

PERSONAL PROFILE

Name	: Dr. Satya Shila Singh
Address for Correspondence & Institution's Address	: Professor Department of Botany Institute of Science Banaras Hindu University Varanasi-221005 Mobile: 07587231571 Email: satyashila@rediffmail.com
Academic highlights	: M.Sc. (Botany), Purvanchal University, Jaunpur, 1989 Ph.D. (Botany), Banaras Hindu University, Varanasi, 1997
Specialization	: Microbial Physiology, Biochemistry and Molecular Biology
Super specialization	: Stress Physiology & Biochemistry, Molecular Systematics of nitrogen fixing organisms.

Scholarship/award/Recognition received

- Young Scientist (DST- Fast Track Scheme) awarded by DST, New Delhi, 2008
- Research Associateship awarded by CSIR, New Delhi, India, 2004
- Senior Research Fellowship (UGC-GATE), 1995
- Junior Research Fellowship (UGC-GATE), 1993
- Graduate Aptitude Test in Engineering (GATE-1992), 82.14 percentile
- Worked as an expert member in DST-SEED Division, New Delhi, 2018- continued.

Courses assigned

- Microbiology
- Biochemistry
- Molecular Biology
- Microbial Genetics

Project completed/ongoing/sanctioned – 07

- Assessment of Nitrogenase Gene Diversity and Phylogenetic Relationship Among The Heterocystous Cyanobacteria and *Frankia* Strains (**completed project as a PI- Supported by** DST, New Delhi under FAST TRACK SHCEME).
- Assessment of salt responsive physiological and biochemical modifications in *Frankia* strains (**completed project as a PI - Supported by** University Grants Commission, New Delhi)
- Identification and Characterization of Cyanobacteria inhabiting paddy fields of Chhattisgarh (**completed project as a PI - Supported by** Start-Up grant, University Grants Commission, New Delhi).
- Diversity analysis and documentation of unexplored diazotrophic cyanobacteria of Chhattisgarh (**completed project as a PI - supported by** CSIR, New Delhi)
- Characterization and immobilization of pesticide induced protein(s) of cyanobacterium *Fischerella* sp. for bioremediation of pesticide contaminated water systems (2017-2020) (**As a Co-PI**) (**ongoing-** supported by ICAR-AMAAS)
- Polyphasic assessment of diversity of phototrophic microorganisms from cold environments and their bioprospection potential (2020) (**As a Co-PI**) (**sanctioned-**supported by DST: International Cooperation Bilateral-India Czech Joint ST Proposals)

Membership of professional bodies

- Life Member, Asian PGPR Society, Hyderabad
- Life Member, Indian Botanical Society

Research Guidance - 09 (As a Ph.D Supervisor)

- Ongoing: 6
- Awarded: 3

Conference Attended -12

- International : 02
- National : 10

Conference Organized -02

A brief summary of ongoing research work in the department

Currently, my research work is focussed on the biology of thermophilic bacteria and cyanobacteria, isolated from hot springs having permanent presence of water, remain undisturbed or minimally interfered due to their extreme and constant environmental conditions. These hot springs are also affected with the hot magma of the earth and provide an extreme ecologically restricted habitat where usually temperature ranges from approximately 40°C to 98°C yet there is wide distribution of different types of microorganisms including cyanobacteria and bacteria.

Many thermophilic cyanobacteria and bacteria have been isolated and maintained in our lab at required temperatures. Their taxonomic status and an evolutionary divergence study using polyphasic approach viz. morphological, physiological, biochemical and PCR based molecular approaches are going on. Recently, three new species of cyanobacteria have been investigated from Chhattisgarh. Similarly, laboratory is also focussing on the other problems related to the temperature responsive physiological, biochemical and molecular modifications in cyanobacterial and bacterial strains.

List of Publications

Research/Review Articles -36

1. Preeti Patel , Archana Prasad, Dipali Srivastava , Abhishek Niranjan, Gauri Saxena, **Satya Shila Singh**, Pratibha Misra, Debasis Chakrabarty (2021) Genotype-dependent and temperature-induced modulation of secondary metabolites, antioxidative defense and gene expression profile in *Solanum viarum* Dunal). **Environmental and Experimental Botany** **194**: <https://doi.org/10.1016/j.envexpbot.2021.104686>

2. Kikku Kunui, Robin Anigo Minj, Arun Kumar Mishra & **Satya Shila Singh** (2021) Iron induced qualitative enhancement in lipid profile of the cyanobacterium *Anabaena sphaerica*. **Vegetos** <https://doi.org/10.1007/s42535-021-00307-w>
3. Tameshwar Prasad Jaiswal, Sindhunath Chakraborty, Prashant Singh, Arun Kumar Mishra and **Satya Shila Singh** (2021) Description of hot spring dwelling Mastigocladus ambikapurensis sp. nov., using a polyphasic approach. **Plant Systematics and Evolution** **307**: 33 <https://doi.org/10.1007/s00606-021-01755-2>
4. Preeti Patel, Archana Prasad, Sateesh Chandra Gupta, Abhishek Niranjana, Alok Lehri, **Satya Shila Singh**, Pratibha Misra, Debasis Chakrabarty (2021) Growth, phytochemical and gene expression changes related to the secondary metabolite synthesis of *Solanum viarum* Dunal. **Industrial Crops & Products**, **166**, 113464 <https://doi.org/10.1016/j.indcrop.2021.113464>
5. Kikku Kunui and **Satya Shila Singh** (2020) Protective role of antioxidative enzymes and antioxidants against iron-induced oxidative stress in the cyanobacterium *Anabaena sphaerica* isolated from iron rich paddy field of Chhattisgarh, India. **Indian Journal of Experimental Biology**, **58**:617-630.
6. Kikku Kunui, Robin Anigo Minj and **Satya Shila Singh** (2020) Iron transportation and its impact on nitrate assimilation in the cyanobacterium *Anabaena sphaerica*: A promising bioaccumulator of iron. **Plant Archives**, **20**:3701-3709.
7. BalKrishna Tiwari, Vandana Sindhu, Arun Kumar Mishra, **Satya Shila Singh** (2020) Carbon catabolite repression of Methyl Parathion degradation in a Bacterial Isolate Characterized as a *Cupriavidus* sp. LMGR1. **Water Air Soil Pollution**, **231**, 357 doi.org/10.1007/s11270-020-04715-7.
8. Robin Anigo Minj, Kikku Kunui and **Satya Shila Singh** (2020) Polyphasic evaluation of cyanobacterial community of unexplored North Hill regions of Chhattisgarh, India. **Plant Archives**, **20**:3600-3612
9. Sindhunath Chakraborty, Aditi Mishra, Ekta Verma, Balkrishna Tiwari, Arun K. Mishra and **Satya Shila Singh** (2019) Physiological mechanisms of aluminum (Al) toxicity tolerance in nitrogen-fixing aquatic macrophyte *Azolla microphylla* Kaulf: phytoremediation, metabolic rearrangements, and antioxidative enzyme responses. **Environmental Science and Pollution Research**, **26**:9041–9054.
10. Prashant Singh, Robin Anigo Minj, Kikku Kunui, Zaid Muneef Shaikh, Archana Suradkar, Yogesh S Shouche, Arun Kumar Mishra, **Satya Shila Singh** (2017) A new species of *Scytonema* isolated from Bilaspur, Chhattisgarh, India using polyphasic approach. **Plants Systematics and Evolution**, **303**: 249-258.
11. Amrita Srivastava, Anumeha Singh, **Satya Shila Singh**, Arun K. Mishra (2017) Salt stress–induced changes in antioxidative defense system and proteome profiles of salt tolerant and sensitive *Frankia* strains. **Journal of Environmental Science and Health Part A**, **52** (5) 420-428.
12. Sindhunath Chakraborty, Balkrishna Tiwari, **Satya Shila Singh**, Alok Kumar Srivastava and Arun Kumar Mishra (2017) Differential physiological, oxidative and antioxidative responses of cyanobacterium *Anabaena sphaerica* to attenuate malathion pesticide toxicity. **Biocatalysis and Agricultural Biotechnology**. **11**: 56-63.
13. Prashant Singh, Robin Anigo Minj, Kikku Kunui, Zaid Muneef Shaikh, Archana Suradkar, Yogesh S Shouche, Arun Kumar Mishra, **Satya Shila Singh** (2016) A new species of

Scytonema isolated from Bilaspur, Chhattisgarh, India. ***Journal of Systematics and Evolution***, 54: 519–527.

14. Robin Anigo Minj, Prashant Singh, Kikku Kunui, **Satya Shila Singh (2017)** Diversity and phylogenetic analysis of some heterocystous cyanobacteria using morphological, Nitrogen fixation and molecular attributes. ***Indian Journal of Biotechnology***, 16: 586-593.
15. Arun Kumar Mishra, Pawan Kumar Singh, Prashant Singh, Anumeha Singh, **Satya Shila Singh**, Amrita Srivastava, Alok Kumar Srivastava and Hridip Kumar Sarma (2015) Molecular Phylogeny and evolutionary genetics of *Frankia* strains based on 16S rRNA and *nifD*-K gene sequences. ***Journal of Basic Microbiology***, 54:1-8.
16. Prashant Singh, **Satya Shila Singh**, Marina Aboal, Arun Kumar Mishra (2015) Decoding cyanobacteria phylogeny and molecular evolution using an evonumeric approach. ***Protoplasma***, 252:519–535.
17. **Satya Shila Singh**, Kikku Kunui, Robin Anigo Minj, Prashant Singh (2014) Diversity and distribution pattern analysis of cyanobacteria isolated from paddy fields of Chhattisgarh, India. ***Journal of Asia Pacific Biodiversity***, 7: 462-470.
18. Amrita Srivastava, **Satya Shila Singh** and Arun Kumar Mishra (2014) Modulation in fatty acid composition influences salinity stress tolerance in *Frankia* strains. ***Annals of Microbiology***, 64:1315–1323.
19. Ekta Shukla, **Satya Shila Singh** and Arun Kumar Mishra (2013) Fingerprinting and phylogeny of some heterocystous cyanobacteria using short tandemly repeated repetitive and highly iterated palindrome sequences. ***Microbiology***, 82:1-8.
20. Arun Kumar Mishra, Ekta Shukla and **Satya Shila Singh (2013)** Phylogenetic comparison among the heterocystous cyanobacteria based on a polyphasic approach. ***Protoplasma***, 250: 77-94.
21. Amrita Srivastava, **Satya Shila Singh** and Arun Kumar Mishra (2013) Sodium transport and mechanism(s) of sodium tolerance in *Frankia* strains. ***Journal of Basic Microbiology***, 53: 163-174.
22. Ekta Shukla, **Satya Shila Singh**, Prashant Singh and Arun Kumar Mishra (2012) Chemotaxonomy of heterocystous cyanobacteria using FAME profiling as species markers. ***Protoplasma***, 249:651-661.
23. Prashant Singh, **Satya Shila Singh**, Josef Elster and A. K. Mishra (2012) Molecular Phylogeny, population genetics and evolution of heterocystous cyanobacteria using *nif H* gene sequences. ***Protoplasma***, 250:751-764.
24. Prashant Singh, **Satya Shila Singh**, Amrita Srivastava, Anumeha Singh and Arun Kumar Mishra (2011) Structural, functional and molecular basis of Cyanophage-cyanobacterial Interactions and its significance. ***African Journal of Biotechnology***, 11(11):2591-2608.
25. Arun Kumar Mishra, Anju Singh and **Satya Shila Singh (2010)** Diversity of *Frankia* strains nodulating *Hippophae salicifolia* D. Don using FAME profiling as Chemotaxonomic markers. ***Journal of Basic Microbiology***, 50:318-324.
26. **Satya Shila Singh**, Arun Kumar Mishra, Ram Sanmukh Upadhyay (2010) Potentiality of *Azolla* as a suitable P- biofertilizer under salinity through acid phosphatase activity. ***Ecological Engineering***, 36: 1076-1082.

27. **Satya Shila Singh**, Anju Singh, Amrita Srivastava, Prashant Singh, Anumeha Singh, Arun Kumar Mishra (2010) Characterization of *Frankia* strains based on physiological, SDS-PAGE of whole cell proteins and RAPD-PCR analyses. *World Journal of Microbiology and Biotechnology*, 26: 985-992.
28. Anju Singh, **Satya Singh Singh**, Prem Chandra Pandey, Arun Kumar Mishra (2010) Attenuation of metal toxicity by *Frankia* siderophores. *Toxicology and Environmental Chemistry*, 92(7): 1339-1346.
29. **Satya Shila Singh**, Ram Sanmukh Upadhyay and Arun Kumar Mishra (2008) Physiological interactions in *Azolla-Anabaena* system adapting to the salt stress. *Journal of Plant Interactions*, 3: 145-155.
30. **Satya Shila Singh**, Santosh K. Singh, Arun Kumar Mishra (2008) Na⁺ regulation by combined nitrogen in *Azolla pinnata-Anabaena azollae* symbiotic association during salt toxicity. *Ecotoxicology and Environmental Safety*, 69: 32-38.
31. Anju Singh, Arun Kumar Mishra, **Satya Shila Singh**, Hridip Kumar Sarma and Ekta Shukla (2008) Influence of iron and chelator on siderophore production in *Frankia* strains nodulating *Hippophae salicifolia* D. Don. *Journal of Basic Microbiology*, 48: 104–111.
32. Arun Kumar Mishra and **Satya Shila Singh** (2006) Protection against salt toxicity in *Azolla pinnata-Anabaena azollae* symbiotic association by using combined-N sources. *Acta Biologica Hungarica*, 57 (3):355-365.
33. Hridip Kumar Sarma, Bipin Kumar Sharma, **Satya Shila Singh**, Suresh C. Tiwari and Arun Kumar Mishra (2006) Polymorphic distribution and phenotypic diversity of *Frankia* strains in nodule lobes of *Hippophae salicifolia* D. Don. *Current Science*, 90:1516-1521.
34. Santosh Kumar Singh, **Satya Shila Singh**, Vidya Dhar Pandey and Arun Kumar Mishra (2006) Factors modulating alkaline phosphatase activity in a diazotrophic rice-field cyanobacterium, *Anabaena oryzae*. *World Journal of Microbiology and Biotechnology*, 22:927-935.
35. Surya Pal Singh, Subas Rai, Ashwani K. Rai, Shree Prakash Tiwari, **Satya Shila Singh**, Samarketu and J. Abraham (1994) Athermal physiological effects of microwaves on a cyanobacterium *Nostoc muscorum* : evidence for EM- memory bits in water. *Med. & Bio. Eng. & Comput*, 32: 175-180.
36. **Satya Shila Singh**, Shree Prakash. Tiwari, J. Abraham, Subas Rai and Ashwani K. Rai (1994) Magnetobiological effects on a cyanobacterium, *Anabaena doliolum*. *Electro & Magnetobiology (Now Electromagnetic Biology and Medicine)* 13(3): 227-235.

Proceedings - 02

37. Arun Kumar Mishra, Prashant Singh, **Satya Shila Singh**, Ekta Shukla, Amrita Srivastava, Anumeha Singh (2010) Role of Blue Green Algae in Rural Development. In: Proceedings of the National Seminar on “Transformation in Rural Economy of North East Hills Region in India: Status, Determinant and Prospects” held on 7-8th May, 2010, National Institute of Rural Development, North Eastern Regional Centre, Khanapara, Guwahati, Assam.
38. Arun Kumar Mishra, Prashant Singh, Anumeha Singh, Amrita Srivastava and **Satya Shila Singh** (2009) Role of *Frankia* in Agroforestry. In: Proceedings of the National Seminar on “Agroforestry for Socioeconomic Development of North Eastern Region” held on 11-12th December, 2009, NERIST, Nirjuli, Arunachal Pradesh.

39. Preeti Patel, Archana Prasad, Kartikeya Srivastava, **Satya Shila Singh**, Debasis Chakrabarty, Pratibha Misra (2020) Updates on steroidal alkaloids glycoalkaloids in *Solanum* spp.: Biosynthesis, *in vitro* production and pharmacological values. In: Studies in Natural Product Chemistry (Bioactive Natural Products), Elsevier Science Publishers, Amsterdam, (ed. Rahman, A.). pp. 99-127.
40. Sindhunath Chakraborty, Ekta Verma and **Satya Shila Singh** (2019) Cyanobacterial Siderophores: Ecological and Biotechnological Significance. In: Cyanobacteria: From Basic Science to Applications (eds. Mishra, A.K., Tiwari, D.N. and Rai, A.N.). pp. 383-397, Elsevier, ISBN: 978-0-12-814667-5.
41. Kikku Kunui , Robin Anigo Minj, **Satya Shila Singh** (2017) Iron uptake strategies, transportations and storage relevant to plants and microorganisms. In : **Plants and Microbes in an ever changing environment** (ed) Singh SS., Nova Science Publisher, New York.pp.211-255
42. Sindhunath Chakraborty ,**Satya Shila Singh**, Ekta Verma , Balkrishna Tiwari ,Arun Kumar Mishra (2017) Aluminium toxicity and defence mechanism in plants. In: **Plants and Microbes in an ever changing environment** (ed) Singh SS., Nova Science Publisher, New York.pp.183-210
43. Prashant Singh , **Satya Shila Singh** (2016) Cyanobacteria: Diversity and applications in Biotechnology. In: **Environmental Biotechnology** (eds) Gupta RK and Singh SS., Daya Publishing House, Darya Ganj, New Delhi, pp, 83-100
44. Robin Anigo Minj, **Satya Shila Singh** (2016) Cyanobacterial diversity of Chhattisgarh. In: Algal Diversity of Chhattisgarh. **Singh SS** (ed) A and V publishing House, Raipur, Chhattisgarh, pp.19-48.
45. Kikku Kunui , **Satya Shila Singh** (2016) Diversity among the green algae of Chhattisgarh. In: **Algal Diversity of Chhattisgarh** (ed) **Satya Shila Singh.**, A and V publishing House, Raipur, Chhattisgarh, pp. 49-68
46. Amrita Srivastava, Prashant Singh, Anumeha Singh, **Satya Shila Singh** and Arun Kumar Mishra (2011) Cyanobacteria : Phenotypic to the Genotypic Diversity. In: **Microbial Biotechnology & Ecology** (eds) Vyas et al., Daya Publications, Darya Ganj, New Delhi, pp. 41-59.
47. Arun Kumar Mishra and **Satya Shila Singh** (2010) Responses and Tolerance of *Azolla-Anabaena* system against salinity stress. In: **Ecotoxicology Around the Globe**, Nova Publisher, USA, pp, 53-86.
48. Amrita Srivastava, Anju Singh, **Satya Shila Singh** and Arun Kumar Mishra (2009) *Frankia*-Actinorhizal Symbiosis: An Overview. In: **Soil Microflora** (eds) Gupta et al., pp. 86-101.
49. K.K. Choudhary, **Satya Shila Singh** and Arun Kumar Mishra (2007) Nitrogen fixing cyanobacteria and their potential applications. In: **Advances in Applied Phycology** (eds) Gupta & Pandey, pp.142-154.

50. Arun Kumar Mishra, Santosh Kumar Singh, **Satya Shila Singh** and Vidya Dhar Pandey (2005) Regulation of Heterocyst and Nitrogen Metabolism. In: *The Glimses of Cyanobacteria* (eds) Gupta *et al.*, 26-47.

Books - 03

1. **Satya Shila Singh (2017)** Plants and Microbes in Ever Changing Environment. Nova Science Publishers, Inc. Hauppauge, New York, U.S.A **ISBN : 978-1-53610-918-4 (International Edition).**
2. Rajan Kumar Gupta , **Satya Shila Singh (2016)** Environmental Biotechnology. Daya Publishing House, Darya Ganj, New Delhi. **ISBN 978-93-5124-736-4 (Hardbound); ISBN 978-93-5130-962-8 (International Edition)**
3. **Satya Shila Singh (2016)** Algal Diversity of Chhattisgarh. A and V publishing House, Raipur, Chhattisgarh. **ISBN: 978-93-85525-19-3(National Edition).**

(Dr. Satya Shila Singh)