=1.852$ ;  $CI\ 95\%= 0.672, 2.123$ ;  $p=0.042$ ) and fat mass ( $\beta = 1.762$ ;  $CI\ 95\% = 0.732, 4.345$ ;  $p =.0023$ ). Significant differences in dietary energy density among underweight, normal-weight, and overweight/obese young adults were identified. Dietary energy density was found to be associated with BMI, fat mass percent, and fat-free mass. Dietary energy density might be considered an important aspect of the obesity nutritional education programs for young people.

**Keywords:** *Body Composition component, Energy Density, Adiposity, Fat mass percentage*



## Physiochemical and Functional Properties of Sweet Potato Starch and Sweet Potato Puree-Wheat Bread

Srinivas Janaswamy<sup>1,\*</sup>, Raed Alayouni<sup>1,2</sup>, Mukani Moyo<sup>3</sup>, Tawanda Muzhingi<sup>3,4</sup>, Mariam Nakitto<sup>5</sup>,

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The world's population is on a continuous rise and is growing at a pace of 1.10% per year to add 83 million annually. It was projected to surge to 9.3 billion by 2050. Such an increase threatens the well-being of individuals and societies and demands supplying safe, healthy, and nutritious foods. Sweet potatoes are the seventh most important food crop in the world. They serve as an energy supplement and are good sources of  $\beta$ C, anthocyanins, polyphenols, starch, soluble fiber, and minerals. Their intrinsic antioxidant and anticarcinogenic properties further underscore the benefits of serving as a health-promoting staple food source. Among the several available choices to serve sweet potatoes, purees, prepared by peeling, cutting, grinding, and cooking in water that hold more than 90% of carotenoids, stand out in developing functional foods, e.g., bread. Herein, seven sweet potato cultivars, namely NASPOT8, NASPOT10, NASPOT11, NASPOT12, NASPOT13, Kakamega, and Ejumula, harvested in Uganda, were used to isolate the starch and study physiochemical properties. Furthermore, sweet potato puree (SPP) was prepared, and functional bread was made by substituting 50% wheat flour with SPP. The starch from the cultivars exhibited irregularly elliptical granules with amylose content ranging from 20.87 to 35.40%. Their pasting viscosity, crystallinity, and in vitro starch digestion are different. The breads display significant protein, ash, total phenolic components, moisture, and antioxidant activity differences. The SPP incorporation in the bread alters protein, ash, moisture, and antioxidant activity and improves the texture. The bread's starch digestion was reduced, suggesting their potential to address diabetic concerns. Overall, sweet potato-derived ingredients enhance wheat bread's nutritional profile and offer valuable insights for designing and developing novel functional foods.

**Keywords:** Sweet Potato Starch, anthocyanins, polyphenols, nutritional profile

### 3 D food printing for healthy and sustainable food systems

**Dr. Pradeep Singh Negi**

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Food systems include all elements and activities related to food production, processing, distribution, preparation, consumption, and disposal, as well as the outcomes of these elements on health, livelihoods, and the environment. Opportunities for food system transformation depend primarily on the scope for improving potential agricultural productivity together with post-harvest loss reduction, and opportunities for improving incomes through value addition. Different food systems have diverse and specific pathways for providing healthy, affordable, safe, and sustainable diets, and thus need tailor-made solutions. Diverse diets can improve nutrition and health; however, such supply should be affordable and accessible.

3-D Food Printing facilitates the production process from mass manufacturing to personalized manufacturing, and it is based on personal nutritional needs. This technology allows for the customization of nutrient intake and offers food to be consumed in more aesthetic way. This technology can optimize development of functional foods by enriching with required micro and macronutrients, substituting undesirable fat and allergic proteins, and printing multi-ingredient appealing food for various needs. Further, it has the potential to impact health, livelihoods, and the environment.

**Keywords:** *sustainable food systems, 3-D Food Printing, allergic proteins*

## **The Role of Sorghum and Millets in Reshaping Global Food and Agriculture Paradigms**

**Dr. Nate Blum**

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Recently published peer-reviewed research from academic institutions around the world concur in regard to previously unrecognized health and nutritional benefits of sorghum and millets in human and animal diets. Further scientific papers have also been published which detail environmentally sustainable attributes of sorghum and millets as they pertain to water, wildlife, and soil health, as well as being an optimal tool for carbon sequestration. This research, coupled with increasing consumer demand and awareness through the 2023 International Year of Millets, has created the conditions by which existing food and agricultural paradigms might be challenged to better address food security, climate change, and access to value-added markets for small-holder and conventional farmers around the world.

***Keywords:*** *Millets, Sorghum, sustainability*

## **Millets: Challenges and opportunities**

**Mr. Parminder Singh Joshi**

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Millets are significant due to their low water requirements, resulting in a reduced carbon footprint, and their ability to thrive in challenging environmental conditions such as heat, rain, and droughts. In a scenario where India is losing 30% of its land due to degradation, these crops serve as a solution, capable of withstanding extreme environmental conditions. Millet crops have short growth periods, allowing them to be cultivated alongside major crops. They are nutritionally rich, containing essential micronutrients like calcium and iron. Moreover, millets are renowned for their role in weight reduction, regulating blood sugar levels, enhancing digestion, and acting as antioxidants. Despite their numerous benefits, millets have a shorter shelf life, are enzyme inhibitors, and require longer cooking times. The presentation addresses these challenges and explores strategies for managing them, while also highlighting how the industry has capitalized on the benefits of millets by creating various products suitable for different age groups.

***Keywords:*** *millets, micro-nutrients, shelf life*

## **Non-conventional Protein Source**

**Debanjan Biswas and Soumya Ranjan Purohit\***

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Non-conventional protein sources have intrigued the researchers for a considerable period of time and continue to grab their attention as a non-conventional protein source. With the growing population and increasing awareness towards efficient resource utilization, LPCs have a potential to gain popularity as a novel source of protein. This deliberation summarizes the various methods of LPC concentration or precipitation and also highlight their nutritional quality, anti-nutritional factors, and digestibility, that have been explored so far for various leaf sources. Though there are a number of advantages that can be derived from fractionation of leaf proteins, challenges pertaining to the process are vivid. Hence, an attempt to review these advantages and challenges have been made in this presentation. The scope of utilization of LPC is vast but before diving into commercial utilization, it is of utmost importance that the safety and efficiency of these protein sources are well investigated. The key findings through the review exercise are issues like, lack of sulfur containing amino acids and minerals in LPC which makes the source not very balanced; non-conventional protein concentration method like fermentation as green and efficient means of protein concentration; importance of leaf drying for reduced cyanogenic potential, etc. Moreover, the application of LPC as feed and food has thus been highlighted and possible approach towards solving the challenges regarding LPC has been put forward in form of an idea in this article. An exemplary study on Bamboo LPC was done and protein was precipitated using conventional and non-conventional method like fermentation. Investigation was carried out to evaluate, yield, Osborne fraction and secondary structure of protein. The key findings are issues like, lack of sulfur containing amino acids and minerals in LPC which makes the source not very balanced; non-conventional protein concentration method like fermentation as green and efficient means of protein concentration; importance of leaf drying for reduced cyanogenic potential, etc. Bamboo LPC from different precipitation methods tested in the present study revealed that, the acid precipitated one had the highest yield of 60.4 mg/g dry matter followed by fermentation. For the crude protein percentage content in the LPCs, acid precipitation again exhibited the highest value of 39.55% followed by fermentation, high-temperature precipitation and then low-temperature precipitation. The acid precipitated LPC was thus further evaluated for its Osborne fraction composition. The results revealed that the LPC contained highest percentage of Glutelins in it, followed by Prolamins, Albumins, and Globulins. The application of LPC as feed and food has thus been highlighted and possible approach towards solving the challenges regarding LPC has been put forward as an idea in this article. Fermentation can be green and sustainable means of LPC recovery method with better yield and digestibility. Secondary structure analysis of Bamboo LPC showed higher digestibility attributes.

**Keywords:** *LPC, protein sources, sulfur, Glutelins, Globulins.*

## **Safeguarding Food Security: A Holistic Perspective on Agro-Food Waste and Supply Chain Dynamics**

**Tawheed Amin**

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This abstract investigates the complex correlation among agro-food waste, supply chain dynamics, and their combined influence on ensuring food security. In an era characterized by a burgeoning global population and heightened environmental apprehensions, addressing and mitigating food waste has emerged as a critical imperative. This necessitates the adoption of a comprehensive viewpoint, delving into the intricacies of the agro-food system to pinpoint key areas where waste is prevalent. An essential facet involves the examination of supply chain dynamics since disruptions at any stage can worsen issues related to food insecurity. The application of a thorough approach is vital, encompassing both upstream and downstream components of the supply chain, spanning from production to consumption. By closely analysing these interconnections, viable strategies for waste reduction and overall efficiency enhancement can be identified. Furthermore, it is imperative to underscore the broader repercussions of agro-food waste, extending beyond its immediate impact on food security. This includes recognizing the environmental ramifications of inefficient supply chains and advocating for sustainable practices to mitigate strain on natural resources. Ultimately, a nuanced exploration is essential to comprehend the intricate balance needed to safeguard food security, acknowledging the pivotal roles of waste reduction and supply chain optimization in today's world.

**Keywords:** *food waste, supply chain, dynamics, global population, waste reduction*



## **Waste to wealth: Way toward the sustainable food production**

**Dr. Mahesh Gupta**

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Agricultural biodiversity, plays a crucial role in ensuring food security and sustainable development. As the global population continues to grow and climate change poses new challenges to agricultural productivity. The processing, preservation and waste utilization of food crops promote food diversification and sustainable agriculture. Traditional and underutilized food crops are often regarded as staple foods and have been valued for their nutritional content, versatility in food applications, and ability to thrive in specific climates and growing conditions. They have the potential to be used for novel food formulations as well. Preserving traditional food resources not only maintains nutritional security, but also safeguards cultural heritage and traditional knowledge. Dietary fiber from fruit waste as a potential source of metabolites in maintenance of gut health. Dietary fiber (DF) (polysaccharides) has become an important role in owing to various putative health such as ulcerative colitis. To fulfil industrial and scientific demands of dietary fibre, waste utilization can prove advantageous. Since pomegranate peel is considered an agricultural waste product, the development of nutraceuticals utilizing pomegranate peel is an attractive strategy to provide value for money and promote waste reduction and sustainable production. However, production of fruits and vegetables is gradually increasing due to improved horticultural practices with availability of suitable cultivars, but more than 25% of fruit losses are due to inadequate storage and processing facilities in the country. Conservation efforts towards processing and preservation of these waste from the food resources are crucial for safeguarding sustainable nutrition and food security.

**Keywords:** *polysaccharides, underutilized foods, conservation, conversion, preservation*

## **Vacuum frying: an alternate frying technique for novel and healthier snack foods**

**Swati Sethi\* and Pankaj Kumar**

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Vacuum frying is a reduced-pressure frying technique that differs from traditional deep-fat frying. It has been used for a variety of fried food products but is most associated with fruits and vegetables. Operating pressure below 8 kPa reduces the boiling point of water, facilitating the frying at temperatures below 90 °C. This approach outperforms conventional deep-fat frying in terms of fried food quality, such as color, texture, oil absorption, and sensory acceptance. The frying time-temperature combination is a processing parameter that affects the quality of the completed product. The benefits of vacuum frying are attributed to the low temperatures and limited exposure to oxygen during the frying process. This approach also demonstrated a reduction in the detrimental impacts on oil quality. The other advantages are the preservation of natural color and flavor, the preservation of nutrients, and the reduction of acrylamide content. Vacuum frying is a viable alternative for producing high-quality fried snack foods with superior color and flavor due to reduced oxidation, lower frying temperatures, and substantially quicker processing times when compared to conventional frying. The escalating demand for fried foods due to the rise of fast-food establishments and online food deliveries has underscored the necessity for efficient, small-scale, and a viable alternative to conventional deep frying. In this context, a small-scale vacuum fryer has been developed at ICAR-CIPHET, Ludhiana.

**Keywords:** *vacuum frying, alternate approach, resource preservation*

## **Vegetables: New Interfaces for nutritional security**

**Hira Singh**

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Globally, hidden hunger is a serious challenge particularly in low to middle income countries. Deficiencies of iron, zinc, vitamin A etc are most pronounced and lack of nutritionally enriched balanced food is directly linked with under-weight, stunting and wasting (too thin for height) in infants and growing children. To achieve Zero Hunger target, the United Nations-2030 framed 17 Sustainable Development Goals (SDGs). Among these, second SDG focuses mainly on the elimination of malnutrition and hunger by ensuring sustainable food systems. For this purpose, vegetable crops will be the ideal option being enriched with various essential nutrients as well as cheaper source of nutrients. Since antiquity, these crops offer a sustainable and cost-effective opportunity to deliver micronutrients to masses that has limited access to a healthy and balanced diet. Being enriched with minerals, vitamins and bioactive compounds, vegetables play a significant role in securing nutritional security. These crops play a key role in diversifying diets, needed to address “hidden hunger”. Vegetables are the integral component of a balanced diet predominantly vegan population like India. Since vegetable crops are put under the category of protective foods because of their protection against several ailments, ensuring thereby uncountable direct or indirect health benefits. In spite of the remarkable progress made in vegetable production, their per capita consumption in India is significantly lower per day per person, which is below the minimum dietary requirement. The significance and opportunities of the vegetable sector in India needs more focus and attention to strengthen the nutritional as well as economic security in the country.

**Keywords:** *hidden hunger; dietary requirements, Sustainable Development Goals (SDGs)*

## Unlocking the Secrets of Active Food Packaging: Challenges of By-products and Plant-Derived Extracts and Regulatory limitations

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The widespread usage of materials derived from fossil fuels and non-biodegradable food packaging has led to severe environmental degradation. This emphasizes how urgently we need sustainable packaging substitutes to reduce these harmful effects on the environment. This presentation explores the cutting edge of active food biopackaging and looks into using plant- and food by-products-derived natural extracts to improve the quality and safety of packaged foods.

The food packaging sector has much to benefit from the natural extracts' inclusion into biopolymers, as demand for eco-friendly and sustainable solutions rises. With an emphasis on the biological properties of the natural extracts, this presentation explores the scientific foundations of this original concept for food packaging. The possible contamination of these extracts by pesticide residues and mycotoxins will also be addressed.

A wide range of natural extracts will be focused, such as those from *Rosmarinus officinalis* L., *Camellia sinensis* L., and citrus by-products, highlighting their effectiveness in preventing lipid oxidation and lowering microbial contamination, which prolongs shelf life and maintains the quality of packaged food. In addition, the efficacy of using active food biopackaging on a variety of model foods will be presented, and any obstacles to their commercialization, including regulatory limitations, will be discussed. Additionally, the factors that are essential to improving the efficiency of active food biopackaging will be focused.

The ultimate goal of this presentation is to increase the body of knowledge in sustainable active food packaging in order to encourage the food industry to develop and implement environmentally friendly packaging alternatives.

**Keywords:** *Active Food Packaging, Biopackaging, By-products, Legislation, Natural extracts, Sustainable packaging.*

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## **Food Safety & Quality Management**

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Due to significant improvements in income levels and lifestyles, consumers have increasingly demanded better quality and safer food in recent years. Not only this, as a result of increasing health consciousness amongst the masses, they are inclined to consume quality and safe food to minimize ailment, and chronic diseases and increase their longevity towards a better healthy lifestyle.

Lack of food safety and quality is often due to inadequate awareness by food chain functionaries and consumers in developing countries. Often lenient attitudes towards food safety and poor implementation of food laws are also considered as two of the major identified areas for improvement. Poverty and inadequate food security can also be identified as a reason for unsafe and substandard food being consumed by a large group of masses. Fast food or ready-eat food is flooding the markets in view of the increasing demand by consumers due to changed lifestyles. Obviously, the use of food additives and chemicals has increased in food to enhance shelf-life.

***Keywords:*** *health awareness, food security, ready-to-eat*

## Research opportunities in Food Science and Nutrition

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To address the most advanced researches in the field of nutrition, I propose to distinguish reductionist and holistic emerging topics. Overall, the main reductionist emerging research topics intent to correct observed negative effects of anterior nutritional issues. However, the most promising innovations in nutritional sciences will come from the application of holistic approaches, from farm to fork. Such analyses have led to new unifying/holistic paradigms, generally resulting from an empirico-inductive approach, i.e., from reality to theory, and not the other way.

Otherwise, food and nutrition sciences are first holistic by essence. However, as for exclusive reductionism, to be only holistic may also lead to an impasse, in the way that we need to develop more reductionist mechanistic studies to better understand complex system, and according to a hypothetico-deductive method. If not, one may remain contemplative, and curb innovations. Hence, the importance of virtuously combining holism and reductionism, which correspond to complex thinking. However, the emerging nutritional issues emphasize the need for more holistic and empirico-inductive researches to address multi-causal complexity, e.g., living labs.

**Keywords:** *farm to fork, nutrition, holistic approach*



## Research Opportunities in the Smart Protein Space

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The demand for sustainable and nutrient-dense protein sources is rising because of the world's population growth, increased environmental concerns, and shifting consumer preferences. As a result, the smart protein sector has grown to be a promising field that includes modern technologies and alternative protein sources that address these issues. The research and commercial possibilities in the smart protein space are examined in this abstract, with emphasis given to developments in food science, sustainability, and biotechnology.

Plant-based protein research projects include the whole value chain, from crop production to consumer acceptability. Research projects in food science aim to resolve technological issues related to processing plant proteins into edible and useful food items. To enhance the sensory qualities, texture, and nutritional content of plant-based protein meals, new extraction procedures, protein separation strategies, and texturization procedures are being developed. In addition, efforts are being made to replicate the flavor and texture of animal-derived proteins to improve consumer acceptability and uptake of plant-based alternatives. We discuss a few research case studies that we have carried out: plant-based beverages, meat analogs, vegan egg and vegan pork belly.

In summary, there are a variety of interdisciplinary and complex research opportunities in plant-based protein, which present promising avenues for the development of sustainable agriculture and nutrition. By leveraging the combined knowledge of scientists, policymakers, and industry participants, research initiatives can stimulate creativity, tackle worldwide issues related to food security, and facilitate the shift towards more robust and eco-friendly food systems that rely on plant-based protein sources.

**Keywords:** *smart proteins, plant proteins, interdisciplinary research*

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80	<i>Nutritional assessment and management in dialysis patients</i>	Ramsha Qureshi, Ankita Jagannath Lakade
81	<i>Managing cachexia and improving quality of life in cancer patients</i>	Kalash Garg, Niharika Shanker
82	<i>The molecules in our stomach: exploring food as a medium of science</i>	Kashish Rajput
83	<i>“Exploring the interconnection between food and mood: a comprehensive review”</i>	Chauhan K, Chhetri, A and Sharma, S
84	<i>Understanding celiac disease: overview, pathogenesis, symptoms and diet</i>	Ananya Dhyani and Niharika Shanker
85	<i>The role of specific nutrients in different heart diseases</i>	Rukma Saksena
86	<i>The influence of diet on cardiovascular disease: impact of food and nutrients on risk factors for heart health</i>	Arpita Saxena
87	<i>Title: nutritional strategies and protein management in non-dialysis chronic kidney disease: an integrated review</i>	Hiral Kapoor
88	<i>Food adulteration: a comprehensive review</i>	Simran Pandey, Preksha Vishnoi, Palak Singh
89	<i>HEPATOCELLULAR CARCINOMA: CURRENT INSIGHT</i>	Khushie saxena, Soumi Chakraborty
90	<i>EXPLORING THE COMPLEX LANDSCAPE OF DIABETES MELLITUS: FROM MECHANISMS TO MANAGEMENT</i>	Ritu and Sunayan
91	<i>Intermittent Fasting and Physical Exercise for Preventing Metabolic Disorders</i>	Priyanshi Bansal, Shweta Suri
92	<i>Immunotherapy for Cancer Treatment</i>	Riya Nagar and Soumi Chakraborty

93	<i>Impact of social media on Students Dietary Choices</i>	Saundraya Dutta and Soumi Charkarborty
<b>Theme 4: Next Generation Foods</b>		
1	<i>Amelioration of Ulcerative Colitis in Balb/C Mice by Fermented Aegle Marmelos Juice</i>	Pritika Sharma, Aakriti Garg, Nidhi, Vasudha Sharma
2	<i>Physico-Chemical, Nutritional and Sensory Characterization of Meat Analogues Based on Spirulina/Pea Protein Mixtures</i>	K Chaudhary, L Piplani, P Prajapati, M Garg
3	<i>Study On Effect of Anti-Rancidity and Packaging Treatments on Instant Coconut [Cocos Nucifera L.] Chutney Mix</i>	Prakruti B. Tandel, Nilam V. Patel, Brijesh Kumar Yadav, Pradeep Kumar
4	<i>Development And Characterization of Plant-Based Protein Bar as A Nutritional Supplement for Athletes: A Focus on Green Gram (Vigna Radiata)</i>	Bachu Dhanalaxmi, Dasari Rohitha, Chhavi Taliwal, Maheshwar Mekam
5	<i>Development And Nutritive Assessment of Blended Rts Prepared from Guava (Psidium Guajava L.) And Karonda (Carissa caranda)</i>	Usha Sharma and Saleem Siddiqui
6	<i>Development Of Roselle Calyces (Hibiscus Sabdariffa L) Jelly: A Nutrient Rich Food</i>	Poonam Pramod Nichat, Chhavi Taliwal, Shireesha Mukka, Maheshwar Mekam
7	<i>Exploring The Different Extraction and Quantification Methods of Lecithin and Its Applications: A Comprehensive Review</i>	Harika Vasa, Shireesha Mukka, Maheshwar Mekam
8	<i>DEVELOPMENT OF MALTED WEANING MIX</i>	Priyadharshini. K. R
9	<i>Development And Characterization of Rice Protein Oleogels</i>	Bonigala Manas, Kalaiyappan I, Rituja Upadhyay
10	<i>Modification &amp; Isolation of Non-Traditional Oils</i>	M Bhalerao, Dr. V Y Karadbhaje, Dr. S V Karadbhaje
11	<i>Acceptability Of Ready to Eat Breakfast Cereals Prepared from Common Buckwheat</i>	Aneesha <sup>1</sup> , Pratibha Singh
12	<i>Porous Corn Starch Granules as Effective Host Matrices for Encapsulation and Sustained Release of Curcumin and Resveratrol</i>	Maryam Wahab, Srinivas Janaswamy
13	<i>Enhancing Fruit Juice Quality: Fortification with Agave Sisalana-Derived Prebiotic Inulin and Its Application</i>	Vaishali and Lakhvinder Kaur
14	<i>Development Of Cluster Fig Incorporated Kulfi</i>	Sheetal R Patil, Vikramsinh M. Ingale, Dr Gurunath V Mote
15	<i>Studies On Preparation of Khajoor (Phoenix Dactylifera) Burfi Incorporated with Honey</i>	Pawar P G
16	<i>Organoleptic And Nutritional Analysis of Drink Formulated with Rhododendron Arboreum Flower</i>	Saurabh Arya, Jyoti Goyat

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17	<i>A Study on Utilization of Yam and Whole Wheat flour in Formulation of Swiss Roll</i>	Kelapure N N
18	<i>Functional properties and recent developments in chocolate processing</i>	Vansh Batra, Renu Khedkar
19	<i>Technological innovations in dairy industry: a review</i>	Sharvi Sharma and Salony Sharma
20	<i>Optimizing infant formula feeding: mitigating risks of cow milk allergy for enhanced infant health</i>	Akshay R and Sakshi Sukhija
21	<i>A comprehensive overview on use of vegetarian and non- vegetarian preservatives in water based non-alcoholic beverages and their impact on human health.</i>	Ikram H and Sharma S
21	<i>Nutritional properties of moringa and its applications in food products – a review</i>	Neha sharma and Ashok Kumar Pathera
22	<i>Nutraceutical potential of bamboo</i>	Tanvi Jain, Riya Garg, Meena Kumari
23	<i>Food fortification and balanced diet to improve the health status in low level economy</i>	GoelT, BadolaJ, SharmaS
24	<i>Development of tamarind rice (puliogare) mix with reduced tartaric acid concentration</i>	Radhika Menon and Ashok Kumar Pathera
25	<i>Probiotic delivery mechanisms to human gastrointestinal tract: objectives and challenges</i>	Mehak Bharadwaj
26	<i>Nutritive potential of moringa oleifera in various food matrices”</i>	Maanya Gupta
28	<i>Development of an immunity boosting drink from turmeric, ginger and orange</i>	Malika Reshi
29	<i>Effect of nutritional additions on extruded and deep fried potato chips</i>	Shreya Dimri & Sakshi
31	<i>3d printing: an innovative technology for food processing</i>	Grishika Gupta, Renu Deepak Khedekar
32	<i>Chocolate: an overview on its processing and fortification approach</i>	Mekhla Singh, Riya Mahajan, Bindhya Prasad,Tarun
33	<i>Innovation in space Food research: Enhancing Astronaut Nutrition and Psychological well being</i>	Palak Singh, Simran Pandey and Preksha Vishnoi
34	<i>Dehydration of coconut water for premix and evaluation of it's functional property</i>	Badola.J, Goel T, Mohite A
35	<i>Plant based milk: a vegan alternative for functional drink</i>	Devanshi sharma, Gupil garg, Khushi, gupta Grishika gupta and Monika thakur
36	<i>Postbiotics- an emerging concept in food technology</i>	Amina Khan and Shweta Suri
37	<i>Vegetable soups: a healthy alternative for functional diet</i>	Aayushi, Anushka and Kayan



38	<i>Advancement in food industry: use of genetically modified organisms</i>	Navya Jassal, Prachi Khandelwal, Sancha Rajkumari, Nikisha Subba and Meena Kumari
39	<i>Mushrooms: a potential source of nutraceuticals</i>	Sudiksha Arya, Sania Gupta, Tanisha Tomar and Sunayan Sharma
40	<i>Development of health mix for children by incorporating transgenic milk</i>	Aadhavan R M
41	<i>Nutritional and functional properties of apricots</i>	Ishika Kaushik, Renu Deepak Khedkar
42	<i>Recent Innovation in Edible cutlery in the Food Industry: A Review</i>	Yashpreet Kaur, Vidit Jain and Satyajit
<b><i>Theme 5: Millets- Magical Sustainable Crops</i></b>		
1	<i>Vegan Millet Milk- An Alternative for Dairy Milk</i>	Ananya Mohan and Vasudha Sharma
2	<i>Evaluation Of Quality Changes and Predictive Modelling of Safe Storage Time for Pearl Millet Grains</i>	Jayasree Joshi T and P Srinivasa Rao
3	<i>Bioactive Peptides of Millets: A Review</i>	Er. Shahwar Siddiqui
4	<i>Physico-Thermal and Antioxidant Properties of Irradiated Brown Top Millet Flour</i>	Varsha Thakur and Savita Rani
5	<i>To Study the Influence of Process Parameters of Vacuum Frying on The Quality Attributes of Millet-Based Snacks</i>	Heena Sudhakar Kamdi, Sivaranjani S and Srinivasa Rao
6	<i>Development Of Instant Cup Pasta Enriched with Millets</i>	Dhivyabharathi C, Brindha S and Abhirami PP
7	<i>Study On Processing Techniques of Millets for Development of Probiotic Beverage</i>	Vaidehi Mande, SV Karadbhaje
8	<i>Development And Evaluation of Novel Edible Cutlery from Gluten-Free Millet and Starch Blends: A Sustainable Alternative to Plastics</i>	Sheetal D Deshmukh, Shantanu
9	<i>Beneficial Effects of Fermented Foods and Beverages Developed from Millets</i>	Shreya Jain, Tanisha Shrivastav and Anamika Mehta
10	<i>Ragi Millet: A Nutrient-Rich Ingredient for Healthy Biscuit Production</i>	Harsh Gangwar
11	<i>Assessment of Techno-Functional Properties of Optimized Popped Finger Millet Grains</i>	Shalini Choudhary, Muskan Chadha, Karuna Singh, Ratnakar Shukla
12	<i>Effect of Germination on Antioxidants, Functional Properties, Bioactive Compounds, And Nutrients of Barnyard Millet</i>	Aina Chaudhary, Meena Kumari and Swati Vyas
13	<i>Gluten Free Traditional Indian Finger Millet Snack (Papad): Impact of Formulation and Processing</i>	Sneha Karadbhajn, Sakshi Ukhalkar and Prashant Lungad

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14	<i>Marketing Chain and Consumer Behaviour for Health- A Study on Selected Millet-Based Products in Delhi</i>	Urishita Gambhir and Mahua Bhattacharjee
15	<i>Development And Formulation of Kheer Mix Incorporated with Ragi Flour and Pumpkin Seed Powder</i>	Kiruthika S, Mithra.B and R Shivani and S Madumitha
16	<i>Millets! A Way to Good Health and Well-Being Among Gen Z</i>	GowdaV, Agrawal C and Gulati U
17	<i>Effect of UV-C Treatment on the Quality Attributes of Pearl Millet Flour</i>	Prashanth P, Jayasree Joshi T, Shagolshem Mukta Singh, and P. Srinivasa Rao
18	<i>Devising Nutrient Enriched Nutri Mix Brownie Incorporated With “Lepidium Sativum and Moringa Oleifera Seed”</i>	Abithadharshini.M, Mithra.B and. Priyaalini G
19	<i>Millet based beverages</i>	Rithvik K and Renu Khedkar
20	<i>Miraculous millets : powering tomorrow's plates</i>	Anushka Ghosh
21	<i>Millets as functional ingredient in gluten free products</i>	Ayush Srivastav and Neha Sharma
22	<i>Assessing millets as a gluten-free option for individuals with gluten sensitivity</i>	Vedika Kohli and Meena Kumari
23	<i>Preparation of millet-based instant dhokla mix</i>	Akshita Thapliyal and Renu Khedkar
24	<i>Ragi: the rising star of superfoods for the new generation</i>	Srishti and Meena Kumari
25	<i>Development of indigenous fermented products using barnyard millet</i>	Henna Hameed, Neha Sharma and Ashish M Mohite
26	<i>Millet based dietary pattern for combating malnutrition in lower income group : a comprehensive review</i>	Shweta Sharma, Divita Shree Goel, Shivi Tawker, Aditya Sharma, Sunayan
27	<i>Grain of hope: exploring millet as a nutritious alternative for celiac patients</i>	Vidushi Garg
28	<i>Barnyard millet–a potential food and feed crop of future</i>	Khushbu gupta and Meena Kumari
29	<i>Development of millet based chakli premix</i>	Tushar Gupta and Renu Khedkar
30	<i>Millets: A Solution to Agrarian and Nutritional Challenges</i>	Neerja and Meena Kumari
31	<i>Analysing the interplay between millet and multigrain flour-enriched gluten-free baking and nutritional well-being – an evaluation of gluten-free ingredients and flours, nutritional benefits, and advanced baking methodologies</i>	Bhoomish Purswani and Monika Thakur
32	<i>Millets in combating micro mineral deficiency in lactating women and young children</i>	Yati Patel , Spriha Rai, Anshi Dahiya, Avni Samuel, Akriti Singh, Devanshee Singh, Khushi Malik, Sunayan Sharma
33	<i>Next generation food- millet noodles</i>	Sakshi Kumari Sharma and Mandeep kaur

34	<i>Improving millet's nutritional profile by phytin reduction and including complementary proteins</i>	Arham Jain and Alfiya Khan
35	<i>Millet's tarts: an innovative functional dish with health benefits</i>	Gupil Garg, Khushi Gupta, Devanshi Sharama and Grishika Gupta
36	<i>Use of millets as functional components in bakery</i>	Riya Mahajan, Mekhla Singh, Bindhya Prasad, Tarun
37	<i>Review: Millet-Based Noodles</i>	Lavanya Naudiyal and Renu Khedkar
<b>Theme 6&amp;7: Food Regulation and Policies and Food Safety</b>		
1	<i>Evolving food auditing: integrating technology, sustainability, and global perspectives for future impact</i>	Harshit Jain
2	<i>Food regulation and policies</i>	Karthikeyan rawat
3	<i>Ensuring food safety: combating adulteration and enhancing Quality control</i>	Navya.S and Sunayan.S
4	<i>Food hygiene and awareness among street vendors and hawkers: a survey-based exploration</i>	Atharvan Joshi , Kashwini, Rakshan S R, Ishpreet Kaur Sarna and Sunayan Sharma
5	<i>Microbial contamination risks in packaged drinking water &amp; potential mitigation techniques</i>	Anshika Tyagi and Alok Saxena
6	<i>Studies on decontamination techniques for seasonal fruits from main markets of noida, uttar pradesh, india</i>	Shikha Singh and Monika Thakur
7	<i>Shelf life and safety concerns of bakery products: a focus on cakes</i>	Tushar Gupta and Renu Khedkar
8	<i>Empowering food safety and sustainability: the revolution of smart packaging</i>	Samriddhi Johari and Anas ahmad
9	<i>Supply chain logistics and food spoilage: a review</i>	Nishika Pan, Tisha and Aadhia Tripathi
10	<i>Awareness on food adulteration and its harmful effects on human health</i>	Khushi Agarwal, Tiya Bhattacharya, Ashish Chauhan, Mohit Sahu, Raksha Shahane
11	<i>Microbiology of street food: understanding risks for improving food safety</i>	Tarun, Bindhya Prasad, Mekhla Singh, Riya Mahajan Dr Alok Saxena
12	<i>Consumer awareness in terms of food packaging and labelling</i>	Adya Goenka, Monika Pandey, Nainika Baidya, Akshita Arora, Sunayan Sharma
13	<i>Reduction of reliance on preservation by bio-preservation</i>	Alfiya Khan and Arham Jain
14	<i>Food terrorism: a new threat in sustainable food system</i>	Manjunatha Varma, Aditi and Aditya
15	<i>Carbon dots in future of green food packaging: a review</i>	Aadhia Tripathi, Tisha, Nishika Pan
16	<i>Heavy metal analysis of different milk products present in the market</i>	Madhvan Vij, Kamakshi Soni and Monika Thakur

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17	<i>Green packaging innovations: advancing sustainable and safe food storage solutions</i>	Aakriti Pathak, Nehi Sharma, Pradyumna Pandey, Nishank Sharma
17	<i>Analysing the Impact of Food Labels on Consumer Purchasing Behaviour</i>	Preksha Vishnoi, Simran Pandey, Palak
18	<i>Food irradiation: a solution to combat microbial contamination</i>	Aleena Roy, Naba, Hadeeqa Zehra and Nishit Kumar
19	<i>Food adulteration: a comprehensive review</i>	Simran Pandey, Pareksha Vishnoi, Palak Singh
20	<i>Decoding the Truth: Understanding Monosodium Glutamate (MSG)</i>	Aditya Raj, Aditi Tonk , Manjunatha Verma
21	<i>Decoding the truth: colourants an important food additive for innovation in food production</i>	Jaskeerat Singh Ahuja, Aditya Raj , Aditi Tonk , Manjunatha Verma
22	<i>Advancement in food preservation techniques: a comprehensive review</i>	Kayan Behal, Anushka Sharma & Aayushi
23	<i>Knowledge on hygiene practices and sanitation among street vendors in noida</i>	Tanisha Tomar, Sania Gupta, Swastika Maiti, Sudiksha Arya and Sunayan Sharma
24	<i>Food safety and security amoung street vendors</i>	Anshita grover, Radhika chaturvedi, Shagun sharma and Sunayan
25	<i>Microbial safety of street food products in developing countries</i>	Kanishka Rana
26	<i>Phytochemical, antimicrobial, and antioxidant activity of citrus limetta extracts and essential oil against selected plant pathogens</i>	Ujjawal kaushik, Charu Gupta, and Girish Sharma
27	<i>Block-chain technology in food safety: ensuring transparency from farm to fork</i>	Nishank Sharma, Pradyumna Pandey, Nehi Sharma, Aakriti Pathak.
26	<i>Application of nanotechnology in food packaging for improved safety and freshness</i>	Divyanshu Singh and Akshant RT
27	<i>HACCP and consumer awareness: communication and transparency</i>	Vanshika Gaur
28	<i>Ethylene oxide contamination in spices: an assessment of health risks and regulatory strategies</i>	Anushka Sharma, Sunidhi Raghuvanshi, Siddhant Saini and Monika Thakur
29	<i>Quality criteria: effect of different grading size and maturity of potato under sub-tropical climatic conditions</i>	Bandana and Vineet Sharma
30	<i>Challenges impeded by the pandemic covid-19 to the indian food security</i>	Vinod Kumar Yadav and Radha Krishna Jha
31	<i>Assessing consumers' understanding and perceptions regarding food labels</i>	Vijayata Sengar and Arushi Loiwal
32	<i>Food Security and nutrition an overview</i>	Vidya E, Velvika S, Bala Meenakshi

		Sesetty
33	<i>Lactobacillus strains: screening, characterization and in vitro assessment of their bacterial characteristics for product commercialization</i>	Wattamwar S A, Kulthe A A, Athawale GH, Dagadkhair RA, Shaikh KA
34	<i>Assessment of environmental indicators in selective sectors of india</i>	Shalu
35	<i>Relationship between High Value Agricultural Products and Health Issues Among Youth in Delhi</i>	Sejal Sharma and, Mahua Bhattacharjee
36	<i>Title: consumer behavior and semiconductor industry in food economy</i>	Abhinandan Asthana
37	<i>Quality and shelf-life improvement by using alginate-based edible coating on fresh-cut melons</i>	Sadaf Ahmad, Rashid Imran Ahmad Khan, Nazia Tabassum, Asfa Alam
38	<i>Effect of plant essential oils on xanthomonas campestris</i>	Tamanna Hussain, Geetanjali Raikwar, Arjun Sharma, Praveen Dahiya, Sumedha Mohan
39	<i>Phytochemical screening, antimicrobial and antioxidant activity of processed and unprocessed root extracts of asparagus racemosus against plant pathogens</i>	Aakanksha Yadav, Charu Gupta, Girish Sharma and Neetu Singh
40	<i>Colorimetric detection of oxytocin in bottle gourd using cysteamine functionalized gold nanoparticle (cys-aunps)</i>	Sarushi Rastogi, Vasudha Sharma, Vinita Kumari, Farhan Jalees Ahmad
41	<i>Analytical review on compliance to food regulations</i>	Jaju Rameshwar
42	<i>Determinants of food safety</i>	Jaju Rameshwar
<b>Theme 8: Sustainable Food Production</b>		
1	<i>Application of Fly Ash in Agriculture: A Strategic Perspective</i>	Harsha Sejwal, Praveen Dahiya and Sumedha Mohan
2	<i>Extraction of Bioactive Compounds from Kinnow Flavedo by Ultrasonication Assisted Natural Deep Eutectic Solvent</i>	Taru Negi, Anil Kumar, Satish Kumar Sharma, Archana Gangwar
3	<i>Preservation of Post Harvest Quality of Amla Fruit with Beeswax Coating</i>	Anushka Gupta and Vivek Kumar
4	<i>Study Of Non – Thermal Treatment on Wheat Grain</i>	Richa Gaur, Ranjana Pand <sup>2</sup>
5	<i>Hot Water Treatment: A Non-Chemical Approach for Reduction Fungicide Residues in Apples (Var. Royal delicious)</i>	Ajit Kumar Singh, Shruti Sethi, Tirthankar Banerjee, Alka Joshi, Ram Asrey, Mast Ram Dhiman, R M Sharma and Raju Kumar
6	<i>Effect Of Variable Steam Parboiling on Selected Pigmented Bao Rice Varieties</i>	Aditi Duarah, Arnab Roy, Himjyoti Dutta
7	<i>Indian Spinach: Green Leafy Vegetable Crop for Strengthening the Human Immunity</i>	Jashandeep Kaur, Shilpa Gupta and Hira Singh

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8	<i>Development And Quality Evolution of Functional Cookies Using Jaggery as A Natural Sweetener</i>	Namita Patil, Gurunath Mote
9	<i>Development Of Tulasi Cookies</i>	Trinit Rency E
10	<i>Novel Approach of Using LEDs To Grow Indoor Lettuce Hydroponically</i>	Shreya Raghorte, Sheetal Deshmukh and N Thejokalyani
11	<i>Millets - The Sustainable Nutri-Cereals: A Review</i>	Shweta A. Patil and Iranna S. Udachan
12	<i>Nutritional And Health Benefits of Nutri cereals</i>	Sneha V Karadbhajne, darshana Admane, Aditi K Bonde
13	<i>Performance Of Sustainable IPM Components on Plant Growth Parameters and Yield of Cauliflower</i>	Saransh Sah <sup>1</sup> and Neetu Singh
14	<i>Process Standardization, Consumer Acceptability and Nutritional Evaluation of Value-Added Bread with Mushroom Powder</i>	Bernice Efua Buabeng Odo <sup>1</sup> , Karuna Si, and Monika Thakur
15	<i>Promotion Of Pulses Production in District G.B Nagar and Bulandshahr Uttar Pradesh -A Stepping Towards Food &amp; Nutritional Security</i>	Neetu Singh & Roshan Lal
16	<i>Sustainable Pork Production and Processing: Step Towards Empowering Tribal Women of Northeast India</i>	Shivani Mehta, Mahua Bhattacharjee
17	<i>Elevating The Sustainability of Food Production Through Organic Agriculture: A Case Study on Spinach Cultivation</i>	Jahnvi Manshotra, Dr. Neetu Singh
18	<i>Enhancing Sustainable Food Production Through Mycorrhizal Symbiosis: A Comprehensive Study</i>	Harshvardhan, Dr. Neetu Singh
19	<i>Technology Adaption and Sustainable Food Production: A Study with Reference to Ground Water</i>	Niharika Panda, Mahua Bhattacharjee
20	<i>Participation In Agricultural Extension Services &amp; Economic Growth: A Case Study Of Uttar Pradesh</i>	Riya Singh and <sup>2</sup> Mahua Bhattacharjee
21	<i>A Study on Sustainable Food Distribution in India with Reference to Procurement of Wheat in Bihar</i>	Diksha Singh and <sup>2</sup> Mahua Bhattacharjee
22	<i>Marketing Efficiency of a Sustainable Crop: Analytical Study on Millet and Millet Based Products in Cities of Delhi NCR and Chennai</i>	J Shree Nidhi and <sup>2</sup> Mahua Bhattacharjee
23	<i>Beverage Sector &amp; It's Growth Prospect with Relation to International Market</i>	Aadya and Mahua Bhattacharjee,
24	<i>Food Preference and Tourism Sector in North-East India</i>	Neha Bhattacharya and Mahua Bhattacharjee
25	<i>Farmer Friendly IPM Module for Sustainable Production of Okra: A Success Story</i>	Archana Singh and Fazil Hasan

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26	<i>A Study on The Impact of Climate Changes in Indian Agriculture</i>	Muskan and Pooja Mehra
27	<i>Foam-Matted Overripe Banana Powder as A Functional Additive for Puffed Extruded Snack</i>	Ajay R. Narola, Alka Joshi, Bindvi Arora, Shruti Sethi, Madhubala Thakre
28	<i>Post harvest washing &amp; decontaminating solutions for seasonal vegetables in delhi, ncr region, india</i>	Preeti Rani and Monika Thakur
29	<i>Advancing sustainable soilless agriculture: optimizing nutrient management and environmental efficiency</i>	Anas Ahmad and Samriddhi Johari
30	<i>Revolutionizing agriculture: a sustainable solution in food processing</i>	Anushka, Kayan and Aayushi
31	<i>Health benefits on microgreens: a review</i>	Debdatta Mazumdar
32	<i>Sustainable food production for a better future</i>	Shouryaa Sharma, Himanshu Chaudhary, Mukul Ghalyan Tanishk Tiwari, Sunayan Sharma
33	<i>Sustainable Solutions for Food Waste Reduction: A Comprehensive Exploration</i>	Fahad Ashraf
34	<i>Multi-cereals and their impact on sustainable food system</i>	Vidit Jain, Yashpreet Kaur, Satyajith Panicker
35	<i>BIOTECHNOLOGY AND GENETIC ENGINEERING IN FOOD INDUSTRY</i>	PIYUSH KUMAR and ADHITHYAN J

***Theme 9, 10 & 11: Food in Conflict Zone & Emergencies, Exploiting New Interfaces in Food Science & Nutrition, Biodiversity in Foods***

1	<i>Recent Developments in Active And Smart Packaging</i>	Ayush Gupta and Renu Khedkar
2	<i>Development In Biscuit Manufacturing</i>	Aanchal Vashisth and Renu Khedkar
3	<i>Bioactive Compounds in Spices: Unveiling Health Benefits, Extraction Techniques, Mechanism Of Action And Their Applications In The Food Industry</i>	Mili Sharma and Saksham Sanghvi
4	<i>Food Irradiation: An Effective Technology for Food Safety and Preservation</i>	Bindhya Prasad, Tarun, Mekhla Singh And Riya Mahajan
5	<i>Nutritional Scarcity: Addressing Food Insecurity in Conflict Prone Areas</i>	Gupil Garg, Devanshi Sharma, Grishika Gupta and Sakshi
6	<i>Biodiverse Banquets: Diving Into Nature’s Culinary Treasury</i>	Khushi Gupta, Grishika Gupta, Devanshi Sharma, Gupil Garg and Ashok Pathera
7	<i>Fortification Of Staple Foods: An Urgent Need for Sustainable Diet</i>	AdhithyanJ, Piyush and Sahil

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8	<i>Fortification Of Confectionery Food Products to Combat Micro-Nutrient Deficiency</i>	Aditi Kohli and Monika Thakur
9	<i>Cultured Meat: An Overview</i>	Chettri A, Chauha K and SharmaS
10	<i>Recent Advancements in Beverage Industry.</i>	Aditya Narayan Singh and Ashish Mohite
11	<i>Regulations And Standards of Organic Food</i>	Hargun Kaur and Neha Sharma
12	<i>Vitamin D-Rich Dumplings: A Healthy Product for Pregnant Women</i>	Heena Rawat and Meena Kumari
13	<i>Development Of Sausages Using Pulses</i>	S. Aryan and Neha Sharma
14	<i>Sugar revolution: embracing alternatives for healthier lifestyles</i>	Vishanth yelamarthi
15	<i>3d food printing using extrusion-based technique for fruits and vegetables</i>	Akshay Bhavsar and Roji Waghmare
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22	<i>Development of anti-inflammatory and anti-acne serum containing zingiber ottensii valetton extract</i>	Pradtana Chairat, Charinya Chankhampan, Worapong Kitdamrongtam, Charu Gupta, Supakorn Silakate, Jiradej Manosroi and Aranya Manosroi,
23	<i>Development of skin whitening cream containing extract from peel of ripe mango (Mangifera indica l.)</i>	Napasnan Thanarattanachai, Worapong Kitdamrongtham, Charinya Chankhampan, Charu Gupta, Supakorn Silakate, Jiradej Manosroi , Aranya Manosroi



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27	<i>Development of skin whitening cream containing indian gooseberry (Phyllanthus emblica l.) Fruit extract</i>	Napasorn Kruthangka, Worapong Kitdamrongtham, Charinya Chankhampan, Charu Gupta, Supakorn Silakate, Aranya Manosroi, Jiradej Manosroi
28	<i>Development of anti-acne cream from extracts of thai spices</i>	Rapeepan Phimphasoot, Charinya Chankhampan Worapong Kitdamrongtam, Charu Gupta, Supakorn Silakate, Aranya Manosroi and Jiradej Manosroi
29	<i>Development of anti-aging serum containing thai medicinal plant extract</i>	Tanison Rachasak, Worapong Kitdamrongtham, Charinya Chankhampan Charu Gupta, Supakorn Silakate, Aranya Manosroi , Jiradej Manosroi ,
30	<i>Development of Anti-inflammatory and Anti-acne Serum Containing Extracts from Clove (Syzygium aromaticum (L.) Merr. &amp; L.M. Perry) and Marigold (Tagetes erecta (L.))</i>	Anchalee Lueangsakunwong Charinya Chankhampan Worapong Kitdamrongtam, Charu Gupta, Supakorn Silakate, Aranya Manosroi and Jiradej Manosroi
31	<i>Development of a whitening gel containing bitter cucumber (momordica charantia l.) Fruit extract</i>	Kanokporn Jujai , Worapong Kitdamrongtham Charinya Chankhampan Charu Gupta Supakorn Silakate, Walailuck Witkittiluck, Aranya Manosroi Jiradej Manosroi
32	<i>Development of whitening gel containing plant mucilage extract</i>	Kunyamas Thanom, Worapong Kitdamrongtham Charinya Chankhampan Charu Gupta , Supakorn Silakate , Aranya Manosroi, Jiradej Manosroi
33	<i>Development of anti-aging serum containing extracts from hybrid flesh passion fruits (passiflora edulis)</i>	Suchada Wongs Worapong Kitdamrongtham Charinya Chankhampan Charu Gupta, Supakorn Silakate, Jiradej Manosroi, Aranya Manosroi

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35	<i>Improvement in the antioxidant activity and organoleptic characteristics of blanched green peas with ilex paraguariensis infusion</i>	Medina, Analía V, Nazareno, Mónica A Chaillou, Lucrecia L and Gupta Charu
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*Theme 1:*  
***Novel Foods and***  
***Novel Food***  
***Ingredients***

**EDIBLE SEEDS OF ARTOCARPUS LAKOOCHA AS SUSTAINABLE  
OPTION FOR NUTRACEUTICALS**

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### ABSTRACT

Undernourishment is a global issue that leads to several challenges in maintaining a healthy lifestyle. According to FAO, children and middle-aged groups are observed to be highly affected by malnutrition. To maintain a well-balanced diet, the utilization of a nutrition-rich food source is a viable option. Addressing the problem of malnutrition, this research was conducted to determine nutrients present in the edible seeds of *Artocarpus lakoocha* (AL), which is commonly referred as Monkey Fruit. This fruit is an endemic plant belonging to the family *Moraceae*, which is the same family as jackfruit, which has been proven to be a source of nutraceuticals. Previous studies have confirmed the non-toxicity and edibility of monkey jack seeds. The presence of fibers, minerals, and proteins in AL seeds suggests that they may have plausible health benefits, such as promoting bowel regularity and reducing the risk of chronic diseases such as diabetes and cardiovascular disease. To unlock the full advantage of these seeds, the present study focused on identifying their nutritional values. Proximate analysis revealed that the seeds are rich in carbohydrates and fibers and have a substantial number of proteins. Additionally, the seeds hold the potential to possess several micronutrients such as Mg, P, Ca, Zn, and Se, phytochemicals having rich antioxidant properties. Through the outcome obtained from this study, we propose these seeds as a food fortification to supply the bioactive components in various value-added products.

**Keywords:** *Artocarpus Lakoocha (AL) seeds, nutraceuticals, food fortification, functional foods*

## STANDARDIZATION OF PROCESS PARAMETERS FOR DEVELOPMENT OF READY-TO-EAT PORRIDGE MIX USING THREE UNDERUTILIZED RED PIGMENTED RICE OF ASSAM.

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### ABSTRACT

The dynamic shift in consumer choices worldwide, influenced by changing lifestyles and health awareness has led to a transition towards bioactive rich convenient ready meals. Cereals serve as the major component of staple diet making it an optimal choice for designing convenient meals. *Bao* is a group of underutilized bioactive rich red rice varieties which generally grow in the flood plains of Assam and are consumed locally. Porridge is one of the ready to use food product which is significantly popular among people. The underutilization of bao rice is attributed to its lower productivity due to limited popularity. Therefore, this

study focusses on the utilization of three varieties of red *bao* rice (kenkowa bao (KB), amona bao (AB) and badal bao (BB)) and standardizing process parameters to develop Ready-to-eat porridge mix. Process optimization was carried out using response surface methodology (RSM) using central composite design. The rice concentration and cooking time was taken as independent variables to assess the responses in terms of water absorption index (WAI), water solubility index (WSI), swelling power (SP) and bulk density (BD) of the final porridge mix base individually for each rice. Severe treatment resulted in higher WAI, lower WSI, higher WSI and lower BD. Macro-nutritional analysis of the developed porridge mixes as compared to its control counterparts revealed no significant change. However biochemical activity of the developed porridge mixes significantly decreased compared to its controls. Highest overall acceptability was depicted by KB porridge mix.

**Keywords:** *pigmented rice, bioactive, ready-to-eat meals, standardization, hydrothermal*

## EXTRACTION AND CHARACTERIZATION OF ALGAL $\beta$ GLUCAN FOR THE TARGETED DELIVERY OF BIOACTIVE PEPTIDES

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### ABSTRACT

In the current research an attempt was made to develop encapsulated peptides (EP) within algae derived  $\beta$  glucan. The  $\beta$  glucan (BG) was extracted from *Gracillaria corticata* and peptides (PSP) from pumpkin seeds. The developed encapsulated matrix was characterized for its physio-functional properties. Nuclear Magnetic resonance (NMR) confirmed the presence of  $\beta$  glycosidic linking  $\beta$  (1 $\rightarrow$ 3);  $\beta$  (1 $\rightarrow$ 6) in algal glucans. An encapsulation efficiency of 71.74% & drug delivery percentage of 69.12% was observed. Scanning electron microscope (SEM) confirmed the incorporation of peptides within  $\beta$  glucans matrix further Fourier transform infrared spectroscopy showed differential characteristic band at 1644.7  $\text{cm}^{-1}$ . The thermal transition peaks of samples were observed at 81.22°C for BG, 89.20 °C for PSP and 98.79°C for EP. Swelling behaviour demonstrated the release of peptides with pH dependency. The encapsulated peptides retained antioxidant activity of 57.28% respectively. The rheological studies displayed shear thinning behaviour of BG and EP, hence, can be used in different food product development specially beverages and functional foods.

**Keywords** *Gracillaria corticata, Pumpkin seed peptides, Encapsulated peptides, Functional Foods*



## CARBOXYMETHYL CELLULOSE BASED EDIBLE COATING WITH ANTI-BROWNING AGENTS TO MAINTAIN NUTRITIONAL AND SENSORY QUALITY OF FRESH-CUT PINEAPPLES

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### ABSTRACT

Fresh-cut pineapples were treated with a carboxymethyl cellulose (CMC) based edible coating associated to anti-browning agents and the effects on the deterioration at low temperature were studied. Pineapple slices were packed in polyethylene terephthalate trays and the changes in physico-chemical and sensory quality measured along 15 days of storage at 5°C. The treatments inhibit browning, retained colour, and decreased soluble solid content, titratable acidity, ascorbic acid and total phenolics changes of the slices. At the end of experiment, the weight loss of control samples (9.49% on day 15) was significantly higher than the coated slices. Control samples had maximum browning with a decrease in Luminosity ( $L^*$ ) value from 53.95 on initial day to 40.21 on 15<sup>th</sup> day of storage. However, the browning was effectively controlled with incorporation of anti-browning agents (ascorbic acid and calcium chloride) in the coated slices with  $L^*$  value of 62.35 and 54.25 on initial and last day, respectively in carboxymethyl cellulose with ascorbic acid and calcium chloride coated samples. Fresh-cut pineapple samples coated with CMC significantly delayed the increase in polyphenol oxidase (PPO) activity compared to the control samples. The PPO activity of uncoated samples increased rapidly with storage time. Carboxymethyl cellulose coating improved the shelf-life of fresh-cut pineapple by reducing microbial spoilage without significantly affecting nutritional and sensory qualities. The browning inhibitors further increased this capacity, with ascorbic acid performing best.

**Keywords:** *Carboxymethyl cellulose; Fresh-cut pineapples; Sensory; Quality;*

## DEVELOPMENT OF ALMOND MILK ICE CREAM BARS ENRICHED WITH MEDICINAL PLANTS

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### ABSTRACT

Ice cream is a product with unique textural and sensory characteristics, and it is highly recognized by the broad spectrum of consumers. It is consumed by all the age group. The ice-cream contains milk fat of 8-24%, so it aids in weight gain. The product has been developed with Almond milk, Mexican mint, Hibiscus, Brown sugar and pink guava. The fat content is comparatively lower than the ice-cream available in the market. The study was undertaken to provide health benefits for consumers. Ice cream bar developed is a good source of Energy,

Calcium, Vitamin-C and Antioxidants. The ingredients used in this bar contain good nutritional and medicinal values. The developed products were given to 30 semi-trained panel members for sensory evaluation. Overall, variation III was accepted by the panel members. The developed ice cream bar contains Energy – 169.9 kcal, Carbohydrate – 8.64g, Protein – 1.78g, Fat – 1.22g, Calcium – 76.83mg, Fibre – 1.88g and Vitamin - C – 633.3 mcg. It is a good replacement for frozen desert and ice-cream bar available in the market.

**Keywords:** *Ice cream, Mexican mint, Calcium, Nutritional value, Vitamin – C*

## DIETARY FIBRE- A WONDER PRODUCT FROM BAGASSE

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### ABSTRACT

Sugarcane upon crushing yields juice which is used for making sugar while the fibrous material obtained, termed as “Bagasse” is primarily used as fuel in boilers for generating steam to produce power. Due to lowering of tariffs for the bagasse-based power, the sugar factories are not tempted to going for power exports and only limited quantities of bagasse are used for the purpose. At present the saved bagasse to a certain extent is used for making pulp and paper, compostable crockery, and particle board etc. but, still sizable quantity of bagasse is left to be used for any other purpose. Bagasse since comprises of Cellulose, Hemicellulose and Lignin, after due processing it can be an excellent source for producing dietary fibre, but major limitation is its low digestibility which is due to association of lignin with cellulose and hemicellulose. To overcome this difficulty several chemical and biological treatments must be done for delignification. It is pertinent to mention that due to sedentary lifestyle, many of us face health issues particularly those related with metabolism. Dietary fibre intake can resolve such issue besides improving the health in many ways. The study carried out by the authors provide details of the technology, product profile, health benefits and how it can make a turn-around for the sugar industry as well by increasing the revenue streams.

**Keywords:** *Sugarcane bagasse, Dietary Fibre, Cellulose, Hemicellulose, Lignin*

## DEVELOPMENT AND FORMULATION OF PUDDING AS AN ALTERNATIVE FOR LACTOSE INTOLERANCE

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### ABSTRACT

Lactose intolerance is a condition where the person's body can't break down the lactose, lacking an enzyme called lactase. The following study emphasizes the development and formulation of pudding using coconut milk for lactose intolerant people. Puddings are classified as semisolid pastes made of proteins and starch. Adding beetroot extract to enhance the flavor. The samples were prepared, and then sensory evaluation was done to determine the color, texture, appearance, taste, consistency, mouth feel and overall acceptability. The finalized product is analyzed for proximate analysis and chemical constituents include moisture and ash. The nutrients like energy carbohydrate protein fat fiber and calcium were analyzed, to meet all the macronutrients. The nutrient analysis resulted in high calcium, thus results as a very good alternative to mammal milk for those who have lactose intolerance.

**Keywords:** *Lactose intolerance, pudding, coconut milk, nutrition analysis*

## LUTEIN: ITS THERAPEUTIC VALUE AND INCORPORATION INTO THE FOOD PRODUCTS

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### ABSTRACT

The increase in demand by consumers for clean labels has encouraged industry to search for replacements of synthetic ingredients in food products particularly in colorants. Lutein, a yellow plant pigment belonging to the xanthophyll family of carotenoids is present in corn, spinach, broccoli kale, peas, lettuce and widely in marigold flower. Lutein supplement, and other forms of lutein are beneficial in preventing age-related macular degeneration and other eye diseases, as well as certain cancers and cardiovascular disorders that may be influenced by the antioxidant properties of lutein. It also shows anti-arthritis, anti-inflammatory, hepatoprotective, anti-cataract, antidiabetic properties. Lutein is also utilized in food products such as lutein enriched baked bread, lutein-fortified fresh noodles, lutein fortified milk tea, lutein fortified cookies, muffins, Lutein fortified fermented milk, lutein fortified cupcakes. Therefore, incorporation of lutein into food products shows a promising health benefits and economical value to the farmers.

**Keywords:** *Lutein, xanthophyll, Therapeutic, Fortification, Antioxidant*

## UTILIZATION OF BLACK RICE (*ORYZA SATIVA* L.) FOR VALUE ADDED PRODUCTS: A REVIEW

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### ABSTRACT

The demand for nutritious food is increasing among people as they have become more aware of the association between nutrition and health. Black rice (*Oryza sativa* L.) is considered a functional food and has gained popularity in recent years due to its health benefits. Black rice is rich in protein, fiber, and iron. It is also rich in several antioxidants, such as anthocyanins, flavonoids, and carotenoids, which may help protect against heart disease, obesity, and certain forms of cancer due to its anti-inflammatory properties and anticancer effects. In addition to its nutritional benefits, black rice is also naturally gluten-free and may aid in weight loss. Large varieties of value-added products from black rice can be achieved by utilizing its unique properties and nutritional benefits in various food such as bakery (muffins, cookies, cakes, bread) extruded products (breakfast cereals, noodles, pasta) fermented products (wine, beer, yogurt) and non-food applications (nutraceutical and cosmetics) Black rice value addition has the potential to provide health, and environmental benefits and also providing opportunities for the development of new products and markets.

**Keywords:** *Anthocyanin, Antioxidant, Black Rice, Nutritional properties, Value added products.*

## MUNG BEAN ALBUMIN PROTEIN: EXTRACTION AND APPLICATION AS AN EGG SUBSTITUTE

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### ABSTRACT

Mung beans (*Vigna radiate*) esteemed for their abundant nutrient profile characterized by high protein content (19.5-33.1%), exhibit a diverse array of functional properties. Mung bean albumin is devoid of cholesterol and fat. It's an excellent source of minerals including iron and potassium, vitamins C, and dietary fibre. The proteins present in the mung beans are albumin, globulin, prolamins and glutelin. The albumin content in the mung bean protein is 16.3%. To date, there has been no extensive literature review regarding the potential use of mung bean albumin in food applications. the potential of plant albumins as a substitute of animal proteins, especially in foaming applications. The foaming properties of albumins were good, those to whey or egg white proteins. The mung bean albumins are extracted using borate-buffer assisted extraction. The use of borate buffer enhances the integrity and

functionality of albumin proteins throughout the extraction process. The pH level significantly influences the extraction process of albumin, exerting a pronounced impact on the efficiency and outcome of protein extraction from mung beans. pH 9.0 and temperature 4°C yields more albumin protein than the other pH levels, which is recommended by the design of experiments. The supernatant, obtained after the extraction process undergoes acid precipitation to yield a protein precipitate. The yield of the total protein precipitated is 34.23%. The extracted protein undergoes freeze-drying for subsequent analysis, revealing the promising potential of mung bean albumin as a viable substitute for eggs in various applications of the food industry. This study aims to evaluate mung bean albumin as a potential egg substitute by assessing its functional properties in comparison to conventional eggs.

**Keywords:** *Mung Bean, Egg, Albumin Protein, Protein Extraction*

## **NEW TRENDS IN FLAVOUR RELEASE AND ENCAPSULATION TECHNIQUES FOR FOOD PROCESSING AND PRESERVATION**

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### **ABSTRACT**

Flavour is the most recognized and highly appreciable ingredient in any food product. Protecting and eventually delivering the aroma of the food compound become essential for the desired perception. Although, the aroma is readily lost during the time of storage, chemically unstable to air, pH, moisture, high temperature or reacted with other aroma, food base, and evaporated since they are volatile in nature. Encapsulation is an advance technique used to cover an active compound with coating material and used to treat flavour to protect against thermal stability, evaporation, and migration in a food. Different flavour protection and encapsulation technique have been industrially utilized, and most common method are spray drying, spray chilling, or spray cooling, extrusion coating, fluidized bed coating, freeze drying, coacervation and molecular inclusion. The preference of appropriate encapsulation technique depends upon the end term utility and the processing condition of manufacturing product. Thus, this review describes each method cited above based on chemical, physical principle involved and cover mechanism of flavour release in food matrices.

**Keywords-** *Core material, Encapsulation, Microparticle, Coating material, Industrial application*

## EXPLORING THE POTENTIAL NUTRACEUTICAL USES OF ALGAE

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### ABSTRACT

With an increasing global population, there is a growing need for sustainable dietary/food supplements. Nutraceuticals are basically those nutrients obtained from food sources that, in addition to serving as dietary supplements, aid in the treatment or prevention of illnesses and/or disorders. The word "nutraceuticals" is derived from the concept of "nutrition" and "pharmaceuticals". Algae, being the most abundant primary producers on Earth's surface can be categorized into microalgae and macroalgae. A variety of nutrients, such as carbohydrates, proteins, lipids, and trace minerals like antioxidants and vitamins, are present in algae. These substances can provide organic nutritional additions in animal and human feed along with many other health-promoting properties. By concentrating and using the nutritional components of algae, nutraceuticals maximise the positive health impacts. As algae are introduced into more and more dietary plans worldwide, it is anticipated that human consumption of algae will increase. More research and development are always being focused on boosting the production and utilisation of these algae to meet the growing demand and uncover the benefits of different varieties of algae. There will undoubtedly be continued interest in and research into the health advantages of algae for humans due to their potential to treat and prevent a wide range of ailments.

**Keywords:** *Antioxidants, bioactive peptides, carotenoids, functional foods, nutraceuticals*

## BIOPOLYMERS BASED FOOD PACKAGING MATERIALS: A SUSTAINABLE SOURCE

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### ABSTRACT

The Food and Agriculture Organisation (FAO) predicts that 20-30% of fruits and vegetables are discarded during post-harvest handling. The development of bio-based polymers is critical, given the extent of worldwide environmental contamination caused by the production of synthetic materials. Industrial waste originates from a variety of sources including fruits and vegetable pomace, seeds, orange and lemon peels, sugarcane bagasse, rice husks etc. Biopolymer-based packaging materials have become of greater interest to the world due to their biodegradability, renewability, and biocompatibility. In recent years, various

biopolymers—such include starch, chitosan, carrageenan, polylactic acid, and others—have been studied for their possible use in food packaging. Some packaging materials, such as cellulose, starch, polylactic acid, and polybutylene adipate terephthalate, are still utilised in the packaging business. The use of biopolymers in packaging products has grown significantly; thus, this review paper discusses numerous issues and potential solutions linked with materials used for food packaging. It discusses the difficulties of employing biopolymers in their pure form, as well as future trends in food packaging. Biopolymers are sustainable, biodegradable, non-toxic, renewable, and biocompatible alternatives to synthetic packaging materials. According to research, biopolymer-based packaging materials are extremely useful when combined, but more research is needed before they can be employed as an alternative packaging material.

**Keyword:** *Biopolymers, Contamination, Starch, polylactic acid, polybutylene adipate terephthalate, Food packaging.*

## ASSESSING THE EFFECT OF OLEOGELS ON FRIED SNACK QUALITY

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### ABSTRACT

Fried snacks are a common delicacy enjoyed all around the world, but research into alternate cooking methods has been prompted by worries about the health effects of standard frying methods. The ability of oleogels—structured lipid systems with room-temperature solid-like properties—to reduce oil absorption and improve product quality has made them a viable substitute for conventional frying oils. The impact of oleogels on the qualitative features of fried snacks has been the subject of recent investigations, which are summarized in this abstract. Research findings indicate that incorporating oleogels into frying processes positively influences the sensory, textural, and nutritional properties of fried snacks. Oleogel-based frying leads to reduced oil uptake during frying, resulting in snacks with lower fat content and improved crispiness. Moreover, the structured nature of oleogels imparts stability to frying oils, minimizing oil degradation, and extending the shelf life of fried products. In addition to improving product quality, the use of oleogels in frying processes holds promise for addressing health concerns associated with traditional frying methods. The reduced oil absorption and improved nutritional profile of fried snacks prepared with oleogels align with consumer preferences for healthier food options, contributing to the development of more sustainable and health-conscious snack products.

**Keywords:** *oleogels; oil absorption; fried snacks; frying; stability.*



## FUNCTIONAL ICE CREAM SHOTS: FROM GLOBE TO THE OUTER SPACE

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### ABSTRACT

As the world trends, many manned space missions have been and are being launched, nutritious, appealing yet self-sufficient food for long-term space exploration has been the topic of intense research. However, self-sufficiency primarily lies in the optimal production of natural, unprocessed, fresh foods as diets. However, the greatest quandary as stated by NASA is the consumption of processed foods during space missions. This research aims to identify gaps and eliminate the dilemma in space nutrition. With the advancement of technology, the spectrum of food products has widened, considering nuts as they are known to eliminate the inadequate nutrients: calcium, iron, polyphenols, and various vitamins and are reportedly deficient in astronauts as mentioned in NASA and RSA databases and a product underlying these nuts is produced, in its natural form is served without any microgravitational hindrance. Thus, while developing functional ice cream, various dietary deficiency parameters were considered. Proximate level testing and texture analysis were run to validate the nutritional claims. Nutrition in space has many areas of impact, not only physical but psychological which is evident in productive missions and crew morale.

**Keywords:** *space nutrition, microgravity, astronauts, long-term space tasks, dietary deficiencies, fresh foods*

## STUDY ON STANDARDISATION THE DRYING PROCESS, CHEMICAL COMPOSITION AND SHELF LIFE OF DRIED TAMBUL

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### ABSTRACT

In the context of our daily lives, tambul (betel leaves/Paan, betel nut, Kath, sugar powder, powdered dried rose petals, clove, cardamom, nutmeg, aniseed, and ajwain) is incredibly safe and beneficial to consume. It functions as a digestive stimulant and helps us maintain good dental hygiene. It stimulates digestion after meals as well. Betel leaves were blanched, dried at 50°C, and then ground into a powder to make tambul. Later, dried betel leaves were combined with powdered rose petals and other components. A nine-point hedonic scale was utilized to evaluate the organoleptic quality of dehydrated tambul. The dehydrated tambul made with 16% dried betel leaf powder and 8% dried rose petals powder was determined to be satisfactory. Later, dehydrated tambul was packaged in aluminium laminated packaging bags and HDPE packaging bags. The chemical and nutritional composition of dehydrated tambul was as follows: moisture 3.02 % protein 9.57%; fat 4.47%; carbohydrate 67.45 percent; ash 5.17%; vitamin C 17.30 mg/100g; antioxidant activity 34.25%; and chlorophyll



content 1.09%. Shelf-life research indicated that dehydrated tambul packed in aluminium laminate could be kept at room temperature for up to 28 days.

**Keywords:** *Betel leaves, cabinet drying, tambul*

## **STUDIES ON PRODUCTION AND STORAGE STABILITY OF CARROT HALWA READY-MIX FROM OSMO DEHYDRATED CARROT SHREDS**

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### **ABSTRACT**

Carrot halwa is a popular traditional Indian sweet delicacy and widely consumed, but it is time consuming process. To make it instantly available with minimum requirements and for industrial production of popular sweet meal an optimized process is needed. In this study instant carrot halwa ready-mix (CHR) was developed from Osmo dehydrated carrot shreds, ghee, milk solids and an antioxidant. Carrot halwa ready-mix was evaluated for nutritional parameter moisture, total soluble solids, protein,  $\beta$ -carotene, fat, fibre, water activity, sensory qualities. Carrot halwa ready-mix was packed in aluminium laminated pouches and shelf-life study was carried out for period of six months to monitor changes in quality. Results of nutrition and sensory evaluation indicated that a good quality CHR can be prepared by using Osmo dehydrated carrot shreds. During the six months of storage of CHR, there was about 4.8 per cent increase in moisture, 5.27 per cent decrease in  $\beta$ -carotene, small amount of increase in free fatty acids (FFA) and peroxide value (PV), along with slight losses in sensory quality. Thus, rehydrated product with similar overall acceptability, indicating comparable sensory characteristics with fresh sweet carrot halwa could be prepared from CHR.

**Keywords:** *Carrot Halwa Ready-mix, Osmo dehydrated carrot shreds, Antioxidant, Storage stability, Nutritional and sensory quality.*

## **DEVELOPMENT AND FORMULATION OF PROBERRY SHAKE INCORPORATED WITH GOAT MILK AND BERRIES**

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### **ABSTRACT**

Proberry shake is a sweet beverage made by blending goat milk whey, strawberry, longan fruit, guava, and fructose. It enhances insulin sensitivity and provide immune power with Anti-inflammatory responses. The objective of the study was to prepare delicious and nutritious drink and compensate for the daily requirement of protein. It is prepared in three

variations in following ratios (goat milk: strawberry: longan fruit: guava: Fructose), VI (30:15:20:50:5), VII (30:25:15:20:10) and VIII (S0 30:25:15:0). The standardised and developed product were analysed for the sensory properties and nutrient analysis such as energy, carbohydrates, protein, fat, fibre was done. The nutrient analysis resulted in high protein content. Among the three variations, variation II was mostly attracted and accepted by the sensory panellists. The sensory score of the VII, appearance  $4.9 \pm 0.97$ , colour  $4.4 \pm 0.70$ , taste  $4.9 \pm 0.97$ , texture  $4.2 \pm 0.61$  and the overall acceptance  $4.4 \pm 0.91$ . The developed proberry shake was estimated above Rs. 128 /- for 100ml. The results obtained shows the feasibility of producing good quality proberry shake from variation II.

**Keywords:** *Sweet beverage, goat milk, longan fruit, berries, proberry shake*

## **MILK EXOSOMAL CURCUMIN: A STABLE AND MORE PHYSIOLOGICALLY ACTIVE ALTERNATIVE TO FREE CURCUMIN**

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### **ABSTRACT**

Exosomes, the extracellular nano-vesicles, are being considered as the new generation drug delivery vehicles. They can carry the encapsulated drug entities to the target cells. Milk exosomes is the rich source of exosomes. Curcumin has been widely accepted being a bioactive compound with a wide range of therapeutic properties. But there is a constraint on its pharmaceutical use which is poor water solubility, stability, and bioavailability issues. Therefore, this study is designed to encapsulate the curcumin into milk exosomes increasing its therapeutic potential. In this study, the stability, and the solubility of free curcumin and exosomal curcumin was investigated using spectrophotometric methods along with the *in vitro* digestive processes. The enhanced bioavailability was checked *in vitro* in Caco-2 cells employing cellular uptake and transwell migration assay. It was observed that Curcumin in milk exosomes had higher stability in PBS. Curcumin was more resistant to the harsh digestive processes when encapsulated in milk exosomes and more bioavailable as observed by trans well migration assay compared to the free curcumin. Overall, encapsulating curcumin into the exosomes enhances its physiological potential as it increases its stability, solubility, and bioavailability. Also suggesting the role of milk exosomes as a potential oral drug delivery vehicle.

**Keywords:** *Exosomes, Milk, Curcumin, Bioavailability, Caco-2 cells*

## HIMALAYAN GEM “*RHODODENDRON ARBOREUM*”: A POTENTIAL NOVEL INGREDIENT

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### Abstract

According to WHO (2015), 65% of flora of India are medicinal plants and 80% population treats many diseases by using plant products. These plant or animal products or parts are being added in the food and are prevalently categorised as functional foods. Functional foods, for enhancing the health are being used highly now a days. *Rhododendron arboreum* is a potential medicinal plant being used in very small Himalayan region of India and has lots of hidden phytochemicals and bioactive components that makes it a highly beneficial plant to be used. *Rhododendron arboreum* is said to be a rich source of magnesium and sodium that helps in normal functioning of the transportation mechanism of the body. Other minerals such as the arsenic, zinc, molybdenum is also present abundant quantities. Cofactors such as the zinc, iron, selenium is rich source for the enzyme functionality. The major component rutin is helpful in treating painful ulcers in mouth and gastrointestinal tract and used for osteoarthritis. Rutin is also helpful in reducing Parkinson's disorder. *Rhododendron arboreum* also possess anti-cancer and cytotoxic activity. *Rhododendron arboreum* was screened against human cancer cell lines to determine its cytotoxic activity and it was found to reduce the oncogenic transformation of the cells. *Rhododendron arboreum* is used for medicinal purposes and the flower has very minimal side effects as well.

**Keywords:** Functional foods, Himalayan flowers, *Rhododendron arboreum*, Rutin.

## STINGING NETTLE: A POTENT PLANT SOURCE TO ADD DIETARY DIVERSITY AND IMPROVE NUTRITIONAL STATUS

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### ABSTRACT

Stinging nettle is an extraordinary plant commonly found in the hilly regions of Uttarakhand. The limiting factors for the use of nettles are perishability, processing, and its non-availability in the local market. The study aimed to prepare leaf powder of stinging nettle to analyse its nutritional composition and to develop a value-added savoury snack from it to add dietary diversity. To prepare leaf powder, leaves were washed, sorted, blanched and dried. The dried leaves were ground and sieved to obtained uniform powder. The analysis for proximate composition, iron, calcium, total phenol content, flavonoid, total antioxidant activity, ascorbic acid, beta-carotene, and total dietary fibre was done using standard methods. Sev was prepared using gram flour as a base material and value-added products were made by substituting gram flour with nettle leaf powder. The prepared products were further evaluated

organoleptically by a panel of 30 members and the most acceptable product was further analysed for its nutritional composition. The total ash, crude protein, crude fat, crude fibre and carbohydrate content of leaf powder was estimated as 17.94, 23.99, 3.33, 14.91 and 39.83 per cent, respectively. The leaf powder contains iron (52.11mg) and calcium (347.46mg). Results obtained revealed that *Sev* with 7% leaf powder has crude protein (18.65g), calcium (41.52mg), iron (5.95mg), flavonoid (67mgRE). It is concluded that *Sev* developed with the incorporation of nettle leaf powder are nutrient dense which will improve dietary diversity and help in combating public health problems like iron deficiency anaemia, protein energy malnutrition and vitamin A deficiency. It can meet RDA for protein (17.25%), iron (15.63%), fibre (6.59%) in adult man by consuming 50g of *Sev*.

**Keywords:** *Dietary diversity, public health problems, Nutritional analysis, RDA, Nutritional status.*

## EXPLORING THE NUTRACEUTICAL PROPERTIES OF MAKHANA

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### ABSTRACT

Makhana, alternatively stated to as lotus seed or fox nut, has been an enduring element in Asian cookery civilizations, predominantly in India, where it carries profound cultural and gastronomic significance. Beyond its role in cookery, makhana has increased acknowledgment for its potential healthiness aids, stemming from its broad spectrum of bioactive compounds, robust antioxidant qualities, and diverse phytochemical composition. Bioactive Compounds in Makhana: Makhana encompasses a rich array of bioactive complexes, natural elements found in nutrients that go beyond basic nourishment to affect bodily meanings. Among these composites found in makhana are flavonoids such as quercetin, kaempferol, and rutin, which are prominent for their antioxidant, anti-inflammatory, and anti-cancer belongings. These flavonoids partake remained connected to various healthiness reimbursements, including dropping the risk of long-lasting diseases and promoting overall well-being. Additionally, phenolic compounds such as gallic acid and catechins, found in makhana, bolster its antioxidant capabilities and aid in counteracting oxidative stress, a pivotal factor in both aging and disease prevention. Phytochemical Profile of Makhana: Makhana boasts a diverse phytochemical profile, encompassing a broad spectrum of subordinate metabolites that offer potential health benefits. These Phytochemical constituents contribute to the distinct flavour, aroma, and therapeutic attributes of makhana, rendering it a valuable component in old-style medicinal practices. Tannins present in makhana demonstrate antimicrobial and anti-inflammatory properties, while terpenoids exhibit cytotoxic and anti-proliferative effects compared to cancer cells. Furthermore, the inherent sedative qualities of makhana encourage unwinding and enhance the quality of sleep, lowering tension and boosting general wellbeing. Makhana is a useful complement to any healthy lifestyle since it offers a tasty and nourishing method to take advantage of these nutraceutical benefits when included in a balanced diet.

**Keywords:** *Bioactive Compounds, antioxidant, anti-inflammatory, and anti-cancer, Phytochemical*

## LOTUS SEED (MAKHANA): THE POWER PACK OF NUTRITION

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### ABSTRACT

Makhana, or lotus seeds, are a nutritious powerhouse that are brimming with vital minerals. These tiny, round seeds are high in protein and low in calories and fat, which makes them a great plant-based protein source for vegetarians and vegans as well as a great snack for those trying to control their weight. Lotus seeds also have a high amount of dietary fibre, which facilitates digestion and helps with weight loss by making you feel fuller. Lotus seeds include a variety of micronutrients, such as magnesium, potassium, phosphorus, iron, and zinc, which are essential for sustaining general health, in addition to macronutrients. Their flavonoid-derived antioxidant qualities help fight oxidative stress and lower the risk of chronic illnesses including cancer and heart disease. Lotus seeds are also good for people with diabetes or those trying to control their blood sugar levels because they have a low glycaemic index. Their ability to reduce inflammation may help with the symptoms of inflammatory diseases like arthritis. Lotus seeds also have natural sedatives in them that help with relaxation and sleep. They are adaptable in the kitchen and may be used in a wide range of recipes, from savoury curries to sweet desserts, providing both a distinct texture and nutritional value. Lotus seeds are essentially proof of nature's capacity to combine flavour and nutrition into one cohesive whole.

**Keywords:** *powerhouse, micronutrients, macronutrients, oxidative stress, glycemic index*

## EXTRACTION OF INSOLUBLE DIETARY FIBRE FROM KADAM FRUIT (*NEOLAMARCKIA CADAMBA*) WITH ALKALI METHOD ASSISTED WITH ULTRASOUND AND MICROWAVE TREATMENT

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### ABSTRACT

In this study, Insoluble dietary fibre was extracted from under-utilized kadam fruit (*Neolamarkia cadamba*) using an alkali-extraction method along with ultrasound (temperature 50 °C, power 250 W, time 30 minutes and the solid liquid ratio of 1:40) and microwave (power 450 W for 4.5 minutes) assisted treatments followed by 15 minutes of centrifugation at 5000 g. All extracted samples were characterized with Fourier transform infrared, X-ray diffraction and scanning electron microscopy. The highest yield of IDF was found in the ultrasound-assisted treated samples (4.341%) followed by microwave-assisted treated samples and untreated samples (3.928%, and 3.561% respectively). The Fourier transform infrared peaks confirm that the extracted samples were insoluble dietary fibre like

hemicellulose, cellulose, and lignin. X-ray diffraction analysis suggested that the extracted samples were amorphous. The scanning electron microscopy results show the effect of different treatments on the particle size and surface morphology. The functional properties like water holding capacity ( $10.6 \pm 0.04$  g/g), oil holding capacity ( $1.3 \pm 0.03$  g/g), swelling power ( $11.84 \pm 0.06\%$ ), solubility index ( $1.98 \pm 0.04\%$ ) and emulsion activity ( $31.25 \pm 0.0013\%$ ) were observed were found highest in the ultrasound-assisted treated samples followed by microwave-assisted treated samples and untreated samples. According to our findings, extracted insoluble dietary fibre samples obtained from the Kadam fruit (*Neolamarckia cadamba*) have the potential to be used as a functional food ingredient.

**Keywords:** *Alkali-extraction method, Kadam fruit, microwave-assisted extraction, ultrasound-assisted extraction.*

## BIOACTIVE COMPONENTS OF LOTUS ROOT (NELUMBO NUCEFERA GAERTN)

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### ABSTRACT:

This review paper delves into the diverse array of bioactive components present in lotus root and their implications for human health. The nutritional composition, encompassing vitamins, minerals, and macronutrients, serves as the foundational exploration, shedding light on the root's significance in a balanced diet. Phytochemicals, including flavonoids, alkaloids, and phenolic acids, emerge as crucial contributors, with potential health benefits ranging from antioxidant and anti-inflammatory properties to antimicrobial activity. Lotus root's anti-cancer potential, neuroprotective effects, and immunomodulatory properties are thoroughly examined, providing a comprehensive understanding of its multifaceted impact on various physiological systems. The review also addresses its role in cardiometabolic health, shedding light on potential applications for cardiovascular well-being and metabolic disorders. Furthermore, the paper scrutinizes the gastroprotective effects of lotus root components, exploring their influence on gut health and digestive processes. The therapeutic applications of these bioactive compounds are explored, spanning medicine, functional foods, and nutraceuticals. Lastly, the abstract touches upon the culinary aspects, elucidating how lotus root's bioactive components contribute to its flavour profile and culinary appeal. By consolidating current research, this review aims to offer a holistic perspective on the bioactive components of lotus root, emphasizing its potential in both nutritional and therapeutic realms.

**Keywords:** *Lotus root, bioactive compounds, antioxidant, anti-inflammatory, immunomodulatory, cardiometabolic, therapeutic application*



## PROCESS OPTIMIZATION AND CHARACTERIZATION OF BLACK WHEAT BASED RAWA *IDLI* MIX

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### ABSTRACT

The current project aimed to enhance a traditional Indian dish, "*idli*" by creating a convenient and nutritious version suitable for commercial production. This involved developing a dry rawa *idli* mix based on black wheat, a value-added approach to the popular dish. The goal was to ensure consumer acceptance, commercial viability, safety, convenience, and nutritional value. The black wheat-based instant rawa *idli* mix was formulated to simplify the preparation process, traditionally laborious, by requiring only the addition of curd and water to form the batter. Through a process of optimization of black wheat-based instant rawa *idli* mix using response surface methodology, the ideal blend of black wheat semolina and wheat semolina (in a ratio of 82:18) was determined based on sensory and textural attributes. Compared to the semolina rawa *idli* mix (control), the optimized product exhibited higher levels of protein, carbohydrates, dietary fiber, iron, zinc. The % DPPH inhibition was <30% thus showing antioxidant property. High Resolution Mass Spectrometry (HRAMS) metabolomic profiling identified 43 compounds in the optimized product, including fatty acids, amino acids, and other bioactive compounds absent in the control. Scanning Electron Microscopy (SEM) images revealed a distinctive starch gelatinization structure in the optimized product, likely due to the higher cooking temperature required compared to the control. This study not only supports sustainable practices but also suggests the potential for incorporating other lesser-known cereals into food production, demonstrating an innovative approach at the nexus of agriculture and food industries.

**Keywords:** *Black wheat, rawa idli, idli mix, semolina*

## DEVELOPMENT OF HARD-BOILED CANDIES WITH VALUE ADDITION FROM BIO-COLORANTS

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### ABSTRACT

With the rise in awareness about the healthy and nutritious food products, the food industry is under a persistent pressure to cater to such demands and deliver the desired food products to the consumers. Confectionary products, such as hard-boiled candies are products of interest for people of all age groups, ranging from children to adults. Due to the presence of insubstantial calories present in these hard-boiled candies, they are constantly being catechized for their nutritional and health benefits. To address this rising demand for such

candies, this research work aimed to incorporate bio-colorants as micronutrients in the candy formulations. This was done with the objective to address and target common micronutrient deficiencies and to confer a health benefit on the consumers. The aim to develop the products with apt sensory properties that are shelf-stable was achieved using kiwi extract, a green bio-colorant, to address vitamin-C deficiency and date extract, a brown bio-colorant, to address iron deficiency. The hard-boiled candies were formulated using chocolate extract as the flavouring agent with both the respective bio-colorants to develop two different types of hard-boiled candies.

**Keywords:** *boiled candies, healthful candies, bio-colorants*

## REFINING OF EDIBLE VEGETABLE OIL

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### ABSTRACT

Today, consumers' food preferences are attracted by health awareness and safety reasons. Since edible oils are a major part of the human diet, their history and function play a major role in customer acceptance. Vegetable oils need to be refined to remove impurities that affect their colour, flavour, stability and safety. Degummed vegetable oil is refined. During this process, some macro and micro impurities are removed or reduced to a lower level so that the oil can have the desired properties later. Refining is done through physical and chemical processes. This study focuses on the steps used in oil refining. Depending on the properties of the oil, chemical or physical refining is used to obtain the properties of the oil. The refining steps are sequential, and each removes one or more specific impurities. Technological developments aim to reduce drug use, unhealthy foods, petroleum waste and prevent the production of trans fatty acids. The review also discusses the possibility of using cosmetics to obtain beneficial substances such as phosphatidylcholine, tocopherols and tocotrienols. By adding value and integrating wastewater through different steps, the edible oil industry can become more efficient and sustainable.

**Keywords:** *Vegetable oils, refining, phosphatidylcholine*

## PHYSICAL AND CHEMICAL MODIFICATIONS OF DIFFERENT PROTEIN ISOLATES/CONCENTRATES

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### ABSTRACT

Proteins, fundamental components of life, play a pivotal role in various biological processes, making them indispensable in human nutrition and essential across diverse industries. Their



multifaceted functionalities and nutritional value have propelled significant interest in harnessing their potential to meet the evolving demands of modern society. Protein isolates and concentrates are concentrated forms of proteins obtained from various sources, such as plants, animals, and microorganisms. They present valuable options for nutrition supplementation and industrial utilization. However, modifications are necessary to tailor their functionalities according to specific applications. Modifying protein isolates and concentrates through physical and chemical means is essential to augment their functional properties. These modifications aim to improve solubility, emulsification, gelation, and stability, facilitating their integration into a plethora of applications. Physical modifications, involving techniques such as heat treatment and high-pressure processing, alter protein structures, impacting properties like solubility, emulsification, and gelation. Ultraviolet light treatment and cold atmospheric pressure plasma are emerging methods with promising potential for protein modification. UV light induces alterations in protein structure, affecting solubility, gelation, and functionality. CAPP, through controlled structural changes, enhances protein functionalities, expanding their applications in biotechnological processes. Gamma irradiation, a widely adopted method, involves exposure to high-energy gamma rays, inducing ionization and free radical formation within proteins. This modification influences protein structure and functionality, enhancing their applications.

**Keywords:** *Concentrates, Modification, Protein isolates, Enhancement*

## **UNLOCKING THE NUTRITIONAL TREASURE, FLAXSEEDS: A SUPERFOOD FOR CARDIOVASCULAR DISEASES**

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### **ABSTRACT**

Flaxseeds, in traditional Indian medicine, have gained global recognition for their remarkable health benefits. This abstract explores the association between flaxseeds and cardiovascular diseases (CVDs). CVDs, including heart disease and stroke, remain the leading cause of mortality in India, with an estimated 2.4 million deaths annually. Dietary factors play a significant role in the development and prevention of these conditions, prompting increased interest in functional foods like flaxseeds. Rich in omega-3 fatty acids, lignans and dietary fibre, flaxseeds exhibit potent cardioprotective properties. Research suggests that the consumption of flaxseeds can significantly lower blood pressure, reduce low-density lipoprotein (LDL) cholesterol levels and improve overall cardiovascular health. Furthermore, their anti-inflammatory and antioxidant properties contribute to mitigating the risk of atherosclerosis and endothelial dysfunction, key precursors to CVDs. Several clinical trials conducted in India have demonstrated the efficacy of flaxseed supplementation in managing CVD risk factors among diverse populations. Integrating flaxseeds into the Indian diet offers a sustainable and cost-effective strategy for combating the CVD epidemic prevalent in the country. In conclusion, flaxseeds emerge as a promising solution in the battle against CVDs in India. Embracing the nutritional wealth of flaxseeds presents a tangible opportunity to mitigate the burden of cardiovascular diseases and foster a healthier future for India's populace.

**Keywords:** *Cardiovascular, Flaxseeds, Health, Mortality, Nutrition.*

## PHYSICAL MODIFICATION ON PLANT PROTEIN: A REVIEW

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### ABSTRACT

Plant proteins have gained a significant attention in recent years due to their nutritional benefits, sustainability, and versatile applications in various industries such as food, pharmaceuticals, and cosmetics. However, their functionality, especially in terms of solubility, emulsification, and gelation properties, often falls short compared to animal-derived proteins. Physical modification techniques offer promising strategies to enhance the functional properties of plant proteins without altering their nutritional profile. The aim of this review is to systematically examine various recent advancements in physical modification techniques applied to plant proteins, including but not limited to cold plasma treatment, ultrasonication, microwave treatment and gamma- irradiation, and their effects on the physicochemical and functional properties of plant proteins. Each technique is studied in terms of its principles, mechanisms, and effects on the structural, functional, and nutritional properties of plant proteins. The mechanisms underlying these modifications and their impact on protein structure, intermolecular interactions, and functionality are reviewed. Special emphasis is given to the enhancement of protein solubility, emulsifying properties, gelation, and textural attributes through physical modification. Moreover, the review examines the potential challenges and future perspectives associated with the utilization of physically modified plant proteins. Studies are provided into ongoing research efforts aimed at optimizing physical modification techniques, exploring novel applications, and addressing sustainability concerns. Overall, this review synthesizes current knowledge in the field of physical modification of plant proteins, offering valuable insights for researchers and food technologists aiming to harness the full potential of plant-based proteins for the development of nutritious and sustainable food products.

**Keywords** - cold plasma treatment, microwave treatment, plant protein modification, ultrasonication

## NUTRIRICE: FIGHTING MALNUTRITION WITH ENRICHED GRAIN

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### ABSTRACT

Malnutrition is still a major global health concern, especially for communities that are vulnerable and live in low-resource environments. *Oryza sativa*, the technical name for rice, is a major staple grain grown in India and is a staple food in many developing nations where hidden hunger is a problem. By increasing rice's nutritious content, widespread rice consumption offers a chance to close the nutritional gap in people that consume rice. The potential for improving nutrition through rice fortification is highlighted in this review paper.

To fortify rice with vitamins and minerals such as iron, folic acid, and vitamin B-12, numerous studies have been carried out. Similar to this, zinc, vitamin A, vitamin B1, vitamin B2, vitamin B3, and vitamin B6 can be added to rice to fortify it with micronutrients either separately or in combination. The process of fortifying rice involves two steps: first, utilizing coating or extrusion technologies, fortified kernels must be manufactured; they are then blended with non-fortified rice at a ratio of 1:100. Research has indicated that consumers accept fortified rice, that the body absorbs the micronutrients, and that the micronutrients are kept in rice throughout preparation to a good degree. Rice can be fortified post-harvest to provide various vitamins, minerals, fibers, amino acids, and other nutrients. This strategy has piqued the interest of the Indian government as a viable way to combat malnutrition and advance sustainable development.

**Keywords:** *Rice fortification, fortified kernel, hidden hunger, vitamins ,minerals*

## CHARACTERIZATION AND FUNCTIONAL POTENTIAL OF DRIED AMARANTHUS LEAVES (*AMARANTHUS VIRIDIS*)

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### ABSTRACT

Amaranthus, a genus of flowering plants, has garnered attention for its multifaceted applications, particularly in the domains of nutrition and food sciences. This study aims to conduct a quantitative analysis of green Amaranthus leaf powder (*Amaranthus viridis*) to elucidate its nutritional composition, including vitamins, minerals, proteins, and bioactive compounds, thus assessing its potential for diverse applications. The experimental setup involved drying the amaranthus leaves in a tray drier at the temperature of 40°C. The drying kinetics were studied. The proximate analysis of the dried amaranthus leaf powder revealed a fat content of 1.94%, protein 2.3%, ash content 9.12%, fiber content of 8.2%, and moisture content of 7.67%. The leaves are serving as a veritable goldmine of vital minerals such as iron, manganese, copper, potassium, calcium, sodium, zinc. The presence of bioactive compounds e.g. polyphenols, flavonoids deepens their allure. In essence, Amaranthus leaves unveil a world of endless possibilities, interlinking the areas of nutrition, food science, functional food innovation, sustainability and health, enriching our diets and fortifying our food systems.

**Keywords-** *Amaranthus leaves, Quantitative Analysis, Functional food, Nutritional benefits.*

## USAGE OF PEA PROTEINS IN PLANT BASED MEATS: A REVIEW

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### ABSTRACT

This review examines how nutritious plant-based meat substitutes can resemble the texture and flavor of real meat, emphasizing the role of functional components and protein sources. *Pisum sativum* (peas) are an essential dietary staple that are high in fiber, protein, and carbohydrate. Because pea protein is readily available, has a high protein level, is low in allergens, and comes from a sustainable crop, it is highly valued in the global industry. Great functional qualities of pea protein include its solubility, ability to hold water and oil, and ability to form emulsions. Pea protein isolates and concentrates are extracted using a variety of techniques, such as salt extraction, mild fractionation, dry and wet fractionation, and so on. This review also examines how to improve the functionality of proteins using chemical and biological approaches as well as physical techniques including heat treatment, high pressure, and extrusion. We concentrate on the characteristics of extraction, chemistry, structure, functionality, and modification methods, taking into account the long-term use and health advantages of pea proteins in plant-based meat substitutes. By comprehending the range and possibilities of pea protein, we can see how it is transforming the future of sustainable eating and why it stands out in the ever expanding field of plant-based meat substitutes.

**Keywords :** *pea protein , plant based meats , protein functionality , pea protein isolates , sustainable source*

## SEA WEEDS: A WONDER FUNCTIONAL FOOD

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### ABSTRACT

The study of marine microbial ecology has grown significantly over the last ten years, partly due to advancements in technology that make it possible to describe the diversity and function of bacteria in great detail. Thus, it is evident that a vast variety of bacteria can be found in the marine environment. Despite not having specific tissues like a root system or vascular tissue system, seaweeds are sessile, multicellular, photosynthetic eukaryotes. Many nations, including China, Japan, and Korea, as well as some Latin American nations, including Mexico, have long employed them in food goods. For many years, almost 65% of the algae species in these nations have been a regular ingredient in diet. Rhodophyta, Phaeophyta, and Chlorophyta are the three marine macroalgae groups that comprise seaweeds. They have a low calorie content but are rich in nutrients such proteins, soluble dietary fibers, minerals, vitamins, antioxidants, phytochemicals, and polyunsaturated fatty acids. When compared to terrestrial plants, seaweeds have a larger amount of important fatty acids, specifically docosahexaenoic and eicosapentaenoic fatty acids. Seaweeds are rich in

anti-inflammatory, anti-cancer, antioxidant, and anti-diabetic qualities. Seaweeds have garnered attention from numerous food-producing businesses due to their renewable nature and high added value chemicals. They are frequently used in the creation of novel functional food products as well as in bakery, dairy, fish, meat, and vegetable-based goods. Certain poisonous minerals have been found to have a great affinity for specific seaweeds, and the concentrations of these minerals are entirely dependent on the environmental factors (such as temperature, pH, nutrient concentrations, and oxygen availability).

**Keywords:** *sea weeds, marine macroalgae, functional potential, marine microbial ecology*

## ISOLATION AND CHARACTERIZATION OF PLANT-BASED PROTEINS

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### ABSTRACT

Proteins are one of the major macronutrients that are required for daily processes of the human body. Recently, there have been an increase in the consumption of proteins in the world and thus more protein sources are being sought after. Plant sources such as legumes, seeds and many other are being used to derive the proteins in order to fulfill the growing demand. There are various techniques and methodologies used for the extraction and isolation of plant protein. These techniques include alkaline extraction, aqueous extraction, ultrafiltration, micellisation. Many techniques have been found to be useful for isolation of proteins. After isolation, an important step is to purify these proteins. Purification of proteins help in giving a better understanding of the amino acid make up. To analyze the amount of protein that is present in the sample allows better formulation and better understanding of the food product. Processes such as UV absorbance and Kjeldahl methods are used to quantify the proteins in a given sample. In most cases, characterization of proteins is done using HPLC, SEM, and TEM. They use software which helps in the identification of the proteins. The protein profiling can be done with the help of SDS-PAGE. Protein isolate is obtained which can be used as potential human source as they are rich in amino acids and can be used as protein supplement in various countries. Advancements in the modification techniques can help in achieving better quality proteins and understanding their utilization for effective storage and processing conditions and developing innovative food products.

**Keywords-** *Alkaline extraction, Kjeldahl, micellisation, SDS-PAGE, ultrafiltration*

## PLANT BASED MEAT: A NEW SUSTAINABLE FOOD APPROACH

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### ABSTRACT

A meat analogous is a substitute of meat for people consuming vegan products. It is also called as *faux-meat*, *mock meat*, *vegan meat*, *meat alternative* which contains the organoleptic characteristics i.e. flavour, texture, colour, taste, and nutritional parameters same as of meat. Meat is always considered as the product having high protein content and good nutrition benefits as well, which is beneficial for human health. But on the other hand vegetarian people are not able to consume it. The plant based protein are consumed by people since many years and the studies have been taken to make it better and nutritive. Developing a new food products for vegan to the consumers is a challenge. However, it is even more complex when these new foods to develop a meat substitute products that are highly appreciated and accepted, like meat. This challenge has been accepted by many developers to develop new sustainable meat substitutes to reduce the negative environmental impact of industrial-scale meat production for human consumption. Due to the animal diseases, global shortage of animal protein, global warming the demand and need of plant based protein has increased, happily there is an increasing importance of legume, oil-seed proteins in the manufacturing of various functional food products due to their high-protein contents and texture. However, the greatest obstacle to utilize these legumes and oil-seeds is the presence of anti-nutrients present in them, though these can successfully remove or inactivated by employing certain processing methods. Legumes and oil-seeds provide well-balanced amino acid profiles when consumed with cereals, Soybean proteins and other plant proteins have been used for preparation of meat analogues successfully.

**Key words:** *Meat analogous, anti-nutritional factors, protein sources, sustainable food products*

## INSECTS: AN ALTERNATIVE PROTEIN SOURCES FOR SUSTAINABLE FOOD

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### ABSTRACT

Due to the recent increase in the human population and the associated shortage of protein resources, it is necessary to find new, sustainable, and natural protein resources from invertebrates (such as insects) and underutilized plants. In most cases, compared to plants (e.g., grains and legumes) and animals (e.g., fish, beef, chicken, lamb, and pork), insect proteins are high in quality in terms of their nutritional value, total protein content, and essential amino acid composition. They are also rich in fiber and micronutrients such as copper, iron and magnesium. However, risk of allergy from insects varies greatly depending on the species consumed. From the nutritional point of view silkworm larval and pupal stage



enjoys the privilege of being edible insect and consumed by the people of China, Japan, Korea, Thailand and Northeastern India. There are many questions about the safety of using insects as food, which involve the following three risks: biological, chemical, and allergenic. According to the European Food Safety Authority (EFSA), the chemical contaminants of greatest concern are heavy metals such as cadmium, mercury, lead, and arsenic, as well as the accumulated pollutants from the environment such as hormones and pesticides. Due to their high protein content and nutritional value, edible insects, especially crickets, are currently considered solutions to the growing protein demand worldwide. Among edible insects, mealworm larvae are considered novel food due to their high nutritional value (high protein, fat, and mineral contents) and their feasibility in the food industry. The growing interest in the preparation of isolated proteins and/or hydrolysate from insects as functional and natural additives in the industry to improve the nutritional quality and functionality of food products. Potential to be produced on an industrial scale in a more sustainable way than traditional protein sources. Edible insects are rich in protein, possessing all the amino acids needed for a healthy diet, and can be processed into protein-rich food ingredients. In this regard, the techno-functional properties of insect proteins are determinative for the selection of applications. In addition, foods enriched with insects (i.e., hydrolysates) may prevent various health problems, such as hypertension, hyperlipidemia, hyperglycemia, and cancer (hepatoma and gastric cancer). At the same time, the challenge of allergenic risk in insect protein foods must be addressed to meet the needs of the global society. Consider that the problem of insufficient consumer acceptance relates to cultural aspects and taste and sensory attributes; thus, functionality, cost-effectiveness, sustainability, and consumer safety are not the only aspects that consumers consider when choosing food.

**Key words:** *insect protein, nutritional benefits, protein, functional potential*

## APPLICATION OF DIFFERENT TYPES OF WHEY PROTEIN IN HIGH-PROTEIN YOGURT

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### ABSTRACT

This comprehensive study unveils the nutritional intricacies and health benefits of high-protein yogurt, a burgeoning dietary staple. Rigorous analysis reveals elevated protein content, enriched amino acid profiles, and the harmonious collaboration of whey and casein proteins, distinguishing high-protein yogurt from conventional varieties. The research meticulously explores the health advantages tied to regular consumption, showcasing its role in muscle fortification, effective weight management, and heightened satiety. Nutritional assessments encompassing fat, carbohydrate, and sugar content provide a holistic understanding of its impact on overall diet quality. Additionally, the study sheds light on innovative production methods that augment protein content while preserving the sensory appeal of yogurt. This research not only enhances comprehension of the nutritional value and versatility of high-protein yogurt but also positions it as a compelling choice for those seeking functional and health-conscious dairy options in their daily nutrition.

**Keywords:** *Amino acid profiles, innovative production methods, nutritional composition, whey, casein proteins.*

## STUDIES ON THE DIFFERENT TYPES OF WHEY PROTEIN

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### ABSTRACT

Whey protein, a byproduct of cheese production, has gained immense popularity in the health and fitness industry due to its high nutritional value and numerous health benefits. This abstract provides a detailed examination of the various types of whey protein available in the market and the processing differences that impact their composition and quality. The two primary types of whey protein are whey protein concentrate (WPC) and whey protein isolate (WPI). WPC contains varying levels of protein, typically ranging from 30-80%, along with some lactose and fats. On the other hand, WPI undergoes further processing to remove most of the lactose and fats, resulting in a product that is over 90% protein by weight. This key difference makes WPI a preferred choice for individuals with lactose intolerance or those seeking higher protein content per serving. The processing methods used to produce whey protein can significantly influence its quality. Common processing techniques include microfiltration, ultrafiltration, and ion exchange. Microfiltration and ultrafiltration are gentle methods that help preserve the natural structure of proteins while removing impurities. In contrast, ion exchange involves a more aggressive process that can denature proteins to some extent but yields a higher protein concentration. Understanding the distinctions between whey protein types and processing methods is crucial for consumers looking to make informed choices based on their dietary needs and fitness goals. By selecting the appropriate type of whey protein and being aware of how different processing techniques impact its composition, individuals can optimize their nutritional intake and achieve desired outcomes effectively.

**Keywords-** *Microfiltration, Protein concentration, Whey protein concentrate, Whey protein isolate, Ultrafiltration.*

## GREEN ELIXIR: UNRAVELLING THE MYSTERIES OF CHLOROPHYLL

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### ABSTRACT

Incorporating plenty of green vegetables into your diet is crucial for optimal health and vitality. Harnessing the green essence from vegetables for supplementation provides a convenient means to enhance nutritional intake. This summary explores the findings of studies regarding the advantages of chlorophyll as a supplement, including its role in



controlling body odour, combating acne, boosting red blood cell production, detoxifying the body, bolstering the immune system, and potentially preventing cancer. The deeper the green hue of the vegetable, the more chlorophyll it typically contains. As a supplement, chlorophyll comes in a synthetic form known as "*chlorophyllin*," which is water-soluble and enriched with copper and sodium for easier digestion. Chlorophyllin is available in various forms like topical gels, tablets, soft gels, and liquid supplements. Incorporating liquid chlorophyll into one's wellness routine may provide a simple yet effective way to promote overall health and well-being. However, further studies, including clinical trials, are needed to fully understand its impact and optimise its use for human health. Nonetheless, with its antioxidant, detoxifying, and immune-boosting properties, liquid chlorophyll stands as a promising avenue for enhancing health and vitality.

**Keywords:** *Elixir, Supplement, Health, Antioxidant*

## THE IMPORTANCE OF MELATONIN TO SUSTAIN A HEALTHY LIFESTYLE

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### ABSTRACT

Melatonin (N-acetyl-5 methoxytryptamine) as the "sleep hormone," is essential for preserving many facets of human health and wellbeing. The importance of melatonin in encouraging a healthy lifestyle is examined in this poster. Not only does melatonin control sleep-wake cycles, but it also affects mood, the immune system, eye health, and the symptoms of seasonal depression. It may even contribute to a longer lifespan. This review explores the various ways that melatonin affects the body's processes, including its function in stress management and antioxidant capabilities. Knowing the significance of melatonin helps explain how variations in its levels or synthesis can cause a range of health problems. Melatonin synthesis can be influenced by a variety of lifestyle factors, including shift employment, exposure to artificial light at night, and poor sleeping patterns. The article discusses ways to maximize melatonin levels, including controlling light exposure, adhering to a regular sleep pattern, and thinking about using melatonin supplements. To sum up, promoting adequate melatonin levels is critical for general health and emphasizes the relationship between wellbeing, sleep, and lifestyle decisions.

**Keywords:** *Melatonin, sleep hormone, functional food, seasonal depression*

## **PULSE BASED PROTEIN BAR WITH MAHUA (*MADHUCA LONGIFOLIA*) AND JAGGERY**

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### **ABSTRACT**

Plant proteins plays a significant role in vegan diet in which pulse properties has a major role. In this study pulse-based protein bar with combination of jaggery and mahua (*Madhuca longifolia*) as a sweetener were developed six combination T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, and T<sub>6</sub> were prepared in which T<sub>5</sub> and T<sub>6</sub> were kept as only jaggery and only mahua (*Madhuca longifolia*) as a sweetener. Further T<sub>1</sub> – T<sub>4</sub> were based on different fraction of moong dal, chana dal, and ground nut respectively. The result that the protein bars prepared by using composition of T<sub>3</sub> and T<sub>4</sub> found better result for protein bar as  $4.25 \pm 0.2$  and  $4.11 \pm 0.04$  compare to another samples. Fiber contains was also found higher when compare to another sample. The water activity was found as 0.6552, 0.6598, and 0.663 for T<sub>1</sub>, T<sub>3</sub>, and T<sub>5</sub> sample. Sensory evaluation found satisfactory result for T<sub>3</sub> < T<sub>4</sub> < T<sub>5</sub> sample. From this study T<sub>3</sub> and T<sub>4</sub> samples found good possibilities for protein bar preparation.

**Keywords:** *Fibers, jaggery, mahua, protein bar, sensory evaluation.*

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Theme 2:

Valorization of  
Food by-products

## **VALORIZATION OF WASTE FRUIT FOR PRODUCING BIOFUEL (BIOETHANOL) BY FERMENTATION AND DISTILLATION**

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### **ABSTRACT**

The food processing waste are those end products of various food processing industries which cannot be utilized in the production of that specific product. This waste could be considered as valuable by-products if there are appropriate techniques to utilize these products to produce a valuable new product. The waste product from the fruit industry which produces products like jams, jellies, fruit juices etc can be utilized in production of biofuel such as bioethanol by the process of fermentation and distillation. Bioethanol is an alcohol made by fermentation of carbohydrates which break down into sugar by process called hydrolysis. Further the sugar is broken down to glucose and fructose with the help of invertase. The glucose and fructose react with zymase to produce ethanol and carbon dioxide. This process is called sugar fermentation. After the sugar fermentation the ethanol which is produced contains some quantity of water which must be removed. This removal of water from the ethanol is done by the distillation process in which both water and ethanol is boiled. The boiling point of ethanol is lower than water (boiling point of ethanol is 78.37 °C and of water is 100°C), therefore ethanol converts to vapour which is further condensed and removed from water. The fruit waste from industry dealing with fruit juice, jellies, jams etc are collected. The waste includes fruit peels, pulp juice etc. This waste contains a large amount of sugar which helps in making bioethanol. The enzyme used in the process can be yeast which provides heat to the system. The time of fermentation is 5-6 days, and the temperature of distillation is 75-80°C.

**Keywords:** *Fermentation, distillation, hydrolysis, pomace,*

## **UTILIZATION OF FRUIT WASTE (BANANA PEELS) FOR SYNTHESIS OF POLYMERIC FILM**

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### **ABSTRACT**

The focus of the research is on developing a method to synthesize polymeric film from banana peels. Polymeric film is the biodegradable film made from biomass, like banana peels, sugarcane bagasse's, rice husk, etc. As a possible substitute for the conventional plastic, is there polymeric film which is made from banana peels. One promising alternative to the inefficient use of petroleum in the plastics industry is the production of polymeric film from banana peels. This study set out to demonstrate that the starch found in banana peels is utilized in the manufacturing of biodegradable polymeric film, that could be used as a replacement for traditional plastic. Glycerol and banana peels were mixed to create a polymer. This polymer could then be used to make a polymeric film with properties like mechanical, thermal, strength and pliability. Banana peels films had an opaque appearance

with a yellowish colour and were very flexible. The films had mechanical properties comparable with those of commodity plastics, such as 32 to 36 MPa tensile strength. The films were biodegradable under anaerobic conditions and showed good biodegradability in soil. Grafting of banana peels with maleic anhydride was performed to improve its properties, e.g. the hydrophilicity of the polysaccharides-based materials. Films from banana peels had an elongation of 55. Finally, the synthesized products were characterized using FTIR and XRD analysis, which confirmed that the polymer is a film. The process of making polymeric film from banana peels is discussed in this research, which can contribute to a decrease in pollution. The results are promising, but further improvements, e.g. in respect to hydrophilicity and upscaling, are needed for banana peels film to develop into raw materials for next-generation bioplastics.

**Keywords:** *Polymeric films, Banana peels, next-generation bioplastics, FTIR and XRD analysis*

## PROCESS OPTIMIZATION AND NUTRITIONAL ANALYSIS OF TRADITIONAL WATER KEFIR DRINK

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### ABSTRACT

The COVID-19 pandemic has heightened the demand and acknowledgment of natural food items, particularly probiotic beverages, for augmenting an individual's immunity. Water kefir grains have emerged as naturally occurring agents for fermenting probiotic beverages. These grains offer extensive health advantages and contribute to disease prevention such as cholesterol, diabetes, hypertension. This study aims to formulate and examine the physical and nutritional properties of fermented drinks made from water kefir grains. A concentration of 4-6 % w/v of water kefir grain (WKG) was inoculated into 100 ml mineral water containing 6-8% w/v brown sugar. The colony forming units per millilitre (CFU/mL), pH, and overall acceptability using a 9-point hedonic scale are accessed through Response Surface Methodology (RSM). The optimal formulation for the beverages was found to be 6% WKG inoculated with 8% brown sugar in 100 ml mineral water, resulting in a pH level of approximately 6.2 and  $4.9 \times 10^9$  CFU/mL, with an overall acceptability score of 7.5. The study further analysed physicochemical and nutritional properties using AOAC methods of the optimized drink. The results should show that water kefir fermented drink could be a great source of vegan fermented drink as well as a good alternative for many disease preventions.

**Keywords:** *Water Kefir, Probiotics, RSM, Nutrition, Physiochemical, Traditional methods*

## ANALYSIS OF PHYSIOCHEMICAL CHARACTERISTICS OF CELLULOSE MICRO-FIBRES DERIVED FROM RICE STRAW

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### ABSTRACT

Isolation of cellulose from rice straw is a significant step towards the utilization of agricultural waste for sustainable materials and to address the detrimental impact of rice straw burning on environment. This study focuses on isolation of cellulose from rice straw through sequential steps consisting of pre-treatment and bleaching. Alkali treatment (12% NaOH) was used to remove hemicellulose and lignin followed by bleaching (acetified sodium chlorite, pH 3-5 using acetic acid) to enhance purity. The compositional analysis including cellulose, hemicellulose, lignin, and silica was carried in both untreated and alkali treated samples. The cellulose content in untreated and alkali treated rice straw sample showed increased cellulose content from 35.03% to 78.7%, indicating effective delignification and hemicellulose removal. Nearly almost all the silica content was solubilised in the pre-treatment step. The isolated were then subjected to high frequency ultrasonication which uses acoustic vibrations to break down chemically treated cellulose fibres into microfibrils. The morphological, thermal, and structural analysis of untreated, alkali treated and ultrasonicated fibres were carried out successfully. FTIR analysis confirmed the removal of impurities and the structural changes in the cellulose whereas XRD results indicated the changes in crystalline structure of cellulose which highlighted the effectiveness of cellulose isolation. The morphological analysis carried out through SEM showed that ultrasonicated cellulose fibres had smoother and finer morphology as compared to chemically isolated cellulose fibres. Elemental analysis by ICP-MS indicated lesser amount of mineral content and higher proportion of organic matter. The current work contributes towards utilization of agricultural waste for sustainable utilization to produce cellulose microfibrils, which can be further utilized in food packaging, biofuel production, textile, and biomedical materials.

**Keywords:** *alkali pre-treatment, cellulose microfibrils, rice straw, ultrasonication, sustainability*

## PREBIOTIC ACTIVITY OF ASH GOURD SEEDS AND VARIOUS HEALTH BENEFITS ASSOCIATED WITH ASH GOURD SEEDS

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### ABSTRACT

Ash gourd (*Benincasa hispida*) fruit pulp is used in preparation of sweets and juices from long time, but ash gourd seeds are as healthy as fruit pulp, because they are rich in various

nutrients. Prebiotics are non-viable food components. Prebiotics selectively stimulate the growth and activity of beneficial microorganisms in the colon. Among prebiotics only bifidogenic, non-digestible oligosaccharides (particularly inulin, its hydrolysis product oligofructose, and galacto-oligosaccharides (GOS)), fulfil all the criteria for prebiotic classification. Several studies suggested that prebiotics are helpful in providing relief from intestinal discomfort, reduction of inflammation and prevention in colon cancer. Present review aims to discuss the prebiotic activity of ash gourd seeds and enlighten the health benefits from consumption of ash gourd seeds. Seeds are having antibacterial, antifungal and antioxidant properties. Seed oil is also rich in therapeutic value, as it is high in phytonutrients such as squalene, terpenoids, alkaloids, flavonoids, and total phenols. This makes it very valuable for food and pharmaceutical industries. Some previous studies reported proximate analysis of seeds 4.9 % moisture, 24.8 % protein, 40.27 % crude fat, 2.41 % crude fiber, 11.86 % ash and 15.66 % carbohydrate. The composition of prebiotics was found to be 34 % mg/dl low molecular weight carbohydrates, 29.5 % mg/dl resistant starch and 26.01 mg/dl insulin in the seeds. Due to increasing awareness among individuals people prefer healthy food practices. Therefore, prebiotic aspects of ash gourd seed can be incorporated in various food formulations.

**Key words:** *Ash gourd seeds, Galacto-oligosaccharides (GOS), Oligofructose, Prebiotic and Therapeutic value.*

## DEVELOPMENT OF INNOVATIVE FOOD PRODUCTS FROM COCONUT INFLORESCENCE

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### ABSTRACT

The coconut inflorescence is one of the versatile and Novel food ingredients derived from coconut. Compound spadix is the name of the coconut's inflorescence. It's a racemose inflorescence type. Numerous sessile flowers are enclosed in a large bract, or spathe, on the main axis, which is branched. Mostly the coconut inflorescence is used as decorative items in rituals in many states. But it is a remedy for many lifestyle diseases like diabetes and high blood pressure and it is useful for postpartum women. Till now, Coconut inflorescence sap (neera) tapped from the unopened spathe or inflorescence is the sweet, oyster-white coloured sap collected from the immature coconut spadix (inflorescence) and is used for value-added products like natural coconut sugar, palm syrup, jaggery and honey, which have high potential in domestic and international market is known to all. Based on repurpose, the coconut inflorescence incorporated millet products like Soya chunks Millet Rotties, Millet Smoothies, Sweet corn flitters, Italian Brocolian Millet bowl, Millet porridge with berries were developed. The main objective is to develop the product and standardize with nutritional attributes which can help in impending lifestyle diseases like hepatitis and hypertension. A 9 – point hedonic scale was used for evaluating sensory attributes of the developed product. Phytochemical analysis and Antioxidant assay by DPPH Method was done for the developed product.



**Keywords:** *Coconut inflorescence, Nutrient analysis, Phytochemical Constituents, Antioxidant assay and Millet recipes*

## **EFFECT OF DRYING TECHNIQUES ON QUALITY OF CARROT SANDGE, INDIAN MAHARASHTRIAN TRADITIONAL FOOD ADJUNCT OF VIDARBHA REGION**

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### **ABSTRACT**

The current study was carried out to compare the effect of microwave and solar drying techniques on physio-chemical properties of Carrot sandge, Indian Maharashtra Traditional Food Adjunct of Vidarbha Region. Microwave drying of Sandge was compared to solar drying on the basis of color, nutritional value, and textural properties. Sandge were dried using microwave oven at power level of 900W and exposure time of 4-5hrs at temperature of 50<sup>0</sup>C. Drying time required for microwave drying was comparatively less as compared to solar drying. Microwave dried (MD) carrot Sandge had higher  $\beta$ -carotene and vitamin C content, softer texture than those prepared by solar drying. Solar dried sandge were darker. Less color deterioration occurred when microwave drying was applied. Microwave dried sandge were rated as equal to or better than solar dried samples by a sensory panel for color, texture, flavor and overall preference, in fried state. Although energy consumption is more in microwave drying as compared to solar drying but in terms of quality and time attributes microwave dried carrot sandge could be favored.

**Keywords:** *Carrot Sandge, solar drying, microwave drying, Nutritive value, Texture*

## **VALORIZATION OF FLOWERS OF MAHUA (*MADHUCA LONGIFOLIA*) FOR FOOD USE**

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### **ABSTRACT**

Mahua (*Madhuca longifolia*) belongs to the family of Sapotaceae. Its flowers are rich in nutrient like vitamin-C, mineral and sugar. Mahua is also rich in medical properties. Mahua flowers are sweet, have cooling effect and cures burning sensation. It possesses galactagogue, aphrodisiac, biliousness, antibacterial, hepatoprotective, antioxidant and anthelmintic properties. The tribal people use the flower for food, medicine, fodder, local drink, etc. The local people consider the mahua tree and mahua drink as a part of their cultural heritage. The present paper reviews the earlier work performed on Mahua flower and highlights the use of



value-added products made from it. There are many traditional and modern food items made from Mahua like country liquor, *ladoo*, *kheer*, *sweet puri*, *paratha*, jam, etc. Mahua is one of the nutrient rich yet most underutilized plants. Its valorisation and promotion for food use will have a significant effect on socio-economic status of the tribal people from Madhya Pradesh, Chhattisgarh, and Orissa regions of our country.

**Keyword:** *Antioxidant, fermented products, mahua flower, medical properties, value added products*

## **GREEN VALORISATION OF WHEY: INVENTIVE APPROACH FOR SUSTAINABLE DEVELOPMENT AND VALUE-ADDED PRODUCT FORMULATION**

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### **ABSTRACT**

Recently the pursuit of sustainable approaches and the efficient use of by-products and wastes has become paramount in various industries such as food and beverage sector. The management and use of whey in dairy industry is one big challenge. Discarding of whey in sewerage system leads to environmental concerns owing to its high Biological Oxygen Demand and Chemical Oxygen Demand. Now-a-days researchers and industry leaders recognized the potential of whey for developing innovative approaches and value addition while minimizing the waste and environmental impact. An overview of the technologies used for whey valorisation, various products developed in our laboratory with a focus on new approaches, innovative products, and emerging perspectives are the main highlight. The major objective is to stimulate research and innovation in this critical field, fostering the development of a more sustainable and circular dairy industry.

**Keywords:** *Whey Valorisation, Health Benefits, Functional Properties, Circular Economy, Sustainable*

## **VALORIZATION OF CORNCOB BY PREPARING CELLULOSIC RESIDUE-BASED BIODEGRADABLE PACKAGING FILMS**

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### **ABSTRACT**

Plastic is durable, lightweight, and versatile, making it popular in packaging. However, it takes longer to degrade and disintegrate into microplastics and nano plastics, contaminating

water, air, and food and affecting human and animal health and the ecosystem. In this regard, biopolymers such as cellulose, starch, protein, and chitosan are being explored as packaging alternatives to minimize environmental pollution. Herein, cellulosic residue from corncob was tested as a viable and sustainable source to prepare films. Corncobs were crushed and treated with 5% KOH, followed by 10% NaClO<sub>3</sub>, which yielded 38.7% white cellulosic residue (CCR). CCR was dissolved in ZnCl<sub>2</sub> and crosslinked with calcium ions and plasticizer sorbitol. Box Behnken Design was used as the experimental design to optimize the independent variables CCR, CaCl<sub>2</sub>, and sorbitol against the response variables tensile strength (TS), elongation at break (EB), and water vapor permeability (WVP). The optimized film was characterized for UV-blocking properties, water absorption kinetics, biodegradability, and shelf-life of raspberries. Results suggest that an increase in CCR, CaCl<sub>2</sub>, and sorbitol increased the TS and decreased the WVP, while EB was minimally affected. The optimized film showed partial blockage of UV-Vis-IR light, followed Peleg's water absorption kinetics, and more importantly, biodegraded within 29 days at 24% soil moisture. The raspberries' shelf-life was extended by seven more days compared to polystyrene film. The outcome provides a win-win situation for the environment, the agricultural industry, and consumers by addressing plastic pollution, promoting sustainability and circular bioeconomy, and creating value addition to discarded agricultural streams.

**Keywords:** *Corncob, biodegradable packaging, cellulosic residue, sustainable*

## **CELLULOSIC RESIDUE OF SOYBEAN HULLS FOR DEVELOPING ECO-FRIENDLY PACKAGING FILMS AND RASPBERRIES PRESERVATION**

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### **ABSTRACT**

Due to humans' busy lifestyles and convenience, the demand for and consumption of packaged foods is increasing. Consequently, single-use plastic packaging production is skyrocketing and is on par with population growth. However, the non-biodegradable nature of plastics poses a significant environmental threat, harming land, and sea ecosystems. Plastic debris, mainly microplastics and nano plastics, in the alimentary canals of animals such as fish and humans' lungs, heart, liver, and placenta are another concerning health risk factor. Thus, an alternate, biodegradable, and sustainable plastic-replacing material is needed to address these concerns. Herein, the cellulosic residue of soyhulls (SCR) has been demonstrated as a potential candidate for developing eco-friendly packaging films. Films were prepared by solubilizing SCR in 68% ZnCl<sub>2</sub> solution and crosslinked with variable amounts of calcium ions and glycerol. The film-forming components SCR (0.3-0.5g), CaCl<sub>2</sub> (200-500mM), and glycerol (0.5-1.5%) were optimized based on 15 runs from the Box Behnken Design (BBD) to examine the responses tensile strength (TS), elongation at break (EB), and water vapor permeability (WVP). The optimized film was characterized for hydrophobicity, transmittance of electromagnetic irradiations, and biodegradation.

Furthermore, the shelf-life of raspberries has been studied. Results suggest that increasing  $\text{Ca}^{2+}$  ions and glycerol concentrations increased TS and EB and decreased WVP. The film biodegraded within 25 days at 24% soil moisture. The SCR films preserved raspberries for six extra days compared to the commercial polystyrene film. The outcome leads to a waste-free and resource-friendly strategy with novel biodegradable packaging alternatives and offers new income opportunities to soybean producers.

**Keywords:** *soyabean hull, biodegradable packaging, cellulosic residue, single-use plastic*

## **NANOCELLULOSE EXTRACTION ENCOMPASSING CHLORINE FREE METHODOLOGY FOR VALORIZATION OF INDUSTRIAL RICE (*ORYZA SATIVA*) WASTE TO SUSTAIN CIRCULAR ECONOMY**

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### **ABSTRACT**

Industrial rice is one of the highest lignocellulosic biomass contributors but currently underutilized. An attempt was made to extract nanocellulose from rice husk by chlorine free/green method. A hydrothermal pretreatment was given to powdered rice husk for loosening the lignocellulosic bond. Response surface methodology was used to optimize material moisture content (% d.b.), hydrothermal temperature (°C) and screw speed (rpm). The optimum values of moisture, hydrothermal temperature and screw speed were: 20% d.b., 135 °C and 300 rpm, respectively. Under the optimized hydrothermal conditions, cellulose content and lignin content were maximum and minimum, respectively. Green/chlorine free method was used for nanocellulose extraction following hydrothermal pretreatment. Response surface methodology was used to optimize NaOH concentration (%),  $\text{H}_2\text{O}_2$  concentration (%) and oxalic acid concentration (%). The optimum values of NaOH concentration,  $\text{H}_2\text{O}_2$  concentration and oxalic acid concentration were: 5%, 15% and 20%, respectively. Under the optimized extraction conditions, cellulose, hemicellulose, and lignin yields were: 77.32%, 12.15% and 7.18%, respectively. Nanocellulose was further obtained by homogenization for 40 minutes. Nanocellulose yield was 66.89%. Nanocellulose yield obtained by standard method was 57.12%. SEM images showed changes in morphology of rice husk with each treatment. XRD analysis showed increase in crystallinity from raw rice husk to nanocellulose. Colour and thermal analysis also showed indicated changes. This nanocellulose can further be used for edible coating, films, membranes, etc.

**Keywords:** *Rice husk, chlorine free method, hydrothermal treatment, Response surface methodology*

## **MAXIMIZING CITRULLINE YIELD FROM WATERMELON RIND: ENHANCING FOOD BY-PRODUCTS' VALUE THROUGH EXTRACTION AND OPTIMIZATION FOR SUSTAINABLE CONTRIBUTION AND APPLICATION**

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### **ABSTRACT**

Among the paramount challenges confronting global food production is the management of agricultural by-products, exemplified by watermelon rind. The primary aim of this study is to optimize the extraction of citrulline from watermelon rind through procedural refinement. The objective of this research is to enhance the yield of citrulline, a crucial amino acid renowned for its numerous health benefits, through the exploration of sustainable methodologies utilizing watermelon rind. The investigation employs acid hydrolysis extraction technique and optimization methodologies, with considerations given to parameters such as temperature, duration, and solvent concentration. Furthermore, the research examines the potential application of citrulline incorporated in food product. The findings of this study contribute to the expanding repository of knowledge concerning sustainable agricultural practices and circular economy principles, while also providing insights into the efficient utilization of agricultural residuals such as watermelon rind. Ultimately, the project endeavours to bridge the gap between waste management practices and food production processes by transforming agricultural by-products into valuable resources with multifaceted applications.

**Keywords:** *Agricultural by - product, Citrulline, Watermelon Rind*

## **UTILIZATION OF ONION PEEL: TRANSFORMING FOOD WASTE INTO A VALUABLE RESOURCE**

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### **ABSTRACT**

Onion (*Allium cepa* L.) stands as one of the most widely cultivated vegetable crops globally, experiencing a consistent increase in production annually to meet rising consumer demand, both domestically and industrially. Processing industries mainly consume onion to produce dehydrated onion, canned onion, and onion pickles in the form of flakes and powder for seasoning purpose. Onion industries discards about 37% -40% onion as wastes. These wastes are rich in organic matter, phenolics, functional compounds, phytochemicals, and compounds with nutraceutical properties and exhibit anti-oxidative, anti-microbial, anti-inflammatory, and immune-modulatory properties. These wastes can act as substrate to produce industrial amino-acids, single cell protein, essential oils, exogenous enzymes, and it also can be utilized

as a packaging material for the processed food products, as a bio colorant, in noodles, pasta etc. The utilization of the peel gives a new direction in the preparation of designer foods with additional health benefits.

**Keywords:** *Onion wastes, phenolics, phytochemicals, exogenous enzyme, bio colorant*

## **VALORISATION OF NANOSTRUCTURED TiO<sub>2</sub>-CAO CATALYSTS VIA SOL-GEL METHOD FOR ENHANCED BIODIESEL SYNTHESIS AND ITS OPTIMISATION USING CASTOR OIL AS FEED STOCK**

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### **ABSTRACT**

The paper investigates into the valorization of sol-gel-synthesised nanostructured TiO<sub>2</sub>-CaO catalysts to improve the production of biodiesel, with an emphasis on the process of optimising castor oil as a feedstock. To address environmental issues and lessen reliance on fossil fuels, biodiesel production must make use of renewable feedstocks. Because of their large surface area, reactivity, and durability, calcium oxide (CaO) and titanium dioxide (TiO<sub>2</sub>) nanoparticles present intriguing catalytic features for transesterification processes. Nanostructured TiO<sub>2</sub>-CaO catalysts are created via the sol-gel process, which provides exact control over surface characteristics, shape, and composition. To improve catalytic activity and selectivity for the generation of biodiesel, the synthesis process parameters—such as precursor concentration, solvent composition, pH, and calcination temperature—are methodically optimised. Castor oil, a non-edible oil with high viscosity and fatty acid content, is selected as the feedstock for biodiesel synthesis due to its abundance and potential for sustainable production. The influence of reaction parameters such as catalyst loading, methanol-to-oil ratio, reaction temperature, and reaction time on biodiesel yield and quality is investigated using response surface methodology (RSM) and statistical analysis. The optimized TiO<sub>2</sub>-CaO catalyst is characterized using various techniques including X-ray diffraction (XRD), scanning electron microscopy (SEM), transmission electron microscopy (TEM), Brunauer–Emmett–Teller (BET) surface area analysis, and Fourier-transform infrared spectroscopy (FTIR) to elucidate its structural, morphological, and surface properties. The catalytic performance of the optimized catalyst is evaluated in a batch reactor for transesterification of castor oil to biodiesel, and the results are compared with conventional catalysts. The findings of this study contribute to the development of efficient and sustainable catalysts for biodiesel production from renewable feedstocks, thereby advancing the prospects of biofuels as a viable alternative to conventional fossil fuels.

**Keywords:** *Waste eggshell, Inedible Oil, Transesterification, Optimisation, Biodiesel.*

## **A SUSTAINABLE SOLUTION FOR FOOD PACKAGING: DEVELOPMENT OF BIODEGRADABLE UTENSILS FROM SWEET LIME PEEL POWDER AND COCONUT COIR**

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### **ABSTRACT**

Due to growing environmental concerns about plastic, the food industry is turning to sustainable solutions for food storage and packaging. Biodegradable utensils have become a popular eco-friendly option due to their ability to break down naturally, compatibility with living organisms, and safety for the environment. This research project focused on creating biodegradable utensils using sweet lime peel powder and coconut coir. The process involved optimizing ingredients and procedures, then testing the utensils' ability to hold and absorb water, their solubility, and how easily they break down. The results showed that the utensils absorbed water quickly, reaching full saturation after 45 minutes. Additionally, their water-holding capacity increased significantly with different water temperatures, ranging from 10±0.6 to 25±0.5 minutes at temperatures between 25-100 °C. After 30 minutes of water immersion, the utensils showed a solubility of 31±1.23%. Importantly, the biodegradability tests revealed that the utensils completely broke down in just 30 days. These versatile utensils can be used for both hot and cold liquids, making them a promising sustainable option for the food industry.

**Keywords:** *Waste valorisation, food waste, biodegradable cutlery, sustainability*

## **AGRO-WASTE WASTE DERIVED XYLOOLIGOSACCHARIDES: PRODUCTION, OPTIMIZATION AND FOOD APPLICATION**

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### **ABSTRACT**

The global population growth is causing an annual increase in the amount of agricultural waste generated. Hundreds of millions of tonnes of trash are produced by the agriculture industry each year, which has negatively impacted the ecology of the surrounding areas. The efficient and methodical reduction and reuse of agro waste is therefore imperative. Utilizing this waste, "non-digestible oligosaccharides" can be produced, which have numerous advantages for both society and consumers. Because it is stable, non-cariogenic, low in calories, and capable of fostering the growth of good bacteria (*Bifidobacteria* and *Lactobacilli*) in the colon, xylooligosaccharides (XOS), a developing oligosaccharide, offer

significant prebiotic potential. They also have a connection to a lower risk of gastrointestinal issues and colon cancer. Additionally, these compounds have a lot of potential for enhancing the physicochemical properties of various food products and adjusting food flavour in the food industry. numerous applications in a variety of industries, including the environmental, agricultural, and pharmaceutical fields. These materials can be taken directly from their natural sources or produced chemically and/or enzymatically. Accordingly, the proposed study intends to highlight numerous nutritional, environmental, and financial benefits of XOS. The process optimization of different methods to produce xylooligosaccharide, along with its characterization and food application, will be investigated to create a feasible and economical technique that helps in the better yield of a prebiotic xylooligosaccharide with health-promoting properties.

**Keywords:** *Agrowaste, Non-digestible oligosaccharides, Prebiotics, Xylooligosaccharides*

## METHODOLOGY AND BY-PRODUCT UTILIZATION IN PANEER PROCESSING

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### ABSTRACT

This abstract elucidates the methodological aspects of paneer processing and the innovative utilization of its by-products, contributing to sustainability and value addition in the dairy industry. Paneer is a South Asian soft cheese made from sour cream and hot milk. It is popular in South Asia and used in the preparation of a variety of cooking and snack foods. It is rich in high-quality animal proteins, fats, minerals and vitamins. Due to the many types of milk and differences in the composition of milk, various technologies for cheese production have been developed according to the needs of users, providing significant improvements in yield and other good properties. By-product utilization strategies encompass a spectrum of applications, including bioconversion into value-added products such as whey protein concentrates, lactose, and probiotic beverages. Additionally, whey-derived ingredients find applications in functional foods, sports nutrition, and pharmaceutical formulations, capitalizing on their nutritional and functional properties. This review discusses about the method of paneer processing, nutritional value, and by-product utilization of paneer.

**Keywords:** *paneer processing, bioconversion, probiotic beverages*

## **INITIATIVES AND TECHNOLOGIES AIMED AT MINIMIZING FOOD WASTE THROUGHOUT THE SUPPLY CHAIN**

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### **ABSTRACT**

This abstract explores the dynamics landscape of sustainable food supply chains, delving into initiatives aimed at minimizing food waste. The global data from the United Nations Environment Programme (UNEP) Food Waste Index Report 2021 shows that most of this waste globally comes from households followed by food services and retail outlets. According to the research, around 74 million tonnes of food is lost in India every year which is 22% of foodgrain and horticulture production, put together in the country in 2022-23. In a world grappling with sustainability challenges as crucial tools to address the pressing issue of food waste. One way to reduce food waste and enhance safety is to use Novel Preservation Methods that extend the shelf life and retain the nutritional and sensory properties of food. Another way to reduce food waste and environmental impact it to use Biodegradable Packaging materials that can decompose naturally or be composted. The integration of the technological solutions presents a promising pathway to minimize food waste.

**Keywords:** *Food waste, Methods ,Supply chain, Sustainable, Technologies.*

## **LOTUS SEED (*NELUMBO NUCIFERA* G.): A COMPREHENSIVE REVIEW OF ITS NUTRITIONAL AND MEDICINAL PROPERTIES, PROCESSING TECHNIQUES, AND FUNCTIONAL APPLICATIONS**

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### **ABSTRACT**

Lotus seed (*Nelumbo nucifera* G.) is an aquatic plant belonging to the family Nelumbonaceae. Another species, *N. lutea*, is predominantly found in Eastern and Southern parts of North America (Mukherjee, Maji, Rai, Heinrich, 2009). China, the largest producer of lotus seed, has utilized it as a functional food across Asia. The lotus is classified into three types: rhizome lotus, seed lotus, and flower lotus. The flower parts can be utilized as food



and medicine by the Ministry of Health of the People's Republic of China. The dried seed is used as popcorn, and the roasted seed is used as a coffee substitute. Perfume is extracted from the lotus flower, the stamen is used as a flavoring for tea, and the petal is used for garnish. The main component of lotus seed (LS) is starch, which has been found to have a high peak gelatinization temperature ( $>70^{\circ}\text{C}$ ), pasting temperature ( $>75^{\circ}\text{C}$ ), and a high amylose content (20-30%). It is suggested to consume 3-4 LS daily. The nutritional value of 100 grams of LS (with 14% moisture content) includes 70 grams of carbohydrate, 55 grams of starch, and a total of 50% (dry basis). Lotus seed has been found to have several benefits in depression, Alzheimer's disease, cancer, and as an antioxidant. Modifications of LS have been made using various methods such as autoclave, microwave, high chemical, and enzymatic processing to improve functionality.

**Keywords:** *Lotus seed, aquatic plant, functional food, functional applications*

## **MAXIMIZING CIRCULAR BIO ECONOMIC POTENTIAL: PIONEERING COST-EFFECTIVE VALORISATION TO INNOVATIVE PROCESSING SOLUTIONS OF ALLIUM VEGETABLES**

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### **ABSTRACT**

This research sets out on a ground-breaking goal to create cost-effective valorisation strategies to new processing technologies unlocking the cyclical bio economic potential of allium vegetables. Significant waste is generated during the processing of allium vegetables. This waste, often discarded as inedible biomass, harbours a hidden wealth of bioactive compounds like flavonoids, organosulfur compounds, and dietary fibre. Mapping out the existing waste streams and examine how they are produced at every point in the processing chain. Valorising this waste presents not only environmental benefits by reducing landfills and fostering a circular economy, but also unveils exciting opportunities for developing high-value products. The extracted bioactive possess diverse functionalities, including antioxidant, anti-inflammatory and antimicrobial properties. These properties pave the way for their application in the development of functional foods, nutraceuticals, pharmaceuticals and cosmetics. Allium waste can be converted into biofuels, bio fertilizers, and bio composites, contributing to a more sustainable future. Allium waste valorisation can transform waste into valuable resources, promoting environmental sustainability and human health.

**Keywords:** *nutraceuticals, fertilizers, pharmaceutical*

## MUSKMELON SEEDS (*CUCUMIS MELO* L.): A FUNCTIONAL FOOD

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### ABSTRACT

Muskmelon seeds (*Cucumis melo* L. ) belong to the family cucurbitaceae. Muskmelon iranian origin germinated well at 12 - 14° C enhancement of these effect was good at 10 - 11° C for Persia and at 15 - 16 °C for Noy Yizre'el storage Oil content (whole seed basis) between from 12.5 to 39.1 and iodine value from 106.0 to 124.1 muskmelon seeds were priming in darkness at 25°C in many solutions also three osmotic potential. Under 17 and 25°C better germination rate and seedling development nutrition analysis of seeds are good in energy protein, fats, carbohydrates, minerals like calcium, magnesium, iron, potassium and phosphorus. Presence of polyunsaturated fatty acids like as omega -6 ( linoleic acid) monounsaturated fatty acid like omega - 9 (oleic acid) it also consists saturated fatty acid like Palmitic acid and stearic acid. It is essential for good health during pregnancy and prevention of muscular degeneration also plays important role in blood clotting and cardiovascular diseases. Muskmelon seeds consists antioxidant potential, anti-inflammatory, anti-microbial, anti-Alzheimer, Anti-diabetic and diuretic properties. These all are used to prevent and treat many diseases and prove to be an essential component of healthy diet.

**Keywords:** *functional foods, muskmelon seeds, saturated fatty acid, antioxidant potential*

## SUSTAINABLE SOLUTIONS FOR FOOD WASTE REDUCTION: A COMPREHENSIVE EXPLORATION

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### ABSTRACT

Food waste is a pressing global issue with significant economic, environmental, and social implications. In recent years, there has been a growing recognition of the urgent need to address this problem through sustainable solutions. This abstract provides an overview of various strategies and approaches for reducing food waste comprehensively. Firstly, it examines the importance of understanding the root causes of food waste, which often stem from inefficiencies in production, distribution, consumption, and disposal processes. By identifying these underlying factors, targeted interventions can be implemented to minimize waste generation at each stage of the food supply chain. Additionally, this abstract delves into the significance of consumer behavior and awareness in shaping food waste patterns. Educational initiatives, incentives, and technological innovations play crucial roles in empowering consumers

to make more informed choices and minimize wasteful practices. Furthermore, it discusses the potential of circular economy principles, such as food recovery and redistribution, composting, and anaerobic digestion, in diverting organic waste from landfills and promoting resource recovery. Moreover, the abstract highlights the importance of collaboration among various stakeholders, including government agencies, businesses, non-profit organizations, and communities, to create a conducive environment for effective food waste management.

**Keywords:** *Food waste, supply chain, social responsibility*

## OPTIMIZATION OF FERMENTATION CONDITIONS FOR ENHANCED BIOETHANOL PRODUCTION FROM BREWERY WASTE

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### ABSTRACT

The investigation of alternative fuels has accelerated due to the increased demand for sustainable energy sources worldwide, with bioethanol emerging as a strong contender. The goal of this research is to produce more bioethanol from brewery waste, which is a rich supply of fermentable sugars, by optimizing the fermentation process. The goal is to produce bioethanol as efficiently as possible while reducing the impact on the environment and the use of resources. Brewery waste is a perfect substrate for fermentation to produce ethanol because of its high quantity of organic chemicals and carbs. However, several variables, like temperature, pH, inoculum size, and fermentation duration, have a significant impact on how effective this approach is for you. To determine the ideal circumstances for the synthesis of bioethanol, the current study methodically examines these elements. During fermentation, temperature has a significant impact on microbial metabolism and enzyme activity. The results of our research show that the conversion of carbohydrates to ethanol is greatly increased when a particular temperature range (the ideal range TBD°C) is maintained. Additionally, the activity of yeast cells and enzymes is significantly impacted by pH levels. The findings show that preserving a slightly acidic pH within the optimal TBD range improves fermentation and raises the production of bioethanol. Another important component influencing the generation of bioethanol is the inoculum size, which is a measure of the concentration of microorganisms added to the fermentation medium. We determine the ideal inoculum size that maximizes ethanol yield while lowering the danger of contamination through a series of carefully monitored tests. The results of this study provide important light on the complex interactions between fermentation parameters in the process of producing bioethanol from brewery waste. The study's optimal conditions provide a route for the manufacturing of bioethanol sustainably, aiding in the continuous pursuit of economically and environmentally sound substitutes for traditional fuels.

**Keywords:** *Bioethanol, fermentation, enzymes, fermentation sugars, sustainable energy*

## UNLOCKING POTENTIAL: UP-CYCLING FOOD WASTE FOR SUSTAINABLE SOLUTIONS

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### ABSTRACT

Repurposing food waste has become a game-changing tactic for addressing sustainability issues in the food sector. The concept, importance, and possible effects of up-cycling food waste on resource optimization and environmental conservation are thoroughly examined in this research. Through repurposing food waste as a valuable resource rather than a disposable by-product, up-cycling attempts to mitigate the negative effects of food waste while also opening new economic opportunities. A variety of up-cycling techniques, such as insect farming, anaerobic digestion, composting, and enzymatic conversion, are examined and their applicability and scalability in various situations explained. Furthermore, a detailed analysis is conducted of the socio-economic effects of up-cycling food waste, including increased food security, community involvement, and employment development. Additionally, our investigation reveals a noteworthy research void about the creation of innovative up-cycling technologies customized for categories of food waste. Although current techniques provide insightful information, more focused strategies are required to address the distinct qualities and composition of various food waste streams. More effective and resource-efficient solutions may result from research on the adaptation and optimization of up-cycling procedures for categories of food waste, such as fruits, vegetables, grains, or dairy products. To create innovative and customized up-cycling solutions that optimize resource recovery and reduce environmental effect, interdisciplinary collaboration between food scientists, engineers, environmental researchers, and industry stakeholders is necessary to bridge this gap. Additionally, recommendations for future study are made with the intention of filling this vacuum and developing the field of up-cycling food waste. Through directing research efforts toward the creation of specialized up-cycling technologies, scientists can open new avenues for resource utilization and sustainable waste management in the food business.

**Keywords:** *up-cycling, environmental conservation, sustainable waste management, food business*

## **VALORIZATION OF FRUITS AND VEGETABLE WASTES AND BY - PRODUCTS TO PRODUCE NATURAL PIGMENTS**

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### **ABSTRACT**

With growing consumer demand for natural products and awareness about sustainable production, market for naturally obtained pigments is increasing rapidly. Although the production of natural pigments poses more challenges than synthetic pigments, but increasing concern for health and safety of consumers as well as growing concern for environment, will lead to increased demand for natural products. Use of synthetic pigments for production of food, pharmaceuticals, and cosmetics has been popularized majority of time. Lesser time required for artificial and synthetic pigment production, cheaper manufacturing and larger quantity of product for lesser input, including other benefits have been preferred by manufacturers over health and well-being of consumers. The major pigments used in food industry as food additives (colourants) include anthocyanins, betalains, carotenoids and chlorophylls. These natural pigments can be extracted from wastes or by- products of fruits and vegetable processing industry. Different techniques utilized for extraction involve microwave-assisted extraction, ultrasound - assisted extraction, pulsed electric field extraction, supercritical fluid extraction and enzyme - assisted extraction. This review study focuses on the technological aspects and different processing techniques of extraction of these pigments with the purpose of sustainable development and keeping in mind the health of the consumers.

**Keywords:** *consumers, health, natural, pigments, sustainable*

## **STUDIES ON PHYSICOCHEMICAL AND FUNCTIONAL PROPERTIES OF MOTH BEAN POD POWDER**

Parul Chauhan<sup>1\*</sup>, Nisha<sup>1</sup> Ashish Mohite<sup>1</sup>, Neha Sharma<sup>1</sup>  
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### **ABSTRACT**

The sustainable development of agro-industry requires the efficient use of all raw matters, which implies physicochemical and functional studies of by- products for finding their potential usage in industrial processes. The objective of the present study was to assess physico-chemical and functional properties of obtained from moth bean pod powder. Moth bean pods were dried using recirculatory tray dryer, tray dryer and cross flow dryer at temperatures 40°C and 45°C, respectively. Dried samples were ground into fine powder using hammer mill. The results found yellowish color of b\*(blueish to yellowish) parameter values as RT1:17.54, RT2: 17.49, CF1: 18.35, CF2: 18.61, TD1:18.01 and TD2:18.22, respectively

with a slight red colour hue angle value. Moth bean pod powders showed high water holding capacity as 9.02% for CF2, 9.01% for CF1, 8.91% for RT2, 8.45% for TD2, 8.40% for TD1, 8.30% for RT1 whereas for oil holding capacity values were found as 2.30% for RTD1, RTD2-2.91%, FAD1-2.01%, CF2-2.22%, TD1-2.40%, TD2- 2.45%). Screening for most of the bio-active compounds were found to be positive moth bean pod powder. The results for proximate compositions were found close to each other but differ slightly in case of fibre content which were found as 15.30%, 16.91%, 14.01%, 15.02%, 16.40% and 15.45% for RT1, RT2, CF1, CF2, TD1 and TD2, respectively. Moreover, a high content of ash (3-4%) were also found for all samples. Overall, the results obtained indicated that moth bean pod dried by recirculatory dryer, and its powder has potential to be used as a raw material for the food application.

**Keywords:** *Moth bean pod, Proximate, Drying, Oil holding capacity, Physic-chemical*

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**Theme 3:**

**Food for Health**  
**and Well Being**

## FORMULATION OF LOW-FAT AND ANTIOXIDANT-RICH SYNBIOTIC DRINK USING KEFIR AND BASIL SEED GUM EXTRACT

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### ABSTRACT

Kefir produced by microbial activity of ‘kefir grains’ is a fermented beverage with renowned probiotics associated with a wide array of nutraceutical benefits. Basil seed gum (*Ocimum basilicum*) is a non-digestible fiber that is classified as a prebiotic and offers great potential for use as an emulsifying and fat replacer agent in food. The levels of kefir grains inoculum (2-4% w/v) and basil seed (0.2-0.4% w/v) on pH, colony forming unit count per ml (CFU/ml), and overall acceptability (9-point hedonic scale) were optimized using central composite design, a response surface methodology (RSM). Nutritional and physiochemical analyses were performed as per AOAC methods, DPPH radical-scavenging activity, and phenolic compounds were estimated using UV spectrophotometer. The most optimized combination of variables for the preparation of symbiotic drink was 3% for kefir grains inoculum and 0.3% for basil seed gum addition with 5.3 pH level,  $5.32 \times 10^9$  CFU/ml, and 7.7 overall acceptability. The findings depict protein 3.6g, carbohydrates 5.3g, fat 1.1g, Iron 3.5mg, calcium 29.3mg, potassium 120.6mg, and sodium 59.3mg per 100ml, DPPH antioxidant potential 82%, and 24mg/100 GAE phenolic compound was estimated. The optimized symbiotic drink attained good range of CFU count, nutritional and antioxidant properties, which can be helpful in improving gut microbiota, thus preventing gastrointestinal diseases. Thus, this shows the drink has the potential for development of its variants and industrial exploitation. To the best of our knowledge, this is the first report on the development of a symbiotic drink with a combination of kefir and basil seed.

**Keywords:** Kefir, Basil seed, RSM, Nutrition, Antioxidant

## DEVELOPMENT OF FROZEN FRIED STRIPS FROM ELEPHANT FOOT YAM

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### ABSTRACT



Elephant foot yam (EFY) (*Amorphophallus paeoniifolius*) is a high-yielding tropical tuber crop rich in dietary fiber, carbohydrate, protein, vitamins, and minerals. The presence of oxalate and acidity are the reason for its underutilization and poor commercialization. Therefore, a study with an effort to increase the consumer preference of this underutilized tuber was done through value addition by preparing frozen fried strips. Rice flour was used as gluten-free binder to add texture and crispiness to the product. Optimization of the preparation process was adjudged based on lower oil uptake, optimal texture in the form of hardness and overall sensory acceptability. A double frying technique was employed. Different concentrations of the EFY: rice flour (100:0, 79:21, 73:27, 68:32, 0:100) was used to develop the frozen fried strips. Processing resulted in lower L\* values, higher a\* values and higher b\* values of the prepared strips. The strips prepared in the ratio 73:27 (w/w) was selected as optimized sample as it showed overall better result compared to other samples. The optimized sample showed lower oil uptake, optimal hardness, and higher overall sensory acceptability. Compared to controls (100:0, 0:100) all the prepared EFY strips showed superior quality in terms of oil uptake, texture and overall acceptability.

**Keywords:** *Amorphophallus paeoniifolius*, value addition, snack foods, texture, optimization

## LOW GLYCEMIC INDEX (GI) NATURAL SUGAR FORTIFIED WITH VITAMIN ‘A’

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### ABSTRACT

The consumption of sugar has always been subject to controversy due to its negative impact on health, such as obesity, diabetes, cardiovascular and tooth decay, etc. In this fast and furious pace of life, the importance of nutritious balanced diet has lost its essence. The rising consciousness among the consumers with a view to ‘stay fit’ has led to several changes in their dietary patterns. Considering eating healthy and consuming less calories in one’s diet, consumers often tend to make wrong decisions for instance, while overestimating the calorie content of sugar, they fail to acknowledge the fact that other carbohydrates and fats provide the same number of calories or even more. As sugar being one of the staple foods, consumed by almost every individual and India being second largest producer and world’s largest consumer of sugar, enriching sugar with micronutrients is a promising approach to overcome the controversies which have arisen about sugar over the last few years. It is also worth mentioning that in a recent review post, the World Health Organization (WHO) has also warned the consumers against using artificial sweeteners with a view to control body weight or reduce the risk of non-communicable diseases. The WHO further elaborated that prolonged use of artificial sweeteners may not be effective in weight management and could be a cause of potential health risks. In pursuit of mitigating micronutrient deficiencies and tackling with the negative media tags on sugar the authors have intended to re-engineer the traditional sugar wherein micronutrient such as vitamin A and natural sweetener extracts such as stevia, monk fruit etc. may be incorporated in the crystal lattice of sugar itself. This one-of-a-kind sugar which is vitamin A fortified and having a low GI profile will not only help us

addressing the nutrient deficiency prevalent in the country but will also help to cater to the needs of diabetic people as the so produced sugar will help in managing the sugar levels without giving sudden spike in the blood glucose levels. Initiatives and innovations like these will help the sugar sector to have a strong competitive edge in the market and would also help them diversify their resources towards value-addition making them more sustainable and self-resilient.

**Keywords:** *obesity, diabetes, artificial sweeteners, stevia, non-communicable diseases, value addition, low GI*

## **SENSORY TRIAL BASED ANTI-BITTERNESS STANDARDIZATION OF WILD POMELO (*CITRUS MAXIMA*) BEVERAGE FROM NORTHEAST INDIA**

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### **ABSTRACT**

The bitter taste in fruits and vegetables have long posed to be a challenge faced by the beverage industry. This is particularly demanding in the case of citrus fruits. Inherent bitterness due to the presence naringin and limonoids limit the productivity of lesser-known citrus varieties. *Citrus maxima*, commonly known as pomelo, is a prominent underutilized citrus species that grows abundantly in the North-Eastern part of India. Its utilization is severely limited by high concentrations of bitterness-causing compounds in its juice. Adverse tastes of beverages can be altered by carbonation and bitterness-suppressing additives. In this study, bitter pomelo juice was subjected to appropriate levels of carbonation and sweetening under most desired conditions of the process so as to limit any adverse effect on the natural flavor of the beverage. This was analyzed through intensity testing using a sensorially trained panel. The acceptability of the beverages prepared using different sweeteners was checked through fuzzy analysis. Additionally, effect of the treatment on the beverage's biochemical parameters was also studied. Carbonation and the beverage temperature were observed to be effective in reducing the inherent bitterness as well as improve the flavor profile of the beverage. Addition of sucrose and sucralose was observed to positively affect the acceptability of the juice whereas, aspartame and stevia reduced beverage likeability.

**Keywords:** *Citrus maxima, beverage, bitterness, fuzzy analysis, sensory analysis*

## **EFFECT OF CRYSTALLIZATION NUCLEI AND TEMPERATURE FOR THE PRODUCTION OF CRYSTALLIZED HONEY PRODUCT**

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### ABSTRACT

Honey is often regarded as a preferable source of sweetness when compared to other sugars due to its unprocessed origin, nutritional advantages, antioxidants, lower glycaemic index, and distinct flavour profile. The exceptional nutritional value of honey can occasionally be hindered by its tendency to crystallize while being stored. The typical phenomena of honey crystallization during processing and storage is mostly caused by the precipitation conversion of glucose to glucose monohydrate, which is then precipitated. Crystallized honey offers all the benefits of fresh honey. Its lower moisture content and spreadable texture make it ideal for spread due to reduced moisture content and a spreadable textured product. The crystallized product was designed to study potential methods of utilization of crystallized honey. Regarding the optimal concentration of nuclei to add to produce a creamy honey that is imperceptible and smooth, there is no information available. The nuclei were added to the fresh honey in varying amounts, and they were then kept at various temperatures until fully crystallized. It was found that the ideal temperature range for producing crystallised honey product was 10–18 °C with a concentration of 3–9 %. This method adheres to the natural composition of honey. The resulting product, with its dense consistency and smooth texture, improves spread ability, potentially benefiting industries by demonstrating the positive attributes of honey crystallization.

**Keywords:** *crystallized honey, honey, nuclei, honey processing*

## AN EXPLORATION INTO THE PREBIOTIC POTENTIAL AND HEALTH BENEFITS OF SOME TRADITIONAL INDIAN FOODS CONSUMED DURING FASTING

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### ABSTRACT

Several types of foods have been traditionally consumed during fasting in India. Many different religions in India observe fasting at different times of the year. During ‘Navratri’ fasting, food products commonly known as ‘falahar’ are consumed by the individuals during fasting period. These essentially contain ingredients like *Fagopyrum esculentum*, *Celastrus paniculatus*, *Euryale ferox*, *Trapa natans* L. and *Curcuma angustifolia* etc. Prebiotics have long been known to modulate gut microbiota; these are mostly non-digestible food ingredients that beneficially stimulate growth of some microorganisms in the colon to improve human health. Prebiotics like inulin and resistant starches, reduce the occurrence of

gastro-intestinal disorders, such as diarrhoea, provide relief from intestinal disorders and inflammation, and provide protection to prevent colon cancer. These also promote satiety and weight loss, thus preventing obesity. The present review discusses the different types of prebiotics; prebiotic activity of foods consumed during fasting and highlights their reported health benefits. These fasting nourishments are, rich in oligo or polysaccharides, dietary fibres, resistant starch, polyphenols, have high cell strengthening action and so forth. Some exploration work has been detailed which affirms that these chosen foods extend a prebiotic action, however further research is anticipated in future to confirm this with deeper insights. With increasing awareness among consumers about functional foods, the market for prebiotic nourishments is rapidly increasing. Therefore, information regarding these traditional foods used during fasting helps in making them ingredients of choice for usage in prebiotic formulations.

**Keywords:** *Prebiotic, Fasting Foods, Gut microbiota, Colon*

## **KOMBUCHA FRUIT BEVERAGE – A NEXT GENERATION ALTERNATIVE TO CARBONATED DRINKS WITH POTENTIAL HEALTH BENEFITS**

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### **ABSTRACT**

Kombucha is a fermented tea made by adding symbiotic culture of bacteria and yeast. The aim of this study is to develop a modern health focused alternative to carbonated beverages, offering potential well-being benefits of next generation lifestyle. In this study, the kombucha fruit beverage is prepared by grapefruit juice, basil plant extract and star anise spice to improve the nutritional profile of the drink. The ingredients used are kombucha tea, grape juice, basil extract, star anise with variations V1(80ml, 15ml, 5ml, 0.5g), V2 (70ml, 20ml, 10ml, 0.5g) and V3 (60ml, 25ml, 15ml, 0.5g). The developed product with variation V3 is highly acceptable in the overall organoleptic evaluation with mean score of appearance is  $4.8 \pm 0.3$  and flavor  $4.8 \pm 0.5$ . The selected product is subjected to nutrient analysis and the results of the analysis indicated that Energy is 31.17Kcal, phenolic compounds 179mg, alcohol 4.87g and antioxidant activity 91.3DPPH per 100ml of developed kombucha drink. The shelf-life analysis was carried out under both room temperature and refrigeration for 45 days. The results showed changes in color and flavor under room temperature and no changes in refrigeration. The cost analysis for 500 ml grape flavored kombucha drink is estimated as Rs.189. This refreshing kombucha fruit beverage is a traditional food with modern popularity which boosts gut health, fights inflammation, strengthens immune system and supports overall health.

**Keywords:** *Kombucha, Probiotics, Fermented drink, Health benefits, Healthy beverage*

## STANDARDIZATION AND ADVANCING THE DEVELOPMENT OF ENERGY BARS FOR ATHLETES USING PUMPKIN PULP FLOUR

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### ABSTRACT

The incorporation of pumpkin pulp flour into energy bars enhances their nutritional content, leveraging its high levels of dietary fibre, total sugar, protein, carotenoids, and antioxidant capacity. Addressing a research gap, the investigation assesses the feasibility and potential benefits of utilizing pumpkin pulp flour in energy bar formulations, aiming to offer healthy and affordable options in the market. The bar caters to athletes and individuals leading busy lifestyles, offering a convenient energy source for those who lack the time or ability to prepare their meals. Different combinations of pumpkin pulp flour were used during the development of the bars to ensure they were nutritionally balanced, contained significant levels of macronutrients, and high energy. Sample 1 (30% pumpkin pulp flour), Sample 2 (20% pumpkin pulp flour, 10% milk powder), and Sample 3 (18% pumpkin pulp flour, 9% milk powder, and 9% dark chocolate) were formulated. Sensory evaluation was conducted using a 9-point Hedonic scale method and proximate analysis of the product was employed. Organoleptic analysis favoured Sample 3 with highest mean scores for taste ( $7.9 \pm 1.0$ ), odour ( $7.4 \pm 1.4$ ), colour ( $8.1 \pm 0.8$ ), texture ( $7.7 \pm 1.1$ ), and overall acceptability ( $7.9 \pm 1.0$ ). Proximate analysis revealed Sample 3 as per 100g of bar contains 327.25 kcal energy, 71.56g carbohydrates, 10.28g dietary fibre, 6.75g protein, 8.22g total fat, 10.95g moisture and 2.52g ash. The bar being rich in carbohydrates, offer instant energy for workouts/training and aid in glycogen replenishment post-exercise. Overall, incorporating pumpkin pulp flour in energy bars shows promising results for enhancing their nutritional profile and market availability.

**Keywords:** *athletes, development, energy bar, pumpkin pulp flour, sensory evaluation.*

## MECHANISM OF INSULIN LIKE SUBSTANCE IN BITTER GOURD FOR THE MANAGEMENT OF DIABETES MILLETUS.

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### ABSTRACT

Bitter gourd (*Momordica charantia*) has been traditionally utilized for its medicinal properties, particularly in the management of diabetes. These abstract aims to elucidate the mechanism of insulin-mediated effects on bitter gourd. Insulin, a key hormone in glucose metabolism, facilitates the uptake of glucose into cells, thereby lowering blood glucose

levels. Bitter gourd contains bioactive compounds such as charantin, polypeptide-p, and vicine, which have been shown to exhibit hypoglycaemic effects. These compounds mimic insulin's action by enhancing glucose uptake and utilization in peripheral tissues. Type 2 Diabetes Mellitus (T2DM) is a complex metabolic disorder characterized by hyperglycaemia and glucose intolerance. It is recognized as one of the most common metabolic disorders and its prevalence continues to raise major concerns in healthcare globally. Certain bioactive compounds such as polyphenols, vitamins, and minerals found in vegetables and fruits can have antioxidant and anti-inflammatory effects that allow for preventative or potential treatment options for T2DM. M. charantia is utilized for its glucose-lowering effects and is often used as a treatment for diabetes and related metabolic conditions amongst the indigenous populations of Asia, South America, India, and East Africa.

Furthermore, bitter gourd components have been found to stimulate insulin secretion from pancreatic beta cells, thereby improving insulin sensitivity and promoting glucose utilization in the liver, adipose tissue, and skeletal muscles. Additionally, bitter gourd may exert antioxidant and anti-inflammatory effects, which contribute to its overall metabolic benefits.

**Keywords:** *Antioxidant; Bitter Gourd; Bioactive compounds; Insulin; Indigenous medicine*

## DEVELOPMENT OF EGG NUTRI-NUGGET PROTEIN COOKIES FOR ATHLETES

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### ABSTRACT

Athletes who are trained to elevate their performance are dependent on an adequate amount of protein. Soya chunks and eggs provide complete protein. Soya chunks are textured vegetable protein that facilitates muscle recovery, reduces soreness, and promotes optimal performance. Carbohydrates present in soya chunks are mainly made of fibre. The presence of high dietary fibre in cookies balances gut microbiota which improves digestion and nutrient absorption. Protein cookies are nutritious, pre-made cookies with more protein content than regular snack cookies. The aim is to develop a healthy and delicious post-workout protein snack. Two formulations of protein cookies were standardized with the different ingredients Soy chunks, Egg, Black gram, Dark chocolate, Almonds, and Sugar in the first variant. Instead of black gram, red gram is used in the second variant. The first variant of the cookies has got higher overall acceptability with a mean score of  $7.233 \pm 0.773$ . The first variation was preferred by customers over the second due to its crispy texture and pleasant aroma. The 9-Point Hedonic scale was used for sensory evaluation. The mean score of attributes for the accepted variant in 9-Point Hedonic scale are taste  $7.4 \pm 1.13$ ; Odor  $6.86 \pm 1.30$ ; color  $7.93 \pm 0.78$ ; Texture  $7.23 \pm 1.04$ . The Nutritional profile of Soy-egg Protein cookies was examined which consists of energy 402.90 kcal/100g; Carbohydrates 59.70g/100g; Protein 17.68g/100g; Fat 10.37g/100g; Fiber 11.13g/100g; Total ash 2.68g/100g and Moisture



9.56g/100g. Egg Nutri- Nuggets Protein Cookies are specifically designed to resemble delicious snacks and are conveniently packaged for quick and easy consumption.

**Keywords:** *Protein cookies, Healthy Snack, Muscle recovery, Dietary Fibers, Gut microbiota*

## **EFFECT OF ULTRASOUND ASSISTED EXTRACTION METHOD ON THE FUNCTIONAL PROPERTIES OF PROTEINS FROM OYSTER MUSHROOM (*PLEUROTUS OSTREATUS*)**

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### **ABSTRACT**

Researchers are exploring on lesser-known protein alternative to animal sources with plant protein being a prevalent option. But plant protein is deemed to be of inferior quality due to its incomplete amino acid profile. *Pleurotus ostreatus*, an edible oyster mushroom with significant nutritional properties provides a comprehensive amino acid profile. Thus, this study aims at isolating protein from defatted oyster mushroom by ultrasound assisted extraction (UAE) where the functional properties were studied at different sonication conditions i.e., 25% and 30% of power efficiency and processing time 5 min and 10 min. The UAE at 30% efficiency for 10 min showed improved functional properties as compared to control. In this process combination, there was an increased in water holding capacity from 3.65±0.10 g/g to 6.51±0.05 g/g, oil holding capacity from 3.71±0.11 g/g to 8.57±0.06 g/g, foaming capacity from 36.33±0.40 % to 52.17±0.04 %, foaming stability from 30.66±0.27 % to 60.00±0.15 %, emulsion activity index from 0.73±0.134 m<sup>2</sup>/g to 2.14±0.05 m<sup>2</sup>/g, and emulsion stability index from 28.67±0.2 min to 45.13±0.43 min. This data on the functional properties of UAE protein from oyster mushrooms will be helpful in its processing, storage, consumption, and utilization with other food systems.

**Keywords:** *Functional properties, oyster mushroom, proteins, ultrasound assisted extraction.*

## **DEVELOPMENT AND STANDARDIZATION OF A CARBOHYDRATE RICH PURPLE RICE-QUINOA ENERGY BAR**

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### ABSTRACT

Inclusion of purple rice and quinoa serve as valuable sources of energy, carbohydrates, dietary fiber, iron, antioxidants, vitamins, and minerals, while dates offer benefits in weight management, cardiovascular health, and gastrointestinal function. This study is focused on the development of energy bar (purple rice-quinoa energy bar) prepared by incorporating purple rice, quinoa, walnuts, sesame seeds with jaggery, dates and little amount of ghee to provide instant energy source to the athletes. Ingredients were chosen based on their nutritional and functional attributes. The energy bar comprises natural sugars from dates and jaggery, with no added colour or flavour. The bar was developed through two formulations, Formulation 1 and Formulation 2, maintaining consistent ingredient proportions but varying in processing techniques. Sensory evaluation, employing a 9-point hedonic scale favored Formulation 1, exhibiting notable scores for taste  $7.6 \pm 0.7$ , odour  $6.9 \pm 1.1$ , colour  $7.1 \pm 1$ , texture  $7 \pm 0.9$  and the overall acceptability was  $7.4 \pm 0.9$ . Proximate analysis of formulation 1 per 100g indicated energy content at 401 Kcal, carbohydrate content at 80.3g, dietary fiber at 11.8g, protein at 5.2g, total fat at 6.5g, moisture at 6.2g, and ash at 1.6g. The energy bar is suitable for vegetarian athletes as well and is viable as a pre, during and post-exercise snack owing to its abundance of easily digestible natural carbohydrates sourced from plants. Overall, the energy bar presents a harmonious blend of nutrients, rendering it a convenient and advantageous dietary option for athletes seeking optimized performance and recovery.

**Keywords:** *purple rice, quinoa, standardization, energy bar, vegetarian diet.*

## NUTRIENTS INTAKE AND THEIR ASSOCIATION WITH NUTRITIONAL STATUS OF CHILDREN BETWEEN 6-59 MONTHS

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### ABSTRACT

Optimal health, growth, and development in infants and young children depends on adequate intakes of micronutrients like iron, zinc, and calcium along with the macronutrients. This study assessed nutrients intakes and their association with nutritional status of children aged 6-59 months in urban Vadodara through a community based cross-sectional study. A total of 452 children (6-59 months) from four zones were randomly enrolled based on sample size calculations out of which 233 of them were females and 219 were males in urban Vadodara. Nutritional status of children was assessed using WHO growth standards after obtaining informed consent from the mothers. Data regarding dietary intakes was obtained using three consecutive days 24-hour dietary recall. Findings showed the prevalence of severe stunting was 16.4 %, wasting 4.4%, and underweight 6.4% (<-3SD). Stunting and underweight prevalence was highest in children between 25 to 36 months of age. Statistical analysis



revealed that no child met energy requirements; however, 2 to 3 year olds fared well in comparison to other age groups. Children were consuming more protein than was recommended. The rest of the population, except infants aged 6 to 12 months, consumed enough fat. Only infants between the ages of 6 and 12 months could meet iron requirements. Females had higher intakes of nutrients as percentage RDA with the exception of calcium and iron. WAZ scores had a significantly positive relationship with the mean percentage RDA for fat in children. Enhancing the diet quality is of utmost importance to fight malnutrition in young children. Health education on assessing child's diet and healthy eating practices, particularly for mothers, is crucial. Thus, strategies focusing on assessing diet quality and improving the same may help in reducing malnutrition.

**Keywords:** *Dietary intake, Nutritional Status, infant and young child nutrition, Malnutrition, stunting, wasting*

## **HYPOLIPIDEMIC EFFECTS OF THE POMEGRANATE JUICE CONCENTRATE FORMULATIONS IN HIGH-FAT DIET FED HYPERLIPIDEMIC RATS**

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### **ABSTRACT**

Hyperlipidaemia is a disarray of lipid metabolism due to a rise in plasma concentrations of the various lipid and lipoprotein fractions. Pomegranate, a highly popular fruit crop, is renowned for its numerous health benefits derived from its fruit, peel, seeds and leaves. In this study, pomegranate juice concentrate (PJC) prepared *via* conventional concentration method was incorporated with pomegranate peel and seed powder in different proportions ranging 2.5, 5 and 5, 10% respectively and evaluated for its ability to reduce cholesterol level in hyperlipidaemic rats. Sprague Dawley albino rats were fed with high-fat diet for 15 days period followed by concurrent administration of PJC formulations for another month. These formulations were administered in hyperlipidaemic rats (2.5mL/kg body weight) and their hypolipidemic potential was studied in comparison with conventional drug (Statin-80 mg/kg body weight). Our investigation showed promising effect of PJC formulations on the lipid profile in comparison to the standard drug. Pomegranate juice concentrate (PJC) containing 10% pomegranate seed powder (PSP) and 5% pomegranate peel powder (PPP) showed a

significant decrease in the serum cholesterol (from  $136.37 \pm 3.05$  mg/dL to  $110.62 \pm 2.76$  mg/dL), low density lipoprotein (from  $82.51 \pm 1.19$  mg/dL to  $49.90 \pm 3.32$  mg/dL), very low density lipoprotein level (from  $24.76 \pm 0.36$  mg/dL to  $19.40 \pm 0.55$  mg/dL) and it promoted high density lipoprotein level (from  $29.10 \pm 1.20$  mg/dL to  $41.32 \pm 1.34$  mg/dL). Polyphenols in pomegranate juice are capable of free radicals scavenging and inhibiting LDL oxidation and inhibition of endogenous lipid synthesis. Thus, our findings clearly demonstrate the hypolipidemic activity of the PJC formulations.

**Keywords:** *Hypolipidemia, pomegranate juice concentrate, pomegranate peel powder, pomegranate seed powder*

## DEVELOPMENT AND EVALUATION OF ENERGY BAR USING MAKHANA POWDER AND DATES

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### ABSTRACT

Makhana powder and dates offer the potential to create a specialized product catering to the requirements of athletes. Makhana, also referred to as gorgon nut or foxnut, is a food rich in protein that can serve as a nutritious snack or be utilized as an ingredient in various products. With its low sugar and high protein content, it is an excellent option for athletes seeking a balanced diet. Dates, on the other hand, can be processed into a stable powder by adding ingredients like maltodextrin, tricalcium phosphate, and glycerol monostearate. This research aimed to produce an energy bar using natural, nutrient-rich components for athletes. The bar consisted of makhana powder, rice crisps, watermelon seeds, and dried fruits such as dates, figs, and walnuts, combined with jaggery and honey. Two formulations were created with varying ingredient proportions: Sample 1 (25% jaggery, 4.16% honey) and Sample 2 (20.82% jaggery, 8.33% honey). A sensory evaluation using a 9-point Hedonic test favored Sample 2, scoring higher in taste ( $7.7 \pm 0.7$ ), odor ( $7.2 \pm 1.2$ ), color ( $7.0 \pm 1.5$ ), texture ( $7.5 \pm 1.0$ ), and overall acceptability ( $7.6 \pm 0.9$ ). Proximate analysis showed that the bar contained 383.12 kcal energy per 100g, carbohydrates (75.5%), protein (4.78%), fat (6.89%), moisture (11.48%), and 10.41% dietary fiber. The overall assessment indicated that the bars had favorable sensory qualities and physical attributes. Makhana energy bar offer nutritional benefits that can be seamlessly incorporated into athletes' diets, enhancing their performance and recovery.

**Keywords:** *athlete, energy bar, makhana, performance and recovery, standardization*

## IMPACT OF GERMINATION ON NUTRITIONAL COMPOSITION OF QUINOA (*CHENOPODIUM QUINOA*) FLOUR

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### ABSTRACT

Quinoa is a gluten-free pseudocereal with excellent nutritional composition and various health benefits. The goal of the present study was to assess the impact of 72-hour germination on the nutritional quality of quinoa flour in terms of proximate composition, minerals, dietary fibre, *in vitro* protein digestibility, antioxidants, and anti-nutritional factors. All the analytical experiments were carried out in triplicates using standard procedures. Results of the present study showed that germinated quinoa flour had higher crude protein (13.6%) and crude fibre (7.16%) content whereas raw quinoa flour had higher moisture (11.0 %), total ash (2.22%), crude fat (5.2%), carbohydrate (64.15%) and physiological energy (351.66 Kcal/100 g) in comparison to their counterparts. Data on mineral composition revealed that germination led to significant increases of 49, 33.87, 18.38 and 13% in iron, calcium, potassium, and phosphorus contents, respectively, which can be correlated with the decrease in antinutritional factors with germination. Quality parameters like dietary fibre, *in-vitro* protein digestibility and antioxidants viz total phenol, flavonoids and DPPH radical scavenging activity were found significantly higher in germinated quinoa flour. Low-cost processing of quinoa seeds with germination led to improved nutritional quality of quinoa flour. Germination led to an increase in protein bioavailability which can be beneficial to vulnerable groups such as children with PEM. Due to the higher dietary fibre, mineral and antioxidant content in germinated flour, it can be advantageous to people with lifestyle disorders such as diabetes, cardiovascular diseases, obesity etc. It can be strongly recommended for celiac disease patients.

**Keywords:** *Dietary fibre, germination, pseudocereal, quinoa*

## ASSESS THE KNOWLEDGE AND ATTITUDE REGARDING DISEASE MANAGEMENT AMONG WOMEN WITH CELIAC DISEASE

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### ABSTRACT

Celiac disease, an autoimmune disorder, requires individuals to eliminate gluten from their diet. It is essential for women with this condition to have sufficient knowledge and a positive

mindset regarding disease management to promote their overall health and wellness. Understanding disease management and having a positive attitude towards dietary habits are especially crucial for women diagnosed with celiac disease. It's essential that they are knowledgeable about the accessibility and nutritional content of suitable foods to maintain a balanced diet while effectively managing their condition. The aim of this research is to assess the knowledge and Attitude of women with celiac disease concerning disease management and dietary habits. This research study focuses on young women aged 18 to 38 who have been diagnosed with celiac disease. Results of Secondary data suggest that women with celiac disease often have insufficient knowledge and varied attitudes towards managing their condition. Many lack a thorough understanding of the disease and its management protocols. Furthermore, attitudes towards necessary dietary adjustments vary, with some women displaying reluctance or resistance while others are more open to change. The study findings indicate the importance of providing comprehensive education to women to enhance their knowledge and attitudes towards disease management, ultimately leading to improvements in their overall well-being.

**Keywords:** *Celiac disease, Knowledge, Attitude, Disease Management, Dietary habits*

## **DATE FRUIT (*PHOENIX DACTYLIFERA L.*) POTENTIAL HEALTH BENEFITS AND ITS APPLICATION IN FUNCTIONAL FOOD.**

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### **ABSTRACT**

Fruit is an excellent source of essential nutrient and provide a wide range of health-boosting antioxidants, including flavonoids. In world date fruits (*Phoenix dactylifera L.*) are one of the dried fruits of the date palm tree which is growing in many tropical regions. Due to the date fruit impressive nutritional profile and health benefit date fruit have now become increasingly popularly. Date fruits contain 6.5–11.5% total dietary fibers (of which 84–94% insoluble and 6–16% soluble dietary fiber), about 1% fat, 2% proteins, and 2% ash and is a rich source of phenolic antioxidants (1–2%). Date fruits are also a good source of sugar (70–80% sugar content), which varies according to the stage of maturity of the fruit's species. Dates contain 1–2% phenolic antioxidants, tannin-based pigments, and epicatechin oligomers. Dates fruits have been used as functional ingredients in some newly developed foods and for other purposes. Dates offer an impressive array of nutrients and potential health benefits. Date fruit potential health benefits were reviewed and presented in this article. This all-detailed information will improve the worth of date fruit as cheap sources of natural diet that can functions of both nutritive and bioactive ingredient in functional foods.

**Keywords:** *Date, antioxidant, nutritional value, functional food*

## **THE CRUCIAL ROLE OF DAIRY IN THE TRANSFORMATION OF FOOD SYSTEMS FOR CHILD HEALTH AND WELL-BEING**

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### **ABSTRACT**

Throughout a child's vital years of growth and development, malnutrition in all its manifestations can have long-lasting effects on their health and wellbeing. Many people worldwide still struggle with under nutrition and over nutrition, especially small children who are dependent on others for sustenance, even though most of the malnutrition may be avoided with straightforward dietary treatments. Children's health is facing increasing problems from infectious diseases, pollution, degrading environments, and climate change, in addition to dietary concerns. Achieving the 2030 Sustainable Development Goals will need a dramatic transformation of both food production and consumption patterns, which are at the core of these problems. Food production methods, food sources (foods derived from plants vs. foods from animals), and the consequences of Health and sustainability research as well as policy discussions have been paying more and more attention to food processing, the effects of an increasingly globalized food system, and food loss and waste. Numerous studies suggest cutting back on foods derived from animals that require a lot of resources. Foods that have been processed and linked to excessive waste and pollution, while also offering more options sourced from plants. However, when considering challenges like global child health, some of these ideas need for a bit more depth. All kinds of food can have a big impact on children's global nutrition needs as well as the welfare and standard of living of their families and communities. The global variations in dairy production and consumption patterns, along with their effects on child health and the sustainability of the food system, make dairy products an excellent illustration of the need for nuance. This narrative review seeks to shed light on the contribution of dairy products to children's health within the framework of a sustainable food system. To effectively balance trade-offs, optimize outcomes, and prevent unintended consequences, it is advised that when evaluating child health within this framework, a holistic approach that considers all four domains of sustainability (health, economy, society, and the environment) be used. The story of the larger food systems transformation must give specific attention to the needs of children to guarantee that they have access to safe and nutrient-dense foods within sustainable food systems.

**Keywords:** *child security, nutrition, food systems, dairy, sustainability, and healthy, sustainable*

## **OPTIMIZATION AND DEVELOPMENT OF NUTRIMIX PORRIDGE FLOUR FOR LACTATING MOTHERS**

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### ABSTRACT

The nutrient-dense instant porridge was developed by combining flours from Nutrimix Flour, which includes germinated finger millet, green gram, semolina, amaranth seeds, and gingelly seeds. The processing parameters were carefully optimized using Nutrimix flour with Wheat broken, milk powder, and icing sugar to develop the porridge. A Randomized Box-Behnken experimental design was conducted to determine the ideal formulation of Nutrimix porridge flour. A total of twenty trial sets of experiments were carried out to determine the optimized values of the flour. The optimized ingredients for the porridge were found to be Nutrimix Flour (45%), Wheat Broken (22.5%), Milk Powder (23.5%), and Icing Sugar (9%) respectively. The nutritional analysis of the product reveals a well-balanced composition with a moisture content of 5.8% ( $\pm 1.02$ ), energy value of 400.4 kcal ( $\pm 1.05$ ), carbohydrates of 72.08% ( $\pm 0.45$ ), contributing to the product's energy content. The protein content was notable at 13.5% ( $\pm 1.01$ ), highlighting its potential as a protein source. Additionally, the presence of 6.4% crude fat ( $\pm 0.32$ ) adds to the overall macronutrient balance. The total ash content was 2.1% ( $\pm 0.88$ ) and crude fiber content was 1.0% ( $\pm 0.01$ ). Furthermore, the product contains 507.0mg of calcium ( $\pm 0.34$ ) and 3.1mg of iron ( $\pm 0.19$ ), emphasizing its contribution to essential mineral intake. The product also exhibits significant physical and functional characteristics, as indicated by the provided parameters. Its swelling capacity was recorded at 18.2 ml ( $\pm 0.24$ ), water absorption capacity was substantial at 49.3% ( $\pm 0.67$ ), emulsion activity and capacity were recorded at 43.2% ( $\pm 0.03$ ), while the emulsion stability was 47.6% ( $\pm 0.55$ ), and the bulk density of 843 kg/m<sup>3</sup> ( $\pm 0.22$ ) provides insight into its physical density. Overall, these parameters collectively highlight the diverse and beneficial characteristics of the product, making it a complete balanced meal for lactating mothers and versatile for various applications in food and industrial settings.

**Keywords:** *Finger Millet, Lactating mothers, Nutrimix, Optimization, Porridge, RS*

## MICRONUTRIENT ENHANCEMENT AND IMPACT OF COOKING ON NUTRITIONAL CONTENT OF FERMENTED FOOD PRODUCTS

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### ABSTRACT

Fermentation has been recognized as an effective method for enhancing the micronutrient content of various food products. This process involves the breakdown of complex compounds into simpler and more easily digestible forms, resulting in an increased availability of micronutrients. However, the effects of heating the fermented mixture on its nutrient profile have been a subject of debate. While some studies have shown that heating



can further enhance the bioavailability of micronutrients, others suggest that it may leads to their degradation. Therefore, these abstract aims to review the current literature on the changes in micronutrient content after fermentation and the possible effect of heating regarding this nutrient. By looking at these aftereffects we can obtain a better comprehension of the potential benefits and drawbacks of consuming fermented and heated foods and make informed decisions about our dietary choices. In the end, this research may aid in the creation of practical methods for optimizing the nutritional content of fermented foods and promoting their consumption as a means of improving overall health and wellbeing.

**Keywords:** *Micronutrient enhancement, fermentation, bioavailability, bioactive compounds, nutrient retention, heating effects, nutrient degradation, food processing.*

## **SIMULATION OF GASTRIC RESPONSE AGAINST STARCHY FOOD IN AN ARTIFICIAL DUODENUM**

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### **ABSTRACT**

This study focuses on developing an artificial small intestinal model to understand gastric response dynamics by chyme flow characteristics. Considering the actual dimension of human duodenum dimensions, an artificial system was designed along with provision for peristaltic movement of food bulk and contraction. Based on general perception that food bulk takes 180 min to pass through a 7 m long, small intestine, the velocity of the chyme was estimated to be 0.0006 m/s through the intestine having a diameter of 0.025m. Further, to understand the density and consistency of chyme, a model food (rice) was considered for the investigation. It was found that viscosity of chyme to be three to five times of water while density remains close (slightly) higher than water. With this, the Reynold's number of the chyme was estimated to be in the range of 3-5, which matches with the actual physiological range. Based on density and viscosity of simulated rice chyme and through meticulous calculation, we identified that maintaining a ratio of rice to gastric juice between 1:2.3 and 1:2.6 is important in achieving the desired Reynold's number. In continuation, we are in the process of understanding the influence of segmented contractions, a vital aspect of intestinal motility, on the process of chyme flow through duodenum.

**Keywords:** *human duodenum model, segmented contraction, digestion of food.*

## **ASSESSING THE SCOPE AND CHARACTERISTICS OF UNHEALTHY FOOD ADVERTISING TARGETING CHILDREN ON INDIAN TELEVISION**

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### ABSTRACT

Abstract: India, with its diverse population and rapidly changing lifestyle patterns, faces a dual challenge of undernutrition and overnutrition. While the country grapples with malnutrition-related issues, the increasing consumption of unhealthy foods, often promoted through aggressive advertising, has become a major concern. The rising prevalence of non-communicable diseases (NCDs) such as obesity and diabetes has prompted a closer examination of the role that food advertisements play in shaping dietary choices and overall public health. Therefore, the present study aims to investigate the prevalence and characteristics of unhealthy food advertisements on Indian television, focusing on the persuasive marketing strategies employed. Following the INFORMAS protocol, we conducted a comprehensive analysis by observing content from three of India's most popular TV channels, totalling 432 hours over three months. This coverage included both weekdays and weekends. Advertisements were categorized by product type, and their nutritional quality was evaluated using the WHO nutrient profile model for the South-East Asia region. The study also scrutinized the persuasive marketing techniques used in these ads. Statistical analysis, facilitated by IBM SPSS, revealed that food ads constituted 9.32% of all advertising, with 6.02% promoting products not meeting WHO SEARO standards. The prevalence of non-compliant products was notably higher, indicating a need for improved regulatory measures. Among the frequently advertised food categories were confectionery, coffee, tea, composite foods, cereal-based beverages, and potato or animal-based products. These advertisements often employed persuasive strategies, prominently featuring children in promotions. The outcomes of this study hold significant policy implications for India. Policymakers in the country should contemplate implementing more stringent regulations on the advertising of unhealthy food targeted at children through television channels.

**Keywords:** *Unhealthy food advertising, Television, Children, Policy regulations*

## MICRONUTRIENT ENHANCEMENT AFTER FERMENTATION AND AFTEREFFECTS OF HEATING THE MIXTURE

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### ABSTARCT

Fermentation has been recognized as an effective method for enhancing the micronutrient content of various food products. This process involves the breakdown of complex compounds into simpler and more easily digestible forms, resulting in an increased availability of micronutrients. However, the effects of heating the fermented mixture on its



nutrient profile have been a subject of debate. While some studies have shown that heating can further enhance the bioavailability of micronutrients, others suggest that it may lead to their degradation. Therefore, this abstract aims to review the current literature on the changes in micronutrient content after fermentation and the possible effect of heating regarding this nutrient. By looking at these after effects we are able to obtain a better comprehension of the potential benefits and drawbacks of consuming fermented and heated foods and make informed decisions about our dietary choices. In the end, this research may aid in the creation of practical methods for optimizing the nutritional content of fermented foods and promoting their consumption as a means of improving overall health and wellbeing.

**Keywords:** *Micronutrient enhancement, fermentation, bioavailability, bioactive compounds, nutrient retention, heating effects, nutrient degradation, food processing.*

## HEALTH BENEFITS AND POTENTIAL USE OF POSTBIOTICS IN FOOD INDUSTRY: AN OVERVIEW

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### ABSTRACT

Functional foods have become widespread among the consumers due to their potential health benefits. Postbiotics are the newly popularized term evolving among the research community for providing health benefits through foods. Postbiotics are the soluble bioactive compounds or metabolites released by active and live probiotics in intestine such as organic acids, enzymes, polysaccharides, antimicrobial peptides, and unsaturated fatty acids. They are produced through food-grade microbes during progression and fermentation in intricate microbiological culture (cell-free supernatant), food, or human gut, which makes it functional food for users. These lifeless microbes containing paraprobiotics may offer health benefits to the host by adding further bioactivity to probiotics. Postbiotics are aligned due to its chemical structure, long shelf life and the health properties such as anti-hypertensive, anti-obesogenic, anti-inflammatory, hypocholesterolaemia and antioxidant activities exhibited by its various molecules. These overgenerous health properties may contribute towards improving the overall health of host, but extensive research is needed to elucidate the exact mechanisms. However, this review focusses on exploring the various health benefits, practical and valuable potential of these compounds in the food industry.

**Keywords:** *Antioxidant, Bioactive compounds, Functional foods, Paraprobiotics, Postbiotic*

## **EFFECTIVENESS OF IRON SUPPLEMENTATION IN THE PREVENTION OF IRON DEFICIENCY ANEMIA AMONG ADOLESCENT GIRLS**

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### **ABSTRACT**

The most common form of micronutrient malnutrition is iron deficiency anaemia, which affects both developed and developing nations and has a detrimental effect on the economy as well as impediments to national growth. Due to increasing pubertal growth, adolescent girls between the ages of 12 and 15 have the highest incidence since their requirements are at their peak. National Family Health Survey (NFHS) conducted in the year 2019-21, reported that more than 52 percent of pregnant women and more than 59 percent of adolescent girls across the country had anaemia. The prevalence of iron deficiency anemia is partially induced by plant-based diets, containing low levels of poorly bio-available iron. Usually the iron supplements are required in India to prevent and control anaemia, even with an adequate diet, due to the country's predominately vegetarian diet and low iron absorption. So, this can be improved with an additional increase of iron-rich food in the daily diet. Dietary diversification and food fortification with iron are two food-based therapies that must be used to enhance the amount of iron consumed to prevent and treat iron deficiency anaemia. One of the primary strategies used in underdeveloped nations to combat the high prevalence of iron deficiency anaemia is to fortify or supplement food items with iron to raise the level of iron consumption and enhance nutritional status. Food supplementation is the most efficient, and cost-effective, and environmentally friendly technical strategy for addressing iron deficiency since it optimizes both intrinsic and added food iron levels without causing any adverse effects on the gastrointestinal tract. Non-heme iron is typically utilized for supplementation since it is readily available and reasonably priced. Thus, the high prevalence of mild and moderate anaemia demand due emphasis on food-based approaches like iron supplementation. Health and nutrition education along with good quality iron rich nutritious food can bring down the total prevalence of iron deficiency anaemia among adolescent girls.

**Keywords:** *Supplementation, Diversification, Consumption, Requirements, Malnutrition*

## QUALITY AND NUTRITIONAL CHARACTERISTICS OF CHICKPEA (*CICER ARIETINUM* L.) MICROGREENS VAR. PUSA-3062 GROWN UNDER CONTROLLED CONDITIONS

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### ABSTRACT

Microgreens are nutritionally packed tender greens possessing extraordinary quantities of health benefitting phyto-active compounds. With an average life cycle of 7-30 days, these miniature greens are categorised by the emergence of cotyledonary leaves or early pair of true leaves. However, they are easily cultivable under minimal growth conditions but exhibit profound nutritional qualities when grown on specific substrates and supplemented with optimum light intensity and nutrient media. The present study was conducted on desi chickpea variety Pusa-3062 for microgreen production at weekly intervals up to 28 days after sowing (DAS). Seeds of P-3062 were firstly soaked overnight followed by sowing in plastic trays filled with sand. The trays were then kept in growth room under optimum growth conditions of temperature ( $25\pm 2^{\circ}\text{C}$ ), humidity ( $50\pm 5\%$ ) and light ( $\sim 10,000$  lux). The sand was regularly sprayed with water to keep it moist. The shoot and leaf emergence were closely monitored. Chickpea microgreens were studied for morphometric, nutritional, and sensory parameters up to 28 DAS. It was observed that length of shoot and number of compound leaves increased to 21.6 cm and 15 respectively by 28 DAS. Further, the fresh weight of microgreens was observed to be 0.568 g per shoot at 28 DAS. The microgreens were analysed for change in proximate composition, concentration of phenols, total chlorophylls, ascorbic acid, and antioxidant activity during this period of growth.

**Keywords:** *chlorophyll, microgreen, morphometric, nutrition, proximate composition.*

## BIOELECTRICAL IMPEDANCE ANALYSIS AS A PROGNOSTIC TOOL OF NUTRITION STATUS ANALYSIS

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### ABSTRACT

BIA, or bioelectrical impedance analysis, is a predictive method for evaluating nutritional status. This study explores the intricacies of bioelectrical resistance (BIA), a non-invasive method that quantifies biological tissues' resistance to current flow. Through evaluation of fluid distribution and body composition, BIA becomes an important predictive factor for nutritional health. This hazard of nutrition varies between 20 to 62% of hospitalized patients. Several screening tools have been developed to assess nutritional risk, such as the Healthy

Risk Testing Tool 2002 (NRS-2002) developed by the European Society for Enteral and Parenteral Nutrition (ESPEN) and the Subjective Global Evaluation (SGA) questionnaire. BIA is a valuable method for body composition study that allows three important body compartments to evaluate in fat mass, fat free mass, and water. There was the history of BIA and the 18th to 20th century was full body fat, muscle, and tissues or water. This study emphasizes how useful and effective BIA is in offering comprehensive understanding into nutritional status. By carefully examining bioelectrical characteristics such as reactance and resistance, this study seeks to develop a reliable predictive model. A framework like this makes it easier to spot nutritional abnormalities early on, which allows for prompt treatments and individualized eating plans.

**Keywords:** *Bioelectrical impedance analysis, Body composition, Phase angle, Fat-free mass, Singular frequencies BIA,*

## INDIVIDUALIZED NUTRITIONAL SUPPORT FOR HOSPITALISED PATIENTS

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### ABSTRACT

Individualized nutritional support plays a crucial role in the care of hospitalized patients, particularly those with varying medical conditions and nutritional needs. This abstract explores the significance and implementation of tailored nutritional interventions in the hospital setting. Recognizing the diverse nutritional requirements of patients, individualized approaches aim to optimize dietary intake, prevent malnutrition, and promote recovery. Key components include thorough nutritional assessments, personalized meal plans, supplementation when necessary, and regular monitoring of nutritional status. This review highlights the importance of interdisciplinary collaboration among healthcare professionals, including dietitians, physicians, and nurses, to design and implement individualized nutritional support strategies. By addressing specific patient needs and considering factors such as diagnosis, comorbidities, and treatment regimens, individualized nutritional support contributes to improved clinical outcomes, enhanced patient well-being, and overall quality of care during hospitalization. Regular monitoring of nutritional status and clinical progress allows for timely adjustments to the nutritional regimen to optimize patient outcomes. Additionally, patient education and counselling play a vital role in promoting dietary adherence and empowering patients to make informed nutritional choices during and after hospitalization. By addressing the specific nutritional needs of hospitalized patients through individualized approaches, healthcare providers can mitigate the risk of malnutrition, improve clinical recovery, and enhance overall patient well-being. Ultimately, personalized nutritional support contributes to better clinical outcomes, reduced length of hospital stays, and improved quality of care for hospitalized patients.

**Keywords:** *individualized nutritional support, hospitalized patients, nutritional assessment*

## EFFECTIVENESS OF A LOW FODMAP DIET IN MANAGING SYMPTOMS OF IRRITABLE BOWEL SYNDROME (IBS)

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### ABSTRACT

Irritable bowel syndrome (IBS) is a common gastrointestinal disorder that is characterised by a variety of symptoms, including altered bowel habits like constipation or diarrhoea including gas, bloating, and stomach discomfort. A multitude of factors, including altered gut microbiota, intestinal inflammation, genetic factors, nutrition, food intolerance, stress, and anxiety, are likely to be involved in the development of IBS, even if its exact cause is unknown. It is categorised as a chronic illness, which implies that even if its frequency and severity can change, it often lasts for a long period. One dietary approach that has gained attention for its effectiveness in treating IBS symptoms is the low-FODMAP diet. FODMAPs (Fermentable Oligosaccharides, Disaccharides, Monosaccharides, and Polyols) are a type of carbohydrates that are poorly absorbed in the small intestine and have the potential to ferment in the colon, which in susceptible individuals can result in symptoms like gas, bloating, and diarrhoea. Restricting foods high in these fermentable carbs is part of the low- FODMAPs diet. A low-FODMAP diet is acceptable for IBS patients, although careful calorie and nutrient tracking is required to avoid malnourishment. The success of the diet depends on the assessment and instruction provided by a dietitian. It is crucial to inform patients during the first education session that long-term management and food reintroduction are the main goals of dietitian guidance once they have achieved clinical improvement and that the low-FODMAP diet is not a diet for life as the removal of foods high in the FODMAPs such some fruits, vegetables, and grains, may result in a decrease in the consumption of vital nutrients like fibre, vitamins, and minerals. This restriction may eventually increase the risk of vitamin shortages if alternative nutrient-rich foods aren't well balanced and continuously monitored.

**Key terms:** *Gastrointestinal disorder, constipation, diarrhoea, bloating, altered gut microbiota, Low FODMAP diet.*

## EXPLORING THE MECHANISMS OF THERAPEUTIC DIETS IN DISEASE MANAGEMENT

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### ABSTRACT

Therapeutic diets are integral to managing various diseases, offering targeted nutritional interventions that can positively influence disease progression and symptom management. This review aims to explore the underlying mechanisms through which therapeutic diets exert

their effects in disease management, focusing on their impact at the cellular and molecular levels. This review aims to provide an overview of current knowledge regarding the mechanisms of therapeutic diets in disease management. One key mechanism is the modulation of metabolic pathways; for instance, ketogenic diets have been found to reduce seizures in epilepsy patients by altering neurotransmitter metabolism in the brain. Similarly, diets high in omega-3 fatty acids can reduce inflammation and improve cardiovascular health by modulating the production of pro-inflammatory cytokines. In the context of genetic disorders, therapeutic diets restrict the intake of specific amino acids to prevent the accumulation of toxic metabolites. Moreover, therapeutic diets can influence the composition of the gut microbiota, which emerging evidence suggests plays a crucial role in the development and progression of various diseases. Dietary interventions, such as fiber-rich diets, can promote the growth of beneficial gut bacteria, improving metabolic health and reducing the risk of certain diseases. Addressing the existing knowledge gap and enhancing awareness of the diet-disease relationship is imperative. This abstract underscores the importance of therapeutic diets, which exert their effects through various mechanisms, including metabolic modulation, gut microbiota alteration, and gene expression regulation. Understanding these mechanisms is crucial for developing personalized dietary interventions that can effectively manage and prevent a wide range of diseases.

**Keywords:** *Therapeutic diets, Dietary Interventions, Metabolic pathways*

## **IMPACT OF MALNUTRITION ON HOSPITAL LENGTH OF STAY & CLINICAL OUTCOMES**

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### **ABSTRACT**

Malnutrition is an imbalance between the nutrients your body needs to function and the nutrients it gets. It can mean undernutrition or overnutrition. Undernutrition, including deficiencies in essential nutrients like protein, vitamins, and minerals, persists predominantly among impoverished communities, exacerbating health disparities and hindering socioeconomic development. Conversely, overnutrition, marked by an increasing prevalence of overweight and obesity, presents a dual burden of malnutrition. Urbanisation, changing dietary patterns, and sedentary lifestyles contribute to this phenomenon, fueling the rise of non-communicable diseases such as diabetes, cardiovascular ailments, and certain cancers. The coexistence of undernutrition and overnutrition within households and communities underscores the complex nature of malnutrition in India. Several factors contribute to the prevalence of malnutrition, including inadequate access to nutritious food, poor sanitation and hygiene practices, limited healthcare infrastructure, socio-economic

inequalities, and insufficient public health interventions. Addressing malnutrition requires a multi-faceted approach encompassing policy interventions, community-based programs, and behavioural changes. Efforts to combat malnutrition must prioritise targeted interventions aimed at improving access to nutritious food, enhancing maternal and child health services, promoting breastfeeding practices, fortifying staple foods, and advocating for nutrition-sensitive agricultural policies. Additionally, empowering communities through education and awareness programs can foster sustainable behaviour change and strengthen resilience against malnutrition.

**Keywords:-** *Malnutrition, Nutrition, Socioeconomic, Undernutrition, Overnutrition, Communities*

## **FACTORS INFLUENCING ADOLESCENT AND CHILDHOOD OBESITY**

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### **ABSTRACT**

Obesity is a complex medical condition characterized by the accumulation of excess body fat, often resulting in adverse health effects. The prevalence of obesity was 19.7% and affected about 14.7 million children and adolescents. Childhood and adolescent obesity can result from a combination of factors, including genetic factors where certain genes may influence factors like metabolism, fat storage, and appetite regulation. Individuals with a family history of obesity might inherit genetic variants that predispose them to weight gain. Unhealthy dietary habits consuming more calories than the body needs, often from sugary drinks, fast food, and snacks, diets high in added sugars and saturated fats, common in processed foods, contribute to weight gain. Lack of physical activity when there is an insufficient amount of activity, the energy balance incline towards excess calorie storage, can result in a slower metabolism, making it easier to accumulate excess fat. These factors shows that the problem of obesity is quite complicated. A healthy lifestyle is crucial in preventing obesity in adolescents and children. Schools and communities can play a role by providing access to nutritious meals, promoting physical education, and creating safe spaces for outdoor activities. Family involvement is key; educating parents on healthy habits and involving them in meal planning can positively impact a child's lifestyle. Overall, approach involving schools, communities, and families is vital in preventing obesity in young individuals.

**Keywords** – *Obesity, Childhood, Adolescent, Fat storage, Dietary habits*

## **MINDFUL EATING AND ITS IMPACT ON NUTRIENT ABSORPTION:**



## **A SCIENTIFIC INVESTIGATION**

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### **ABSTRACT**

Mindfulness is a powerful practice that can transform our food-related struggles into moments of joy, gratitude and fulfilment. It involves our body, heart and mind in the process of selecting, preparing and consuming food. This holistic approach allows us to fully immerse ourselves in the vibrant array of colours, textures, scents, tastes and sounds associated with eating and drinking. However, many individuals struggle to embrace mindful eating due to hectic schedules, constant distractions and ingrained habits. Emotional factors like stress and boredom can also lead to mindless consumption. Research suggests that mindful eating promotes a strong mind-body connection, potentially enhancing nutrient absorption and overall health, reducing binge eating and helping with weight management. By promoting a relaxed state during eating, mindful practices may mitigate the negative impact of stress on digestion. The act of savouring each bite, chewing food thoroughly and paying attention to hunger and fullness cues can contribute to improved digestive processes and optimize the body's ability to absorb essential nutrients. Embarking on mindful eating is like discovering a secret world of flavours, transforming meals into moments of joy and gratitude. By slowing down, chewing deliberately and being present, one creates a deeper connection with their food and well-being.

**Keywords:** *Chewing, Eating Disorders, Mind-Body Connection, Mindful Eating, Weight Management*

## **SESAME SEEDS: A WAY TOWARDS MANAGEMENT OF DIABETES MELLITUS**

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### **ABSTRACT**

Sesame seeds are recognized for their abundance in bioactive compounds, including Sesamol, PUFA, Phytosterols, Tocopherols, Lignans etc. Sesame seeds nutritional components includes 21.9% protein, 8.10% fiber and 18% carbohydrates, along with essential micronutrients like folic acid, niacin, calcium, iron, manganese, zinc, magnesium, selenium, and copper . Sesame seeds exhibit promising anti-diabetic properties by influencing key pathways. Sesame seeds helps in management of diabetes by potentially enhancing insulin sensitivity, regulating glucose metabolism, and relieves oxidative stress. Moreover, their high fiber content may contribute to improved glycemic control by slowing



carbohydrate absorption and aiding in the regulation of postprandial blood glucose levels, also facilitating insulin secretion and glucose metabolism.

**Key words:** *Sesame seeds, Diabetes mellitus, Pathophysiology, Mechanisms, Nutritional benefits*

## **VITAMIN C AND GUT HEALTH: IMPACT ON MICROBIOTA COMPOSITION AND IMMUNE FUNCTION**

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### **ABSTRACT**

Gut Microbiota is a diverse group of microorganisms in the colon and gastrointestinal tract, crucial for metabolism, digestion, and immune regulation. In addition to being crucial to the pathophysiology of numerous diseases, the gut microbiome also maintains host health, and diet plays a major role in influencing the composition and diversity of the gut microbiota. Among all the essential nutrients, Vitamin C stands out as being particularly important for preserving gut health and enhancing immune system function and as well as a potential antioxidant, it has numerous health benefits in a variety of stress-related disorders like obesity, diabetes, cancer and cardiovascular disease and can favorably boost the gut microbial population. Because of its anti-inflammatory qualities, Vitamin C helps to stabilize the microbiota by promoting the growth of beneficial bacteria and preventing the growth of pathogenic ones. Vitamin C, essential for metabolic processes in cardiovascular disorders, has shown promising results in fortifying immunity and addressing cardiac problems in elevated dosages. Foods high in Vitamin C, such as bell pepper, kiwi, strawberries, and citrus fruits, also include fiber, which serves as a prebiotic to support the development of probiotic bacteria in the stomach. This abstract also highlights the importance of understanding Vitamin C's molecular mechanisms in improving human health and reducing immune-mediated illnesses through tailored therapies. Overall, Vitamin C's health benefits include improved intestinal barrier function, immune system function, and regulation of gut microbiota composition and metabolic activity, although adverse effects may encourage endotoxemia, gastrointestinal disorders, obesity, and diabetes.

**Keywords:** *Gastrointestinal tract, Gut Microbiota, Immune system, Metabolic processes, Vitamin C*

## **PROMINENCE OF NUTRIMENT IN OVARIAN HEALTH : AN ALTERNATIVE TO PHARMACEUTICAL APPROACH**

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### **ABSTRACT**

Ovarian Health refers to Reproductive Well being of a woman which includes different components like puberty, menstruation fertility, prenatal care, post partum care, menopause etc. Nutriment defines food which provides nourishment or nutrient. This article highlights the importance of food associated with healthy ovaries as it is very common for women to experience gynaecological conditions including sexual dysfunction, polycystic ovary syndrome, fibroids, endometriosis and infertility. The abstract emanates unhealthy eating habits responsible for poor sexual health of a female which elaborates irregular eating patterns, consumption of saturated and processed foods like butter, biscuits, refined flour, bakery items. Whereas this also talks about an approach to healthy functioning of ovaries. Malfunction of ovaries can provoke other health issues like undesired weight gain, frequent mood swings, acne, depression, unable to conceive, heart disease and much more. An approach to healthy functioning of ovaries could be medication or surgery. Therefore, this abstract emphasizes on the alternative which is role of dietary modification and lifestyle. It refers to intake of foods rich in dietary fibre (vegetables and legumes), omega-3 (walnut, fatty fish, cod liver oil, oilseeds), whole grains (barley and millet) and unsaturated fats (vegetable oil). Furthermore it portrays the salience of some micronutrients like vitamin D and Folic acid in child bearing age. The abstract supports an evidence based approach rooted in paradigm of food as medicine. Thus, it concludes by focusing on alleviation of problems rising to ovarian health and calls for an increase in finding an alternative to pharmaceutical approach.

**Keywords:** *Dietary: Modification , Gynaecological Conditions , Nutriment, Ovarian Health*

## **ROLE OF “VEGAN DIET” IN CARDIOVASCULAR DISEASE**

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### **ABSTRACT**

Vegan nutrition is often referred to as a healthy diet and contains high amounts of nutrients. A vegan diet is a diet that excludes all animal products and byproducts, including meat, dairy, eggs and honey. People who follow a vegan diet only eat foods such as fruits, vegetables, grains, legumes, nuts, seeds, and other plant-based animal products. This diet will benefit human health, the environment and the immune system. Plants ensure that defence mechanisms work

well by providing vitamins, minerals, phytochemicals, and antioxidants that support cell survival and immunity. According to the research conducted compared to omnivorous diets, which are generally lower in calories, vegan diets are associated with lower body mass index (BMI) values and changes in cardiovascular disease (CVD) risk markers such as total cholesterol, blood sugar, pain, and blood pressure. Reducing your intake of low-density lipoprotein (LDL), saturated fat, processed meat, and increasing your fibre and phytonutrients can improve cardiovascular health. However, vegetarians contain less nutrients than non-vegetarians, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), selenium, zinc, iodine, and vitamin B12, which may affect the cardiovascular system. A vegan diet may reduce the risk of heart disease by reducing cholesterol, blood pressure and weight, improve diabetes control and reduce the risk of metabolic syndrome. It does this by reducing saturated fat, increasing fiber and antioxidants, and supporting heart health. The aim of this review is to describe the effects of plant-based foods (PBD), especially vegan foods, on the cardiovascular system.

**Keywords:** *vegan diet; plant-based health benefits.*

## UNVEILING THE IMPACT OF ADDED SUGARS ON HUMAN HEALTH: A COMPREHENSIVE REVIEW

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### ABSTRACT

In the contemporary dietary landscape, added sugars have emerged as a ubiquitous yet often overlooked component of modern diets. This abstract delves into the intricate interplay between added sugars and human health, scrutinizing their impact on overall wellness. Through an exploration of the physiological repercussions and epidemiological evidence, firstly this study elucidates the adverse effects of excessive sugar consumption particularly refined sugars and high-glycemic carbohydrates, on cardiovascular function, including the development of obesity, and the risk of chronic diseases. Secondly, it delves into the intricate mechanisms by which sugar disrupts metabolic processes, leading to insulin resistance, inflammation, and oxidative stress leading to skin conditions like eczema and psoriasis. Furthermore, it explores the intricate relationship between sugar consumption and mental health, highlighting the potential links to the neurological health, encompassing cognitive decline, mood disorders, and heightened risk of neurodegenerative diseases, is discussed. Additionally, the adverse effects on oral health, including dental caries and periodontal diseases, are outlined. By reviewing the behavioral approaches, nutritional education initiatives, and policy interventions, this abstract proposes multifaceted strategies aimed at curbing sugar consumption and fostering healthier dietary habits. Ultimately, this research aims to raise awareness about the adverse consequences of sugar-laden diets, providing insights to inform public health policies and underscores the urgency to empower individuals to make informed dietary choices conducive to long-term well-being.

**Keywords:** *neurological health, oxidative stress, psoriasis, periodontal diseases,, sugar-laden diets*

## **FERMENTED FOODS FOR POST-SURGICAL RECOVERY: A TREASURE TROVE OF PROBIOTICS AND BIOACTIVE COMPOUNDS OPTIMIZING GUT MICROBIOME COMPOSITION**

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### **ABSTRACT**

Fermented foods contain a variety of living cultures that have the potential to be probiotics and can colonize the gut to help restore the balance of microorganisms. They are also a rich source of bioactive metabolites that have been linked to several health advantages, including organic acids, bioactive peptides, and short-chain fatty acids (SCFAs). Despite its ability to save lives, surgery upsets the delicate balance of the gut microbiota, which raises the possibility of complications and slows healing. The expanding volume of studies on fermented foods, which are high in bioactive chemicals and living cultures, offers a potential direction for enhancing gut health and enhancing the results of surgery. Surgical treatments can cause gut microbiome dysbiosis, which is characterized by reduced microbial diversity and enrichment of potentially harmful bacteria. Other contributing factors to this dysbiosis include stress, antibiotic usage, and changing nutritional consumption. This imbalance has the potential to impair immunological response, raise inflammatory levels, and impede wound healing, all of which can postpone healing and raise the risk of infections and other issues. This review explores the possible mechanisms of action via which fermented foods may influence the makeup of the gut microbiota, and how this may lead to improved recovery after surgery. By implementing this plan into practice, post-operative treatment might be significantly transformed, resulting in faster recovery, fewer problems, and ultimately, better patient outcomes.

**Keywords:** *Post-surgical recovery, Fermented foods, Gut microbiome, Probiotics, Anti-inflammatory, Wound healing*

## **EXPLORING THE IMPACT OF CULTURAL INFLUENCES ON DIETARY CHOICES AND THEIR CONTRIBUTION TO ADOLESCENT OBESITY**

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### **ABSTRACT**

The prevalence of adolescent obesity has reached alarming levels globally, with more than one billion people worldwide are obese – 650 million adults, 340 million adolescents and 39 million children. Among these determinants, cultural influences on dietary choices emerge as a crucial yet understudied aspect. This comprehensive analysis critically examines the multifaceted relationship between cultural influences and dietary choices, focusing on their significant contribution to the alarming rise in adolescent obesity.

Cultural factors encompass a wide range of elements, such as traditional food practices, social norms, and marketing strategies. The exploration of traditional food habits unveils the impact of cultural heritage on dietary choices. The intergenerational transmission of culinary traditions not only defines cultural identities but also shapes preferences and attitudes toward food. Traditional diets rich in heritage may coexist with contemporary lifestyles, yet the infiltration of globalized, energy-dense diets challenges the sustainability of these healthier practices. Recognizing the intricate interplay between these components is vital for developing effective interventions aimed at mitigating the rising trend of adolescent obesity. By addressing the cultural dimensions of dietary behaviour, advance efforts can be made to combat the global epidemic of adolescent obesity and promote a healthier future generation.

**Keywords-** *Obesity, adolescent, cultural, dietary choices, interventions*

## **THE ROLE OF NUTRITIONAL SUPPLEMENTS IN HOSPITALISED PATIENTS**

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### **ABSTRACT**

Hospitalised patients often experience poor nutritional status because of disease, trauma, or surgery, which can worsen their condition and take longer to heal. Essential nutrients that may be lacking or inaccessible through regular dietary consumption are supplied by nutritional supplements, which are crucial in supporting these individuals. The focus of this review is to explore the function of nutritional supplements in hospitalised patients, emphasising how they affect clinical results, nutritional status, and medical expenses. Nutritional supplements examples oral supplements example : vitamin- D, multivitamin capsules, B-complex, folic acid supplements, enteral nutrition (EN) such as tube feeding, and parenteral nutrition (PN), are widely used in clinical settings to address the increased nutrient requirements of hospitalised patients. Particular focus is given to specific patient populations, such as critically ill patients, older adults, and those with chronic diseases. Supplements offer patients a concentrated and easily digestible source of nutrients, assuring that they get enough energy, protein, vitamins, and minerals. Nutritional supplements can bridge the gap between nutrient requirements and actual intake, preventing malnutrition, promoting tissue repair and immune function, and enhancing clinical outcomes, including mortality rates and length of hospital stay. Nutritional supplements contribute to the overall management of chronic diseases, aiding in the prevention of complications and promoting a faster recovery. Furthermore, it concludes the potential challenges associated with implementing nutritional supplementation protocols in hospital settings, including barriers to adherence, dosage considerations, and interactions with concurrent medications.

**Keywords:** *Nutritional Supplements, Hospitalised Patients, Malnutrition, Immune Function*

## PHARMALOGICAL AND NUTRITIONAL ASPECTS OF ESSENTIAL FATTY ACIDS IN TREATMENT OF ENDOMETRIOSIS

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### ABSTRACT

Endometriosis is a complex gynaecological disorder characterized by the presence of endometrial-like tissue outside the uterus, leading to debilitating pain and fertility issues in affected individuals. This review explores the emerging evidence supporting the integral role of essential fatty acids (EFAs) in the pathogenesis and management of endometriosis. Essential fatty acids, play crucial roles in regulating inflammation, immune responses, and hormonal balance. Dysregulation in these processes is a hallmark of endometriosis, making EFAs potential key players in the modulation of the disease. The anti-inflammatory properties of omega-3 fatty acids, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), have been shown to mitigate inflammatory pathways associated with endometriosis, offering a promising avenue for therapeutic intervention. Moreover, the balance between omega-3 and omega-6 fatty acids is essential for maintaining homeostasis in the endocrine system. Imbalances, often observed in individuals with endometriosis, may contribute to hormonal disturbances that exacerbate the disease. This review explores the intricate interplay between EFAs and hormonal regulation, shedding light on their potential impact on endometriosis development and progression. Additionally, the influence of EFAs on oxidative stress, angiogenesis, and cell proliferation - processes implicated in endometriotic lesion formation - is discussed. Studies suggest that EFAs may exert protective effects against oxidative damage and abnormal cell growth, offering a multifaceted approach to addressing endometriosis-related pathology. Furthermore, the therapeutic potential of dietary interventions, supplementation, and pharmacological agents targeting EFAs is explored. Understanding the intricate mechanisms by which EFAs influence endometriosis opens new avenues for personalized and targeted treatment strategies, providing hope for improved symptom management and quality of life for affected individuals. Endometriosis risk can be controlled and even prevented by modifying dietary fat intake, as dietary fatty acids may contribute to endometriosis by modulating inflammatory pathways and affecting endogenous estragon production in conclusion, this comprehensive review underscores the pivotal role of essential fatty acids in the pathophysiology of endometriosis. Future research efforts should focus on elucidating the precise molecular mechanisms underlying EFA-mediated effects, paving the way for innovative therapeutic approaches in the management of endometriosis.

**Keywords:** *dietary fats; endometriosis; inflammation; pelvic pain; women*

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## PHARMACOLOGICAL AND THERAPEUTIC POTENTIAL OF *HOUTTUYNIA CORDATA*-A HIDDEN MEDICINE

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### ABSTRACT

*Houttuynia cordata*, also known as Chameleon plant or Heartleaf, is a perennial herb native to North-eastern parts of India like Manipur, Mizoram, Assam, Meghalaya, Tripura, Sikkim and Andhra Pradesh and East Asia, mostly China, Japan, Korea. The consumption of both roots and leaves in the form of spicy salad and chutney (Indian sauce) is a culinary practice in northeastern states of India. The benefits of this herb include the bioactive compounds present in *H. cordata*, including flavonoids, alkaloids, and essential oils, which contribute to its medicinal efficacy. Its extracts have been utilised for their therapeutic properties which include its anti-inflammatory, anti-microbial, virulent, antioxidant and immunomodulatory effects in traditional Asian medicine for centuries. After COVID-19 outbreak its potential has come to light due to its antiviral activity. The extracts and derivatives of *H. cordata* have shown promising results in terms of anti-tumour activities, inhibits effects on *Pseudomonas aeruginosa* in cystic fibrosis patients, interstitial cystitis/bladder pain syndrome, rheumatoid arthritis (RA), and the leaves of *H. cordata* is used as medicine to treat intestinal infection by the Naga tribes in North-east India since a long time ago. This review highlights the pharmacological and therapeutic benefits of *Houttuynia cordata* and its potential as a valuable natural resource for drug development and complementary medicine.

**Keywords:** Chameleon plant, bio-active compounds, Asian medicine, therapeutic properties

## AFFECT OF GOOD EATING HABITS ON PCOS

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### ABSTRACT

Polycystic ovary syndrome (PCOS) affects women of reproductive age worldwide and is characterized by hormonal deficiency and irregular menstruation. This abstract explores the relationship between diet, eating habits and PCOS symptoms across age groups. A study of 500 women (aged 18-40) with PCOS shows that 82% experienced improvement in symptoms through healthy eating habits, such as increasing consumption of fruits and vegetables. Additionally, 65% report that their menstrual cycles are better after following a healthy diet. Retrospective analysis of electronic health records of PCOS patients aged 25 to 35 shows an association between dietary patterns and metabolic disorders. People who followed a diet rich in whole grains, lean protein and healthy fats had 28% lower insulin resistance and 22% lower body weight than dieters. These findings highlight the importance of nutrition in the management of PCOS across age groups. Addressing nutritional deficiencies through a

healthy diet may provide an effective way to reduce symptoms and improve health outcomes in women with PCOS. Hence Good eating habits have a positive impact on PCOS.

**Key words-** *PCOS, metabolic disorders, menstrual cycles, insulin resistance, dieters.*

## **STRESS EATING A GROWING PROBLEM AMONG COLLEGE STUDENTS**

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### **ABSTRACT**

Stress eating or emotional eating , is the term used to describe overeating that is caused by stress or other negative emotions rather than hunger. Negative emotions — like sadness, anger, loneliness, jealousy, self-criticism, fear, or rejection — can be difficult, even painful at times which plays a vital role in dietary changes of college going students. The eating habits of university students are highly varied. Weight gain is a common occurrence among college students, especially those who are enrolled for the first time. The transition from high school to a college atmosphere may intensify stress, which may affect eating patterns and metabolism and ultimately encourage obesity and overweight. The purpose of this study was to investigate how stress can affect dietary changes among college going students. The lengthy study hours, heavy workloads, and lack of free time that characterise college students sometimes result in their irregular eating habits. People find it challenging to alter their eating habits. The best strategies for managing stress include eating often and in modest portions, avoiding foods high in fat and sugar, caffeine, and salt, and not missing meals. For many students attending university can be a source of considerable stress. A way to avoid dealing with stress is to avoid manifesting unhealthy eating habits, finding more coping mechanisms for stress such as exercise, meditation, doing things you love or talking to counsellors may help to overcome the unhealthy eating habits.

**Keywords:** *stress, eating behaviours, college students*

## **EVALUATING THE EFFICACY AND CHALLENGES OF GLUTEN AND CASEIN-FREE DIETS AS DIETARY INTERVENTIONS FOR AUTISM SPECTRUM DISORDER**

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### **ABSTRACT**

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition characterized by a range of symptoms affecting social interaction, communication, and behavior. Amidst the multifaceted nature of ASD, there has been growing interest in exploring dietary interventions as potential adjunctive therapies to complement traditional treatments. Among



these interventions, gluten and casein-free diets have garnered attention, based on the hypothesis that certain dietary proteins may exacerbate ASD symptoms in susceptible individuals. This comprehensive review aims to critically evaluate the current evidence surrounding the use of gluten and casein-free diets in individuals with ASD, while also addressing the methodological challenges and practical considerations associated with implementing such diets. Providing an overview of exploring theories related to gastrointestinal issues, immune dysregulation, and neurotransmitter abnormalities. The review addresses practical considerations associated with implementing gluten and casein-free diets in real-world settings, including nutritional adequacy, accessibility of alternative food options, and potential social implications for individuals and families. While some studies suggest potential benefits of gluten and casein-free diets in certain subsets of individuals with ASD, the overall evidence remains inconclusive. Management of ASD requires an intricate research with components such as large scale randomized controlled trials with long term follow up to elucidate the efficacy, safety and optimal implementation strategies of dietary interventions. There has been changes for providing evidence-based guidance to healthcare professionals, individuals with ASD, and their families, as they navigate treatment options aimed at optimizing quality of life and well-being.

**Keywords:** *Autism Spectrum Disorders, casein-free diet, gluten, immune dysregulation, neurotransmitter abnormalities.*

## **THE VITAL ROLE OF ZINC IN INFANT GROWTH AND DEVELOPMENT**

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### **ABSTRACT**

Zinc, an essential micronutrient, plays a critical role in the growth and development of infants. This abstract discusses how zinc influences various aspects of infant health, including growth, brain development, immune function, and overall well-being. It acts as a cofactor for numerous enzymes involved in cellular metabolism, protein synthesis, and DNA replication, crucial processes for supporting rapid growth during infancy. Furthermore, zinc plays a pivotal role in immune function, aiding in the production of antibodies and the regulation of inflammatory responses, this help infants fight off infections and illnesses. Moreover, zinc influences cognitive development by contributing to synaptic plasticity, neurotransmitter synthesis and myelination, essential processes for cognitive functioning and learning abilities in infants. Deficiencies in zinc have been linked to impaired growth, increased susceptibility to infections, and developmental delays, emphasizing the indispensable nature of this micronutrient during the critical period of early life. Dietary sources of zinc, including breast milk, formula and complementary foods are discussed, As infants transition to solid foods, zinc can be obtained from lean meats, beans and dairy products, alongside factors affecting zinc bioavailability. Strategies for optimizing zinc intake in infants, including supplementation and dietary diversification are explored. Recommended Dietary Allowances (RDAs) for zinc differ globally. Infants aged 0-6 months require 1.5-2mg/day, 7-12 months need 3-8mg/day, and 1-3-year-olds should intake 4-9mg/day, emphasizing the importance of ensuring adequate zinc status for optimal growth and development outcomes in infants. This

review highlighting the importance of focusing on zinc nutrition to promote infant health and prevent diseases.

**Keywords:** *Bioavailability, Health promotion, Immune function, Infant growth, Neurodevelopment, zinc*

## UNDERSTANDING GESTATIONAL-DIABETES MELLITUS

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### ABSTRACT

Gestational diabetes mellitus (GDM) presents a common pregnancy complication characterized by elevated blood glucose levels developing during pregnancy, notably in the second or third trimester, among women without a history of diabetes. According to the criteria of most used screening method worldwide, International Association of Diabetes and Pregnancy Study Groups (IADPSG), the global prevalence of GDM is 14.7%. This condition brings significant risks to both maternal and fetal health, including macrosomia, birth trauma, neonatal hypoglycemia, and an increased likelihood of cesarean delivery. Additionally, women diagnosed with GDM face an elevated risk of developing type 2 diabetes later in life. The etiology of GDM involves intricate interactions between genetic, metabolic, and environmental factors. A woman who is overweight, not physically active, pre diabetic or had a gestational diabetes history during her previous pregnancy are more prone to get gestational diabetes. Effective management strategies for GDM encompass dietary modifications, physical activity, and, in some cases, insulin therapy. Timely diagnosis and management play crucial roles in minimizing complications and promoting favorable outcomes for both mother and child. This abstract offers an overview of the current understanding of GDM, emphasizing its clinical significance, risk factors, diagnostic criteria, management approaches, and long-term health implications.in easy.

**Keywords:** *Gestational diabetes mellitus, Hypoglycemia, Pregnancy, Timely Diagnosis*

## EFFICACY OF MULTIVITAMIN SUPPLEMENTS

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### ABSTRACT

Vitamin supplements are concentrated forms of essential nutrients intended to address deficiencies or enhance overall health. While vitamins play crucial roles in various physiological functions, their supplementation should be approached with caution and based on individual needs. Supplements offer a convenient way to obtain vitamins, especially for those with restricted diets, nutrient absorption issues, or specific health conditions. However, relying solely on supplements may not provide the same benefits as obtaining vitamins from whole foods, which offer a complex matrix of nutrients and bioactive compounds. Research

indicates that certain populations, such as pregnant women, vegetarians, and older adults, may benefit from targeted vitamin supplementation to meet increased nutritional demands or compensate for age-related nutrient absorption decline. Factors influencing the efficacy of multivitamin supplements include the composition of the supplement, individual nutritional status, dietary habits, and underlying health conditions. Furthermore, the bioavailability and interaction of nutrients within multivitamin formulations can vary, affecting their effectiveness in addressing nutrient deficiencies and promoting health. However, indiscriminate use of supplements among healthy individuals without medical guidance may pose risks of nutrient excess, adverse effects, and potential interactions with medications. Multivitamin supplements are often utilised as adjunctive therapies in the management of chronic diseases. These supplements aim to address potential nutrient deficiencies and support overall health. While research indicates potential benefits in conditions such as cardiovascular disease, diabetes, osteoporosis, cancer, and age-related macular degeneration, the evidence remains variable and context dependent. Multivitamins contribute to disease management and prevention by addressing nutrient deficiencies, supporting immune function with vitamins like C and D, reducing inflammation through nutrients like E and omega-3s, promoting tissue repair with vitamins A and C, protecting against oxidative stress with antioxidants, and supporting bone health with calcium and vitamin D. The efficacy of multivitamin supplements remains a complex and debated topic in nutritional science. While certain populations may benefit from targeted supplementation to address specific deficiencies or health concerns, indiscriminate use of multivitamins among healthy individuals may not confer significant advantages and could even pose risks.

**Keywords:** *Multivitamin, Vitamin supplementation, Chronic disease, bioavailability, adverse affects, nutrient deficiencies*

## **THE GUT–BRAIN CONNECTION: HOW THE MICROBIOTA INFLUENCES BRAIN FUNCTION AND DISORDERS**

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### **ABSTRACT**

The gut microbiota, the diverse collection of microorganisms that reside in the gastrointestinal tract, has a profound impact on the communication between the gut and the brain, known as the microbiota–gut–brain axis. This axis affects various aspects of brain development, function, and behaviour, as well as mental health and neurological disorders. In this review, we provide an overview of the current knowledge on how the gut microbiota influences the gut–brain axis through different mechanisms, such as the production of neurotransmitters (such as serotonin, gamma-aminobutyric acid, dopamine) and metabolites (such as short chain fatty acids like butyrate, Indole, acetylcholine), the modulation of the immune and endocrine systems, the stimulation of the vagus nerve and the enteric nervous system. We also explore the potential of manipulating the gut microbiota through dietary interventions, probiotics (such as *Lactobacillus rhamnosus*, *Bifidobacterium longum* NCC3001, *Lactobacillus helveticus* R0052, and *Bifidobacterium animalis* ssp. *lactis* BB-12), prebiotics (such as fructo-oligosaccharides (FOS), galacto-oligosaccharides (GOS), xylol-

oligosaccharides (XOS), and inulin), and fecal microbiota transplantation as promising approaches to improve brain health and prevent or treat neurological and psychiatric conditions. We address the challenges and limitations of the existing studies, and suggest future directions and recommendations for advancing the field of microbiota–gut–brain axis research.

**Keywords:** *Gut Microbiome, Gut-brain axis, Neurotransmitters, Metabolites, Probiotics, Prebiotics, Neurological Conditions*

## **ROLE OF OMEGA-3 FATTY ACIDS FOR MATERNAL AND FETAL WELLNESS**

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### **ABSTRACT**

Omega-3 fatty acids are crucial polyunsaturated fats, including eicosapentaenoic acid (EPA), docosahexaenoic acid (DHA), and alpha-linolenic acid (ALA), essential for promoting maternal and fetal wellness during pregnancy and various vital aspects of their lives. These essential nutrients cannot be synthesized by the body and thus are acquired through diet by the mother and provided to the fetus through placental transfer. Adequate intake of omega-3 fatty acids during pregnancy can help prevent preeclampsia by improving vascular function, extend gestational duration, potentially reduce the likelihood of postpartum depression in mothers and decrease the risk of low birth weight, preterm birth, and allergies in the fetus. Specifically, DHA improves fetal neurodevelopment. Rich sources of omega-3 fatty acids include fatty fish such as salmon and mackerel (15% omega-3s) along with plant-based options like walnuts, almonds, and seeds such as flaxseed (57% omega-3s) and chia seeds (30% omega-3s). Additionally, oils like canola (11% omega-3s) and soybean (8% omega-3s), as well as fortified foods and supplements like fish oil pills, provide ample omega-3s. Delicious recipes such as salmon quinoa bowls and chia seed puddings, as well as walnut-crushed tofu, ensure a wholesome dietary profile abundant in essential fatty acids. This abstract underscores the importance of incorporating omega-3-rich foods through a combination of dietary diversity and supplementation to enhance maternal and fetal health.

**Keywords:** *Omega-3 fatty acids, Pregnancy, Foetal nutrition, Diet*

## **ROLE OF GUT MICROBIOTA IN LIVER HEALTH**

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### **ABSTRACT**

The gastrointestinal tract contains a complex network of microorganisms known as the gut microbiota, which are essential for maintaining metabolic homeostasis and modulating liver function. Gut microbes and the liver have a complex relationship that affects various

processes, including metabolism, immune response, detoxification, and more. Hepatic diseases like NAFLD, alcoholic liver disease, and even cirrhosis have been linked to dysbiosis, an imbalance in the gut microbiota. Alterations in gut microbiota composition and function are associated with liver diseases, and these changes can be detected in patients with different liver conditions. Gut microbiota can influence insulin resistance, dyslipidemia, and hepatic steatosis, which are key factors in NAFLD progression. The gut microbiota has been found to be a vital target for liver cancer treatment, The permeability of the intestinal wall during dysbiosis can increase, which can lead to inflammation and oxidative stress in the liver because of microbial products entering the bloodstream. However, a well-balanced and diverse intestinal microbiota allows to produce beneficial metabolites (such as short-chain fatty acids), which have anti-inflammatory and protective effects in liver tissues. Understanding the importance of gut microbiota to liver health has important therapeutic potential. The use of probiotics, prebiotic supplements, and dietary adjustments to improve the gut microbiota and promote a healthy gut-liver relationship is proving to be remarkably effective in both liver disease prevention and treatment.

**Keywords:** *Dysbiosis, dyslipidemia, homeostasis, gut microbiota, metabolites*

## **ROLE OF SELENIUM SUPPLEMENTATION IN HYPOTHYROIDISM**

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### **ABSTRACT**

Reduced thyroid hormone secretion, which is essential for controlling metabolism, is a common endocrine condition known as hypothyroidism. Its etiology is multifaceted and includes autoimmune disease and nutritional deficits. Selenium is essential for thyroid hormone metabolism and thyroid cell protection against oxidative damage. Due to its dual roles in thyroid hormone synthesis and oxidative damage defence, selenium is essential for thyroid function. Selenoproteins, which are vital for the thyroid gland's ability to convert T4 into T3, the hormone that is biologically active, depend on selenium for their action. Furthermore, as an antioxidant that protects thyroid cells from oxidative stress, selenium is essential for preserving the integrity of thyroid cells. Moreover, the capacity of selenium to regulate immunological responses is especially significant in cases of autoimmune hypothyroidism, such as Hashimoto's thyroiditis, in which the thyroid gland is attacked by the immune system. Selenium supplementation has been suggested as a viable therapy in the management of thyroid disorders because it supports the generation of thyroid hormone and guards against immune-mediated harm. Thereby it can be said that selenium plays a critical role in thyroid health by affecting immunological regulation, antioxidant defence systems, and hormone synthesis. Its role in selenoprotein activity is essential for the transformation of T4 into T3, as well as for shielding thyroid cells from oxidative stress. Selenium's significance for thyroid function is shown by the thyroid gland's high selenium concentration. Supplementing with selenium is helpful for controlling hypothyroidism, especially autoimmune types like Hashimoto's thyroiditis, given its possible therapeutic implications.

**Keywords -** *Hypothyroidism, Selenium, thyroid hormone synthesis, oxidative damage defence , selenoproteins , hashimoto thyroiditis*

## **FOOD PHOBIA AND ITS NUTRITIONAL CONSEQUENCES IN EATING DISORDERS**

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### **ABSTRACT**

Food phobia, a distinctive subset within the spectrum of eating disorders, is characterized by an irrational and intense fear of certain foods or food groups. Individuals with food phobia experience anxiety, distress, and avoidance behaviours related to specific foods, often leading to restrictive dietary patterns. Food phobia is a prevalent yet under-recognized component of eating disorders, impacting individuals across diverse demographics. Research indicates that a substantial number of individuals with anorexia nervosa, bulimia nervosa, and other eating disorders concurrently exhibit symptoms of food phobia. The prevalence underscores the need for a nuanced understanding of this phenomenon to enhance diagnostic accuracy and guide targeted interventions. Addressing food phobia within the context of eating disorders necessitates a multifaceted approach. Therapeutic interventions, such as cognitive-behavioural therapy and exposure therapy, have shown promise in alleviating food phobia symptoms. Additionally, nutritional rehabilitation, guided by registered dietitians, plays a pivotal role in restoring a balanced and varied diet, mitigating the risk of malnutrition, and promoting overall well-being. Comprehensive treatment models that integrate psychological support, nutritional counselling, and medical monitoring are essential for fostering sustainable recovery from food phobia and its associated nutritional consequences. Understanding the interplay between food phobia and eating disorders is crucial for developing targeted interventions that address both psychological and nutritional aspects. This abstract emphasizes the importance of a holistic approach in treating individuals with food phobia, aiming to enhance their quality of life and promote lasting recovery.

**Key words:** *Food phobia, eating disorders, Therapeutic interventions*

## **PROBIOTICS: FUNCTIONAL FOOD WITH MANIFOLD HEALTH BENEFITS**

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### **ABSTRACT**

In today's world when everyone is running behind, diet is something that plays a major role. Probiotics are important to keep a person healthy. Probiotics are the live microorganisms that help in the gut health. They require nutrients to survive inside the body which are known as prebiotics. Prebiotics help in stimulating the growth of probiotics in the body. This combinations of prebiotic and probiotic is known as symbiotic. Probiotics help in improvising immune functions and preventing infections in the body. They also help in lowering cholesterol and blood pressure. In India, this method of symbiosis is followed since



the age of ancestors even though they were not aware of the scientific reason behind it at that time. Probiotics holds one of the significant place in nutraceuticals. They can be easily consumed in our diet with few modifications to lead a healthy lifestyle. The latest research shows that probiotic foods may offer benefits against a range of health conditions, including allergies, arthritis, asthma, cancer, depression, heart disease, and gastrointestinal (GI) problems. Probiotics may even help with weight loss.

**Key words:** *probiotics, prebiotics, symbiotic, gut health, nutraceuticals, healthy lifestyle*

## **MITIGATING IRON DEFICIENCY AMONG UNDERPRIVILEGED COMMUNITIES: INSIGHTS FROM AWARENESS AND EDUCATIONAL ENDEAVOR**

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### **ABSTRACT**

Iron deficiency remains a pressing public health challenge worldwide, particularly impacting underprivileged populations. The awareness focused on individuals residing in socioeconomically disadvantaged areas, probing into their understanding, attitudes, and practices concerning iron deficiency and its prevention. The awareness outcomes revealed a troubling prevalence of iron deficiency among the surveyed population, signalling an urgent need for intervention. Results indicated a lack of awareness regarding the significance of dietary iron intake, alongside prevalent misconceptions regarding iron-rich food sources and supplementation. Furthermore, socioeconomic constraints hindered access to nutritious foods and healthcare services, exacerbating the prevalence of iron deficiency within these communities. Sustained endeavours are imperative to tackle the multifaceted determinants of iron deficiency among underprivileged populations. Policy advocacy, community mobilization, and collaborative efforts between governmental bodies and non-governmental organizations are crucial for ensuring equitable access to iron-rich foods, nutritional supplements, and healthcare services. Additionally, targeted interventions addressing socioeconomic disparities and promoting nutrition-sensitive approaches are essential for achieving enduring enhancements in iron status and overall health outcomes among underprivileged communities. Through this awareness, behavioural modifications, and advocacy for policy interventions, strides can be made toward alleviating the burden of iron deficiency and fostering health equity for all.

**Keywords:** *Iron Deficiency, Micronutrient Deficiency, Anaemia, Behaviour Change.*

## **THE TRANSFORMATIVE INFLUENCE OF DIETARY CHOICES ON THE MANAGEMENT OF NON-ALCOHOLIC FATTY LIVER DISEASE**

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### **ABSTRACT**

Non- Alcoholic Fatty Liver Disease is a liver complication which is related to excess accumulation of triglycerides in the hepatic tissue of the human body. The prevalence of fatty liver is increasing very rapidly, it is intricately linked to the escalating rate of obesity and various metabolic disorders. Implementing wholesome dietary modifications in conjunction with adhering to a consistent exercise regimen holds the potential to foster weight reduction and impede the advancement of non-alcoholic fatty liver disease (NAFLD). Medical Nutrition Therapy aims to prevent or manage NAFLD by restricting the consumption of sources rich in VLDL, LDL, and triglycerides level. A spectrum of dietary methodologies such as the Mediterranean diet, Plant-centric diet, Low-carbohydrate diet, Low-fat diet, and Intermittent fasting are advocated as strategies for combating the ailment. Through meticulous examination of available literature, and observational studies, this investigation aims to elucidate the diverse effects of these dietary regimens on hepatic lipid deposition, liver functionality, inflammatory responses, insulin sensitivity, and other pertinent metabolic indicators. The insightful findings gleaned from this comparative study will help us to craft highly personalized and robust strategies to effectively combat the complexities of NAFLD.

**Keywords:** *Intermittent Fasting, Lipid deposition, Mediterranean diet, NAFLD, Nutrition therapy*

## **EXAMINING THE INFLUENCE OF LIFESTYLE FACTORS AND EVALUATING NUTRITIONAL AWARENESS ON NONALCOHOLIC FATTY LIVER DISEASE**

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### **ABSTRACT**

Nonalcoholic fatty liver disease (NAFLD) has emerged as significant health concern globally, characterized by excessive fat accumulation in the liver in the absence of significant alcohol consumption. Lifestyle factors play a pivotal role in its development and progression. This study investigates lifestyle impacts on NAFLD and nutritional awareness among affected individuals compared to those with healthy habits. A cross-sectional study was conducted involving 25 NAFLD-diagnosed individuals and 25 age-matched controls using structured questionnaire covering demographics, dietary habits, physical activity, sleep patterns, stress levels, and nutritional awareness. Statistical analyses were employed to determine associations between lifestyle factors, nutritional awareness and NAFLD. Results showed individuals with poor lifestyle like dietary pattern rich in saturated fats, sugars, and refined carbohydrates, along with sedentary behaviour and disturbed sleeping cycle exhibited



higher and greater grade of NAFLD with 48% overweight, 28% obese, and 24% within the normal weight range. Furthermore, 90% of participants in both groups lacked adequate nutritional awareness for the management of their lifestyle and NAFLD. In conclusion, NAFLD individuals commonly exhibit poor lifestyle habits and demonstrate reduced inclination towards acquiring nutritional awareness as compared to the control group. These findings underscore the necessity for targeted interventions aimed at improving lifestyle habits and nutritional awareness among individuals at risk of or diagnosed with NAFLD.

**Keywords:** *Cross-sectional study, Dietary habits, Nonalcoholic fatty liver disease, Nutritional awareness, Sedentary lifestyle.*

## **ROLE OF PREBIOTIC AND PROBIOTIC FOOD IN GASTROINTESTINAL DISORDERS: A COMPREHENSIVE OVERVIEW**

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### **ABSTRACT**

A gastrointestinal disease is one that affects the gastrointestinal (GI) tract, the passage that runs from the mouth to the anus. Some examples include food poisoning, lactose intolerance and diarrhea. Probiotics are live organisms that confer health benefits when given in adequate amounts. They have shown potential therapeutic roles in gastrointestinal disorders. The probiotic foods contain live beneficial microorganisms that have proven to be beneficial for our gut health. A prebiotic is a selectively fermented ingredient that allows specific changes, both in the composition and/or activity in the GI microbiota that confers benefits upon host well-being and health. This review examines the impact of prebiotic and probiotic food items on conditions such as irritable bowel syndrome (IBS) & inflammatory bowel disease (IBD). Their mechanism of action & immune response are explored.

**Keywords:** Prebiotic Food, Probiotic Food, Gastrointestinal disorders, Gut Health, Immunity

## **INTER- RELATION BETWEEN FOOD, ACTIVITY LEVEL AND THEIR EFFECTS ON HUMAN BODY**

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### **ABSTRACT**

Lifestyle in simpler words can be said as a “way of living” that with a little more work, can be improved and avoid many problems. Different lifestyles have different consequences; sedentary lifestyles and very active lifestyles being two examples of it. India is one of the world's most overworked population of the world. With it also comes a number of complications that not only impact a person physically but also mentally. The unhealthy lifestyles and inadequate dietary consumption adds on to these issues. Most vegetarians also

suffer from other inadequacies as a result of not knowing what to consume to achieve optimal health. All of this knowledge is progressively being known to people, but are they using it? Do they realize that knowing how our body, activity level, and diet interact is the key to identifying a solution? And what are the main conclusions that they may use to their lifestyle to improve outcomes? With the passage of time, circumstances shift, bringing with them new challenges and answers. Overall, working people have unhealthy lifestyles that cause them to experience various health problems including fatigue, back pain, constipation, and other conditions that might eventually develop into other diseases or disorders.

**Keywords:** *Lifestyle, Working, Complications, Activity level, Human Body, Diet.*

## **PATIENTS UNDERGOING LIVER TRANSPLANTATION: THE IMPORTANCE OF NUTRITION**

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### **ABSTRACT**

The liver is a vital organ that regulates metabolism and is essential for releasing, storing, and removal of substances that are endogenous and exogenous from our body. The steady decline in liver function is known as chronic liver disease. This is a persistent process that causes the liver parenchyma to become inflamed, destroyed, and regenerated. This process leads to stages like liver fibrosis and cirrhosis, resulting in protein-energy malnourishment, and patients with end-stage liver disease who get their liver transplanted frequently experience this. Liver transplantation is a life-sustaining procedure for individuals who are suffering from acute liver failure, cirrhosis or end-stage liver disease but the success of this process depends on the nutritional status of the patients. For patients with chronic liver disease seeking better outcomes, nutritional status assessment and malnutrition management are crucial. Sarcopenia and malnutrition are linked to worse outcomes following liver transplantation, infections, decompensation, and wait-list death rates. Therefore, appropriate nutritional support must be given during all phases of the liver transplant process. This study is done on a group of 15 liver transplant recipients with the objective to analyse changes in their clinical parameters post liver transplantation after desired nutritional interventions were made.

**Keywords:** *Biochemical parameter, Chronic liver disease, Nutritional management, Sarcopenia*

## **EXPLORING THE BENEFICIAL IMPACT OF FERMENTED FOODS ON DIABETES MANAGEMENT: UNLOCKING THE POTENTIAL**

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### **ABSTRACT**

Fermented foods are considered as functional foods. In recent decades, there has been a notable improvement in the intake of fermented foods due to growing understanding of its health advantages. Fermented foods are high in probiotics, they may help improve blood sugar control. One of the biggest risks to a person's lifespan is diabetes. Type 2 diabetes (T2D) is a complex metabolic disease, which involves a maintained hyperglycemia due to the development of an insulin resistance process. Among multiple risk factors, host intestinal microbiota has received increasing attention in T2D etiology and progression. So, Fermented foods can be particularly beneficial for individuals with Type 2 diabetes, which is often characterised by insulin resistance. They support a healthy gut microbiome. A balanced gut microbiota is associated with better metabolic health and reduced inflammation. They can influence the makeup of your gut microbiome. There's some evidence that they might support gut bacteria that produce short-chain fatty acids (SCFAs). Fermented foods contain bioactive compounds that possess anti-inflammatory properties, potentially reducing the inflammation associated with diabetes. Fermentation can increase the bioavailability of certain nutrients. Yogurt and other fermented dairy products, for instance, may improve the body's absorption of calcium and magnesium, two nutrients that are critical for healthy bones and general wellbeing. Foods such as kimchi, sauerkraut, and miso are also high in antioxidants, which can help protect against oxidative stress and damage to cells. It is preferable to substitute conventional dairy products with fermented ones when incorporating fermented foods into the diet. One could add some sauerkraut to salads or sandwiches, one may replace conventional yogurt with kefir, can have ragi idli or barley dosa for breakfast.

**Keywords:** Fermented foods, probiotics, gut microbiome, bioactive compounds

## **HIDDEN HUNGER IN THE INDIAN ADULT POPULATION: RAISING AWARENESS OF MICRONUTRIENT MALNUTRITION**

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### **ABSTRACT**

Despite significant economic progress, India continues to grapple with hidden hunger, characterized by micronutrient deficiencies despite adequate calorie intake. This issue affects a large segment of the adult population, leading to adverse health consequences and hindering the nation's overall development. This review aims to raise awareness about the gravity of hidden hunger in India, exploring its prevalence, impact, and potential solutions. The prevalence of micronutrient deficiencies in various adult population groups was analysed alongside qualitative insights from studies exploring the socioeconomic factors contributing

to hidden hunger. This highlights the alarmingly high prevalence of hidden hunger in India, affecting both men and women across diverse income groups and geographical regions. Iron, vitamin A, and folate deficiencies are identified as major concerns, contributing to increased vulnerability to illness, reduced cognitive function, and compromised work productivity. Moreover, the negative impact of hidden hunger on maternal health and child development is emphasized, creating a vicious cycle of malnutrition across generations. There is a need to propose potential solutions, including dietary diversification, food fortification, targeted supplementation programs, and behavior change interventions.

**Keywords:** *Hidden hunger, micronutrient malnutrition, adult population, public health, awareness*

## **ROLE OF WALNUTS IN PREVENTION OF DIABETES MELLITUS: A REVIEW**

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### **ABSTRACT**

Persistent hyperglycemia is a hallmark of a group of metabolic illnesses known as diabetes mellitus. Type 2 diabetes mellitus (T2DM) impacts almost 90% of the 451 million individuals who were estimated to have diabetes in 2017. Diabetes mellitus is a serious global health concern. These days, diabetes mellitus is a prevalent co-morbid condition that is closely linked to other serious illnesses. Because functional foods have the potential to be antioxidant, anti-inflammatory, and insulin-sensitive, they are being used to prevent and control Diabetes mellitus. Nutty intervention studies have not shown that nuts improve long- or short-term glycemic management in persons with diabetes, but they may help lower postprandial glycemia, lessen postprandial oxidative stress, and enhance blood lipid profiles. For those with type II diabetes, consuming just 1-2 ounces of walnuts per day has a major positive impact in this area. Several studies have demonstrated that diets high in polyunsaturated fatty acids (PUFAs) can assist attain optimal fat consumption without having a negative impact on total fat or energy intake. They can also considerably lower blood LDL cholesterol levels and the ratio of total cholesterol to HDL cholesterol. Walnuts may have additional anti-atherogenic benefits since they have a higher quantity of polyunsaturated fats (PUFAs), such as  $\alpha$ -linolenic acid, than other nuts. A systematic evaluation of clinical trials revealed that consuming two to three servings of walnuts daily consistently reduced LDL and total cholesterol. Consuming walnuts has been demonstrated to enhance endothelial function in hypercholesterolemia patients. Therefore, by aiding in the metabolism of fat for bodybuilding and energy production—a process that is compromised by diabetes—we can guarantee that walnuts serve to mitigate other problems associated with diabetes, such as cardiovascular diseases.

**Key words:** *walnuts, nutraceuticals, healthy lifestyle, Diabetes mellitus, glycemic index*

## **NUTRITIONAL ENHANCEMENT IN FOOD TECHNOLOGY: IMPROVING PUBLIC HEALTH THROUGH FUNCTIONAL COMPONENTS AND INNOVATIVE PROCESSING TECHNIQUES**

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### **ABSTRACT**

Nutritional enhancement through food technology represents a pivotal strategy in addressing public health concerns and improving overall well-being. This abstract explores the role of food technology in fortifying and enhancing the nutritional content of food products, with a focus on functional foods and innovative processing techniques. Functional foods, enriched with vitamins, minerals, and bioactive compounds, offer targeted health benefits beyond basic nutrition. These specialized food products are formulated to address specific health concerns and support various physiological functions, ranging from immune support to heart health and cognitive function. By incorporating functional ingredients into everyday foods, consumers can easily access essential nutrients and bioactive compounds, contributing to improved public health outcomes and disease prevention. Furthermore, advances in food processing techniques, such as high-pressure processing (HPP) and cold plasma treatment, play a crucial role in preserving the nutritional integrity of foods while extending their shelf life. HPP utilizes high levels of hydrostatic pressure to inactivate harmful pathogens and enzymes without compromising the nutritional quality and sensory attributes of foods. Similarly, cold plasma treatment employs ionized gas to sterilize surfaces and eliminate pathogens, ensuring food safety while maintaining nutritional value. In conclusion, nutritional enhancement through food technology represents a promising approach to improving public health and well-being. By fortifying foods with essential nutrients and utilizing innovative processing techniques, the food industry can contribute to reducing the burden of malnutrition and chronic disease, ultimately fostering healthier and more resilient communities.

**Key words:** *Nutritional enhancement, Functional foods, high-pressure processing,*

## PERSONALIZED NUTRITION AND FUNCTIONAL FOODS: TAILORING HEALTH AND WELLNESS

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### ABSTRACT

Using advances in science and technology, personalized nutrition and functional foods offer a paradigm shift in the way that dietary guidelines and food consumption are approached, allowing for the customization of recommendations to meet the unique needs and tastes of each individual. The potential of functional foods and tailored nutrition to transform the field of nutrition and advance optimal health outcomes is explored in this abstract. Personalized nutrition refers to the process of tailoring dietary guidelines and recommendations to each individual based on their specific genetic composition, metabolic profile, lifestyle choices, and health objectives. By utilizing cutting-edge technologies like wearables, microbiome analysis, nutrigenomics, and artificial intelligence, personalized nutrition platforms provide individualized meal plans and useful information that enable people to make well-informed food choices that meet their unique nutritional needs. Conversely, functional foods are designed to offer extra health advantages over just basic nourishment; they are frequently enhanced with probiotics, vitamins, minerals, and bioactive substances. By addressing nutritional deficiencies, boosting immunological function, fostering gut health, and lowering the risk of chronic diseases, these bioactive substances target particular physiological functions or medical disorders. Through the integration of functional foods and customized nutrition, individuals can tailor their dietary intake to suit their unique health requirements and preferences. Personalized nutrition and functional foods provide a customized strategy for reaching optimal health outcomes, whether the goal is treating chronic illnesses, promoting overall well-being, or improving athletic performance. Additionally, the emergence of mobile health applications and direct-to-consumer genetic testing services has democratized access to tailored nutrition information, empowering people to take charge of their own health and wellness. However, obstacles including data accuracy, privacy concerns, and regulatory oversight continue to be crucial factors to take into account when implementing personalized nutrition programs. To sum up, functional foods and personalized nutrition offer exciting new opportunities for promoting health and wellness on a personal level. By utilizing innovation and technology, these approaches will transform the field of nutrition and enable people to take charge of their overall health and dietary decisions.

**Keywords:** *nutrigenomics, microbiome, personalized nutrition, functional foods*



## THE ROLE OF JAMUN EXTRACTS IN MANAGING DIABETES: A LITERATURE REVIEW

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### ABSTRACT

Jamun is a plant that can be used to treat metabolic syndrome-related symptoms all over the world. Its fruit and leaves are beneficial to those with diabetes. The fruit helps control blood sugar levels and facilitates the conversion of carbs into energy. The extracts of the leaves, seeds, and bark are very successful in treating diabetes. These valuable natural products are widely utilized as folk medicine in various parts of the world for disease treatment. The kernels are not only rich in carbohydrates, protein, minerals, and crude fibers but also contain a substantial variety of biogenic phytochemicals with versatile applications in both the food and nonfood industries. It alleviates the symptoms of diabetes, like pushing and frequent urination. The peel, pulp, and seed of the Jamun are all significant sources of antioxidants, polyphenols, flavonoids, minerals, vitamins, and phytochemicals. Several studies show Jamun's pharmacological association with metabolic issues. Amongst all, the anti-diabetic properties are the most promising and explored as the seeds contain jambosin, alkaloid, and anti-mellin or jambolin glycosides, which impede the diastatic starch to sugar conversion. Jamun extracts had a significant protective effect on the central nervous system. Jamun has been used in traditional medicine to treat various ailments, including diarrhea, dysentery, and stomach ulcers. Jamun pulp quickly restored the liver cells and assisted in bringing the levels of the enzymes back to normal. These anti-allergic qualities of the jamun leaf extract might be attributed to the presence of flavonoids. Jamun extract has shown promising results in reducing blood sugar levels in individuals with type 2 diabetes. Jamun has been used in Ayurvedic medicine to improve digestion and relieve digestive disorders.

**Keywords:** *Jambosin, alkaloid, anti-Mellin, bioactive compounds, Ayurvedic medicine*

## IMPACT OF DIETARY FIBERS ON METABOLIC HEALTH: A COMPREHENSIVE REVIEW

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### ABSTRACT

The relationship between dietary fibres and metabolic health has garnered significant attention in recent years due to the rising prevalence of metabolic disorders worldwide. This comprehensive review examines the impact of dietary fibres on various aspects of metabolic health, including glucose metabolism, lipid profile, body weight regulation, and gut microbiota composition. Studies consistently demonstrate that increased intake of dietary



fibres is associated with improved glycaemic control, insulin sensitivity, and reduced risk of type 2 diabetes mellitus. Furthermore, dietary fibres play a crucial role in modulating lipid metabolism by lowering serum cholesterol levels and improving lipid profiles, thus mitigating the risk of cardiovascular diseases. Moreover, dietary fibres exert beneficial effects on body weight regulation through mechanisms such as increased satiety, reduced energy intake, and modulation of appetite-regulating hormones. These effects contribute to the prevention of obesity and metabolic syndrome. In conclusion, a diet rich in dietary fibres exerts multiple beneficial effects on metabolic health, including improved glucose metabolism, lipid profile, body weight regulation, and modulation of gut microbiota composition. Thus, promoting increased intake of dietary fibres through dietary recommendations and public health initiatives represents a promising strategy for the prevention and management of metabolic disorders.

**Keywords:** *Dietary fibres; Disorders; Glucose; Health; Metabolism.*

## **NUTRITION AS A KEY TO BOOST IMMUNITY AGAINST COVID-19**

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### **ABSTRACT**

Macronutrients like proteins are vital for antibody production. Dietary constituents such as omega-3-fatty acids, vitamin C, vitamin E, phytochemicals such as carotenoids and polyphenols exhibit anti-inflammatory and antioxidant properties. This review highlights the significance of relevant nutrients in boosting the immune system. Ascorbic acid or vitamin C is a water-soluble vitamin and antioxidant that plays critical roles in both innate and adaptive immunity, including B and T-cell function. Vitamin C protects against viral respiratory infection and even the common cold in individuals exposed to harsh environments (e.g., cold, intense exercise) or stressful conditions, with evidence remaining inconclusive under routine conditions. Vitamin D also contributes to innate and adaptive immune function through production of metabolites and activation of vitamin D responsive elements. Although only present in a few foods naturally (e.g., fatty fish), vitamin D is fortified in foods and can be obtained from direct sunlight. Vitamin D status has been associated with COVID-19 infection and severity in some reports, but not others. However, subsequent meta-analyses and systematic reviews have revealed that both COVID-19 disease severity and mortality risk are increased with low vitamin D status. Zinc is a trace mineral obtained in the diet primarily through meat, fish, and other seafood along with fortified foods, like grain cereals. Zinc is required for many enzymatic reactions related to innate and adaptive immunity, including antiviral defense mechanisms. Iron is a mineral common in the diet and is obtained primarily through beef, chicken, fish, beans, and fortified grains, such as cereals. Iron is required for critical enzyme function of immune cells, such as neutrophils and lymphocytes.

**Keywords:** *Macronutrients, Micronutrients, Phytochemicals, Anti-inflammatory, Antioxidant*

## **OBESITY AS MOTHER OF ALL DISEASES: A REVIEW**

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### **ABSTRACT**

Obesity is the term used to describe people whose weight is greater than what is deemed healthy for their height. Body mass index (BMI) is a straightforward weight-for-height metric that's frequently used to categorize persons who are overweight or obese. It could make you more susceptible to a variety of health issues, particularly if you have excess fat around your waist. Achieving and maintaining a healthy weight can help avoid these issues, halt their progression, or even completely resolve them. You should exercise caution because gaining weight can lead to a variety of health issues. Maintaining an ideal weight, staying physically fit, and preventing other issues are crucial. Obesity is the mother of all diseases and needs to be addressed immediately. In addition to physical health concerns, obesity is linked to mental health problems such as anxiety, stress, and depression. Obese and overweight individuals frequently experience body shaming and social stigma, which can undermine their self-esteem and hinder their ability to grow personally and professionally. Changing one's lifestyle is one way to address obesity.

**Keywords:** *Overweight, Diseases, Health Risks, Weight Gain, Depression*

## **ENHANCING PUBLIC HEALTH: EXPLORING THE FORTIFICATION OF FOOD FOR IMPROVED NUTRITION**

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### **ABSTRACT**

Fortification of food for enhanced nutrition is a pivotal strategy in public health aimed at ameliorating prevalent deficiencies and augmenting overall well-being. By augmenting commonly consumed foods with essential micronutrients, fortification initiatives endeavour to mitigate nutritional lacunae and foster improved health outcomes, particularly among populations susceptible to malnutrition. Effective implementation of fortification programs necessitates meticulous consideration of diverse determinants, encompassing nutritional exigencies, cultural dynamics, regulatory frameworks, and sustainable supply chains. Collaboration among policymakers, food manufacturers, healthcare practitioners, and community stakeholders is imperative to ensure the efficacious dissemination and equitable

accessibility of fortified foods. Integration of the "+F" symbol on fortified food packaging serves as a visual indicator for consumers, denoting the presence of added nutrients and facilitating informed dietary decisions. This symbol not only heightens consumer awareness but also streamlines adherence to fortification mandates and benchmarks. Additionally, public education campaigns play a pivotal role in bolstering awareness regarding the advantages of consuming fortified foods and fostering behavioral shifts toward healthier dietary practices. Fortification of food for enhanced nutrition emerges as a multifaceted approach with significant potential for addressing nutritional inadequacies and advancing public health on a global scale.

**Keywords:** *Food Fortification, public health, consumer awareness*

## **DIETARY FIBER: HEALTH BENEFITS, MECHANISMS OF ACTION, AND IMPLICATIONS FOR DISEASE PREVENTION AND MANAGEMENT**

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### **ABSTRACT**

Dietary fibre, a plant-based material that eludes digestion by human digestive enzymes, is a pivotal component of a balanced diet. It is categorized into two distinct types: soluble and insoluble. Both varieties are indispensable for optimal health and should be incorporated into our daily dietary regimens. The majority of plant-based foods contain a blend of these two types of fibre. The consumption of dietary fibre yields a plethora of health benefits. Individuals who consume high amounts of dietary fibre are significantly less prone to developing obesity, diabetes, hypertension, coronary heart disease, stroke, and various gastrointestinal disorders. Furthermore, increasing the intake of dietary fibre has been shown to reduce serum cholesterol and blood pressure levels. In both diabetic and non-diabetic individuals, the consumption of soluble fibre has been linked to improved glycemia and insulin sensitivity. For individuals struggling with obesity, the addition of fibre supplements to their diets has been shown to expedite weight loss. Additionally, increased fibre consumption has been associated with improvements in various gastrointestinal conditions, such as gastroesophageal reflux disease, duodenal ulcer, constipation, and haemorrhoids. Prebiotic fibres, in particular, have been shown to fortify the immune system. The benefits of dietary fibre consumption extend to children as well, with their advantages being comparable to those experienced by adults. The recommended daily intake of fibre for both adults and children is 14 g/1000 kcal. Within the digestive system, dietary fibre functions as a polymer matrix with a diverse array of physicochemical characteristics. These characteristics, which are contingent upon the chemical and physical composition of the fibre, govern the physiological activities of the fibre. Dietary fibre plays a pivotal role in the metabolism of fats and carbohydrates, as well as in various disorders of colonic

function. It acts as a carrier for faecal water and augments the volume of faecal bacteria, thereby increasing stool size. Certain types of fibre retard the rate at which glucose is absorbed, mitigating the surge in blood glucose and insulin following meals. Mucilaginous fibres have been shown to reduce plasma cholesterol levels.

**Keywords:** *Dietary fibre, glycaemia, prebiotic, gastrointestinal disorder, colonic function*

## GLUTEN – FREE DIET

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### ABSTRACT

The only known treatment for celiac disease is a diet devoid of the gliadin and glutenin protein components found in wheat, rye, and barley. Due to the perceived health, weight loss, and therapeutic benefits of gluten-free diets (GFDs) and wheat avoidance, people who have not received an official diagnosis of celiac disease are choosing these lifestyle changes more frequently. Gluten gives flour the elasticity it needs to bind. Flour (dough) cannot be prepared without gluten. The incapacity of enzymes to break down gluten leads to celiac disease, which is a condition where the small intestine of a person is harmed. It has also been noted that the prevalence of celiac disease has increased recently. Atrophies of the intestinal villi and persistent inflammation of the mucosa of the gut are two of the clinical features of CD, an autoimmune disease. The lack of gluten in processed and natural foods determines the safety of a gluten-free diet. For human nutrition, small grains including buckwheat, quinoa, sorghum, and amaranth are beneficial.

**Key words:** *Celiac disease, gliadin protein, glutenin, gluten free diets*

## EFFECT OF *WITHANIA COAGULANS* ON TYPE-II DIABETES

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### ABSTRACT

Diabetes affects many people worldwide, particularly in developing nations like India. 90-95% of diabetic people are having type 2 diabetes. Its major risk factors are lifestyle modifications such as reduced frequency of exercise, laziness, dietary patterns, stress, and sedentary living, as well as alcohol and tobacco use which have a negative impact on body maintenance causing obesity, which can further lead to insulin resistance and the onset of the disease. *Withania coagulans* also known as paneer doda or paneer phool or Indian cheese maker has shown to exhibit hypoglycemic properties making it a safe alternative treatment for diabetes. *W. coagulans* fruit (5-6 in no.) was soaked overnight in 100mL water and was taken by the study group empty stomach on daily basis for 3 months to see its effects on the

blood glucose levels. In this paper, an attempt was made to demonstrate the effectiveness of this fruit in lowering down the sugar levels.

**Keywords:** *Diabetes, Withania coagulans, hypoglycemic*

## **DIALYSIS DYNAMICS: BRIDGING THE GAP IN RENAL CARE**

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### **ABSTRACT**

Dialysis is a form of renal replacement therapy. The kidney's role of filtration of the blood is supplemented by artificial equipment to remove excess water, solutes, and toxins. Dialysis ensures maintenance of homeostasis (a stable internal environment) in people experiencing a rapid loss of kidney function, known as acute kidney injury (AKI), or a prolonged, gradual loss in renal function, called chronic kidney disease (CKD, previously end-stage renal disease, ESRD). Kidney failure is when 10-15% of your kidney function remains, measured by an estimated glomerular filtration rate (eGFR) of less than 15 mL/min. It is the mainstay in ESRD management, a rising global burden is attributed mainly to diabetes mellitus and hypertension. In haemodialysis, a dialyzer is used to remove waste and extra fluid from your blood, and then return the filtered blood into your body. Before starting haemodialysis, a minor surgery is needed to create a vascular access site, usually in your arm. This access site is important to have an easy way to get blood from your body, through the dialyzer, and back into your body. The dietary regimen for dialysis patients is a crucial aspect of their overall care. Typically, a dialysis diet involves restricting certain nutrients, such as sodium, potassium, and phosphorus for prevention of high blood pressure, electrolyte imbalance and vascular calcification. Additionally, managing protein intake helps mitigate uremic symptoms and preserve muscle mass, while fluid restriction prevents volume overload and maintains hemodynamic stability.

**Keywords:** *AFI(acute kidney failure), dialyzer, eGFR(estimated glomerular filtration rate), ESRD(end-stage renal disease)*

## **ASSESSMENT OF WHEAT GERM OIL ROLE IN THE PREVENTION OF METABOLIC MARKERS: A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

*Triticum aestivum*, commonly known as wheat, is a significant part of the global diet, consisting mainly of endosperm, bran, and germ. Wheat germ, abundant in antioxidants, carotenoids, polyphenols, and tocopherols, is highly valued for its nutritional benefits and is

used in various food and cosmetic products. Extracted through milling, wheat germ oil (WGO) is esteemed for its medicinal properties and high protein content, containing essential amino acids vital for health. Numerous studies have investigated WGO's therapeutic effects, finding it effective in managing lipid metabolism, diabetes, and hyperlipidemia. Fermented wheat germ extract (FWGE) has shown promise in inhibiting metastasis in colorectal and ovarian cancer cells in animal models. Additionally, research indicates that WGO possesses antioxidant and anti-inflammatory properties crucial for addressing conditions like atherosclerosis, hypercholesterolemia, and oxidative stress. Furthermore, consuming essential fatty acids (EFAs) from plant sources, such as linoleic acid (LA) and  $\alpha$ -linolenic acid (ALA), has been associated with various health benefits, including promoting cardiovascular health and reducing inflammation. Understanding the absorption and distribution mechanisms of EFAs in the gastrointestinal tract is essential for maximizing their therapeutic effects. In summary, the diverse therapeutic potential of wheat germ and its derivative, WGO, along with the health advantages of essential fatty acids, highlight the importance of ongoing research and utilization of these natural resources in preventive and therapeutic strategies against a range of diseases.

**Keywords:** *antioxidants, essential fatty acids, hyperlipidemia, therapeutic*

## OFFER HEALTHIER FOOD OPTIONS AT WORKPLACE

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### ABSTRACT

Most Americans spend an average of 8 hours per day in the workplace. Current understanding of eating behaviours in the workplace and their association with overweight, obesity and binge eating disorder (BED) is limited. The workplace canteen supplies meals for a regular client, with most employees eating one or more meals per day while they are at work. People spend an extensive proportion of their waking hours at work and what they consume there is of important. Companies frequently adopt communication strategies and interventions that encourage individuals to make healthier choices when eating at work. However, canteen food is often criticised for being nutrient poor, energy dense and expensive. In addition to this, consumers are increasingly demanding greater information on food eaten out of the home, on the nutritional content of dishes, the origin of ingredients and the presence of possible allergens. Increasingly, mandatory and voluntary menu labelling policies are being adopted across the eating out industry to support informed food choices among consumers. Unhealthy dietary habits have been identified as a major factor linked with the co- morbidity of diabetes type 2, hypertension and obesity. It has been suggested that when consumers are provided with information such as calorie, fat and sodium levels, they are more likely to adopt healthier options. Information includes allergens information, environmental impacts, specific dietary requirements and production methods. Offering healthier food options like wide range of fruits, vegetables and breads; main ingredients should include rice, pasta or potatoes; offer fish and chicken often; include a variety of vegetarian options which use peas, beans, lentils, eggs or quorn. Some options like raw or dry

- roasted nuts and seeds with low or no added salt or sugar , and 100 % whole grain chips and healthy dips ( salsas , guacamole or bean dips ).

**Keywords:** *canteen food, eating habits, healthier food choices, workplace*

## CONSUMER AWARENESS ABOUT FOOD QUALITY AND SANITATION

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### ABSTRACT

Growing consumer concern about food safety and quality has fueled heightened awareness of food production practices. This has led to increased demand for transparency and accountability throughout the supply chain, prompting stricter regulations and industry standards. Consumers are increasingly interested in the origin and handling of their food, leading vendors to prioritize sourcing high-quality ingredients and implementing rigorous cleaning and sanitation practices. Regulatory bodies and industry organizations play a vital role in raising awareness and setting guidelines to ensure food safety and hygiene. This shift in consumer preferences is shaping the food industry, influencing purchasing decisions and industry practices. Continued advancements in education, regulation, and innovation are crucial to maintain and enhance consumer awareness about the importance of food quality and sanitation.

**Keywords:** *Food safety, Food quality, Consumer awareness, Sanitation, Regulations , Food hygiene*

## NUTRITIONAL ASSESSMENT AND MANAGEMENT IN DIALYSIS PATIENTS

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### ABSTRACT

Dialysis is a type of treatment that helps your body remove extra fluid and waste products from your blood when the kidneys are not able to. Dialysis was first used successfully in the 1940's and became a standard treatment for kidney failure starting in the 1970s. Since then, millions of patients have been helped by these treatments. It's needed if your kidneys no longer remove enough wastes and fluid from your blood to keep you healthy, it usually happens when you have only 10 to 15 percent of your kidney function left. There are 2 main



types of dialysis: hemodialysis and peritoneal dialysis. Hemodialysis involves diverting blood into an external machine, where it is filtered before being returned to the body and peritoneal dialysis involves pumping dialysis fluid into the space inside your abdomen (tummy) to draw out waste products from the blood passing through vessels lining the inside of the abdomen. Nutritional requirements for the dialysis patients- calories requirement is 1752 kcal/day, protein is 6.16g, sodium is 500-1000 and potassium is less than 3000mg. Foods to be restricted are high in sodium and potassium even fluid should also be in restriction that is 500-1000mg more fluid than lost in the previous day.

**Keywords-** *Dialysis, hemodialysis, peritoneal dialysis, nutritional requirements, abdomen.*

## **MANAGING CACHEXIA AND IMPROVING QUALITY OF LIFE IN CANCER PATIENTS**

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### **ABSTRACT**

Cachexia is one of the most common, related factors of malnutrition in cancer patients. Cancer patients develop cachexia due to systematic inflammation, negative protein, and energy balance. Cancer cachexia is a multifactorial syndrome defined by an ongoing loss of skeletal muscle mass (with or without loss of fat mass) that leads to progressive functional impairment. Conventional dietary support cannot reverse the loss of skeletal muscle; hence it is advised to combine anti-inflammatory medicines with additional nutrients. In this review, we examined the effects of nutrients (eicosapentaenoic acid,  $\beta$ -hydroxy- $\beta$ -methyl butyrate, creatine, and carnitine) that are anticipated to counteract muscle loss brought on by cancer cachexia to suggest current dietary treatments. In conclusion, the study underlines the importance of research based on nutritional supplements for cancer patients for better disease management and prognosis.

**Keywords:** *Cancer, Cachexia, EPA, HMB, Creatine, Carnitine.*

## **THE MOLECULES IN OUR STOMACH: EXPLORING FOOD AS A MEDIUM OF SCIENCE**

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### **ABSTRACT**

The human stomach is a dynamic environment in which complex changes in food molecules take place, influencing our dietary intake and overall health. This abstract explores the difficult field of stomach digestion and clarifies the intricate interactions between dietary components, gastric secretions, and enzymes in the stomach's acidic environment. The stomach aids in the uptake of nutrients and energy metabolism, which are vital for maintaining body functioning, by dissolving macronutrients including proteins, lipids, and carbs into forms that are easily absorbed. This abstract also delves into the symbiotic link that

exists between food molecules and the gut bacteria, highlighting the critical role that these interactions play in preserving gut health and regulating immune responses. It goes beyond digestion into the field of food science, where the molecular makeup of consumables becomes a focus of research. It looks at the structural characteristics of nutrients and how they affect sensory qualities and nutritional quality via the perspective of food chemistry. Furthermore, new paradigms in research on nutrition and disease prevention such as metabolomics and nutrigenomics provide insights into the customized impacts of food molecules on genetic expression and metabolic pathways. This abstract underscores the intrinsic connection between food and science, portraying food as not only sustenance but also a medium for scientific exploration and innovation. By unraveling the molecular intricacies embedded within our meals, we gain profound insights into human health and nutrition, paving the way for advancements in both scientific research and dietary practices.

**Keywords:** *Food molecules, dietary intake, metabolism.*

## **EXPLORING THE INTERCONNECTION BETWEEN FOOD AND MOOD: A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

The relationship between food and mood has garnered increasing attention in recent years, with ample evidence suggesting a bidirectional interplay between dietary habits and emotional well-being. Diet, mood and concentration, there's no single super-food that boasts mood - it's about having a varied, healthy diet. A varied, healthy diet improves your memory, concentration and can even increase your level of optimism of & protect you from depression. Nutritional components such as carbohydrates, protein, fats, vitamins, & minerals play pivotal roles in neurotransmitter synthesis, neural functioning & hormone regulation, all of which directly influence mood states, moreover, dietary patterns, including the Mediterranean Diet, the Western diet, & specific dietary. This paper provides a comprehensive overview of the intricate connections between food consumption & mood regulation, encompassing both physiological & psychological mechanism.

**Keywords** - *Mood, Food, Neurotransmitter, Physiological & Psychological*

## **UNDERSTANDING CELIAC DISEASE: OVERVIEW, PATHOGENESIS, SYMPTOMS AND DIET**

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### ABSTRACT

With a pooled global prevalence of 1.4 % of the general population, Celiac disease is one the chronic condition worldwide. Celiac disease is a inherited chronic autoimmune disorder triggered by the ingestion of gluten in genetically predisposed individuals. Gluten is a protein found in foods like wheat, barley, rye. This condition affects the small intestine, leading to inflammation, villous atrophy, and malabsorption of nutrients. Over time, this reaction damages your small intestine’s lining and prevents it from absorbing nutrients. The intestinal damage often causes symptoms such as diarrhea, fatigue, weight loss, bloating or anemia. It also can lead to serious complications if it is not managed or treated. In children, malabsorption can affect growth and development in addition to gastrointestinal symptoms. Despite its prevalence, celiac disease often remains underdiagnosed due to such diverse clinical manifestations and lack of awareness among healthcare providers. Diagnosis relies on a combination of serological testing and confirmatory small intestinal biopsy. The cornerstone of management is a strict gluten-free diet, which requires vigilant attention to food labels and cross-contamination risks. Additionally, patients may benefit from nutritional supplementation and regular monitoring of nutrient levels. This abstract provides an overview of celiac disease, it’s pathogenesis, diagnostic approach, and management strategies for celiac disease, emphasizing the importance of timely recognition and comprehensive care to improve patient’s health.

**Keywords:** *Celiac Disease, gluten, damage to small intestine, malabsorption, lack of awareness, gluten free diet*

## THE ROLE OF SPECIFIC NUTRIENTS IN DIFFERENT HEART DISEASES

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### ABSTRACT

Nutrition plays a critical role in preventing and managing various heart diseases. This paper explores the impact of specific nutrients on different types of heart ailments, highlighting their potential therapeutic benefits. In coronary artery disease (CAD), a leading cause of mortality worldwide, dietary factors such as saturated fats, trans fats, and cholesterol contribute to plaque formation and arterial narrowing. Conversely, omega-3 fatty acids found in fish oil have been associated with reduced inflammation and improved lipid profiles, offering protective effects against CAD. Hypertension, another prevalent cardiovascular condition, is influenced by excessive sodium intake and inadequate potassium consumption. High sodium levels contribute to elevated blood pressure, while potassium-rich foods such as fruits and vegetables have been shown to lower blood pressure levels. Heart failure, characterized by impaired cardiac function, is often exacerbated by deficiencies in micronutrients such as coenzyme Q10, magnesium, and thiamine. Supplementation with these nutrients has demonstrated potential benefits in heart function and quality of life in heart failure patients. Furthermore, emerging research suggests that antioxidants like vitamin E and flavonoids may confer protective effects against atherosclerosis and endothelial dysfunction, key contributors to heart disease development. In conclusion, optimizing

nutrient intake through a balanced diet rich in omega-3 fatty acids, potassium, and essential vitamins and minerals may offer significant cardioprotective effects across various heart diseases. However, further research is warranted to elucidate these nutrients' precise mechanisms and optimal dosages in mitigating cardiovascular risk factors and improving clinical outcomes.

**Keywords:** *Antioxidants, Coronary Artery Disease, Fiber, Nutrients, Omega-3 Fatty Acids,*

## **THE INFLUENCE OF DIET ON CARDIOVASCULAR DISEASE: IMPACT OF FOOD AND NUTRIENTS ON RISK FACTORS FOR HEART HEALTH**

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### **ABSTRACT**

Dietary factors play a pivotal role in the prevention and management of cardiovascular disease (CVD), with various nutrients and food choices influencing cardiovascular risk factors. This comprehensive review explores the impact of diet on CVD risk and outlines evidence-based dietary recommendations for cardiovascular health. Key findings highlight the importance of balanced macronutrients, emphasizing complex carbohydrates, lean proteins, and healthy fats, while limiting saturated fats and added sugars. Whole foods, including fruits, vegetables, whole grains, lean proteins, and healthy fats, are emphasized over processed and refined products due to their rich nutrient content and cardiovascular benefits. Additionally, reducing consumption of processed and sugary foods is crucial for mitigating cardiovascular risk factors such as obesity, hypertension, dyslipidemia, and insulin resistance. Incorporating anti-inflammatory and antioxidant-rich foods, such as fatty fish, fruits, vegetables, nuts, seeds, and olive oil, can help reduce inflammation and oxidative stress, further supporting cardiovascular health. Weight management through portion control, regular physical activity, and lifestyle modifications is also emphasized for preventing and managing CVD. These findings underscore the importance of adopting a heart-healthy diet to reduce the global burden of cardiovascular disease and promote optimal heart health.

**Keywords:** *anti-inflammatory, antioxidants, cardiovascular disease, lifestyle modifications, macronutrients, nutrition.*

## **NUTRITIONAL STRATEGIES AND PROTEIN MANAGEMENT IN NON-DIALYSIS CHRONIC KIDNEY DISEASE: AN INTEGRATED REVIEW**

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### **ABSTRACT**

Chronic kidney disease (CKD) presents a multifaceted challenge to healthcare, especially in managing dietary needs to slow disease progression and enhance patient quality of life. The role of protein intake in non-dialysis CKD patients emerges as a critical aspect of this

nutritional management, balancing the need to prevent malnutrition while avoiding excess burden on the kidneys. This review aims to dissect the impact of dietary proteins—focusing on both protein-rich foods and the quantity of protein intake—on the health outcomes of individuals with CKD not requiring dialysis. It synthesizes current evidence on how different sources of dietary proteins ( Plant-Based: Legumes, soy products, nuts .Animal-Based: Poultry, fish, eggs, low-fat dairy. ) influence renal function, the progression of CKD, and associated metabolic disturbances. Furthermore, the review proposes evidence-based dietary recommendations that harmonize with the goals of preserving renal function, preventing protein-energy wasting, and reducing the risk of CKD complications. By highlighting the nuances of protein management in the diet of non-dialysis CKD patients, this paper seeks to guide clinicians and dietitians in optimizing nutritional interventions tailored to individual patient needs, thereby contributing to a more personalized approach to CKD management. The protein requirement for CKD in Early Stages (Stages 1-3): Aim for 0.8 g/kg/day. Later Stages (Stages 4-5, Pre-Dialysis): Reduce to about 0.6 g/kg/day.

**Keywords:** *Chronic kidney disease (CKD); protein intake; non-dialysis CKD patients; protein-energy wasting; inflammation; metabolic alterations; protein-rich foods; renal function; clinical outcomes; nutritional interventions.*

## **FOOD ADULTERATION: A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

Food adulteration is a widespread problem that puts the public's health and safety at serious risk. This thorough analysis explores all facets of food adulteration, including types, techniques of detection, legal frameworks, and consequences. Food adulteration is the deliberate addition of unsafe or inferior ingredients to food products with the purpose of profiting from the product, therefore lowering its nutritional content and overall quality. This review explores the different types of food adulterants commonly found in various food categories, such as milk, spices, oils, and grains. It discusses the potential health hazards associated with consuming adulterated foods, ranging from mild allergic reactions to severe illnesses and even fatalities. Furthermore, it highlights the importance of stringent quality control measures and regular monitoring to prevent and detect food adulteration. Various analytical techniques for detecting food adulterants are examined in detail, including chromatography, spectroscopy, and DNA-based methods. The review also addresses the challenges in identifying sophisticated forms of adulteration and emphasizes the need for continuous research and innovation in this field. Moreover, it provides an overview of existing regulatory frameworks and enforcement mechanisms aimed at combating food adulteration globally. Recommendations for policymakers, food manufacturers, and

consumers are outlined to promote transparency, accountability, and ethical practices in the food industry. In conclusion, this review underscores the urgency of addressing food adulteration through collaborative efforts involving government agencies, industry stakeholders, and consumers to safeguard public health and ensure the integrity of the food supply chain.

**Keywords:** *Food adulteration, nutritional value, health hazard, food substitution, quality compromise*

## HEPATOCELLULAR CARCINOMA: CURRENT INSIGHT

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### ABSTRACT

Cancer is a disease characterized by the abnormal growth of cells that have the ability to invade or spread to other parts of the body. It can arise from almost any type of cell in the body and has many different forms, but all cancers share the common feature of uncontrolled cell growth. One of the most frequently occurring cancer is Liver Cancer which also known as Hepatocellular Carcinoma (HCC) which is the main type of liver cell that is hepatocyte and other type of types include cholangiocarcinoma, which starts in the bile ducts, and angiosarcoma, which starts in the blood vessels of the liver. HCC is predominantly associated with chronic liver disease, particularly hepatitis B and C infections, alcoholic liver disease, non-alcoholic fatty liver disease, and cirrhosis. This abstract aims to provide an overview of the current understanding of HCC, including its epidemiology, etiology, pathogenesis, diagnosis, risk factors, treatment, dietary requirements and case study

**Keywords:** *cancer, liver cancer, HCC, risk factors, case study*

## EXPLORING THE COMPLEX LANDSCAPE OF DIABETES MELLITUS: FROM MECHANISMS TO MANAGEMENT

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### ABSTRACT

Diabetes mellitus, a chronic metabolic disorder characterized by elevated blood glucose levels, poses a significant global health challenge. This abstract provides an overview of the etiology, classification, clinical manifestations, and management strategies associated with

diabetes. The etiology of diabetes involves a complex interplay of genetic and environmental factors. Type 1 diabetes results from autoimmune destruction of pancreatic beta cells, leading to insulin deficiency. In contrast, Type 2 diabetes primarily stems from insulin resistance and inadequate insulin secretion, often linked to lifestyle factors such as sedentary behavior and unhealthy diets. Gestational diabetes occurs during pregnancy, posing risks to both mother and child. Clinically, diabetes manifests with symptoms such as polyuria, polydipsia, and unexplained weight loss. Long-term complications include cardiovascular disease, neuropathy, retinopathy, and nephropathy, emphasizing the importance of early diagnosis and management. Accurate classification is crucial for tailoring treatment plans, with advancements in personalized medicine offering targeted interventions. Management strategies encompass lifestyle modifications, pharmacotherapy, and, in some cases, insulin therapy. Lifestyle interventions include dietary adjustments, regular physical activity, and weight management. Pharmacological options range from oral hypoglycemic agents to injectable therapies, aiming to control blood glucose levels and mitigate complications. Patient education and self-management play pivotal roles in achieving optimal outcomes. The advent of continuous glucose monitoring and telehealth technologies has revolutionized diabetes care, enhancing real-time monitoring and remote patient support. Ongoing research explores novel therapies, including stem cell-based interventions and gene therapies, holding promise for future breakthroughs. In conclusion, diabetes mellitus remains a pervasive health concern with diverse etiological roots. Advances in classification, diagnostics, and therapeutic modalities underscore the dynamic landscape of diabetes care. Comprehensive management, incorporating lifestyle modifications and cutting-edge interventions, is essential for improving patient outcomes and addressing the global burden of diabetes.

**Keywords:** *Diabetes, lifestyle modifications*

## **INTERMITTENT FASTING AND PHYSICAL EXERCISE FOR PREVENTING METABOLIC DISORDERS**

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### **ABSTRACT**

Obesity and metabolic syndrome (MetS) are a growing problem all across the globe, and hence there has been an increasing focus among the medical community to come up with innovative therapies to counter their pathophysiological effects. A sedentary lifestyle accompanied by unhealthy eating habits propels the release of harmful metabolites, which impair the intestinal barrier, thereby triggering a constant change in the immune system and biochemical signals. Metabolic disorders represent a series of complex conditions characterized by abdominal obesity, dyslipidemia, hypertension, glucose intolerance, and insulin resistance that, when occurring together, strongly lead to detrimental clinical outcomes, entailing both health risks and economic burdens to our society. Healthy dietary interventions, such as intermittent fasting, coupled with regular physical exercise can improve several metabolic and inflammatory parameters, resulting in stronger beneficial actions for metabolic health. One approach to improving weight and metabolic outcomes is intermittent fasting, which consists of multiple different timing schedules for temporary food



avoidance, including alternate-day fasting, other similar full-day fasting patterns, and time-restricted feeding (where the day's food is consumed over a 6-h period, allowing for 18 h of fasting). These feeding schedules have favorable metabolic effects by intermittently inducing the metabolism of fatty acids to ketones. Intermittent fasting and physical activity overall lead to a decrease in weight and have been linked to improvements in dyslipidemia and blood pressure. independent and synergistic effects of fasting and exercise interventions on metabolic health and provide perspectives for preventing metabolic disorders.

**Keywords:** *Intermittent fasting, metabolism, physical exercise, obesity, hypertension*

## IMMUNOTHERAPY FOR CANCER TREATMENT

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### ABSTRACT

Immunotherapy is a type of cancer treatment. It uses substances made by the body or in a laboratory to boost the immune system and help the body find and destroy cancer cells. Immunotherapy can treat many different types of cancer. It can be used alone or in combination with chemotherapy and/or other cancer treatments. The immunotherapy of cancer has made significant strides in the past few years due to improved understanding of the underlying principles of tumour biology and immunology. These principles have been critical in the development of immunotherapy in the laboratory and in the implementation of immunotherapy in the clinic. This improved understanding of immunotherapy, enhanced by increased insights into the mechanism of tumour immune response and its evasion by tumours, now permits manipulation of this interaction and elucidates the therapeutic role of immunity in cancer. Also important, this improved understanding of immunotherapy and the mechanisms underlying immunity in cancer has fueled an expanding array of new therapeutic agents for a variety of cancers. Pegylated interferon- $\alpha$ 2b as an adjuvant therapy and ipilimumab as therapy for advanced disease, both of which were approved by the United States Food and Drug Administration for melanoma in March 2011, are 2 prime examples of how an increased understanding of the principles of tumor biology and immunology have been translated successfully from the laboratory to the clinical setting. Principles that guide the development and application of immunotherapy include antibodies, cytokines, vaccines, and cellular therapies.

**Keywords:** *Antibodies, Cancer, Immunotherapy, immunity*

## IMPACT OF SOCIAL MEDIA ON STUDENT DIETARY CHOICES

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### ABSTRACT

The abstract surveys how social media affects students' food preferences. Dietary choices are the items that a person chooses to eat and drink in order to satisfy their nutritional

requirements. In insertion to judgments regarding portion sizes and meal scheduling, these choices may involve preferences for particular food types, such as fruits, vegetables, grains, proteins, and fats. Individuals base their food decisions on a variety of variables, such as personal views, cultural influences, taste preferences, and health considerations. Through a study of how exposure to food-related content, peer relationships, and advertising shape students' eating patterns, the study investigates the impact of online platforms on nutritional behaviours. In order to understand the dynamics of social media's influence on dietary decision-making, the research uses a mixed-methods approach that combines surveys and qualitative interviews. Initial results point to a complicated interaction between real-world food choices and online material, emphasising the need for focused interventions to encourage healthier eating habits in the context of students' widespread use of social media.

**Keywords-** *nutritional, emphasising, interventions, dietary, peer-relationship*

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**Theme 4:**

**Next Generation**

**Foods**

## AMELIORATION OF ULCERATIVE COLITIS IN BALB/C MICE BY FERMENTED *AEGLE MARMELOS* JUICE

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### ABSTRACT

This study aimed to explore the potential therapeutic benefits of fermented bael juice for ulcerative colitis (UC), a chronic inflammatory colon disease. Using a BALB/c mice model, UC was induced with 2% Dextran sulphate sodium (DSS) in drinking water for 14 days. Following 7 days of DSS exposure, mice were orally administered 1 mL of fermented bael juice daily for another 7 days. Various parameters were assessed to evaluate the efficacy of the treatment. DSS administration resulted in decreased body weight, heightened disease activity index (DAI), and compromised antioxidant defenses characterized by reduced SOD levels. Elevated levels of inflammatory biomarkers TNF- $\alpha$  and IL-6, alongside histopathological changes, indicated colon damage. In contrast, treatment with fermented bael juice notably increased body weight, reduced DAI, and mitigated DSS-induced colon damage. This was evidenced by decreased TNF- $\alpha$  and IL-6 levels and elevated SOD activity compared to the DSS-treated group. Furthermore, High-Performance Liquid Chromatography (HPLC) analysis of fermented bael juice revealed potential bioactive compounds that could contribute to its therapeutic effects. Overall, the study suggests that fermented bael juice holds promise as a therapeutic approach for UC, as it effectively counteracted pro-inflammatory mediators responsible for UC's pathogenesis and demonstrated antioxidant properties.

**Keywords:** *Aegle marmelos*, *Ulcerative Colitis*, *Fermented juice*, *Bael fruit*, *DSS-induced animal model*, *Functional foods*

## PHYSICO-CHEMICAL, NUTRITIONAL AND SENSORY CHARACTERIZATION OF MEAT ANALOGUES BASED ON SPIRULINA/PEA PROTEIN MIXTURES

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### ABSTRACT

Transitions to sustainable lifestyle and diets have created a thrust to replace conventional meat with more sustainable and nutritious sources. Considering the current trend, plant-based meat analogs have become increasingly popular among consumers, lauded with exemplary qualities such as sustainability, nutritious and environment friendly. According to earlier

studies, plant-based meat has a lower protein digestibility in comparison to traditional meat. This presents an opportunity for food scientists to investigate innovative sources or methods of producing plant-based meat. In a similar vein the study has been conducted to form an innovative plant-based meat comprising pea protein, wheat gluten and spirulina. Five different combinations were formulated and analyzed on sensory parameters. Among them, the meat analogue containing 15% spirulina protein had the highest acceptability compared to the others. Additionally, proximate analysis, scanning electron microscope (SEM), Fourier transform infrared spectroscopy (FTIR) and cookability were performed on this meat analogue. To accurately assess the influence of spirulina on the meat analogue, the results obtained were compared with the control (without spirulina). Current findings suggest addition of spirulina content significantly alters the sensory and physical characteristics of the developed meat analogue. Moreover, it contributes to a higher amino acid score as well as imparting antioxidant activity to the nutritional content. The sensory results found that adding spirulina negatively affected the sensory characteristics of meat analogue, which needs to be enhanced by adding textural modifying agents and flavoring compounds to improve the taste.

**Keywords:** Sustainable, Spirulina, Pea Protein, SEM, FTIR

## STUDY ON EFFECT OF ANTI-RANCIDITY AND PACKAGING TREATMENTS ON INSTANT COCONUT [*COCOS NUCIFERA* L.] CHUTNEY MIX

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### ABSTRACT

The experiment entitled “Standardization of technology for preparation of instant coconut [*Cocos nucifera* L.] chutney mix” was conducted during November-April, 2021-22 at Department of Post Harvest Technology, ASPEE College of Horticulture and Forestry, Navsari Agricultural University, Navsari, Gujarat, India. The experiment was aimed to evaluate the anti-rancidity treatments and packaging materials for sensory as well as nutritional quality of instant coconut chutney mix during storage. An experiment was laid out using a completely randomized design with factorial concept comprising sixteen treatment combinations with three repetitions. In the experiment, instant coconut chutney mix was prepared by using various anti-rancidity treatments [control (R<sub>1</sub>), N<sub>2</sub> gas packaging (R<sub>2</sub>), TBHQ 0.01% (R<sub>3</sub>) and TBHQ 0.02% (R<sub>4</sub>)] and packed in four different packaging materials (low density polyethylene ((P<sub>1</sub>), high density polyethylene (P<sub>2</sub>), aluminum laminate ((P<sub>3</sub>) and polypropylene (P<sub>4</sub>) and stored at ambient condition. The results of present investigation indicated that instant coconut chutney mix containing 0.01% TBHQ and packaged in

aluminum laminated pouches (R<sub>3</sub>P<sub>3</sub>) resulted lower increase in moisture, reducing sugars and peroxide value and delayed rancidity and spoilage. It also delayed the reduction in TSS, total sugars, ash, protein, crude fat, crude fiber, potassium content and starch with, maintaining good sensory score for colour, texture, flavour, taste, and overall acceptability during storage. Overall findings of investigation revealed that instant coconut chutney can be successfully stored for 6 months with good quality attributes by incorporating antioxidant TBHQ 0.01% followed by packing in aluminum laminate and storage at ambient condition. Thus, this treatment can be commercially used by traders and processors for longer time storage.

**Keywords:** *TBHQ, Instant chutney mix, Rancidity, Aluminum laminate, Coconut*

## **DEVELOPMENT AND CHARACTERIZATION OF PLANT-BASED PROTEIN BAR AS A NUTRITIONAL SUPPLEMENT FOR ATHLETES: A FOCUS ON GREEN GRAM (*VIGNA RADIATA*)**

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### **ABSTRACT**

Protein bars are convenient and nutritious snacks for athletes that can provide various health benefits, such as enhancing muscle growth, managing weight, and improving blood sugar control. However, the quality and safety of protein bars depend on selection and processing of ingredients, as well as the standardization of formulations and methods. The aim of this study was to develop protein bars using different sources of plant-based proteins such as green gram (whole and germinated) watermelon seeds, almonds, cashews along with jaggery, honey and ghee. This research also addresses the lack of healthy and affordable options in markets primarily targeted at athletes and vegetarians. Since green gram has not been used to develop protein bars before, two formulations were made one with germinated green gram and one without germinated. Where overall acceptability and sensory evaluation through 9-point Hedonic scale was recorded. The protein bars exhibited positive sensory evaluations, particularly favouring germinated green gram bars, with highest mean scores for taste (8.02±0.79), odour (7.40±1.06), colour (7.48±0.96), texture (7.56±0.83) and overall acceptability (7.97±0.72). The germinated green gram protein bar was then evaluated for their proximate composition, The results showed that the protein bar had high protein (20.91g/100 g), Fiber (11.28g/100 g), carbohydrate (45g/100g) and energy (497 kcal/100 g) values with moisture content 5.57g/100g respectively. The nutritional benefits of green gram are enhanced through sprouting, resulting in an increase in bioavailability and a reduction of anti-nutrients. Overall, incorporating green gram into protein bars offers athletes a convenient, tasty, and balanced option on the go.

**Keywords:** *Protein bar, Athlete, Green gram, Plant based, Germinated.*

## DEVELOPMENT AND NUTRITIVE ASSESSMENT OF BLENDED RTS PREPARED FROM GUAVA (*PSIDIUM GUAJAVA L.*) AND KARONDA (*CARISSA CARANDA*)

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### ABSTRACT

Incorporation of karonda in guava RTS may result in an increased nutritional profile and better sensory characteristics due to the presence of vitamins, antioxidants, and unique tart-sweet flavor attributes. The present study was carried out to standardize the optimal combinations of guava (*Psidium guajava L.*) and karonda (*Carissa caranda*) pulp for the preparation of ready-to-serve (RTS) and to evaluate its nutritional properties. Preliminary tests were carried out to determine the optimum concentration of sugar and citric acid for the preparation of guava RTS. The prepared blended RTS of guava pulp and (Gp) and karonda (Kr) was formulated with different proportions containing T1(Control), T2 (90%Gp: 10% Kr), T3 (80%Gp: 20% Kr), T4 (70%Gp: 30%Kr), and T5 (60%Gp: 40%Kr) along with equal amount of sugar and citric acid. Additionally, different stabilizers such as guar gum, xanthan gum, and carboxymethyl cellulose (CMC) were added in appropriate quantities to evaluate their stabilizing effect in prepared RTS. The physicochemical analysis including titratable acidity, pH, ascorbic acid, phenolic acid, antioxidants, and minerals analysis were conducted to determine the chemical composition and nutritional profile. The sensory attributes were then assessed using a 9-point hedonic scale. It was observed that the RTS containing 90% guava pulp and 10% karonda was considered best with respect to the mean values of color, appearance, flavor, taste, consistency, and overall acceptability. Xanthan gum in the concentration of 0.2% resulted in improved viscosity and stability. The outcomes of this research provide valuable insights into comprehensive analysis and development of nutritious RTS which will cater to diverse consumer preferences.

**Keywords:** *Guava, Nutrition, Organoleptic, Ready-to-serve, Xanthan gum*

## DEVELOPMENT OF ROSELLE CALYCES (*HIBISCUS SABDARIFFA L*) JELLY: A NUTRIENT RICH FOOD

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### ABSTRACT

Roselle (*Hibiscus sabdariffa*) is widely embraced as an edible plant in many countries. The roselle plant possesses a multitude of applications. Its various parts, including leaves, fruits,



roots, calyces and seeds, are utilized in both culinary and traditional medicinal practices. Its calyces are known for their natural antioxidant properties and hold the utmost significance among all the components of the roselle plant. The main objective of this study is to develop a standardized product of roselle calyces. Four variations of jellies of roselle calyces were developed: Two samples were developed by using dried roselle calyces (Dried sample 1 & 2), and other two samples made of fresh roselle calyces (fresh sample 1 & 2). In sample 1 and 2 the concentration of roselle calyces was 76.19% and 70.80%, agar content was 4.76% and 2.65%, and sugar content was 19.05% and 26.55%, respectively. The sensory analysis was carried out to evaluate consumer acceptance, with Sample 2 of both dried and fresh jellies proving to be more favored by the panelists. The nutrient content of both the dried and fresh jellies of sample 2 as per 100g exhibited carbohydrates content of 41.32% & 50.95% respectively while the energy content was measured as 169.36 kcal and 208.32 kcal, moisture content of 57.01% and 47.36%, protein content of 1%, fat was entirely absent and dietary fiber was 0.44% and 0.47 %, whereas the commercial jelly had no discernible protein and lack in dietary fiber. The vitamin C content was 51.47% and 58.82% and the total phenol content of the jellies was 0.90gGAE and 0.86gGAE respectively. Roselle calyces' jellies offer a healthier alternative to traditional jellies, with lower energy and fat content, higher vitamin C and total phenols exhibiting antioxidant property showing promising option to the consumers.

**Keywords:** *antioxidant, jellies, roselle calyces, standardization, total phenol*

## **EXPLORING THE DIFFERENT EXTRACTION AND QUANTIFICATION METHODS OF LECITHIN AND ITS APPLICATIONS: A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

Lecithin, an important phospholipid, consists of Phosphoric acid, choline, fatty acid, and esters of glycerol. Lecithins are derived from a variety of sources, with soybean, sunflower seeds, milk, and egg yolk being the primary sources in the industrial sector. Its primary function is to maintain the integrity of the cell membrane. Lecithin possesses antibacterial, anti-inflammatory, and antioxidant properties. It also serves as a good emulsifying agent. It finds extensive applications in human food, animal feed, pharmaceuticals, and various industrial sectors. Moreover, it offers protection against neurological, cardiovascular, and cerebrovascular diseases. The objective of this review is to elucidate different techniques for lecithin extraction and its quantification from food sources, as well as the diverse applications of lecithin in various fields. This study was conducted using specialized search engines such as research gate, PubMed, google scholar, MDPI, Elsevier and Science direct, employing keywords like lecithin, isolation, extraction, egg yolk, soybean, and adhering to the following inclusion criteria: (i) documents published between 2010 and 2024, (ii) sources of lecithins, (iii) extraction and quantification methods of lecithins, and (iv) applications of lecithins to gather the necessary data. This review offers a comprehensive overview of the extraction methods for lecithin and its wide-ranging applications in various fields.

**Keywords:** *egg yolk, extraction methods, lecithin, phospholipids, soya bean*

## DEVELOPMENT OF MALTED WEANING MIX

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### ABSTRACT

Weaning food is an instant product with high biological value. Weaning foods are generally texture modifications of adult foods to make them easily digestible and promote healthy growth of a child. Malted cereal grain contains essential vitamins, minerals, amino acids, and dietary silicon that support bone health. The aim of the study is to develop product using malted wheat, malted green gram and dried carrot powder. Malted wheat and green gram are highly nutritious in protein, vitamins, and minerals. Three variations were done at V1 [ 30,25,20g], V2 [ 35,20,20g], V3 [ 40,15,20g]. Sensory evaluation is done using 25 semi-trained panel members. Nutrient analysis was done for the selected variation. The product was analysed for organoleptic evaluation. From the results it is summarized that variation 3 was much acceptable. The developed malted weaning mix was highly nutritious and palatable for infants.

**Keywords:** *Weaning mix, Malted green gram, Malted wheat, Vitamins and Minerals*

## DEVELOPMENT AND CHARACTERIZATION OF RICE PROTEIN OLEOGELS

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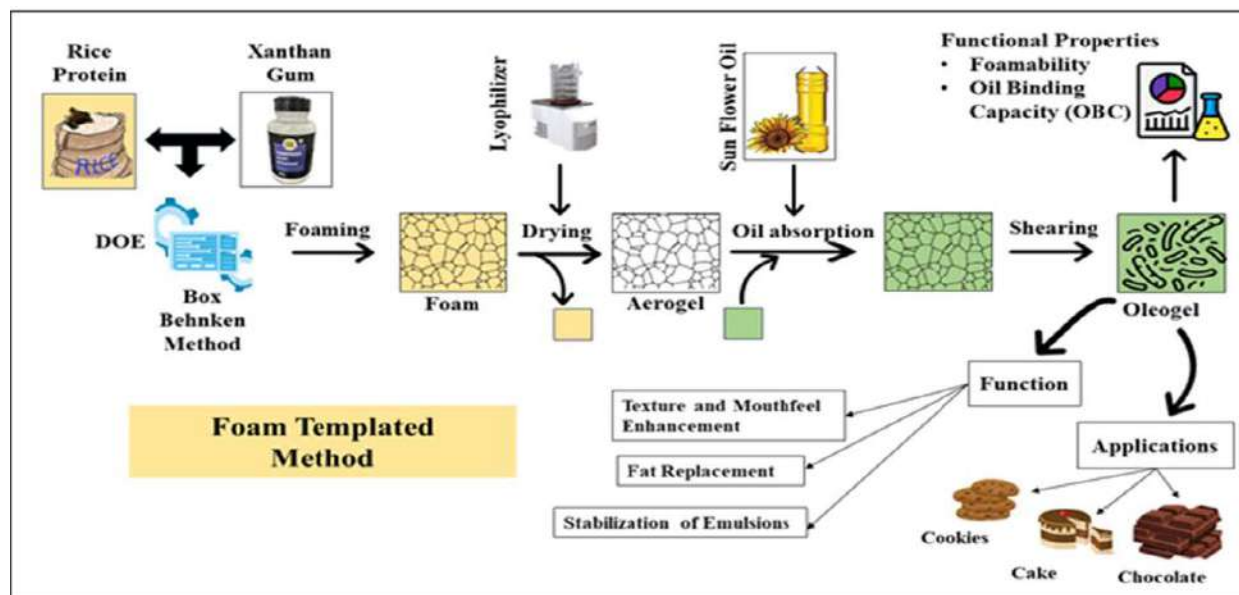
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### ABSTRACT

Organ gelation, specifically oleo gelation, revolutionizes liquid oils into a gel like structure, offering innovative structured fats that replace detrimental ones. The thermo-reversible three-dimensional gel network entraps oil within a gelator molecule, presenting diverse applications. Mixtures of plant sterols in edible oils, like sunflower oil, show promising health benefits. Utilized as a replacement for saturated and trans fats, oleogels improve the texture, stability, and shelf life of food products, delivering bioactive compounds such as antioxidants, vitamins, and flavors. The research employs the Box-Behnken method, foam-templated oleogel preparation, and meticulous analysis of oleogel characteristics. Key components like rice protein powder, xanthan gum, and refined sunflower oil are employed, while equipment such as a magnetic stirrer, deep freezer, and lyophilizer facilitates the experimental setup. The foamability test reveals pH-dependent variations in rice protein, with the highest overrun at pH 9. The oil binding capacity test demonstrates effective oil absorption by the oleogel, supporting its potential as a stable carrier. Released oil percentage and oil binding capacity (OBC) are calculated that was found to be of 67.27%. The research explores the potential of oleogels as structured fat systems, offering healthier alternatives across industries. The comprehensive experimental approach provides insights into

foamability, oil binding capacity, and the influence of pH levels on rice protein, paving the way for innovative applications in food technology and materials science.



**Keywords:** Rice Protein, oleogels, foam templated, oil binding capacity

## MODIFICATION & ISOLATION OF NON-TRADITIONAL OILS

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### ABSTRACT

This research is intended to highlight the utilization of non-traditional oils in a newer way. Main objective of the research is to develop modified non-traditional oil to improve the functionality of oil, by developing technique to eliminate the limitations of these oil used currently. Cooking oils are imported and still these are used in various food industries for their derivatives. These modification processes which is adapted in this research study is the esterification and interesterification of nontraditional oil such as Charoli Seed oil along with the groundnut oil. The direct use of nontraditional oil is not recommended as then availability and the functionality are less as compared to the other vegetable oil. Different sets of combination of these oils in ratio of 1:1, 1:2 and 1:3 is performed. The runs were carried out to check the feasibility and the degree of the reactions. Also, the parameters and factors such as temperature, duration of process, pressure, byproduct formation, catalyst requirement and the pH of the medium were also studied. Charoli seed oil has unique compositions hence modified oil gives an excellent product to be as emulsifier. This will increase the nutritional value of nontraditional oils to increase the visibility of these oils in the market. Therefore, finished products with these blends and modification will provide health benefits.

**Keywords:** Charoli seed oil, modification, esterification, interesterification, groundnut oil.

## ACCEPTABILITY OF READY TO EAT BREAKFAST CEREALS PREPARED FROM COMMON BUCKWHEAT

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### ABSTRACT

Breakfast cereals are a popular and easy meal Ready to Eat (RTE) option. They are commonly manufactured from grains such as Wheat, Corn, and Oats. However, there is an increasing demand for gluten-free Cereal products that provide additional Health benefits. Buckwheat has essential nutrients for promoting health. Despite its nutritional value, Buckwheat is underutilized in the food industry, especially in the production of RTE Breakfast cereals. This study aims to bridge this gap by evaluating the acceptability of Common Buckwheat based RTE Breakfast cereals. With this objective, Buckwheat based RTE Breakfast cereals, such as Buckwheat rolled flakes and Honey Coated Buckwheat Muesli with Nuts were developed. Semi-trained panellists assessed the overall acceptability versus the control (Commercially available Corn Flakes and Muesli with Nuts) using a 9-point Hedonic rating scale of Sensory Evaluation. The results showed that there was no significant difference in overall acceptability between Buckwheat Muesli and commercially available Muesli, but there was a significant difference with respect to Flakes with the control. The study demonstrated the potential of employing Buckwheat as a sustainable and varied food ingredient in the manufacture of RTE Breakfast cereals, thereby increasing its utilization.

**Keywords:** *Breakfast Cereals, Buckwheat, Sustainable foods*

## POROUS CORN STARCH GRANULES AS EFFECTIVE HOST MATRICES FOR ENCAPSULATION AND SUSTAINED RELEASE OF CURCUMIN AND RESVERATROL

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### ABSTRACT

Diabetes is influenced by dietary carbohydrates that metabolize and absorb rapidly. To mitigate this condition, regulating carbohydrate digestion is crucial. To this end, one promising approach is utilizing plant polyphenols. However, polyphenols are unstable at normal processing and storage conditions and have low bioavailability, thus limiting their effectiveness in product development. In this regard, encapsulating them within an inexpensive and suitable wall material, such as starch, aids in overcoming the limitations. This study investigated the potential of porous starch granules to encapsulate and deliver polyphenols. Curcumin and resveratrol, known for their health benefits, were selected as the test polyphenols. The optimal conditions for preparing porous corn starch granules were established through enzymatic modification with 11, 22, and 33 units of amyl glucosidase for a 2-, 4-, and 6-hour reaction time on corn starch granules. The encapsulation efficiency was

determined, and the *in vitro* starch digestion of complexes was established. The *in vitro* release profiles of the encapsulated polyphenols during the gastric and intestinal fluids were measured. The findings suggest that a reaction time of 2 hours and 33 enzyme units are optimal in creating spherical-oval pores on corn starch granules and achieving the highest encapsulation efficiency of 80.16% and 88.33% for curcumin and resveratrol, respectively. The encapsulation of curcumin and resveratrol reduced the porous starch digestion significantly and increased the resistant starch percentage. Polyphenols' *in vitro* release behavior demonstrated good stability in the simulated gastric fluids and sustained release in simulated intestinal fluids and followed a complex Fickian type of diffusion mechanism. The outcome offers a novel pathway to developing new functional foods loaded with polyphenols to address diabetes concerns and other chronic diseases.

**Keywords:** *bioavailability, starch digestion, Gastrointestinal release, functional foods*

## ENHANCING FRUIT JUICE QUALITY: FORTIFICATION WITH AGAVE SISALANA-DERIVED PREBIOTIC INULIN AND ITS APPLICATION

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### ABSTRACT

As the demand for healthier dietary options escalates, research on novel food ingredients assumes heightened significance in response to consumer preferences for healthier alternatives. This abstract delineates the extraction and isolation process of inulin from the *Agave sisalana* plant, with a focus on fortifying fruit juice. *Agave sisalana*, colloquially referred to as Sisal, pertains to the herbaceous monocotyledonous plants within the Agavaceae family. Following the drying of the plant boles at 80°C, extract precipitates and subsequently. The extraction and purification procedures facilitate the incorporation of inulin into fruit juice formulations, aimed at evaluating its effects on sensory attributes and nutritional profiles. The outcomes furnish insights into the viability and potential of integrating inulin from *Agave sisalana* as a functional ingredient in fruit juices, thereby contributing to the creation of novel foods enriched with beneficial constituents. The plant's sustainable nature and widespread availability present opportunities for leveraging its inulin content in food applications such as fat replacement. Inulin, characterized by its solubility and dietary fiber properties, confers various physiological benefits, including prebiotic effects, enhanced gut health, and regulation of blood sugar levels.

**Keywords:** *Agave sisalana, Inulin, Prebiotic, Fortification, Fruit juice.*

## DEVELOPMENT OF CLUSTER FIG INCORPORATED KULFI

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### ABSTRACT

Cluster fig (*Ficus racemose*) also Known as Gular fig or country fig in English. It belongs to Moraceae family It grows abundantly in all parts of India. The fruits when fully ripe have a pleasant odor, and it provides good amounts of calcium, copper, iron, protein, and zinc content. It is mostly used in Ayurveda, Unani, siddha and homeopathy as an antioxidant, anti-cancer, anti-inflammatory, anti-bacterial, gastroprotective agents and memory enhancer. The intention behind using the Cluster Fig, it is not widely consumed by the people though it has many nutritional properties. Kulfi is an indigenous frozen dessert prepared by blending milk, sugar, and Flavour, with or without stabilizer. The different levels of Cluster Fig Powder 5, 10, 15 and 20 were tried in buffalo milk. The product was evaluated for physico-chemical and sensorial attributes. The color, Flavor, and taste of the product is acceptable. The main advantage of using Cluster Fig powder is that it can be used for the treatment of numerous disorders.

**Keywords:** Cluster Fig, Frozen dessert, Kulfi, Milk, Sensory Evaluation

## STUDIES ON PREPERATION OF KHAJOOR (*PHOENIX DACTYLIFERA*) BURFI INCORPORATED WITH HONEY

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### ABSTRACT

The present study was investigated to optimize the level of honey in khajoor (*Phoenix dactylifera*) burfi based on organoleptic evaluation. The khajoor burfi formulated by using khoa and khajoor in proportion of 80:20 with incorporation of 2, 4 and 6 per cent honey and subjected for organoleptic evaluation and nutritional composition. The khajoor burfi incorporated with 4% honey scored highest in the sensory attributes. Hence based on score of overall acceptability the 4% honey incorporated burfi was liked by panel members. The nutritional composition of all treatments showed that the fat and carbohydrate content of burfi was reduced with increased level of honey. The fat, protein, total sugar and reducing sugar of selected treatments were found to be 16.42, 14.80, 42.43 and 32.52 per cent respectively. Further it can be concluded that honey can be utilized in burfi up to 4 per cent.

**Keywords:** formulation, preparation, khajoor burfi and organoleptic characteristics



## ORGANOLEPTIC AND NUTRITIONAL ANALYSIS OF DRINK FORMULATED WITH RHODODENDRON ARBOREUM FLOWER

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### ABSTRACT

The flower of *Buransh* (*Rhododendron arboreum*) from Himalayas is known for its unique nutritional and medicinal values. Thus, the study considered and formulated a nutritionally rich drink by incorporating the extract of this wild edible flower along with ginger, green tea and aloe vera juice. Three experimental samples namely T1, T2 and T3 were prepared and organoleptically tested at lab scale against the control sample drink (CS) containing rhododendron juice available in markets. The experimental sample with the highest sensory score was selected for comprehensive nutritional analysis. The energy (24.24 Kcal/100g), ash (0.32g/100g) carbohydrate (4.76g/100g) and total sugar (0.5g/100g) content were analysed as per standard procedures. The antioxidant activity of the prepared sample drinks was assessed using high performance liquid chromatography. Experimental sample T1 was found to have high antioxidant values of propyl gallate (13.22 mg/kg), tert-butyl-hydroquinone (13.46 mg/kg), butylated hydroxy anisole (15.12 mg/kg) & butylated hydroxytoluene (14.12 mg/kg). The amalgamation of *Buransh* juice with ginger, green tea, and aloe vera presents promising potential in the development of a revitalizing drink. The resulting drink not only capitalizes on the potential health benefits of *Rhododendron arboreum* but also offers a refreshing and revitalizing option for consumers.

**Keywords:** antioxidant activity, *Buransh*, nutritional, organoleptic, *Rhododendron arboreum*

## A STUDY ON UTILIZATION OF YAM AND WHOLE WHEAT FLOUR IN FORMULATION OF SWISS ROLL

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### ABSTRACT

The study presented on Utilization of Yam and whole wheat flour in formulation of Swiss roll. The bakery industry is among the few processed food segments whose production has been increasing consistently in the last few years. Swiss Rolls produced are egg less and pure vegetarian, hence acceptable throughout. The typical ingredients are used, and three different trails taken with varying proportions of yam flour and other ingredients. Out of three samples, second sample B has more acceptance than others. Sample B contains 10% yam flour and 30% whole wheat flour. Then it is further analyzed for sensory and chemical evaluation.

**Key words:** Formulation, Whole wheat flour, yam flour, Swiss roll, Sensory & Chemical Evaluation



## FUNCTIONAL PROPERTIES AND RECENT DEVELOPMENTS IN CHOCOLATE PROCESSING

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### ABSTRACT

Chocolate processing is a multifaceted field that combines science and art to produce the delectable treat loved worldwide. This study sheds light on the elements that impact chocolate's quality, flavor, and sustainability by investigating the functional qualities of chocolate and contemporary advancements in chocolate processing. Functional qualities like texture, flavor, color, and aroma are carefully examined with an emphasis on their importance in the creation of chocolate. Modern grinding and conching methods, sustainable practices, alternative sweeteners and fats, automation, AI, and nanotechnology applications are just a few of the most recent advances in chocolate production that are featured. The study also discusses issues with sustainability in the manufacture of chocolate, focusing on ethical sourcing and environmental responsibility. It also describes future directions for research and development and talks about the industry's regulatory and environmental challenges. The potential for individualized and unique chocolates is a reflection of the industry's expanding dedication to satisfying consumer wants. The importance of research in maintaining the superior quality of chocolate products while embracing sustainability and innovation is shown by this in- depth analysis of functional qualities and recent advancements in chocolate processing.

**Key words:** *Chocolate processing, functionality, sustainability, AI and Nanotechnology*

## TECHNOLOGICAL INNOVATIONS IN DAIRY INDUSTRY: A REVIEW

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### ABSTRACT

The dairy industry is undergoing a transformative phase driven by rapid technological innovations that have profound implications for efficiency, sustainability, and market dynamics. This paper explores the multifaceted effects of technological advancements on various aspects of the dairy sector. Efficiency gains are witnessed through the integration of automation, data analytics, and artificial intelligence into dairy farming practices. Precision farming technologies enhance milk production by optimizing feed composition, monitoring animal health, and improving breeding strategies. The use of robotic milking systems not only increases operational efficiency but also provides real-time data for better decision-making. Sustainability is a key focus area as the industry grapples with environmental concerns and resource constraints. Advanced waste management systems, renewable energy sources, and precision agriculture contribute to reducing the environmental footprint of dairy operations. Market dynamics are shifting with the advent of blockchain technology,

traceability solutions, and e-commerce platforms. Consumers increasingly demand transparency and ethical sourcing, prompting the industry to adopt blockchain for supply chain transparency. Direct-to-consumer models enabled by e-commerce platforms empower farmers to connect with consumers, while traceability solutions ensure the authenticity and quality of dairy products, fostering consumer trust. While technological innovations promise significant benefits, challenges such as high initial costs, data privacy concerns, and the need for skilled workforce adaptation must be addressed. This paper provides insights into the ongoing technological revolution in the dairy industry and highlights the potential for creating a more efficient, sustainable, and consumer-centric ecosystem.

**Keywords:** *Innovations, Dairy Industry, Efficiency, Sustainability, Market Dynamics*

## **OPTIMIZING INFANT FORMULA FEEDING: MITIGATING RISKS OF COW MILK ALLERGY FOR ENHANCED INFANT HEALTH**

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### **ABSTRACT**

Cow's milk and its derivatives have been extensively utilized in the production of infant formulas. Despite their widespread use, the presence of known allergens presents challenges for some infants, prompting a crucial exploration into refining formula composition. This study investigates strategies to alleviate cow milk allergy, with a specific focus on a primary source of cow's milk allergy: beta-lactoglobulin. The research also examines the risk of necrotizing enterocolitis in preterm infants and explores how cow milk proteins may play a role in its pathogenesis. The study delves into the utilization of hydrolysed proteins, emphasizing their impact on cytotoxicity and osmolality to ensure a safe and nourishing formula. Additionally, the removal of beta-lactoglobulin from the formula is explored to enhance its compatibility with infants. The paper also addresses the integration of human milk oligosaccharides, prebiotics, and probiotics in formula, shedding light on their potential benefits for infant gut health and brain development. By integrating insights from various studies, this paper offers a comprehensive look into infant formula composition, contributing to our understanding of infant health.

**Keywords:** *beta-lactoglobulin, cow milk allergy, human milk oligosaccharides, infant formula, necrotizing enterocolitis*

## **A COMPREHENSIVE OVERVIEW ON USE OF VEGETARIAN AND NON-VEGETARIAN PRESERVATIVES IN WATER BASED NON- ALCOHOLIC BEVERAGES AND THEIR IMPACT ON HUMAN HEALTH.**

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### **ABSTRACT**

Non-alcoholic beverages are trending in today's market and are facing challenges and rapid growth due to continued innovation in this category of beverages. Commercial non-alcoholic beverages are at the peak of growth, achieved through a wide range of markets such as tea, coffee and fruit smoothies, which are included in recent nutritional trends with improved taste and convenience. The review paper examined the effect **preservatives** commonly used in the beverage industry that are of vegetarian origin. (**Ascorbic acid and citric acid**) and of non-vegetarian origin (**Gelatin and casein**) used as films in the food industry, this study focuses on water based non- alcoholic beverages used by consumers including Adults, young children and Elderly. The review also investigates the health impact of these preservatives used in water-based beverages that can vary depending on factors such as the specific ingredients used, the amount consumed, and individual health conditions. Moderation and choosing beverages with natural ingredients and minimal additives are generally recommended for maintaining good health.

**Keywords-** *Preservatives, Gelatin, Casein, Ascorbic acid, citric acid.*

## **NUTRITIONAL PROPERTIES OF MORINGA AND ITS APPLICATIONS IN FOOD PRODUCTS – A REVIEW**

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### **ABSTRACT**

The tropical and subtropical parts of the world are home to the Indian native *Moringa oleifera* plant. It is commonly known as ‘horseradish tree’ or ‘drumstick tree’. The majority of current research recommended using moringa as a functional food additive. Vital components in moringa leaf powder include protein, vitamins, minerals, and phytonutrients such flavonoids, carotenoids, tocopherols, polyphenols, alkaloids, and tannins. The nutrients found in dried moringa leaves can be extracted to create leaf powder. The moringa leaves are rich in protein content (22.99–29.36%), and low in fat (4.03–9.51%), ash (8.05–10.38%) and fibre (6.00–9.60%). The fresh moringa leaves contains vitamin C (187.96–278.50 mg/100 g), phosphorus (0.152–0.304 g/100 g), calcium (1.322–2.645%), and potassium (1.317–2.025 g/100 g). It also contains fatty acids in which  $\alpha$ -linolenic acid (44.57%) had the highest value, followed by g-linolenic (0.20%), palmitic (0.17%), heneicosanoic (14.41%), and capric acid (0.07%). Moringa is used as potential antioxidant, anti-diabetic, anti-inflammatory, anticancer

and antimicrobial agent. Powdered moringa leaves has long been thought to provide health advantages and moringa ought to be a useful element in food items. Use of dried moringa as dietary purposes is restricted because of its disagreeable flavor, which gets even more bitter throughout the drying process. Therefore moringa leaf powder can be used into a variety of products, including tablets, capsules, and cereal mixes. Moringa leaf powder has been used to in fortified and functional food products. The functional qualities of moringa leaves make them suitable for usage in snacks or ready-to-eat food products like toasted products structured like ribbons. A number of baked goods have their nutritious levels greatly increased by the addition of moringa powder. According to a recent survey on the uses of the moringa plant, its leaves can be used to make tea, salads, and soups.

**Key words-** *alkaloids, antimicrobial, moringa, phytonutrients, polyphenols.*

## NUTRACEUTICAL POTENTIAL OF BAMBOO

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### ABSTRACT

The nutraceutical potential of bamboo, often referred to as 'Green gold,' has garnered significant attention from both traditional medicine practitioners and modern scientists. Bamboo, comprising numerous species globally, particularly abundant in Asia Pacific and South America, holds immense promise due to its diverse pharmacological properties. From its historical use in traditional Asian medicines to its current exploration in laboratories worldwide, bamboo's bioactive components have been studied extensively for their antimicrobial, anti-diabetic, anti-cancer, anti-inflammatory, anti-obesity, anti-fatigue, anti-lipidemic, and cardiovascular effects. The nutritional composition of various bamboo parts, including shoots, leaves, and seeds, highlights its richness in dietary fiber, vitamins (such as thiamine, niacin, vitamin A, vitamin B6, and vitamin E) and minerals. Despite its beneficial properties, bamboo contains a potentially toxic compound called taxiphyllin, requiring careful consideration in its consumption. Furthermore, bamboo's role in addressing health challenges of the modern era, such as obesity, diabetes, cardiovascular diseases, and cancer, is increasingly recognized. Its antioxidant-rich nature, particularly in shoots and leaves, presents opportunities for the development of functional foods and nutraceuticals aimed at promoting overall health and preventing age-related chronic diseases. Certain species of bamboo shoots contain secondary metabolites like glucosides, choline, cyanogen, and betaine, contributing to their medicinal properties, including the treatment of diarrhea and cough. The overall taste of bamboo is influenced by factors such as total sugar, amino acids, and tannins.

**Keywords:** *Bamboo, Nutraceutical, Medicine, Bioactive, Health, Antioxidant.*

## FOOD FORTIFICATION AND BALANCED DIET TO IMPROVE THE HEALTH STATUS IN LOW LEVEL ECONOMY

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### ABSTRACT

Health Education with differs by social position some people might not be even aware the meaning of health education. This review discuss overall health and well being on how to improve health by method such as food fortification and balanced diet. Food fortification refers to the addition of vitamins and minerals to semi-solid foods immediately before consumption. Balanced diet is a another method to improving health and fulfil body needs on daily basis. A balanced diet contains an adequate amount of all the nutrients required by the body to grow, remain healthy and disease-free. To improve health at low economy group the paper studied and examine that average person needs about 2,000 calories every day. Balanced diet is a another method to improving health and fulfil body needs on daily basis. A balanced diet contains an adequate amount of all the nutrients required by the body to grow, remain healthy and disease-free. In addition, a healthy balanced diet provides the necessary energy requirement, protects against vitamin, mineral, and other nutritional deficiencies, and builds up immunity. Base meals on higher fibre starchy foods like potatoes, rice; Have some dairy product like milk and curd; Eat some beans, pulses, fish, eggs, meat and other protein; Choose unsaturated oils and spreads, and eat them in small amount; Drink plenty of water (at least 6 to 8 glasses a day)

**Keywords:** *Health improvement, Home fortification, Balanced diet*

## DEVELOPMENT OF TAMARIND RICE (PULIOGARE) MIX WITH REDUCED TARTARIC ACID CONCENTRATION

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### ABSTRACT

Puliogare also known as tamarind rice, is a traditional South Indian dish known for its tangy flavour. It is made by mixing cooked rice with a spice mix called “Puliogare mix” or “Puliogare Powder”. Puliogare powder typically consists of a combination of various spices like turmeric, red chillies, curry leaves, peanut etc., tartaric acid for sourness, and tamarind concentrate for tanginess. Puliogare is commonly consumed in South India, especially in the states of Kanataka, Tamil Nadu and Andhra Pradesh. Tartaric acid is naturally present in tamarind and contributes to its characteristic tart flavour. However, tartaric acid can be expensive and excessive tartness can be undesirable for some consumers, hence the need to reduce its concentration in the product is essential. To reduce tartaric acid, the amount of

tamarind paste or concentrate in the puliyogare mix can be adjusted. Substituting tartaric acid with tamarind concentrate can result in a milder, less tangy flavour profile. Here we mainly focus on the effect on product due to substitution of tartaric acid with tamarind concentrate and challenges faced during this substitution.

**Keywords:** *Puliyogare powder, tartaric acid, tamarind concentrate, cost reduction*

## **PROBIOTIC DELIVERY MECHANISMS TO HUMAN GASTROINTESTINAL TRACT: OBJECTIVES AND CHALLENGES**

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### **ABSTRACT**

Gastrointestinal diseases are characterized by dysfunction in the gastrointestinal tract, often accompanied by an imbalance in the gut microbiome. Probiotics, which are live microorganisms that confer health benefits to the host when administered in adequate amounts, have been studied for their potential therapeutic role in gastrointestinal diseases by modulating the gut microbiota. However, several challenges, including safety concerns, the ability of probiotics to withstand stress conditions, quantification of probiotics postcolonization, and the development of effective evaluation models, hinder their widespread application. This review discusses emerging methods and materials for delivering probiotics, as well as the role of bacteriocins—proteinaceous compounds produced by bacteria that inhibit the growth of other bacteria—in enhancing the competitiveness of probiotics and addressing challenges in large-scale application. Bacteriocins from probiotics have shown promise in gastrointestinal diseases by stimulating the immune system, protecting the intestinal barrier, and exhibiting cytotoxic effects against intestinal tumors. Recent advances in fluorescent labeling technology and in vitro and in vivo models for quantifying probiotics in complex microbiomes and evaluating probiotic delivery systems are also highlighted. Understanding these challenges and advancements is crucial for the development and effective use of probiotics as live biotherapeutics for gastrointestinal diseases.

**Keywords:** *Bacteriocins, Gastrointestinal diseases, Gut Microbiome, Microbes, Probiotics*

## NUTRITIVE POTENTIAL OF *MORINGA OLEIFERA* IN VARIOUS FOOD MATRICES

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### ABSTRACT

In today's era of dynamic socio-economic changes, there is a heightened concern for health, prompting a shift towards the utilization of natural plant-based products known for their fewer side effects. The popularity of these products lies in their potential to impart health benefits beyond traditional nutrients. *Moringa oleifera*, commonly known as the Drumstick tree, emerges as a tree with substantial nutritional and medicinal benefits, boasting macro and micronutrients crucial for normal bodily functions and the prevention of diseases. Its various parts, including leaves, flowers, seeds, bark, and pods, are not only edible but also find applications in biodiesel production and water purification. With therapeutic properties such as anticancer, antiulcer, antimicrobial, and antioxidant effects, numerous research studies advocate for *Moringa*'s utilization as a functional ingredient in food products. This review aims to emphasise the relevance of *Moringa oleifera* as a potential ingredient not only in food products but also in various industries, providing a foundation for future research endeavours. Simultaneously, the contemporary societal interest in enhancing the nutritional profiles of consumed foods has given rise to the booming trend of industrial food reformulation. In this context, *Moringa oleifera*, owing to its high yield, adaptability to climate change, and profound nutritional potential, emerges as a promising means of fortifying products to enhance diverse food matrices. Its various plant parts, including leaves, seeds, flowers, pods, and roots, possess marketable nutritional and medicinal attributes. This comprehensive analysis, drawing upon various scientific studies, evaluates the potential of *Moringa oleifera* in terms of its incorporation into food matrices and its influence on final sensory characteristics. The merging of several *Moringa* components into products such as bread, pastries, snacks, and beverages is explored to enhance the nutritional profile of the end product, offering increased proteins, essential amino acids, minerals, and fibre. However, caution is advised, as high concentrations of *Moringa* in food products may lead to distinctive colorations, Flavors, and changes in mechanical properties, impacting the final product's acceptance. This study emphasizes the ongoing need for research into the technological properties, aiming to incorporate different parts of *Moringa* into food matrices and enhance consumer familiarity with this versatile plant.

**Keywords:** *Moringa oleifera*, Drumstick, therapeutic properties, Food matrices



## **DEVELOPMENT OF AN IMMUNITY BOOSTING DRINK FROM TURMERIC, GINGER, AND ORANGE**

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### **ABSTRACT**

Growing interest has been shown in functional foods and natural therapies as ways to improve immunity and advance general health in recent years. This study focuses on creating a drink that boosts immunity by combining turmeric, ginger, and orange—all of which are recognised for their strong bioactive components and positive health effects. The body's defence mechanism against microorganisms and outside objects, immunity, is essential for preserving health and averting disease. To recognise and eliminate dangerous intruders like bacteria, viruses, and poisons, the immune system is a sophisticated network of cells, tissues, and organs. During the creation process, active ingredients from orange, ginger, and turmeric, Curcumin, a component of turmeric, has immune-modulating, anti-inflammatory, and antioxidant properties. Orange offers vitamin C, flavonoids, and other antioxidants essential for immune function, while ginger, rich in gingerol and other bioactive compounds, has anti-inflammatory and antibacterial qualities. Drinking the immunity-boosting beverage may improve immunity, lower inflammation, and shield the body from oxidative stress, among other health advantages. According to studies, the drink's bioactive ingredients may strengthen the body's defences against infections and disorders by influencing immune cell activity, encouraging the synthesis of cytokines, and enhancing antioxidant status. In conclusion, the development of an immunity-boosting drink from turmeric, ginger, and orange holds promise as a natural and convenient approach to enhancing immune function and promoting holistic health.

**Keywords:** *Immunity Boosting, Curcumin, Gingerol, Vit-C, Health benefits*

## **EFFECT OF NUTRITIONAL ADDITIONS ON EXTRUDED AND DEEP-FRIED POTATO CHIPS**

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### **ABSTRACT**

With a crisp exterior that gives way to a satisfyingly fluffy centre, potato chips reign as the ultimate snack indulgence, transcending mere sustenance to become a culinary delight cherished by snack enthusiasts worldwide. The potato chips industry reflects consumer choice in various ways, including flavours, packaging sizes, and health considerations. Companies often innovate to meet consumer demands for diverse flavour options, healthier ingredients, and convenient packaging. The process for potato chips production involves either deep frying or the process of extrusion is implied. Frying in hot oil at temperatures

between 160° and 180°C , the drying in oil inevitably leads to a considerable oil uptake of around 35 percent, most of which is located on the surface of the chip. Extruded snacks are normally high in calories and fat with low content of protein, fiber, and perceived as unhealthy food to many consumers. This review summarizes the research published on addition of high nutritional sources to extruded potato snacks to study their impact like reduction in absorption of oil while deep frying. The addition of high-fiber, high protein alternate ingredients to starch significantly affect the texture, expansion and overall acceptability of the extruded snack. Snacks with soy flour absorb less oil while frying . Addition of soy flour to potato flakes is seen to have reduced fat content. The chip containing 40% corn meal and 20% soy flour was further analysed and had a proximate composition of 13.33% protein, 20.33% fat, 2.75% crude fiber, 5.2% moisture, and 2.94% ash.

**Keywords-** *Extrusion, Frying, Healthy, High protein, Oil absorption, Potato*

## **3D PRINTING: AN INNOVATIVE TECHNOLOGY FOR FOOD PROCESSING**

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### **ABSTRACT**

3D printing is a process also known as additive manufacturing and rapid prototyping, has intrigued many industries from aerospace , medicine and even the food production now . 3D printing is a computer based process in which physical models are constructed from 3D design without the help of a mould building up layer by layer .In the food industry this technology is known as 3D food printing which allows to customise food manufacturing with different shape, colour, flavour, texture and even nutrition. Therefore food products can be designed in a personalized way through controlling the amount of printing material and nutrition content. This technique usually includes extrusion based printing, selective sintering printing (SLS), binder jetting, and inkjet printing. Several types of products are manufactured with the help of it that includes fruits and vegetables, cakes, cookies, chocolates, hamburgers, cheese, dough and even meat analogue for vegetarian people. This technique helps people who have difficulty in chewing, lack of nutrition and those who want personalized diets. It is recently coming to the restaurants and is a boon for future endeavours. The motive of this abstract is to summarise and analyse published articles and papers diving into 3D food printing, its impact on food processing as well as to provide an articulated insight in the path of its future development.

**Keywords:** *3D printing, selective sintering printing, personalized diets, food processing*

## CHOCOLATE: AN OVERVIEW ON ITS PROCESSING AND FORTIFICATION APPROACH

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### ABSTRACT

Chocolate has always been thought to be exclusively for children, but thanks to fortification, which has given it additional health benefits, it is now consumed by people of all ages. One of the most well-known dietary sources of polyphenols is cocoa beans, which have higher levels of phenolic antioxidants than most other foods. The three polyphenol categories found in cocoa beans are called pro-anthocyanidins (58%), anthocyanidins (4%), and catechins (37%); these flavonoids are the most prevalent phytonutrients in cocoa beans. Cocoa is also rich in minerals: potassium, phosphorus, copper, iron, zinc, and magnesium. It has vitamins, minerals, and bioactive substances such as flavonoids, procyanidins, theobromine, and polyphenols. The food business makes a wide variety of chocolates, with dark chocolate becoming increasingly popular in recent years. Due to its physiological and possible health benefits, including blood pressure control, insulin production, vascular health, oxidation processes, prebiotic effects, glucose homeostasis, and lipid metabolism, cocoa has become more and more popular. However, a number of nutrients—including thiamine, ascorbic acid, flavonoids, and polyphenol—are lost when chocolate is processed. Therefore, adding fortification would be a good way to increase the chocolate's overall nutritious content and make it more self-sufficient. Mulberries, chokeberries, and elderberries were among the fruits, spices, phytosterols, peanut oil, probiotics (*Lactobacillus* and *Bifidobacterium*), prebiotics (inulin, xanthan gum, and maltodextrin), flavonoids, that were employed in the fortification process.

**Keywords:** *Chocolate; Cocoa beans; Fortification, probiotics, flavanoids*

## INNOVATION IN SPACE FOOD RESEARCH: ENHANCING ASTRONAUT NUTRITION AND PSYCHOLOGICAL WELL BEING

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### ABSTRACT

Research into space food is essential to keeping people alive on long-term space missions. An overview of current developments, obstacles, and potential paths forward in space food research are provided in this abstract. Enhancing shelf life, taste, nutritional value, and packaging effectiveness have been the main goals of space food technology advancements. In order to maintain food quality and guarantee microbiological safety, innovative food processing methods have been developed, including freeze-drying, irradiation, and thermo-stabilization. Furthermore, attempts have been made to improve the diversity and palatability

of cuisine in space by adding herbs, spices, and items from different cultures. There are still issues, though, such as the requirement for nutrient-dense, portable, and lightweight food options that can survive the demands of space travel. Long-term missions should also be concerned about the psychological effects of sensory deprivation and monotonous diets. In order to overcome these issues, future research paths will use developments in biotechnology, 3D printing, and customized nutrition to create space food that is specifically tailored to the needs of each astronaut. It is also imperative that food scientists, nutritionists, engineers, and psychologists collaborate across academic boundaries in order to optimize space food systems and support crew health and well-being throughout prolonged space exploration missions.

**Keywords:** *space food research, food processing techniques, microbiological safety, monotonous diets, long-duration missions*

## **DEHYDRATION OF COCONUT WATER FOR PREMIX AND EVALUATION OF IT'S FUNCTIONAL PROPERTY**

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### **ABSTRACT**

The aim of the research work was to develop a multiple flavoured a coconut water powder premix for increasing the flavour and nutrition attributes. Coconut premix powder was kept and made in a freeze-drier at 45°C and 55°C for nutritional content analysis and physical attributes. The coconut pre mix powder obtained by this method was evaluated for it's functional properties and sensory attributes. The functional attributes of the premix powder such as proximate analysis, water activity, Viscosity and colour properties. The freeze dried coconut water powder with orange juice powder T3 observe better functional property compare to T1, T2, and T4 sample. The Result indicates that the powdered T3 sample can be used as ready to serve(RTS) premix powder.

**Keywords :** *Freeze drying , Proximate Analysis, Ready to Serve*

## **PLANT BASED MILK: A VEGAN ALTERNATIVE FOR FUNCTIONAL DRINK**

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### ABSTRACT

Novel food has been described by European commission as any food that wasn't consumed at a higher degree. Among these, Plant based foods particularly in the dairy section are gaining popularity due to factors including, consumer awareness about sustainable production, search for alternatives as vegan culture gained its popularity. Among many other benefits, fermented plant based dairy products have seen a hike, since the reaction triggers the growth of probiotics, which adds to the nutritional profile. These are the cow's milk imminent that are obtained by breakdown of plant materials. Based on the sources they are obtained from they are categorized under different groups. Cereal based milk such as oat milk have aroused the interest recently due to presence of dietary fiber beta-glucan which possesses nutraceutical properties. An india based company Vvegano owns a supply chain of oat milk fortified with calcium and some essential vitamins. Legume based milk such as soya milk has been in market since early times, being a good source of essential (Monounsaturated and polyunsaturated) fatty acids. Presence of iso-flavones, which are known for their protection against cancer, contributes to its popularity. Hershey's has introduced SOFIT soya milk in the Indian market which make up 11% of the daily protein intake. Another consumer-preferred product is almond milk, categorized as a type of nut-based milk. Almond milk contains 25% protein and is naturally rich in vitamins particularly E which is not synthesized by our body. A company called Urban Platter, provides unsweetened almond milk fortified with calcium and vitamin D.

**Key words:** *Cow milk, vegan, novel foods, iso-flavones.*

## POSTBIOTICS- AN EMERGING CONCEPT IN FOOD TECHNOLOGY

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### ABSTRACT

Postbiotics, a relatively recent addition to the field of probiotics and prebiotics, represent a novel avenue in food technology and nutritional science. Emerging as a result of advancements in microbiome research, postbiotics are bioactive compounds produced during the fermentation of probiotics or prebiotics. Unlike probiotics, which are live microorganisms, or prebiotics, which are non-digestible food ingredients that stimulate the growth of beneficial microorganisms in the gut, postbiotics encompass a wide range of metabolites, including organic acids, peptides, polysaccharides, and bacteriocins. These metabolites exhibit various health-promoting properties, including immunomodulatory, anti-inflammatory, antioxidant, and antimicrobial effects. Moreover, postbiotics offer several advantages over probiotics, such as enhanced stability, longer shelf life, and suitability for individuals with compromised immune systems. Consequently, postbiotics have garnered significant attention in the food industry, where they are being incorporated into functional foods, beverages, and dietary supplements to promote gut health and overall well-being. This abstract provides an overview of postbiotics as an emerging concept in food technology, highlighting their potential applications, health benefits, and future directions for research and development.

**Keywords-** *Postbiotics, Gut health Immunomodulatory, Bacteriocins, Anti-inflammatory.*

## **VEGETABLE SOUPS: A HEALTHY ALTERNATIVE FOR FUNCTIONAL DIET**

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### **ABSTRACT**

Soup is considered to be a healthy meal. It is made by combining ingredients such as meat, vegetables, with a broth or liquid base. Soups are found in almost every cuisine around the world offering a versatility & often comforting dish. The cultural dimensions of soup are rich & varied showcasing the diversity of culinary traditions worldwide. A soup comes in myriad of forms & flavours across the globe. (a) Clear Broths, (b) Creamy Soups, (c) Vegetable - based Soups, (d) Meat-Based Soup (e) Noodle Soups, (e) Cold soups, (g) Speciality Soups, (h) Spicy soups. Broth is a flavourful liquid obtained by simmering meat bones, vegetables in water. It forms the foundation for many stews & soups, & sauces. We can outsource vegetable peels, vegetables remaining, and leftover meat. This can reduce waste products that are produced in large number every year. The amount of waste produced in the vegetable sector on daily basis can vary widely based on factors such as the scale of operation, harvesting methods, local practices. Large scale commercial vegetable production may generate significant waste, including imperfect or unsellable Produce. However, smaller local forms or sustainable practices might result in less waste. Specific data would depend on the region and the specific characteristics of vegetable production in that area.

**Key words:** *Soup, healthy meal, functional components, vegetable production.*

## **ADVANCEMENT IN FOOD INDUSTRY: USE OF GENETICALLY MODIFIED ORGANISMS**

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### **ABSTRACT**

As of 2021, approximately 2.3 billion adults in the world are malnourished in some way. That's around 30% of the world's population. With an increase in number of populations, food issues arise. This can be dealt by enhancing the yield or improving shelf life of food. With the help of advancement in the field of biotechnology for food production, this problem has been primarily solved. Biotechnology deals with techniques of using live organisms or enzymes from organisms to produce products and processes useful to humans. Use of biotechnology or genetically modified organisms in food production goes back to 1990s. Biotechnology is widely used in food industries to produce different food products



such as genetically modified food, to enhance the taste, to enhance the yield, to increase the shelf life and to improve the nutritive value. Biotech crops are supposed to need lesser water, fertilizers, herbicides, lesser need to spray so less fuel consumption, reduced CO<sub>2</sub> and N<sub>2</sub>O emissions. The use of biotechnology to increase shelf life of food products and enhancing the nutritive value has been extended to various fruits and vegetables. But whether all the organically produced food products in the market, should be replaced by GMOs (genetically modified foods) is still a debatable question as genetically engineered foods may lack the antioxidants, minerals, and other key components required for good health and immunity.

**Keywords:** *Biotechnology, Food, Genetically modified organisms, Industry, Nutrition.*

## MUSHROOMS : A POTENTIAL SOURCE OF NUTRACEUTICALS

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### ABSTRACT

Mushrooms are fungi that have been consumed as food since time immemorial. Nutritionally, they are an excellent source of healthy food because they are low in calories and high in carbohydrates, essential amino acids, and fiber, as well as essential minerals and vitamins. In the last two decades, there has been an increase in the use of mushrooms as nutraceuticals, and many edible species have been thoroughly investigated and validated for medicinal purposes. The species that have been properly analyzed for medicinal value are *Ganoderma lucidum* (Reishi), *Lentinus edodes* (Shiitake), *Grifola frondosa* (Maitake), *Agaricus blazei* (Himematsutake), *Cordyceps militaris* (Caterpillar fungus), *Pleurotus ostreatus*. Many more species of cultivated and wild edible and non-edible mushrooms have been studied for their nutritional and nutraceutical components, though to a lesser extent than those listed above. Polysaccharides, dietary fibers, oligosaccharides, triterpenoids, peptides and proteins, alcohols and phenols, as well as mineral elements like zinc, copper, iodine, selenium, and iron, vitamins, amino acids, and so on, are among the active constituents of mushrooms. These have been shown to boost the immune system, have anti-cancerous properties, act as anti-hyper-cholesterolemic and hepato-protective agents, exhibit anti-HIV and anti-viral activity, and reduce the toxic effects of chemotherapy and radiotherapy. In mushrooms, unsaturated fatty acids predominate over saturated fatty acids, particularly palmitic acid, oleic acid, and linoleic acid, with a very small proportion of linolenic fatty acids. Mushrooms, which contain fat-soluble vitamins as well as ergosterol, are thought to be the only vegetarian source of vitamin D. Although there is limited data on fiber content and composition, polysaccharides such as  $\beta$ -glucans increase the nutritional value of mushrooms.

**Keywords:** *medicinal mushrooms, nutraceuticals, medicinal value,  $\beta$ -glucans*



## DEVELOPMENT OF HEALTH MIX FOR CHILDREN BY INCORPORATING TRANSGENIC MILK

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### ABSTRACT

A suggestion for a children's health mix that includes transgenic milk, finger millet, pearl millet, and encapsulating agents such maltodextrin, sodium alginate, cocoa powder, and whey protein concentrates. Add powdered sugar, salt, and cardamom powder to enhance the product's flavor. To obtain high retention of the key components and nutrients included in it, malted millet mix and transgenic milk must be combined with encapsulating agents after millets are ground into powder. And now we would have a slurry made of transgenic milk, encapsulating agent, and malted millet mix. "DRY-SPRAY HEALTH MIX." In addition to being spray-dried to lengthen its shelf life, it is also available in powder form, which makes it simple to reconstituted with milk or water to create a uniform solution. The main ingredient in this product is transgenic milk, which has been selected because it contains several essential proteins found in breast milk, such as lysozyme, lactoferrin,  $\alpha$ -lactalbumin, and others. occasionally circumstances prohibit mothers from lactating, and occasionally they do not want to. Thus, the creation of alternative protein sources would be advantageous for the health of new-borns. This product is unique in that it offers both the nutritious components of millets, which are high in energy, and the proteins found in human milk, all in one convenient package. With the use of biological testing, the ratios in which the ingredients should be combined to create a safe and nutrient-rich product must be investigated and analysed.

**Key words:** *Lactoferrin, Lysozyme, Malted millet mix, Spray dried, Transgenic milk.*

## NUTRITIONAL AND FUNCTIONAL PROPERTIES OF APRICOTS

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### ABSTRACT

Apricots (*Prunus armeniaca L.*) is a nutrient – dense fruit from the Rosaceae family that is well known for its health benefits due to its bioactive component. The present review focuses on the nutritional value of apricots (sugars, organic acids, minerals) as well as its functional properties. The speciality of the apricots is their colour that is obtained from high  $\beta$ - carotene content. The essential volatiles including ethyl acetate, hexyl acetate, limonene,  $\beta$ -cyclocitral,  $\gamma$ -decalactone, 6-methyl-5-hepten-2-one, 2-hexenal, and hexanal fuse together, cognising to the fine flowery and fruity aroma. The silky surface and juicy,

golden interior give apricots an appealing and healthy quality as a snack. Moreover, they are rich in phytochemicals, fibre, and vitamins. It has micronutrients such as vitamins, minerals and some macronutrients like sugars, organic acids, and amino acids. Within the family of stone fruits, apricots are especially noted for being the most diverse and functional. In terms of its nutritional composition, it contains water content ranged from (79.87% to 88.6%), proteins (0.66% and 1.3%), lipids between (0.1% and 0.57%), vitamins (vitamins A, C, K, and B complex), and organic acids (citric acid and malic acid), which are measured on dry weight basis. The apricots are truly nutrient-dense with vitamins and minerals. The fruit is known to be a functional food because of its high content of bioactive phytochemicals such as carotenoids, flavonoids, phenolics, and antioxidants activity of apricots enhances the body's defence mechanism against free radicals, which can benefit a variety of medical conditions. The fruit has a great market value as fresh and dried food commodities and has the highest market share of agricultural income. This review reports that there are appreciable amounts of total phenolic compounds and flavonoids in the fruit, making them more valuable functional foods.

**Keywords:** *Apricots, Antioxidant activity, Minerals, Phytochemicals, Flavonoids, Volatiles*

## RECENT INNOVATION IN EDIBLE CUTLERY IN THE FOOD INDUSTRY – A REVIEW

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### ABSTRACT

The term "edible cutlery" describes utensils, which usually include knives, forks, spoons, and even plates, that are made to be entirely edible after use and used for eating. Particularly, the takeout and online meal delivery cultures that fuel our fast-paced, contemporary lifestyle generate a significant quantity of plastic garbage. It is concerning how much plastic cutlery is used worldwide. Studies show that billions of plastic cutlery pieces are thrown away every year, adding to landfills and ocean plastic pollution. Serious risks to ecosystems, wildlife, and eventually human health result from this. Edible silverware offers a revolutionary substitute. Natural components such as rice, wheat, millet flour, or vegetable starches are used to make them. They are entirely edible, so there is no waste, and they naturally decompose, leaving no toxic trace behind. Different flavors, such as those of herbs, spices, or fruit extracts, are infused into edible cutlery. This lessens waste and gives the food a distinctive flavor. Create cutlery molds that enable users to customize edible utensils in various sizes and forms, enhancing the enjoyment and interaction of mealtimes. This helps us maintain sustainable demands while also drastically reducing the impact on the environment. Even though issues with pricing and shelf life still exist, edible cutlery is a big step in the direction of a food sector that is more ecologically conscious and sustainable.

**Keywords:** *Edible cutlery, Sustainable food industry, Plastic waste reduction, biodegradable materials, innovations, future of food, online food delivery.*

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Theme 5:

Millets - Magical

Sustainable Crops

## VEGAN MILLET MILK- AN ALTERNATIVE FOR DAIRY MILK

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### ABSTRACT

Millets have been recommended as a strategy to combat food insecurity in areas vulnerable to shifting climatic conditions, especially in India and sub-Saharan Africa. 2023 has been dubbed as the “Year of Millets” by the United Nations Food and Agricultural Organization in honour of their significance to the world’s food supply. In developed countries, a condition known as lactose intolerance, that limits the consumption of milk, and dairy products is becoming more common particularly among the elderly. The inability to effectively digest lactose, a sugar present in dairy products is known as lactose intolerance. Lack of the “lactase” enzyme which breaks down lactose into glucose and galactose is the main cause of this. Dairy products should be avoided since they can increase sensitivity in patients with inflammatory bowel disease (10–20%). A negative immunological reaction to one or more of the milk’s components typically protein, causes milk allergy which is a category of food allergy. A full avoidance of milk and its products is the only way to prevent a milk protein allergy. These millets can be used in the production of various kind of vegan products. Example- Vegan millet milk: It is a dairy free substitute to the normal milk and a superfood packed with numerous macro and micro molecules.

**Keywords:** *Intolerance, lactose, milk, millet, vegan*

## EVALUATION OF QUALITY CHANGES AND PREDICTIVE MODELLING OF SAFE STORAGE TIME FOR PEARL MILLET GRAINS

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### ABSTRACT

The storage ecosystem is affected by various biotic and abiotic factors, which can cause damage to stored grains. To maintain grain quality, it is crucial to control the effects of biotic factors by monitoring temperature fluctuations and moisture migration within the storage system. Grains with high temperatures and high moisture provide limited time for post-harvest actions. Hence, it is important to determine the time before spoilage for different moisture contents and temperatures. Safe storage guidelines assist farmers in scheduling different post-harvest operations, such as drying, cooling, turning, etc., to avoid crop

spoilage. In the study, the effect of storage variables (storage temperature, moisture content, and storage period) on the quality parameters of pearl millet was evaluated. The model for predicting the allowable storage time was developed using a feed-forward back propagation neural network. The storage variables had a statistically significant effect on the germination rate, FFA, and moisture content. Storing pearl millet at higher moisture levels ( $\geq 14\%$ ) for more than 2-4 weeks poses a considerable risk due to seed viability loss, increase in FFA, and early infection with visible and invisible molds. When storing pearl millet for an extended period, it is recommended to maintain a temperature below 20°C to ensure high quality and seed viability. The developed neural network model for safe storage time demonstrated a high level of predictability. These findings offer valuable insights for the development of tools to predict shelf life, thereby ensuring the safe storage and availability of high-quality millet grains on the market.

**Keywords:** *Safe storage guidelines, Pearl millet, Quality changes, Predictive modelling.*

## BIOACTIVE PEPTIDES OF MILLETS: A REVIEW

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### ABSTRACT

Plants growth and productivity are highly vulnerable to various abiotic and biotic stresses exacerbated by global climate change. Besides millet's excellent nutritional value, ability to withstand various abiotic stresses and resist pathogens, it offers a wide range of options for developing strategies to produce climate-resilient staple crops. Millet's cultivation can maintain productivity in arid regions and ensure future food and nutritional security. Arid and semi-arid regions of the world rely heavily on millets. As a climate-friendly crop, millet stands out for its marginal growth conditions and nutritional value compared to other cereals such as wheat and rice. It is rich in protein, fatty acids, minerals, vitamins, dietary fiber, and polyphenols. Millets include bioactive substances such as phenolic acids and glycosylated flavonoids, as well as a high protein content, antioxidants, and antibacterial properties. Millet foods have been identified as potential prebiotics that can improve the viability and functionality of probiotics, providing considerable health advantages. Fermentation and germination have all resulted in increased concentrations of these beneficial bioactivities. BAMPs (Bioactive millet peptides) are released by enzymatic hydrolysis of seed proteins and appear to play crucial roles both in vitro and in vivo. In vivo and In vitro studies have shown that BAMPs have antibacterial, antioxidant, antihypertensive, anticancer, and antidiabetic effects. The quality and structure of these peptides have a decisive impact on organic relevance, retention, and bioavailability in target tissues. This review describes the bioactivity of millets, their role in disease prevention, and functional and physicochemical properties.

**Keywords:** *Abiotic, Biotic, staple crop, BAMP, probiotics, prebiotics.*

## PHYSICO-THERMAL AND ANTIOXIDANT PROPERTIES OF IRRADIATED BROWN TOP MILLET FLOUR

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### ABSTRACT

The aim of this study was to evaluate the physicochemical, thermal and antioxidant properties of brown top millet (BTM) flour exposed to varying doses of  $\gamma$ -radiation (2.5, 5.5, 7.5, 10, and 15 kGy). The research revealed that the water absorption capacity (WAC) of the BTM flour decreased non-significantly ( $P \leq 0.05$ ) as the radiation dose increased (from 2.45 g/g to 2.17 g/g). Similarly, the oil absorption capacity (OAC) remained relatively constant up to 5.5 kGy, with no significant difference from the control ( $P \geq 0.05$ ). There were significant variations in the swelling index between the control and irradiated BTM flours, with the control sample displaying the highest swelling index. The solubility index rise ( $P \leq 0.05$ ) with increasing irradiation doses. The lightness value decreased with higher levels of irradiation. Thermal analysis results indicated a significant elevation in both the onset and end temperatures of gelatinization compared to the control sample. The maximum enthalpy value ( $\Delta H$ ) was recorded under the 10 kGy irradiation treatment. The findings from the antioxidant analysis revealed enhanced total phenolic content and DPPH activity in the treated samples.

**Keywords:** *Brown top millet, Irradiation treatment, Functional properties, gelatinization temperature, antioxidant activity*

## TO STUDY THE INFLUENCE OF PROCESS PARAMETERS OF VACUUM FRYING ON THE QUALITY ATTRIBUTES OF MILLET-BASED SNACKS

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### ABSTRACT

This study explores the effect of process parameters on the overall quality, texture, and sensory attributes of vacuum-fried (VF) millet-based snacks. A Box–Behnken experimental design (BBD) combined with response surface methodology (RSM) was used to determine the optimum process parameters, including vacuum frying temperature (120, 130 and 140°C), pressure (35, 45 and 55 cm of Hg), and time (4, 5 and 6 min). The increased vacuum frying temperature, pressure, and duration significantly decreased the moisture content of the snack by up to 4.21%. Reducing temperature lowers fat content (2.56-9.66%) due to the prevention of temperature induced tissue matrix degradation that increases oil absorption. The higher color change (7.09) was observed at higher frying temperatures and time, while the browning index increased (77.56-117.60) with increasing vacuum frying temperature and pressure. The hardness of snacks increased (3.28-30.99 N) with vacuum pressure and temperature due to crust formation. Low adhesiveness (-0.40-1.77 mJ) was observed in VF millet-based snacks. At 130°C frying temperature, 45 cm Hg pressure, and 5 min frying duration, the millet-based

snacks recorded a remarkably high overall acceptability score of 7.7/9 and improved texture values. There was a 37.5% reduction in oil content observed in the VF millet-based snacks compared to the deep-fat fried (DFF) millet-based snacks. This research contributes insights into creating healthy, low-fat snacks incorporating millet through the innovative approach of vacuum frying, offering a balance between taste and nutritional benefits.

**Keywords:** *Vacuum frying, millet-based snacks, fat content, quality, texture*

## DEVELOPMENT OF INSTANT CUP PASTA ENRICHED WITH MILLETS

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### ABSTRACT

Pasta is made from grain, one of the basic food groups in a healthy diet and a good source of energy and fiber that can help with stomach problems and may help lower cholesterol. The pasta available in the market contains a high glycemic index, so it aids in diabetes. The product has been developed with pearl millet flour, finger millet flour, barnyard millet flour, and black rice flour. Millets have nutraceutical properties (phenolic acids, flavonoids and phytic acid) in the form of antioxidants which prevent various chronic diseases. The glycemic index is comparatively lower than the pasta available in the market. This study was initiated to provide the consumers with convenience foods such as RTE and RTC foods. Instant cup pasta is developed with a good source of energy, carbohydrate, protein, fat, calcium, iron and dietary fiber. The ingredients used in this pasta are less expensive and affordable. The developed products were subjected to 50 semi trained panel members using 9 points hedonic rating scales. Among the three variations, variation III is highly accepted in all sensory attributes. The developed product contains Energy (138.28 Kcal), Carbohydrate (48.15g), Protein (14.88g), Fat (5.12g), Calcium (145.65 mg), Fiber (13.63mg), Iron (20.89 mg), Magnesium (5.56 mg). It is an excellent supply for rectifying deficiencies in malnutrition and suitable in terms of sensorial features.

**Keywords:** *black rice, dried vegetables, antioxidant, glycemic index, nutraceutical*



## STUDY ON PROCESSING TECHNIQUES OF MILLETS FOR DEVELOPMENT OF PROBIOTIC BEVERAGE

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### ABSTRACT

With rising interest for healthy and nutritional diet much attention is directed towards nutrient rich foods. Millets have good nutritive potential compared to cereal grains but also have antinutritional factors which makes micronutrients less accessible. Major millets viz sorghum, pearl millets (PM) and finger millets (FM) were analysed under three processing techniques soaking, germination and natural fermentation at different time point on physical, functional, proximate, antinutritional and micronutrients compounds. Effect of soaking was studied at 12hrs and 24hrs, while that of germination and natural fermentation at 24hrs, 48hrs and 72hrs respectively at 30°C. Results showed that TPC and TFC values increased significantly ( $P \leq 0.05$ ) by germination and fermentation 16.19%, 11.91% & 10.01% and 13.88%, 11.45%, 8.75% in FM, PM and sorghum respectively. Further dietary fiber, protein content increased with a range (5.41%-6.74%), (27.11%-33.94%), (12.05%-18.25%) by soaking, germination, and fermentation respectively. The anti-nutritional compounds such as phytic acid and tannin contents decreased significantly ( $P \leq 0.05$ ) during processing treatments. Phytic acid in finger millets, pearl millets and sorghum decreased to the extent of 23.16%, 22.53%, 29.49% and tannin contents as 45.11%, 48.71, and 37.76%, after germination and fermentation respectively. A significant ( $P \leq 0.05$ ) increase in micronutrients contents was observed after the processing treatments of millets. Further there was decreased in bulk density and gelatinization temperature and increase in water absorption capacity (WAC) of the millet samples. Hence it can be concluded that application of these techniques increases the nutrient availability for development of probiotic fermented beverages.

**Keywords:** *Fermentation, Germination, Millets, Probiotics*

## DEVELOPMENT AND EVALUATION OF NOVEL EDIBLE CUTLERY FROM GLUTEN-FREE MILLET AND STARCH BLENDS: A SUSTAINABLE ALTERNATIVE TO PLASTICS

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### ABSTRACT

The present work elucidates the development and analysis of innovative edible spoons and cutlery derived from gluten-free millets - finger millet, pearl millet, sorghum, starches (corn starch, sago starch, rice flour), hydrocolloids (xanthan gum, guar gum), and plasticizers (honey, coconut oil). A cost-effective mixing, kneading, and shaping method enabled direct

molding of the composite biopolymer dough into cutlery followed by baking process. Physiochemical analysis revealed the formulated edible cutlery exhibited moisture content of 7.8%, minimal water absorption of 45% in hot water (70°C), water absorption of 26.1% at room temperature, tensile strength exceeding 5000-gram force comparable to wooden cutlery spoons, and pleasant sensory attributes acceptable by consumers. Proximate analysis indicated nutritional composition of 4.85% protein and 5.7% fat, 4.7% dietary fibre, and mineral content of 0.6% with notable vitamins. Compared to conventional wood-based cutlery, millet edible cutlery demonstrated equivalent functionality benchmarks, showcasing unique potential as an eco-friendly, nutritionally enhanced substitute to non-biodegradable plastics within the foodservice industry. This pioneering research provides a robust foundation and novel directions for the creation of next-generation biodegradable edibles as food delivery tools promoting sustainability.

**Keywords:** *Edible cutlery, millets, sustainability, biodegradable, Nutritive value*

## **BENEFICIAL EFFECTS OF FERMENTED FOODS AND BEVERAGES DEVELOPED FROM MILLETS**

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### **ABSTRACT**

Small-seeded grasses called millets are mostly grown in Asia and Africa in hot, arid regions. They are essential for food security since they are resilient and can flourish in poor soil and limited water circumstances. Despite their undervalued, research is being done to highlight the nutritional benefits of millets to strengthen food security. Fermentation is a traditional method which uses a variety of bacteria to change dietary substrates into products that are full of flavour and nutrients. This review collates different fermented millets products in Asia and Africa like *Koozh*, *Mingri*, *Lohpani* and *Bhangchang*, *Rakshi*, *Rabadi*, *Obushera*, *lohoh*, *Bushera*, *Koko* etc. Fermentation of millets causes some significant changes: starch is broken down into simpler sugars, increasing the availability of energy; protein content and quality increase; minerals are easier to access; and decrease in antinutrients like phytates, trypsin,  $\alpha$ -amylase inhibitors. This procedure improves protein utilisation, increases biological value, and enriches the content of B vitamins (niacin, thiamine, and riboflavin). Given the circumstances, fermentation improves millets' nutritional content and digestibility. Beyond dairy-based choices, there is an increasing need for vegetarian probiotic products as vegetarianism gains popularity in developed countries. Because of their lower cholesterol levels, appealing taste to lactose-intolerant people, and nutritional profile, millet beverages are becoming increasingly popular as probiotic substitutes. The promotion of fermented probiotic foods and beverages will significantly improve health and ensure food security among lower socioeconomic classes.

**Keywords:** *Fermentation, Fermented beverages, Millets, Probiotic.*

## RAGI MILLET: A NUTRIENT-RICH INGREDIENT FOR HEALTHY BISCUIT PRODUCTION

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### ABSTRACT

The significant health benefits of Ragi millet include protecting cardiovascular health, helping people achieve and maintain a healthy weight, and managing inflammation in the gut. Ragi millets have rich in dietary fiber which helps to grow good bacteria it supports improve the digestive system. It contains high health benefits rich in antioxidants. A Ragi millet biscuit was standardized by Ragi millet and wheat flour at different levels. By substituting Ragi millet flours with wheat flour include stevia powder, nutralite butter and milk powder formulation was standardized to make high Nutritive and healthy cookies. Biscuits are analysed for chemical and physical analysis and sensory characteristics. The result of total five selected samples in that best sample is three. After preparation of biscuit various physiochemical properties were determined nutritional parameters. The quality analysis after score revealed that cookies prepared from these ragi millet biscuit were highly acceptable with enhanced nutritional quantity and sensory evaluation.

**Keywords:** *Ragi millet, Cardiovascular health, Gut health, Nutralite butter, Stevia powder*

## ASSESSMENT OF TECHNO-FUNCTIONAL PROPERTIES OF OPTIMIZED POPPED FINGER MILLET GRAINS

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### ABSTRACT

Finger millet is a nutrient-dense cereal with excellent nutritional value that can be incorporated in everyday meals. Popping is a secondary approach which is being used since ancient times which is used to achieve a product having good palatability and digestive value. This study aims to evaluate the techno-functional parameters and nutritional value of the optimized popped finger millet. For popping, the usual salt roasting method was utilised. To improve the product's popping yield, expansion ratio, and general acceptability, the Box-Behnken resource surface design process was applied. The moisture supplied (0.2-2ml), popping temperature (220-260°C), and popping time (20-60 seconds) were all changed during the optimisation process. FTIR spectra revealed that starch was the primary ingredient of popped finger millet flour, followed by protein lipids and phenolic acids. The results suggest that the ideal popping conditions are 230.6°C, 1.36 ml moisture/10 gram of finger millet grains, and 24 seconds of popping time, resulting in an 85.4% popping yield, 0.89 expansion ratio, and an overall acceptability of 8.1. The nutrient analysis showed 8.7±0.2% protein, 70.4±1.68% carbohydrates, 1.3±0.05 fat, and 2.6±0.01% crude fibre. The value-added product was finger millet pops with a good flavour, texture, and general acceptability.

**Keywords:** *Popped finger millet, Optimization, techno-functional properties, Nutrient evaluation*

## **EFFECT OF GERMINATION ON ANTIOXIDANTS, FUNCTIONAL PROPERTIES, BIOACTIVE COMPOUNDS, AND NUTRIENTS OF BARNYARD MILLET**

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### **ABSTRACT**

The process of germination is a useful method for enhancing millets' nutritional value. This study analysed changes in barnyard millet's nutritional composition, antinutritional components, bioactive compounds, functional qualities, and mineral contents during 48 hours of germination. Prolonged germination resulted in notable increases in protein, fibre, iron, calcium, zinc, total phenolics, total flavonoids, and antioxidant activity; conversely, trypsin inhibitor activity, phytate, tannin, and fat levels decreased during this process. The primary purpose of germination is to encourage the activation of natural hydrolytic enzymes that are latent in raw seeds. This process has been shown to increase antioxidant and functional qualities, induce structural alteration, lower ANFs, soften the kernel structure, and boost nutritional value. The antioxidant activity of germination barnyard millet was significantly increased because of the improvement of flavonoids. In comparison to ungerminated barnyard millet, germinated millet offered superior nutritional value and antioxidant properties, and it was a great natural source of phenolic compounds and flavonoids. Consequently, germination of barnyard millet could make it a viable functional food for promoting health.

**Keywords-** *Antioxidant, Barnyard Millet, Bioactive compounds, functional properties, Germination.*

## **GLUTEN FREE TRADITIONAL INDIAN FINGER MILLET SNACK (PAPAD): IMPACT OF FORMULATION AND PROCESSING**

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### ABSTRACT

Papads are widely consumed in India and are consumed majorly with the meals. This project – “Ragi (finger millet) Papad” aims to promote millets and incorporate them in our diet due to their vast nutritional benefits. Millets are round shaped cereals, majorly grown in India, source of variety of nutrients like calcium, iron, zinc, proteins, fibres etc. and are gluten free. Finger millet (*Eleusine coracana*) is rich in Calcium and contains tryptophan which lowers appetite and helps in keeping weight in control, and threonine helps bringing down the cholesterol levels of the body. The papads were made by dough method by using water, ajwain, sesame seeds, sodium bicarbonate, salt, asafoetida, sodium benzoate, rice flour and organic ragi flour; and with water: flour ratio as 2:1. Numbers of trials were carried out by varying the ingredients’ ratio and steaming time, with and without adding colour, and 4 samples were standardized with 100% ragi flour, 50% ragi flour + 50% rice flour, 75% ragi flour + 25% rice flour, 80% ragi flour + 20% rice flour. Ideal time for steaming dough was found out to be 15-20 minutes. Water retention capacity of dough before and after steaming was analysed. Stickiness, hardness, and cohesiveness of the dough were analysed for 5, 10, 15, 20, 25 minutes before and after steaming by texture analyser. In ragi papads (with no rice flour incorporated) the hardness of dough decreased after steaming, whereas in papads containing both ragi flour and rice flour, the hardness of the dough was found to be increased after steaming. Stickiness and cohesiveness increased after steaming in each sample.

**Keywords:** *Finger millet, gluten free, traditional snack, hardness, stickiness*

## MARKETING CHAIN AND CONSUMER BEHAVIOUR FOR HEALTH- A STUDY ON SELECTED MILLET-BASED PRODUCTS IN DELHI

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### ABSTRACT

Marketing Chains encompass a series of inter-connected activities that bring a product to consumer where the key components range from production, distribution, promotion, and retailing. Consumer behaviour is influenced by psychological, social, cultural, and economic determinants. The interplay between marketing chain dynamics and consumer behaviour is characterized by a loop such that each influence and shapes the other. With special reference to the millet economy, in recent years, a resurgence of interest in traditional and organic grains is observed driven by factors like increasing health consciousness and sustainability concerns. Post covid, consumers were motivated to build and increase their natural immunity and hence there was an increase in millet consumption by 5 %. An attempt is made in this paper to understand the available market of millet-based products in Delhi through mapping the products marketed in e-commerce and retail markets and to get a quick glimpse of the consumer’s specific preference on millets using mixed method approach. It is found that the variety of millet products available include millet flour, millet-based snacks, breakfast cereals, ready to cook meals, beverages, noodles, cake mixes, dosa and idli. It is also found that bajra (40.59%), jowar (8.09%) and ragi (12.7%) are the most consumed and cultivated varieties of millets in India with breakfast cereals, dosas and healthy snacks constituting a major chunk of consumption. The motivations of consumers were formed by these five categories- awareness, emotions, sensory attributes, beliefs and social adoption and

comparison. Awareness and social adoption are the broad areas which need intervention for reducing the gap between consumer's preference and market availability.

**Keywords:** *Marketing chain, consumer behaviour, millet economy, health consciousness*

## **DEVELOPMENT AND FORMULATION OF KHEER MIX INCORPORATED WITH RAGI FLOUR AND PUMPKIN SEED POWDER**

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### **ABSTRACT**

Kheer is a traditional and popular dairy dessert served in Indian subcontinents. The objective of this study is to formulate a kheer mix with high protein and fiber content. The kheer mix is incorporated with finger millet and pumpkin seed to increase its nutritional value and quality. The standardization of three variation is prepared by ratio (Finger millet : Sugar : Pumpkin seed : Carrot : Milk) Variation I (50:20:10:20:250), Variation II (40:25:25:10:250), Variation III (35:20:30:5:250). The developed product were analyzed for the sensory properties and nutrient analysis such as energy, carbohydrates, protein, fat, fiber was done. The nutrient analysis results in high fiber and protein. In sensory evaluation among three variation, Variation III was accepted by the semi-trained sensory panelist. The sensory score of Variation III is Appearance  $4.6 \pm 0.9$ , Color  $5 \pm 0.9$ , Taste  $4.5 \pm 0.9$ , Texture  $4.6 \pm 0.93$ , Overall acceptance  $4.8 \pm 0.9$ . Finger millet and Pumpkin seed powder incorporated in Kheer mix can be supplemented to children and adults.

**Keywords:** *Dairy dessert, Kheer, Finger millet, Pumpkin seed, Fiber*

## **MILLETS! A WAY TO GOOD HEALTH AND WELL-BEING AMONG GEN Z**

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### **ABSTRACT**

Food has a significant impact on mental, emotional stability, and physical health, all of which are vital components of total wellbeing. Food provides minerals for growth and repair, energy we need to stay active throughout the day, and protection against diet-related illnesses including some cancers. The cause for many diseases and abnormalities are due to not consuming right food and in right quantity. Due to lifestyle changes, more in urban area due to busy, fast life, with too much time and efforts expected at work, less time left for personal



care like in cooking, many are dependent on packed food or ordering food from food delivery apps. Food we consume, gives us nutrition, energy, helps in weight management through balanced diet, helps with mental well-being as it impacts on mood levels. Due to rise in diabetes and awareness on prioritising health and well-being, food, especially healthy food is taking a priority among these busy people. Millets is one such healthy food that people can shift to for a healthy life! Millet has long been an important component of people's everyday diets, and it took some time for them to discover the health benefits of millet consumption. It helps to protect us from a variety of health conditions. It has a lot of vitamins and minerals and is quite useful to children. It is an excellent food in weight loss. This chapter is an attempt to understand acceptance of millets among Gen Z people as a shift in food consumption for good health and well-being.

**Keywords:** Food, Gen Z, Good Health, Millets, Well-being

## EFFECT OF UV-C TREATMENT ON THE QUALITY ATTRIBUTES OF PEARL MILLET FLOUR

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### ABSTRACT

Pearl millet (*Pennisetum glaucum*) is one among the major millets with high nutritional properties. The crop can endure drought and high temperatures. The major challenge associated with the processing of pearl millet is its high lipid content and enzyme activity, which limits its shelf life. The presence of antinutrients also poses significant challenges. Hence, it is important to improve the quality and shelf life of the flour by using appropriate technologies. The application of ultraviolet (UV) light in the food industry has held great promise from long time due to its ability to lower microbial load, enzyme inactivation, and modification in food properties, hence ensuring food safety and improving its shelf life. This study aims to investigate the effects of UV-C treatment on the quality characteristics of pearl millet flour. The independent variables of the study were power level (1.5, 3, 4.5 W), exposure time (2, 3, 4 min), and bed density (5, 10, 15 mg/cm<sup>2</sup>). Treatment conditions had statistically significant effect on response variables. Major antinutrients like tannins and phytates were reduced by 16% and 11%, respectively, after UV-C treatment. Lipase activity showed decreasing trend with increase in UV power and exposure time. Functional properties like oil absorption capacity, water solubility index, and emulsion capacity increased with UV power and bed density but were reduced with more prolonged exposure time. The findings of this study may encourage the application of pearl millet flour in the development of various food products and extend the application of UV in food processing.

**Keywords:** Pearl millet, UV-C, Nutritional Properties, Functional characteristics.



## DEVISING NUTRIENT ENRICHED NUTRI MIX BROWNIE INCORPORATED WITH “*Lepidium sativum* AND *Moringa oleifera* SEED”

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### ABSTRACT

Anemia is a condition that results in lack of iron content in food. In India, among adolescent & pregnant women anemia prevalence is at high level in the survey conducted by NFH3-5 (2019-21). This study was undertaken to provide nutrient enriched brownie that could be given as a snack for the women so, it helps to improve their iron content in the body. The millet-based Nutri-mix powder and moringa oleifera (drumstick seed) & lepidium sativum (halim seed) seed powder are used in this preparation of brownie, as it consist of iron and vitamin C. The developed Product was given to 25 semi-trained panel members for sensory evaluation. In overall, variation 3 was accepted by the sensory panelist. The accepted variation was analyzed for its nutritional composition and shelf life. The estimated nutritional composition of this product is enriched with iron content from moringa oleifera & lepidium sativum seed were energy 238.6 kcal, carbohydrate 33.54g, protein 3.32g, Fat 14.11g, crude fiber 3.11g, iron 48.3g, vitamin B 0.41mg, and vitamin C 0.346mg. This Product is rich in iron content and antioxidant so, it can be supplemented to treat iron deficiency anemia among adolescent and pregnant women.

**Keywords:** *Anemia, Enrichment, Iron, Lepidium sativum, Moringa oleifera, Nutrimix brownie.*

## MILLET BASED BEVERAGES

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### ABSTRACT

The demand for diverse and nutritious beverages has spurred a significant interest in exploring alternative sources. Millet-based beverages, derived from various millet varieties, have emerged as promising candidates due to their rich nutritional profiles, gluten-free nature, and adaptability to different climatic conditions. This review comprehensively explores the world of millet-based beverages, shedding light on their diverse types, production processes, nutritional benefits, and potential applications in promoting health and well-being. It delves into the scientific aspects of millet grains, their composition, and the transformative processes that lead to the creation of beverages. It discusses the socio-economic impact of millet-based beverage production, highlighting their significance in both developed and developing nations. Furthermore, the report elucidates the health benefits associated with millet-based beverages, focusing on their roles in addressing malnutrition, managing chronic diseases, and promoting overall health. Also, through an in-depth analysis

of recent research studies, the report provides insights into the evolving landscape of millet-based beverages in the global market. It also addresses challenges faced in production, distribution, and consumer acceptance, and proposing strategies for their sustainable growth.

**Keywords:** *Gluten-free, Health benefits, Millet-based beverages, Sustainable growth.*

## MIRACULOUS MILLETS: POWERING TOMORROW'S PLATES

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### ABSTRACT

There is emergence and potential of new generation foods, particularly millet-based products, in addressing contemporary dietary challenges and fostering sustainable food systems. Millets are traditionally grown and consumed for their nutritional richness, environmental resilience, and cultural significance. This study explores the nutritional profile of millets, emphasizing their high content of essential nutrients, including protein, dietary fiber, vitamins, and minerals. It examines the role of millet-based products in promoting health and combating malnutrition, particularly in regions where food insecurity is prevalent. Furthermore, the study evaluates the environmental benefits associated with millet cultivation, such as low water and fertilizer requirements, and their potential contribution to climate change mitigation and biodiversity conservation. Through case studies and empirical evidence, it highlights the diverse applications of millet-based products, ranging from staple foods to innovative snacks and beverages, catering to the evolving preferences of consumers. By analyzing current trends, challenges, and opportunities in the millet-based food industry, this also underscores the need for concerted efforts from policymakers, researchers, and stakeholders to promote the production, marketing, and consumption of millet-based products as a means to achieve food security, nutrition, and sustainability goals in the context of global food systems.

**Keywords** – *Sustainable, nutritional richness, innovative foods, food security.*

## MILLETS AS FUNCTIONAL INGREDIENT IN GLUTEN FREE PRODUCTS

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### ABSTRACT

The food industry is paying more and more attention to millet, a family of gluten-free grains and pseudocereals, because of its many functional uses and rich nutritional content. An extensive analysis of millet's use as a useful ingredient in gluten-free products is presented in this research. Richness in nutrients, a variety of bioactive substances, and noteworthy functional capabilities are only a few of millet's many beneficial qualities. Because of its

exceptional ability to absorb water, distinct texture, and potential to improve sensory qualities, it is a popular option for creating baked goods, cereals, pastas, and snacks that are free of gluten. Adding millet to gluten-free goods boosts their nutritional content and satisfies consumers' growing need for healthier options. Additionally, the potential of millet to manage chronic diseases including diabetes and cardiovascular problems is explored, as well as to improve glycemic control. This review discusses the opportunities and difficulties of using millet in the production of gluten-free products, such as changes to formulation, consumer preferences, and sensory acceptability. To promote healthier and more varied options for people with gluten-related diseases and others looking for gluten-free alternatives, future research areas and strategies to optimize the utilization of millet as a functional component in gluten-free goods are addressed.

**Keywords** – *Millet, gluten-free, pseudocereals*

## ASSESSING MILLETS AS A GLUTEN-FREE OPTION FOR INDIVIDUALS WITH GLUTEN SENSITIVITY

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### ABSTRACT

Consumption of wheat gluten protein, primarily composed of gliadin and glutenin, is restricted in specific populations that are susceptible to its effects. As the prevalence of gluten-related diseases continues to rise, there's a growing need for indispensable grains that can give nutritive benefits while avoiding gluten-containing proteins. Millets, a group of small-seeded meadows, have gained attention for their nutritive profile, versatility, and gluten-free nature. Millets not only protect from gluten, but also provide other essential micro- and macronutrients needed for the growth and metabolism of the body. Millets are rich in antioxidants and show a low glycemic index, making them suitable for humans with gluten intolerance, diabetes, or those seeking a balanced diet. Despite offering a wide variety of health benefits, the consumer adequacy of millets is relatively low now. Processing millets and product of variable gluten-free ready-to-eat and nutritive supplements has increased their request value in recent times. Likewise, processing can also help in shelf-life extension of the millets with nutritive enrichment, expanding its market to non-traditional millet consumers. In conclusion, this abstract underscore the prospect of millets as a suitable gluten-free possibility for people with gluten intolerance. Millets can offer a nutritionally rich and palatable result for those seeking gluten-free food choices.

**Keywords :** *Grains, Gluten, Health, Millets, Nutrients*

## PREPARATION OF MILLET-BASED INSTANT DHOKLA MIX.

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### ABSTRACT

Millets, a group of small-seeded grains, have gained prominence as a sustainable and nutritious alternative to conventional cereals. This study focuses on the development of a millet-based instant dhokla mix, aiming to enhance the nutritional profile of this popular Indian snack while promoting the consumption of millets. The research involved the formulation and optimization of a convenient instant dhokla mix using Sorghum flour as the primary ingredient. The selection of sorghum was driven by its nutritional benefits, including high dietary fiber, essential minerals, and phytonutrients. Various combinations of millet flour and chick pea flour were tested to achieve the desired texture, and taste. An instant mix containing 80% sorghum was selected based on the hedonic testing. Additionally, the influence of additives such as baking soda, citric acid, and spices on the final product's sensory attributes was evaluated. The development process included assessments of batter consistency, leavening agents, and cooking methods to ensure the ease of preparation for consumers. The incorporation of sorghum into the dhokla mix would contribute to improved fiber content and micronutrient profile compared to traditional preparations. Furthermore, consumer acceptability tests were conducted to assess the sensory attributes and overall acceptability of the millet-based dhokla. The findings indicated that the developed product was well-received among consumers, highlighting its potential to be incorporated into regular diets as a nutritious and convenient snack option. It caters to individuals seeking nutritious, gluten-free, and easy-to-prepare food choices.

**Key words:** *Millets, Instant dhokla mix, Sorghum, fibre content, sensory evaluation*

## RAGI: THE RISING STAR OF SUPERFOODS FOR THE NEW GENERATION

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### ABSTRACT

Ragi, scientifically known as *Eleusine coracana* and commonly known as Finger Millet, is a cereal crop widely cultivated in Africa and Asia. This abstract provides an overview of ragi's nutritional composition, health benefits, and functional properties. Ragi is rich in essential nutrients such as calcium, iron, dietary fiber, and amino acids, making it a valuable addition to diets, especially for individuals with specific dietary requirements or deficiencies. Its low glycemic index and high fiber content contribute to better glycemic control and digestive health. In addition, ragi contains phytochemicals with antioxidant properties, potentially offering protective effects against chronic diseases such as diabetes, cardiovascular diseases, and certain cancers. Beyond its nutritional value, ragi exhibits promising functional

properties, including its ability to act as a gluten-free alternative in food formulations, enhance satiety, and improve the texture and shelf-life of food products. Furthermore, ragi cultivation is environmentally sustainable, requiring fewer inputs such as water and fertilizers compared to other cereal crops. The versatility of Ragi allows consumers to incorporate it into their diets in different ways, catering to diverse tastes and preferences without the need for expensive processing. Moreover, Ragi is also an economical cereal as it requires minimal input and remains accessible and affordable for local commodities. Overall, ragi emerges as an inexpensive option that provides excellent value for consumers seeking budget-friendly yet nutritious food and diversity in food choices.

**Key words:** *Food, Health, Millet, Nutrition, Ragi.*

## **DEVELOPMENT OF INDIGENOUS FERMENTED PRODUCTS USING BARNYARD MILLET**

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### **ABSTRACT**

Millets are a viable solution to the issues of food insecurity and malnutrition in the face of growing population and stagnating wheat and rice produce. In terms of protein, calories, vitamins, and minerals, millet grains are on par with or even better than main cereals. These are abundant sources of micronutrients and phytochemicals. The proteins present in them being gluten free, therapeutic effects of bioactive compounds and abundant presence of micronutrients makes them very much suitable for the development of functional foods and other value added products. The demand for barnyard millet has increased significantly in recent years due to its wide range of adaptability, moreover, the crop is regarded as a functional food due to its high nutrient and antioxidant value. Barnyard millet grains are used as food and can be cooked similarly to rice. They can also be used as functional food for those with atopic dermatitis and allergy disorders. In developing nations, food preservation through fermentation is a common practice. Appam and idli are two common fermented foods that are extensively consumed in south India and Sri Lanka. It improves the nutritional quality of the food and increases its safety by lowering harmful chemicals. In this study, the fermented foods like appam and idli are prepared by incorporating the barnyard millets in various ratios . Then, the samples undergo proximate analysis and sensory analysis, and the results are compared with those of the control samples of appam and idli.

**Key words:** *fermentation, gluten free, malnutrition, functional food*

## **MILLET BASED DIETARY PATTERN FOR COMBATING MALNUTRITION IN LOWER INCOME GROUP : A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

Millet, characterized by their resilience, represent a valuable nutritional resource, particularly in regions facing food security challenges. Ragi, a notable variety of millet, is replete with essential nutrients including calcium, proteins, vitamin A, vitamin B, and phosphorus. Its significant fibre content confers benefits such as alleviating constipation, hypertension, and reducing the risk of intestinal cancer. Similarly, Bajra, another variant of millet, offers a rich nutritional profile, featuring a balanced amino acid composition, elevated levels of iron, zinc, and insoluble dietary fibre. Moreover, its gluten-free nature and ability to retain alkalinity post-cooking make it an advantageous dietary option for individuals with gluten intolerance and acidity concerns. Despite these nutritional advantages, millets encounter underutilization attributable to limited awareness and constrained market access, particularly among marginalized communities.

This review endeavours to explore strategies aimed at enhancing public awareness, specifically targeting low-income women aged 18-35 years with at least one child, regarding the nutritional merits of millets. Furthermore, the review seeks to identify and address barriers impeding millet consumption among below poverty line (BPL) groups. The review studied the integration of low-cost millet-based dishes such as finger millet chilla (ragi chilla), pearl millet porridge (bajra khichdi), pearl millet chapati (bajra roti) , sorghum chapati (jowar roti), and others into dietary practices, thereby fostering improved health outcomes and bolstering food security within vulnerable populations.

**Keywords:** *low-income women, nutritional resource, millets, millet-based diets,*

## **GRAIN OF HOPE: EXPLORING MILLET AS A NUTRITIOUS ALTERNATIVE FOR CELIAC PATIENTS**

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### **ABSTRACT**

In the world of dietary alternatives for celiac patients, millet emerges as a beacon of hope. With its gluten-free composition and rich nutritional profile, millet presents a compelling option for individuals grappling with gluten intolerance. This abstract delves into the potential of millet as a dietary staple for celiac patients, shedding light on its myriad health benefits and culinary versatility. Millet, often overshadowed by mainstream grains, possesses an impressive nutritional resume. Packed with essential nutrients like fibre,

protein, vitamins, and minerals, millet stands as a wholesome substitute for gluten-containing grains. Its low glycemic index also makes it a favorable choice for managing blood sugar levels, offering an additional advantage for individuals with celiac disease who often contend with associated conditions like diabetes. Furthermore, millet's versatility in the kitchen adds to its allure. From savory dishes like pilafs, salads, and stir-fries to sweet treats such as porridges and desserts, millet seamlessly integrates into diverse culinary traditions, promising a flavorful and satisfying dining experience for celiac patients. Moreover, the environmental sustainability of millet cultivation enhances its appeal. As a resilient crop requiring minimal water and resources, millet aligns with eco-conscious consumption practices, promoting both personal and planetary health. In conclusion, this abstract champions millet as a viable dietary option for celiac patients, emphasizing its nutritional richness, culinary adaptability, and environmental friendliness. By embracing millet, individuals with celiac disease can embark on a journey towards improved health and well-being, one grain at a time.

**Keywords:-** *celiac disease, millets, gluten, gluten-free*

## **BARNYARD MILLET–A POTENTIAL FOOD AND FEED CROP OF FUTURE**

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### **ABSTRACT**

Barnyard millet, also known as *Echinochloa frumentacea*, is a small, seeded grain that belongs to the millet family. It has been cultivated for centuries and is primarily grown in India, China, and other parts of Asia. Barnyard millet is considered a potential food and feed crop of the future due to its numerous benefits. Firstly, it is highly nutritious, rich in dietary fibre, protein, and essential minerals such as iron and calcium. It is also gluten free making it a suitable option for individuals with gluten intolerance or celiac diseases. In addition to its nutritional value barnyard millet known for its adaptability to various climatic conditions. It can thrive in both dry and semi arid regions making it resilient crop that can with stand climate change challenges. This versatility makes it an excellent choice for sustainable agriculture. Also, barnyard millet has a short growing cycle, typically around 60-70 days, which allows for multiple harvests in a year. This makes it a cost effective and efficient crop for farmers. It also requires less water compared to other crops, making it environmentally friendly. Not only in barnyard millet a potential food source for humans but it can also be used as animal feed. Its high protein content makes it a valuable ingredient in livestock feed, contributing to overall health and productivity of animals. Overall barnyard millet shows great promise as a food and feed crop of future and sustainability make it a viable option for addressing food security challenges and promoting sustainable agriculture practices.

**Keywords:** *Agriculture, Barnyard Millet, Feed, Gluten, Sustainable.*



## DEVELOPMENT OF MILLET BASED *CHAKLI* PREMIX

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### ABSTRACT

India is the largest producer of millets in the world contributing to 42% of the world production. Millets are regarded as superfood, In India millets are called *Shree anna*. This research aims to prepare a *chakli* premix using millet. *Chakli* is traditional Indian savory product commonly prepared in South India. It is a spiral shaped deep- fried snack with spiked surfaces. It is prepared from rice flour, Bengal gram, black gram and spices. Millet sorghum (jowar) was used for making premix. Sorghum is one of the most important cereals in the world. It is mostly grown in dry lands in India. In this research, *chakli* premix was prepared using different combinations of jowar (50%, 80% and 100%) and rice flour. After sensory evaluation of the *chakli* samples prepared, the premix containing 80% jowar flour was selected.

**Keywords** – *millets, sorghum, chakli, traditional food*

## MILLETS: A SOLUTION TO AGRARIAN AND NUTRITIONAL CHALLENGES

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### ABSTRACT

Millets, often referred to as Nutri-cereals, have gained significant attention as a sustainable solution to address both agrarian and nutritional challenges while promoting social welfare. Traditionally considered as minor or neglected crops, millets are now gaining recognition for their exceptional nutritional value, capacity to withstand harsh climates and adaptability to a wide range of agro-ecologies. This abstract examines the multifaceted benefits of millets in tackling agrarian issues such as climate change, water scarcity, and soil degradation, while also addressing nutritional concerns such as malnutrition and diet-related diseases. Millets offer a sustainable substitute to conventional crops due to their low water and input requirements and capacity to flourish in marginal soils and minimal environmental footprint. Furthermore, their abundance of nutrients which includes high levels of protein, dietary fibre, vitamins, and minerals makes them an ideal candidate to combat malnutrition and promote public health. Encouraging millets cultivation and consumption can foster agricultural diversity, enhance food security, and contribute to the achievement of sustainable development goals. However, unlocking the full potential of millets requires concerted efforts from policymakers, researchers, farmers, and consumers to overcome existing challenges related to awareness, infrastructure, market access, and policy support. In conclusion,

integrating millets into diets and farming practices offers a comprehensive approach to resolving the interconnected problems of nutrition, sustainability, and agriculture.

**Keywords-** *Millets, Cereals, Sustainable, Nutrition, Climate.*

## **ANALYSING THE INTERPLAY BETWEEN MILLET AND MULTIGRAIN FLOUR-ENRICHED GLUTEN-FREE BAKING AND NUTRITIONAL WELL-BEING – AN EVALUATION OF GLUTEN-FREE INGREDIENTS AND FLOURS, NUTRITIONAL BENEFITS, AND ADVANCED BAKING METHODOLOGIES**

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### **ABSTRACT**

Gluten-free baking is increasingly sought after, but concerns exist regarding its nutritional value. This review explores the potential benefits and challenges of using millet and multigrain flour blends in gluten-free baking for enhanced nutritional well-being. We reviewed scientific literature and resources on gluten-free ingredients, nutritional profiles of millet and multigrain flours, and advanced baking techniques and performed various test by performing them on gluten free bakery products like cakes, breads and cookies. Millet and multigrain flour blends offer increased dietary fibre, protein, and essential micronutrients such as iron, magnesium, and calcium compared to traditional wheat flour. However, challenges include potential drawbacks in terms of calorie and fat content, texture management due to the absence of gluten, and the need for specific leavening and binding agents. Millet and multigrain flour-enriched gluten-free baking can be a nutritious option, particularly for individuals with gluten intolerance or celiac disease. However, individual dietary needs, ingredient quality, and portion control are crucial factors to consider. Advanced baking techniques for achieving desirable texture and structure in gluten-free products are explored, emphasizing the importance of gums, leavening agents, protein sources and moisture management.

**Keywords:** *baking techniques, gluten-free baking, millet, multigrain flours, nutritional benefits*

## **MILLETS IN COMBATING MICRO MINERAL DEFICIENCY IN LACTATING WOMEN AND YOUNG CHILDREN**

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### **ABSTRACT**

Micro mineral deficiency is the insufficient intake of essential nutrients such as Iron, Zinc and Calcium. If sufficient amount of these minerals are not present in a person's body, then it could cause a number of health risks including Anaemia, Impaired immune function, Osteoporosis and many more. The part of population which is most affected by these deficiencies are lactating women and young children (6-12 years). A Food based approach that is gaining popularity in combating these deficiencies is the use of millets in our diet. Millets are an excellent source of calcium, iron, zinc, magnesium, as well as B vitamins, niacin, B6 and folic acid and also they are quite cheaper as compared to other grains. This review paper focuses on spreading the awareness regarding the nutritional advantages of millets and inclusion of the same in daily diet that would prevent the widespread deficiency of essential minerals. The socio- economic and cultural aspects of millet consumption, emphasizing their affordability, acceptability among diverse populations. Thus, the incorporation of millets into diets holds immense potential to alleviate micromineral deficiency among lactating women and young children, contributing to improved material and child health outcomes and sustainable development goals.

**Keywords:** *awareness, diet, deficiency, millets, micro mineral, nutritional, population*

## NEXT GENERATION FOOD- MILLET NOODLES

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### ABSTRACT

Millets are tiny-seeded grains that have been grown in Asian and African nations for countless years. They are rich in vitamins, minerals, and proteins, high in fiber, and free of gluten, making them an excellent source of nourishment. The flour used to make millet noodles is high in protein, fiber, and important elements like iron, zinc, magnesium, and vitamins B and E. For those who have gluten sensitivity or celiac disease, millet is a great alternative because it is free of gluten. Millet noodles are an excellent food for weight management because of their low calorie and fat content. They are also a wonderful source of carbohydrates, which give the body energy. They can also strengthen the immune system and aid with digestion. Since millet noodles have a lower glycemic index than wheat noodles, they are an excellent choice for controlling blood sugar levels. These noodles are composed of vital nutrients that offer several health benefits to the body. Millet noodles are a pleasant and nutritious alternative to ordinary wheat noodles.

**Keywords:** *millets, gluten, glycemic index, weight management*

## IMPROVING MILLET’S NUTRITIONAL PROFILE BY PHYTIN REDUCTION AND INCLUDING COMPLEMENTARY PROTEINS

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### ABSTRACT

Millets, in addition to being more sustainable, are highly nutritious, gluten-free, have a low glycemic index and are high in antioxidants. All that being said, we still have some hurdles to cross in terms of unleashing the full potential of these miraculous grains. Millets contain a significant amount of anti-nutrients, which (via metal chelation and protein inhibition) hinder nutrient absorption, leading to reduced bioavailability. If consumed uncooked, they may even pose health issues to humans. One of the disadvantages of millets is a higher concentration of anti-nutritional factors compared to wheat and rice such as tannins, phytates, oxalates, trypsin, and chymotrypsin inhibitors. However this can be fixed by processing them into various by-products, which also reduces the phytate and tannin levels, increases the minerals and amino acids bioavailability, and improves starch and protein digestibility. De-hulling can remove 40-50% of phytate. Soaking, germination and malting at temperatures between 45-65°C and slightly acidic pH can reduce the phytic acid content by up to 40-60%. Fermentation, via the enzymatic breakdown and optimum pH, can also hydrolyse up to 80% of the phytates. Adding an absorption-enhancing agent such as vitamin C-rich food improved the percentage of iron bioavailability by up to 6.8 times. Alternatively, Biofortification can be used to enhance the accumulation of nutrients or reduce anti-nutrients in them. Millets are a great source of amino acids, mainly methionine, which are even more bioavailable than wheat. However, the limiting factor present is Lysine, which can be fixed by combining it with products of beans and soya to form complementary protein pairs. Thus, this review highlights the improvement in millet’s nutritional profile by phytin reduction and including complementary proteins as a sustainable approach.

*Key words: millets, nutriceals, complementary proteins, phytic acid*

## MILLETS TARTS: AN INNOVATE FUNCTIONAL DISH WITH HEALTH BENEFITS

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### ABSTRACT

Millets, known as *Nutri-cereals*, could be key in addressing the challenges of hidden hunger and malnutrition. Not only, the nutrition content of millets is higher than the flour we usually use, it grows extremely quickly and matures in almost half the time required for rice and wheat. This makes it the ideal and sustainable crop for consumption. To indulge in this tapestry of millets, a tart dough employing the processes of seed germination, thorough drying and precise grinding is formulated. The tarts were crafted utilizing a combination of sorghum flour, rice flour, refined wheat flour, and chickpea flour with the percentage of millets being at 50-60%. The tarts containing different types of fillings were made to go through sensory evaluation by a panel at 9 pointer hedonic scale. The results revealed that the tarts were crispy, mouth-size and a delicacy in the world of bitter healthy food. The tarts were proven to be easy to make, with better nutritional profile and gives the consumer an opportunity to be creative with the fillings. The overall acceptability of millet tarts was exceptionally excellent.

**Keywords:** *Nutri-cereals, Millets, sensory properties, functional system*

### USE OF MILLETS AS FUNCTIONAL COMPONENTS IN BAKERY

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### ABSTRACT

Cereal staples like wheat supply two thirds of the calories and protein consumed in poorer nations. Gluten is a protein found in wheat that, when combined with water, gives the grain its unique texture and elastic dough. There are two drawbacks to consuming cereals, though: first, gliadin, which is a component of wheat protein, is intolerant to many people, and second, when cereal proteins are ingested on their own, they are deficient in numerous amino acids, which can lead to protein deficiencies. The challenges and opportunities of minor cereals with poor viscoelastic value deserve special attention in breadmaking applications due to their unique nutritional components. Bakery products account for a major part of the processed food industry. The use of additional gluten-free grains in the form of flour or secondary raw material in the recipes of bakery products allows for regulating the biotechnological processes of dough maturing and proofing, obtaining a finished product with new functional properties and high nutritional values. It was found that the addition of flour from millet grains, sorghum and amaranth seeds in a mixture with wheat flour had a positive effect on the activation of baking yeast and the maturation of dough. Millets are considered to be a superior form of grains due to the presence of relatively high levels of phenols, and their greater antioxidant properties. They are known to have a greater number of bioactive compounds. As of today, numerous people suffer from gluten sensitivity, the use of millets not only helps cope with gluten-related disorders but also provides many essential nutrients not present in staples like wheat and rice. With the prevention of diseases such as chronic inflammation, they also help in enhancing the

overall nutritional, sensory, and textural characteristics of the products. Millets have the potential to produce novel bakery products. Baked products are good substrates for implementing fortification and value-addition operations and can be used to feed people at a mass scale. However, more research would be required to determine the various parameters and requirements for preparing good quality bakery products.

**Keywords:** *bioactive compounds, elasticity, gluten intolerance, protein deficiency, value addition*

## REVIEW: MILLET BASED NOODLES

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### ABSTRACT

Millet-based noodles have emerged as a promising alternative to conventional wheat noodles, offering numerous nutritional, sensory, and health benefits. This review provides a comprehensive overview of the current research landscape surrounding millet-based noodles. Millets, encompassing a diverse group of small-grain cereals, serve as the primary ingredient in these noodles, providing essential nutrients such as protein, dietary fiber, vitamins, and minerals. Various processing techniques, including blending, extrusion, and fortification, have been employed to optimize the texture, cooking properties, and sensory attributes of millet noodles. Sensory evaluations have demonstrated the acceptability of millet-based noodles among consumers, indicating their potential as a viable substitute for wheat-based counterparts. Furthermore, millet noodles offer distinct health advantages, including improved glycemic control, weight management, and cardiovascular health, attributed to their low glycemic index, high fiber content, and bioactive compounds. Despite these benefits, challenges such as technological limitations, formulation optimization, and consumer perception need to be addressed to enhance the marketability and widespread adoption of millet-based noodles. Future research should focus on refining processing techniques, investigating novel formulations, and conducting long-term human studies to elucidate the health impacts of integrating millet noodles into regular dietary patterns. Overall, millet-based noodles present a promising avenue for diversifying the noodle market, promoting sustainable food choices, and improving public health outcomes.

**Key words:** *Millets, Noodles*

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**Theme 6 & 7:**  
**Food Regulations**  
**and Policies & Food**  
**Safety**



## **EVOLVING FOOD AUDITING: INTEGRATING TECHNOLOGY, SUSTAINABILITY, AND GLOBAL PERSPECTIVES FOR FUTURE IMPACT**

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### **ABSTRACT**

This research paper explores the evolving landscape of food auditing, investigating the integration of advanced technologies, sustainability practices, and global perspectives to envision the future trajectory of this crucial aspect in the food industry. Critical analysis is conducted on major auditing techniques, addressing their advantages, and identifying key flaws observed in both auditor and facility audits. Issues in current auditing practices are thoroughly examined, shedding light on areas for improvement. Additionally, the upcoming reforms in food auditing are discussed, along with their implications and potential implementation challenges. The role of cutting-edge technologies, notably Artificial Intelligence (AI), is emphasized for its transformative potential in reshaping auditing processes. The study also considers global perspectives in food auditing, international standards, and collaborative approaches for addressing global food security concerns. Ethical considerations in technological integration, including responsible AI implementation and ethical challenges in sustainable auditing, are integral to the investigation. Synthesizing key findings, the paper offers forward-looking recommendations aimed at optimizing food auditing processes to ensure heightened transparency, sustainability, and contribute to global food security. By embracing advanced technologies, incorporating sustainable practices, and adopting a global perspective, the future of food auditing can be shaped to meet the challenges of tomorrow, safeguarding the integrity of food supply chains, and promoting equitable access to safe and nutritious food for all.

**Keywords:** *auditing, food, global perspectives, sustainability, technology*

## **FOOD REGULATION AND POLICIES**

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### **ABSTRACT**

Food regulations are established by governments to ensure food safety and quality across various stages of the food supply chain, from production to distribution. Originating from concerns about health and safety, these regulations address issues like adulteration and contamination, aiming to protect consumers' well-being. In India, the Food Safety and Standards Authority (FSSAI) governs food regulations, setting standards and overseeing enforcement activities to maintain food safety. Food policies in India, evolving since independence, focus on ensuring food security, agricultural development, and addressing malnutrition. Significant policies include the National Food Security Act (NFSA) of 2013, which subsidizes food grains for a large population segment, and various government schemes like the Public Distribution System (PDS) and Mid-Day Meal Scheme. These policies aim to enhance agricultural productivity, ensure fair prices for farmers, and

improve food access for vulnerable populations. Food regulations and policies impact food safety by setting standards, reducing risks of contamination, protecting consumers, promoting public health, enhancing market reputation, and facilitating global trade. The first significant food regulation in India, the Prevention of Food Adulteration Act (PFA) of 1954, aimed to prevent food adulteration and ensure safety. Enacted by the government, it laid the foundation for current food safety governance under FSSAI.

**Key Words:** *Food regulations, FSSAI, Public Distribution System (PDS)*

## **ENSURING FOOD SAFETY: COMBATING ADULTERATION AND ENHANCING QUALITY CONTROL**

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### **ABSTRACT**

Food adulteration poses a significant threat to public health and consumer confidence worldwide. This review paper examines the current landscape of food adulteration and quality control measures. The review paper explores various types of adulteration, including the addition of harmful substances, dilution, and mislabelling, highlighting the potential health risks associated with consuming adulterated foods. The paper delves into the role of regulatory bodies in combating adulteration through strict monitoring, testing, and enforcement of food safety standards and also discusses the importance of implementing quality control systems throughout the food supply chain to ensure the integrity and authenticity of food products. The paper concludes by emphasizing the need for collaborative efforts between government agencies [FSSAI, etc] in regulating the manufacturing, storage, distribution and sales and ensuring availability of safe and wholesome for human consumption] food manufacturers, retailers and consumers to address food adulteration effectively and safeguard public health.

**Keywords:** *Food Adulteration, Quality Control, FSSAI, Food Safety*

## **FOOD HYGIENE AND AWARENESS AMONG STREET VENDORS AND HAWKERS: A SURVEY-BASED EXPLORATION**

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### **ABSTRACT**

This unveils a comprehensive investigation into the critical domains of food hygiene and awareness among street vendors and hawkers. The study, conducted through a structured survey, delves into the multifaceted aspects of food safety practices and the level of consciousness among those engaged in the vibrant street food industry. The survey methodology involved direct interactions with a diverse sample of street vendors across New

Delhi and Noida. It scrutinized their food handling practices, sanitation methods, and storage conditions. Findings revealed both commendable adherence to hygiene norms and areas warranting improvement. Notably, a significant proportion of vendors demonstrated a keen understanding of basic food safety measures, such as proper handwashing and utensil cleanliness. However, challenges emerged in aspects like cross-contamination prevention and adequate storage protocols. Furthermore, the survey probed the awareness levels of street vendors concerning health risks associated with poor food hygiene. Results indicated varied levels of awareness, with some vendors displaying a robust understanding of potential hazards, while others showcased a need for targeted education. This dichotomy emphasizes the importance of tailored awareness campaigns to enhance overall hygiene consciousness within the street food community. Survey data revealed an initiative aimed at raising awareness among vendors about health risks and best practices. The initiative, which focused on maintaining high food hygiene standards, showed positive results, indicating a heightened understanding of the importance of food safety. By presenting a nuanced analysis of survey outcomes and the impact of targeted awareness efforts, this poster contributes valuable knowledge for stakeholders in public health, policymaking, and the street food industry. The ultimate goal is to foster an environment where street vendors and hawkers can provide delicious and safe culinary experiences for consumers while minimizing health risks associated with inadequate food hygiene practices.

**Keywords:** *Food Hygiene, Street Vendors, Awareness, Survey-Based Research, Public Health*

## **MICROBIAL CONTAMINATION RISKS IN PACKAGED DRINKING WATER & POTENTIAL MITIGATION TECHNIQUES**

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### **ABSTRACT**

Bottled water has perceived safety and convenience, yet it may have hidden microbiological hazards. Contamination can occur at various stages, from inadequately treated source water to post-bottling hygiene lapses. Bacteria like *E. coli*, viruses like Hepatitis A, and protozoa like *Cryptosporidium* can lurk within, potentially causing illnesses ranging from mild to severe. Combating these risks requires a multi-layered approach. Disinfection at the source plays a crucial role, with techniques like chlorination, ozonation, and ultraviolet irradiation proving effective against various microbial threats. Advanced filtration technologies like reverse osmosis and microfiltration offer targeted removal of specific contaminants. Additionally, robust monitoring systems are crucial for real-time detection and rapid response to potential breaches. Beyond source water treatment, ensuring hygienic bottling practices and utilizing tamper-evident seals are essential. Finally, it is crucial to consider the role of customer awareness. Lowering the risk of contamination after purchase can be achieved by using proper handling and storage practices. For packaged drinking water to be contamination free advanced treatment techniques, innovative packaging concepts, and informed consumer behaviour can all help to minimise the risks and guarantee the safety of this essential beverage.

**Keywords:** *Chlorination, Consumer awareness, E.Coli, Packaged drinking water, Safety*

## STUDIES ON DECONTAMINATION TECHNIQUES FOR SEASONAL FRUITS FROM MAIN MARKETS OF NOIDA, UTTAR PRADESH, INDIA

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### ABSTRACT

Pandemic COVID-19 warned the importance of preparing the immune system to prevent diseases. Therefore, consuming fresh fruits is essential for a healthy and balanced diet due to their diverse compositions of vitamins, minerals, fiber, and bioactive compounds. However, these fresh products grew close to manure and irrigation water and are harvested with equipment or by hand, representing a high risk of microbial, physical, and chemical contamination. The handling of fruits exposed them to various wet surfaces of equipment and utensils, an ideal environment for biofilm formation and a potential risk for microbial contamination and foodborne illnesses. These foods may be consumed raw or minimally processed, and therefore can be a vehicle of several pathogens. The microorganisms most frequently linked to produce-related outbreaks include bacteria (*Salmonella spp.*, *Listeria monocytogenes*, *Escherichia coli*, and *Shigella spp.*), viruses and parasites. Here, we have discussed various decontamination methods including simple household washing, chemical treatments, and modern technologies with their mode of action for microbial and removal. Household decontamination methods & techniques form the last barrier to prevent the illness carriers in the entire supply chain from farm to fork. In this review, we have summarized various decontamination techniques employed at household level to ensure safe intake. The techniques range from potable water wash to chemical aids to heat treatments to modern methods employed to reduce microbial load, and organic/inorganic non-natural contaminants as well as preserve the organoleptic properties and shelf life of produce. This paper summarizes the advantages and limitations of each decontamination method and highlights the need for appropriate selection and application of these methods to ensure the safety of the fruits.

**Keywords:** *Household Decontamination, Washing, fruits Cleaning, Microbial Load Reduction, Chemical solution, Tap Water, Heat treatment, Food safety*

## SHELF LIFE AND SAFETY CONCERNS OF BAKERY PRODUCTS: A FOCUS ON CAKES

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### ABSTRACT

Bakery products are prepared in an oven using flour, sugar, and additional ingredients. Bread, cakes, cookies, muffin, etc. are few examples of bakery products. Cakes are a kind of a bakery product that is beloved for their celebratory role and delicious taste, faces challenges

regarding shelf life and safety. Cakes fall into low, intermediate, or high moisture categories, impacting their vulnerability. High-moisture cakes are magnets for mold and bacteria due to their water activity, while low-moisture ones (like fruitcakes) are more prone to drying and textural changes. Specific ingredients and processing methods significantly impact both aspects. Cream fillings and perishable decorations add risk, while proper hygiene throughout baking is vital. Various additives like propionic acid, sodium propionate, sorbic acid are used to increase shelf life by inhibiting microbial growth. Temperature and humidity are crucial. High temperatures accelerate spoilage and staling, while low temperatures can affect texture. The ideal conditions vary based on the cake's moisture content. Foodborne pathogens like Salmonella can lurk, posing serious health risks. Maintaining proper hygiene during baking is paramount. To maximise cakes' shelf life and safety, it is essential to comprehend how moisture content, ingredients, production, storage, and potential contaminants interact. To balance shelf life and consumer health, more research on risk reduction techniques and natural preservation approaches is required.

**Keywords** – *Moisture content, Salmonella sp, shelf life, hygiene*

## **EMPOWERING FOOD SAFETY AND SUSTAINABILITY: THE REVOLUTION OF SMART PACKAGING**

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### **ABSTRACT**

Using smart packaging solutions is a revolutionary step in today's food business toward guaranteeing the best possible food safety, quality, and sustainability. In order to monitor vital criteria like food freshness, temperature fluctuations, and rotting signs, this abstract promotes the development of sophisticated packaging systems outfitted with sensors, indicators, and communication capabilities. These clever packaging pieces are made to communicate with customers' smartphones, giving them access to real-time information and insights about the state of the food items inside. A network of sensors that are carefully inserted into the package material is the foundation of smart packaging technology. Temperature, humidity, and gas composition are just a few of the environmental variables that these sensors continuously measure and track, all of which have an impact on the safety and quality of food. Furthermore, indicators that provide visual cues about the product's freshness and shelf life are integrated, such as time-temperature labels or color-changing tags. Smart packages connect seamlessly to customers' cellphones using wireless communication protocols including NFC (Near Field Communication) and RFID (Radio-Frequency Identification). Thanks to this connectedness, customers may find out a lot of details about the food product, such as where it came from, when it was made, when it expired, and how it is now doing. Customers can access real-time data, including temperature history, storage suggestions, and spoiling alerts, by merely tapping their smartphone on the package. Additionally, data analytics algorithms and cloud-based platforms are used by smart packaging systems to process and evaluate the gathered data. Food waste can be minimized and inventory management can be optimized for both customers and retailers by using this analytical approach to forecast food shelf life. Furthermore, through the integration of data across the supply chain, smart packaging technologies promote transparency and traceability,

guaranteeing responsibility and strengthening confidence among manufacturers, retailers, and end users. Using smart packaging technology has several advantages for the whole food sector ecosystem. It gives customers peace of mind about the safety and quality of the products, enabling them to make wise purchases. Smart packaging improves public health and wellbeing by reducing the chance of consuming damaged or contaminated food. Furthermore, smart packaging contributes to sustainability goals by minimizing the environmental effect of food production and disposal by reducing food waste through enhanced inventory management and shelf-life extension. To sum up, the creation and broad application of smart packaging solutions have the potential to completely transform the food sector. These intelligent packaging improve food safety, quality, and sustainability by fusing cutting-edge sensor technology, wireless connectivity, and data analytics. They also provide consumers unparalleled transparency and control over the foods they choose.

**Keywords:** *Sustainability, sensors, NFC, RFID.*

## **SUPPLY CHAIN LOGISTICS AND FOOD SPOILAGE: A REVIEW**

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### **ABSTRACT**

Food products gradually and cumulatively deteriorate from harvest until consumption, leading to food spoiling. Food storage and transportation are closely related since moving food longer distances necessitates keeping it from spoiling along the way. Enhancing access to real-time information on a product's quality for manufacturers, distributors, retailers, and consumers can be achieved by the effective use of manufacturing and monitoring processes at each stage of the supply chain. The supply of food has constantly fluctuated in human communities. The amount of time that food is edible and nutritious varies on a number of variables (such as temperature and moisture). Older methods of preserving food, including smoking, drying, and salting, needed less energy; more recent methods, such as canning and compressed gas refrigeration, need more energy. As storage technologies advanced, transportation was possible to provide fresh and preserved food to people all over the world while mitigating productivity swings.

**Keywords:** *Food quality, Food safety, Degradation kinetics, Microbial growth, Smart logistics, Indicators, Dynamic labelling, Dynamic pricing, Food waste*

## **AWARENESS ON FOOD ADULTERATION AND ITS HARMFUL EFFECTS ON HUMAN HEALTH**

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### **ABSTRACT**

Food adulteration refers to the alteration of food quality that takes place deliberately. It includes the addition of ingredients to modify different properties of food products for economic advantage. Color, appearance, taste, weight, volume, and shelf life are such food properties. Substitution of food or its nutritional content is also accomplished to spark the apparent quality. Substitution with species, protein content, fat content, or plant ingredients

are major forms of food substitution. Original misrepresentation of food is often practiced increasing the market demand of food. Organic and synthetic compounds are added to ensure a rapid effect on the human body. Adulterated food products are responsible for mild to severe health impacts as well as financial damage. Diarrhea, nausea, allergic reaction, diabetes, cardiovascular disease, etc., are frequently observed illnesses upon consumption of adulterated food. Some adulterants have shown carcinogenic, clastogenic, and genotoxic properties. This review paper aims at creating awareness among low-income groups. Food adulteration can lead to serious health issues, including food poisoning, digestive problems, and long-term diseases. It undermines nutritional value and can be particularly harmful to vulnerable populations. Prevention involves stringent food safety regulations, regular inspections, public awareness campaigns, and promoting ethical practices within the food industry.

**Keywords:** *Food adulteration, physical properties, food substitution, synthetic adulterants, health hazard*

## **MICROBIOLOGY OF STREET FOOD: UNDERSTANDING RISKS FOR IMPROVING FOOD SAFETY**

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### **ABSTRACT**

Street food has become a global phenomenon, providing many people, particularly in urban areas, with tasty and reasonably priced meals. In addition to its financial advantages, it draws tourists and promotes a feeling of community while functioning as a window into the local way of life. There is, however, another side to this coin. The very characteristics of street food that make it accessible—its informality and low cost—also give rise to worries about its safety. There is a serious health risk when dangerous bacteria are introduced due to improper cleanliness and legislation. Street food has been discovered to contain high amounts of bacteria, which puts customers at risk for foodborne illnesses. We must adopt more sophisticated molecular detection tools in place of more conventional testing methods if we are to fully comprehend the scope of this issue. This will give a more accurate picture of the risks that are really connected to eating street food. Acknowledging the problem is essential. Now that we are aware of the possible risks, we can begin looking at remedies. This could entail creating rules to guarantee hygienic standards, guaranteeing access to clean water and sanitation, and educating merchants on safe food handling techniques. Getting the balance right is the difficult part. We must figure out how to make street food safer without compromising its accessibility or cultural value. This could entail empowering customers to make educated decisions by providing them with information about potential dangers, as well as assisting vendors in putting safe processes in place without undermining their spirit of entrepreneurship. In the end, street food vendors, patrons, and government agencies must work together to ensure the food's safety. Together, we can make sure that this cherished cooking custom endures without endangering the general public's health.

**Key words:** *Street food, molecular detection tools, food safety, potential dangers*



## CONSUMER AWARENESS IN TERMS OF FOOD PACKAGING AND LABELLING

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### ABSTRACT

“In today’s fast-paced world, consumer awareness plays a crucial role in making informed choices about the food we consume. This abstract explores the significance of food packaging and labelling in enhancing consumer awareness. The main objectives of this study were to examine the impact of food packaging and labelling on consumer decision-making and to assess the effectiveness of current labelling practices in conveying accurate information to consumers. To achieve these objectives, a mixed-methods approach was employed, combining qualitative interviews with consumers and quantitative analysis of food packaging and labelling practices across various product categories. The findings revealed that consumers rely heavily on packaging and labelling information to make purchasing decisions, with clear and transparent labelling being highly valued. However, the study also identified several areas of concern, including misleading claims, insufficient nutritional information, and confusing labelling formats. These findings highlight the need for improved regulations and industry standards to ensure accurate and easily understandable information is provided to consumers. Overall, this research underscores the importance of consumer awareness in relation to food packaging and labelling. By addressing the identified issues, policymakers, food manufacturers, and consumers can work together to promote transparency and empower individuals to make healthier and more informed food choices.”

**Key words:** *consumer, food packaging, labelling*

## REDUCTION OF RELIANCE ON PRESERVATION BY BIO-PRESERVATION

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### ABSTRACT

The demand for organic, chemical-free preservative-free, and additive-free meals is here to stay due to the growing trend of customers becoming more conscious of the components in their food. The need for innovative preservation techniques increases with the goal of a clean label while avoiding spoiling and guaranteeing food safety. Nowadays, BIO-PRESERVATION is regarded as a well-liked substitute for traditional food preservation techniques in order to guarantee the safety and quality of the product. The process of preserving food and extending its shelf life by the use of natural or regulated macrobiotics or anti-microbiotics is known as bio-preservation. One method to extend food’s shelf life or prevent it from spoiling is to add lactic acid bacteria (LAB) to the food. Bacteriocins are produced by lactic acid bacteria together with organic acid, which lowers pH. The most

popular LAB bacteriocin, NISIN, has a broader range of applications in the food industry and has been licensed by the Food and Drug Administration (FDA). Bacteriocins are thought to be effective bio-preservative agents. Because of their antagonistic activities, which depend on ethanol production and tolerance, competition for resources, and the creation of a broad class of antimicrobial chemicals with anti-food-spoilage properties, yeasts have also been shown to have a bio-preservation impact. Therefore, this review emphasizes the benefits of bio-preservation, which include enhanced safety and little modification of sensory attributes, resulting in safer and healthier food sector goods.

**Key words:** *Bio-preservation, lactic acid bacteria, bacteriosin, nisin, anti-microbials.*

## **FOOD TERRORISM: A NEW THREAT IN SUSTAINABLE FOOD SYSTEM**

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### **ABSTRACT**

Food terrorism is an international threat to communities that takes many forms, including malicious actions meant to contaminate or disrupt food supplies. This evil plan, which is often implemented by individuals or groups with competing interests, focuses on points of weakness along the entire food supply chain. Manipulation can occur at any point during the agricultural production process, including distribution, consumption, and processing. A wide range of reasons, including political upheaval, religious fanaticism, intellectual extremism, or even extortion for financial gain, might inspire food terrorism. Regardless of the motivation, the end goal is always the same: to incite fear among the populace, upend the existing quo, and cause chaos. Such acts have far-reaching consequences that go well beyond merely inflicting physical pain. They also have a major detrimental impact on the economy, undermine public trust in food safety, and destabilize society. A coordinated, all-encompassing approach is required to combat food terrorism successfully. This entails creating networks for exchanging intelligence, bolstering food safety regulations, improving monitoring systems, and increasing public awareness and fortitude. For food terrorism problems to be identified, remedied, and managed effectively, strong partnerships must be established between governmental bodies, law enforcement agencies, industry participants, and international organizations. By putting a focus on knowledge, preparedness, and teamwork, societies may be better able to defend their food security, public health, and social well-being against this insidious menace.

**Keywords:** *Food terrorism, regulatory frameworks, food safety,*

## **CARBON DOTS IN FUTURE OF GREEN FOOD PACKAGING: A REVIEW**

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### **ABSTRACT**

Carbon dot-based nanomaterials have become popular due to their electrical, optical, mechanical, and thermal properties. The active ingredient in food packaging that forms antioxidants or antimicrobials is carbon dots. There are two ways to synthesize carbon dots: top-down and bottom-up. The top-down method is a physical one that uses chemical, electrochemical, and physical processes to break down bulk nanomaterial into carbon dots. The bottom-up strategy involves employing energy, such as hydrothermal treatment, ultrasonic treatment, thermal breakdown, pyrolysis, carbonization, and microwave synthesis, to synthesize carbon dots from smaller carbon units into ultra-small units. Due to their excellent physical and chemical characteristics—such as their small size, good quantum yield, abundant availability, photoluminescence, high tensile strength, ultraviolet barrier, high photo stability, low toxicity, high biocompatibility, antioxidant, and antimicrobial—carbon dots are a good fit for applications involving food packaging. Due to its antibacterial and antioxidant qualities, carbon dots prevent the growth of germs that cause food spoiling and neutralize free radicals that contribute to food deterioration. Increase the shelf life of packaged foods in this way to cut down on waste and maintain the integrity of the food supply. The doping techniques using heteroatoms and other atom combinations improve the chemical, physical, and functional properties of carbon dots. Metal and non-metal doping can be used in carbon dots depending on the kind of material. There has been much research done on the use of carbon dots in optical technologies, photo catalysis, biochemical sensing, and biological imaging.

**Keywords:** *anti-microbial properties, antioxidant properties, Carbon-dots, Packaging*

## **HEAVY METAL ANALYSIS OF DIFFERENT MILK PRODUCTS PRESENT IN THE MARKET**

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### **ABSTRACT**

Given that milk is a food that our bodies need and is bursting with vital nutrients, it is reasonable to argue that it is a super-food. For example, milk fat combines with fat-soluble vitamins (A, D, E, and K) and vitamin B2, which supports healthy skin and eyes, as well as casein, which is thought to be the building block needed for the development of bones, teeth, and body tissues. Finally, but just as importantly, milk's mineral content—particularly its calcium and phosphorus content—is essential to the health of our bones and teeth. Even though milk is nearly a complete diet, it may still include traces of harmful

heavy metals and other chemical pollutants from the environment, which poses a risk to consumers. There are several sources of heavy metals in milk that mainly originate from environmental pollution that contaminate animal feeding and water, anthropogenic activity, or accidentally during the storage and packaging of milk product. The prevalence and concentrations of heavy metals in milk and dairy products vary from study to another and from countries to another due to various factors such as the route of exposure, animal nutrition, lactation, and environmental pollution. Heavy metal toxicity is linked with a number of diseases but the severity of situation multiplies too many folds if these heavy metals are found in milk, which is the basic food item of vulnerable age group of people. In this review, the toxic impacts of different heavy metals on human health, their sources in milk, detection methods, and regulatory limits for heavy metals in milk have been discussed.

**Key words:** *milk, heavy metals, Heavy Metal, fat-soluble vitamins*

## **GREEN PACKAGING INNOVATIONS: ADVANCING SUSTAINABLE AND SAFE FOOD STORAGE SOLUTIONS**

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### **ABSTRACT**

Green packaging innovations have emerged as a critical component in addressing the dual challenges of sustainability and food safety within the food industry. This abstract explores the latest advancements in green packaging technologies, focusing on their role in enhancing the sustainability and safety of food storage practices. With increasing consumer awareness and regulatory pressures to reduce environmental impact, there is growing demand for eco-friendly packaging solutions that minimize resource consumption, emissions, and waste generation throughout the packaging lifecycle. Green packaging innovations encompass a diverse range of materials and technologies, including biodegradable polymers, compostable packaging, bio-based plastics, recycled materials, and innovative packaging designs optimized for minimal environmental footprint. Furthermore, green packaging innovations contribute to enhancing consumer trust and confidence in food products by providing transparent and traceable packaging solutions. Smart packaging technologies, such as RFID tags, QR codes, and block-chain-enabled systems, enable real-time monitoring of product freshness, origin, and handling conditions, empowering consumers to make informed purchasing decisions while promoting supply chain transparency and accountability. By harnessing the potential of green packaging innovations, food manufacturers and retailers can achieve their sustainability goals, meet regulatory requirements, and respond to consumer preferences for eco-friendly products. However, challenges such as cost-effectiveness,

scalability, and compatibility with existing packaging infrastructure remain important considerations in the widespread adoption of green packaging solutions. In conclusion, green packaging innovations represent a promising pathway towards achieving sustainable and safe food storage practices, offering opportunities to reduce environmental impact, enhance food safety, and build consumer trust in the food supply chain. Continued research and collaboration across the food industry are essential to drive further advancements in green packaging technologies and accelerate the transition towards a more sustainable and resilient food system.

**Keywords:** *Green Packaging, cost-effectiveness, sustainability goals, food manufacturers*

## **ANALYSING THE IMPACT OF FOOD LABELS ON CONSUMER PURCHASING BEHAVIOUR**

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### **ABSTRACT**

Food labels have a significant impact on the purchasing decisions of consumers. Studies show that clearly designed and readable labels help customers make educated decisions about what they eat. Labels that are specifically related to sustainability. Sustainability labels that are reliable and easy to understand, like “organic,” “fair trade,” or “sustainably sourced,” frequently encourage consumers to make more ecologically friendly decisions. Understanding the ways in which food labels impact consumer behaviour and preferences is the fundamental goal of research on food labelling and its impact on consumer purchasing behaviour. Important product information is provided on food labels, and this information may influence consumers’ decisions to buy. Nutritional and health claims, such as “sugar-free,” “low-fat,” “high in fibre,” and “source of vitamin D,” can also be seen on food labels. In the ingredients list, allergens need to be mentioned and highlighted. Simple and easy-to-read labels promote purchases, while highly technical or complex labels make it more difficult for customers to make educated judgments. Common food label kinds include Nutrition Information Panels (NIPs), List of Ingredients, Allergens, and Genetically Modified Organisms (GMOs). It is advised to create labels that are easy to read, offer clear, important information, and minimize complexity to aid in comprehension and decision-making in order to maximize the influence of food labels on customer behaviour. Making interesting and educational labels can grab consumers’ attention and help them choose the right foods. Investigating and comprehending the ways in which food labels impact customers’ decisions is the main goal of research on food labelling and its impact on consumer purchasing behaviour.

**Keywords:** *Food labels, consumers, Vitamin D, GMO, NIP, sustainability*

## FOOD IRRADIATION: A SOLUTION TO COMBAT MICROBIAL CONTAMINATION

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### ABSTRACT

A concern associated with food production is the proliferation of dangerous microorganisms that can lead to disease or even death in humans. Using natural antimicrobials such as cloves, oregano, thyme, rosemary, and turmeric is one way to find a remedy. Today, a variety of techniques, including heat treatment and chemical preservatives, are used to preserve food. Using these procedures has drawbacks such as loss of nutritional content, freshness, and originality as well as the addition of foreign materials in the form of preservatives. Therefore, it was determined that a non-thermal approach was required to adequately preserve food without the necessity of chemical preservatives. Customers anticipate that the food they purchase will be secure. Furthermore, consumers seek food that is high in nutrients and requires little preparation time, as seen by the rise in items like convenience ready-to-eat meals and fresh vegetables with little processing. Rays are one such technology. Food irradiation is the technique of exposing food to a precisely calibrated quantity of ionizing radiation, a strong kind of radiant energy. Foods do not become radioactive from radiation, lose any of their nutritional value, or experience appreciable changes in flavor, texture, or appearance. It is actually difficult to determine whether a food has been exposed to radiation since the effects of radiation are so slight. The purpose of this review is to give information on the fundamentals of food irradiation, how it affects bacteria that contaminate food, and some of the restrictions on its wider application as a food preservation technique. The notion of food irradiation and its applicability in different foods are highlighted in the abstract.

**Keywords:** *pathogenic microbes, Irradiation, microbial contamination*

## FOOD ADULTERATION: A COMPREHENSIVE REVIEW

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### ABSTRACT

Food adulteration is a widespread problem that puts the public's health and safety at serious risk. This thorough analysis explores all facets of food adulteration, including types, techniques of detection, legal frameworks, and consequences. Food adulteration is the deliberate addition of unsafe or inferior ingredients to food products with the purpose of profiting from the product, therefore lowering its nutritional content and overall quality. This review explores the different types of food adulterants commonly found in various food categories, such as milk, spices, oils, and grains. It discusses the potential health hazards associated with consuming adulterated foods, ranging from mild allergic reactions to severe illnesses and even fatalities. Furthermore, it highlights the importance of stringent quality

control measures and regular monitoring to prevent and detect food adulteration. Various analytical techniques for detecting food adulterants are examined in detail, including chromatography, spectroscopy, and DNA-based methods. The review also addresses the challenges in identifying sophisticated forms of adulteration and emphasizes the need for continuous research and innovation in this field. Moreover, it provides an overview of existing regulatory frameworks and enforcement mechanisms aimed at combating food adulteration globally. Recommendations for policymakers, food manufacturers, and consumers are outlined to promote transparency, accountability, and ethical practices in the food industry. In conclusion, this review underscores the urgency of addressing food adulteration through collaborative efforts involving government agencies, industry stakeholders, and consumers to safeguard public health and ensure the integrity of the food supply chain.

**Keywords:** *Food adulteration, nutritional value, health hazard, food substitution, quality compromise*

## DECODING THE TRUTH: UNDERSTANDING MONOSODIUM GLUTAMATE (MSG)

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### ABSTRACT

Monosodium glutamate (MSG) is salt of sodium and glutamic acid. It is most commonly known as a flavouring enhancer in food processing which provides umami taste that intensifies the meaty, savoury flavour of food as naturally occurring glutamate does in foods such as stews and meat soups. The amino acid glutamic acid it is naturally presents in food. Globally, commercial MSG's consumption is increasing, makeable high in Asia. Likewise, Its production has known Improvement regarding both method and technical equipment. Although MSG's safety was evaluated by international organizations (EFSA, FDA) as safe and limits were set up, there are studies concerned about its side effects such as obesity, asthma, migraine, headache, etc. The European Union classifies it as a food additive permitted in certain foods and subjects to quantitative limits. The increase in commercially MSG use has raised the concern of both scientists and consumers about its safety. Therefore, due to a need of full comprehension about MSG, it is necessary to give more attention in studying it. Advantage in the development of analysis methods and technical equipment's should be exploited to obtain higher accuracy result.

**Keywords:** *Flavor, food additives, food safety, monosodium glutamate, EFSA, FDA*



## **DECODING THE TRUTH: COLOURANTS AN IMPORTANT FOOD ADDITIVE FOR INNOVATION IN FOOD PRODUCTION**

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### **ABSTRACT**

Colourants play a crucial role as food additives in modern food production, offering a spectrum of possibilities for innovation. This abstract explores the significance of colourants in the food industry and their impact on product development and consumer perception. Firstly, it delves into the physiological and psychological aspects of colour perception, highlighting how colour influences taste perception and consumer behaviour. Secondly, it examines the diverse range of natural and synthetic colourants available, emphasizing their role in enhancing food aesthetics, improving product appeal, and extending shelf life. Additionally, it discusses the regulatory landscape surrounding colourant usage, including safety considerations and labelling requirements. Furthermore, the abstract underscores the importance of innovation in colourant technology, such as the development of sustainable and plant-based alternatives to synthetic colourants, to meet evolving consumer demands for clean label products. Overall, this abstract underscore the pivotal role of colourants in driving innovation in food production, shaping consumer preferences, and meeting industry standards.

**Keywords:** *food colour; food additives, safety, labelling, guidelines.*

## **ADVANCEMENT IN FOOD PRESERVATION TECHNIQUES: A COMPREHENSIVE REVIEW**

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### **ABSTRACT**

Over time, advances in food preservation techniques have resulted in the incorporation of several strategies to prolong the shelf life of food products without compromising their nutritional content and quality. Among the developments are: Refrigeration and Freezing: this technology has evolved by minimizing the development of ice crystals through faster freezing methods and preventing freezer burn with vacuum sealing; Modified Atmosphere Packaging: MAP slows down the deterioration of food products by changing the atmosphere surrounding them. improvements include freshness-preserving packing materials and improved control over gas composition; High Pressure Processing (HPP): a non-thermal preservation method entails applying high pressure to food in order to render enzymes and microbes inactive. The application of HPP technology to a greater variety of food products has increased as a result of its advancements; Nanotechnology: the antibacterial qualities of nano-materials as well as their capacity to erect barriers against moisture and oxygen, so improving food preservation, are being investigated; and Using naturally occurring microbes to prevent food spoilage and harmful germs is known as bio-preservation. One development is the discovery of novel

antibacterial strains. In general, improvements in food preservation methods are made in response to consumer demands for food products that are more natural, healthier, and shelf-life extended.

**Key words:** *nano-materials, High Pressure Processing, MAP, food preservation, non-thermal processing*

## KNOWLEDGE ON HYGIENE PRACTICES AND SANITATION AMONG STREET VENDORS IN NOIDA

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### ABSTRACT

Access to safe food is considered a basic human right, but food-borne disease presents a significant public health concern globally. Selling street food is a common and unique aspect of a large unorganized sector in both developed and developing nations. A major public health problem is food safety because so many people eat out of the house and run the risk of contracting food-borne illnesses. Food handlers are crucial to maintaining food safety at every stage of the supply chain, including preparation, processing, manufacturing, and retailing. Street food refers to ready-to-eat meals and drinks that are made and sold by street vendors in marketplaces. Several people from low-income households rely heavily on food from street vendor businesses for their income. Due to their accessibility, items sold on the street assist the majority of individuals working in the unorganised sector's varied diets. Food handlers are crucial to maintaining food safety at every stage of the supply chain. Food-borne diseases are a major threat to global health. In low- and middle-income nations, the issue is made worse by widespread improper food handling and sanitation practices, a lack of education for food handlers, a lack of awareness about food safety, and inadequate regulations.

**Keywords:** *Food Safety, Hygiene, Street Food, Public Health, Food Borne Diseases*

## FOOD SAFETY AND SECURITY AMONG STREET VENDORS

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### ABSTRACT

In emerging nations, street food plays a significant role in the lives of urban residents. There are plenty of work prospects in the food industry. The knowledge, attitude, and practices of vendors about food safety are crucial since they give people all over the world access to food and nourishment at extremely low costs. Due to the significant danger of contamination, which compromises food safety, most street foods are unhealthy. With the aid of cluster analysis to classify vendors, the current study sought to evaluate the knowledge, attitudes,

and practices of vendors regarding food safety as well as the most important influencing elements of these aspects. The participants in this study were chosen at random from various Delhi locations. Most street food vendors do not adhere to basic food safety guidelines, such as wearing an apron, having access to tap water, being unable to clean utensils with soap, and having refrigerators to store food. Only about one-third of street food vendors had registered to operate food-vending shops. The findings indicate that vendors who were properly registered, had better education levels, and lived in affluent areas adhered to greater safety regulations. From a policy standpoint, the findings demonstrate that while India’s food safety regulations are comparable to those of most developed nations, there is uncertainty about how street food vendors would really apply them. It is important to encourage street food sellers and customers to share their experiences to prevent situations like this one. “Clean street-food clubs” should be promoted as a means of identifying the requirements of street vendors and taking note of customer feedback in order to raise their awareness of food safety regulations.

**Key words:** *street food, food safety, safety regulations*

## MICROBIAL SAFETY OF STREET FOOD PRODUCTS IN DEVELOPING COUNTRIES

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### ABSTRACT

Street food is a vital component of the food landscape in developing countries, providing convenient and affordable options for urban dwellers. However, concerns about the microbial safety of street food persist, posing significant health risks to consumers. This abstract provides an overview of the microbial safety issues associated with street food in developing countries. Common pathogens such as *Salmonella*, *Escherichia coli*, and *Staphylococcus aureus* are frequently implicated in foodborne illnesses linked to street food consumption. The precarious conditions under which street food is prepared, including inadequate hygiene practices, lack of access to clean water, and improper storage and transportation, contribute to microbial contamination. Furthermore, environmental pollution and the presence of pests exacerbate the risk of contamination. Addressing these challenges requires a multifaceted approach that encompasses regulatory measures, education, and infrastructure development. Strengthening regulatory frameworks to enforce hygiene standards and monitor food safety practices among street food vendors is essential. Additionally, initiatives aimed at raising awareness about safe food handling practices and improving access to clean water and sanitation facilities are crucial. Collaborative efforts involving government agencies, public health authorities, street food vendors, and consumers are imperative to enhance the microbial safety of street food in developing countries. By implementing comprehensive interventions and fostering partnerships, it is possible to mitigate the risks associated with street food consumption and ensure the provision of safe and nutritious food to urban populations in developing countries.

**Key words:** *street food, pathogens, Salmonella, Escherichia coli, Staphylococcus*

## PHYTOCHEMICAL, ANTIMICROBIAL, AND ANTIOXIDANT ACTIVITY OF *CITRUS LIMETTA* EXTRACTS AND ESSENTIAL OIL AGAINST SELECTED PLANT PATHOGENS

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### ABSTRACT

The goal of the current study was to assess the phytochemicals, antimicrobial, antioxidant, and antifungal effects of the peel extracts and essential oils of *Citrus limetta* (Mausambi) against some plant pathogens. This is one of the few studies to report on the comparison of phytochemical, antimicrobial, and antioxidant effects of the peel extracts and essential oil of *Citrus limetta* against common plant pathogens. The *Citrus* peels were collected from a juice vendor in Delhi and the peels were sorted, shade-dried, and used for the present study. A total of six extracts using different solvents (ethyl acetate, ethanol, 50% aqueous ethanol, chloroform, methanol, petroleum ether) were prepared using the maceration technique. The essential oil from peels was extracted using the Clevenger apparatus. The phytochemical screening was done to check the presence of various phytochemical components and the antimicrobial activity of the peel extracts and oil was studied against common plant pathogens by agar well diffusion assay. The total phenolic content and the total antioxidant activity were assessed by the Folin-Ciocalteu method and DPPH assay using the standard gallic acid as a standard. Amongst all the six solvents, the 50% aqueous ethanol followed by ethanol was found to be the most effective extraction medium. It was found that the 50% ethanol peel extract exhibited a wide range of antimicrobial activity against all groups of bacteria with the highest inhibition zone diameter (IZD) produced against Gram-negative *Enterobacter aerogenes* (20.5±0.1 mm) followed by Gram-positive *Staphylococcus aureus* (19.5±0.1 mm) whereas the peel essential oil against Gram-positive *Bacillus subtilis* (18.4±0.1 mm) followed by *Staphylococcus aureus* (13.75±0.1 mm). The total phenolic content of the peel extract and essential oil was found to be 1.754 µg/mg and 15.49 µg/mg GAE respectively. The total % inhibition antioxidant activity of extract and oil were 57.4% and 28.7% respectively. In the current investigation, the results illustrate that out of peel extracts and essential oil of *Citrus limetta*, the peel essential oil exhibits a wide range of antimicrobial and total phenolic contents whereas the extract displayed better % inhibition antioxidants and can potentially be used as an inexpensive natural antimicrobial agent. The antifungal activity is still under investigation and the results will be presented later.

**Keywords:** *Citrus limetta*, peel, essential oil, Antimicrobial, Antioxidant, Total Phenols.

## **BLOCK-CHAIN TECHNOLOGY IN FOOD SAFETY: ENSURING TRANSPARENCY FROM FARM TO FORK**

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### **ABSTRACT**

Block-chain technology creates previously unheard-of levels of openness across the food supply chain; it has emerged as a revolutionary force in assuring food safety. This abstract examines the various ways that block-chain is affecting the agriculture and food industries, emphasizing how it protects the process "from farm to fork." The absence of real-time information sharing in traditional supply chains might cause delays in the detection and resolution of problems with food safety. Block-chain transforms this environment with its immutable, decentralized ledger. A thorough, verifiable history of each product is available to stakeholders by securely and transparently documenting every stage of the supply chain. Transparency reduces the extent and effect of foodborne outbreaks by improving traceability and facilitating quick and accurate identification of contamination sources. Furthermore, block-chain maintains confidence between farmers, processors, distributors, retailers, and customers—all parties involved in the supply chain. Smart contracts embedded in the block-chain enable automated execution of predefined agreements, streamlining transactions and reducing the risk of fraud. This abstract also discusses the potential for consumer empowerment, as individuals gain access to real-time information about the origin, processing, and transportation of the food they consume. As the abstract ends, the application of block-chain technology in food safety promises a paradigm change towards a more robust, secure, and transparent food supply chain, ultimately contributing to improved public health and heightened customer trust in the safety and quality of the products they consume.

**Keywords :** *Block-chain technology, food safety, foodborne outbreaks, supply chain*

## **APPLICATION OF NANOTECHNOLOGY IN FOOD PACKAGING FOR IMPROVED SAFETY AND FRESHNESS**

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### **ABSTRACT**

In order to promote health and novelty, nanotechnology has been widely used in a variety of industries, including food bundling. To advance innovation and well-being, this theory explores the application of nanotechnology in food packaging. Food bundling is an essential component in preserving food quality and extending its shelf life. Anyhow, standard packaging materials sometimes fall short when it comes to preventing deterioration, microbial growth, and foodborne illnesses. A variety of creative solutions to these problems are provided by nanotechnology. Creating materials known as nanocomposite is one way that

nanotechnology is being used in food packaging. Because the bundling material in these films contains nanoparticles, their blocking properties are improved. Certain nanoparticles, such as silver nanoparticles, have been shown to possess antibacterial properties that inhibit the growth of numerous germs and microscopic organisms. By encasing these nanoparticles into films, the spread of germs can be successfully suppressed, hence reducing the incidence of foodborne illnesses. Moreover, nanotechnology makes it easier to create clever bundling strategies. These frameworks are suitable for confirming and displaying food goods' freshness and composition. Nanosensors included into wrapping materials may be able to continuously monitor changes in temperature, gas composition, and pH levels in food. This information may be sent to partners and buyers to warn them of possible tainting or degradation. Moreover, better sanitation may result from the use of nanosensors to identify and evaluate allergens or contaminants. In general, food bundling with nanotechnology offers enormous possibilities for improved security and novelty. The incorporation of nanoparticles into bundling materials improves their antimicrobial viability and obstructive capabilities, reducing the risk of foodborne illnesses and tainting. The combination of nanosensors allows for ongoing monitoring of food conditions, and dynamic bundling schemes efficiently extend the shelf life of food products. As nanotechnology continues to advance, it is reasonable to predict that it will play a major role in ensuring the freshness and safety of packaged food sources.

**Key words:** *gas composition, Nano-sensors, nanotechnology, allergens, food samples*

## **HACCP AND CONSUMER AWARENESS: COMMUNICATION AND TRANSPARENCY**

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### **ABSTRACT**

In the globalized food market, consumer awareness regarding food safety and quality has become increasingly crucial. Hazard Analysis and Critical Control Points (HACCP) is a systematic approach recognized internationally for ensuring food safety. However, its effectiveness is contingent upon transparent communication throughout the food supply chain, from producers to consumers. This abstract explores the significance of communication and transparency in HACCP implementation to enhance consumer awareness and trust. Effective communication strategies play a pivotal role in conveying the principles and benefits of HACCP to consumers. This involves clear and accessible information regarding the measures taken to identify, evaluate, and control hazards at critical points in the production process. Furthermore, transparency in disclosing food safety practices and adherence to HACCP protocols instills confidence among consumers, fostering trust in the food industry. Consumer awareness can be bolstered through various channels, including product labeling, advertising, educational campaigns, and digital platforms. Transparency in HACCP implementation involves not only the dissemination of information but also the active engagement of stakeholders in

the food supply chain. Effective communication and transparency are integral components of successful HACCP implementation, fostering consumer awareness and trust in the safety of food products.

**Keywords :** *consumer awareness, communication, HACCP*

## **ETHYLENE OXIDE CONTAMINATION IN SPICES: AN ASSESSMENT OF HEALTH RISKS AND REGULATORY STRATEGIES**

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### **ABSTRACT**

The contamination of spices with ethylene oxide (EO) has emerged as a pressing public health concern due to its established carcinogenic properties. This review critically examines the sources, associated health risks, and regulatory frameworks pertaining to EO contamination in spices. EO, a colourless gas, is commonly employed in spice sterilization processes to eradicate microbial pathogens and prolong shelf life. However, its designation as a Group 1 carcinogen by the International Agency for Research on Cancer (IARC) underscores the gravity of its health implications. Extensive scientific research has substantiated the link between EO exposure and various malignancies, including leukaemia, lymphoma, and breast cancer. Spice contamination with EO predominantly arises during fumigation or ethoxylation procedures. Additionally, deficiencies in regulatory oversight and substandard manufacturing practices exacerbate the persistence of EO residues in spices, thereby amplifying the health risks for consumers, particularly frequent consumers of spiced foods. Notably, regulatory bodies such as the Food and Drug Administration (FDA) in the United States and the European Food Safety Authority (EFSA) have established maximum residue limits (MRLs) for EO in food products. However, the effective enforcement and monitoring of these thresholds remain challenging, leaving consumers vulnerable to continued exposure risks. To address the health hazards associated with EO contamination in spices, concerted action is imperative from regulatory authorities and food manufacturers alike. Implementation of enhanced processing methodologies, rigorous quality control protocols, and routine surveillance of EO levels in spices are indispensable measures to uphold public health standards. In summary, the presence of ethylene oxide in spices poses a significant carcinogenic threat, necessitating collaborative interventions to ensure the safety and integrity of the global food supply chain.

**Keywords:** *Ethylene Oxide, Carcinogenic, Health Risks, Regulatory Strategies*



## QUALITY CRITERIA: EFFECT OF DIFFERENT GRADING SIZE AND MATURITY OF POTATO UNDER SUB-TROPICAL CLIMATIC CONDITIONS

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### ABSTRACT

The potato (*Solanum tuberosum* L.) is a major agricultural crop in the world, consumed daily by millions of people from various cultural backgrounds. Potatoes are processed into many different products, including cooked potatoes, par-fried potato strips, french fries, potato chips, potato starch, potato granules, potato flakes, and dehydrated diced potatoes, among others. Potato processing is determined by tuber quality, which takes into account both external and internal parameters. External parameters for potato tubers include size, shape, appearance, eye depth, and any surface defects. Potato processing is based on tuber quality, which takes into account both the external and internal properties of the potato. The internal parameters are dry matter, chip color, reducing sugars, and discoloration. Quality parameters have a large influence on profitability and consumer acceptance. Harvesting dates or chemical maturity also governs the overall quality the crop produce. Keeping in view, an experiment was conducted to investigate the impact of harvesting dates on crop processing quality. The indigenous varieties were Kufri Chipsona-1, Kufri Chipsona-3. Varieties were harvested 75, 90, and 110 days after planting. For potato biochemical parameters, different grades of potato varieties were chosen, including baby potato, small, medium, large, and over-large. Both the varieties had acceptable dry matter at 90 and 110 days of maturity. Almost all of the varieties had acceptable dry matter at 90 and 110 days of maturity. Biochemical parameters too varied depending upon the intrinsic behaviour of potato, chemical maturity and grade size.

**Keywords:** *potato, chemical maturity, grading, biochemical parameters*

## CHALLENGES IMPEDED BY THE PANDEMIC COVID-19 TO THE INDIAN FOOD SECURITY

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### ABSTRACT

Unfortunately, COVID-19 has threatened Indian food security. Mainly, Indians are concerned that COVID-19 may throttle the capability of our food supply chain to guarantee sufficient food availability. Nevertheless, short-term shortfalls in food resources and improved costs for certain foods may happen. This can't be decided because of the unprecedented nature of this particular worldwide tragedy. COVID-19 produces a distinctive 'income shock' that's likely to boost the occurrence of home food insecurity. More fundamentally, COVID-19 heightens household concern around the capability of the Indian food system to guarantee food availability. Despite surges widespread and supply chain interruptions, we presently don't notice substantial, fast appreciation in food costs as in the other parts of the world. This implies that there's an abundant source of foods for the near term. There's much less certainty over more extended and intermediate periods because a lot of variables are in flux, especially the speed of raises in deaths and sicknesses across India and worldwide. Details on these health



factors and the components of the food supply chain are required to foresee beyond a short time frame. In this regard, we examine three recurring considerations the simplicity of capital flows, overseas exchange, and keeping transportation designed to help make sure food accessibility within the longer run.

**Key words:** *COVID-19, food insecurity, worldwide tragedy*

## **ASSESSING CONSUMERS’ UNDERSTANDING AND PERCEPTIONS REGARDING FOOD LABELS**

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### **ABSTRACT**

Worldwide, poor diets are responsible for more deaths than any other risk factor, and are the leading cause of non-communicable diseases (NCDs). Evidence suggests excessive consumption of processed/ultra-processed packaged foods are associated with increased risk of obesity and related NCDs. Effective nutrition labelling, including simple-to-use Front of Pack Labelling, has been identified as one of the strategies that countries should use to address the growing global concern of unhealthy dietary patterns. Thus, the present study was undertaken to evaluate the consumers’ understanding and perceptions regarding food labels. For the consumer survey, snowball sampling (purposive sampling) was used as the sampling technique. Data was collected from 425 study participants in the age group of 15-49 years residing in India. Information was obtained on consumer’s understanding of food labels i.e. back of pack and front of pack labels along with their perceptions regarding labelling. It was observed that although they reported of information being received from Back of pack labels and Front of pack labels, the extent of information understood was low. Around 55.3% of the study participants considered the back of pack label as the best way of informing them about the health effects of consuming processed packaged foods while only 44.7% considered the front of pack label effective for the same. Overall, unhealthy food consumption is increasing especially amongst young children. There is a strong need to educate consumers about labels so that they can understand the information behind it and use it for making healthier food choices.

**Keywords:** *food labels, non-communicable diseases, consumer perceptions, processed packaged foods*

## **FOOD SECURITY AND NUTRITION: AN OVERVIEW**

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### **ABSTRACT**

Food Security is defined as a situation that exists when all people always have physical, social, and economic access to sufficient, safe, and nutritious food that meets their dietary needs and food preferences for an active and healthy life. Along with various issues like

climate change, sustainable development, food security is also one of the major issues. Rapidly growing populations have driven and increase in demand for food stuff, which has led to arise in consumption. The four pillars of food security are availability, access, utilization, and stability. The primary issue that determines humanity’s existence involves the abundance of food for some and lack of food and nutrition for others. The major bottlenecks faced in the implementation of food security are poverty, climate change, unequal distribution, biodiversity laws food based, international trade regulations, malnutrition, etc. Food wholesomeness is an important component of nutrition. Malnutrition is a multi-sectoral, multi-level problem that leads to an intricate interplay of household and individual decision-making, food, health, and environmental system. Malnutrition is still a problem in many different forms. The effects of malnutrition are severe widespread and frequently undetectable. The nutritional challenges face several issues including micro-nutrient deficiencies, child stunting as well as the newly rising issues of overweight and obesity. The relationship between food security and nutrition along with coping factors are examined in this review paper. It highlights the global issues and also suggests alternative solutions to improve both outcomes. Additionally, it links the functions of agriculture and food science in supplying the world’s food demand. Conclusively, this study examines the trans disciplinary approach to decreasing food waste and loss by simultaneously attaining nutritional security.

**Keywords:** Food Security, Malnutrition, consumption, health, sustainable development.

## **LACTOBACILLUS STRAINS: SCREENING, CHARACTERIZATION AND *IN VITRO* ASSESSMENT OF THEIR BACTERIAL CHARACTERISTICS FOR PRODUCT COMMERCIALIZATION**

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### **ABSTRACT**

The awareness of consumers regarding meals that promote health beyond just flavor and nutrition has led to a rise in the popularity of probiotic products. Although probiotics are frequently recommended without regard for their efficacy, they are not all the same, and their effects on the host might vary significantly. Probiotic characteristics should be determined *in vitro* before clinical investigations to understand a microbe's basic characteristics is an essential step for choosing the best bacteriotherapy for every individual. In the present investigation seven strains (*L. acidophilus* (NCDC 15), *L. plantarum* (NCIM 2083), *L. casei* (NCIM 5752), *L. rhamnosus* (NCDC 296), *L. helveticus* (NCIM 2126), *L. delbreuckii* (NCIM 2025), *L. fermentum* (NCIM 2165)) were checked for their ability to tolerate simulated intestinal conditions, cell surface hydrophobicity, auto aggregation assay, co-aggregation assay and various biochemical tests. All the bacterial strains survived in the simulated intestinal conditions. *L. rhamnosus* and *L. plantarum* showed highest adhesion to intestinal

lining as compared with others. While the capacity of each bacterial strain to interact with different pathogens varied, the largest auto aggregation assay was found to be exhibited by *L. planatum* and *L. rhamnosus*. Every strain exhibited a negative reaction to catalase and a positive reaction to the hydrolysis of esculin. The results shown that the strains under analysis have distinct biological characteristics *in vitro*, underscoring the value of *in vitro* experiments as a bridge to clinical research.

**Keywords:** *Lactobacillus strain, in vitro analysis, probiotic.*

## ASSESSMENT OF ENVIRONMENTAL INDICATORS IN SELECTIVE SECTORS OF INDIA

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### ABSTRACT

This study investigates the critical issue of greenhouse gas emissions and their repercussions on global warming, specifically focusing on prominent states in India. The escalating concentration of greenhouse gases, primarily attributed to human activities, has contributed significantly to the rise in Earth's temperature, exacerbating global warming. To assess the environmental impact of human activities, the study employs the concept of a "carbon footprint," quantified through indicators such as global warming potential, expressed in carbon dioxide equivalent (CO<sub>2</sub>eq) units. The primary objective of the study is to calculate and analyze the greenhouse gas emissions of key Indian states, with a particular emphasis on three pivotal gases—carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), and nitrous oxide (N<sub>2</sub>O). By delving into these emissions, the research aims to provide valuable insights into the agricultural sector and their respective roles in the total emissions landscape. Findings from the study reveal sector-wise contributors to greenhouse gas emissions, with agriculture, waste, energy, and industrial sectors emerging as significant players. The nuanced examination of these emissions in the context of major Indian states enriches our understanding of the intricate dynamics at play. This research contributes substantially to the ongoing discourse on environmental sustainability by shedding light on the complex interplay of greenhouse gas emissions within urban settings. The insights gained from the assessment offer a robust foundation for informed decision-making and policy formulation. As the world grapples with the challenges of climate change, this study provides a valuable perspective on the environmental indicators in selective sectors of India, crucial for developing targeted strategies towards a more sustainable future.

**Keywords:** *Greenhouse gas emissions, Carbon footprint, Agricultural sector, Environmental Sustainability, carbon dioxide equivalent (CO<sub>2</sub>eq) units.*

## RELATIONSHIP BETWEEN HIGH VALUE AGRICULTURAL PRODUCTS AND HEALTH ISSUES AMONG YOUTH IN DELHI

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### ABSTRACT

India's health environment has rapidly changed due to urbanisation and globalisation, which had a major impact on food patterns and way of life in metropolitan regions. This study looks into how youth consumption patterns of High Value Agricultural Products (HVAP) relate to their health issues in India. Survey on National Family Health has shown that in the last four years, the percentage of men and women who are obese has climbed from 19% to 23% and from 21% to 24%, respectively. It affects 33.3% of the urban population, compared to 19.7% of the rural population. With 42.5% of the population suffering from diabetes, Delhi has the highest rate of the disease. In addition, 41% of Delhi's population is obese, and hypertension affects 32.8% of the population. The study examines data from a primary survey of 300 people in Delhi using Factor Analysis and Multiple Regression Analysis. Findings reveal that health issues explains 46.7% of the total HVAP consumption. Meat and fish consumption within the HVAP basket has been found to be less influenced by health than the consumption of fruits, vegetables, milk, and eggs. Interestingly, when it comes to the High Value Agricultural Products (HVAP) factors like price, availability in the market influence the decision to consume. Therefore, this study gives the industry and marketers a foundation for effectively promoting High Value Agricultural Products (HVAP) and gives policymakers knowledge for creating successful health interventions.

**Keywords:** *High Value Agricultural Products (HVAP), Health Issues, Urban Indian Youth*

## CONSUMER BEHAVIOR AND SEMICONDUCTOR INDUSTRY IN FOOD ECONOMY

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### ABSTRACT

The food industry, which has generally been sluggish to adopt technology, is undergoing a paradigm shift as a result of the growing influence of consumer behaviour and technological breakthroughs supported by the semiconductor industry. This convergence is transforming several aspects of the industry, ranging from production and distribution to consumer habits. The study digs into how developing semiconductor technologies could alter the food supply chain, including food traceability, quality control, and nutrition solutions. In this present era of technological divide, the endogenous growth theory lays emphasis on the fact that internal factors such as innovation, technological advancements etc. play a critical role and serve as a cornerstone for growth in various industries. Government launching the Indian semiconductor mission and its plan to set up a fabrication plant in India with key focus on

research and development(R&D). With increased global demand for semiconductors, India hopes to become a key player in the industry. This study seeks to examine the major drivers such research and development (R&D), technical improvements, and the growing local market. The result showed that factors such as research and development(R&D) and GDP have significant impact on the growth of the semiconductor industry. The study intends to offer important insights into the development of India's semiconductor sector and its possible influence on the dynamics of consumer behaviour within the food industry.

**Keywords:** *Semiconductor Industry, Food Technology, Consumer Behaviour, Research and Development, Technological divide*

## QUALITY AND SHELF-LIFE IMPROVEMENT BY USING ALGINATE-BASED EDIBLE COATING ON FRESH-CUT MELONS

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### ABSTRACT

In this study, the effects of sodium alginate (SA), rice bran oil (RBO) and pectin (P)-based edible coating combinations with glycerol, tween80 and calcium chloride (CaCl<sub>2</sub>) on the quality of melons (*Cucumis melo*) pieces stored under refrigeration ( $4 \pm 1^{\circ}\text{C}$ ) were investigated. Fresh-cut melon pieces were treated with no coating (control), alginate-pectin coating [SA (2%)-RBO (1%)-P (2%)] and pectin-free coating [SA (2%)-RBO (1%)]. Weight loss, titratable acidity, pH, total soluble solids content (TSS), color characteristics (L, a, b, color change, chroma, hue angle and whiteness index) and sensory evaluation were performed. It was found that the samples with alginate-pectin coating and pectin-free coating enhanced the shelf life, physico-chemical and sensory characteristics of melon pieces. During 10 days storage period, coating treatments resulted in decreased weight loss, slowed increase in TSS and decrease in titratable acidity. Coated samples showed better color characteristics throughout the storage period. It was also observed that alginate-pectin-based coating masked the actual taste of melon pieces whereas pectin-free coating retained the actual taste of pineapple thus making it more preferable. It was concluded that both coatings enhanced the shelf life and other characteristics of the piece but pectin-free coating displayed better results in enhancing the shelf life and retaining the sensory characteristics of fresh-cut melons pieces.

**Keywords-** *edible coating, melons, pectin, shelf life, sodium alginate*

## EFFECT OF PLANT ESSENTIAL OILS ON *XANTHOMONAS CAMPESTRIS*

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### ABSTRACT

Plant pathogenic bacteria induced diseases are an arising threat to the agricultural sector. A vast genus of Gram-negative bacteria called *Xanthomonas* cause diseases in a number of host plants, which result in significant losses in harvest quality and output. Primitive techniques of using pesticides, insecticides etc., have shown adverse impact on plant species, human health, and environment. To aid to this problem an alternative method of naturally occurring and biologically active compounds from various plant species, such as essential oils, organic extracts, or plant-associated microbiota, have been extensively used as greener, safer, eco-friendly, and cost-effective methods. Essential oils (EOs) from various plants have been tested to determine their antibacterial activity against many plant pathogens. Numerous studies have shown the inhibitory effects of essential oils from plants like neem, basil, eucalyptus, thyme, lemongrass, tea tree etc., against *Xanthomonas campestris*. The effects vary depending upon the active biological component present in the plants. Recent studies based on purification and characterization of these bioactives from essential oils have identified their role in the inhibition of *Xanthomonas campestris*. This study is conducted to further extend our knowledge on the inhibitory effects of certain essential oils with respect to their antimicrobial activity.

**Keywords:** *Xanthomonas campestris*, plant pathogens, essential oils, antibacterial effect, bioactive compounds

## PHYTOCHEMICAL SCREENING, ANTIMICROBIAL AND ANTIOXIDANT ACTIVITY OF PROCESSED AND UNPROCESSED ROOT EXTRACTS OF *ASPARAGUS RACEMOSUS* AGAINST PLANT PATHOGENS

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### ABSTRACT

**INTRODUCTION:** *Asparagus racemosus* (Shatavari; family Liliaceae) is a medicinal plant with a wide range of therapeutic benefits, especially its roots in female reproductive disorders. However, to date, there is no scientific study (antimicrobial and antioxidant activity) reported on the comparative evaluation of the processed and unprocessed root extract of *A. racemosus* against common plant pathogens.

**OBJECTIVE:** To assess the phytochemicals, total phenolic content, antimicrobial and antioxidant activity of the root extracts of *Asparagus racemosus* against some plant pathogens.

**METHODOLOGY:** The roots of *Asparagus racemosus* were processed by boiling in the pressure cooker for 20 minutes followed by peeling and drying whereas the unprocessed roots were directly washed, dried, powdered, and used for the study. Extracts for both the root samples were prepared in four different solvents (methanol, ethyl acetate, ethanol, and aqueous). The total phenolic content and antioxidant activity were assessed by the Folin-Ciocalteu method and DPPH assay using the standard gallic acid solution as a standard respectively. The antimicrobial activity of the extracts was determined by agar well diffusion assay.

**RESULTS:** The qualitative analysis of phytochemical constituents of the roots depicted the presence of major phenolic and saponin content in its alcoholic extracts. Amongst all the four solvents, methanol was found to be the most effective extraction medium for the unprocessed roots and exhibited the highest inhibition zone diameter (IZD) against *Bacillus subtilis* (IZD 14.2±0.1mm) and *Staphylococcus aureus* (IZD 12.7±0.1mm).

The highest antimicrobial activity was observed in both ethyl acetate and ethanol extract (processed) against *Pseudomonas fluorescens* with an (IZD of 25.5 mm) each, followed by *Bacillus subtilis* (IZD 14.2 ±0.1mm) in ethyl acetate and (13.5±0.1mm) in ethanol.

The percent inhibition antioxidant activity of processed and unprocessed roots was found to be 34.9% and 34.2% respectively and the total phenolic content was 0.174µg/mg GAE and 46.42µg/mg GAE for unprocessed and processed roots of *A. racemosus*.

**CONCLUSION:** The root extracts of *A. racemosus* before and after processing show minor differences in their antimicrobial and antioxidant activity; however exhibited significant differences in total phenolic content. The determination of chemical constituents and the antifungal activity of the extracts is under study and results will be presented later.

**Keywords:** *Asparagus racemosus*, Processed/Unprocessed Roots, Antioxidant, Total Phenolic Content, Antimicrobial.

## COLORIMETRIC DETECTION OF OXYTOCIN IN BOTTLE GOURD USING CYSTEAMINE FUNCTIONALIZED GOLD NANOPARTICLE (CYS-AUNPS)

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### ABSTRACT

To visually identify oxytocin in bottle gourds, a colorimetric technique was developed. The traditional Turkevich approach was used to create cysteamine-modified gold nanoparticles for this purpose. When cysteamine was added, the assay's sensitivity increased. The reaction was finished in less than 15 minutes after the sample was added, and the created colorimetric sensor was able to detect oxytocin with the aid of a color shift at pH 4.5. A strong connection

( $R^2 = 0.96$ ) was found by the approach between the variation in absorption values and the oxytocin concentration. The hue of the solution changed from red to blue due to the hydrogen bonding between oxytocin and cysteamine. Selectivity, accuracy (88.96–91.5%), and precision (RSD > 15%) all demonstrated strong dependability for the approach. Therefore, the method was demonstrated to be highly suitable for screening of oxytocin from bottle gourd.

**Key words:** *bottle gourd, oxytocin, cysteamine.*

## ANALYTICAL REVIEW ON COMPLIANCE TO FOOD REGULATIONS

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### ABSTRACT

A food regulation refers to the laws and administrative rules that regulate all aspects of the food supply chain including procurement of food stuff, supply, production, packaging and distribution of food products to protect and maintain food safety. The study is basically focused on purview of various regulations and their provision. It mainly covers the regulation of food control, food safety, quality and relevant aspects of food trade across the entire food chain, from the manufacturer to the consumer. To regulate the provisions made under the FSSA, 2006 along with the mandate in FSSAI certain rules and regulations came into act. Such, Food Regulations or standards in consistent with the act and rules to make specific provisions for each category via consultations and deliberate provisions. Some regulations like licensing and Registration of Food Business, Prohibition and Restriction of sales, Packaging regulations, labelling regulations, laboratory sampling analysis and food products standards and food additives.

The Food Safety and Standard Act, 2006 is an Act to consolidate the laws relating to food and to establish the Food Safety and Standards Authority of India, These particularly deals with science based standards for articles of food and to regulate their manufacture, storage, distribution, sale and import, to ensure availability of safe and wholesome food. There are many amendments in the food regulations form time to time. The food safety and standard regulations started in the year 2011, where initially 06 regulations were passed. The analytical study is a measure to find new amendments and their status of the FSSR started in 2011.

**Keywords:** *Food Regulations, FSSR, compliance and others*



## DETERMINANTS OF FOOD SAFETY

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### ABSTRACT

The term 'food safety' is defined as that food will not cause harm to the consumer when it is prepared and/or eaten according to its intended use. Food safety, nutrition and food security are closely linked. In addition to contributing to food and nutrition security, a safe food supply also supports national economies, trade and tourism, stimulating sustainable development. There are some hazards which can be stated as any agent with the potential to cause adverse health consequences for consumers. Food safety hazard may be classified into four categories likely physical, chemical, biological and allergen.

Any foreign object (inanimate) found in the food or a naturally occurring object (bone in fillet), that poses; a hazard is called a 'Physical Contamination'. Naturally occurring and Process Induced Chemical substances that can cause a food borne illness is called a 'Chemical Contaminant or Hazard'. Biological hazards are organisms, or substances produced by organisms, that pose a threat to human health. They are a major concern in food processing because they cause most food borne illness outbreaks. The Allergens are the type of hazard with concern to foods and ingredients which may cause hypersensitivity and shall always be declared on the labels. The typical allergens are cereals containing gluten; (i.e., wheat, rye, barley, and oats), crustacean and products, egg, milk and milk products, soyabean and peanuts. We have to take great measure to maintain food safety with adherence to the food safety and standards act, 2006.

**Keywords:** *Food Safety, hazards, nutrition and others.*

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# Theme 8:

# Sustainable Food

# Production

## APPLICATION OF FLY ASH IN AGRICULTURE: A STRATEGIC PERSPECTIVE

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### ABSTRACT

The significance of fly ash (FA) in agricultural practices has been thoroughly investigated by several researchers, focusing on both its benefits as well as challenges. FA is a secondary outcome derived from coal combustion in thermal power stations. In the past decade FA has piqued the interest of many researchers due to its ability to enhance soil properties, as well as providing both macro and micronutrients for plant growth. FA is a soil conditioner that improves physical, chemical, and biological properties of the amended soil. FA addition in soil for cultivation of *Lens culinaris* revealed that 20% FA dose enhanced the nutrient availability and rhizobium activity in soil leading to better plant growth (Hussain & Faizan, 2023). Whereas in *Cucurbita moschata* 10-30% FA improved the growth and biochemical parameters of the crop (Ahmad *et al.*, 2021). Even though FA addition in soil showed beneficial results with respect to crop growth and yield, it also has some negative aspects associated with it like heavy metal toxicity. Hence the fusion of FA with organic products like manure, vermicompost and others might prove effective in pacifying the effects of metal toxicity. Therefore, the use of FA in agriculture needs to be studied for method of application, different soil properties and the type of crop being grown. This approach will focus on utilization of FA in sustainable food production while keeping track of the challenges faced due to metal contamination.

**Key words-** Fly ash, organic amendments, sustainable agriculture, crop production, heavy metals.

## EXTRACTION OF BIOACTIVE COMPOUNDS FROM KINNOW FLAVEDO BY ULTRASONICATION ASSISTED NATURAL DEEP EUTECTIC SOLVENT

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### ABSTRACT

The citrus fruit processing industry generates huge amounts of citrus peel which is a treasure of bioactive compounds. Conventional organic solvents (COSs) such as hexane and methanol are used for the extraction of these bioactive compounds which have high toxicity, less biodegradability, high flammability, and volatility in nature. Thus, in present work, Natural Deep Eutectic Solvent (NADES), alternative to COSs, was used which is eco-friendly and less volatile in nature. In this study, 1,2 propanediol NADES was used as a solvent which was coupled with ultrasonication for extraction of bioactive compounds from citrus peel. Parameters such as solid-liquid ratio (1:20 g/mL), water content (30 %) and temperature (50 °C) were kept constant whereas time and power of ultrasonication were varied. Total phenol content (41.55 mg/100 gm dw) and total flavonoid content (8.64 mg/100 gm dw) were found

highest at 30 min time and 200 W power. Also, the antioxidant capacity of obtained extract was determined by three different methods i.e. DPPH, ABTS and FRAP. Further, antioxidant potency composite index was computed from DPPH, ABTS and FRAP assay. Highest antioxidant capacity was observed at power of 200 W for 30 min. which was higher than the traditional solvent (i.e. 80 % methanol) used in this study. Our finding suggests that 1,2 Propanediol NADES coupled with ultrasonication assisted extraction can be successfully used for extraction of bioactive compounds from kinnow peel and the prepared extract can be further utilized for the enrichment of functional food.

**Keyword:** *citrus peel, ultrasonication, natural deep eutectic solvent, antioxidant capacity*

## **PRESERVATION OF POST HARVEST QUALITY OF AMLA FRUIT WITH BEESWAX COATING**

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### **ABSTRACT**

Amla fruit is renowned for its medicinal properties and dietary functions, yet it is highly perishable with a shelf life of approximately 5-6 days, deteriorating rapidly post-harvest. Various preservation methods such as blanching, drying, and chemical treatments have been employed to extend its shelf life. However, one promising method is edible coating, known for its eco-friendly nature as it is biodegradable. Edible coating forms a thin layer on the fruit, providing glossiness and acting as a barrier. In this study, we utilized beeswax, which is approved by FSSAI, to coat amla fruit. A 100% wax coating was applied, and the fruit was stored for 20 days at temperatures of 10°C and 30°C. At 4-day intervals, all fruit parameters were analyzed. Results revealed that fruits stored at lower temperatures exhibited a longer shelf life. The coating was found to slow down the ripening process, resulting in reduced weight loss, moisture content, color changes, and ascorbic acid loss, while maintaining firmness. Additionally, lower pH and total soluble solids (TSS), along with substantially higher titratable acidity (TA), were observed.

**Keywords:** *Amla fruit; Beeswax coating; post-harvest preservation; Shelf life extension.*

## **STUDY OF NON – THERMAL TREATMENT ON WHEAT GRAIN**

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### **ABSTRACT**

Wheat plays a pivotal role in human nutrition, economic and environmental sustainability. It serves as a staple food crop, providing essential nutrients, like protein, carbohydrates, vitamins, and minerals. Wheat is generally categorized as hard and soft on the basis on gluten and protein content, such varieties include Durum Wheat, Hard Red Winter Wheat, Soft

White Wheat, and other variations which are selectively picked varieties like Black and Purple Wheat. It is important to develop new varieties of products to lessen the burden on conventional wheat crops. Cold Plasma technology has emerged as a promising tool in agricultural science for improving crop productivity, quality, and sustainability. This abstract mainly focuses on investigating how the application of such novel non thermal treatment impacts wheat and its various other varieties. It also looks upon its effect on seed germination, yield, growth, and post – harvest characteristics. Cold Plasma has been found to enhance the nutrient uptake, germination rate and improve the resistance to diseases and pests, thus extending the shelf life of the grains. In addition, it has also been studied that Cold Plasma induces biochemical changes in wheat composition, leading to alteration in the protein content, starch properties and the antioxidant levels.

**Keywords:** *Wheat, Durum Wheat, Cold Plasma, Sustainability*

## **HOT WATER TREATMENT: A NON-CHEMICAL APPROACH FOR REDUCTION FUNGICIDE RESIDUES IN APPLES (VAR. ROYAL DELICIOUS)**

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### **ABSTRACT**

Apple is one of the most important temperate fruit crops which has immense nutritional value and is a source of good number of antioxidants. In India, apple production in comparison to other countries, its yield and productivity is dismally low (8.1 MT/ha), due to emerging insect-pest infestations such as San Jose scale, *Quadraspidiotus perniciosus* (Comstock); woolly apple aphid, *Eriosoma lanigerum* (Hausmann); and diseases such as powdery mildew, *Podosphaera leucotricha* (Ell. and Ev.) Salm; and scab, *Venturia inaequalis* Cooke (Wint) during the production period. Therefore, to protect this valuable crop from diseases, application of fungicides is a mandatory requirement. The study elucidated the effect of hot water treatment (HWT) on fungicide residue degradation in apples. Residues were measured by liquid chromatography coupled with tandem-mass spectrometry (LC-MS/MS) during cold

storage after HWT (48, 50, 52 and 54°C for 2, 3, 4 and 5 min) of fruits. The developed method for mixture of six fungicides (azoxystrobin, carbendazim, dithianon, difenconazole, hexaconazole, tebuconazole) was validated for linearity, specificity, selectivity, accuracy and precision using SANTE (SANTE/2020/12682) guidelines. The results of recovery ranged from 75.18 to 119.17% with 4.19 to 12.72% relative standard deviation. Increasing HWT temperature and duration yielded significant reduction in residues (90-98%) in terms of processing factor. HWT of apple at 48°C/ 5 min and 50°C/ 2 min yielded acceptable quality fruits along with maximum reduction in fungicide residues. Fungicide reduction followed linear relationship and first-order rates. Azoxystrobin and hexaconazole dissipated at a lower rate than dithianon, difenoconazole, carbendazim and tebuconazole.

**Keywords:** *Fungicides, Hot water treatment, Dissipation, QuEChERS, LC-MS/MS*

## **EFFECT OF VARIABLE STEAM PARBOILING ON SELECTED PIGMENTED BAO RICE VARIETIES**

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### **ABSTRACT**

Bao rice (*Oryza sativa*, L.) is a group of deep-water flood resistant rice types that predominantly grow in the flood-prone Brahmaputra valley of Assam, North-East India. While popular for their characteristic internode's elongation ability, a few pigmented Bao rice types have also attained commercial significance due to their pigmented nature and reported high mineral content. Parboiling is carried out to improve milling yield and nutritional status of rice. The basic parboiling process has industrially evolved through the past decades to further improve process efficiency and product quality. In this study, three pigmented Bao rice varieties, namely Amona Bao, Kekowa Bao and Badal Bao were subjected to single stage open and pressure parboiling (0 and 15psig separately) and a multistage pressure (0, 7, 10, and 15psig in different combinations) for 20 minutes each. Significant improvement in milling yield (up to 100%) was attained for each rice. Alterations in L/B ratio were recorded predominantly in Amona and Kekowa samples. Changes in L\*, a\* and b\* values of milled rice indicated synergetic effects of starch gelatinization, Maillard browning and pigment retention. Antioxidant retention was evaluated based on DPPH assay. The multistage approach was successful in superior retention of antioxidant activities (up to 51.18%, 36.84%, and 52.34%) against single pressure parboiling (30.71%, 20.10%, and 26.25%) for Amona, Badal and Kekowa, respectively. X-Ray diffraction of flours indicated variable extents of retrogradation and starch-lipid complexation suggesting probable relations with amylose chain length distribution. Newer findings indicated novel insight into the physicochemical properties of the economically important flood resistant pigmented Bao rice types.

**Keywords:** *Pigmented, Antioxidant, Physicochemical, Parboil*

## INDIAN SPINACH: GREEN LEAFY VEGETABLE CROP FOR STRENGTHENING THE HUMAN IMMUNITY

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### ABSTRACT

Since ancient, various plants and herbs are the natural medications practiced worldwide. Being an enriched source of vitamins, minerals, phytochemicals and bioactive compounds, vegetables are used to strengthen the human immune system. Amongst vegetables, green leafy vegetables being good source of proteins, vitamins and minerals make them crucial to be a healthy diet for humans. Such a plant with high mineral and vitamin stature is *Beta vulgaris* L. var. *bengalensis*, commonly known as Indian spinach. It is a leafy vegetable variant of *B. vulgaris* species, widely recognized for its nutritional benefits and culinary versatility. It is rich and cheap source of vitamins A & C, minerals, proteins, antioxidants, bioactive compounds, fibre etc. A 100g of edible leaves contain energy 46Kcal, moisture 86.4%, protein 3.4g, fat 0.8g, carbohydrates 6.5g, vitamin A 5862 IU, B<sub>1</sub> 0.26mg, B<sub>2</sub> 0.56mg, B<sub>3</sub> 3.3mg, vitamin C 70mg, Ca 380mg, P 30mg and 16mg Fe. In addition to these valuable attributes, unfortunately, crop is also rich in anti-nutritional factors viz. nitrate, oxalate etc. Reduction in contents of these attributes can add value to its nutritional and therapeutic properties i.e. for the treatment of inflammation, constipation, indigestion, headache, liver, and spleen diseases etc. Spinach's bioactive compounds work against anti-cancer, anti-obesity, hypoglycaemic and cardiovascular diseases. Despite its high nutritive and therapeutic qualities, the information in context of their nutritional/antinutritional composition is meagre. This lacuna delves into the nutritional, health, culinary, and agricultural aspects of palak, highlighting its potential and the necessity for further research that could unveil new applications in nutrition, medicine, and sustainable agriculture.

**Keywords:** *Indian Spinach, vitamins, minerals, nutritional security*

## DEVELOPMENT AND QUALITY EVOLUTION OF FUNCTIONAL COOKIES USING JAGGERY AS A NATURAL SWEETENER

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### ABSTRACT

Nutraceutical and functional foods not only improve nourishment but also play a role in



disease prevention and promoting overall health and well-being. The COVID-19 pandemic has led to an increased adoption of value-added herbal and natural products, with people placing a greater value on healthy living. Jaggery, which is known for its nutraceutical properties, is manufactured from sugarcane juice and contains a range of health benefits, including phenolics, antioxidants, minerals, and amino acids. In rapidly urbanizing countries such as India, there is a growing demand for processed foods. Bakery products like cookies have gained widespread popularity among both urban and rural populations. In recent years, foods with enhanced health benefits have attracted considerable attention and jaggery, with its natural and superior nutrient content, can be utilized as a healthier substitute for white sugar. Cookies were enriched with jaggery at levels of 50%, 60%, and 70% to serve as a natural sweetener and replace sugar. The cookies were then analyzed for various characteristics, including diameter, height, spread ratio, color, texture, moisture, and fat content. The physical examination of the cookies revealed that the spread ratio varied from  $4.5 \pm 0.2$  to  $5.1 \pm 0.01$ , and an increase in the quantity of jaggery led to an improvement in the hardness and strength of the cookies (4730.911 g to 11793.827 g).  $L^*$ ,  $a^*$ ,  $b^*$  values varied from 52.55-57.78, 10.58-12.25, and 32.19-34.90, respectively. The results of the sensory evaluation indicated that the incorporation of jaggery was completely acceptable in terms of appearance, color, texture, taste, aroma, and overall acceptability.

**Keywords:** *Jaggery, Natural sweetener, Functional and Nutraceutical Food, value addition*

## DEVELOPMENT OF TULASI COOKIES

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### ABSTRACT

Tulasi leaf (*ocimum sanctum*) essence generate immunity and more resistant to bacterial infection The study was designed to formulate a fiber enriched herbal based biscuit by incorporating herbs (tulsi leaves), they rich in vitamin A, C and K, minerals like calcium, magnesium, phosphorus, iron and potassium and contain good amount of protein and fibre. The main objective of the study is to develop the standardized herbal biscuit. Herbal biscuits were prepared by incorporating tulsi leaves, whole wheat flour, dalda and brown sugar. Incorporation of tulsi leaves at three variation, that variation 1, variation 2, variation 3 with the proportion of wheat flour, tulsi , brown sugar V1 ( 30G,30G,40G) ,V2 (35G,25G,40G) , V3(40G,20G,40G) .The recipe was standardized and evaluated for organoleptic acceptability by five point hedonic scale . Sensory evaluation was done by 25 semi trained panel to evaluate sensory attributes. The nutritive value of the biscuit was Energy 294.2kcal, Carbohydrates 66.29g, Protein5.63g, Fat 1.2g, Fibre 1.32g, Calcium 86.6mg, Vit C 6.4 mg, Iron 3.64 mg. The result shows that the Variation (V3) was good and much acceptable. The developed cookies were highly nutritious and suitable by all age group of people.

**Keywords:** *Herbal cookies, Hedonic scale, Tulsi, Fibre, Vitamins.*



## NOVEL APPROACH OF USING LEDS TO GROW INDOOR LETTUCE HYDROPONICALLY

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### ABSTRACT

Lettuce—perennial shrub, is a green leafy vegetable that belongs to daisy family, Asteraceae. Due its high nutritional values novel approaches to grow this vegetable is need of the hour. It is mostly found as well as consumed in China, United States of America rather than in India. Lettuce, being a winter crop, grows well at 15-20°C of temperature with 6-8 hours of exposure to sunlight every day. India being a tropical country, temperature is not very favorable for lettuce to grow on annual basis to a desired extent. One way to address this issue without any compromise in its nutritional values is the use of Light Emitting Diodes (LEDs)— a non-thermal source of energy and propagating it hydroponically. Prior state of art cites the hydroponic cultivation of Lettuce with varied wavelengths and intensity of light (i) Red light (620-750nm) helps in growth, biomass accumulation, promote photosynthesis and anthocyanin accumulation in leaf and increase in concentration of phenolics, (ii) Blue light (460-495nm) exposure stimulates photomorphogenesis, controls stomata functioning and anthocyanin biosynthesis, (iii) Green light(495-570 nm) regulates leaf expansion, stem stretching and stomatal conductance. Lettuce cultivated under the irradiation of LED light yields higher number of leaves with healthy appearance, leaf area and it is not very unlike from naturally grown lettuce as nutrients and antioxidants are retained using organic or inorganic nutrient solutions in which lettuce grown hydroponically. Hence, LED lightning is beneficial and suitable for production of lettuce every season, quality of lettuce can be tuned by appropriate selection of LED light intensity and wavelength, thereby offering great nutritional facts irrespective of season is the outcome of this research.

**Keywords:** *Lettuce, perennial shrub, hydroponic, LEDs, antioxidants, organic/inorganic nutrient solution*

## MILLETS - THE SUSTAINABLE NUTRI-CEREALS: A REVIEW

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### ABSTRACT

Millets belong to a group of highly variable small, seeded grasses, widely grown around the world as cereal crops or grains for fodder and human food. Millets can be grown on less fertile soils, with minimum water requirement and short maturity time. They are highly nutritious, non-glutinous and non-acid forming foods which makes them easy to digest. The phenolic properties found in millets containing phenolic acids, flavonoids, and tannins benefit human health. Some research has also shown that millets have high antioxidant activity. The phytochemicals in millets have a positive effect on human health which lowers the cholesterol and phytates in the body, thus protecting against age-related degenerative diseases like cardiovascular diseases (CVD), diabetes, cancer, etc. Considering the low glycaemic index of millets, they provide health benefits like reduction in blood sugar level (diabetes), blood pressure regulation, thyroid, and celiac diseases. Today's busy lifestyle and diet are major factors which influence susceptibility to many diseases. On the other side, due to poverty and low-income status, most communities in developing countries largely consume cereal and inadequate nutritional foods leads to this malnutrition and/ or deficiency. Millets possess a huge potential to solve this problem, which gives better nutritional properties in comparison to cereals like rice and wheat. Considering all these benefits, the nutri-cereals can become a better and sustainable crop for the future.

**Keywords:** *Millets, Low glycaemic index, Antioxidant activity, Malnutrition, Nutrition, Nutrition, Nutri-cereals.*

## NUTRITIONAL AND HEALTH BENEFITS OF NUTRICEREALS

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### ABSTRACT

Millet is a pseudocereal and a part of poaceae family. It is extensively produced worldwide as a grain or cereals crop in dry and tropical parts of Eurasia and Africa. The economic survey of FY 2023 states that, India produces 50.9 million tonnes of millet (accounts for 80% of Asia and 20% of global production). There are various millets grown in India such as kodo, finger, sorghum, proso, kodo, barnyard and foxtail millet. Millets, a low glycaemic index foods are depository of macro and micronutrients and contains essential amino acids. It is also rich in antioxidants such as tannins, anthocyanins, phytates and phytosterols. Millet is hidden source of health supporting phytochemicals and antioxidants and contains different nutrients useful for our health if consumed as a functional food and nutraceuticals. Millet is termed as “miracle grain” also known as “crop of the future” as it requires very low resources as compared to other crops though its cultivation is very easy also it helps in reducing atmospheric carbon dioxide makes it sustainable. Millets are highly nutritious and have several benefits for human. Millets also supports in weight loss, reduces the risk of cancers

such as colon, maintain the blood pressure, helps to slowing of muscle degradation and relieves the menstrual cramps. It helps preventing many diseases such as diabetes, cardiovascular disease, hyperlipidaemia etc. This review paper focuses on the detail nutritional attributes and potential health benefits of millets. This article will also promote the nutritional requirements and sustainability goals of millets.

**Keywords:** *Millets, antioxidants, Phytochemicals, global millet production, sustainable approaches, vitamins & minerals*

## PERFORMANCE OF SUSTAINABLE IPM COMPONENTS ON PLANT GROWTH PARAMETERS AND YIELD OF CAULIFLOWER

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### ABSTRACT

An investigation is carried out at Amity institute of organic agriculture, Amity university Noida to standardize the performance of sustainable IPM (Integrated Pest Management) components on plant growth parameters and yield of cauliflower, With the dual goals of minimising environmental effect and maximising crop productivity, Integrated Pest Management, or IPM, has become a viable method of pest control. Plant growth metrics and yield are assessed in this study report to see how well different sustainable IPM component's function. Biological control agents, cultural practices, and alternative pest management options are evaluated for their effects through field trials and data analysis. Results show improved agricultural production over traditional pesticide-based methods and significant improvements in plant growth indices like biomass, height, and leaf area index. To promote ecological sustainability and agricultural productivity, In the present investigation, the results showed demonstrate the effectiveness and potential of incorporating sustainable IPM components into agricultural practices. Plant growth characteristics like height, biomass, and yield can be analysed to show how sustainable IPM techniques can increase crop productivity while reducing negative environmental effects. The results highlight how practical it is to replace traditional pesticide-intensive farming practices with comprehensive IPM tactics, which will support food security and agricultural sustainability.

**Keywords:** *Integrated pest management (IPM), Sustainable agricultural practices (SAP*

## PROCESS STANDARDIZATION, CONSUMER ACCEPTABILITY AND

## NUTRITIONAL EVALUATION OF VALUE-ADDED BREAD WITH MUSHROOM POWDER

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### ABSTRACT

*Pleurotus sajor caju* popularly known as oyster mushrooms were sampled for this project study. It is extremely perishable as a result causes mushroom drain during the peak seasons on the country's economy. This ends up affecting the commercial production and large sales. To alleviate the problem, fresh oyster mushrooms were processed to powder which were used to formulate the bread. There were massive successes in the mushroom powder bread formulation. The following concentrations of 0% which is the standard, 5%, 10% mushroom powder were inculcated into the wheat flour. The value-added product which is mushroom was found to behave an organoleptic acceptability for the appearance, color, taste, texture, flavour. The protein composition of the formulated bread increases as the mushroom flour is increased. There was an observation that the 5% mushroom powder bread had a better outcome in terms of texture and acceptability of the consumers as well as nutrients content. When you consider both the acceptability of the consumer and the nutritional composition, the study concluded that out of the three samples of formulated breads that were made, the one that contains 5% MP received the highest acceptability from consumers. When there is more than 10% MP added to the product, it affects the value and quality of the baking product and its general acceptability. Mushroom's anti-inflammatory properties were also tested, and the findings revealed that oyster mushroom has high anti-inflammatory proper.

**Keywords:** *Mushroom Powder, Pleurotus Sajor Caju, Anti-inflammatory, nutritive value*

## PROMOTION OF PULSES PRODUCTION IN DISTRICT G.B NAGAR AND BULANDSHAHR UTTAR PRADESH -A STEPPING TOWARDS FOOD & NUTRITIONAL SECURITY

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### ABSTRACT

Pulse crops are one of the major components of plant-forward diets as protein source and the ability to play a critical role in sustainable production systems by reducing greenhouse gas emissions and natural resources usage. The adoption of pulse crops by farmers can improve soil health by providing nitrogen through process of nitrification leading to improved quality and productivity of different crops on the same field. By virtue of unique environmental benefits, pulses should be strongly considered in all future solutions for developing sustainable agricultural practices and strategies across the globe. Our Centre is also

promoting pulses for soil, crop, and human health in G.B Nagar and Bulandshahr since 2013 through awareness and front-line demonstrations (FLDs) under National Food Security Mission (NFSM) for sustainable increase in the production of pulses. These demonstrations highlight natural methods/techniques for optimized crop protection and production. The results showed the restoration of soil fertility and productivity at the individual farm level and rise in farm level net income at selected farmers' fields in both the districts.

**Keywords:** *Pulses, Front line demonstrations, Nitrification, Soil fertility, National Food Security Mission (NFSM)*

## **SUSTAINABLE PORK PRODUCTION AND PROCESSING: STEP TOWARDS EMPOWERING TRIBAL WOMEN OF NORTHEAST INDIA**

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### **ABSTRACT**

This study explores the transformative potential of sustainable pork production and processing as a mean to empower tribal women in Northeast Region (NER) of India. NER faces multiple challenges from poverty, gender inequality and lack of access to sustainable livelihood and therefore enhancing sustainable production and processing methods for pork (it being their staple food), presents not only an opportunity for socio-economic development of the region but also effective tools towards economic empowerment of women. Through primary survey the study outlines the current practices and barriers in sustainable pork production methods. It further proposes for effective waste management methods as a tool to economically empower tribal women alongside making pork production sustainable. Furthermore, the study investigates pork value chain and proposes a model for community-based pork production systems. The study finds that empowering women through sustainable pork production and processing can lead to boarder socio-economic benefits including food security and gender equality. The study calls for policy intervention, capacity building and establishment of supportive networks to enhance growth of NER, thereby contributing to the attainment of SDGs targets proposed by Indian economy.

**Keywords:** *Sustainable production, Processing, Waste management, Pork, Northeast India.*

## **ELEVATING THE SUSTAINABILITY OF FOOD PRODUCTION**

## THROUGH ORGANIC AGRICULTURE: A CASE STUDY ON SPINACH CULTIVATION

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### ABSTRACT

Green revolution which began in 1960s in India aimed to increase agricultural productivity through introducing high yielding varieties and use of modern techniques (use of fertilizers, pesticides, weedicides). It brought significant increase in food production and solved the problem of food security in India at that time. But the prolonged and unchecked use of chemicals input had various negative effect on the environment such as degradation of soil, nutrient imbalance, increased salinity in soil, loss of soil organic matter, water contamination etc. To mitigate the damage caused by modern techniques of green revolution one must switch to more sustainable mode of agriculture like organic agriculture. Organic agriculture encourages to use organic farming practices and reduce the dependence on chemical inputs. This study with the focus on spinach crop aims to investigate and assess the role of organic agriculture and sustainable food production. Through field trials, data analysis this study seeks to explore the contribution of organic agriculture in sustainable food production. The field trials emphasis on use of organic fertilizers and other organic practices to promote the production of crop. The plant growth parameters are monitored on regular basis. The paper will also discuss the potential benefits of implementing these practices in context of spinach production.

**Keywords:** *Sustainable Food Production Spinach cultivation, green revolution, organic fertilizers*

## ENHANCING SUSTAINABLE FOOD PRODUCTION THROUGH MYCORRHIZAL SYMBIOSIS: A COMPREHENSIVE STUDY

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### ABSTRACT

In the light of growing population and environmental problems the sustainable food production has become a global necessity. This study investigates the possibility of using mycorrhizal symbiosis to promote sustainable food production. The symbiotic relationship between plant and fungus is called mycorrhizal association. This association improves soil health, facilitates nutrient absorption in plants, nutrient cycle and promote biodiversity in soils. This study shows how mycorrhizal associations promotes plant growth, yield, and soil fertility. This paper shows the influence of mycorrhizal associations on growth, yield on garlic crop and its effect on soil health. Field trials were conducted on garlic crop. In field trials the plots applied with mycorrhiza is compared with control and other plots. Plant growth parameters (plant height, plant population, number of leaves) were measured on a regular basis. Apart from yield and soil health this paper also explores impact of mycorrhiza on environment conservation. This paper explores the idea of usage of mycorrhiza in organic agriculture. The keywords “organic agriculture” and “environmental conservation” are the

focus of this investigation. The result of this investigation will contribute to the growing body of knowledge on organic farming and environmental conservation, highlighting the role of mycorrhiza in sustainable agriculture and environmental conservation.

**Keywords:** *Mycorrhiza symbiosis, sustainable agriculture, organic agriculture, environmental conservation*

## **TECHNOLOGY ADAPTION AND SUSTAINABLE FOOD PRODUCTION: A STUDY WITH REFERENCE TO GROUND WATER**

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### **ABSTRACT**

Groundwater depletion in India is currently one of the most pressing issues for Food and Water Security. The overall annual ground water recharge for the entire country is 437.60 billion Cubi meters, while the yearly ground water extraction is 398.08 billion cubic meters. Ground water depletion in India is expected to reach 36 centimeters per year between 2041 and 2080. Groundwater is the backbone of irrigated agriculture in India. The increase of groundwater-based irrigation fulfils the increased food demands of India. The Research aims to see Secondary Study of the Changing Status of Water Depletion in States of India. The qualitative data analysis Shows the interdependency between the profitability & Water Utilization is examined by crops (Wheat, Rice, Cotton & Sugarcane). The relation between crop preference and water utilization is seen, 30% Dependency has increased on Irrigation over the years . In the study it is found that Economic Factor like Profitability is found to be the key variable influencing the farmer of Punjab to select the crop. The study reveals a significant correlation between crop cultivation costs and Minimum Support Prices. It indicates that in Punjab, large-scale farmers opt against cultivating Cotton and Sugarcane due to the combination of high investment requirements and low land fertility. Instead, they favor paddy cultivation, driven by lesser investment and higher returns than cotton and sugarcane. This preference is related to market constraints that resulted in the demise of Cotton and Sugarcane in Punjab.

**Keywords:** *Agriculture, Groundwater management, Irrigation, Sustainable Food Production*

## **PARTICIPATION IN AGRICULTURAL EXTENSION SERVICES & ECONOMIC GROWTH: A CASE STUDY OF UTTAR PRADESH**

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### **ABSTRACT**

The agrarian sector of India contributes significantly to the country's economy through its significant commitment to the nation's Gross domestic product. The growth of agriculture is dependent on a variety of factors like rainfall, irrigation infrastructure, agricultural research



and development, and price stabilization. Another crucial factor is agricultural extension, which facilitates the transfer of innovations from research labs to farmers' fields. Providing accurate information at the right time and through the proper channels is vital for farmers to make informed decisions. The research aims to study the participation and performance of extension services in India with special reference to Uttar Pradesh. Furthermore, it aims to assess the gap between the “Access” and ‘Adoption” of technical extension services among farmers by analyzing data from the NSSO 77<sup>th</sup> round. The analysis demonstrates that only 20% of farmers have access to technical guidance, but 90% of those who do are actively adopting the services in India. In Uttar Pradesh out of a sample of 1000 agricultural households only 281 have access to technical extension services. Notably, "progressive farmers" have been identified as the key source of information for farmers. The study also provides suggestions for enhancing the function of extension services in the agricultural sector of Uttar Pradesh, these include maximizing the utilization of the ATMA model, establishing stronger linkages between research and extension services, simplifying access to technology, and prioritizing investment in agricultural extension services research and development.

**Keywords:** *Agriculture extension, ATMA, linkages, NSSO 77<sup>th</sup> round, technology.*

## **A STUDY ON SUSTAINABLE FOOD DISTRIBUTION IN INDIA WITH REFERENCE TO PROCUREMENT OF WHEAT IN BIHAR**

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### **ABSTRACT**

In recent decades Indian agriculture has changed significantly owing to the improved standard of living. Wheat happens to be one of the major cereal crops with 14% of total area of under production. The production of wheat has gone up from 75.81 million MT 2006-07 to a record high of 94.88 million MT in 2011-12. A major increase in the productivity of wheat has been observed in Northwestern Plain Zone (million ha) 11.55). Despite this shift India still grapples with the plague of poverty where food security cannot be assured just by the availability of the agricultural products but by increasing the purchasing power of the people. India ranked 68<sup>th</sup> out of 113 major countries as per Global Food security index 2022. It is hence become a greater challenge to make food available at affordable prices and make our country's food secure. Through public distribution system, Indian government plays a crucial role in the country's agricultural landscape, particularly in the production and procurement of wheat. And discussion on social security system must begin with the recognition of abominable nature of extreme poverty prevailing in different states of India particularly Bihar which has 26.59% of its population in poverty bracket 2022-23(NHFS 5) making it home to the highest number of poor people in the country. This study aims to investigate the state-center share in India's Public Distribution System, delving into why certain states, despite similar policies, struggle with high populations of hungry and malnourished individuals. The focus will be on the wheat procurement system in Bihar, comparing it with other leading states, to identify and analyze the key constraints hindering its wheat procurement system. Through this exploration, the study highlights the need to provide insights into the uneven



distribution of benefits and challenges within India's PDS landscape. This study has been able to identify the changing landscape of wheat procurement.

**Keywords:** *food security, public distribution system, wheat procurement*

## **MARKETING EFFICIENCY OF A SUSTAINABLE CROP: ANALYTICAL STUDY ON MILLET AND MILLET BASED PRODUCTS IN CITIES OF DELHI NCR AND CHENNAI**

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### **ABSTRACT**

Millet, a sustainable and nutrient-rich crop, holds promise as a solution to address food security and promote healthier diets, accounting for 27.80 million tons of production globally. The millet market is projected to grow at a CAGR of 4.5%, reaching \$12 billion by 2025. Marketing efficiency pertains to the effectiveness of promotional strategies in driving consumer adoption of millet-based products while optimizing resource allocation. Consumer behavior encompasses the attitudes, perceptions and purchasing decisions of individuals towards millet-based products. In this paper efforts are made towards understanding consumer behavior and marketing efficiency, driving the exploration of three objectives. Firstly, it examines the changing status of the millet economy in India by providing insights into the evolving trends and dynamics shaping the market. Secondly, the study analyzes the factors influencing consumer attitude and preferences towards millet-based products in Delhi NCR and Chennai, aiming to understand the drivers behind consumer behavior and preferences. Thirdly, it identifies strategies to improve consumer awareness and enhance marketing efficiency for millet-based products in these cities. The study identified a steady rise in millet exports from India after the declaration of the ‘IYOM 2023’ where the export value has increased from US \$59 million to US \$75 million between 2019-20 and 2022-23 fueled by increasing global demand for healthy and sustainable food options. Analysis of millet consumption patterns revealed an increase in domestic consumption, approximately by 10.59%, from 2012 to 2022. Addressing low awareness as a potential barrier to marketing efficiency, the study proposes recommendations aimed at bridging the gap and fostering greater adoption of millet-based products among consumers. By enhancing marketing efficiency and consumer awareness, the study aims to facilitate the sustainable growth of the millet economy in India, ultimately fostering a healthier and more resilient food system.

**Keywords:** *Consumer Behaviour, Marketing Efficiency, Millets, Sustainable Food*

## **BEVERAGE SECTOR & IT'S GROWTH PROSPECT WITH RELATION TO INTERNATIONAL MARKET**

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### **ABSTRACT**

Beverage industries are also known as drink industries, producing particularly ready to drink products. The beverage sector comprises of two major categories namely the Alcoholic beverages and Non-Alcoholic beverages which further sub categorize into different types. The global beverage market was worth USD1180 billion in 2020 and is projected to reach a growth of 84.1% in 2026, with a compound annual growth rate (CAGR) of 7.3 per cent. Whereas India is expected to show an annual growth rate (CAGR 2024-2028) of 48.31%, resulting in a projected market volume of US\$5,971m by 2028. The research paper aims to investigate growth of Indian beverage Industry with help of comparative analysis of the different categories of beverages. The non-alcoholic beverage sector comprises bottled water, carbonates, concentrates, energy drinks, juices (100 per cent), juice drinks (up to 24 per cent), sports drinks and ready-to-drink (RTD) tea. Across these eight categories of beverages, carbonates have the highest share in terms of sales value. While all states have registered growth over the ten- year period, the purchase volume in Bihar and Odisha have increased the most with CAGRs 17.69 per cent and 17.67 per cent respectively. Alcoholic beverages in states such as Haryana and Assam, the highest revenue earning was from the 'country spirits' segment with a share of 98.51 per cent and 81.31 per cent, respectively. In Uttar Pradesh and Rajasthan, revenue earnings from both foreign liquors and spirits' and 'country spirits' were almost equal, with a combined share of 84.93 per cent and 75.6 per cent, respectively of total revenue from alcohol.

**Keywords:** *Beverage Industry, Comparative Analysis, Growth*

## **FOOD PREFERENCE AND TOURISM SECTOR IN NORTH-EAST INDIA**

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### **ABSTRACT**

Food preference is one the most important factors that influence a traveller's decision while choosing their tourism destination. Food is a cultural component that enhances a destination's image in addition to being a basic requirement for travellers. The Northeastern part of India is famous for many unique and natural beauties with diverse food options. This region is famous for its Assam tea, Masoor Tenga, and Khar from Assam. Northeast is also famous for Thukpa, Roasted Duck, Jadoh with Doh Khleh, etc from other states of that region. Despite these perquisites, it is one of the least visited places in India. Among these states, Sikkim ranks 25<sup>th</sup> in domestic tourism and 13<sup>th</sup> in international tourism, being the most popular destination among the Northeastern states. Mizoram ranks as the 34<sup>th</sup> for domestic tourism and Tripura ranks 36<sup>th</sup> for international tourism, being the least favourite among the other Northeastern states. The other states are also ranked in the 30s for both domestic and

international tourism destinations. This research paper aims to understand the relationship between the hospitality sector and the food industry that promotes tourism, especially in Northeast India. It also studies the tourism factors which influence tourists’ decisions while choosing their destination. This paper also throws light on the perception of people towards the tourism sector of Northeast India. Through the examination of these aspects, policy recommendations can be formulated to improve the tourism sector of the region. The primary study shows that food preference is one of the most important aspects that influence travellers’ decisions while choosing their destination. Around 73.6% of the people think that food is one of the most important factors that influence their decision while choosing their tourism destination, while the other 26.4% did not give importance to food preference. Moreover, it was found that people have a negative perception towards the availability of food options in that area. Around 58.8% of people think that they will face food-related issues when visiting Northeast India.

**Keywords:** *Food Preference, Food Industry, Northeast India, Tourism*

## **FARMER FRIENDLY IPM MODULE FOR SUSTAINBLE PRODUCTION OF OKRA: A SUCCESS STORY**

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### **ABSTRACT**

In the present study an attempt has been made to manage the major soil borne maladies using farmer-friendly and safe practice as against the toxic and expensive chemical means still being used by majority of vegetable growers including okra of western U.P., India. Through extensive surveys around vegetable growers’ fields heavy infestation of root knot nematode and root rot fungus associated the root zone causing disease-complex was recorded on okra (*Abelmoschus esculentus*) resulting synergistic effects on the common host. The management of both the co-inhabitants has been carried out through integrated approach of neem oil seed cake, locally isolated most potent strains of fungal endophytes as core component viz., *Trichoderma harzianum* alongwith Neem seed kernel extract. In vitro studies with the core component i.e. fungal bioagent against both, pathogenic fungus and root knot nematode, clearly showed high degree of parasitism by *T.harzianum* against *Rhizoctonia solani* while against root knot nematode exhibited toxic and egg parasitic properties respectively. The results of in vivo or pot culture studies on okra Cv. Parbhani Kranti carried out through integrating all the above management components clearly showed significantly outstanding performance in respect to plant biomass and also reducing incidence of both root knot nematode and root rot fungus the earlier one predisposing the common hosts for the fungal attack as compared to the rest of treatments.

**Keywords:** *Root Knot Nematode, Egg parasitization, Trichoderma harzianum,Neem seed kernel extract*

## A STUDY ON THE IMPACT OF CLIMATE CHANGES IN INDIAN AGRICULTURE

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### ABSTRACT

The study investigates the repercussions of climate change on food-grain production in India. As per the IMF (2023) report on a framework of climate change mitigation in India, Agriculture is responsible for 21% of total GHG emissions. In COP 26, the GoI has committed to achieving net zero emissions by 2070 and a 45% reduction in GHG emission intensity by 2030 and agriculture can contribute to timely realising this target by reduced emission through improved input-use efficiency and land-use management practices. An empirical investigation of the change in the impact over a decade of physical components of GHG i.e. rainfall and temperature along with carbon emissions on the food-grain production has been done. The cross-sectional data of all the states and UT's have been taken to perform multiple linear regression and it has been found the carbon emission is insignificant in 2011-12. However, over a span of 10 years it has been observed to be significantly impacting the food grain production in India. Moreover, the coefficient of rainfall has reduced from 2.69 to 2.4 signifies adverse impact on food grain production. The study concludes that climate change will impact food-grain physiology and irrigation, affecting agricultural production and sustainability. Thus provides a robust foundation for policymakers, researchers, and stakeholders to formulate adaptive measures that can enhance the resilience of Indian agriculture in the face of ongoing climate changes.

**Keywords:** Climate change, GHG emissions, Net Zero, Sustainable Agriculture

## FOAM-MATTED OVERRIPE BANANA POWDER AS A FUNCTIONAL ADDITIVE FOR PUFFED EXTRUDED SNACK

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### ABSTRACT

The market value for overripe banana is extremely low due to flavour defects, brown spots as well as extremely soft texture. Overripe banana is a rich source of sugar which can be used as a natural sweetener in foods. Keeping its high perishability, sugar and mucilaginous texture in view, foam mat drying was standardized by comparing three different foaming agents i.e., casein, soy and whey protein isolates. Based on desirable techno-functional properties that include water solubility index, water absorption index and rheological attributes, foam of soy protein isolate at 12.5% (v/w) was optimized for foam mat dried powder preparation and its utilization as a functional additive for extruded snacks. For product optimization, a three-

factor three-level Box Behnken Design was used. The optimized process parameters include 27% banana flour with 220 rpm screw speed and 16% feed moisture. The proximate composition of extruded snacks showed that it is a fair source of dietary fiber with a slightly sweet tinge of overripe banana flour without any added sugar. Being very low in fat content (0.13 g per serving), it can be categorized as a ‘Fat-Free Snack’. Arrhenius model was used for shelf-life prediction under accelerated conditions which was 6, 4, and 9 months for control, foam mat dried powder, and optimized extruded snack, respectively at 30°C and 75% RH. The developed foam mat drying process and extruded snacks can open new avenues for the utilization of overripe banana which otherwise is treated as a zero-value waste.

**Keywords:** *Drying, Modelling, Over-ripe banana, Puffs, Rheology*

## **POST HARVEST WASHING & DECONTAMINATING SOLUTIONS FOR SEASONAL VEGETABLES IN DELHI, NCR REGION, INDIA**

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### **ABSTRACT**

Vegetables are a good source of vitamins and minerals and prevent us regarding digestive problems and micronutrient deficiencies. Foodborne infections have been rising rapidly in recent years as a result of greater demand for vegetables. Pathogens found in vegetables, remaining pesticides, or organic as well as inorganic deposits have all been associated to these food borne illnesses on a regular basis. The final line of defence against disease carriers in the entire food supply chain from farm to fork is household decontamination procedures and techniques. We have covered multiple decontamination methods performed at the household level to guarantee safe consumption in this review. However, recent studies showed that vegetables are the sources of many disease outbreaks. This study was carried out to assess the current knowledge and future developments for the microbial safety of fresh vegetables. Vegetables I.e Spinach and Okra were collected from two localities to determine the frequency of microorganisms using standard plate count method. The procedures applied to decrease microbial load, residual pesticide level, and organic/inorganic non-natural harmful substances range from potable water wash to chemical helps to heat treatments. At various points, the effect of altering acetic acid concentration on the microbial load of vegetables was assessed. This investigation identified *Escherichia. coli*, *Pseudomonas spp.*, *Salmonella*, *Shigella*, *Klebsiella spp.*, *Enterobacter spp.*, and *Bacillus spp.* was found to have the highest frequency of occurrence (23.3%), followed by *Pseudomonas* and *Enterobacter spp.* (16.6%), *Salmonella* (16%), *Shigella* (13.3%), *Klebsiella spp.* (10%), and *Bacillus spp.* (3.3%). According to this study, rising vinegar concentration from 0.5 to 2.5% lowers microbial load. By preventing potential contamination, the risk of foodborne illness linked with consuming fresh vegetables can be reduced. Most common pesticide residues might have an effect on the final consumers (including humans and animals), particularly when pesticide-treated vegetables are eaten raw. To avoid consuming pesticides in food products, proper processing techniques should be used while using vegetables on a regular basis. These techniques include washing, peeling, boiling, cooking, drying, and others.

**Keywords:** *decontamination, Washing, Vegetable Cleaning, Microbial load, Pesticides.*

## **ADVANCING SUSTAINABLE SOILLESS AGRICULTURE: OPTIMIZING NUTRIENT MANAGEMENT AND ENVIRONMENTAL EFFICIENCY**

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### **ABSTRACT**

Soilless farming, also known as hydroponics or aeroponics, is an innovative agricultural method that eliminates the need for soil by growing plants in nutrient-rich water solutions. This approach has numerous advantages over traditional soil-based farming, including increased crop yields, water efficiency, and the ability to grow crops in non-arable regions. Key Components of Soilless Farming are **Hydroponics** (systems involve suspending plant roots in a nutrient solution, either directly or through an inert medium like perlite or rockwool. This method provides precise control over nutrient levels, pH, and water content, optimizing plant growth); **Aeroponics** (systems grow plants in air, with their roots suspended in a mist or aerosol nutrient solution. This approach maximizes oxygenation and nutrient absorption, leading to faster growth rates and higher yields compared to traditional methods); **Aquaponics**: (systems combine hydroponics with aquaculture, where fish waste provides nutrients for plant growth. The plants, in turn, filter the water for the fish, creating a symbiotic ecosystem that minimizes resource waste). Advantages of Soilless Farming are Increased Yield; Water Efficiency; Space Utilization; Reduced Environmental Impact; Crop Diversity; Challenges and Considerations are Initial Investment; Technical Expertise; Energy Consumption and Market Acceptance. Despite the numerous benefits of soilless farming, widespread adoption may be hindered by consumer perceptions and market acceptance, as well as regulatory barriers and traditional agricultural practices.

**Key words:** *Hydroponics, Aeroponics, Aquaponics, water efficiency, space utilization.*

## **REVOLUTIONIZING AGRICULTURE: A SUSTAINABLE SOLUTION IN FOOD PROCESSING**

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### **ABSTRACT**

The dynamic landscape of modern agriculture, focusing on the integration of emerging technologies for smart agriculture and precision farming. The paper introduces technological advancements, including Internet of Things (IoT) devices, unmanned aerial vehicles (UAVs),



sensors, and data analytics, which collectively contribute to enhancing the efficiency and sustainability of farming practices. The abstract highlights how these technologies enable real-time monitoring of crop conditions, precise resource management, and data-driven decision-making for optimal yield. Additionally, it addresses challenges such as data security, interoperability, and the need for farmer education in adopting these innovations. As the agricultural sector undergoes a technological revolution, this abstract serves as a comprehensive guide to understanding the transformative impact of smart and precision technologies on the future of farming.

**Key words:** *agriculture, emerging technologies, IoT, Technological advancements*

## **HEALTH BENEFITS ON MICROGREENS: A REVIEW**

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### **ABSTRACT**

Microgreens, the tiny, vibrant shoots of vegetables and herbs, have gained popularity not only for their exquisite flavours but also for their remarkable health benefits. Packed with concentrated nutrients, these miniature greens offer a powerhouse of vitamins, minerals, and antioxidants that can contribute significantly to overall well-being. One notable health benefit of microgreens is their exceptional nutrient density. Despite their small size, microgreens can contain up to 40 times more nutrients than their mature counterparts. These include essential vitamins A, C, and K, as well as minerals like iron, magnesium, and potassium. The abundance of antioxidants in microgreens helps combat oxidative stress and inflammation, supporting the body's natural defense mechanisms. Moreover, microgreens have been linked to improved heart health. Their high levels of polyphenols and fibre can contribute to lower cholesterol levels and better cardiovascular function. Additionally, these miniature greens may aid in weight management due to their low calorie content and ability to enhance satiety. Microgreens also boast potential anti-cancer properties, thanks to their rich source of phytochemicals. These compounds have been studied for their ability to inhibit the growth of cancer cells and reduce the risk of certain cancers. Incorporating microgreens into a balanced diet is a convenient and delicious way to boost nutritional intake. Whether added to salads, sandwiches, or smoothies, these tiny greens offer a burst of flavour and a plethora of health benefits, making them a valuable addition to any nutritious eating plan.

**Key words:** *microgreens, nutritional, health benefits, cancer cells, minerals*

## **SUSTAINABLE FOOD PRODUCTION FOR A BETTER FUTURE**

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### **ABSTRACT**

Sustainable food production is essential for securing a better future by addressing environmental, social, and economic challenges. It involves adopting practices that minimize environmental impact, conserve natural resources, and prioritize the well-being of communities. Agro ecological principles, such as organic farming, integrated pest management, and crop rotation, promote biodiversity, soil health, and water conservation. Embracing sustainable food production mitigates climate change by reducing greenhouse gas emissions and fostering resilient agricultural systems. Localized and diversified food systems contribute to food security, as they are less vulnerable to global supply chain disruptions. Additionally, prioritizing fair labor practices and equitable distribution ensures social sustainability, fostering inclusive growth for farmers and communities. Technological innovations, like precision agriculture and vertical farming, enhance efficiency while minimizing resource use. Circular economy approaches, such as reducing food waste and recycling byproducts, further contribute to sustainability. Consumer awareness and support for sustainable practices drive market demand, influencing businesses to adopt responsible production methods. In summary, sustainable food production intertwines environmental stewardship, social equity, and economic viability, providing a pathway to a more resilient and nourished future for both people and the planet.

**Key words:** *sustainable food, organic farming, Consumer awareness*

## **SUSTAINABLE SOLUTIONS FOR FOOD WASTE REDUCTION: A COMPREHENSIVE EXPLORATION**

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### **ABSTRACT**

Food waste is a pressing global issue with significant economic, environmental, and social implications. In recent years, there has been a growing recognition of the urgent need to address this problem through sustainable solutions. This abstract provides an overview of various strategies and approaches for reducing food waste comprehensively. Firstly, it examines the importance of understanding the root causes of food waste, which often stem from inefficiencies in production, distribution, consumption, and disposal processes. By



identifying these underlying factors, targeted interventions can be implemented to minimize waste generation at each stage of the food supply chain. Additionally, this abstract delves into the significance of consumer behavior and awareness in shaping food waste patterns. Educational initiatives, incentives, and technological innovations play crucial roles in empowering consumers to make more informed choices and minimize wasteful practices. Furthermore, it discusses the potential of circular economy principles, such as food recovery and redistribution, composting, and anaerobic digestion, in diverting organic waste from landfills and promoting resource recovery. Moreover, the abstract highlights the importance of collaboration among various stakeholders, including government agencies, businesses, non-profit organizations, and communities, to create a conducive environment for effective food waste management. Keywords: Food waste, supply chain, social responsibility

**Keywords:** *Food waste, supply chain, social responsibility*

## **MULTI-CEREALS AND THEIR IMPACT ON SUSTAINABLE FOOD SYSTEM**

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### **ABSTRACT**

A family of small-seeded grains known as millets has become a significant crop because of its sustainability and high nutritional content. The several domains in which millets are being promoted are significant. First, there is an effort to include millet into mainstream diets by increasing public awareness of its nutritional advantages through nutrition programs and educational initiatives. Second, to promote environmental sustainability, sustainable agriculture practices are being promoted. This emphasizes millets' adaptability to a variety of climates and their capacity to flourish with little inputs. Furthermore, initiatives are made to increase millet planting to improve food security, particularly in areas that are susceptible to both food insecurity and climate change. Through value addition and market connections, market development programs seek to increase demand for millet-based products, thereby presenting farmers and business owners with financial prospects. Ultimately, encouraging millet production and incorporating it into food and nutrition strategies requires policy support, which includes funding for research and subsidies. Combining forces, these programs aim to use millets' potential to address global issues pertaining to agriculture, nutrition, and sustainability, resulting in a more robust and healthier food system.

**Keywords:** *Millets, Resilience, Food Security, Market Linkages, Nutrition Policies*

## BIOTECHNOLOGY AND GENETIC ENGINEERING IN FOOD INDUSTRY

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### ABSTRACT

Biotechnology and genetic engineering revolutionized food production by harnessing scientific advancements to address critical challenges. This study examines their transformative impact on agriculture, focusing on genetic modification, gene editing and bioreactor technologies. These methods offer precise control over crop traits, enhancing yield, nutritional value and resistance to pests and diseases. The abstract highlights the potential of these innovations to address global challenges such as food security and environmental sustainability. The ethical and regulatory dimensions of genetic engineering underscore the need for responsible application and public engagement. Concerns regarding unintended environmental consequences and long-term health effects necessitate rigorous risk assessment and transparent communication. Regulatory frameworks ensure safety and promote public trust while fostering innovations in food production. Furthermore, biotechnology extends beyond crop improvement to the production of pharmaceuticals, enzymes, and sustainable biofuels, enhancing agricultural sustainability and reducing dependency on fossil fuels. By elucidating the benefits, risks, and ethical considerations of biotechnology in food production, this research aims to inform policymakers, stakeholders, and the public. Understanding the potential and limitations of genetic engineering empowers informed decision-making, shaping a resilient, sustainable, and equitable food system for future generations.

**Keywords:** *Biotechnology, genetic engineering, environmental sustainability*

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**Theme 9, 10 & 11:**

**Food in Conflict**

**Zone, Exploiting**

**New Interfaces in**

**Food Science and**

**Nutrition**

**Biodiversity in**

**Foods**

## RECENT DEVELOPMENTS IN ACTIVE AND SMART PACKAGING

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### ABSTRACT

The packaging industry is presently undergoing a profound metamorphosis due to the advent of active and smart packaging technologies. This review paper provides an in-depth exploration of recent advances in these innovative packaging solutions, extending beyond conventional methods to actively engage with the products they encase. These innovations hold the promise of extended product shelf life, enhanced product safety, and enriched consumer interactions. Active packaging encompasses components such as oxygen scavengers, ethylene absorbers, antimicrobial films. Recent research and review papers have cast light on the pivotal roles of these technologies in mitigating spoilage and curtailing food waste. The impact of active packaging isn't confined to food preservation alone; it extends its influence to sectors like pharmaceuticals and cosmetics, as expounded in various research papers. In the domain of smart packaging, this paper explores the application of technologies such as Near-Field Communication (NFC) tags, QR codes with product authentication, intelligent freshness indicators, and tamper-evident features. These innovations provide real-time data, enhance transparency, and bolster traceability within supply chains, thereby elevating consumer trust and contentment. A critical component of these recent developments is their alignment with sustainability and environmental responsibility. This paper highlights the industry's recognition of the pressing need for ecologically friendly solutions, focusing on biodegradable and recyclable materials, reduced energy consumption, and streamlined design, as underscored in multiple research papers.

**Key words:** Active packaging, smart packaging, scavengers, antimicrobial films, NFC

## DEVELOPMENT IN BISCUIT MANUFACTURING

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### ABSTRACT

This subject of Biscuit Baking and Manufacturing explores the complex process of biscuit making, covering important topics such as ingredient selection, mixing techniques and baking techniques. It delves into the research behind achieving the desired texture, flavor, and shelf life while also addressing the challenges of maintaining product consistency in the market. In recent years, the biscuit industry has witnessed remarkable advancements and innovations. Consumers are increasingly health-conscious, driving the industry to develop biscuits with reduced sugar, fat, and artificial additives. Manufacturers are also introducing gluten-free, organic, and fortified options to cater to diverse dietary preferences and requirements. Automation and digitalization have revolutionized biscuit manufacturing processes, leading to improved efficiency, consistency, and quality control. Advanced machinery and robotics are being employed to streamline production and meet the growing demand for biscuits worldwide. The biscuit industry is witnessing significant growth in emerging markets due to changing consumption patterns, urbanization, and rising disposable incomes. Manufacturers

are expanding their global footprint through strategic partnerships, acquisitions, and investments in distribution networks to capitalize on these opportunities. Functional biscuits, also known as fortified or specialized biscuits, have gained popularity due to their added health benefits and targeted functionalities. Here's a review of various types of functional biscuits. These biscuits are enriched with dietary fiber, which aids digestion, promotes gut health, and helps in weight management. High-fiber biscuits are often made with whole grains and seeds, providing a nutritious option for consumers seeking digestive wellness. Protein-fortified biscuits are designed to provide an additional source of protein, which is essential for muscle repair, growth, and overall body function. These biscuits are popular among athletes, fitness enthusiasts, and individuals looking to increase their protein intake without consuming meat or dairy products.

With the increasing concern over excess sugar consumption and its impact on health, low-sugar biscuits are gaining traction. These biscuits are formulated with natural sweeteners, sugar substitutes, or reduced sugar content while maintaining flavor and texture.

**Key words:** *Biscuit Baking, dietary fiber, fortified*

## **BIOACTIVE COMPOUNDS IN SPICES: UNVEILING HEALTH BENEFITS, EXTRACTION TECHNIQUES, MECHANISM OF ACTION AND THEIR APPLICATIONS IN THE FOOD INDUSTRY**

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### **ABSTRACT**

This study looks at how to extract bioactive compounds from different spices and how they can be used in food, with a focus on the health benefits they offer. Spices contain many bioactive compounds like polyphenols and flavonoids as well as essential oils. Each of these compounds has its own unique properties that make them beneficial in terms of medicinal and nutritional benefits. This study looks at ways to extract and use bioactive compounds in food products to improve flavor and health benefits. The study reviews existing literature and performs experimental analyses to look at the various health benefits that can be derived from the consumption of spices. These health benefits include antioxidant and anti-inflammatory properties, as well as antimicrobial activity and potential improvements in cardiovascular health and metabolic health. The results suggest that there may be promising applications for bioactive compounds in the development of functional foods that meet consumer preferences for different and exotic flavors as well as provide tangible health benefits. In addition, the study delves into the bioactive compounds of spices and their role in food preservation to address issues of spoilage and naturally extend shelf life. The results of this study are intended to help the food industry create healthier, more sustainable products. This is in line with the growing consumer interest in natural ingredients with proven health benefits. In conclusion, this study contributes to the ever-changing world of functional foods and highlights the bioactive compounds derived from spices as valuable additives to our culinary and nutritional world.

**Keywords:** *Bioactive compounds, Spices, Food industry, Health benefits, Polyphenols, Flavonoids, Essential oils*

## **FOOD IRRADIATION: AN EFFECTIVE TECHNOLOGY FOR FOOD SAFETY AND PRESERVATION**

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### **ABSTRACT**

Irradiation is a non-thermal food preservation technique used to extend and enhance the shelf life of processed or fresh foods. It is a non-chemical, energy-efficient method that can help reduce significant losses caused by food deterioration and contamination by pathogenic bacteria and other parasitic life forms such as *Escherichia coli*, *Campylobacter* spp., and *Salmonella* spp. The process involves exposing food to a regulated amount of ionizing radiation, such as gamma rays from Cobalt-60 and Caesium-137 radioisotopes, X-rays from machine sources up to 5MeV, and accelerated electrons from machine sources up to 10MeV. This radiation can harm cells directly or indirectly by damaging the DNA molecules of microorganisms, disrupting their atomic structure, and subsequently halting their development. As irradiation destroys microorganisms without raising the temperature, it is also known as "COLD STERILIZATION." Depending on the dose of radiation absorbed, either alone or in combination with other preservation techniques, various effects can be achieved, including shelf life extension, sprouting and germination inhibition, disinfestation, and delayed ripening. There are three dosage levels in radiation: low (0-1kGy), medium (1-10kGy), and high (>10kGy). Irradiation does not make the food radioactive as the food does not come into direct contact with the radiation source. Irradiated food products are evaluated for food safety based on their chemical, nutritional, microbiological, and toxicological characteristics. In response to contamination concerns, the Joint FAO/IAEA/WHO Expert Committee on the Wholesomeness of Irradiated Food (JECFI) has set a maximum average dose of 10kGy to prevent any toxicological risks, nutritional and microbiological strain in foods. The FAO/WHO has labeled these irradiated food products with an international radura symbol for consumers to identify that particular food has undergone irradiation.

**Keywords:** *Irradiation, Radioisotope, Cold Sterilization, Preservation, Sprouting, Germination, Radura symbol*

## **NUTRITIONAL SCARCITY: ADDRESSING FOOD INSECURITY IN CONFLICT PRONE AREAS**

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### **ABSTRACT**

Achieving food security, eradicating hunger and malnutrition, and fostering sustainable agricultural practices, which are the aims of Sustainable Development Goal (SDG) 2, known as ‘Zero Hunger,’ are significantly reliant on the advancements in SDG 16, which focuses on fostering peaceful and inclusive societies. There are currently at least 238 million acutely food insecure people around the world, with global war and crisis being the major driving force of the shocking data. The Russia-Ukraine conflict has mainly impacted food systems by disrupting cereal and vegetable oil trade, halting fertilizer exports, and increasing energy

costs. In addition, a decline in Ukraine’s agricultural production has been a considerable contributing factor. The Hamas-Israel war has resulted in over 500,000 individuals in Gaza, facing food insecurity due to Israel’s restrictions in the blockaded area. Israel’s government delays the allowance of food at the border, which spoils the food before it enters Gaza, so food with longer shelf life is needed. A sustainable approach to farming, selecting crops which are drought resistant, faster to grow like millets, and heirloom plants can improve the overall nutritional vulnerability worldwide. Millets won’t only help in achieving the goal of “Zero Hunger” but combat the issue of Hidden Hunger which prevails in regions of Africa south of the Sahara and the South Asian subcontinent. With the use of technology in the food sector, like freeze-dried food packs offer a practical solution during food scarcity; they are lightweight, long-lasting, and easy to prepare, ensuring access to essential nutrients without the need for cooking or refrigeration. Building resilience to economic, environmental, and health shocks is required in conflict-affected areas.

**Keywords:** *Drought-resistant Crops, Freeze-dried Food Packs, Hidden Hunger, Sustainable Agriculture, Zero Hunger*

## **BIODIVERSE BANQUETS: DIVING INTO NATURE’S CULINARY TREASURY**

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### **ABSTRACT**

Food biodiversity is abundance of plants, animals and other organisms at species and genetic levels which can be utilised as food. FAO states that approximately 6,000 plant species can be grown for food but only a handful of crops like wheat, maize, rice determine 66% of our diet. However, an extensive array of locally grown wild plants is being used for sustenance by the indigenous people. Through technology, we have now entered an era of genetically engineered plants, which offer an increase in resistance to pests and unfavourable climatic conditions, along with added nutrition and flavour. Due to urbanisation, there has been an increase in the demand of meat products. India is the world’s third largest exporter of beef and 95% of goat meat produced is consumed locally. Depending on the region of the consumers, the consumption of meat products is greatly influenced, with chicken being the most accepted by the vast majority. Moreover, methods of cross breeding have been introduced to improve the availability and taste profile of the meat products. Additionally, it’s worth noting that the use of microorganisms for fermentation, has been harnessed by humans for thousands of years to develop food technologies for producing items such as cheese, bread, as well as beverages like wine and beer. As we navigate through the web of food biodiversity, harnessing both traditions and new technology is essential to ensure resilience and promote biodiversity.

**Keywords:** *Cross Breeding, Genetically Engineered Plants, Fermentation, Food Technologies, Urbanization*



## **FORTIFICATION OF STAPLE FOODS: AN URGENT NEED FOR SUSTAINABLE DIET**

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### **ABSTRACT**

Fortification of staple foods examines the complex relationship between juvenile malnutrition and low-resource environments, examining interventions that range from community-based education projects to nutritional supplementation programs. It explores the ways that healthcare infrastructure limitations, cultural variables, and socioeconomic determinants affect the prevalence of malnutrition. Furthermore, the subject explores cutting-edge strategies for preventing malnutrition, including bio-fortification, vitamin fortification, and therapeutic foods. Malnutrition in childhood is a serious worldwide health issue, especially in low-resource contexts where socioeconomic inequality and inadequate healthcare infrastructure amplify its effects. The multidimensional character of childhood malnutrition is examined in this abstract, with an emphasis on interventions, difficulties, and potential future paths. Utilizing an amalgamation of extant literature and empirical data, it delves into an array of Interventions that span from community-based education initiatives to nutritional supplementation programs, all geared towards tackling the underlying causes of malnutrition. Access to healthcare, cultural norms and socioeconomic factors all show up as important drivers of the prevalence of malnutrition. Though there are still obstacles to implementation, novel approaches including bio-fortification, micronutrient fortification, and therapeutic foods show promise in the fight against malnutrition. Obstacles The necessity for comprehensive, multi-sectoral responses is highlighted by factors such as maternal health inequities, inadequate access to clean water, and food insecurity. The significance of ongoing funding for nutrition-sensitive interventions and the inclusion of nutrition in larger development goals are emphasized in this abstract. Sustainable Development Goal 2: Zero Hunger and guaranteeing the holistic well-being of children in low-resource settings can be achieved in part by encouraging stakeholder collaboration and utilizing new knowledge.

**Key words:** *sustainability, Fortification, staple foods, biofortification*

## **FORTIFICATION OF CONFECTIONERY FOOD PRODUCTS TO COMBAT MICRO-NUTRIENT DEFICIENCY**

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### **ABSTRACT**

Millions of people worldwide, especially children in developing nations, are impacted by micronutrient deficiencies, which are mostly in vitamins and minerals. Even though they are sometimes rich in sugar and energy, confectionery items are low in vital micronutrients. In order to treat micronutrient deficiencies, this concept investigates the possibility of fortifying confectionery foods with essential micronutrients while taking acceptability, stability, and feasibility into consideration. A lack of certain micronutrients can cause stunted growth, poor cognitive development, and an increased risk of infections, among other health issues. The

goal of fortification methods is to minimize the impact on the product's taste, texture, and shelf life while taking into account the following factors: regulatory compliance, cost-effectiveness, sensory evaluation, nutrient selection, and fortification process. The following are the possible advantages: increased intake of micronutrients, especially for more susceptible populations. Potential interactions between nutrients and other components that could alter stability and bioavailability are among the many difficulties encountered. Technical restrictions on fortification techniques based on the product matrix and selected nutrients. Acceptance of fortified products by consumers, especially about modifications in flavour and texture. The long-term viability and financial viability of extensive fortification initiatives. Confectionery product fortification shows potential as an approach to address micronutrient deficiencies, but careful evaluation of several aspects is required. To maximize the influence on public health, guarantee product quality, and optimize fortification techniques, more research and development work is required.

**Key Words:** *fortified confectionery products, fortification, micronutrient deficiency*

## **CULTURED MEAT: AN OVERVIEW**

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### **ABSTRACT**

Cultured chicken, also known as lab-grown or cultivated chicken, represents a groundbreaking innovation in the field of alternative protein production. Cultured chicken is produced through cellular agriculture, a process that involves growing real meat from animal cells in a controlled environment outside the animal's body. The process typically begins with a small sample of animal cells obtained through a biopsy. These cells are then placed in a nutrient-rich medium where they multiply and differentiate into muscle tissue, replicating the texture and taste of conventionally farmed chicken meat. Its development holds significant promise for addressing various sustainability and ethical concerns associated with conventional animal agriculture. Furthermore, cultured chicken has the potential to revolutionize the global food system by providing a more efficient and sustainable source of protein. The purpose of this research is to explore the technology behind cultured chicken and its potential impact on various aspects of society. Furthermore, this paper aims to analyse the various challenges it faces in its widespread adoption. According to the United Nations the world's population is expected to exceed 9 billion by 2050, in this context cultured chicken could help alleviate this pressure by offering a scalable and resource-efficient alternative to traditional meat production. However, despite its potential benefits, cultured chicken faces several challenges, including regulatory approval, consumer acceptance, and scalability issues. Overcoming these challenges will require collaboration among scientists, policymakers, industry stakeholders, and consumers to ensure the successful commercialization and adoption of this innovative technology.

**Keywords:** *Cultured chicken, alternative-protein, cellular agriculture, innovative technology.*

## RECENT ADVANCEMENTS IN BEVERAGE INDUSTRY.

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### ABSTRACT

The beverage industry is currently undergoing a substantial transformation due to changing consumer tastes and innovative approaches. This study specifically investigates recent developments in the beverage sector, highlighting the remarkable ascent of both cocktails and mocktails. It delves into the dynamic realm of mixology, the art of crafting cocktails, as well as the creation of sophisticated non-alcoholic alternatives. The research explores the components, methods, and presentation styles that have contributed to the increasing popularity of these beverages. It emphasizes the pivotal role that cocktails and mocktails play in enhancing the overall beverage experience and their substantial influence on the industry's evolution, catering to a wide spectrum of preferences. This study offers valuable insights into how the beverage industry is adapting to the ever-changing consumer demands and the creative prospects within the mixology field. This research also delves into the unique and innovative process of crafting Guava Beer, which represents a fusion of traditional brewing methods and modern ingredients, using guava, barley, sugar, hops, honey, and lemon within an earthen pot as the primary vessel. It explores the interactions among these ingredients, the fermentation process, and the flavour profile of Guava Beer. By examining this distinctive beverage, this study sheds light on how it contributes to the diversification of the craft beer market within the context of recent advancements in the beverage industry. Furthermore, the use of an earthen pot as the brewing vessel adds a traditional dimension to this modern brewing process, emphasizing the harmonious integration of heritage and innovation in beverage production. This research highlights the potential of the craft beer industry, showcasing how ancient techniques can be seamlessly combined with contemporary flavours and ingredients, creating a truly unique and appealing beverage that aligns with the latest trends in the beverage industry.

**Key words:** *beverage, brewing, Guava Beer.*

## REGULATIONS AND STANDARDS OF ORGANIC FOOD

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### ABSTRACT

Organic food has become a symbol of healthy, sustainable, and environmentally friendly eating. However, this reputation hinges on a complex network of standards and regulations that ensure the integrity of the organic label. This review paper delves into the world of organic food, exploring the historical context, production standards, labelling and certification processes, global regulations, and the various challenges faced by the industry. It also examines the role of testing and verification methods in upholding these standards. The paper concludes by discussing the impacts of these regulations and speculating on future trends and developments in the organic food sector. The organic food industry has come a long way from its grassroots origins, and it remains a dynamic, evolving sector where standards and regulations are of paramount importance.

**Key words:** *global regulations, verification, evolving, labelling, certification.*

## **VITAMIN D-RICH DUMPLINGS: A HEALTHY PRODUCT FOR PREGNANT WOMEN**

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### **ABSTRACT**

Vitamin D deficiency is a prevalent issue affecting pregnant women, leading to various health risks for both the mother and the foetus. This study introduces an innovative, cost-effective dietary solution aimed at combating this deficiency through the culinary domain. We developed a unique recipe for dumplings, a popular food item, by incorporating vitamin D-rich ingredients such as oyster mushrooms and egg yolk, without using all-purpose flour, instead, cabbage leaves were used as a wrapping material. Cabbage leaves not only enhanced the nutritional content but also cater to gluten-sensitive individuals. The filling comprised a healthful blend of beans, carrot, egg yolk, mushroom, and capsicum, specifically chosen for their nutrient profiles beneficial to pregnant women. This research presents the development process and potential health benefits of these dumplings, emphasising their role in providing essential nutrients, particularly vitamin D, ensuring the product's feasibility for inclusion in the diet of pregnant women. This research supports the broader objective of improving health outcomes for mothers and their babies by addressing the dietary needs of pregnant women with palatable and readily accessible culinary options. It highlights the importance of incorporating nutritious and appealing food choices into pregnant women's diets to support their health and the developmental well-being of the foetus. Furthermore, this approach exemplifies how innovative food solutions can play a critical role in public health strategies aimed at reducing nutritional deficiencies during pregnancy.

**Keywords:** *Dietary intervention, Dumplings, Innovation, Nutrition, Vitamin D.*

## **DEVELOPMENT OF SAUSAGES USING PULSES**

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### **ABSTRACT**

High protein plant-based food such as moong dal, moth dal, urad dal, chana dal were used in the present investigation to develop vegan sausage. Five different combinations of pulses in which one was kept controlled were prepared from the above given pulses. The sample were analysed on weight loss, emulsion stability, colour, texture, and sensory properties. Among this T2 and T3 sample found better result for stability, colour, and texture. The sensory properties found best score for T2 followed by T3 and T1 sample respectively. The weight loss was gradually decreasing for T2 sample followed by T3 and T5 sample respectively. From the result it can be concluded that T2 and T3 samples has better possibilities for developing vegan sausage.

**Keywords:** *Colour, emulsion stability, protein, texture, vegan sausage, weight loss*

## **SUGAR REVOLUTION: EMBRACING ALTERNATIVES FOR HEALTHIER LIFESTYLES**

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### **ABSTRACT**

This abstract examines the necessary transition, known as the "sugar revolution," from traditional refined sugars' harmful health impacts to using alternative sweeteners as food additives. It draws attention to the connection between metabolic illnesses and excessive sugar consumption and highlights the pressing need for workable alternatives to reduce these risks. Examining the characteristics and advantages of both artificial and natural sweeteners, including erythritol, stevia, and monk fruit extract, it highlights how they can be sweetened without having the negative health impacts of regular sugars. In order to encourage better lives and lessen the impact of diet-related diseases on public health, it promotes the incorporation of alternative sweeteners into food formulations, addressing issues including taste, texture, and regulatory requirements. In conclusion, this abstract advocates for a paradigm shift in the use of sugars as food additives, urging food manufacturers to embrace healthier alternatives in their product formulations. By prioritizing the adoption of alternative sweeteners, the food industry can contribute to promoting healthier lifestyles and reducing the burden of diet-related diseases on public health.

**Key words:** *sugar revolution, food additives, sweeteners*

## **3D FOOD PRINTING USING EXTRUSION-BASED TECHNIQUE FOR FRUITS AND VEGETABLES**

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### **ABSTRACT**

A cutting-edge technology for the food business, 3D printing offers enormous potential for creating personalized and customized nutrition for food products made mostly of fruits and vegetables. Numerous studies have focused on the creation of printable ink, print stability, and quality standards. This review seeks to examine the prospects and discuss the latest developments in 3D food printing for fruits and vegetables. The method most frequently employed in 3D printing is extrusion-based because of its many benefits. The study looks at three categories of extrusion printing: gel-forming extrusion, room-temperature extrusion, and fused deposition manufacturing. This review piece compiles the advancements made over the last few years in the field of 3D food products made from powdered fruits and vegetables. The inference drawn from these findings is that the production of 3D and even 4D food products has been accomplished with the help of fruits and vegetables. Pre- and post-processing technique improvement will require further research. Though further study is needed in this field, 3D printing can also be used to create functional food.

**Keywords:** 3D Printing, Fruits and Vegetables, Extrusion.

## APPLICATION OF ARTIFICIAL INTELLIGENCE IN FRUITS AND VEGETABLES INDUSTRY

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### ABSTRACT

Currently, majority of the food processing industries are primarily focused on food quality, nutritional value, and processing technique as consumers are demanding for foods that are in line with the products' qualities, sensory appeal, and shelf life. Technology advancements in machine learning (ML) and artificial intelligence (AI) are beneficial in this field to gauge the drifting problems with food processing equipment and techniques. AI is a multidisciplinary, promising strategy that can be used to improve performance across the food industry. Significant adjustments were made to address issues and expand the food industries. Mainly fruits and vegetable losses are increasing due to improper processing conditions and handlings. These losses can be managed by applying artificial intelligence in the fruit and vegetable industry in sectors such as sorting, grading, washing etc which minimizes losses. This study aims to understand the application of different artificial intelligences algorithm's and techniques in fruits and vegetable industry. It also includes fuzzy logic , machine learning and Artificial neural networks algorithms which are in prime use in fruit and vegetable industry.

**Key words:** AI in food industry, AI in fruit, ANN, Fuzzy logic, Machine learning.

## EFFECTS OF BIOSTIMULANTS ON HORTICULTURE CROPS

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### ABSTRACT

Biostimulants have garnered a lot of attention recently due to their application in horticulture, where they can increase crop growth, yield, and stress tolerance. A wide range of compounds known as biostimulants are obtained from natural sources and when given to plants, they cause physiological reactions that enhance their abilities. Biostimulants include proteins, enzymes, amino acids, minerals, and extracts from seaweed. The word “biostimulants” is also frequently used to refer to natural stimulants, such as protein hydrolases, phenols, salicylic acid, humic and fulvic acids etc. The biostimulants work in a number of ways that influence hormone regulation, stress alleviation, nutrient absorption and plant metabolism. Bio stimulants stimulate biochemical pathways that boost root growth, nitrogen uptake, and overall plant vigour by interacting with physiological processes in plants. They also encourage the production of endogenous compounds such as phytohormones and antioxidants, which offer resilience to harsh environmental conditions like drought, salt, and extreme heat. Studies have demonstrated that the application of biostimulants can lead to



increased germination rates, quicker seedling development, and improved fruit set and flowering. Furthermore, in plants treated with biostimulants, fruit quality attributes such as size, colour, flavour, and nutritional content improve. These effects are particularly pronounced in crops like grapes, strawberries, tomatoes, peppers, cucumbers, and peppers that have shown significant agronomic benefits from biostimulant sprays. Numerous agrochemical applications are necessary for the production of horticultural crops. The ability of biostimulants to reduce reliance on synthetic fertilisers and agrochemicals is highlighted as a key component of their significance in sustainable agriculture practices. Because they promote healthy soil and efficient nutrient utilisation, biostimulants decrease the adverse environmental effects of conventional farming practices and help preserve natural resources. One practical strategy for increasing crop output in horticulture and strengthening crop resilience to changing environmental conditions is the use of biostimulants.

**Keywords:** *Biostimulants, horticulture crops, humic acid, fulvic acid.*

## **INCORPORATION OF RAW BANANA PULP POWDER FOR MANUFACTURING GLUTEN FREE NOODLES TO OVERCOME GLUTEN INTOLERANCE AND ENHANCE FUNCTIONAL PROPERTIES.**

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### **ABSTRACT**

The emerging demand for gluten free products for people with celiac issues led to significant technological research and analysis on replacement of gluten products. The proportion of gluten free products compared with gluten products is less in market. However, gluten plays an important role in dough formation and elasticity, replacements of them in bakery products is quite challenging. Considering the above cited facts, the project was planned to develop gluten free noodles. Noodles are most popular snack among consumers. They are gaining significant attention in global market. Incorporation of various organic supplements and additional benefits creates a wider opportunity. The project focused on developing raw banana (*Musa ananalu*) incorporated noodles. The main objectives of the project was to study the effect of blanching raw banana, study the drying characteristics of raw banana, compare the effect of grinding in a mixer grinder and a pulverizer & to develop different formulation and compare the difference between gluten and gluten free banana incorporated noodles. Six batches of noodles were prepared. The first batch was taken as control (without banana powder). Following batches were added with banana powder with 10, 20, 30, 40, 50 percentages along with *rice flour (Oryza sativa)* and *xanthan gum*. All these were prepared at room temperature. It showed that even without gluten a proper dough was developed and was extruded into noodles using simple noodle maker. Extruded noodles were then dried at 80 degree Celsius for one hour. This study aims to incorporate health benefits of raw banana like its probiotic nature due to resistant starch content to develop gluten free noodles.



**Keywords:** *Extrusion, Gluten free products, Gluten products, Xanthan gum.*

## **RODUCTION OF ACTIVE VITAMIN B12 RICH NUTRIMIX THROUGH FERMENTATIVE FORTIFICATION**

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### **ABSTRACT**

Vitamin B12 plays an important role in human body in building healthy neural system, formation of red blood corpuscles, synthesis of DNA and normal brain function. B12 deficiency causes megaloblastic anaemia, neuropathy and increased risk of heart attack. Natural occurrence of B12 is restricted to foods of animal origin. Indian population, with largely vegetarian food habit, is more prone to harbour deficiency of B12. Hence, affordable and sustainable dietary sources of B12 are needed to be developed to ensure sufficient intake of B12. Ready to use foods and premixes are widely accepted by the population of all age groups and they could be most ideal vehicle to assist in nutritional rehabilitation of essential nutrients. Millets contains good amount of riboflavin and niacin, which acts as precursor for 5,6- dimethylbenzimidazole (DMBI) production. The active vitamin B12 production capacity of *P. freudenreichii* depends on the availability of the DMBI. *P. freudenreichii* inoculated into the medium containing sorghum and milk solids based and incubated at set conditions resulted in production of active B12 upto 6µg/g in the fermented base. The optimization of vitamin B12 rich composite nutrimit was carried out using D-optimal mixture design technique, using Fermented base, cereal malt and sugar as components and evaluated for sensory and reconstitution properties. The ready to reconstitute nutrimit developed recorded Vitamin B12 content of 3µg/g of powder, 13.5% protein and 2.19% fat.

**Keywords:** *Vitamin B12, harbour deficiency, dimethylbenzimidazole (DMBI)*

## **DEVELOPMENT OF ANTI-DANDRUFF SHAMPOO CONTAINING AROMATIC VOLATILE OIL AND EXTRACTS FROM THAI MEDICINAL PLANTS**

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### **ABSTRACT**

The objective of this research was to develop the anti-dandruff shampoo containing extracts and aromatic volatile oil from medicinal plants. Five samples were selected including Clove

Bud oil, Som Poi extract, Turmeric, Kaffir lime oil and Lemongrass oil. Inhibition of *Malassezia furfur* by disc diffusion method indicated that the clove oil gave the highest activity with the inhibition zone of  $21.00 \pm 0.35$  mm at 2.00 mg, while ketoconazole gave the inhibition zone of  $30.74 \pm 0.67$  mm at 0.2 mg. Clove oil which gave the highest inhibition zone, turmeric oil which has the anti-inflammation activity and Som Poi extract which has the rinsing activity from the previous studies were mixed at 2:1:1 weight ratio to put in the developed shampoo base at 0.5, 1.0, 2.0 and 4.0%w/w. The pH values of all shampoo formulations were in the range of 4.68 - 6.80. The pH values of the shampoo decreased when the amounts of the mixed extracts/oil were increased. The viscosity of the shampoo was in the range of 19,667 - 19,860 mPa.s. For the foaming test at 0 - 40 mins, the shampoo base gave the highest volume of foam while the shampoo containing 4.0%w/w of the mixed extracts/oil gave the lowest volume of foam. For the accelerate stability testing by heating and cooling for 6 cycles, the physical stability, pH and viscosity of the shampoo base and the 4 shampoo formulations containing the mixed extracts/oil did not change when compared with at initial time. The shampoo containing 1.0%w/w of the mixed extracts/oil was selected to test for *Malassezia furfur* inhibition activity in comparing to the mixed extracts/oil, the shampoo base and the commercial Nizoral shampoo. The developed shampoo (1%w/w of the mixed extracts/oil) gave 25.04%, while the mixed extracts/oil gave 81.54% inhibition activity of the standard Nizoral anti - dandruff shampoo. For the satisfactory test of the developed shampoo on 30 human volunteers, it indicated that the average satisfaction scores were at 4.44 out of 5.00 with the standard deviation of 0.51 which was the level of very good satisfaction. The estimated cost of the developed shampoo was about 500 Bath per kilogram, which was competitive to the commercial available anti-dandruff shampoo in the market of 4 folds lower cost than the commercial product. This developed shampoo will be an acceptable anti- dandruff shampoo for the consumers because of its natural active contents.

**Keywords:** Anti-dandruff Shampoo, Essential Oil Extract, Clove (*Syzygium aromaticum* L.), Turmeric (*Curcuma longa* L.), Som Poi (*Acacia concinna* (Willd.) DC.)

## DEVELOPMENT OF ANTI-ACNE CLEANSING GEL CONTAINING SAPPAN WOOD (*CAESALPINIA SAPPAN*) EXTRACT

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### ABSTRACT

The objective of this research is to develop a safe and effective anti-acne cleansing gel containing Sappan Wood (*Caesalpinia sappan*) extract. The percentage yields of the extract using 2 extraction methods, Soxhlet and maceration were compared. The extract from Soxhlet extraction method using water-based solvent with the yield of 7.82% was selected for further development of gel-base formulation. The antioxidant activity of the selected extract was lower than Vitamin C of 8.5155 times. Only 2% of the extract was selected to use in the formulation. The formulated gel was tested for stability by the heating and cooling method. It

was found that the gel did not show any change of odor, color, pH and separation. Then, for the irritation test in 10 volunteers, no irritation was observed, but with overall moderate satisfaction. Most of them satisfied with the cleansing property. For anti-acne study, The incidence of acne were decreased to a certain level. The result of their study have high potential to be a commercial product.

**Keywords:** *Anti-acne, Cleansing Gel, Sappan Wood, Extract*

## DEVELOPMENT OF ANTI-INFLAMMATORY AND ANTI-ACNE SERUM CONTAINING *ZINGIBER OTTENSII* VALETON EXTRACT

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### ABSTRACT

The aim of this study was to develop an anti-inflammatory and anti-acne serum containing *Zingiber ottensii* Valeton extract. *Z. ottensii* was extracted with 95 % ethanol by the hot and cold processes. The appearance of the extracts is semi-solid, dark yellow with specific odor. The hot and cold extracts had the % yield of 3.41 and 1.17 respectively. The % yield of the hot extract was higher than the cold extract. From the phytochemical testing of the *Z. ottensii* extracts, it found that the hot extract contains alkaloids and tannins, while the cold extract contains anthraquinones. For anti-inflammatory activity and antibacterial activity against *Cutibacterium acnes*, the hot extract gave higher anti-inflammatory activity than the cold extract. However, the hot extract gave lower anti-acne activity than the cold extract. The extract was selected by scoring. The cold and hot extract got 275 and 300 scores from the total score of 350, respectively. Therefore, the hot extract was selected for the further development as an anti-inflammatory and anti-acne serum. From the development of 3 serum bases, it was found that after the stability test by the heating-cooling of 6 cycles, the best serum base formula No.3 gave the best stability with good texture and had the pH value of 6.12. The best serum base was mixed with the *Z. ottensii* hot extract in 3 different concentrations (0.50, 1.00 and 2.00% (w/w)) and performed the stability test by the heating-cooling test for 6 cycles. After the stability test, the best serum containing 1.00% (w/w) of the *Z. ottensii* extract was selected because it had the best color odor and texture. The selected *Z. ottensii* serum was investigated for bioactivities in comparing with the serum base and the standards. It found that the *Z. ottensii* serum demonstrated anti-inflammatory activity. It can inhibit the denaturation of albumin with the IC<sub>50</sub> value of 8.79±0.26 mg/ml which was 0.05 time of the standard anti-inflammatory drug (diclofenac diethylammonium) (IC<sub>50</sub> at 0.41±0.006 mg/ml), while no anti-inflammatory activity was detected in the serum base. From the antibacterial activity against *C. acnes* of the *Z. ottensii* serum and the serum base compared with the standard drug, clindamycin by the disc diffusion method, both serums gave no antibacterial activity against *C. acnes*. For skin irritation test in human volunteers, it showed no skin irritation. The estimated cost of the *Z. ottensii* extract and *Z. ottensii* serum were 22,663.24 and 369.88 Baht per kilogram, respectively. This research work can be used for the further development of an anti-inflammatory and an anti-acne cosmetic product.

**Keywords:** *Zingiber ottensii Valetton Extract, Zingiber ottensii Valetton Serum, Anti-inflammatory, Anti-acne*

## **DEVELOPMENT OF SKIN WHITENING CREAM CONTAINING EXTRACT FROM PEEL OF RIPE MANGO (*MANGIFERA INDICA* L.)**

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### **ABSTRACT**

The objective of this study was to develop skin whitening cream containing extract from ripe mango peel. The peels of three varieties of the ripe mangoes including Nam Dok Mai, Maha Chanok and Choke Anan was selected to prepare the extracts by the hot and cold processes. The hot process was by the reflux condenser, while the cold process was by maceration with two solvents including water and ethanol 95 %. Twelve extracts were obtained. The extract from the mango peel of Maha Chanok gave the highest yield of 60.45 %. For biological activity, the extract from Nam Dok Mai by hot and cold ethanol exhibited the highest free radical scavenging activity with SC<sub>50</sub> value of 0.02±0.00 mg/ml, the same as that of the standard vitamin C. The extract from peel of mango Maha Chanok by cold ethanol gave the IC<sub>50</sub> value of 0.07±0.01 mg/ml of 3.5 folds of the standard kojic acid. The extract from peel of mango Maha Chanok by cold ethanol was selected and 2 % was selected to incorporated in the whitening cream. The developed whitening cream was physically stable when tested by heating-cooling for 6 cycles. The cream gave no skin irritation on human skin and demonstrated whitening effects by color strip test on forearm in 80% (8 in 10 volunteers) 10 healthy female volunteers (age 18-28 years old), after application for 28 days. This research cannot only increase the value of peels which are waste of mango, but also being able to the high efficient and safe skin whitening cream from mango peels as well.

**Keywords:** *Skin Whitening, Cream, Ripe Mango Peel, Extract*

## **DEVELOPMENT OF ANTI-WRINKLE CREAM CONTAINING EXTRACT FROM FRUIT OF JAMAICAN CHERRY (*MUNTINGIA CALABURA* L.)**

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### ABSTRACT

The purpose of this study was the development of anti-wrinkle cream containing extract from fruit of Jamaican Cherry (*Muntingia calabura* L.). Fruit of Jamaican Cherry was extracted with 95 % ethanol and water by the hot and cold processes. From the processes of extraction, there are 4 samples of Jamaican Cherry extracts including hot water, cold water, hot ethanol and cold ethanol extracts. The appearance of all extracts is brown and yellow-gold semi-solid. The highest % yield is the Jamaican Cherry extracted by cold water of 41.00%. From the anti-oxidant activity test by DPPH radical assay, the result showed that the Jamaican Cherry extracted by hot ethanol gave the highest anti-oxidant activity (the SC<sub>50</sub> value of 0.07±0.01 mg/ml), which was 0.43 times of vitamin C (SC<sub>50</sub> = 0.03±0.01 mg/ml). Moreover, all samples were tested for tyrosinase inhibitory activity by Dopachrome method. It showed that the Jamaican Cherry extracted by hot ethanol gave the highest tyrosinase inhibitory activity (IC<sub>50</sub> value of 5.29±1.38 mg/ml), which was 0.0013 times of the standard whitening agent, kojic acid. The best extract was selected by scoring. The Jamaican Cherry extracted by hot ethanol gave the highest score of 950 from the total of 1,200. Therefore, the Jamaican Cherry extracted by hot ethanol was selected for the further development as an anti-wrinkle cream. From the development of 3 cream bases, after the stability test by the heating-cooling of 6 cycles, the best cream base formula No.3 (F3) was selected, because it gave good stability and viscosity. The selected cream base formulation was mixed with the Jamaican Cherry extract at 4 different concentrations of 3, 1.5, 0.75, and 0.5% (w/w) and performed the stability test by the heating-cooling test for 6 cycles. After the stability test, the best cream containing the Jamaican Cherry extract of 0.75% (w/w) was selected, because it gave good color of cream, and good feeling of use and texture on the skin. Therefore, this selected cream before and after stability test by the heating-cooling test for 6 cycles were investigated for anti-oxidant activity test by DPPH radical assay. The result showed that the cream containing the Jamaican Cherry extract before the stability test gave the free radical DPPH scavenging with the SC<sub>50</sub> value of 331.75±18.35 mg/ml (0.0001 times of vitamin C). On the other hand, cream containing the Jamaican Cherry extract after the stability test and the cream base gave lower free radical DPPH scavenging activity than the cream containing the Jamaican Cherry extract before the stability test. Moreover, cream containing the Jamaican Cherry extract before and after the stability test gave tyrosinase inhibitory activity with the IC<sub>50</sub> value of 21.38±1.59 and 26.49±1.59 mg/ml (0.0008 and 0.0006 times of kojic acid), respectively. For skin irritation test of the selected cream in 10 human volunteers, it showed no skin irritation. From the volunteer satisfaction test by the questionnaire of 50 human volunteers, it showed that all products got the mean score of satisfaction after application for 4 weeks of 4.29 which in the level of high satisfaction. For the efficacy of the cream tested in 50 human volunteers by the questionnaire, the selected cream was more effective significantly (*p-value* < 0.05) in reducing wrinkles than enhancing whitening. The estimated cost of the selected cream extract was 199.19 Baht per kilogram. When compared with the similar product in the market that received the most reviews from the volunteers who answered the questionnaire, the selected cream had the cost lower than the brand in the market of 48.05 times. This research work shows the potential of extracts from Thai plants, which will be possible for the further development of an anti-wrinkle cosmetic for commercialization

**Keywords:** *Jamaican Cherry Extract, Cream with Jamaican Cherry Extract, Anti-wrinkle Cosmetics*

## THE DEVELOPMENT OF WHITENING LOTION CONTAINING RUBBER (*HEVEA BRASILIENSIS* L.) SEED EXTRACT

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### ABSTRACT

Rubber trees are the economic crops of Thailand that are widely grown in every region. Rubber trees have parts of rubber seeds that fall rich in season, that is has a large amount causing decay over time. Rubber seeds contain linoleic acid, which it can be inhibits tyrosinase enzyme; it is an enzyme that causes of melanin pigment under the skin, so it is causes of dark skin. Aims of this studies are extraction the important substances in rubber seeds by 2 methods: Maceration and soxhlet extraction, and used 2 solvents: hexane and ethanol 95%. Crude extract was tested antioxidant activity and tyrosinase inhibition activity. Produce UV-Spectrum fingerprint to study Linoleic acid. After that developed lotion with a mixture of rubber seed extracts by tested antioxidant activity and tyrosinase enzyme inhibition activity. The result of extraction by soxhlet extraction with ethanol 95% obtained the highest %yield; it was 8.04% and have highest %DPPH inhibition at 68.03 mg/ml at a concentration of 5 mg/ml and have %tyrosinase inhibition 72.05 mg/ml at a concentration of 2.5 mg/ml. UV-Spectrum fingerprint of crude extract 4 samples showed that the absorbance at 210 nm found Linoleic acid. 2 lotion formulations was developed by stability test in heating and cooling testing 6 Cycles; temperature at 4 degrees Celsius and 45 degrees, and just only 1 lotion formulation was perfectly after test stability. After that, developed lotion formulation contained 3 ratio of rubber seed extract, which are 1.0%, 1.5% and 2.0% of extracts, and test stability in heating and cooling testing of 6 Cycles; temperature at 4 degrees Celsius and 45 degrees and have to test antioxidant activity (%DPPH inhibition) and tyrosinase enzyme inhibition activity before and after. The result showed that lotion formulation composed of 2% of rubber seed extracts; it was highest % DPPH inhibition 64.75 mg/ml and tyrosinase enzyme inhibition activity 46.10 mg/ml at a concentration of 5 mg/ml. So, Lotion contained 2% of rubber seed extract has Linoleic acid and antioxidant activity and tyrosinase enzyme inhibition activity, including to showed the stability of biological activity.

**Keywords:** Whitening Lotion, Rubber, Seed Extract

**DEVELOPMENT OF ANTI-ACNE AND WHITENING GLYCERINE SOAP CONTAINING EXTRACTS FROM MANGOSTEEN PEEL (*GARCINIA MANGOSTANA* L.) AND LACUCHA WOOD (*ARTOCARPUS LACUCHA* ROXB.EX BUCH.-HAM.)**

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**ABSTRACT**

The objective of this study was to develop a glycerin soap containing extracts from Mangosteen Peel (*Garcinia mangostana* L.) and Mahad wood (*Artocarpus lacucha* Roxb.ex Buch. - Ham.). The 5 soap base formulations were developed. All formulations were in solid appearance. The surface was smooth and did not have any water droplets on the surface. The pH value was between 9.40-9.70. All soap base (SB1, SB2, SB3 and SB4) had the solubility value of 15.00±0.58 to 68.00±2.65 mins and the foam content of 6.93±0.15 to 8.87±0.15 cm, which were the appropriate values. When tested for physical stability in the accelerated conditions by the heating-cooling for 6 cycles, the soap bases of SB1 and SB3 were physically stable under accelerated conditions. The color and clarity of the soap bar remained unchanged. No melting and no water droplets were observed on the surface of the soap. Therefore, SB1 and SB 3 were used to prepare the soap products containing the extracts from Mangosteen peel and Mahad wood at 3 different concentrations, 0.1, 0.2 and 0.3% w/w (of each extract) at the ratio of 1:1. All 6 formulas were tested for pH values which were in the range of 9.30-9.80. From heating-cooling test, the soap mixed with the extract formula of SE1.1 was selected because the color and clarity of the soap bar remained unchanged, no melting and no water droplets on the surface. The solubility value of this soap was 55.00±1.00 min and the bubble volume was 8.00±0.10 cm. It also inhibited *C. acnes* bacteria at the amount of 2 mg and slightly inhibited tyrosinase. The developed soap base and the soap product containing 0.1% w/w Mangosteen peel and 0.1% w/w Mahad wood extract did not show any skin irritation by the close patch test and can enhance skin whitening effect when daily applied for one month in 10 human volunteers when evaluated by Cutometer® dual MPA 580. This study has indicated that Mangosteen peel and Mahad wood extract can be developed as a commercial potential glycerin soap for acne and skin whitening.

**Keyword:** Glycerin Soap, Mangosteen Peel Extract, Mahad Wood Extract, Anti-acne, Skin Whitening



## DEVELOPMENT OF SKIN WHITENING CREAM CONTAINING INDIAN GOOSEBERRY (*PHYLLANTHUS EMBLICA* L.) FRUIT EXTRACT

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### ABSTRACT

The purpose of this research was to develop a skin whitening cream containing extracts from Indian gooseberry (Makhampom) fruits extract. The good quality Makhampom fruit was selected and dried. The extracts were prepared by ultrasonic sonicator using 95% ethanol as a solvent. The highest percentage yield was 16.7%. When testing the biological activity of the extract, it was found that the extracts of Makhampom by 95% ethanol gave high free radical activity, the same effectiveness as the standard vitamin C. The whitening cream containing 3.5% of the Makhampom was developed. The cream gave good physical stability when tested by the heating and cooling method of 6 cycles. When tested for irritation in 5 human volunteers, on the inner forearm, it was found that all volunteers had no swelling, redness, and itching of the skin. This research, in addition to bringing the emblica, which is a fruit that has been applied as fruit and food supplement for diabetes to a value added whitening cosmetic.

**Keywords:** Skin Whitening, Cream, Indian Gooseberry, Extract

## DEVELOPMENT OF ANTI-ACNE CREAM FROM EXTRACTS OF THAI SPICES

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### ABSTRACT

The objective of this research was to develop the anti-acne cream against *Propionibacterium acnes* from Thai spices including Chinese celery (*Apium graveolens* L.) seeds, Best cardamom (*Amomum verum* Blackw.) fruits and Cinnamon (*Cinnamomum bejolghota* (Buch.-Ham.) Sweet) bark. The spices were extracted with hot methanol using Soxhlet apparatus. The highest percentage yield of 17.20% w/w was observed in cinnamon bark. The three crude extracts were tested for antibacterial activity against *P. acnes* by Disc diffusion method. It was found that cinnamon bark extract at 2.00mg and 6.83 mg had inhibitory activity with the inhibition zone of 8.46±0.48 and 15.21±0.20 mm, respectively. Best cardamom fruits extract showed no inhibitory activity on *P. acnes*. Chinese celery seeds

extract at 8.23 mg gave inhibition zone of  $10.04 \pm 0.99$  mm. The standard antibacterial drug, clindamycin at 0.002 mg gave the inhibition zone of  $38.32 \pm 1.07$  mm. Therefore, cinnamon bark extract was selected to incorporate in the cream base at the concentration of 2% w/w. The developed cream containing 2% w/w cinnamon bark extract was tested for stability by heating - cooling method for 6 cycles. The developed cream showed good physical stability. For skin irritation in volunteers, no skin irritation was observed. This study demonstrated the commercialization potential of the developed cream formulation containing 2% w/w of cinnamon bark extract as an anti - acne product.

**Keywords:** *Chinese Celery (Apirum graveolens L.) Seeds, Cardamom (Amomum verum Blackw.) Fruits, Cinnamon (Cinnamomum bejolghota (Buch.-Ham.) Sweet) Bark, Propionibacterium acnes, Anti Acne, Thai Spices*

## DEVELOPMENT OF ANTI-AGING SERUM CONTAINING THAI MEDICINAL PLANT EXTRACT

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### ABSTRACT

The objective of this term project was to develop anti-aging serum containing medicinal plant extract from five medicinal plants, Swamp algae (*Wolfia arrhiza* (L.) Horkel ex Wimm.), Tao (*Spirogyra spp.*), Cowslip. (*Houttuynia cordata* Thunb.), Shallot (*Allium ascalonicum*) and Som Poi (*Acacia concinna*). Five plants were extracted by maceration with 95% ethanol at room temperature for 48 hours. The crude extracts of 5 plants were determined for antioxidative activity by using DPPH assay method and compared with vitamin C (IC<sub>50</sub> equal to 0.013 mg/ml) as a standard. Three plants showed antioxidative activity; which were Sompoi (IC<sub>50</sub> equal to 0.335 mg/ml) Swamp algae (IC<sub>50</sub> equal to 0.584 mg/ml) and shallots (IC<sub>50</sub> equal to 2.933 mg/ml), with the potency of 0.039, 0.022 and 0.004 folds of vitamin C, respectively. The Sompoi extract which showed the highest antioxidative activity was chosen to develop anti-aging serum containing 0.5% w/w of Sompoi extract. The anti-aging serum was tested for stability by using heating-cooling method for 6 cycles. The serum showed good physical properties. Closed patch test method was performed in 5 volunteers for allergic and irritation test. No allergies and irritation on the skin compared with non-serum applied area. However, the standard SLS 15% that applied on the skin caused of skin allergies and erythema. The estimated cost of 1 kilogram of antiaging serum composed of 0.5% (w/w) Sompoi extract was 772.10 Baht. This study showed that serum anti-aging containing 0.5 (w/w) Sompoi extract was stable and safe to use in human skin.

**Keywords:** *Anti-aging, Serum, Thai medicinal plants, Extract*

## DEVELOPMENT OF ANTI-INFLAMMATORY AND ANTI-ACNE SERUM CONTAINING EXTRACTS FROM CLOVE (*Syzygium aromaticum* (L.) Merr. & L.M. Perry) AND MARIGOLD (*Tagetes erecta* (L.))

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### ABSTRACT

This research aims to develop an anti-inflammatory and anti-acne serum containing extracts from clove and marigold flowers. The samples of dried clove and marigold were extracted with 95% ethanol using both reflux (hot extraction) and maceration (cold extraction) methods. The extracts were semi-solid, semi-liquid characteristics with brownish-yellow color and the distinctive aroma of clove and marigold. The highest yield, at 40.00%, was obtained from the hot extraction method. Biological activity testing revealed that the clove and marigold extracts, both from hot or cold extraction, did not have any anti-inflammatory activity in the *in vitro* experiments, in comparing to the standard drug diclofenac diethylammonium. However, both hot and cold extracts demonstrated inhibition of *Cutibacterium acnes*. The hot extraction showed higher inhibition, with an inhibition zone diameter of 20.04±0.80 mm compared to the standard drug clindamycin. The serum base formulas were developed with 3 formulations and tested for stability by heating-cooling cycles. Formula S2 emerged as the most physically stable serum by having good absorbency and non-sticky texture. Three serum formulations with varying concentrations of the clove and marigold mixture extracts (A1 = 0.1%, A2 = 0.5%, A3 = 1.0% w/w) were developed and tested for stability. Although all 3 formulations displayed good physical characteristics, none of them showed inhibition of *Cutibacterium acnes* and anti-inflammatory activity in comparison to clindamycin and diclofenac diethylammonium. Further refinement led to the selection of formula A3 (1.0% w/w) as the most concentrated extract and stable option for serum development. Skin closed patch tests on 10 volunteers showed no irritations, and satisfaction surveys with 20 participants resulted in an average score of 4.55 out of 5 after four weeks of application. Considering the cost effectiveness, the production cost of 1 kilogram of the serum was 393.55 Thai Baht, translating to 0.39 Baht per gram. Comparatively, this serum's cost is significantly lower (approximately 40.18 times) than the commercially available creams. This research demonstrates the commercialization potential of the Thai herbal extracts plants, for the future developments to skincare industry.

**Keywords:** Clove Extract, Marigold Extract, Anti-acne Serum, Anti-inflammatory Serum

## DEVELOPMENT OF A WHITENING GEL CONTAINING BITTER CUCUMBER (*MOMORDICA CHARANTIA* L.) FRUIT EXTRACT

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### ABSTRACT

Bitter Cucumber (*Momordica charantia* L.) is a popular vegetable used to treat diabetes. This plant contains polyphenols and flavonoids which can inhibit tyrosinase enzyme and has an anti-oxidant effect. This research has therefore studied and developed a whitening gel product containing extract from Bitter Cucumber. As fruit were extracted with 2 solvents including distilled water and 95% ethanol, using 2 extraction methods, maceration and heating. The ratio of 30 grams of Bitter Cucumber to 400 milliliters of the solvent were used. It was found that the maceration method with distilled water gave the highest yield of 73.63%. For the antioxidant test by DPPH Assay method, the extract, by maceration with 95% ethanol, showed the ability to capture free radicals, with high IC<sub>50</sub> of 2.866 mg/ml 0.0342 times or 3.42% of Vitamin C. For the determination of total flavonoids, it was found that the extracts by maceration with 95% ethanol indicated high total flavonoids of 0.0194 milligrams in 1 milligram extract. This extract was selected to test for tyrosinase inhibition. The tyrosinase enzyme inhibition with the IC<sub>50</sub> value of 0.450 mg/ml was observed. It gave the potency of 0.87 times or 87.77% of Kojic acid. After that, 2 gel formulations were prepared and tested for physical stability under accelerated conditions by heating and cooling test, for 6 cycles. Both gel formulations, showed good physical stability and formulation No.2 was selected to develop as a whitening gel containing the extract. Compared to Kojic acid, 3.5% w/w of the extract was added. This developed formulation gave the pH of slightly lower than before the heating and cooling test, but still having 99.69% inhibition of tyrosinase enzyme.

**Key words:** Bitter Cucumber fruit, tyrosinase inhibition, gel, whitening cosmetic

## DEVELOPMENT OF WHITENING GEL CONTAINING PLANT MUCILAGE EXTRACT

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### ABSTRACT

The objective of this study was to develop a whitening gel containing extract from plant mucilage. By selecting 5 plants which were okra (*Abelmoschus esculentus* (L.) Moench), Malabar spinach (*Basella alba* L.) Hairy basil (*Ocimum africanum* Lour.) banana (*Musa*

*sapientum* L.) and zucchini (*Luffa acutangula* L.). The plant sample were swollen at the room temperature and 80 degrees Celsius, and precipitated with 95% ethanol. Ratio of 50 g plant per 500 ml of water at the room temperature and 80 °C. The mucilage was separated by filtering with a thin white cloth. The mucilage was precipitated with 95% ethanol and left it overnight and dried by Rotary evaporator, then dried in Hot Air Oven. The extracts were tested for antioxidant activity and tyrosinase inhibitory activity. The extracts that have the highest antioxidant activity are Okra extracted at room temperature with the IC<sub>50</sub> value of 0.12 mg/ml. For the tyrosinase inhibition activity okra extract, (room temperature,) showed IC<sub>50</sub> value of 2.36 mg/ml. The skin whitening gel containing 18% of okra extract showed no irritation and hypersensitivity in volunteers.

**Key words:** Okra (*Abelmoschus esculentus* (L.) Moench), Spinach (*Basella alba* L.), Basil (*Ocimum africanum* Lour,) Banana (*Musa sapientum* L.) and *Luffa acutangula* (L.), white skin

## DEVELOPMENT OF ANTI-AGING SERUM CONTAINING EXTRACTS FROM HYBRID FLESH PASSION FRUITS (*PASSIFLORA EDULIS*)

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### ABSTRACT

This research aimed to develop an anti-aging serum product containing from hybrid flesh passion fruits from 2 sources including Mae Chaem District, Chiang Mai Province and Wiang Pa Pao District, Chiang Rai Province. The extracts were prepared by two solvents including 95% ethanol and water by maceration method at the ratio of the passion fruit flesh to the solvent of 1:4. The extract from Mae Chaem District by ethanol gave the % yield of 14.99%, and the extract by water gave the %yield of 12.85%. The extract from Chiang Rai by ethanol gave the %yield of 15.71% and the extract by water gave the %yield of 17.08%. After that, the DPPH antioxidant activity of all four samples was tested by the DPPH assay method. The ethanolic extract from Mae Chaem gave the concentration that can inhibit 50% DPPH free radicals of 0.3000 mg/ml, while that extracted with water gave the concentration that can inhibit 50% DPPH free radicals of 0.0270 mg/ml. The ethanolic extract from Chiang Rai source had the concentration of 50% DPPH free radical inhibition of 0.1270 mg/ml, whereas that extracted by water exhibited the concentration of 50% DPPH free radical inhibition of 0.0680 mg/ml. The extract by water from Mae Chaem District gave the lowest concentration that can capture the free radicals and had the higher free radical scavenging than the standard vitamin C of 3.48 times. Three serum base formulas were then developed by testing their stability under accelerated conditions by the heating and cooling test by storing at 4 degrees Celsius for 48 hours and at 45 degrees Celsius for 48 hours for 6 cycles. It was found that the

serum base formula 3 was stable and had the pH of 6.18 that was close to the pH of skin. Therefore, it was selected to develop an anti-aging serum containing the passion fruit pulp extract by water from source 1 (Mae Chaem District). The selected extract was mixed in the selected serum base in 5 concentrations including 0.1, 0.5, 1.0, 1.5 and 2.0% and their 6 cycles of stability at the accelerated condition by the heating and cooling test were compared with the serum base. All samples were physically stable with no physical changes and the pH values were slightly changed. When the serum was applied on the skin, there was no coloration of the serum texture. Therefore, the serum formula containing the highest extract concentration of 2% was selected to test for allergy and irritation in five human volunteers by the closed patch test. No irritation of the selected sample was observed. The results from this research have demonstrated the efficacy and safety of the developed serum product containing 2% of the flesh Passion fruit extract for anti-aging. It also shows the potential of the research outcome for commercialization.

**Key words:** *Hybrid flesh passion fruits, anti-aging, serum*

## **DEVELOPMENT OF A TONER PRODUCT CONTAINING FROM ASIATIC PENNYWORT (*CENTELLA ASIATICA* LINN. URBAN) LEAF EXTRACT**

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### **ABSTRACT**

The objective of this research is to develop skin conditioning toner products containing the extracts of Asiatic Pennywort. The extracts of *Centella asiatica* were prepared by the two methods including maceration and Soxhlet extraction, using ethanol at the ratio of 17 grams of *Centella asiatica* and 400 milliliters of ethanol. In the maceration method, *Centella asiatica* was soaked for 48 hours, then evaporated to obtain the dried extracts with a rotary evaporator. For the Soxhlet extraction method, the solvent was extracted for 5 hours at a temperature of 50 degree Celsius, and then evaporated with a rotary evaporator. Two extracts were obtained and tested for antioxidant activity. The UV-spectrum fingerprint to examine the existing of triterpenoid glycosides. The Toner containing the *Centella asiatica* extract was developed. The results showed that the extract prepared by Soxhlet extraction with ethanol 95% gave the highest yield of 15.15%, while that from the maceration method indicated the highest antioxidant activity with the IC<sub>50</sub> value of 1.79 mg/ml. The UV-spectrum fingerprint for the presence of triterpenoid glycoside at the absorbance of 190-230 nm. was indicated. The extracts by both the maceration and Soxhlet extraction using ethanol at solvent were found to contain triterpenoid glycoside in the absorption range of 190-230 nm. The 3 toners

are tested by heating and cooling of 6 cycles, at 4 degrees Celsius and 45 degrees Celsius, were physical stable. No physical changes occurred. The toner base which had the greatest drying property was selected. Then, five developed toners were containing for the *Centella Asiatica* extracts, at 0.1, 0.5, 1, 1.5, and 2% were tested for antioxidant activity. The antioxidant activity before and after heating and cooling testing of 6 cycles found that toner 1 formula containing 1% of the *Centella asiatica* gave the highest remaining %DPPH Inhibition of 64.65% after the 6 cycles in comparing to at initial. This developed toner alter gave no skin irritation. The regard it is an effective and safe toner formulation.

**Key words:** *Asiatic pennywort leaf, extraction, toner, skin balance adjustment*

## IMPROVEMENT IN THE ANTIOXIDANT ACTIVITY AND ORGANOLEPTIC CHARACTERISTICS OF BLANCHED GREEN PEAS WITH *ILEX PARAGUARIENSIS* INFUSION

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### ABSTRACT

Green peas are legumes rich in unsaturated lipids; in addition, they have pro-oxidant enzymes such as lipoxygenase (LOX), which promote oxidative processes. Enzyme can be inactivated by blanching to reduce the consequent loss of nutritional and organoleptic quality and food industry generally uses hot water. Peroxidase (POD) has been used as an indicator of the blanching effectiveness; this work proposed to monitor LOX instead of POD. Since the aqueous extract of *Ilex paraguariensis* (IPE) presents a remarkable antioxidant activity attributable to its high content of phenolic compounds, we proposed to use IPE for blanching peas. The objectives of this work were to optimize the blanching parameters and to compare the effect of conventional blanching and that made with IPE on LOX and POD residual activity. Phenolic compounds content, the antiradical activity and organoleptic characteristics were determined in blanched peas. Besides the kinetic behavior of LOX after blanching treatments were analyzed to propose mathematical kinetic models. The best treatment found was blanching at 95 °C for 4 min in IPE. LOX activity was reduced by 95 % and the green peas presented the highest content of phenolic compounds, the highest antiradical capacity, and the sixteen attributes of sensory characters were better preserved than those observed in the treatment required for POD. The kinetics adjust to first-order exponential decay and the activation energy was 35.41 kJmol<sup>-1</sup> for peas. LOX as an indicator of blanching efficiency should be used in several vegetables as a better alternative than the conventionally used POD.

**Key words:** *Green peas, lipoxygenase (LOX),*



## MUFFINS FORMULATED WITH BAGASSE FLOURS OF DIFFERENT TYPES OF BEER

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### ABSTRACT

Brewer's spent grain (BSG) is the main by-product of beer brewing that comes from the barley malt or cereal used, and its utilization is a strategy for food safety and reduces environmental negative impact. BSG is rich in fibre, protein, and antioxidants, and after drying and milling it can be used as flour in bakery products. The aim of this work is to evaluate sensory, nutritional, and functional parameters of muffins made from BSG flour from different beers.

BSG were separately collected from 4 different types of beers (Indian Pale Ale, Golden and red and black beers) and dried at 100 °C for 24 h. The dried materials were ground in an electric grinder and sieved to obtain the flour. Control muffins were prepared using wheat flour and BSG muffins were formulated by replacing 60% of the wheat flour with each type BSG flours. Extracts were obtained from the baked products to evaluate antioxidant activity, the total content of phenolic compounds and melanoidins. In addition, BSG muffins were characterised from a technological point of view, sensorial analysis and purchase intention evaluation were carried out by a panel of 54 consumers taking as reference control muffins.

Significant differences in colour parameters were found among the BSG muffins. BSG muffins made with IPA beers showed a higher content of phenolic compounds and a higher antioxidant activity than those from the other types of BSG. Those prepared from golden and amber beers showed the greatest lightness and obtained the highest average scores in the sensorial features acceptance and purchase intention, even with respect to the control.

**Key words:** *colour parameters, Brewer's spent grain BSG, phenolic compounds*

## CHANGES IN THE ANTIOXIDANT PROPERTIES OF CACTUS PEAR JUICES WITH AND WITHOUT FRUIT PEELING

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### ABSTRACT

Food waste is an economic, ecological, social, and ethical problem, in consequence, strategies that allow the integral use of food and its by-products are of great interest. In fruits

and their processed products as juices or nectars, the peels are usually wasted; however, they may contribute with bioactive compounds and, hence, with beneficial health effects. This work aims to evaluate the difference in antioxidant traits of three different coloured cactus pear juices prepared with and without their peel.

Yellow, orange and purple cactus pears were harvested, brushed and washed. Half of the harvested fruits were peeled and afterwards, liquefied, while the other half were liquefied without removing the peel. Yields were measured in each case. The juices were then centrifuged to remove suspended solids, and each juice was evaluated for antioxidant activity by DPPH• and ABTS•+ radical bleaching methods, total phenolic compound contents (TPC) by the Folin Ciocalteu method, and betalain content by spectrophotometry. Finally, the juice color was determined using a colorimeter. The sensory acceptability by a consumer panel.

Juices made with the whole fruits had a 47-52 % higher total phenolic compound content than those made with peeled fruits. Regarding the antioxidant activity of the juices, the preservation of the fruit peel resulted in an increase of up to 89% by the DPPH•method and up to 51% according to ABTS•+. In terms of betalain content, the purple fruits had the highest values, and the juices made with peel had almost double the concentration of those made with peeled fruits. This work allows us to revalue the use of integral fruits and reduce the energy and time costs of a fruit processing step as a strategy for sustainability.

**Key words:** Food waste, Juices, total phenolic compound

## **EFFECT OF CLADODE DRYING IN THE ANTIOXIDANT AND SENSORY TRAITS OF FUNCTIONAL MUFFINS FORMULATED WITH NOPAL FLOUR.**

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### **ABSTRACT**

*Opuntia ficus-indica* is the most important cactus from the agricultural point of view. Cactus cladodes or pads are rich in fibres, mucilage, and phenolic compounds. Beneficial health effects are ascribed to these constituents, such as gastric protection and hypoglycaemic effects. Due to their valuable composition, worldwide availability, and low cost, cactus can be used as a food ingredient to prepare functional foods. The main aim of this work was to evaluate the effect of the drying conditions of the cladodes on the nutrient composition and antioxidant function of nopal flour to prepare functional muffins.

*O. ficus-indica* cladodes were harvested, brushed, washed, and filleted. The cuticle and epidermis were removed (preserving chlorenchyma and parenchyma). Both parenchyma and whole pad strips were dried in an oven at 60 °C, in a food dehydrator at 60 °C, in a solar dryer at a maximum temperature of 60 °C and by freeze-drying. Antioxidant activity, total phenolic compound contents (TPCC), soluble and insoluble fibres, sugars, soluble proteins, lipid oxidation were analysed, and colour parameters were also evaluated. Muffins were prepared partially replacing wheat flour with nopal flour. These baked products were sensorially and functionally characterised.

Freeze-dried samples had the highest TPCC, followed by oven-dried samples, both in whole pads and in their parenchyma, with no significant differences in solar dried samples. The

muffins made with nopal flour showed differences in sensory parameters compared to the control formulation, a higher TPCC and lower lipid oxidation. The use of under-utilized cactus for food and dietary therapeutic purposes are tools for food sovereignty and health prevention. Besides, this work explores the use of renewable energies for ingredient obtention for food and dietary purposes.

**Key words:** *total phenolic compound contents (TPCC), Freeze-dried, hypoglycaemic*

## **FORMULATION AND DEVELOPMENT OF YOGURT, ENRICHED WITH ALGAL $\beta$ GLUCAN: EFFECT ON PHYSIOCHEMICAL, RHEOLOGICAL AND MICROSTRUCTURAL PROPERTIES**

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### **ABSTRACT**

In the current research, algae (*G. corticata*) fibre enriched yoghurt was developed by optimizing the concentration of algal  $\beta$  glucan (1-4%) and sodium alginate (0 -0.4%) with incubation time (6-10h) using central composite design, response surface methodology (RSM). The addition of  $\beta$  glucan resulted in improved water holding capacity, firmness, and overall acceptability of the yoghurt. A significant decrease in the syneresis was observed as the  $\beta$  glucan content increased. Rheological studies demonstrated higher values of storage modulus than loss modulus, indicating higher elasticity and improved stress recovery. The scanning electron microscopy revealed complexing of algal  $\beta$  glucan and casein micelles thereby improving the structure and providing physical support against any shear stress. Thus, algal  $\beta$  glucan was found competent substitute in the development of fibre rich yoghurt.

**Key Words** *Algal  $\beta$  glucan, Rheology, functional yoghurt*

## **FOOD IN CONFLICT ZONE AND EMERGENCIES**

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### **ABSTRACT**

Food in conflict zones and in state of emergency are a big challenge to meet. There are several factors affecting the people living in there, in critical situation. This paper basically focuses on the problems, and challenges in conflict situation areas, and the war dynamics which affects the food supply in the interior of the region. Some famous and important case analysis, case studies, are kept in consideration and a holistic vision is used as a tool to analyse such terrible conditions. This doesn't stop here, further, socio-political, economic, and environmental factors are also discussed to better understand such versatile circumstances. These mentioned factors affect the crisis. Also, the paper discusses, the long-term consequences due to spoiled food supply chains, and destroyed agricultural

infrastructures. The role of humanitarian and international organizations in fulfilling the needs of the people in such areas and seeking for scope of improvement in certain hopeful regions, along with innovative technologies, and agricultural practices are also studied in this paper. This research primarily aims to procure some ways for the researchers, policy makers, aid providers, organizations, for effective and implementable strategies to de-escalate the lack of food supply in conflict affected regions. Also, we must not forget that people including the children, men, women, and even soldiers fighting in there, lose a nutritional diet due to lack of food and it leads to malnutrition, especially for cognitive development in small growing age children. Other major problems include contamination of drinking water resources, farming lands destruction due to the on-going war.

**Keywords:** *conflict zone, war dynamics, socio-political, economic, environmental factors, food supply chains, cognitive development.*

## **INSECT PROTEIN AS A SUSTAINABLE FOOD SOURCE IN CONFLICT AREAS AND EMERGENCY SITUATIONS: A TECHNICAL PERSPECTIVE**

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### **ABSTRACT**

In areas susceptible to food poverty and malnourishment, edible insects are becoming more widely acknowledged as a sustainable and nourishing food source. With their high protein content, edible insects offer a viable alternative to conventional sources like fishmeal and meat, playing a crucial role in fostering sustainability. In India, entomophagy has contributed to food security and provided economic benefits in states like Assam, Arunachal Pradesh, and Nagaland. Amongst many species of insects, *Coleopteran* was found to be the highest consumed species in these areas. Insects that are safe for human consumption are a rich source of protein, fat, minerals, vitamins, and fiber, rendering them invaluable in combatting food insecurity. Mini-livestock farming has the potential to reduce malnutrition in critical areas around the world. Insect farming can be used to increase food supply and benefit the environment, globally. The extraction methods include conventional and non-conventional methods. Nonetheless, societal norms, culinary practices, and the perception of disgust pose significant barriers to widespread acceptance of edible insects in modern world. However, overcoming these challenges and promoting the consumption of edible insects could significantly contribute to sustainable food production and address food insecurity in conflict zones and emergency situations. Consequently, it is essential to promote the general use and integration of insect-based food solutions.

**Keywords:** *Edible insects; Food insecurity; Insect-farming; Insect protein; Sustainability.*

## DEVELOPMENT OF CALCIUM FORTIFIED CRISPS FROM GUAVA THROUGH FRYING

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### ABSTRACT

Guava (*Psidium guajava* L.) is also known as “Super fruit” due to its high nutritional value possesses commercial importance in the tropical and subtropical region of the world. Among fruits, guava has highest postharvest loss and needs to be processed for higher shelf life and utility. The process of vacuum frying is carried out at pressures largely below atmospheric levels. Vacuum frying lowers the final oil content and thus slows down the rancidity in oils in comparison to atmospheric fried products. The vacuum frying has several benefits with their low temperatures (<100°C), reduced pressure and minimal exposure to environmental factors such as oxygen makes it favourable for developing snacks from fresh fruits and vegetables. This study entails evaluation of guava variety ‘Shweta’ for their physico-chemical properties and process standardisation for development of guava crisps through frying. Effect of pre-treatments before frying role of fruit matrix and maturity were determined in this study. The guava fruits were grouped into three different maturity stages based on their firmness. The ascorbic acid content and carbohydrates profile showed significant difference at three different maturity stages of guava fruit. TSS and starch content of guava cultivar decreased with fruit maturity. Pectin content increased up to colour turning stage and thereafter decreased at ripe stage. The guava fruits were sliced and subjected to vacuum impregnation. VI slices were dipped in fortification solution (maltodextrin, salt, ascorbic acid, and calcium lactate). Following this, guava slices subjected to freezing pre-treatment and fried in the Refined Oil and finish dried in microwave. The developed guava crisps were evaluated for different textural, chemical, and sensory parameters. Factorability, crispness of crisps was significantly affected by fruit maturity, freezing pre-treatment, and calcium impregnation. Freezing pre-treatment caused decrease in the crispness and toughness and gave superior crisps with crunchy mouthfeel. The browning of crisps increased due to ii freezing pre-treatment while calcium impregnation leads to decreased browning. Calcium infusion leads to >15-fold increase in the calcium content of guava. Highest overall acceptability of crisps from ‘Shweta’ guava was recorded for crisps from ripe stage of guava fruits given freezing and calcium infusion pre-treatments. The shelf life of guava crisps was 30 days upon packing in ALPE (aluminium laminate) pouch with nitrogen gas flushing. Thus, nutrient rich guava fruit could be converted to shelf stable and attractive crisps, which would provide essential nutrients and provide potential health benefits, ensuring off-season availability of the perishable guava in the form of crisps.

**Keywords:** *Guava, Fortification of calcium, ALPE, superfood*

## ENCAPSULATION OF GINGER OIL

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### ABSTRACT

Ginger (*Zingiber officinale* Roscoe, *Zingiberaceae*) is one of most important spices in India. The flavors of ginger are typically due to its essential oils characterized by warm, spicy, and woody notes, with slight lemon notes. Ginger essential oil finds application in food and fragrance industries. However, processing conditions can cause degradation of ginger essential oil reducing its functional properties which could be prevented by microencapsulation. In present investigation, efforts were made to prepare ginger oil from dry ginger by hydro-distillation method and its physical-chemical properties were observed. Further, systematic efforts were taken to standardize the spray drying condition for preparation of microencapsulated ginger oil powder by using acacia gum as wall material. The observations related to physical-chemical and organoleptic characteristics prepared powders revealed that the inlet temperature of 160°C is optimum in microencapsulation of ginger oil.

**Keywords:** *Ginger Oil, essential oil, microencapsulation*

## CERVICAL CANCER, SYMPTOMS, RISK FACTORS, DIETARY CONSIDERATIONS AND PRECAUTIONS

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### ABSTRACT

Cervical cancer nowadays has become one of the biggest health issues worldwide. In cervical cancer, cancer cells start developing in the cervix. Human Papillomavirus (HPV) is a common cause for this infection. When exposed to HPV, the body's immune system typically prevents the virus from doing harm. In a small percentage of people, however, the virus survives for years. This contributes to the process that causes some cervical cells to become cancer cells. Two high-risk types, HPV16 and HPV18, cause 70% of cervical cancers worldwide. A woman with cervical cancer may experience several symptoms heavy, longlasting bleeding after intercourse, after menopause etc. One should avoid tobacco, multiple sexual partners, early involvement in sexual activities etc. in order to prevent cervical cancer. Epidemiologic studies suggest that dietary factors may influence risk for cervical cancer. Part of the effect of diet may be attributable to the suppressive action of certain micronutrients, particularly carotenoids (both vitamin A and non-vitamin A precursors), folate, and vitamins C and E, on HPV infections. Conversely, diets high in saturated fats, processed meats, and refined carbohydrates have been linked to an increased risk of cervical cancer. Additionally, obesity, which is often a result of poor dietary habits, is associated with a higher risk of cervical cancer and poorer outcomes among women diagnosed with the disease. In addition to dietary factors, there are several precautions individuals can take to reduce their risk of cervical cancer. Regular screening through Pap smears or HPV testing can help detect precancerous changes in the cervix early, allowing for

timely intervention and treatment. Vaccination against HPV is another important preventive measure, particularly for young individuals who have not yet been exposed to the virus. This abstract reveals about cervical cancer, its causes, symptoms, preventive measures, dietary recommendations and risk factors.

**Keywords:** *Cervical Cancer, Human papillomavirus (HPV), HPV16, HPV18, dietary considerations, obesity, Pap smears*

## **ENHANCING PUBLIC HEALTH THROUGH INTERVENTIONS AND EDUCATION: A COMPREHENSIVE APPROACH**

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### **ABSTRACT**

Public health interventions and education play a pivotal role in promoting well-being, preventing diseases, and improving healthcare outcomes within communities. This abstract highlights the importance of a comprehensive approach to public health interventions and education, encompassing various strategies, methodologies, and initiatives aimed at addressing diverse health challenges. The abstract begins by emphasizing the significance of public health interventions in tackling pressing health issues, such as infectious diseases, chronic conditions, and environmental health hazards. It underscores the need for evidence-based interventions tailored to specific populations, considering socio-economic, cultural, and environmental factors. Furthermore, the abstract discusses the integral role of education in empowering individuals and communities to make informed decisions about their health. It explores the effectiveness of health education campaigns, school-based programs, and community outreach initiatives in raising awareness, promoting healthy behaviour's, and reducing health disparities. Moreover, the abstract addresses emerging challenges and opportunities in public health interventions and education, including the impact of digital technologies, social media, and global health crises. It emphasizes the need for innovative strategies, adaptive approaches, and continuous evaluation to address evolving health needs and disparities.

**Keywords:** *Public health interventions, preventing diseases, improving healthcare*

## **ROLE OF BREAKFAST: COMMENCING A HEALTHY DAY**

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### **ABSTRACT**

Breakfast means "to break the fast ". This is the first meal of the day after a long night without eating. This abstract is designed to contribute to a broader understanding of lifestyles



that improve overall health and promote healthy lifestyle. Individual like busy professionals, scholars and with irregular schedule may skip breakfast due to factors like stress, lack of appetite in the morning, irregular sleep pattern or simply not considering breakfast a priority meal.

Encouraging a consistent breakfast routine involves thoughtful planning and small adjustments to accommodate individual preferences and lifestyles. The key involves prepping uncomplicated, time-saving breakfast options the evening prior, ensuring a seamless morning routine. Crafting a balanced meal with a fusion of protein, whole grains, and fruits becomes pivotal for essential nutrient intake. For those with a smaller appetite, gradual portion adjustments ease the transition to morning eating. Eating breakfast every day is connected to increased physical activity thermogenesis in slender individuals, resulting in higher overall energy intake without affecting resting metabolism. This abstract address about prioritizing a balanced breakfast which not only fuels our body but sets a positive tone for the day, enhancing both physical and cognitive performance.

**Keywords :** Breakfast, Balanced meal, Healthy, Lifestyle, Meal

## **ALLEVIATING CYCLE OF IMPOVERISHMENT AND MALNUTRITION : HUMANITARIAN AID**

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### **ABSTRACT**

Malnutrition includes under nutrition, hidden hunger, overweight which threatens the survival, growth and development of an individual or community. This abstract highlights the necessity of alleviating vicious cycle between impoverishment and malnutrition. The abstract emanates by understanding the cycle with two scenarios which is children living in deprived areas have lack of access to healthy food, clean water and sanitation leading them to catch diseases easily and remain malnourished. Similarly, undernourished children may always remain ill due to which they are unable to grab opportunities for professional development leading to poverty. In this way impoverishment and malnutrition leads to each other respectively. It raises the need to break the cycle for betterment of a country's socioeconomic development. Therefore, the abstract emphasizes the role of humanitarian aid especially in poverty-stricken areas. It refers to assessment and intervention like food distribution drive, nutrition counselling which promotes physical health and dietary habits. It assists small help other than government programmes by people volunteering and providing social help. Finally, the abstract concludes by focusing on poverty alleviation and nutrient deficiencies, and calls for increased research and humanitarian aid in this important aspect of global crisis to promote health.

**Keywords:** *Humanitarian Aid, Impoverishment, Malnutrition, Socioeconomic Development*

## ADDRESSING THE NUTRITIONAL HURDLES IN RURAL INDIA AND PROMOTING HEALTH

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### ABSTRACT

Poor nutrition influences the development of illnesses in early life, yet rural India struggles with health and nutritional obstacles. This abstract addresses the challenges faced by rural communities in getting adequate nourishment, and proposing strategies for better health outcomes is really crucial. Limited availability of healthy foods, socio-economic disparities, poverty, attitude and knowledge gaps are distinct hurdles in acquiring a healthy diet linked with lower nutrition outcomes, significantly leading to malnutrition, obesity, anemia and micronutrient deficiency in rural areas, which are of major concern. To overcome undernutrition and overnutrition problems that may coexist with certain micronutrient deficiencies is a serious concern for the country. Literature suggests tailored nutritional strategies for rural populations, emphasizing diets rich in fruits, vegetables, whole grains, moderate animal protein and low sodium. Additionally, agriculture is to be used to expand the availability and accessibility of various nutrition-dense foods, allowing people to achieve a balanced diet. Internet-based education emerges as a potential solution to overcome barriers, especially for low-income rural populations. This abstract concludes that addressing the multifaceted challenges of poor nutrition in rural India requires a concerted effort from all stakeholders, including local communities, government agencies and non-profit organizations. Implementing sustainable initiatives focused on nutrition, healthcare access, health awareness and education can pave the way for healthier futures, ensuring that no one is left behind in the pursuit of better health outcomes.

**Keywords:** *Health, Nutrition, Obstacles, Rural, Strategy*

## IMPACT OF FOOD MARKETING ON CHILDHOOD OBESITY

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### ABSTRACT

The Childhood obesity epidemic is a serious public health problem that increases morbidity, mortality and has a substantial long economic and social cost. Food Marketing has an essential global impact on childhood obesity by influencing children food obesity by influencing children food choices through widespread advertising of unhealthy products. The review explores the current strategies and initiatives aimed at preventing and managing child obesity including lifestyle modifications. The abstract addresses a pressing issue concerning

the influence of food marketing on childhood obesity, particularly the promotion of high-calorie and sugary products under the guise of being healthy. Results revealed that children between ages 8 to 12 years are receiving the highest rates of ads exposure. Hence to overcome the booming impact of food marketing on childhood obesity, there is a need to establish and enforce guidelines to limit the promotion of unhealthy foods in media accessible to school going children.

**Keywords:** *Booming, Calories, Epidemic, Morbidity, Mortality, Obesity, Sugary.*

## **EFFECTS OF GOOD EATING HABITS ON CARDIOVASCULAR HEALTH**

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### **ABSTRACT**

Based on scientific data, clinical experience and statistics, it was found that nutrition has significant impact on cardiovascular health. Epidemiological studies have demonstrated a persistent association between dietary patterns and cardiovascular disease (CVD) risk from adolescence to adulthood. Eating a diet rich in fruits, vegetables, whole grains and lean protein may reduce lifetime risk of heart disease. Research data exemplifying changes across age in the effect of diet on cardiovascular outcomes. For example, following the DASH diet has been shown to lower blood pressure and reduce the risk of heart disease in children and the elderly. Similarly, the Mediterranean diet has been shown to reduce CVD mortality across age groups. Analysis of longitudinal studies further confirms the protective potential of good nutrition for all ages. Metaanalyses have shown that increased fruit and vegetable consumption is associated with a 15% reduction in CVD-related deaths among young, middle-aged, and older adults. In addition, increased fiber intake was associated with a reduction in cardiovascular risk. The bottom line is that improving nutrition is important for cardiovascular health at all ages, as evidenced by research and literature. Adopting healthy eating patterns is an important strategy to reduce the global burden of cardiovascular diseases across the lifespan.

**Key words -** *CVD, DASH diet, Mediterranean diet, metaanalyses, mortality.*

## **CARDIOVASCULAR SYMPTOMS AFFECT THE PATTERNS OF HABITUAL COFFEE CONSUMPTION**

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### **ABSTRACT**

Cardiovascular symptoms encompass any indications or feelings that a person may have that point to the existence of cardiovascular illness or malfunction in the cardiovascular system,

which is made up of the heart and blood vessels. Cardiovascular diseases (CVDs) remain a leading cause of morbidity and mortality worldwide, underscoring the importance of early recognition and management of cardiovascular symptoms. This abstract provides a comprehensive overview of common cardiovascular symptoms, their underlying causes, and diagnostic considerations. While frequent coffee consumption is often associated with cardiovascular concerns, a new study suggests people might naturally adjust their coffee habits based on their cardiovascular health. This research, published in the American Journal of Clinical Nutrition, utilized genetic evidence from over 390,000 participants to uncover a causal link between cardiovascular symptoms and habitual coffee intake. The study explored the impact of three key cardiovascular measures: systolic blood pressure, diastolic blood pressure, and heart rate. Genetic variations, acting as natural experiments, were used to isolate the independent effects of these factors on coffee consumption. Individuals with essential hypertension, angina, or heart arrhythmias were significantly more likely to drink less caffeinated coffee, switch to decaf, or abstain entirely compared to those without such symptoms. These findings indicate that people may intuitively reduce or alter their coffee habits in response to cardiovascular warning signs. This potential self-regulatory behaviour highlights the dynamic relationship between coffee consumption and cardiovascular health, suggesting a complex interplay beyond simple cause and effect.

**Keywords:** *Cardiovascular symptoms, Blood Pressure, coffee consumption, cardiovascular health, heart rate, Mendelian randomization.*

## **SUSTAINABLE FOOD PRODUCTION IN INDIA: BALANCING THE PLATE AND THE PLANET**

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### **ABSTRACT**

India faces the monumental challenge of feeding its population of over 1.4 billion people while ensuring environmental sustainability. The reliance on traditional agricultural practices has led to critical environmental and social issues, including soil degradation, water scarcity, impacts of climate change, and economic vulnerability of farmers. This poster explores the shift towards sustainable food production as an essential solution to these challenges, spurred by increased consumer demand for environmentally friendly food and broader concerns for climate change and social justice. The poster examines sustainable solutions such as organic farming, agroforestry, rainwater harvesting, precision agriculture, and the empowerment of farmers through education, market access, and fair pricing mechanisms. These approaches aim to enhance food security, protect the environment, and improve farmer well-being. They promise not only to increase agricultural yields and resilience against climate disruptions but also to offer pathways to reduced resource depletion, lower emissions, and healthier ecosystems. Additionally, the presentation connects these agricultural practices to broader themes of social responsibility and engagement, underlining the importance of understanding global challenges, encouraging critical thinking, and promoting collaborative solutions among stakeholders. Looking ahead, the poster highlights the potential of technological advancements, supportive policy interventions, and shifting consumer preferences towards sustainable food consumption. It concludes by asserting that a multifaceted approach is

required to balance the needs of India's population with planetary health, advocating for sustainable agricultural practices as a model for the rest of the world.

**Keywords:** *Sustainable Agriculture, Food Security, Environment Sustainability, India, Organic Farming, Agro Forestry, Precision Agriculture*

## **IMPACT OF LIFE STYLE IN CARDIOVASCULAR DISEASE**

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### **ABSTRACT**

Cardiovascular Disease (CVD) remains a significant global health issue, encompassing various disorders that impact the heart and blood arteries. The data shows the prevalence of CVD 110 million for men, 80 million for women worldwide. This explores multiple aspects of CVD, such as epidemiology, risk factors, and public health implications. The development and progression of CVD are influenced by a complex interplay of genetic susceptibility, lifestyle choices, and environmental factors. Despite advancements in medical science and technology leading to breakthrough diagnostic tools and therapeutic interventions, effectively addressing the rising prevalence of CVD poses a challenge. Stress may contribute to poor health behaviors, such as smoking or smoking more, overeating and not being physically active. Chronic stress may lead to high blood pressure. By raising general public awareness from this abstract concept, early symptom and risk factor detection may be aided.

**Keywords:** *Cardiovascular Disease (CVD), Risk factors, Lifestyle choices, Therapeutic interventions, Prevalence, Prevention methods*

## **IMPORTANCE OF NUTRITION EDUCATION IN SOCIETY**

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### **ABSTRACT**

This study investigates the vital role of nutrition education in society and offers a comprehensive evaluation of its effects on general health. The study intends to clarify the various ways in which nutrition education affects dietary practices, health outcomes, and general well-being within various societal contexts by a thorough examination of the body of existing literature, empirical investigations, and case analyses. The goal of the research is to add meaningful insights to the continuing discussion on how to integrate and improve nutrition education to improve the health and lifestyle choices of society by examining the efficacy of different education programs and tactics.

**Keywords-** *nutrition education, society, investigations*

## FOOD HABIT OF INFERTILE COUPLES TAKING TREATMENT FROM GOVERNMENT HOSPITALS IN MUMBAI, INDIA

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### ABSTRACT

Infertility poses a significant challenge to couples worldwide, with dietary habits emerging as a potential contributing factor. Unhealthy food habits are known to be significant contributors to various health issues, including reproductive health concerns. This study explores the food habits among couples experiencing infertility and their potential implications. Primary data from two hospitals in Mumbai was collected using structured schedule. Study involved 200 couples married for at least 3 years and undergoing treatment for minimum of 6 months. Research explores the link between dietary behaviors and infertility, revealing significant findings. Approximately 31.5% of wives and over half of infertile males report irregular meal timings. Furthermore, a substantial portion of both females (36%) and males (43%) frequently consume restaurant food, while 60% of females and 69% of males regularly indulge in fast food. Tea consumption is widespread, with 69% of females and 81% of males reporting daily intake. Notably, 7.5% of females and 8% of males consume coffee, while 7.5% of females and 7% of males favor cold drinks. Findings suggest that certain dietary factors, such as irregular meal timings and high consumption of restaurant and fast foods, alongside daily tea intake, may correlate with an increased risk of infertility. Moreover, variations in coffee and cold drink consumption among genders underscore potential dietary influences on reproductive health. Understanding the relationship between dietary patterns and infertility is crucial for developing preventive strategies and optimizing fertility treatments.

**Keywords:** Food-Habit, Infertility, Couples, Consumption.

## SUSTAINABLE USE OF PLANT BASED POLYSACCHARIDE GUMS AS FUNCTIONAL INGREDIENTS

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### ABSTRACT

This study investigates the potential of utilizing natural plant-based gums as functional ingredients in food products. Natural gums, derived from various plant sources, offer a wide range of functional properties such as thickening, gelling, stabilizing, and emulsifying. In recent years, there has been growing interest in replacing synthetic additives with natural alternatives due to consumer demand for clean-label products. This paper reviews the characteristics and applications of natural plant-based gums in food formulation, highlighting their functionality and potential benefits. Additionally, challenges and opportunities associated with incorporating these gums into food products are discussed, along with future

research directions. Overall, this research sheds light on the utilization of natural plant-based gums as versatile and sustainable functional ingredients in the food industry.

**Keywords:** *Food Sustainability, Natural gums, Functional foods.*

## ANTIOXIDANT, ANTIDIABETIC, AND ANTIMICROBIAL PROPERTIES OF TINOSPORA CORDIFOLIA (THUNB) MIERS FROM DIFFERENT GEO-ECOLOGICAL REGIONS OF INDIA

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### ABSTRACT

This study provides a through chemical analysis of *Tinospora cordifolia* (Thunb. Miers) germplasm collected from diverse Indian regions. Notably, TC 2 demonstrated the higher total phenolic content (49.9 mg GAE/g extract) and elevated total flavonoid content (10.56 mg RTE/g extract) compared to the other TC fractions. Hydro-alcoholic extracts of TC 2 displayed superior free radical-scavenging potential, showing IC<sub>50</sub> 199.31 µg/ml for DPPH and 69.54 µg/ml for ABTS. In terms of anti-diabetic potential, *Tinospora cordifolia* stem extracts, and TC 2 exhibited the most significant anti-diabetic response for the percentage inhibition of  $\alpha$ -amylase IC<sub>50</sub> = 721.20 µg/ml and  $\alpha$ -glucosidase IC<sub>50</sub> = 267.61 µg/ml compared to acarbose for  $\alpha$ -amylase 56.15 µg/ml and for  $\alpha$ -glucosidase IC<sub>50</sub> 98.45 µg/ml, respectively. DPP-IV inhibition was also observed in the TC 2 extract with an IC<sub>50</sub> value of 559.14 µg/ml compared to vildagliptin IC<sub>50</sub> of 51 µg/ml. Furthermore, the ethyl acetate extract exhibited notable inhibitory activity against Gram-positive Bacteria *Streptococcus* mutants (20 ± 2 mm) and *Staphylococcus aureus* (11 ± 1 mm) at sub-MIC concentrations of 500µg/ml and 750µg/ml, respectively. Moderate activity was observed against Gram-negative bacterial strains (MIC values ranging between 1000-1200 µg/ml), with the strongest effect against *Streptococcus* mutants. Metabolite profiling of ethyl acetate was conducted using GC-MS techniques, essential tools for selecting, identifying, and characterizing bioactive metabolites.

**Keywords:** *Tinospora cordifolia, Antioxidant, Anti-diabetic, Chemo-profiling, DPPH, FRAP, GC-MS.*



## **EFFECTS OF DIFFERENT COOKING METHODS ON HEALTH-PROMOTING BIOACTIVE COMPOUNDS OF PURSLANE (PORTULACA OLERACEA L.)**

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### **ABSTRACT**

Purslane is one of the important leafy vegetables used in all over the world and cooked in several ways. The current research demonstrated the effect of cooking methods on antioxidant properties of phenolic compounds and other bioactive compounds of purslane leaves. Three commonly used cooking methods viz., boiling, steaming and roasting of purslane leaves were evaluated for a duration of 1 min, 3 min, 5 min, 7 min and 10 min. The outcome of the study demonstrated roasting retained the maximum amount of omega-3 fatty acids along with total phenolic, total flavonoid contents and antioxidant activities in purslane. The omega-3 fatty acid is the dominating compound in purslane leaves which was found retained in roasting up to 10 min and it was significantly low by other water involving processes. The present work would be helpful for designing of cooking process in the food processing industries to minimise loss of bio actives.

**Keywords:** *Cooking, Purslane, Polyphenols, Bioactive compounds*

## **PHYSICAL GROWTH AND NUTRITIONAL STATUS OF SCHOOL GOING CHILDREN IN DIMAPUR DISTRICT, NAGALAND**

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### **ABSTRACT**

Humans differ in their physical growth according to their sex, age, ethnicity, and degree of acculturation, which is a natural process. An individual's environment and genetic composition interact in a complicated way. While the ideal and favorable environmental conditions aid in achieving that goal. Children typically follow any line in the standards for evaluating their own development in terms of population, age, and, more especially, sex. An individual's environment and genetic composition interact in a complicated way. While the ideal and favourable environmental conditions aid in achieving that goal. Children typically follow any line in the standards for evaluating their own development in terms of population, age, and, more especially, sex. This study aimed to determine the dietary preferences and physical growth based on height, weight, and body mass index (BMI) of school-age children in the Dimapur area of Nagaland who were enrolled in grades 3 through 11. The study found that although the frequency of overweight was not very high, underweight, and overweight coexisted among them. With the advancement of science and technology, coupled with a changing lifestyle that includes less regular exercise and a more sedentary approach to leisure time activities, the prevalence of overweight and obesity is rising dramatically, posing a

health risk to many people worldwide, especially in developing nations like India. As a result, special preventive measures regarding the prevalence of overweight and its consequences should be widely known.

**Keywords:** *Physical growth, nutritional status, anthropometric measurement, undernutrition, overnutrition*

## PREPARATION OF HORSEGRAM PROTEIN HYDROLYSATE WITH IMPROVED PROTEIN DIGESTIBILITY

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### ABSTRACT

Horsegram (*Macrotyloma uniflorum*), an economical legume renowned for its abundance in lysine and iron, faces underutilization owing to inherent antinutrients like lectin and trypsin inhibitors. These compounds pose challenges to the breakdown and absorption of its protein. In response, horsegram protein hydrolysates (HGPH) have been engineered. With a 10% degree of hydrolysis, HGPH boasts an impressive protein content of  $86 \pm 1.8\%$  and an outstanding in vitro protein digestibility of  $94.4 \pm 2.4\%$ . This marks a substantial improvement over dehulled horsegram flour, which contains only  $28 \pm 0.4\%$  protein and exhibits a digestibility rate of  $73.3 \pm 1.5\%$ . Furthermore, the trypsin inhibitory activity in HGPH dropped significantly from  $42.3 \pm 1.5$  TIU/mg in horsegram flour to  $18.6 \pm 1.5$  TIU/mg in the hydrolysate, indicating a reduction in antinutrient levels.

Moreover, the levels of branched-chain amino acids, essential for muscle maintenance and growth, were heightened in HGPH. These advancements highlight the potential of horsegram as a valuable vegetarian protein source for the food industry. Its enhanced digestibility and enriched amino acid profile make it an attractive ingredient for formulating nutritious and sustainable food products. By overcoming the barriers posed by antinutrients, HGPH opens avenues for maximizing the nutritional benefits of horsegram, contributing to the diversification and enrichment of plant-based protein sources in the market.

**Keywords:** *Horsegram; underutilized; anti nutrients; in vitro digestibility; hydrolysates*

## PROTOTYPE DESIGN OF COST-EFFECTIVE CLEANING MECHANISM FOR FRUITS

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### ABSTRACT

The cleaning machine for fruits is a need for food processing sector as it contributes to quality parameter of processed food product. Fruits cleaning equipment available in market usually clean them using the combination of washing, brushing, and sanitizing techniques. Further for the guarantee of hygiene and food security requirements, food-grade sanitizers and disinfectants must be used to get the desirable results. In this research a cost-efficient prototype fruit and vegetable washer was developed to decrease the time of washing and labour efforts. Around 20-35 kg capacity (As per the type and shape of fruit) machine was designed and its performance on different fruits and its parameters was evaluated. Based on the variable speed and water required for spraying and dipping, depth capacity and performance index were evaluated. The cost for different fruit washing in mechanical washer as compared to manual washing was studied and was compared with the prototype developed model. The average cost of working with complete design and developed machine was estimated for industrial feasibility.

**Keywords** – Fruits, Prototype, Cleaning, Machine

## EFFECT OF DIFFERENT FRUIT DEODORIZER ON THE PHYSIO-CHEMICAL PROPERTIES AND SENSORY QUALITIES OF ALGAL OIL CHOCOLATE SPREAD EMULSION

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### ABSTRACT

Algae is a significant protein source that is being increasingly utilized in various food products nowadays. However, its application may be hindered, particularly in children's food products, due to its unacceptable odour. Thus the primary goal of present study was to assess the possible use of food deodorizers, such as orange, lemon, and apple powders, in

combination with algae oil to develop a new product i.e. chocolate spread emulsion which would mask the algae oil's odour, the powders of the fruits were prepared using tray drying method. Three variations were developed using Apple Powder(CS<sub>AP</sub>), Orange Powder (CS<sub>OP</sub>), Lemon Powder (CS<sub>LP</sub>), these were prepared from the blend of above ingredients suspended in chocolate emulsion with Algal oil. The physiochemical, microbiological properties were studied for the developed products during ambient storage. These samples were analysed for their pH, total soluble solids (TSS), microbial load, ash, moisture and fibre content. Sensory evaluation was carried out on the samples using 9-Point hedonic scale. Based on a descriptive sensory examination using 9-Point hedonic scale, the products scored between 8.3 and 10.5 (maximum: 15) for acceptability. Based on the spread ability factor on bread, sample CS<sub>OP</sub> was the simplest to spread in comparison to Samples CS<sub>AP</sub>, CS<sub>LP</sub> and control sample respectively. According to analysis, the moisture contents of samples CS<sub>OP</sub>, CS<sub>AP</sub>, CS<sub>LP</sub> and control sample were 5.6.1%, 31.4-32.8 %, 21.5-24.7 %, and 15.6-21.4 %, respectively. The Fibre contents of Samples CS<sub>AP</sub>, CS<sub>OP</sub>, CS<sub>LP</sub>, and the control sample were determined to be, 0.15%, 0.45%, 1.23%, and 0.11% respectively. Further study on the storage stability of all samples CS<sub>AP</sub>, CS<sub>OP</sub>, CS<sub>LP</sub>, and the control sample for 28 days at 28 and 10 °C, respectively, revealed that the hardness of the spread emulsions generally decreased by one week. The water activity (aw) levels, on the other hand, decreased at 28 °C during storage and increased at 10 °C. The examined chocolate spread samples CS<sub>AP</sub>, CS<sub>OP</sub>, CS<sub>LP</sub>, and the control sample did not exhibit any oil separation or microbiological development during the course of the storage time at either temperature.

*Keywords: Deodorizers, Orange Powder, Apple Powder, Lemon Powder, Algal oil*

## IMPACT OF OMEGA-3 AND MAGNESIUM ON PCOS SYMPTOMS

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### ABSTRACT

Polycystic ovarian syndrome (PCOS) is a complex endocrine disorder characterized by hormonal imbalances and inflammation, which can escalate over time. This condition gives rise to physical and mental complications, ranging from excess facial hair to mood swings, attributed to disruptions in female hormone levels. Lifestyle factors play a significant role in the development and progression of PCOS, such as diet, exercise, and stress levels. However, emerging research suggests that dietary modifications, including the addition of omega-3 fatty acids and magnesium, can be instrumental in its management. Omega-3 fatty acids, abundant in fish, nuts, and seeds, exhibit anti-inflammatory properties and modulate insulin sensitivity and lipid metabolism, which are crucial aspects of PCOS management. Similarly, magnesium, found in diverse dietary sources, plays a crucial role in insulin-mediated glucose uptake and cellular metabolism, contributing to overall metabolic health. Furthermore, studies have shown improvements in insulin resistance and lipid profiles in individuals consuming omega-3-rich seeds like flax, sesame, sunflower, and pumpkin. Incorporating

these seeds and magnesium rich foods into the diet, alongside other lifestyle modifications, may offer a holistic approach to managing PCOS symptoms. However, the research is still in its early stages, and more studies are needed to fully understand the impact of Omega-3 and magnesium on PCOS.

*Keywords: Omega-3 fatty acids, Magnesium , Hormonal imbalances , insulin resistance*

## **PREPARATION OF FERMENTED MILK WITH BIOFUNCTIONAL PROPERTIES FROM INDIGENOUS DEONI COW MILK BY LAB**

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### **ABSTRACT**

Consumption of milk and milk products in the human diet can lead to a reduction in the lifestyle disorders. This is because milk proteins contain significant contents of bioactive peptides (BAPs) with several vital health promoting properties. Most of the studies in the area of bioactive peptides are done in the European cattle (*Bos taurus*), but limited studies have been carried out to check the potential of indigenous cattle (*Bos indicus*) milk. Hence, the present study has been designed to exploit the proteolytic activity of lactic acid bacteria (LAB) for the preparation of fermented milk with biofunctional properties from Indigenous Deoni cow milk. Fermented Deoni cow skim milk prepared by as many 05 strains of LAB as a single culture was analyzed for peptide content, alpha-glucosidase, ACE-I, and DPP-IV enzymes inhibition profiles. Peptide contents (measured by OPA method) were ranged between 2.14 to 2.54 mg of leucine/ml. The alpha-glucosidase and DPP-IV inhibitory activities were found highest in skim milk fermentate with *L. helveticus* NCDC 292 followed by *L. helveticus* NCDC 288. The ACE-I inhibitory was found highest in skim milk fermentate with *L. acidophilus* NCDC 15 and followed by *L. bulgaricus* NCDC 8. Ultra-filtration fractionations of fermentate increased the enzyme inhibitory activities. Highest enzymes inhibition was exhibited by 3 kDa permeate. The fermented milk product was prepared by supplementation of peptide rich fraction and it was analyzed for different parameters during storage. Peptide content, alpha-glucosidase, DPP-IV and ACE-I inhibition were significantly higher in product prepared with peptide supplementation. Product was acceptable till 15 days under refrigerated conditions. Sensory, physico-chemical qualities and texture profiles of peptide supplemented fermented milks were better as compared to control. The results from this study showed that peptides with  $\alpha$ -glucosidase, DPP-IV and ACE-I inhibitory activity can be generated by using LAB from Deoni cow milk in a strain specific way.

**Key Words:** Lifestyle disorder, *Alpha- glucosidase, Dipeptidyl Peptidase-IV, ACE-I, Lactic acid bacteria, Bioactive peptides*

## PHYSICOCHEMICAL AND FUNCTIONAL CHARACTERIZATION OF PUMPKIN SEED PROTEIN ISOLATE

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### ABSTRACT

Utilizing proteins from waste for the development of functional food is indeed a promising approach that aligns with both sustainability and health-centric goals. This study deals with the extraction and characterization of pumpkin seed protein isolate (PSPI) extracted via isoelectric precipitation from defatted pumpkin seed cake. The moisture, ash and protein content of PSPI was found to be 7.56%, 2.58% and 85%, respectively. The Dispersibility increased with an increase in pH (9 to 12). The mineral composition was found to be Mg (4.20), P (0.62), K (457.82), Ca (3.76), Fe (5.81), Cr (0.10), Mn (1.46) and Cu (0.21) mg/100g. The SDS-PAGE had 10 detectable bands with molecular weight ranging from 5 to 250kDa. Except glutamine and asparagine, all the amino acids were present indicating the presence of good quality proteins. The onset & melting point temperatures were found to be 69.3°C and 75.6°C, respectively.

**Key words:** Pumpkin seed, Protein Isolate, Biochemical characterization

## EFFICACY OF VARIOUS ORGANIC MANURES AND BIO FERTILISERS ON ECONOMIC OF *BRASSICA OLERACEA* L. (CABBAGE)

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### ABSTRACT

Organic manures and bio fertilisers are renowned for their all-encompassing method of enhancing soil quality. Compost, manure, and plant remains are some of the natural materials used in their production. The soil's structure is improved, microbial activity is encouraged, and nutrients are gradually released with the addition of organic matter. As a result, research was conducted to determine if organic manures were appropriate for producing cabbage. The study employed a randomised block design and included six treatments: vermicompost, chicken manure, farmyard manure, vermicompost + azotobacter, poultry manure + azotobacter, and a control. The economic investigation examined cultivation costs, net returns, gross returns, selling prices, and benefit-cost ratios. The researchers discovered that

using organic manures had a considerable influence on cabbage growth, yield, and economic performance. The chicken manure treatment gave the highest output, followed by vermicompost and farm yard manure. Organic manures caused significant increases in plant weight, height, and head diameter. An economic study found that employing organic manures considerably boosted the net returns and benefit-cost ratio of cabbage production. Vermicompost had the greatest net returns, followed by poultry manure and FYM. Finally, the paper contains useful information about farming cabbage using organic manures. Farmers, legislators, and other agricultural decision-makers may utilise the study's findings to encourage ecologically responsible and economically viable cabbage production practices.

**Key words:** *Organic manures, bio fertilisers, manure treatment, cabbage production*

## **IMPACT OF VARIED ORGANIC MANURES AND BIOFERTILIZERS ON THE ECONOMIC FEASIBILITY OF FENUGREEK CULTIVATION**

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### **ABSTRACT**

Organic manures and biofertilizers can improve the health of agricultural systems by positively impacting soil structure and microbial populations. The research focused on fenugreek, a member of the Fabaceae family known for its culinary and medicinal properties. During the Rabi season 2023-24, a study was conducted at the Amity Institute of Organic Agriculture's research farm at Amity University Noida (Uttar Pradesh) to investigate the effects of various organic manures and biofertilizers on fenugreek yield. The experiment was designed in a randomized block pattern with six treatments replicated three times. A study was conducted to compare the outcomes of new approaches to standard methods and assess their economic viability in the field. The results showed that treatments that included biofertilizer's and organic manures yielded higher net returns and benefit-cost ratios than treatments that only employed organic manures. The numeric calculations indicated that using organic manure combinations was economically viable, with T4 (vermicompost + Azotobacter) providing the greatest net return of 119,389 rupees. These findings demonstrate the potential of organic inputs in sustainable fenugreek cultivation, providing farmers and stakeholders with valuable information to support environmentally friendly agricultural practices.

**Key words:** *Organic manures, bio fertilisers, manure treatment, fenugreek cultivation*

## IMPACT OF ORGANIC MANURES ON THE ECONOMICS OF CAULIFLOWER (*BRASSICA OLERACEA* VAR. *BOTRYTIS*)

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### ABSTRACT

Organic manures are made from natural materials such as plant leftovers, manure, and compost. They provide a comprehensive method of enhancing soil. Adding organic matter improves the structure of the soil, encourages microbial activity and releases nutrients gradually. Organic farming produces legume-based cropping systems with decreased carbon and nitrogen losses. This indicates improved soil health, which is essential for healthy cauliflower development. In the Rabi season of 2023–2024, the current experiment, "Impact of organic manures on the economics of cauliflower (*Brassica oleracea* var. *botrytis*)," was carried out at the Amity Institute of Organic Agriculture (AIOA), Amity University, Sec.126, Noida (U.P.), India. The sandy loam soil in the experimental field has a pH of 8.2, making it rather alkaline in nature. Several nutrients are applied during the trial, including poultry manure, vermicompost, farm yard manure, and azotobacter. The experimental field's structure was established using a Randomized Block Design (RBD) with three replications. The cost of growing cauliflower per hectare was determined to be Rs. 1,44,200, while treatment T4 (vermicompost + azotobacter) yielded highest gross returns per hectare of Rs. 5,73,200 and net returns of Rs. 4,02,600. Benefit-cost ratio were highest (3.51) for T5 (poultry manure + azotobacter) and lowest (2.42) for T6 (control). The overall findings showed that all of the therapies had benefit cost ratios more than unity, which suggests somewhat higher returns per rupee invested.

**Key words:** *Organic manures, Randomized Block Design, cauliflower, Brassica oleracea* var. *botrytis*

## A STUDY ON MANAGEMENT OF *ALTERNARIA* BLIGHT DISEASE OF MUSTARD THROUGH BIOFUNGICIDES

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### ABSTRACT

*Alternaria blight*, caused by *Alternaria brassicae*, is a major disease affecting mustard crops, leading to significant yield losses. Traditional chemical fungicides have been extensively



used to manage this disease, but concerns over environmental pollution, development of resistance, and potential health hazards have shifted the focus towards alternative strategies. Biofungicides, derived from natural sources such as microbes, plants, and their products, have emerged as promising alternatives for managing *Alternaria* blight while ensuring sustainability and minimal environmental impact. The purpose of the present study was the use of biofungicides as a more sustainable alternative for managing *Alternaria* blight in mustard at Amity University, located in Noida, Uttar Pradesh. The organic treatment included FYM, Neem oil, *Trichoderma viride* in different combinations. Pusa Sag1 variety was used for the field study. The present findings revealed the significance differences were recorded in different growth stages of mustard among the various treatment tested. The combined application of Neem oil + *Trichoderma* in the farm yard amended soil showed outstanding performance for the management of *Alternaria* blight disease in mustard through biofungicides holds great promise for sustainable disease control while minimizing environmental risks and promoting agricultural resilience.

**Key words:** *Alternaria* blight disease, Mustard, Biofungicide, Disease management

## EFFECT OF DIFFERENT BIO-FERTILIZERS ON GROWTH AND YIELD OF SPINACH (*SPINACIA OLERACEA* L.)

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### ABSTRACT

A field trial was conducted with the aim to study the effect of different bio-fertilizers on growth and yield of spinach (*Spinacia oleracea* L.) Spinach stands as a significant leafy vegetable in global agriculture, prized for its nutritional richness and versatile culinary applications. With an increasing emphasis on sustainable agricultural practices, the investigation of alternative fertilization methods has garnered attention, particularly bio-fertilizers known for their eco-friendly attributes and potential multifaceted benefits. This study delves into the effects of diverse bio-fertilizers on the growth and yield of spinach crops. During the rabi season of 2023-2024, the field experiment was carried out at AIOA Amity University Noida U.P. Agricultural Research Farm. The experiment was organized in a randomized complete block design to assess the efficacy of different bio-fertilizer treatments. Key growth parameters including plant height, leaf area were meticulously monitored throughout the crop cycle. Additionally, yield metrics such as fresh weight and marketable yield were recorded to evaluate the productivity of spinach plants under various bio-fertilizer regimes with six treatments consisting of a single or combination of biofertilizers in three replications. T6 (Vermicompost + azotobacter +poultry manure) exhibited the highest values for maximum plant height, number of leaves per plant, length of leaves, breadth of leaves, leaf area, followed by T5 and T4 at 30, 45, and 60 DAS. The minimum plant height and other morphological parameters were observed in the treatment T1 (control) at 30, 45, and 60 DAT.

The various treatments greatly influenced the fresh weight. T6 (Vermicompost + azotobacter + poultry manure), T5 (Azotobacter + Vermicompost), and T4 (FYM and poultry manure) had the highest fresh weight whereas the control treatment had the lowest. When compared to all other treatments, the treatment T6 (Vermicompost + Azotobacter + poultry manure) produced the highest growth and yield.

**Key words:** *Growth, Yield, FYM, Poultry Manure, Azotabacter, Vermicompost.*

## **IMPACT OF BIO-FERTILIZERS ON GROWTH ,YIELD AND QUALITY OF SPINACH (*SPINACIA OLERACEA L.*) IN NOIDA UP.**

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### **ABSTRACT**

A sustainable substitute for chemical fertilisers, the use of biofertilizers aims to improve crop yield and soil fertility while reducing environmental damage. The purpose of this study is to determine how different biofertilizers, such as vermicompost, farmyard manure, Azotobacter, and chicken manure, affect the growth and yield of spinach (*Spinacia oleracea L.*) plants. Using a randomised complete block design with three replications, the experiment was carried out under carefully monitored conditions. The field experiment was conducted at the AIOA Amity University Noida U.P. Agricultural Research Farm during the rabi season of 2023–2024. During the experiment, growth measures such as plant height, leaf area, leaf length, and number of leaves per plant were evaluated to assess the vegetative growth of spinach plants. Preliminary results indicate that the use of biofertilizers had a substantial impact on spinach plant growth and yield when compared to the control group. Notably, the combination of biofertilizers, namely (farm yard manure + poultry manure), (farm yard manure + azotobacter), (*Azotobacter*+farmyardmanure+poultrymanure) treatments, resulted in significant improvements in growth indices, demonstrating their potential as effective biofertilizers for spinach cultivation. The combination of biofertilizers (Azotobacter + farmyard + manure + chicken manure) has the highest yield record. Furthermore, the use of biofertilizers substantially benefited soil fertility, as shown by increased nutrient levels and organic matter content. This study clarifies the effectiveness of biofertilizers in improving spinach growth and yield, adding to the expanding body of knowledge on sustainable farming techniques. The results emphasise how crucial it is to use biofertilizers in agricultural practices in order to improve soil health, lessen negative environmental effects, and guarantee sustainable food production.

**Keywords:** *biofertilizers, farmyard manure, vermicompost, Azotobacter, poultry manure, spinach, growth, yield, sustainable agriculture.*

## UNLOCKING NUTRITION: A COLLECTIVE PURSUIT TO ILLUMINATE THE SHADOWS OF HIDDEN HUNGER IN COMMUNITIES - A COMPREHENSIVE REVIEW

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### ABSTRACT

Hidden hunger, a pervasive issue, refers to the chronic deficiency of essential micronutrients in individuals' diets, often unnoticed due to the absence of immediate symptoms. This abstract explores hidden hunger from a community perspective, emphasising its impact on collective well-being and sustainable development. Communities, as interconnected entities, play a crucial role in addressing hidden hunger through shared resources, knowledge, and collaborative initiatives. In many communities, limited access to diverse and nutritious foods exacerbates hidden hunger, leading to long-term health consequences. The community aspect of hidden hunger involves understanding the social, economic, and cultural factors influencing dietary patterns. Collective efforts are essential to raising awareness, promoting education, and fostering sustainable agricultural practices that enhance the nutritional content of local diets. Community-based interventions focus on empowering individuals with the knowledge to make informed dietary choices and advocating for policies that support access to micronutrient-rich foods. Local leaders and influencers can serve as catalysts for change, mobilising resources and encouraging community-wide initiatives, such as community gardens or nutrition programs. Addressing hidden hunger at the community level not only improves the health of individuals but also contributes to broader socio-economic development. Sustainable solutions involve building resilient food systems, promoting biofortification, and integrating nutrition into community development agendas. This abstract underscores the urgency of recognizing hidden hunger as a community-wide challenge and highlights the importance of collaborative efforts in creating lasting impact on nutritional well-being.

**Key words:** *Hidden hunger, intervention, sustainable food system*

## QUALITATIVE ANALYSIS OF IMPORTANT CONSTITUENTS OF VARIOUS CONFECTIONERIES FOOD PRODUCT IN TODAY’S SCENARIO

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### ABSTRACT

Food is basic necessity of life and essential component for the living being for their growth, nourishment, development, repair the worn out tissues and protect the body from various diseases. Confectionery also called sweets or candy is sweet food product. They have two broad classes of baker’s confections and sugar confections. Generally confections are low in micronutrients and protein but quite high in calories. Confections are known because of their wide varieties of food stuff and the presence of sweeteners, but it is possible to buy sugar-free sweets, such as sugar-free peppermints. The most common sweetening agent for confectionery is table sugar, which is chemically a disaccharide or a sucrose. Hydrolysis of sucrose gives a mixture called invert sugar, which is sweeter and is also a common commercial ingredient. Commercially sugars used are available in numbers of forms depending on its particle size. Granulated, milled/icing, coarse, powdered, ultra-fine, caster, non-peril, fine sugar, etc. Sugar syrups can also be used but its stability against microbial spoilage and economy in transportation hinder their uses. The various compositions with confectionery products has increased significantly during the last few decades as consumer demands for new taste and textural sensitivities are the governing factors for research and development in confectionery. Corn syrup, Sweetened condensed milk (SCM), lipolysed butter etc. In this study our focus is to be analyzing the some of the important nutritional parameters through the quantitative methods for the different kind of confectionary products such as biscuits, cookies, cake, macaroons etc. to check whether their values shown in the nutrition labeling is near to accurate or not and what are those health impacts if the concentration varies of various primary metabolites in various confectionaries products.

*Key words: Confectionery, Sweetened condensed milk (SCM), lipolysed butter*

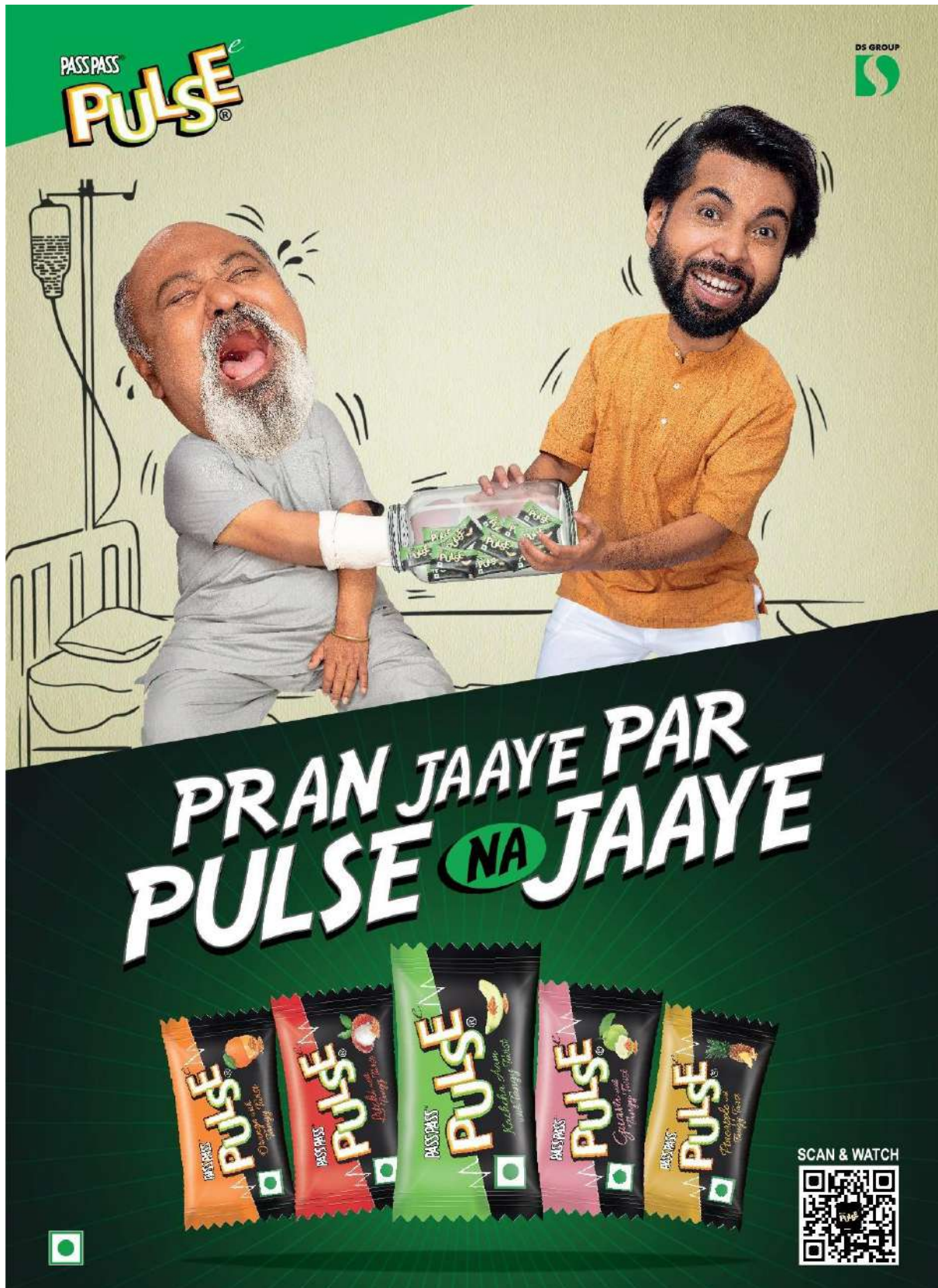
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**Haldiram's**

*Ek bite Meetha*  
**EK BITE NAMKEEN**

The advertisement displays a variety of Haldiram's products on a wooden surface. In the background, there are two boxes of **SOAN PAPDI**: a red one labeled 'SOAN PAPDI' and a teal one labeled 'SOAN PAPDI' with 'DELICACIES' and 'NET WT. 100g'. In the foreground, there are two bags of **CHIPS**: a yellow one labeled 'CHIPS classic SALTED' and a green one labeled 'CHIPS PUDINA treat'. There are also two cans: a blue one labeled **GULAB JAMUN** and a pink one labeled **RASGULLA** with '25% MORE'. To the right, there are two bags of **NAMKEEN**: a red one labeled **BHUJIA** and a dark brown one labeled **NAVATTAN**. Small white bowls contain samples of the products: a bowl of Soan Papdi, a bowl of Gulab Jamun, and a bowl of Bhujia. The background is a bright, blurred indoor setting with a window and a green plant.





PASS PASS **PULSE**

DS GROUP

PRAN JAAYE PAR  
**PULSE NA** JAAYE

SCAN & WATCH

QR code

The advertisement features a man with a white beard and a grey shirt lying in a hospital bed, looking distressed with his mouth open. A man in an orange shirt and white pants stands next to him, holding a large glass jar filled with PULSE products. The background is a simple, light-colored wall. The bottom of the image shows a row of five PULSE product packages in different colors: orange, red, green, pink, and yellow. Each package has the PASS PASS PULSE logo and a small illustration of the product. A QR code is located in the bottom right corner, with the text 'SCAN & WATCH' above it. The overall theme is about the health benefits of PULSE products.



The slide is a presentation for Chemical Systems Technologies. It features a background collage of industrial images: a large refinery at night, a sugar processing facility with large tanks, and a landscape with green fields. The company logo, consisting of three green squares, is in the top left. The main title 'CHEMICAL SYSTEMS TECHNOLOGIES' is in red, with the address 'M-58, II Floor, Market Greater Kailash II, New Delhi, Delhi 110048' below it. A section titled 'About the company' describes the firm's history and achievements. A yellow gear icon labeled 'OUR ACHIEVEMENTS' points to a list of four key technologies. On the left, a 'ZERO DISCHARGE' graphic is partially visible, and at the bottom, icons represent 'Reducing Soil Pollution', 'Controlling Water Pollution', and 'Recycling Waste Water'.

**CHEMICAL SYSTEMS TECHNOLOGIES**  
M-58, II Floor, Market Greater Kailash II, New Delhi, Delhi 110048

**About the company**

The Chemical Systems Group is a technology driven Company, Pioneer in Sugar Industry, actively involved with the Sugar industry since 1986. We started as a toll formulator for Mazer Chemicals, USA (Now part of BASF, Germany) and later introduced an extensive range of our branded Sugar Processing Chemicals. From 1995 onwards we introduced several sugar processing technologies to improve the quality, increase yields, and lower energy consumption. We have to our credit several firsts in sugar technology in India, and the world. With technology as our passion, Chemical Systems shall continue to remain a pioneer in the field.

**OUR ACHIEVEMENTS**

- Membrane-based process for one-stop refinery grade sugar production
- Low-cost brine recovery system, achieving > 90% recovery
- Unique system for filtrate clarification, without recycling to mixed juice
- Patents for sugar/alcohol manufacturing process

**ZERO DISCHARGE**  
AN INNOVATIVE WAY TO AVOID WASTE WATER DISCHARGE

Reducing Soil Pollution

Controlling Water Pollution

Recycling Waste Water





## Uttam Sugar Mills Ltd.

A-2E, 3rd Floor, C.M.A. Tower, Sector – 24, Noida – 201 301 (U.P.)  
Tel. : 0120-4525000, Fax : 0120-4525015



### About the company

From 2,500 TCD in 2001 26,500 TCD, each year the Company has grown in terms of crushing capacity from Plantation white sugar to Refined sugar of less than 20 ICUMSA, Liquid sugar, Specialty sugar, pharmaceutical grade sugar and now has 21 products to its name.

Some of clients includes all leading Hotel chains like Taj, Lalit, Leela, Lemon Tree, etc., organize retail like Amazon, Flipkart, Blinkit, Zepto etc. and prestigious Institutional sale like Rasna, Safal, Britannia, Cadbury, Pepsi, Parle, Mother Dairy etc. Having an installed capacity of 122 MW, we also have an exportable capacity of 64 MW of Green Power.

Focused now on Bio-fuel. The present capacity is 300 KL per day on C-Heavy Molasses. 25% capacity higher in case of B-Heavy/ syrup.

Uttam sugar mills Ltd. Is the Flagship company of the Groups which started production in 2001 and is today the market leader in the production of double Refined Sugar.

Uttam Sugar comes in both bulk and retail packaging, ranging from 50kg to 1 kg packs and also has festive packs for special occasions

widespread distribution network that traverses through all of Northern India, Central India and parts of Western India like Rajasthan and Gujrat. In addition to this, our clients are some of the best known as FMCG sector like Rasna, Safal, Patanjali, britannia, cadbury & Heinz.

WHY  
UTTAM  
SUGAR?







### About the company

DCM Shriram Sugar factories are located in Ajbapur, Rupapur, Hariawan and Loni in Uttar Pradesh, with a combined installed capacity of 41,000 TCD (tonnes crushed of sugarcane daily) and a power-generating capacity of 166 MW. It also operates three Distilleries with 560 KLD capacity.

It also operates three Distilleries with 560 KLD capacity. The Hybrid seed operations- 'Bioseed', R&D facility is in Hyderabad (India) and has an international presence in Philippines too. Fenesta Building Systems has 1 extrusion plant in Kota and 6 fabrication units in Bhiwadi, Chennai, Bhubaneswar and Hyderabad.

### Our outlook

- # Relentless efforts in increasing scale of operation
- # Exploiting Multiple revenue streams
- # Optimizing costs
- # Building efficiencies & flexibilities in the businesses and more importantly the financial discipline.



- ★ Shriram Fertilizers & Chemicals, Kota - Rajasthan
- △ Fenesta Building Systems Kota, Bhiwadi, Chennai, Bhubaneswar Hyderabad
- ⊙ Shriram Alkali & Chemicals, Bharuch-Gujarat
- ⊙ Bioseed Hyderabad & Philippines
- ⊙ Sugar Production units (Central UP) - Ajbapur, Rupapur, Hariawan & Loni & Distillery Units-Ajbapur & Hariawan







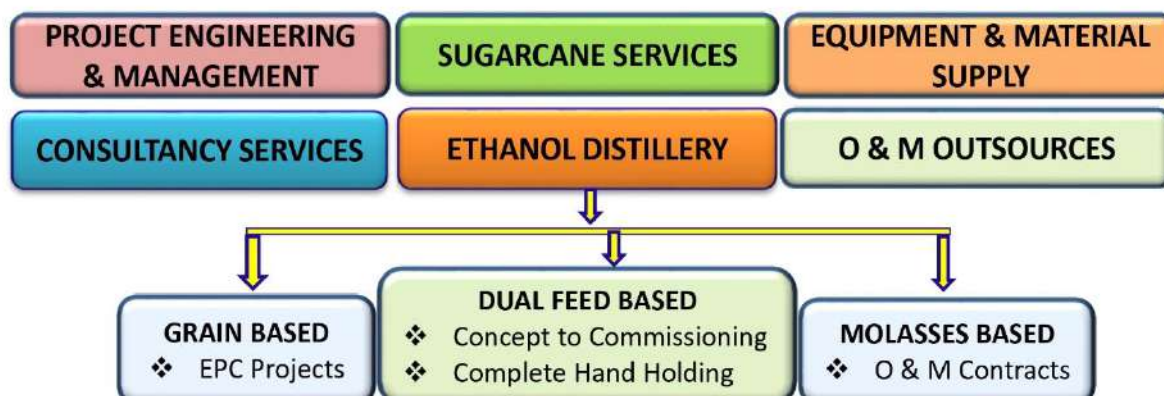
The Global Cane Sugar Services Pvt Ltd. (GCS) comprises of highly experienced team of sugar industry professionals who have operated and managed sugar plants, refineries, Co-generation plants, distilleries as well as Sugarcane Estates. The professionals have practical experience in sugar factory operations and maintenance, brown field expansions, setting up Greenfield sugar projects and sugarcane development programs.

GCS is the only consulting organization in India which is 360° company covering entire aspects of the sugar value chain. GCS has highly specialized and low cost tailor made solutions for operational improvement and to reduce factory O&M cost. GCS is providing its services in India as well as abroad.

### GCS SERVICES IN SUGAR, COGEN & DISTILLERY

#### SERVICES FOR ENTIRE SUGARCANE VALUE CHAIN

- ☐ Latest various Process options for Raw & Refining Technology.
- ☐ Production options for various Speciality Sugars & Marketing Strategy.
- ☐ Low cost raw refined sugar technologies.
- ☐ Energy efficient steam economy projects.
- ☐ Technical audits and performance improvement.
- ☐ Debottlenecking of the Sugar & Distillery Plants.
- ☐ Modern cane management concepts.
- ☐ Drone Technology & Artificial Intelligence in Cane Agriculture.
- ☐ Operation and Maintenance.



- ☐ Design & Planning of the Projects.
- ☐ Project Implementation Capabilities (EPC & Turnkey).
- ☐ Hand Holdings of Various Approvals/Clearances, Permits Licenses and certifications.
- ☐ Pre Feasibility Reports (PFRs) & Detailed Project Reports (DPRs).
- ☐ Implementation of New Technologies in Ethanol Distillery.

**GLOBAL CANESUGAR SERVICES PVT. LTD., 4<sup>th</sup> Floor, TDI Center, Jasola, NEW DELHI**

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CONVENER:

**Dr. Monika Thakur,**

AIFT, Amity University Uttar Pradesh

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ORGANIZING SECRETARY:

**Dr. Renu Khedkar,**

AIFT, Amity University Uttar Pradesh



## ABOUT AMITY UNIVERSITY UTTAR PRADESH, NOIDA

Amity University Uttar Pradesh (AUUP) is one of the leading private universities of India founded by Dr. Ashok K Chauhan. The mission of AUUP is To provide education at all levels in all disciplines of modern times and in the futuristic and emerging frontier areas of knowledge, learning and research and to develop the overall personality of students by making them not only excellent professionals but also good individuals, with understanding and regard for human values, pride in their heritage and culture, a sense of right and wrong and yearning for perfection and imbibe attributes of courage of conviction and action. Amity University is accredited by reputed national and international bodies at university and program level such as the Western Association of Schools and Colleges (WSCUC), USA and the Quality Assurance Agency for Higher Education (QAA), UK and National Assessment and Accreditation Council (NAAC), India. Amity University is ranked among the top universities in India by several prestigious ranking bodies, including the National Institutional Ranking Framework (NIRF) and the Times Higher Education and QS World University Rankings.

## ABOUT AMITY INSTITUTE OF FOOD TECHNOLOGY, AMITY UNIVERSITY UTTAR PRADESH, NOIDA

With our Founder President's unparalleled vision and dynamic leadership of Dr. Ashok K. Chauhan, Amity Institute of Food Technology (AIFT) was established under the aegis of Amity University Uttar Pradesh, Noida in 2006. As a mission, AIFT has been functioning as a model educational & Research institution and creating valuable human resource in the Food Science, Technology and Nutrition Domain for the last 17 years.

AIFT offers three Under-graduate programmes – B. Tech. (Food Technology), B.Tech. (Food Technology) – International, B. Sc. (H) (Nutrition & Dietetics); two Post-graduate programmes – M. Tech. (Food Technology) and M.Sc. (Foods & Nutrition) and two Doctoral programmes – Ph.D. (Food Technology) & Ph.D. (Foods & Nutrition). It has also successfully built Academia-Industry linkages to facilitate easy access for students for their Trainings and Placements. Institute is also taking a big leap in discovering, developing and designing next generation food and nutrition concepts which would eventually meet the needs of Industry and people to overcome malnutrition, optimal conservation and utilization of nation's food resources. The Institute has several thematic research clusters as: functional foods & nutraceuticals, biofilms, underutilized foods, valorizations, food equipment designing, meat analogues, food safety & sustainability. The department collaborates with many national and international organizations to generate cutting-edge technologies for sustainable food systems.

## KNOWLEDGE PARTNER:



National Sugar Institute,  
Uttar Pradesh, Kanpur

It was the Indian Sugar Committee constituted by Government of India in 1920 that first recommended the establishment of an All India Institute for research in Sugar Technology. The need for a Central Sugar Research Institute was also emphasized by the Royal Commission on Agriculture in 1928 and Tariff Board in 1930. The Government of India accordingly after having taken over the Sugar Section of Harcourt Butler Technological Institute (HBTI), Kanpur established Imperial Institute of Sugar Technology in October, 1936. After India attained Independence, the name of Institute was changed to Indian Institute of Sugar Technology (IIST). With effect from 1st Jan, 1954 administrative control of the Institute was handed over to the Government of India under the then Ministry of Food and Agriculture. In April, 1957 the name of Institute was again. Changed to National Sugar Institute (NSI). The institute shifted to its present premises situated in Kalyanpur in 1963. The main functions of the Institute are to provide technical education, research, technical consultancy pertaining to Sugar and Allied Industries preparation of Sugar standards for quality control. In addition to the Institute Provides research guidance/facilities to the scholars leading to Ph.D. degree in applied chemistry awarded by various universities.

85 acre Amity University Campus, Noida (New Delhi NCR)



## ADDRESS FOR CORRESPONDENCE

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