

Dr. Subha Narayan Das

Associate Professor

Molecular Plant-Microbe Interaction & Enzymology Laboratory

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Research Interest

Our research laboratory focuses on molecular plant-microbe interactions with the long-term goal of developing sustainable agricultural practices through the use of beneficial microbes and their associated enzymes. We aim to understand how stress conditions alter the phytobiome of crops, and to identify plant growth-promoting (PGP) bacteria from a variety of plant sources, including crops, medicinal plants, and weeds. The lab is also interested in the discovery and characterization of novel chitin-degrading and chitin-modifying enzymes. These enzymes are explored for their potential applications in synthesizing chitoooligosaccharides (COS), which play a role in boosting plant immunity.

To achieve our research goals, we adopt an integrated approach that combines molecular biology, microbiology, and biochemistry along with plant growth promotion and disease suppression assays.

Teaching Experience: 9 years

June 2026 - present	Associate Professor Department of Botany, Visva-Bharati, Santiniketan
June 2017 - June 2026	Assistant professor Department of Botany, IGNTU, Amarkantak, M.P.

Research Experience: 10 years

2026 - present	Associate Professor Department of Botany, Visva-Bharati, Santiniketan
2017 - 2026	Assistant professor Department of Botany, IGNTU, Amarkantak, M.P.
2016 - 2017	EU Post-doctoral Research Associate University of Hyderabad

Education

2010 - 2016	Ph.D. in Plant Sciences (University of Hyderabad, Hyderabad) Supervisor: Prof. Appa Rao Podile
2004 - 2006	M.Sc. in Plant Sciences (Biotechnology) , Univ. of Hyderabad
2000 - 2003	B.Sc. Botany (Honours) , Chemistry & Microbiology OUAT, Bhubaneswar

Awards & Recognition

2025	Research appreciation award, IGNTU, Amarkantak
2016	Marshall award, Indian Chitin and Chitosan Society
2016	Best PhD thesis award, University of Hyderabad
2015	DST-SERB travel award to University of Muenster, Germany
2014	DFG fellowship for research stay at University of Muenster, Germany
2013	DFG fellowship for research stay at University of Muenster, Germany

Publications: Total No. of refereed journal articles-24, and Book chapters-05

Key Publications

1. Prasad, P., Prajapati, N., Mansoori, A., Dey, D., Kumar, A., & **Das, S. N.** (2026). Multifunctional *Pseudomonas* sp. HCF3 promotes rice growth and suppresses bacterial blight via phosphate mobilization and antimicrobial metabolites. *Physiological and Molecular Plant Pathology*, 145, 103346. <https://doi.org/10.1016/j.pmpp.2026.103346>. (IF-3.6)
2. Mansoori, A., Mohan, M., **Das, S. N.**, Kumar, R., & Kumar, A. (2026). Integrated metabolomics and bioactivity analysis of *Cynoglossum lanceolatum* root extract as a natural inducer of resistance to rice bacterial blight. *Frontiers in Genetics*, 17, 1775858. doi: 10.3389/fgene.2026.1775858. (IF-3)
3. Prasad, P., Mansoori, A., Prajapati, N., Tripathi, J., Sharma, K., Kumar, A., & **Das, S. N.** (2024). Phytochemical screening and antimicrobial activities of *Guizotia abyssinica* L. leaf and flower extracts. *Journal of Natural Pesticide Research*, 9, 100083. <https://doi.org/10.1016/j.napere.2024.100083>.
4. Prasad, P., Kalam, S., Sharma, N. K., Podile, A. R., & **Das, S. N.** (2022). Phosphate solubilization and plant growth promotion by two *Pantoea* strains isolated from the flowers of *Hedychium coronarium* L. *Frontiers in Agronomy*, 4, 990869. <https://doi.org/10.3389/fgro.2022.990869>. (IF-4.2)
5. Singh, P., Singh, K. R. B., Singh, J., **Das, S. N.**, & Singh, R. P. (2021). Tunable electrochemistry and efficient antibacterial activity of plant-mediated copper oxide nanoparticles synthesized by *Annona squamosa* seed extract for agricultural utility. *RSC Advances*, 11, 18050–18059. <https://doi.org/10.1039/D1RA02382A>. (IF-4.6)
6. Basu, A., Prasad, P., **Das, S. N.**, Kalam, S., Sayyed, R. Z., Reddy, M. S., & El Enshasy, H. (2021). Plant Growth Promoting Rhizobacteria (PGPR) as Green Bioinoculants: Recent Developments, Constraints, and Prospects. *Sustainability*, 13(3), 1140. <https://doi.org/10.3390/su13031140>. (IF-3.3)
7. Kumar, A., Kumar, R., Sengupta, D., **Das, S. N.**, Pandey, M. K., Bohra, A., Sharma, N. K., Sinha, P., Masood, H. S., Ghazi, I. A., Laha, G. S., & Sundaram, R. M. (2020). Deployment of genetic and genomic tools towards gaining a better understanding of Rice-*Xanthomonas oryzae* pv. *oryzae* interactions for development of durable bacterial blight resistant rice. *Frontiers in Plant Science*, 11, 1152. <https://doi.org/10.3389/fpls.2020.01152>. (IF-5.9)
8. Sivaramakrishna, D., Bhuvanachandra, B., Mallakuntla, M.K., **Das, S.N.**, Ramakrishna, B., & Podile, A.R. (2020). Pretreatment with KOH and KOH-urea enhanced hydrolysis of α -chitin by an endo-chitinase from *Enterobacter cloacae* subsp. *cloacae*. *Carbohydrate Polymers*, 8:115952, doi.org/10.1016/j.carbpol.2020.115952. (IF-13.2)
9. Basa, S., Nampally, M., Honorato, T., **Das, S. N.**, Podile, A. R., El Gueddari, N. E., & Moerschbacher, B. M. (2020). The pattern of acetylation defines the priming activity of chitosan tetramers. *Journal of the American Chemical Society*, 142(4), 1975–1986. <https://doi.org/10.1021/jacs.9b11466>. (IF-16.6)
10. Vaikuntapu, P. R., Mallakuntla, M. K., **Das, S. N.**, Bhoopal, B., Bellamkonda, R., Nadendla, S. R., & Podile, A. R. (2018). Applicability of endochitinase of *Flavobacterium johnsoniae* with transglycosylation activity in generating long-chain chitoooligosaccharides. *International Journal of Biological Macromolecules*, 117, 62–71. <https://doi.org/10.1016/j.ijbiomac.2018.05.129>. (IF-8.7)
11. Mohan Krishna, M., Papa Rao, V., Bhuvanachandra, B., **Das, S. N.**, & Podile, A. R. (2017). Bioconversion of chitinous substrates to long chain chitoooligosaccharides by a transglycosylating chitinase from *Enterobacter cloacae* sub sp. *cloacae*. *Scientific Reports*, 7, 5140. <https://doi.org/10.1038/s41598-017-05140-3>. (IF-4.9)

12. **Das, S. N.**, Wagenknecht, M., Nareddy, P. K., Bhuvanachandra, B., Niddana, R., Balamurugan, R., Swamy, M. J., Moerschbacher, B. M., & Podile, A. R. (2016). Amino groups of chitosan are crucial for binding to a family 32 carbohydrate binding module of a chitosanase from *Paenibacillus elgii*. *Journal of Biological Chemistry*, 291(36), 18977–18990. <https://doi.org/10.1074/jbc.M116.721332>. (IF-4.1)
13. **Das, S. N.**, Madhuprakash, J., Sarma, P. V. S. R. N., Purushotham, P., Suma, K., Manjeet, K., Rambabu, S., El Gueddari, N. E., Moerschbacher, B. M., & Podile, A. R. (2015). Biotechnological approaches for field applications of chitoooligosaccharides (COS) to induce innate immunity in plants. *Critical Reviews in Biotechnology*, 35(1), 29–43. <https://doi.org/10.3109/07388551.2013.798255>. (IF-8.7)
14. **Das, S. N.**, Dutta, S., Anil, K., Neeraja, C. H., Sarma, P. V. S. R. N., Srinivas, V., & Podile, A. R. (2010). Plant growth promoting chitinolytic *Paenibacillus elgii* responds positively to the tobacco root exudates. *Journal of Plant Growth Regulation*, 29, 409–418. <https://doi.org/10.1007/s00344-010-9152-1>. (IF-5)

Book Chapters

1. Podile, A. R., **Das, S. N.**, Madhuprakash, J., & Sarma, P. V. S. R. N. (2013). Transglycosylation mediated synthesis of chitoooligosaccharides and scope of application. In M. V. Deshpande & J. Ruiz-Herrera (Eds.), *Biotechnology: Beyond Borders* (pp. 348–364). NCL, Pune, India.
2. Sarma, P. V. S. R. N., Madhuprakash, J., **Das, S. N.**, Kaur, M., Purushotham, P., & Podile, A. R. (2013). Microbial chitinases: Natural sources, mutagenesis and directed evolution to obtain thermostable counterparts. In T. Satyanarayana, J. Littlechild, & Y. Kwarabiyasi (Eds.), *Thermophilic Microbes in Environmental and Industrial Biotechnology* (pp. 649–669). Springer.
3. **Das, S. N.**, Neeraja, Ch., Sarma, P. V. S. R. N., Madhuprakash, J., Purushotham, P., & Podile, A. R. (2012). Exploitation of chitinolytic potential of microbial chitinases for chitin waste management. In T. Satyanarayana, B. N. Johri, & A. Prakash (Eds.), *Microorganisms in Environmental Management* (pp. 135–150). Springer.
4. **Das, S. N.**, Madhuprakash, J., & Podile, A. R. (2012). Elicitor active molecules from fungal cell wall. In P. Chowdappa (Ed.), *Molecular Approaches for Plant Fungal Disease Management*. Westville Publishing.
5. Podile, A. R., Purushotham, P., **Das, S. N.**, Sarma, P. V. S. R. N., & Madhuprakash, J. (2012). Chitin, chitosan and chitoooligosaccharides: A treasure in store. In S. Ramreddy, M. A. Singaracharya, & S. Girisham (Eds.), *Microbial Diversity Exploration and Bioprospecting* (pp. 309–324). Scientific Publishers.

Research Funding

S. No.	Funding Agency	Duration	Amount (Lakhs)
1	DBT, New Delhi	2024 - 2029 (Ongoing)	38.22
2	DST-SERB, New Delhi	2021 - 2024	46.34
3	UGC Start-Up, New Delhi	2018 - 2020	10

Invited Talk/Resource Person

- **Invited lecture** on the topic entitled “Decoding the sugar code: chitosans structure and their priming activity in plant” held at CTUAP, Vizianagaram, February 28, 2025.
- **Invited lecture** in an International conference on the topic entitled “Chitin and chitosan degrading enzymes of *Paenibacillus elgii*: functional characterization, specificity and applications” held at University of Hyderabad, February 2, 2025.
- **Resource person** on the topic entitled “Plant Immunity - How Plants Defend Themselves” at Bhavan's Vivekananda College, Osmania University, November 2023.
- **Paper presentation** at 7th Indian Chitin and Chitosan Society Conference, NCL, Pune, 2018.
- **Invited lecture** on Molecular intricacies of plant microbe interactions, IGNTU, Amarkantak, October 2017.