Vibhav Gautam, Ph.D.

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Name: Dr. Vibhav Gautam
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Current Employment: Assistant Professor at Centre for Experimental Medicine and Surgery, Institute of Medical Sciences, Banaras Hindu University, Varanasi-Uttar Pradesh, India.

Postdoctoral Experience (PDF) - Research associate at Dr. Ananda K. Sarkar lab (December 2016- December 2018) at National Institute of Plant Genome Research (NIPGR), New Delhi, India.

Research Interests: At CEMS-IMS, BHU, I am in the process of establishing my research laboratory in the area of phytomedicine. In addition to phytomedicine, I would be also working on selected miRNAs isolated from medicinal plants for the treatment of particular diseases.

Educational qualifications

Doctor of Philosophy (PhD): 2010-2016 from NIPGR, New Delhi, India (First division). In my PhD, I worked in the area of plant molecular biology and development biology from Dr. Ananda K. Sarkar Laboratory. Title of the PhD thesis was "Small RNA mediated regulation of root architecture in *Zea mays* (maize)", (First division).

Master of Science (M.Sc.): 2008-2010 from University of Pune, Pune, India in Biotechnology (First division). In my M.Sc., I performed the minor project, which was entitled as 'Molecular characterisation of microbial content to validate commercial Probiotic formulations' under the guidance of Dr. Yogesh S. Shouche, at the National Centre for Cell Science-Pune, from January 2010 – April 2010, (First division).

Bachelor of Science (B.Sc.): 2004-2007 from University of Kanpur, Kanpur, India in Zoology, Botany and Chemistry (First division).

Research publications:

1. **Gautam V, Singh A, Verma S, Singh S, Chatterjee S, Sarkar AK.** Whole mount in situ localization of miRNAs and target mRNA transcripts in plants. **3 Biotech, 2019** May;9(5):193. doi: 10.1007/s13205-019-1704-x. Epub 2019 Apr 29, **Impact factor – 1.5.**

2. **Verma S, Gautam V, Sarkar AK.** Improved laser capture microdissection (LCM)-based method for isolation of RNA including miRNAs and expression analysis in woody apple bud meristem**. Planta, 2019** Jun;249(6):2015-2020. doi: 10.1007/s00425-019-03127-0. Epub 2019 Apr 11, **Impact factor – 3.6.**

3. **Kumar A, Gautam V, Kumar P, Mukherjee S, Verma S, Sarkar AK.** Identification and co-evolution pattern of stem cell regulator miR394s and their targets among diverse plant species. BMC Evol Biol. 2019 Feb 14; 19(1):55. doi: 10.1186/s12862-019-1382-7, **Impact factor – 3.6.**

4. **Singh A, Gautam V, Singh S, Sarkar Das S, Verma S, Mishra V, Mukherjee S, and Sarkar AK.** Plant small RNAs: advancement in the understanding of biogenesis and role in plant development. Planta 2018 July 2, https://doi.org/10.1007/s00425-018-2927-5**, Impact factor – 3.6** (equal first author).

5. **Singh A, Roy S, Singh S, Das SS, Gautam V, Kumar A, Yadav S, Singh A, Samantha S, Sarkar AK**. 2017. A hormonal crosstalk regulates root growth in Arabidopsis by modulating expression of miR166/5s, target Class III HD-ZIPs and KANADI genes. Scientific Reports 2017, **Impact factor – 4.25**.

6. **Das SS, Yadav S, Singh A, Gautam V, Sarkar AK, Nandi AK, Karmakar P, Majee M, Mishra NS**, 2017. Expression dynamics of miRNAs and their targets in seed germination conditions reveals miRNA-ta-siRNA crosstalk as regulator of seed germination. Scientific Reports 2017, **DOI:10.1038/s41598-017-18823-8, Impact factor – 4.25.**

7. **Gautam V, Singh A, Verma S, Kumar A, Kumar P, Mahima M, Singh S, Mishra V, and Sarkar AK,** 2017**.** Role of miRNAs in root development of model plant *Arabidopsis thaliana***. Indian J Plant Physiol. DOI :10.1007/s40502-017-0334-8**

8. **Singh S, Singh A, Yadav S, Gautam V, Singh A, Sarkar AK**. 2017. Sirtinol, a Sir2 protein inhibitor, affects stem cell maintenance and root development in Arabidopsis thaliana by modulating auxin-cytokinin signaling components. Sci Rep **7**, 42450, doi: 10.1038/srep42450, **Impact factor – 4.25**.

9. **Singh A, Kumar P, Gautam V, Rengasamy B, Adhikari B, Udayakumar M, Sarkar AK**. 2016. Root transcriptome of two contrasting indica rice cultivars uncovers regulators of root development and physiological responses. Sci Rep **6**, 39266, doi: 10.1038/srep39266, **Impact factor – 4.25**.

10. **Gautam V, Singh A, Singh S, Sarkar AK**. 2016. An Efficient LCM-Based Method for Tissue Specific Expression Analysis of Genes and miRNAs. Sci Rep **6**, 21577, doi: 10.1038/srep21577, **Impact factor – 4.25**.

11. **Barik S, Kumar A, Sarkar Das S, Yadav S, Gautam V, Singh A, Singh S, Sarkar AK**. 2015. Coevolution Pattern and Functional Conservation or Divergence of miR167s and their targets across Diverse Plant Species. Sci Rep **5**, 14611, doi: 10.1038/srep14611, **Impact factor – 4.25**.

12. **Gautam V, Sarkar AK**. 2015. Laser assisted microdissection, an efficient technique to understand tissue specific gene expression patterns and functional genomics in plants. Mol Biotechnol **57**, 299-308, doi: 10.1007/s12033-014-9824-3, **Impact factor – 2.0**.

13. **Barik S, SarkarDas S, Singh A, Gautam V, Kumar P, Majee M, Sarkar AK**. 2014. Phylogenetic analysis reveals conservation and diversification of micro RNA166 genes among diverse plant species. Genomics **103**, 114-121,doi: 10.1016/j.ygeno.2013.11.004, **Impact factor – 2.3**.

Book Chapters :

1. **Gautam V, Sourav Chatterjee.** Laser capture microdissection (LCM) based method for isolation of single cell types from rice tissue and its potential application. *Methods in Molecular Biology, Springer* (Article in press).

2. **Gautam V, Singh A, Singh S, Verma S and Sarkar AK**. Improved method of RNA isolation from laser capture microdissection (LCM) derived- plant tissues. **Methods Mol Biol. 2019**;1933:89-98. doi: 10.1007/978-1-4939-9045-0_5.

3. **Sarkar AK, Mayandi K, Gautam V, Barik S, Das SS**. 2013. Improving the Plant Root System Architecture to Combat Abiotic Stresses Incurred as a Result of Global Climate Changes. Wiley-VCH Verlag GmbH & Co. KGaA, DOI: 10.1002/9783527675265.ch12.

Articles under review:

1. **Gautam V, Verma S, Singh A, Mishra V, Sarkar AK.** Uncovering the miRNA signature regulating embryonic and post-embryonic root meristems in *Arabidopsis thaliana*.

2. **Gautam V, Singh A, Singh S, Yadav S, Kumar P, Sarkar AK.** *LBL1* regulate root development in maize through conserved tasiR-ARF-ARF2/3 module and direct regulation of *RUM1* by ZmARF3d.

3. **Singh S, Yadav S, Singh A, Mahima, Gautam V, Singh A, Sarkar AK.** Auxin signaling regulates *LATERAL ROOT PRIMORDIUM1 (LRP1)* expression during lateral root development in *Arabidopsis.*
4. **Kulkarni A, Dorle MJ, Gautam P, Singh SK, Bajpai PK, Gautam V, Kamble SC**. Cultivating common ground: Mathematical approaches to address biological questions in human welfare and disease management.

5. **Rai N, Singh AK, Singh SK, Gaurishankar B, Kamble SC, Mishra P, Gautam V**. Recent technological advancements in stem cell research for targeted therapeutics.

Technical expertise:

PhD: In my PhD, I gained the experience in the advance form of the microscopies such as LCM, multiphoton confocal, live cell imager and SEM. Apart from basic microbiology and molecular biology techniques, I gained the practical knowledge in the gene expression related techniques such as gene expression microarray, miRNA microarray, northern blotting, EMSA, *in-situ* hybridisation, qRT-PCR, stem loop qRT-PCR and its data interpretation. Additionally, I gained the expertise in tissue fixation and processing using paraplast for studying internal histology of the plant/animal tissues using automated microtome.

M.Sc.: In my M.Sc. project, I gained the hands on expertise on basic molecular biology and microbiology techniques, DGGE and sample preparation for NGS.

Research experience

1. Post doc (December 2016 – December 2018):

After the successful completion of my PhD, I joined Dr. Ananda K Sarkar lab at NIPGR, India for pursuing my post-doctoral work. My post-doctoral work is related to LCM based study to identify the RAM and SAM specific miRNAs in plants.

2. PhD research experience (2010-2016):

In my PhD work, I was interested to understand the role of small RNA and related genes in maize root development. One of the key gene of ta-siRNA biogenesis was chosen as a candidate gene to study its role in maize root development. Using functional genomics approaches and mutational analysis, I addressed the molecular basis of ta-siRNA mediated root development in maize. My PhD work highlighted that the mutation in the selected gene results in the alteration of the entire root architecture in maize suggesting the importance of the ta-siRNA pathway in root development. Using gene expression microarray, we have identified downstream components which are involved in the ta-siRNA component mediated root development in maize. To understand the functional conservation between maize ta-siRNA component and its nearest homolog in *Arabidopsis*, complementation studies were carried out which showed that there exists an evolutionary conservation between ta-siRNA component in monocot and dicot. Taken together, our work uncovers the role of ta-siRNA

pathway in regulating maize root architecture. This understanding suggests that ta-siRNA pathway can be engineered to improve RSA and crop improvement.

In addition to the study of RSA of maize ta-siRNA mutant, I also worked on the molecular network of RSA in rice cultivars, which show distinct root phenotype. **Work from our lab have also developed a LCM based method of RNA extraction in plants, which can be used, for miRNA and total RNA extraction.**

3. M.Sc. research experience (2008-2010)

In my M.Sc. project (four months' project), I tested the validity and claims of the commercially manufactured probiotic drugs, which are known to improve gut micro-flora in humans. The project was a blend of molecular biology, microbiology and preliminary bioinformatics techniques. In my study, I found that majority of the commercial probiotic drugs besides having the claimed microorganisms possess several contaminating micro-organisms which can be harmful for human consumption. Our study highlighted the discrepancy present in the claims of the several probiotic drugs.

Scholarships and awards:

1. Qualified Indian Council of Agricultural Research-Agriculture research services/National eligibility test (ICAR-ASRB NET) 2014 and 2018.
2. Qualified Joint Council of Scientific & Industrial Research-University Grants Commission-National Eligibility Test (CSIR-UGC NET) for junior research fellowship (JRF) twice i.e. 2010 and 2011 among JRF awardees in Life Sciences.
3. Qualified Joint CSIR-UGC NET for lectureship thrice in the area of life sciences.
4. Qualified Graduate Aptitude Test for Engineering (GATE), 2010, in Life sciences with 89 Percentile.
5. Recipient of monthly fellowship from CSIR New Delhi for the period of five years.
6. Recipient of a monthly studentship from the Department of Biotechnology, Govt. of India during M.Sc. at University of Pune.
7. Lifetime membership of the Society of Biological Chemists, India.

Academic Reviewer:

1. PLOS One
2. 3 Biotech
3. Functional & Integrative Genomics
4. BMC Plant Biology
5. Plant Molecular Biology Reporter
6. Plant Cell, Tissue & Organ Culture
7. Scientific Reports
8. Plant Cell Reports

9. Acta Physiologiae Plantarum
10. Journal of Genetics

Invited Talk:

1. Title: **"Application of Biotechnology in Addressing Ayurvedic Research"** Opportunity and Challenges in Ayurveda and Medical Sciences: Global Perspective. 15-28 January 2019, Department of Dravyaguna, Faculty of Ayurveda, Institute of Medical Sciences, Banaras Hindu University.

Conferences attended/Scientific presentation:

1. Oral presentation in the *Arabidopsis* conference (2016) at IISER-Mohali, India.
2. Participation in the ISRFG 2013 held at New Delhi, India.
3. Participation in the national conference 'RNA-2010' at Pune University, Pune, India.
4. Participation in the International conference 'ICBBB-2010' held at Pune University, Pune, India.
5. Participation in the AMI 2010 conference held at NCL-Pune, India.

Personal details

Father's Name- Shri Suryapal
Mother' Name – Smt. Rajeshwari
Date of Birth – 02/01/1987
Gender – Male
Nationality-Indian
Marital Status-Married
Languages known- English, Hindi

Referees (Names and contact details):

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