Curriculum Vitae

Name: **SUSHMA MISHRA**

Designation: Asst. Professor, Dept. of Botany, University of Lucknow, Lucknow, Uttar Pradesh, India

Email Id: mishra_sushma@lkouniv.ac.in; sushmamishra87@gmail.com

Contact number: 8860502400, 7678148413

Specialization: Plant Molecular Biology and Biotechnology

Research Interests

- Plant Microbiome
- Bioprospecting of endophytes for natural products
- Agricultural Sustainability

Research profile in brief:

The research area of Dr. Sushma Mishra involves exploring the diversity and functional contribution of microbiota associated with higher plants using a combination of culture-dependent and independent approaches. Current research interest includes use of plant-associated microbes for agricultural sustainability and bioprospecting of endophytes associated with medicinal plants for production of plant secondary metabolites. Besides, she has been associated with functional and molecular characterization of Cryptochrome 2 (blue light photoreceptor in plants) in Rice and Brassica for her doctoral research. The Brassica Cryptochrome over-expression transgenics were found to be semi-dwarf and early flowering under field-grown conditions. In addition, she has been a part of the Golden Swarna project at IARI which shed light on the abnormal phenotype (reduced grain yield and incomplete panicle exsertion) of Indian golden rice lines. The expression analyses also revealed the leaky expression of seed-specific promoter in the transgenic lines. These research findings have been published in Plant Molecular Biology, PloS One, Applied Microbiology and Biotechnology, Symbiosis, Frontiers in Microbiology, Archives of Microbiology and Critical Reviews in Plant Sciences. She has successfully completed two minor projects and has an ongoing SERB-TARE project.

List of publications

1. **Mishra S***, Sharma S* (2023). Temporal dynamics of endophytic bacterial and fungal communities during spike development in *Piper longum* L. Physiology and Molecular Biology of Plants. 2023 Sep 12, **29**: 1117–1134 **[IF: 3.9]**
2. Singh S[$], Sharma P[$], **Mishra S[$]**, Khurana P & Khurana JP (2023) CRY2 gene of rice (Oryza sativa subsp. indica) encodes a blue light sensory receptor involved in regulating flowering, plant height and partial photomorphogenesis in dark. Plant Cell Reports 42(1):73-89; 1432-203X https://doi.org/10.1007/s00299-022-02937-z Published online: 17 October 2022 ([$] equal contribution) **[IF: 5.9]**
3. Phurailatpam L, Gupta A, Sahu PK, **Mishra S*** (2022) Insights into the functional potential of bacterial endophytes from the ethnomedicinal plant, *Piper longum* L. Symbiosis **87**, 165–174. Published: 24 August 2022 https://doi.org/10.1007/s13199-022-00864-x **[IF: 2.9]**
4. Sharma P[$], Mishra S[$], Burman N, Chatterjee M, Singh S, Pradhan AK, Khurana P, Khurana JP (2022) Characterization of Cry2 genes (CRY2a and CRY2b) of *B. napus* and comparative analysis of BnCRY1 and BnCRY2a in regulating seedling photomorphogenesis. Plant Molecular Biology. Published online 13 July 2022, 110: 161-186 https://doi.org/10.1007/s11103-022-01293-6 ([$]:equal contribution) **[IF:5.3]**
5. **Mishra S***, Bhardwaj P, Sharma S* (2022). Metabolomic insights into endophyte-derived bioactive compounds. Frontiers in Microbiology Vol. 13: 835931. Published online 02 March 2022. doi: 10.3389/fmicb.2022.835931 **[IF: 5.2]**
6. Phurailatpam L, Dalal VK, Singh N, **Mishra S*** (2022) Heavy Metal Stress Alleviation Through Omics Analysis of Soil and Plant Microbiome. Frontiers in Sustainable Food Systems Vol. 5. Published online 31 January 2022 https://doi.org/10.3389/fsufs.2021.817932 **[IF: 4.7]**
7. Sahu PK, Tilgam J, **Mishra S**, Hamid S, Gupta A, Jayalakshmi K, Verma SK, Kharwar RN (2022) Surface sterilization for isolation of endophytes: Ensuring what (not) to grow". Journal of Basic Microbiology 62(6):647-668. Published online 12 January 2022 https://doi.org/10.1002/jobm.202100462 **[IF: 3.1]**
8. **Mishra S***, Sahu PK, Agarwal V, Singh N (2021) Exploiting endophytic microbes as micro-factories for plant secondary metabolite production. Applied Microbiology and Biotechnology, 105(18): 6579-6596 Published online 31 Aug 2021. doi: 10.1007/s00253-021-11527-0 **[IF: 5.2]**
9. **Mishra S***, Goyal D, Phurailatpam (2021) Targeted 16S rRNA gene and ITS2 amplicon sequencing of leaf and spike tissues of *Piper longum* identifies new candidates for bioprospecting

of bioactive compounds. Archives of Microbiology 203(7): 3851-3867 Published online: 19 May 2021 https://doi.org/10.1007/s00203-021-02356-w **[IF: 2.8]**

10. Sahu PK, **Mishra S*** (2021) Effect of hybridization on endophytes: the endo-microbiome dynamics. Symbiosis 84: 369–377. Published: 10 March 2021 https://doi.org/10.1007/s13199-021-00760-w **[IF: 2.9]**
11. **Mishra S***, Bhattacharjee A, Sharma S* (2021) An Ecological Insight into the Multifaceted World of Plant-Endophyte Association. Critical Reviews in Plant Sciences, 40(2), 127-146. Published online: 30 Mar 2021 DOI: 10.1080/07352689.2021.1901044 **[IF: 6.3]**
12. Phurailatpam L, Goyal D and **Mishra S*** (2021) Microbe-Mediated Amelioration of Salinity Stress in Plants. Exploratory Biotechnology Research 1 (1), 80-96 DOI: https://dx.doi.org/10.47204/EBR.1.1.2021.80-96
13. Mintoo MN, **Mishra S** and Dantu PK (2019) Isolation and Identification of Endophytic Bacteria from Piper longum. Proceedings of the National Academy of Sciences, India Section B: Biological Sciences 89(4): 1447-1454 Published online 08 January 2019 https://doi.org/10.1007/s40011-018-01064-8
14. **Mishra S*** and Khurana JP (2017) Emerging Roles and New Paradigms in Signaling Mechanisms of Plant Cryptochromes. Critical Reviews in Plant Sciences, 36 (2): 89-115. Published 09 Aug 2017 https://doi.org/10.1080/07352689.2017.1348725 **[IF: 6.3]**
15. Bollinedi H, Krishnan G, Prabhu KV, Singh NK, **Mishra S**, Khurana JP and Singh AK (2017) Molecular and Functional Characterization of GR2-R1 Event Based Backcross Derived Lines of Golden Rice in the Genetic Background of a Mega Rice Variety Swarna. PLoS ONE 12 (1): e0169600. Published: January 9, 2017 doi:10.1371/journal.pone.0169600 **[IF: 3.7]**.
16. Bollineni H, Gopala Krishnan S, Sundaram RM, Sudhakar D, Prabhu KV, Singh NK, Pal M, **Mishra S**, Khurana JP, Singh AK (2014) Marker-assisted Biofortification of Rice with Pro-vitamin A using Transgenic Golden Rice® lines: Progress and Prospects. Indian Journal of Genetics and Plant Breeding Suppl. 74 (4): 624-630.

Book Chapters

1. **Mishra S**, Gupta D and Ranjan R (2019) Molecular approaches for enhancing stress tolerance in plants. In "Approaches for Enhancing Abiotic Stress Tolerance in Plants." Eds. Mirza Hasanuzzaman, Kamrun Nahar, Masayuki Fujita, Hirosuke Oku, and Tofazzal. Boca Raton: CRC Press, https://doi.org/10.1201/9781351104722. eBook ISBN 9781351104715 pg. 403-414
2. **Mishra S*** (2019) Targeted Genome Editing Tools in Plants. In "Innovations in Life Science Research". Eds: R. P. Sinha, S. Pandey-Rai and N. Ghoshal. NOVA Sci. Pub., USA ISBN: 9781536158687 pg. 129-145

3. Mishra S*, Goyal D, Kumar A, Dantu PK (2019) Biotechnological Applications of β-Glucosidases in Biomass Degradation. In "Recent Advancement in White Biotechnology through Fungi" Volume 3: Perspective for Sustainable Environments. Eds: Ajar Nath Yadav, Sangram Singh, Shashank Mishra, Arti Gupta. Springer Nature Switzerland AG. 9783030255053 pg. 257-281
4. Phurailatpam L and **Mishra S***(2020) Role of Plant Endophytes in Conferring Abiotic Stress Tolerance. In "Plant Ecophysiology and Adaptation under Climate Change - Mechanisms and Perspectives II." Springer, Singapore. Eds. Mirza Hasanuzzaman. 9789811521713, Published online 02 June 2020, pg. 603-628
5. Goyal D, Yadav A, Prasad M, Singh TB, Shrivastava P, Ali A, Dantu PK and **Mishra S*** (2020) Effect of Heavy Metals on Plant Growth: An Overview. In " Contaminants in Agriculture: Sources, Impacts and Management". Eds Mohammad Naeem, Abid Ali Ansari, Sarvajeet Singh Gill. Springer, Cham. 9783030415518 pg. 79-102. 10.1007/978-3-030-41552-5_4
6. Jain D, Phurailatpam L and **Mishra S*** (2020) Microbes-Mediated Mitigation of Drought Stress in Plants: Recent Trends and Future Challenges. In "Advances in Plant Microbiome and Sustainable Agriculture". Springer, Singapore. Eds Ajar Nath Yadav, Ali Asghar Rastegari, Neelam Yadav, Divjot Kour 9789811532030, 483908_1_En, (9) pg. 199-218 (https://doi.org/10.1007/978-981-15-3204-7_9)
7. Goyal D, **Mishra S**, Dantu PK (2020) Arbuscular Mycorrhizae Associations and Role in Mitigation of Drought Stress in Plants. In "Agriculturally Important Fungi for Sustainable Agriculture". 978-3-030-48474-3 Springer, Cham, pg. 81-100.
8. Goyal D, **Mishra S**, Dantu PK (2020) Microbial Technologies for Biorefineries: Current Research and Future Applications. In: Biofuels Production – Sustainability and Advances in Microbial Bioresources. Biofuel and Biorefinery Technologies, vol 11. pp 229-250 Springer, Cham. https://doi.org/10.1007/978-3-030-53933-7_11 (Yadav A.N., Rastegari A.A., Yadav N., Gaur R. (eds))

Conference Proceedings

Phurailatpam L, Goyal D, Dantu, PK and **Mishra S** (2019) Isolation of IAA-producing endophytes from *Piper longum* (L.) . Bioprospecting and Bioactive Compounds from Microbes and Plants. ISBN – 9789381778715) pg: 184-192.

Research Projects

- Successfully completed a minor research project [DEI/GBMF(1932018)] entitled "Identification and Characterization of Endophytes from *Piper longum*", funded by Dayalbagh Educational Institute (Deemed-to-be-University), Amount 3.16 lakhs, April 2018-Sept 2019
- Successfully completed minor research project entitled "Bioprospecting of endophytes from *Piper longum* for production of bioactive compounds and Sustainable Agriculture", Amount Rs. 2 lakhs, July 2020-Dec 2021.
- Ongoing DST SERB-TARE project (2021-2024) on "Enhanced production of piperine using endophytes by elicitation", project amount: Rs. 18, 30, 000; Duration: 3 years

Number of M.Sc. dissertation students guided: 10

1. Namrata: 2018
2. Ekta Singh: 2019
3. Hina Khan: 2019
4. Vishad Agarwal: 2020
5. Yashasvi Singh: 2020
6. Surbhi Kansal: 2020
7. Shreyashi Bansal: 2021
8. Charu Singh: 2021
9. Yogita Parwani: 2021
10. Megha: 2021

Number of **PhD students** guided:

S. No.	Name of Student	Role	Title of thesis	Date of viva-voce examination
1.	Laccy Phurailatpam	As PI	Exploring the Potential of Plant Growth Promoting Endophytes from *Piper longum* L. [AWARDED]	26-12-2022
2.	Deepika Goyal	As Co-PI	Investigations into endophytes in *Pimenta dioica* (L.) Merr. [AWARDED]	17-01-2024

Honour and Recognitions

- Reviewer of the journals
    - Theoretical and Experimental Plant Physiology (TXPP) (IF: 1.682)
    - Frontiers in Plant Sciences (IF: 4.4)
    - Plant Growth Regulation (IF: 2.388)
    - Symbioses (IF: 2.2)
    - Algal Research (IF: 5.014)
    - Frontiers of Microbiology (IF: 5.2)
    - Archives of Microbiology (IF: 2.5)

- **Life Member** of **Indian Science Congress Association**, Kolkata
- **Life Member** of **Indian Botanical Society**
- Granted **University Teaching Assistantship** in the Department of Plant Molecular Biology for 4 years from 2009 - 2013
- Won **Poster prizes** in two international conferences: International Symposium on Plant Signalling and Behaviour, held in March 2014 and Asian Congress on Biotechnology (2013)
- **Gold medalist** in M.Sc. in Plant Molecular Biology and Biotechnology
- **University Medal** in B.Sc. (II year) for securing III position at University level
- Secured **highest marks** in Biology in CBSE Board Class XII at the school level.
- Cleared **CSIR-JRF** (first attempt) in MSc (F) year in December 2008
- Awarded following **Scholarships**:
    - Monsanto Post-graduate Scholarship (2008-09),
    - Rotary Club Scholarship (2008-09) at M.Sc. level
    - South Campus Endowment Scholarship (2007-08) at M.Sc. level
    - Science Meritorious Award (2004-07) at B.Sc. level

Training Programmes

- 15 days hands-on-training programme on "**Recent techniques in DNA and protein analysis**", organized by Jiwaji University, Gwalior, from February 24 to March 11, 2018.
- 3-day short term programme on "**Microbes in Human Welfare**" organized by Department of Biochemical Engineering and Biotechnology, IIT, Delhi, from April 9 to April 11, 2018.
- One month "**Orientation program for Assistant Professors**" organized by Aligarh Muslim University and Dayalbagh Educational Institute, from October 29 to November 28, 2018.

- Participated in a 5-d-workshop on "**CRISPR/Cas9-mediated Genome Editing in Plants"**, organized from May 27 - May 31, 2019, organized by University of Delhi South Campus.
- Two week refresher course in '**Botany and Life Sciences**' organized by UGC HRDC Lucknow University from December 17 – 31, 2019.
- One Week International (Online) Multidisciplinary Faculty Development Programme on '**Applications of Genomics, Metagenomics and Bioinformatics in Biological Systems**' organized by Sri Aurobindo College, University of Delhi & ICMR AIIMS Computational Genomics Centre from August 16 – 20, 2021.
- Attended an online Hindi workshop on "**Application of statistical software for analysis of agricultural and survey data**" during September 6-13, 2023 organised by ICAR-Indian Agricultural Statistical Research Institute, New Delhi.

Talks Delivered

- Invited talk in National Seminar on Role of biotechnology in sustainable agriculture and rural development RBS College Agra on March 4-5, 2017.
- Presented talk in III UGC-SAP webinar organized by Dept. of Botany, Dayalbagh Educational Institute in March 2021.
- Invited talk at UGC-SAP Seminar on March 26, 2022 organized by Dept. of Physics and Computer Science, Dayalbagh Educational Institute, Agra.
- Oral presentation in XLV All India Botanical conference on "Climate Change: Biodiversity, Adaptation and Mitigation" organized by Indian Botanical Society and University of Lucknow from October 14-16, 2022.
- An Oral presentation on "Investigation into spike and root microbiome of *Piper longum* provides interesting clues for bioprospecting of bioactive compounds" in International Conference on Fungal Biology and Plant-Microbe Interactions organized by Banaras Hindu University, from February 16-18, 2024

Conferences attended

- Poster presentation in Indraprastha International Conference on Biotechnology (IICB) organized by Guru Gobind Singh Indraprastha University (GGSIPU) from October 22 to 25, 2013.
- Poster presentation in International Symposium on Rice Functional Genomics (ISRFG) organized by National Institute of Plant Genome Research (NIPGR) and University of Delhi (DU) from November 20-23, 2013

- Poster presentation in Asian Congress on Biotechnology (ACB) organized by Indian Institute of Technology (IIT) December 15-19, 2013
- Poster presentation in International Symposium on Plant Signalling and Behaviour organized by University of Delhi (DU) March 7-10, 2014
- Poster presentation in International Plant Physiology Conference organized by Jawaharlal Nehru University (JNU) and National Institute of Plant Genome Research (NIPGR) December 11-14, 2015
- Poster presentation in National Symposium on Germplasm to Genes organized by National Research Centre on plant Biotechnology, IARI August 9-11, 2015
- Participated in National Conference on Bioprospecting and Bioactive compounds from microbes and plants held on March, 28-29, 2019 at Dayalbagh Educational Institute, Agra.
- Participated in Indo-US workshop on Climate Resilience organized by Dayalbagh Educational Institute, Agra on June 14-15, 2019.
- Two week refresher course in 'Botany and Life Sciences' organized by UGC HRDC Lucknow University from December 17 – 31, 2019.
- Attended 3-day National Webinar on Geospatial Approaches for Agricultural Water Management organized by Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar, during 07-09th October 2020
- Attended 27th DR. B.P. Pal Memorial Lecture on "Reforms for Secure and Sustainable Agriculture: A road map" on May 27, 2020 organized by ICAR-IARI.
- Attended Webinar on "Fascinating journey from Discovery to Porduct" organized by Phytobiomes Alliance and Bayer on September 20, 2020
- Attended webinar on ' Symbiosis: When living together is a win- win' organized by the International Symbiosis Society on July 30, 2020
- Attended 3rd Seminar on Bioprospecting and Bioactive compounds from microbes and plants held on March, 24, 2021 at DEI, Agra and presented talk on Bio-prospecting of Endophytes for bioactive compounds
- Oral presentation at the XLV All India Botanical conference on "Climate Change: Biodiversity, Adaptation and Mitigation" organized by Indian Botanical Society and University of Lucknow from October 14-16, 2022.
- Attended a conference "Women Driving Science and Technology in India" organized by DST and CBMR (Centre of Biomedical Research) on August 25 and 26, 2022.

- Attended Workshop on Science of Pollution Tolerant and Climate smart plants organized by NBRI on October 20 and 21, 2022
- Participated in a national conference on "Current trends in Biological Sciences for Sustainable Agriculture, Health and Environment under climate change" organized by Indian Society of Agricultural Biochemists, CSAUA&T and University of Lucknow from November 23-25, 2023.
- Participated in a three-day International Conference on "Fungal Biology and Plant-Microbe Interactions" organized by Banaras Hindu University, from February 16-18, 2024
- Attended a three-day National Level Training Workshop on 'Freshwater Biodiversity Conservation' for Professors, from March 5^{th}-7^{th} 2024, at the Wildlife Institute of India, Dehradun.

WEBINARS ATTENDED

- Attended 3-day National Webinar on Geospatial Approaches for Agricultural Water Management organized by Dr. Rajendra Prasad Central Agricultural University, Pusa, Bihar, during 07-09^{th} October 2020
- Attended 27^{th} DR. B.P. Pal Memorial Lecture on "Reforms for Secure and Sustainable Agriculture: A road map" on May 27, 2020 organized by ICAR-IARI.
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