



Dr. NUTAN KAUSHIK

Director General, Food and Agriculture Foundation, Amity University

Plant Biotechnology Research / Plant Protection / Food Science,
Agricultural Science / Analytical Chemistry/ Metabolomics



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Personal Details

Date of Birth: 17th June 1966

Languages Known: English
and Hindi

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Profile Summary

Professional with extensive experience of **over 25 years in a R&D** and **over 16 years in PG teaching** in the field of biotechnology, plant

- protection, natural products, analytical chemistry and agriculture policy
- As head of R & D research group involved in **project development and management, laboratory management, supervision and teaching of post graduate, Ph. D. students and researchers, training of other researchers, publication and grant writing**
 - Directed cross-functional & research teams using interactive & motivational leadership; acknowledged for coaching, guiding & mentoring team members to achieve resource wise productivity & optimization
 - Leveraged skills in analysing collected information comparing several types of research data and engaging in safe research activities; specializes in agro industrial research, having worked on development of biopesticides and on methods for monitoring environmental pollution
 - Encouraged researchers to develop skills, knowledge and experience, in aspects of research management such as budget & project management, teaching, publication & conference attendance, outreach activities, and membership of committees
 - Possess strong communication, patience, ethical grounding & team management skills with thorough & methodical approach

Educational Qualification

SL. No.	EXAMS PASSED	UNIVERSITY/ INSTITUTION /BOARD	YEAR OF PASSING	MAIN SUBJECTS TAKEN	SUBJECT OF SPECIALISATION	DIV. / CLASS & % OF MARKS
1	10 th	U P Board	1981	Science, Biology, Maths, Hindi, English,	-	77% (1 st Div Hons.)
2	12 th	U P Board	1983	Physics, Chemistry, Biology, Hindi, English	-	68.4% (1 st Div)
3	B. Sc.	Agra University	1985	Chemistry, Botany, Zoology	-	68.88% (1 st Div)
4	M. Sc.	Agra	1987	Chemistry	Organic	67.7%

		University			Chemistry	(1stDiv)
5.	Ph. D.	Indian Agricultural Research Institute, New Delhi	1991	Soil Science and Agricultural Chemistry	Agricultural Chemistry	3.87/4 (1stDiv)

Professional Career

SL. NO	Name & Address of Employer/ Institute	Post/Fellowship/ Associateship held	Adhoc/regular/tem p./ permanent	Period		Total period of each employment in years, months & days
				From	To	
1.	Indian Agricultural Research Institute, New Delhi	Senior Research Fellow	Adhoc	1987	1991	3 Years 6 months
2.	Indian Agricultural Research Institute, New Delhi	Research Associate	Adhoc	1991	1993	2 Years 2 months
3.	Tata Energy Research Institute, New Delhi	Research Associate	Regular	1993	1999	6 Years
4.	The Energy and Resources Institute, New Delhi	Fellow	Regular	1999	2010	11 Years
5.	The Energy and Resources Institute, New Delhi	Senior Fellow	Regular	2010	2017	7 years
6.	The Energy and Resources Institute, New Delhi	Area Convenor	Administrative Position equivalent to HOD	2000	2017	17 years
7.	TERI University	Adjunct Faculty		2001	2017	16 years
8.	Deutscher Akademischer Austauschdienst(DAAD)	DAAD Research Ambassador	Honorary Position	2010	2011	1 year
9.	Institute of International Agriculture, Michigan State University, USA	Cochran Fellow	Fellowship	2003		1 Month
10.	Wageningen University, The Netherlands	NUFFIC Fellow, Royal Government of Netherlands	Fellowship	2005		1 Month
11.	University of California, Davis, USA	DBT CREST Fellow	Fellowship	2013		7 months
12.	Amity University	Director General	Regular	2017	Till date	

Visiting Scientist

1.	2004, 2006 & 2009	Institut für Pharmazeutische Biologie und Biotechnologie, University of Dusseldorf, Germany	Visiting Scientist
2.	2007, 2008 & 2009	University of Bourgogne, Dijon, France	Visiting Scientist
3.	2010, 2011, 2012, 2015	CSIC, Madrid, Spain	Visiting Scientist
4.	2009 and 2011	University of Melbourne, Australia	Visiting Scientist
5.	2009	Queensland University, Australia	Visiting Scientist
6.	2009 and 2013	Michigan State University, USA	Visiting Scientist
7.	2010 and 2015	ULL, Tenerife, Spain	Visiting Scientist

Expertise/Research Experience

Metabolomics, Development of new analytical methods involving volumetric, spectroscopic and chromatographic techniques, Development of methods for monitoring environmental pollution and develop technologies for control of pollution, Isolation, characterization and bioactivity of plant extracts, Quality analysis for selection of low erucic and low glucosinolate mustard/rapeseed lines by GLC and HPLC. Half-seed analysis for the selection of zero erucic mustard, Bioprospecting of biodiversity for valuable phytochemicals, Agriculture-Food Security, Food Safety and Sustainable Agriculture, Development of Bio pesticides, Demonstration of biological control methods for control of pest and diseases for sustainable agriculture, Persistence and metabolism of pesticides on crops

Key Competencies

- Substantial experience, nearly for a period of two decades, in Research, Project Management, Execution, Training & Capacity Building, Planning, Monitoring, in the areas related to environment, life sciences and agri-rural development.
- Extensive experience proposal writing, donor reporting, budget monitoring and overall management of the project cycle.
- Knowledge and experience with implementation of filed project related to agriculture.
- Team coordination, management, motivation of team members.
- Strong written and oral communication skills.
- Coordination with multilateral/ bilateral agencies and NGOs.
- Readiness to take up initiative and work in new areas
- Training in diverse area of research therefore able to manage interdisciplinary research project

Professional training

1. Training on MOOC for UGC PG E-Pathshala organized by UGC on 24th May 2016
2. 7 month training on metabolomics at UC-Davis under DBT CREST fellowship in 2013
3. ISO-Auditors Training in 2006
4. One week refresher course on 'IPR in Biotechnology' held at National Law School of India University, Bangalore, Nov. 18-23rd, 2002
5. IPR workshop organized by BCIL from 9-11th October 2006
6. Participated in many seminars on Intellectual Property rights, Patents & Protection of Traditional knowledge
7. Integrated Pest Management and Sustainable Agricultural Program from 12th June- 29th June 2003 at Institute of International Agriculture, East Lansing, at Michigan University, USA
8. Training on Separo MPLC system at Royal Institute of Chemistry at KTH, Stockholm, Sweden in September 2004
9. Wageningen International Conference Centre, The Netherlands on Integrated Pest Management for Sustainable Agriculture and Food Safety 2005 from 5th June 2005- 2nd July 2005.
10. Trainers Training Program on 'Developing Media Capacity to Cover Environmental Issues in India - EU-India Cross Cultural Programme' from March 21-24th, 2005.

Merits/Awards

1. BIRAC- Best Innovation in Agriculture 2016 Award
2. Awarded DBT CREST Fellowship in the year 2013
3. Bharat Jyoti Award and certificate of excellence from India International Friendship Society, India in 2012. Selected as DAAD Research Ambassador by Deutscher Akademischer Austauschdienst Dienst in 2010
4. Awarded IARI Senior Fellowship.
5. Awarded ICAR NET Fellowship
6. Awarded NFP Fellowship of The Netherland Government in 2005
7. Awarded Cochran Fellowship of USDA in 2003.
8. Government of Korea Travel Award to deliver a lecture in 1st RDA/ ARNOA International Conference on Asia Organic Agriculture Suweon & Cheonan, Republic of Korea in 2002
9. UNESCO Travel Award for participation in IUPAC Conference on Biodiversity (ICOB-3), Turkey in 2001
10. INSA Young Scientist Travel Award for participation in XIVth International Plant Protection Congress (IPPC) Plant Protection Towards the Third Millennium – Where Chemistry Meets Ecology, Isreal in 1999
11. Awarded Merit Scholarship
12. Notification of lowerucic rapeseed line by varietal release committee in August - 2001(as Co- Scientist)

13. Registration of seven quality lines by ICAR-NBPGR Germplasm Registration Committee (as Co-Scientist).
14. Best poster award for “Antiphytopathogenicity of endophytic fungi isolated from Indian medicinal plants” presented at International Conference on Mycology & Plant Pathology: Biotechnological approaches (ICMPB-2012), February 27-29, 2012 at Banaras Hindu University, Varanasi.
15. 2nd Prize for best poster award for the paper “Endophytic Fungi of *Tylophora indica* for management of wilt and root rot of chickpea” presented at 5th International Conference on Biopesticides: Stakeholders’ Perspectives, New Delhi, 26-30 April, 2008 at IHC, India. pp.71-72
16. Best paper award for “Biological effects of *Tylophora indica* on growth and development of *H. armigera*” paper presented at National Symposium ‘Pesticide: Myths, Realities, and Remedies’, Dec 1-3, 2004, IARI, New Delhi.

Patents

1	Endophytic fungi, extracts and consortium thereof	1026/DEL/2014	Applied
2	A novel microbe consortium for infection mediated production of oleo resins from agarwood	664/DEL/2015	Applied
4	Novel biopesticide compositions and method isolation and characterization of same (Australia)	2009350416	Granted
5	Novel biopesticide compositions and method isolation and characterization of same (Madagascar)	2012/004	Granted
6	Novel biopesticide compositions and method isolation and characterization of same (Morocco)	34655	Granted
7	Novel biopesticide compositions and method isolation and characterization of same (South Africa)	2012/01248	Granted
8	Novel biopesticide compositions and method isolation and characterization of same (ARIPO (Africa))	AP/P/2012/006130	Granted
9	An oil yielding fungal consortium and method of oil extraction from the same.	3183/DEL/2010	Applied
10	A natural source based biopesticide formulation for effective bio-control and the procedure for synthesizing the same	1756/DEL/2011(PoA of 277/DEL/2008)	Applied

11	A process for preparation of biopesticide	1533/DEL/2004	Granted
12	A process for the preparation of biopesticide	1532/DEL/2004	Granted
13	Novel bioactive plant saponin compositions and method for isolation and characterization of the same	1278/DEL/2007	Applied
14	Novel biopesticide compositions and method isolation and characterization of same (India)	277/DEL/2008	Applied
15	Novel biopesticide compositions and method isolation and characterization of same (EPO National Phase)	09 787 610.6	Applied
16	Novel biopesticide compositions and method isolation and characterization of same (Malaysia)	PI 2012000391	Applied
17	Novel biopesticide compositions and method isolation and characterization of same (Indonesia)	A00201200438	Applied
18	Novel biopesticide compositions and method isolation and characterization of same (Philippines)	1-2012-500184	Applied
19	Novel biopesticide compositions and method isolation and characterization of same (US)	13/387,697	Applied
20	Novel biopesticide compositions and method isolation and characterization of same (Mexico)	MX/a/2012/001182	Applied

Membership

1. Editorial Board member of Elsevier Journal Heliyon
2. Guest editor of Springer Journal Phytochemistry Review: Special issue "New Processes and Applications for Plant and Microbial Products" 2012 and 2016
3. Member of Editorial Board ISRN Chromatography
4. Member of IUPAC Plant Protection Committee
5. Member of American Chemical Society
6. Member of Phytochemical Society of Europe
7. Member of Crop Science Society of America, USA

8. Member of American Society of Plant Biologists, USA
9. Member of International Association for the Plant Protection Sciences
10. Life Member of Society for Promotion and Innovation of Biopesticides
11. Life member of Society of Pesticide Science, India.
12. Life member of Indian Society of Plant Genetic Resources
13. Life member IARI Alumni Association.
14. Offered membership of New York Academy of Sciences
15. Served as reviewer of many national and international journals
16. Member of Expert committee on development of Biopesticide Strategy paper
17. Member of Entomologist Society of America
18. DAAD-Alumnus
19. MSU-Alumnus
20. Wageningen University-Alumnus
21. UC-Davis Alumnus

Teaching

Teached two Pre-Ph.D courses on Bioprospecting and GC and HPLC techniques. Took classes for M.Sc 'Environmental Biotechnology and 'Natural Resource Management'.

Networking in India and abroad

As a Coordinator for chemical evaluation of Neem and Jatropha, has worked with more than seventy institutions in India

Has collaborations / contacts with Institutions in Germany, France, USA, Australia, Spain, Canada, Sweden, Finland, Norway, UK, Netherlands, Bangladesh, Korea, Nepal, Israel, Turkey, Pakistan, Mauritius, Vietnam etc.

Editor / Reviewer of Journals

Editorial Board member of Elsevier Journal Heliyon

Editor of Phytochemistry Reviews Issue 4 – December 2012 and upcoming issue of 2016

Editorial Board member of ISRN Chromatography-Analytical Chemistry

Served as reviewer in many Journals such as PLOS ONE, Industrial Crops & Products, Biomass and Bioenergy, PLOS Neglected Tropical Diseases ,3biotech, Journal of the American Oil Chemists' Society, Fitoterapia, Canadian Journal of Plant Pathology , Nat Prod Commun, Plant Cell Reports, Biocatal, J Pest Sci, International Journal of Integrative Biology (IJIB), Annals of the Entomological Society of America, African Journal of Pharmacy and Pharmacology, Asia-Pacific Journal of Chemical Engineering, Energy and Fuels, AJMRR, AJPPX, Ind J PI Path, J bmicrobial and Bichem Tech, J Renewable Energy, J of Med Plant Res, Biharean Biologist, African Journal of Agricultural Research Journal of Chinese Integrative Medicine, Journal of Microbiology and Biotechnology, Biologia Plantarum, Microbial Pathogenesis, CLEAN - Soil, Air, Water Basic Research Journal of Microbiology (BRJMB), British Journal of Pharmaceutical Research, Journal of Scientific Research and Reports, African Journal of Biochemistry Research, Global Research Journal of Microbiology, African Journal of Microbiology Research, World Journal of Biology and Biological Sciences (WJBBS), Philippine Journal of Science (PJS), Polish Journal of Microbiology, Chemistry Central Journal, Antonie van Leeuwenhoek Journal of Microbiology, Indian Journal of Natural Products and Resources (IJNPR), Journal of Ecosystems, Indian Phytopathology, International Journal of Genetics and Molecular Biology, Current Microbiology, African Journal of Biotechnology Scientific Research and Essays, BioMed Research International, African Journal of Pharmacy and Pharmacology, Journal of Plant Breeding and Crop Science, Journal of Essential Oil Research, Journal of Microbial and Biochemical Technology, African Journal of Traditional, Complementary and Alternative medicines (AJTCAM), Makara Journal of Science, Journal of Advanced Chemical Engineering.

Projects handled

International

1. Innovative technologies for improving resource utilization in the Indo-European fish value chains(Re-Value)(EU-Inno-Indigo Bio-economy-PI)
2. Diversity of tomato seed-borne endophytes and their applications for the promotion of plant growth and defense against pathogens (TOMendo)(Indo-Tunisia-PI)
3. International Partnership for Research and Education in energy efficient resource utilization in Food value chains (INTPART) (Indo-Norway-PI)

4. Screening of bioactivity and chemical evaluation of essential oils(INTEROC-Peru-PI)
5. Development of fungal biopesticides (Indo-CSIC, Spain - PI)
6. Utilisation of waste of oilseed industries for valued products (EU-APROPOS-PI)
7. Adaptation to climate change through conservative agriculture for improving the food security of vulnerable poor people in the flood prone Chalan Beel area of Bangladesh (UNEP-BARI-PI)
8. Bioprospecting of Endophytic fungi of medicinal plants for its pesticidal activity (Indo-Spanish-PI)
9. Isolation and characterization of biologically active saponins from Chlorophytum species (Indo-French-PI)
10. Sustainability of pyramided Bt genes in crop plants for insect control (Indo-Australia-PI)
11. Demonstration of IPM modules on vegetable crops (USAID-PI)
12. Bio-prospecting of Metabolites of Endophytic Fungi of Family Poaceae for Pesticidal Activity (DST-DAAD-PI)
13. Screening of phytochemical diversity and bioactivity of *Tylophora indica* (INDO-German- PI)
14. EU–India Economic Cross Cultural Programme(EU- Co-ordinator for Food Security)
15. A workshop on ‘Post WSSD - Developments in Sustainable Agriculture and Rural Development. (TERI and Mitsubishi Research Institute, Japan – PI)
16. Demonstration and Evaluation of Agro-technologies at farmers fields- Monsanto-Co-PI and Coordinator pest management activity)

National

1. Development of fungal biopesticides from endophytes isolated from medicinal plants(DBT-PI)
2. Photobioreactor Design and Harvest Technology for Algal Biofuels (DBT-CoPI)
3. Comprehensive State and Districts Agriculture Plan for Tripura (Govt. of Tripura, India-PI)
4. Development of chemical fingerprinting and chemo metrics methods for quality control of Indian *Berberis* species and their value added products(DST-PI)
5. Integrated approach for characterization, conservation, and value addition of agarwood (*Aquilaria malaccensis*) using biotechnological approaches

6. Prospecting of Oil & Deoiled Cakes of *Jatropha curcas* L. and *Pongamia pinnata* (L.) for value addition (DBT-PI)
7. Chemical Evaluation of progenies quality planting material collection and maintenance under DBT Micro Mission Project (DBT-PI)
8. Updation, Upgradation and maintenance of web based knowledge resource on Biopesticide (DBT-PI)
9. On farm field trials, value addition, and generation of data for 9(3) registration of “TERI - DBT Bollcure” biopesticide technology (DBT-PI)
10. Chemical characterization of *Jatropha* species for identification of trees with high oil content and variable fatty acid profile (DBT - PI and Coordinator, Chemical Evaluation)
11. Biochemical evaluation of neem germplasm for cataloguing and value addition, (NOVODB - PI and Coordinator Chemical Evaluation)
12. NATP on Sustainable Management of Plant Biodiversity: Chemical Characterization of Rapeseed Mustard Germplasm for Glucosinolate Content (NATP - Co-PI)
13. Field evaluation and product development from the extracts of *Eucalyptus* and *Callistemon* against *H. armigera*. (DBT-PI).
14. Chemoprofiling of medicinal plants for their sustainable utilization. DBT - PI).
15. A workshop on Biopesticides for Sustainable Agriculture: Prospects and Constraints. (DBT- PI and Co-ordinator).
16. Synthesis of double low (low erucic acid and low glucosinolate) Indian mustard (*Brassica juncea*(L). Czern and Coss) for genetic enhancement of quality. (NATP- Co-PI).
17. Bioprospecting of Phytochemical diversity in the plants of family Myrtaceae for pesticidal activity (DBT-PI)
18. Induction of genetic variability for generation of prolific fatty acids composition for value addition in *B. juncea* (ICAR-Co-PI)
19. Development of OO varieties of rapeseed mustard (NOVODB - Co-PI)
20. National Network on Improvement of quality of Oilseed Brassica (ICAR-Co-PI)
21. Transfer of high oleic acid content in Indian mustard through interspecific hybridization (ICAR - Co-PI)
22. DISHA (Co-ordinator – Agriculture)
23. Green India 2047 (Co-ordinator-Biodiversity)
24. Patent Pooling and Access to Knowledge: A case study of biotechnology with reference to India (IDRC-Served as expert).
25. Isolation and Characterization of Neem Extracts (ICAR-RA)
26. Developing action and monitoring plan for reclamation of mine-degraded lands through forestry and agriculture interventions and addressing socio-economic and livelihood issues of fringe populations of Vastan Lignite Mine of Gujarat Industrial Power Corporation Ltd (GIPCL), Magrol, Surat(GIPCL-PI for Agriculture activities)

27. Working papers for National Mission on Sustainable Agriculture(Co-ordinator-Biotechnology)
28. Trainers Training Program on Collection of Quality Neem Seed and Selection of Plus Trees (PI)

Conference / Seminar /Training/workshop/ organized

- Workshop on Metabolomics for Plant, Human, and Animal Health at TERI, New Delhi 17-18 November, 2016
- 2nd International Conference on “New Processes and Applications for Plants and Microbial Products (ISNPMP-2016, TERI, New Delhi, 1-2 March 2016
- Symposium on “Metabolites from Endophytic Microorganism to Combat Biotic Stress in Crop Plants” In 250th ACS National Meeting & Exposition, August 16-20, 2015, Boston, Massachusetts USA
- DBT Inter-Ministerial Workshop on Quality Feedstock for Biodiesel” on 23rd July 2015
- Indo-Spanish Mini symposium on Endophyte-Based Biospesticide Development: Progress and Perspectives April 16-17th 2015
- Several Farmers meeting and farmers training program in UP, Karnataka and AP during 2007-2014.
- Workshop on DNA chip-based diagnostic tool for plant pathogen detection.with MSU on 17 November 2014
- Training Course on GC and HPLC Techniques, 9-14 Jun 2014
- Symposium on 'Recent Advances in Biotechnology for Food and Fuel', 19-20 Nov 2014
- Workshop on “Food Systems Innovation in the South and South East Asia Region” in New Delhi, India December 17 and 18, 2013.
- International Conference on Best Practices in Food Safety Implementation” was organized in collaboration with FSSAI, CSIR, ICMR Govt. of India and Michigan State University, USA from March 19 - 20, 2013
- International Conference on Agriculture and Climate Change (ICACC2012), 29-30 Jan 2013
- Workshop on Metabolomics: Basics and Applications to Plant Sciences, 19-23 Nov 2012
- International symposium on 'New processes and applications for plant and microbial products' (isnmp-2012) Date: 14-15 Feb 2012
- Training course on GC and HPLC techniques , 16-21 Jul 2012
- Indo-Australia Workshop on "Sustainability of pyramided Bt genes in crop plants for insect control" 7-9 Jun 2011
- Training programme on GC and HPLC techniques, 6-10 Sep 2010

- Minimizing off-site impacts of pesticides: a risk based approach was done on 26 November 2010.
- 3rd Asian-Link Workshop on Marine Natural Products and Medicinal Plants was organized from 23–25 November 2009.
- 5th International Conference on Biopesticides: Stakeholders' Perspective was organized from 26–30 April 2009.
- Training on Vegetable Grafting for Bacterial wilt resistance 1-3 May 2008
- Hands-on Training-cum-Workshop: application of biotechnology in agriculture was conducted from 9–20 June 2008.
- Workshop on Agricultural Biotechnology: a hands on training in advanced tissue culture and molecular biology techniques 18–23 February 2008.
- Post WSSD - Developments in Sustainable Agriculture and Rural Development. (TERI and Mitsubishi Research Institute, Japan) was conducted on 2 February 2004.
- A workshop on Biopesticides for Sustainable Agriculture: prospects and constraints was organized on 29 January 2003.

List of publications

Book Edited

1. Biopesticides for sustainable Agriculture: Prospects and constraints 2004. Editor: Nutan Kaushik, New Delhi: TERI Press.

Papers in Journals

1. Chhipa H and **Kaushik N** (2017) Fungal and Bacterial Diversity Isolated from *Aquilaria malaccensis* Tree and Soil, Induces Agarospirol Formation within 3 Months after Artificial Infection. *Front. Microbiol.* 8:1286.
2. Chowdhary, K. & **Kaushik N.** (2017). Biodiversity and In Vitro Inhibition Study of Fungal Endophytes of *Chlorophytum borivilianum* Against Selected Phytopathogens *Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci.* <https://doi.org/10.1007/s40011-017-0924-2>
3. Chaudhary, G. & **Kaushik, N** Phytochemical and pharmacological studies in *Pedaliium murex* L.N. *Phytochem Rev* (2017). doi:10.1007/s11101-017-9499-z
4. Chhipa, H., Chowdhary, K. & Kaushik, N. Artificial production of agarwood

- oil in *Aquilaria* sp. by fungi: a review *Phytochem Rev* (2017). doi:10.1007/s11101-017-9492-6
5. Mutiat Ibrahim, **Nutan Kaushik**, Abimbola Sowemimo, Hemraj Chhipa, Trevor Koekemoer, Maryna van de Venter & Olukemi A. Odukoya (2017) Antifungal and antiproliferative activities of endophytic fungi isolated from the leaves of *Markhamiatomentosa*, *Pharmaceutical Biology*, 55:1, 590-595
 6. Mutiat Bolanle Ibrahim, **Nutan Kaushik**, Abimbola Adepeju Sowemimo, Olukemi A. Odukoya. Review of the Phytochemical and Pharmacological Studies of the Genus *Markhamia*. *Pharmacognosy Reviews* Vol 10 / Issue 19 / Jan-Jun 2016.
 7. Kumari, Archana and **Kaushik, Nutan** (2016) Oviposition Deterrents in Herbivorous Insects and their potential use in Integrated Pest Management. *Indian journal of experimental biology* 54(03) 163-174.
 8. Chowdhary K and **Nutan Kaushik (2015)**. Fungal Endophyte Diversity and Bioactivity in the Indian Medicinal Plant *Ocimum sanctum* Linn. *PLoS ONE*. 2015 Nov 3; 10(11):e0141444.
 9. Susheel Kumar and **Nutan Kaushik**. 2013. Endophytic Fungi Isolated from Oil-Seed Crop *Jatropha curcas* Produces Oil and Exhibit Antifungal Activity. *PLoS ONE* 8(2): e56202. (doi:10.1371/journal.pone.0056202).
 10. Mutiat Bolanle Ibrahim, **Nutan Kaushik**¹, Abimbola Adepeju Sowemimo, Olukemi A. Odukoya. Review of the Phytochemical and Pharmacological Studies of the Genus *Markhamia*. *Pharmacognosy Reviews* Vol 10 / Issue 19 / Jan-Jun 2016.
 11. Vanit Kathuria, Sven Ruhl, **Nutan Kaushik**, RuAngelie Edrada-Ebel, Peter Proksch. 2013. Evaluation of bio efficacy of *Tylophora indica* leaf extracts, fractions and pure alkaloids against *Helicoverpa armigera* (Hübner). *Industrial Crops and Products*. Volume 46, April 2013, Pages 274–282
 12. Archana Kumari and **Nutan Kaushik** (2016) Oviposition Deterrents in Herbivorous Insects and their potential use in Integrated Pest Management *Indian Journal of Experimental Biology* 54, 163-174
 13. Susheel Kumar and **Nutan Kaushik** (2013). Batch Culture Fermentation of Endophytic Fungi and Extraction of Their Metabolites. *Bio-protocol* 3(19): e926
 14. Susheel Kumar and **Nutan Kaushik**. (2013). Bioassay of Extracts of the Endophytic Fungi. *Bio-protocol* 3(19): e927. <http://www.bio-protocol.org/e927>
 15. **Nutan Kaushik** and Daya Bhardwaj. 2013. Screening of *Jatropha curcas* germplasm for oil content and fatty acid composition. *Biomass and Bioenergy*. DOI 10.1016/j.biombioe.2013.10.010. *Biomass and Bioenergy* 2013 Vol. 58 pp. 210-218
 16. Susheel Kumar, **Nutan Kaushik** and Peter Proksch. 2013. Identification of antifungal principle in the extract of an endophytic fungus *Chaetomium globosum*, harbored in *Withania somnifera*. *Springer Plus*. 2:37.
 17. Kanika Chowdhury and **Nutan Kaushik**. 2013. Endophytic fungi and their metabolites isolated from Indian Medicinal Plants. *Phytochemistry Reviews*, 2012, Vol. 11, Issue 4, pp 467-485 (DOI 10.1007/s11101-012-9264-2).
 18. Susheel Kumar and **Nutan Kaushik**. (2013). Metabolites of endophytic fungi as novel source of biofungicide: a review *Phytochem Rev* (DOI 10.1007/s11101-013-9271-y)

19. **Nutan Kaushik** and Shankarganesh K (2012). Effect of Bollcure (Eucalyptus Leaf Extract Formulation) on Mustard Aphid, *Lipaphis Erysimi* Kalt., and its Predator Complex. Indian Journal of Entomology. 71: (4); 359-360. (Print ISSN : 0367-8288. Online ISSN : 0974-8172) Online published on 1 December, 2011.
20. Neelam Sharma, Richa Satsangi, Ruchira Pandey, Rakesh Singh, **Nutan Kaushik** and Rishi Kumar Tyagi. 2012. In vitro conservation of *Bacopa monnieri* (L.) using mineral oil. Plant Cell, Tissue & Organ Culture. DOI 10.1007/s11240-012-0194-x
21. U.K. Tomar and **Nutan Kaushik**. 2011. Neem (*Azadirachta indica* A. Jusieu) Biodiversity in India for Bioresource: Azadirachtin-an Important Biopesticide. Asian Journal of Experimental Sciences. 25 (1): 15-21.
22. U.K. Tomar and **Nutan Kaushik**. 2011. Neem (*Azadirachta indica* A. Jusieu) Biodiversity in India for Bioresource: Azadirachtin-an Important Biopesticide. Asian Journal of Experimental Sciences. 25 (1):15-21.
23. U K Tomar, G Singh and **Nutan Kaushik**. 2011. Screening *Azadirachta indica* tree for enhancing azadirachtin and oil contents in dry areas of Gujarat, India. Journal of Forestry Research. 22 (2): 217-224.
24. Susheel Kumar, **Nutan Kaushik**, Ruangelie Edrada-Ebel, Rainer Ebel and Peter Proksch. 2011. Isolation, characterization and bioactivity of endophytic fungi of *Tylophora indica*. World J Microbiol Biotechnol. 27 (3): 571.
25. **Nutan Kaushik**. 2010. Crop pest, climate change, and food security. *Indian Farming*. 60 (7): 54-58.
26. Acharya D, Mitaine-Offer A C, **Nutan Kaushik**, Miyamoto T and Lacaille-Dubois M A. 2010. Steroidal saponins from *Chlorophytum orchidastrum*. J Nat Prod 73: 7-11.
27. Acharya D, Mitaine-Offer A C, **Nutan Kaushik**, Miyamoto T, Paululat T, Lacaille-Dubois M A. 2009. Cytotoxic spirostane type saponins from the roots of *Chlorophytum borivillianum*. J. Nat. Prod. 72 (1): 177–181.
28. Ajanta Birah, M Raghuraman, **Nutan Kaushik** and G P Gupta. 2009. Antifeedant and Growth Inhibitory Effects of *Eucalyptus camaldulensis* and *Callistemon lanceolatus* against *Helicoverpa armigera* (Hubner) Pesticide Research Journal. 21(1): 9-12.
29. Acharya D, Mitaine-Offer A C, **Nutan Kaushik**, Miyamoto T, Paululat T and Lacaille-Dubois M A. 2008. Furostane type steroidal saponins from the roots of *Chlorophytum borivillianum*. Chemica Acta Helvetica. 91(12): 2379-2398.
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 36. Vanit Kathuria and **Nutan Kaushik**. 2006. Potential of Eucalyptus species in insect pest management program. The Indian Forester. 131(12):1564-1576.
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Book chapters

1. **Nutan Kaushik** , Shilpanjai Deshpande Sarma, Harpreet Kaur, Swati Mitechelle Dsouza, Swati Tomar and Anjali Parasnis (2016) People, Planet, and Progress Beyond 2015: in Food Security and Safety, TERI Press, New Delhi, India
2. **Nutan Kaushik**, Sushil Kumar and Kanika Chowdhary (2016) Antiphytopathogenic Metabolites Derived From Endophytic Fungi In : Applications of Fungi and their Management Strategies ,
3. **Nutan Kaushik**, Harpreet Kaur and Kanika Chaudhury (2016) Role of Neem Plantations in Reducing Global Warming , Souvenir Global Neem Conference
4. Kanika Chowdhary and **Nutan Kaushik**(2015) Fungi Antiphytopathogenic Metabolites Derived From Endophytic. In: Applications of Fungi and their Management Strategies , Sunil Deshmukh (Ed) CRC Press, Taylor & Francis Group, LLC,USA
5. A. González-Coloma, A. Cosoveanu, R. Cabrera, C. Giménez, **Nutan Kaushik** (2015) Endophytic fungi and their bioprospection In: Applications of Fungi and their Management Strategies , Sunil Deshmukh (Ed) CRC Press, Taylor & Francis Group, LLC,USA

6. Daya Bhardwaj and **Nutan Kaushik**.(2015) Chromatographic fingerprinting: An emerging tool for quality control and chemo-taxonomy of medicinal plants and their drugs In: Recent trends in Instrumentation and Electronics (RITE-2015)49-58
7. **Nutan Kaushik** and Vikram Kumar (2012). Endophytic fungi for stress tolerance. In: Climate Change and Abiotic Stress Tolerance, Tuteja N, and Gill SS (Eds.) Wiley Wiley-VCH Verlag GmbH & Co. Weinheim, Germany
8. **Nutan Kaushik** and Vineet Sharma. 2008. Technologies for sustainable crop protection. In Agriculture for Food Security and Rural Growth, 109-138, edited by V Dhawan. New Delhi: TERI
9. Susheel Kumar, **Nutan Kaushik**, Ruangelie Edrada-Ebel, Rainer Ebel and Peter Proksch. 2008. Endophytic fungi for pest and disease Management A. Ciancio & K. G. Mukerji (eds.), Integrated Management of Diseases Caused by Fungi, Phytoplasma and Bacteria, 365–387
10. **Nutan Kaushik**(2006) Bollcure: A new bio pesticide for cotton bollworm Organic Crop Protection Technologies for Promoting Export Agri-Horticulture, pp139-144.Edited by S Sithanantham, KP Sanjayan, MC Muralirangan and P. Selvaraj Chennai, Sun Agro Biotech Research Centre and GS Gill Research Institute
11. **Nutan Kaushik** 2006. Quality considerations in *Jatropha curcas* In: Biofuels towards greener and secure energy future, pp.173-180, Edited by P P Bhojvaid, TERI Press, New Delhi
12. Vanit Kathuria and **Nutan Kaushik** 2005. Recent advances in the research on *Ocimum* species for insect-pest management. In: Crop Protection Management Strategies (Ed. D Prasad), pp. 73-84, Daya Publishing House, New Delhi
13. **Nutan Kaushik** 2004. Biopesticides for sustaining organic agricultural production. In Biopesticides for Sustainable Agriculture: Prospects and Constraints, (Ed. Nutan Kaushik). Pp. 13-29. TERI Press, New Delhi.
14. **Nutan Kaushik** and Vanit Kathuria. 2004. *Helicoverpa* (Heliothis) and botanical pesticides: an overview. In Advances in Plant Protection Sciences, edited by D Prasad and Amerika Singh Pp. 156-166, Ekta Publishing House, New Delhi.
15. **Nutan Kaushik** 2000. Integrated Pest Management: Status and Concerns. In: Innovative Pest and Disease Management in Horticultural and Plantation Crops. (Eds. S. Narasimhan, G. Suresh, S. Daniel Wesley). Pp. 124-130. Allied Publishers Limited, New Delhi

Popular Media

1. Nutan Kaushik and Pooja Adhikari.2014. Technological interventions to address food security can prove to be a two-edged sword. scidev.net (<http://www.scidev.net/south-asia/food-security/opinion/technology-alone-cannot-solve-food-security-issues.html>).
2. Nutan Kaushik. 2010. Crop pests, climate change, and food security. Indian Farming
3. Nutan Kaushik. 2004. Green revolution to evergreen revolution. TerraGreen, Issue No. 73.
4. Nutan Kaushik. 2004. Biopesticides for managing the pest in organic agriculture –Agrobios Newsletter, Vol III, No. 1, June 2005.
5. Vanit Kathuria and Nutan Kaushik. 2004. Global Warming and Changing Scenario of Insect-Pests Populations - Pesticide Information
6. Nutan Kaushik. 2004. Green Revolution to Evergreen Revolution. TerraGreen, Issue No. 73.
7. Nutan Kaushik. 2003. Bioprospecting of phytochemical diversity for pesticidal activities. Biome 3(2):6.
8. Nutan Kaushik. 2002. Greening the Chemistry of Pesticides: Indian Perspective. Pesticide Information 28(2): 34-37.
9. Nutan Kaushik. 2000. Variability in Azadirachtin – A choice for selection of planting material. Global Neem Update, Vol. IV (No. 1), Pp. 9-10.
10. Abha Agnihotri and Nutan Kaushik. 1997. Quality Rapeseed Mustard: An ideal oilseed for food, feed and industrial purposes. Indian Farming, September 1997, 34-37.

Research papers in National and International conference proceedings/ Presentations / Abstracts

- 106 Nutan Kaushik Tobias Kind, Oliver Fiehn METABLOMICS FOR UNDERSTANDING THE PLANT CHEMISTRY ACS National Meeting & Exposition, March 13-17, 2016, San Diego, California, USA

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News Paper / Media Coverage of 'Bollcure' Technology

S.No.	Newspaper/Publication	Date	Title of Article
1	The Indian Express	14-Aug-07	TERI's formula to keep bugs at bay: Eucalyptus extract
2	The Tribune	12-Aug-07	Eco-friendly biopesticide for cotton bollworm
3	mint - the wall street journal	13-Aug-07	TERI develops biopesticide that is effective against bollworm
4	The Financial Express	27-Aug-07	TERI finds a cure for bollworm pests
5	Times of India	03-Sep-07	Breakthrough for cotton farming

6.	The Telegraph	August 13, 2007	Green weapon
7.	Press Information Bureau, Gol	November 13, 2007	Transfer Of Bollcure Technology: A Promising Botanical Biopesticide
8.	Indian Express	November 20, 2007	Sri Biotech in Tech Transfer Pact
9.	The Siasat Daily	November 20, 2007	Sri Biotech Raises 100 Crore
10.	The Huffington Post	November 20, 2007	Transfer Of Bollcure Technology: A Promising Botanical Biopesticide
11.	The Hindu	November 20, 2007	Sri Biotech Raises 100 Crore
12.	Farm Chemicals International	14-Aug-07	India: Cotton Biocontrol Product Developed
13.	Financial Express	November 20, 2007	Sri Biotech in Tech Transfer Pact
14.	Indian Textile Observer	November 16, 2007	BCIL transfers the cotton bollworm restriction technology to Sri Biotech
15.	Biopespectrum	October 2007 issue	TERI-DBT Bollcure should be commercially released by 2008
16.	Biotech News	December 2007 issue	Checking Cotton Bollworm

Overseas Visit

Country Visited	Year of Visit	Purpose
Australia	2010, Melbourne	For participation and paper presentation in the "12 th IUPAC International Congress on the Chemistry of Crop Protection, Melbourne 2010"
	2009, Canberra	To participate in the training workshop of the Indo-Australian Biotechnology Fund project 'Sustainability of Pyramided Bt genes for Insect Control in Crop Plants'

	2009, Melbourne	For participation in the inaugural training and planning workshop of the Indo-Australian Biotechnology Fund project 'Sustainability of Pyramided Bt genes for Insect Control in Crop Plants'
	2009, Brisbane,	Visiting Scientist
Bangladesh	2014, Dhaka & Rajshahi	For monitoring of UNEP
	2013, BARI, Dhaka	Visiting Scientist
	2012, Dhaka & Rajshahi	for monitoring of the UNEP funded project
	2010, Dhaka & Rajshahi	Final monitoring of the UNEP funded project Field
	2008, Dhaka	To monitor the progress of the UNEP Project
Belgium	2012, Brussels	To attend EU- APROPOS project meeting
China	2011, Qingdao &Shanghi	To present a paper in the 5 th Asian Link Workshop on Natural Product Chemistry & Annual meeting of NSFC major international joint project
Dubai	2016 and 2017	Academic visit
France	2009, Dijon	Visiting Scientist
	2008, Dijon	To participate in the mid-term review of the Indo-French Project and project visit
	2007, Dijon	Visiting Scientist
	2014, Potsdam	For presentation of paper in Apropos Seminar " Best from Rest
	2013, IGV, Potsdam	Visiting Scientist

Germany	2013, Dusseldorf University	Visiting Scientist
	2012, Berlin	To attend APROPOS project initiation meeting
	2011, Potsdam University	EU project meeting
	2010, Dusseldorf University	To present a paper in a symposium on "Bioactive Marine Natural Products"
	2009, Dusseldorf University	To participate in a project personnel exchange programme under DST-DAAD project
	2006, Dusseldorf University	Visiting Scientist
	2006, Dusseldorf University	Visiting Scientist
Isreal	1999, Tel Aviv & Jerusalem,	To present a paper in an XIVTH International Plant Protection Congress (IPPC) Plant Protection Towards the Third Millennium – Where Chemistry Meets Ecology
Lithuania,	2014, Vilnius	Visiting Scientist
Norway	2016, Oslo	Participation in Indo-Norway Workshop
Nepal	2012, Pokhora Kathmandu,	To attend IPM-CRSP project meeting
	2003, Kathmandu	To deliver a lecture in GECAFS Indo-Gangetic Plain Food Systems "Proposal Planning" workshop
Netherlands	2005, Amsterdam, Wageningen	To participate in the Training Programme on Integrated Pest Management for

		Sustainable Agriculture and Food Safety 2005
Poland	2004, Pulawy	For Oral presentation of paper in International Conference on Saponins "Phytochemistry & Application of Plant Saponins"
Republic of Korea	2002, Seoul	To deliver a lecture in 1 st RDA/ ARNOA International Conference on Asia Organic Agriculture Suweon & Cheonan
Spain	2015, CSIC Spain	Visiting Scientist.
	2013, Terrassa	EU project meeting
	2012, CSIC, Madrid	Visiting Scientist
	2012, CSIC, Madrid	Visiting Scientist
	2011, CSIC, Madrid & VLL Tenerife	Visiting Scientist
	2010, CSIC, Madrid & VLL Tenerife	Visiting Scientist
Sweden	2004, KTH, Stockholm	For training on Separo MPLC system
Uganda	2014, Entebbe	For IPMCRSP project review meeting
Thailand	2011. Bangkok, Pathom	To present a paper in 'Sixth International Workshop on Management of the Diamondback Moth and Other Crucifer Insect Pests'
Turkey	2001, Antalya	To present a paper in IUPAC Conference on Biodiversity (ICOB-3)
UK	2007, Rothamsted	Visiting scientists
	2016, San Diego ,	To present a paper in ACS conference on metabolomics.

USA	2016, Washington, DC,	To participate in Food Chain Reaction Games panel discussion.
	2015, Washington, DC,	To participate in Food Chain Reaction Games
	2015, Boston	To organize a symposium and present paper in 250 th American Chemical Society meeting
	2014, San Francisco	To present paper in IUPAC 2014 and ACS meeting
	2013, Davis	To avail DBT Crest Fellowship
	2013, Michigan State University	Visiting Scientist
	2012, Providence, Rhode Island,	To present a paper in APS meeting
	2011, Honolulu	To present a paper at the APS-IPPC Joint Meeting
	2011, Davis	UC-Davis
	2009 , Oregon	To participate in "2008 APS Annual Meeting"
	2008, Michigan State University	To participate in Global IPM Forum
	2008, Virginia Tech University	To interact with scientists working on IPMCRSP Projects
	2003, Michigan University	To participate in training On Integrated Pest Management and Sustainable Agricultural Programme
Vietnam	2008, Hanoi	To participate in "2nd EU-Asian-Link Workshop"
Dubai	2016,2017	
Norway	2016	
Taiwan	2017	
Tunisia	2018	

Supervision of Doctoral Thesis

1. Vanit Kathuria: Evaluation of biological activity of various plant species against *Helicoverpa armigera* (Hübner).
2. Susheel Kumar: Bioprospecting of Endophytic Fungi for Pesticidal Activity.
3. Debabrata Acharya (Co-supervisor , Registered at University of Dijon, France): Isolation and Characterization of Biologically Active Saponins from *Chlorophytum* Species.
4. Daya Bhardwaj: Development of chemical fingerprinting and chemometrics methods for quality control of Indian *Berberis* species and their related value added products.
5. Kanika Chaudhary: Bioprospecting of endophytic fungi isolated from selected Indian medicinal plants.
6. Kirti Rawat : Characterization of *Fusarium. fujikuroi* isolate for the female sterility, vegetative compatibility, fungicidal tolerance and the efficacy of biocontrol agents

Supervision of Masters/Bachelors Thesis

S.No	Trainee Name	Graduate/ Under Graduate	Year	Research Topic
1	Sonal Agrawal	Graduate	2016	Screening of fungicidal and insecticidal potentials of endophytic fungi and their metabolites
2	Priyanka	Graduate	2016	Bioprospecting Extracts of Endophytic Fungi and their extracts for Antifungal, Antibacterial and Insecticidal activity
3	Pragya Tiwari	Graduate	2016	Extraction and Screening of the bioactive compound from endophytic fungal strains for identifying their potential as bio pesticides
4	Bahvya	Graduate	2016	Screening and characterization of Endophytic Fungi EFI-674 for analysis of its Bioactivity against Phytopathogenic Fungi and Insect Pests

5	Yamini Rusia	Graduate	2016	Geographical variability of Berberis on the basis of HPLC Marker based approach
6	Radhika Sinha	Graduate	2015	Bioprospecting Extracts Of Plants And Endophytic Fungi For Their Antifungal And Antifeedancy Activity
7	Versha Chandra	Graduate	2015	GC-MS analysis of artificially infected agarwood of aquilaria malennncesis.
8	Pooja Govil	Graduate	2015	Gas Chromatographic-Mass spectroscopic analysis of In-Vitro Bio-converted agarwood by endophytic microbes
9	Shreya Goyal	Under Graduate	2015	Techniques for bioprospecting
10	Akshay Saini	Under Graduate	2015	Techniques for bioprospecting
11	Payal Bansal	Graduate	2014	Study of agarwood bioconversion by endophytic bacteria of agarwood and their characterization by GC-MS
12	Juhi Tilwani	Graduate	2014	In vitro study of agarwood bioconversion by endophytic fungi and their characterization by GC-MS
13	Shivika Agarwal	Graduate	2014	Bioprospecting of Microbial and plant biodiversity
14	Sharanya Unnikrishnan	Graduate	2014	Biosynthesis of Metal Nanoparticles and their Anti-Fungal and Anti-Insecticidal Efficiency
15	Victoria Wahengbam	Graduate	2014	Isolation of Endophytes and its biochemical characterization
16	Sindhuraj Mukherjee	Graduate	2011	Extraction of secondary metabolites from endophytic fungi
17	Neha Sami	Graduate	2009-11	Insecticidal activity of non-edible oils and extracts derived from jatropa and karanja

18	Roopa Malik	Graduate		Effect of various substrate/culture on the yield and profile of secondary metabolites
19	Jaspreet Kaur	Graduate	2012	Antifungal activity of extracts of endophytic fungi
20	Kishori Kumari Choudhary	Graduate	2011	Optimisation of culture condition for mass multiplication of endophytic fungi isolated from Indian medicinal plants
21	Raghunandan Singh Nathawat	Graduate	2009	Bioprospecting of the extracts of two medicinal plants jatropa curcus and pongamia pinnata for their activity against helicoverpa armigera(Hubner)
22	Deepanshi	Graduate	2012	Optimization of culture conditions of endophytic fungi using different parameters for metabolite production
23	Vineeta Kaushik	Graduate	2012	Antifungal activity of extracts of endophytic fungi isolated from Indian medicinal plants
24	Sarita	Graduate	2012	Antifeedant activity of different extracts obtained from various Indian medicinal plants and endhophytic fungi against Plutella xylostella (Russell) and Spodoptera litura (Fabricis)
25	M Manjula Devi	Graduate	2002	Effect of storage on bioefficacy of TERI formulations and development of analytical methods for monitoring their quality
26	Bharti Gaur	Graduate	1995	Applications of Gas-Chromatography in Bio-sciences
27	Jyoti Rani	Graduate	2013	Antifungal activities of endophytes and their extracts, isolated from Indian Medicinal Plants
28	Nima Arvindan	Graduate	2012	Project report on "Bioprospecting of secondary metabolites of extracts of endophytic fungi isolated from Indian Medicinal Plants

29	Tushita Attre	Graduate	2013	Analysis of secondary metabolites from India Medicinal Plants and their endophytes
30	Hitika Tripathi	Graduate	2013	Bioprospecting of Secondary Metabolites from Endophytes: Tools and Techniques
31	Nisha Yadav	Graduate	2013	Bioprospecting of bioactive secondary metabolites produced by endophytic bacteria of <i>Aquilaria malaccensis</i> against pathogenic fungi
32	Chakori Shukla	Graduate	2013	Project report on "bioprospecting of secondary metabolites of endophytic fungi isolated from <i>Aquilaria malaccensis</i>
33	Bhanu Priya	Graduate	2013	Antifungal activity of endophytes isolated from Indian Medicinal Plants and their morphological characterization
34	Shuruti Rawat	Graduate	2013	Bioprospecting of endophytes for antifungal activity against plant pathogenic fungi
35	Archana Verma	Graduate	2006	Isolation and characterization of fungi infecting <i>Jatropha curcas</i> L seeds, its impact on seed quality and anti-fungal activity of <i>Jatropha</i> seed extracts
36	Prashant Tiwari (MBA)	Graduate	2002	Business of Biopesticides: An Indian Perspective (Delhi & NCR)
37	Saurabh Bhatia	Under Graduate	2009	optimization of extraction process
38	Ekta Joshi	Under Graduate	2013	Biochemical variability in Brassica and <i>Jatropha Curcas</i> - a biodiesel species.
39	Harpreet	Under Graduate	2013	Biochemical variability in Brassica and <i>Jatropha Curcas</i> - a biodiesel species.
40	Neha Sharma	Under Graduate	2013	Antifungal activity of different extracts obtained from endophytic fungi against pathogenic fungi

41	Raghav Sharma	Under Graduate	2008	Standardisation of capsaicin extraction
42	Vikas Tyagi	Under Graduate		Effect of fungal infection on Jatropha oil content and oil quality
43	Aastha Sharma	Under Graduate	2013	Project report on "Bioprospecting of Secondary Metabolites from Endophytes: Tools and Techniques
44	Purnima	Under Graduate	2004	Application of GLC & HPLC in Food Analysis
45	Aparna	Under Graduate	2004	Analysis of Drugs and Vitamins by HPLC
46	Parul Choudhury	Under Graduate	2000	Bioprospecting of plant species.

Significant research contributions

a) *Bioprospecting of biodiversity*

Currently working on bioprospecting of phytochemical and microbial diversity which focuses on screening the biodiversity for bioactive molecules.. The work in this direction has led to the identification of new molecules and development of new biopesticide formulations "Bollcure" from eucalyptus leaves under a project supported by the Department of Biotechnology, Government of India, under its Bioprospecting Network. The formulation is registered in India and the Technology has been Licensed to Sri Biotech, Hyderabad.

Study on the chemical variability of *Withania somnifera* revealed lot of morphological and chemical variability in *W. somnifera*. The cultivated varieties of *W. somnifera* were found belonging to chemotype-I having withanolide-A as major constituent and with significantly high withanolide content as compared to the wild one. Most of the Indian germplasm is found to be intermediate type of chemotype-I and chemotype-II having withanolide-A and withanolide-D as two major withanolides. The study further reveals that the withanolide content in leaves is maximum during the vegetative phase and decreases drastically during the harvest stage. Withanolide content was found to be not effected the by environment. Accessions having high polysaccharide content (>15%) have been identified.

The gymnemic acid content in the 18 accessions of the *Gymnema sylvestre* varied from 0.2290 to 2.53%. Highest gymnemic acid was recorded in accession GS-12. Based on the Gymnemic acid content *Gymnema sylvestre* population formed two major clusters GS13, GH1 and GS12 together formed one cluster while rest other formed second cluster.

Work on standardization of protocol for tylophorine estimation and study of tylophorine diversity in *Tylophora indica* was studied in DBT-INDO-FRG project implemented by me as PI in collaboration with University of Heinrich Heine, Dusseldorf, Germany. A protocol for estimation of Tylophorine content by HPLC has been standardized using LC-MS. Active fraction having activity 155 times higher than the crude extract has been identified. 5 alkaloids present in *T. indica* were isolated, purified and screened for pesticidal activity. HPLC based method for alkaloidal profiling and tylophorine estimation has been developed using HPLC-MS (liquid chromatography-mass spectrometry). The method was employed to generate the alkaloid profiles of 30 accessions of *T. indica* collected from India with quantification of tylophorine content in these accessions. Further active fractions having good activity against lepidopteran pests like *Helicoverpa armigera* and *Spodoptera litura* have been identified with GI50 value of 10 ppm.

To explore the biodiversity and bio prospecting of endophytic microorganisms isolated from different microhabitats in search for novel molecules of biological importance is another important area of research presently under investigation. More than 1500 endophytes have been isolated from different medicinal plants growing in India and screened against a plethora of plant pathogenic fungi for antagonistic activity, phytotoxicity studies, and antifeedancy activity against plant pests of economically important crops. A significant no. of endophytes have shown promising results and bioactive metabolites produced by these endophytes have been characterized. These endophytes are currently under various stages of evaluation and subsequent development and in near future may become a part of Integrated Pest Management programme.

Also working on development of artificial inoculation method for oleoresin production and chemical diversity of oleoresins present in agar wood of North East region of India. The oleoresins from agar wood is very expensive in nature and its cost is approx. 60,000-1, 00,000 per tola and it provides medicinal and fragrance applications. In natural process the infection takes approx. 10 to 20 years. We are looking for potential microorganism which can infect this plant in short time period.

b) Identification of elite germplasm of biodiesel plants

Bio-diesel has emerged as a major alternative to petro-diesel. The Planning Commission, Govt. of India, has initiated an ambitious program of growing *Jatropha curcas* and *Pongamia pinnata* on wastelands for bio-diesel production. The success of this initiative requires the use of improved planting material of *Jatropha* and *Pongamia* giving high seed yield and oil content, which is non-existent at present. Seed yield and oil content, are the two most important traits for bio-diesel species. Both of these characters can be further factorised in to relatively simpler traits such as number of mature fruits per cyme/ raceme, 100-seed weight, seed-kernel ratio and kernel oil content (%). Other desirable traits are superior fatty acid composition, plant hardiness, short and compact canopy (for easy harvesting and high-density plantation) and synchronised maturity. All these characters need to be pyramided together through stepwise screening and selection. At present a large number of accessions of *Jatropha* and *Pongamia* are being collected by various institutes under Bio-diesel network programs funded by DBT and NOVODB. I have been designated as the co-coordinator for chemical

analysis of these germplasm collections under DBT and NOVODB networks. More than 2000 accessions of *Jatropha curcas* and more than 250 accessions of *Pongamia pinnata* collected under the network were analysed their oil content and fatty acid composition. Accessions having > 35% of oil content have been identified. These accessions will serve as valuable germplasm, not only for plantation programs but also for genetic improvement of the tree.

c) Demonstration of IPM module at farmer's field

As a coordinator, I am also actively involved in promotion of IPM (integrated pest management) as an important principle on which sustainable crop protection is based on for solving ecological and health problems posed by synthetic pesticides. Practices for preventing pest damage in IPM include inspecting and monitoring crops for damage, using mechanical trapping devices, botanical pesticides, natural predators/parasites, insect growth regulators, mating disruption substances and, if necessary, only need-based and judicious use of chemical pesticides. IPM modules having biopesticides such as Trichoderma, Trichogramma, and neem-based pesticides as pest control measures have been designed and demonstrated on various crops. The interventions not only reduced the load of pesticides in the environment, and food but also increased yields and thereby incomes. IPM modules were demonstrated for vegetable crops like potato, cabbage, chilly and beans in the state of Uttaranchal. Currently IPM demonstration on vegetable crops like tomato, okra, brinjal, and cucurbits are being undertaken in 15 villages of AP, Karnataka, and UP under USAID project with Virginia Tech University, USA.

d) Development of nutritionally improved strains of rapeseed- mustard

Actively involved as co-scientist in development of several nutritionally improved strains of rapeseed mustard. Seven of these varieties are registered with ICAR-NBPGR registration committee. One of these strains, TERI-Uttam, has been identified for cultivation in the state of Madhya Pradesh.

e) Agriculture policy and planning, Food Security and food safety

I have been actively involved in research on agriculture policy and planning. Developed a road map for Agriculture in India for 2047 in DISHA project. Was part of the Study carried out on agriculture and climate change under Agriculture Mission of Ministry of Agriculture. Prepared a white paper on Food Security and climate change in South and South East Asia for USAID GCFSI Innovation lab of Michigan State University (MSU), USA. Prepared Comprehensive State and District Agriculture plan for Tripura State. Did a project on Food safety with MSU.

f) Training and capacity building

Training and capacity building is another important activity. "One-week Training Programme on GLC (gas liquid chromatography) and HPLC (high performance liquid chromatography) Techniques" and on "metabolomics" have been organized as part of a series of training on this theme to enhance the skills of scientists, post graduate students and those involved in quality control.