BIO-DATA Prof. J. I. S. Khattar

1. **Name** : **DR. JASVIRINDER SINGH KHATTAR**
2. **Designation** : **PROFESSOR**
3. **Department** : **BOTANY**
4. **Date of Birth** : **04.04.1962**
5. **Address for Correspondence** : **Department of Botany, Punjabi University, Patiala 147 002**

Phones : **(0175)304-6265(O)**

Mobile :**094172 42986**

E-mail : **jisk@pbi.ac.in**
jisk_pbi@rediffmail.com,
jiskhattar@gmail.com

6 **Areas of Specialization** : **Physiology and Biochemistry of Cyanobacteria, Environmental Microbiology, Cyanobacterial Biotechnology**

7. **Academic Qualifications:**

Sr. No.	Degree Held	Year	Board/Univ./ Inst.	% of marks	Div./ Rank	Subjects Taken
1	M.Sc.	1983	Punjabi Univ. Patiala	67.5	1st/3rd	Botany
2	M.Phil.	1985	Punjabi Univ. Patiala	'A' Grade		Botany
3	Ph.D.	1989	Punjabi Univ. Patiala			Botany

8. **Membership of Professional Bodies/Organisations**
   - **i) Life Member – Indian Botanical Society**
   - **ii) Life Member- Indian Science Congress Association**
   - **iii) Life Member- Association of Microbiologists of India**
   - **iv) Life Member- Biotech Research Society of India**

9. **Medals/Awards/Honours received**
   1) **Member Senate, Punjabi University, Patiala (2018)**
   2) **Member Syndicate, Punjabi University, Patiala (2018-2019)**
   3) **Member Academic Council, Punjabi University, Patiala (2018, 2021)**
   4) **Chairman, Institutional Ethical Committee, Punjabi University, Patiala (2018-2020)**

5) **Fellow Indian Botanical Society**
6) **Councillor Indian Botanical Society (2014-2017) (2020- present)**
7) **Vice-President Indian Botanical Society (2107-2018)**
8) **Member Editorial Board, Journal of Indian Botanical Society (2017-present)**
9) **G. Panigrahi Memorial Lecture Award (2020) of Indian Botanical Society**

10. Academic/Research/Administrative position

1) **Head, Department of Botany, Punjabi University, Patiala (July 2015 to June 2018)**
2) **Dean Life Sciences, Punjabi University, Patiala (July 2018- June 2020)**
3) **Attended Leadership for Academicians Programme (LEAP) of MHRD during 13-24 May, 2019 at IIT Kharagpur and during 3-7 June, 2019 at IFM Cambridge University, Cambridge.**
4) **Coordinator, FIST of DST, Botany Department, Punjabi University, Patiala (2015-2018)**
5) **Coordinator, DSA-I of UGC, Botany Department, Punjabi University, Patiala**
6) **Member, Advisory Committee, SAP of UGC, Botany Department, Punjabi University, Patiala (2009-2014)**
7) **Professor-incharge (Examinations), Punjabi University, Patiala (June 2020 to Oct. 2021)**
8) **Member Organizing Committee, 3rd GoGreen Summit, Manila, Philippines, March 23-24, 2018**
9) **Member, Board of Post Graduate Studies in Botany, Kurukshetra University, Kurukshetra (2018-2019, 2020-2021, 2021-2022)**
10) **Member, Post Graduate Board of Studies in Microbiology, Mata Gujri College, Fateh Garh Sahib (Session 2018-2019 and 2019-2020) (2020-2021)**
11) **Member Board of Studies in Undergraduate and Post Graduate Studies in Agriculture, Khalsa College, Patiala (June 2018-May, 2021)**

11. Scholarships:

i) Junior Research Fellow (CSIR, New Delhi)
ii) Senior Research Fellow (CSIR, New Delhi)
iii) Research Associate (CSIR, New Delhi)

12. Details of Experience:

S. No.	Name of the Inst./Employer	Position Held	Duration	Major Job Responsibilities and Nature of Experience
1.	Punjabi Univ. Patiala	Lecturer	17.5.90 to 16.5.99	Teaching and Research
2.	Punjabi Univ. Patiala	Reader	17.5.99 to 16.5.07	Teaching and Research
3.	Punjabi Univ. Patiala	Professor	17.5.07 till date	Teaching and Research

13. Published Work (Please specify numbers only) :

a. **Research Papers** i) National = 15
ii) International = 49

b. **Conference/Seminar Presentation** = 66

c. Books

i) Original: nil
ii) Edited: 01

14. R & D Projects:

Completed:

i) To evaluate the potential of immobilized algae to scavenge heavy metal ions from the polluted aquatic systems
CSIR, New Delhi

ii) To screen blue-green algal germplasm from paddy fields of Patiala district with biofertilizer potentialities
UGC, New Delhi

iii) Evaluation of cyanobacterial strains from paddy fields for pesticide degradation
CSIR, New Delhi

(iv) A search for cyanobacterial strains producing novel exopolysachharides,
CSIR, New Delhi

(v) Exploitation of extremophilic cyanobacteria for the production of phycobiliproteins as natural colours
UGC, New Delhi

(vi) Diversity Analysis and Bioprospecting of Thermophilic Cyanobacteria from the North Western Himalayas for Industrial Value Addition.
SERB-DST, New Delhi

(vii) Optimization and lab scale production of carotenoids from microalgae
CSIR, New Delhi.

15. Invited Talks : 26

16. Ph.D. Students guided/under guidance (Details):

S. No.	Name of the Student	Title of Thesis	Year of Completion
1.	Gurpreet Kaur	Factors regulating carbon and nitrogen metabolism and akinete differentiation in the cyanobacterium *Anabaena torulosa* (Co-supervisor)	2000
2.	Anuradha Sharma	Isolation and characterization of chromium, cadmium and nickel resistant mutants of the cyanobacterium *Anacystis nidulans*	2003
3.	Namita Jindal	Isolation, screening and evaluation of exopolysaccharides producing strains of cyanobacteria	2008
4.	Shailza	Evaluation of heavy metal bioremediation potential of algae growing in polluted water	2011
5.	Yadvinder Singh	Cyanobacterial diversity of cold desert and hot water springs of North Western Himalayas	2014
6.	Harjinder Singh	Cellular differentiation in a rice field cyanobacterium with special reference to akinetes	2015
7.	Rajni	Evaluation of selected green algae as a potential feed stock for biodiesel production	2016
8.	Shahnaz	Studies on mechanism of chromium resistance in the cyanobacterium *Synechocystis* sp. Strain PUPCCC 62	2016
9.	Meenu Gupta	Responses of the cyanobacterium *Leptolyngbya foveolarium* to cartap hydrochloride insecticide	2016
10.	Gurdeep Kaur	Interaction of retilachlor herbicide with carbon and nitrogen metabolism of the cyanobacterium *Nostoc muscorum*	2016
11.	Sandeep Kaur	Isolation, optimization and characterization of phycobiliproteins from selected cyanobacteria	2017
12.	Jeevesh Nadda	Characterization and optimization of chlorpyrifos removal and tolerance mechanism in the cyanobaceterium *Synechocystis* sp. Strain PUPCCC 64	2017
13.	Manpreet	Temperature tolerance and level of antioxidants in selected cyanobacteria in the presence of sodium sulphide	2017
14.	Shveta	Evaluation of cyanobacteria from diverse habitats for production and stability of phycobiliproteins	2019
14.	Lata	Physiological, Biochemical and Cultivation studies on *Lentinus sajor-caju* (FR.) FR.	2019

15.	Alka	Optimization, quantification and purification of carotenoids from selected microalgae	2021
16	Deepali Luthra	Forensic characterization of phytoplankton of selected water bodies of Haryana	2021
17.	Jeevan Jyoti	Purification and characterization of cyanophycin synthetase from selected thermophilic cyanobacteria	Registered
18.	Manpreet Kaur	Mechanism of monocrotophos tolerance in *Synechocystis* sp. PUPCCC64	Registered
19.	Manzoor	Characterization of pendimethalin tolerance mechanism in the diazotrophic cyanobacteria *Desmonostoc muscorum* PUP405.10	Registered
20.	Yodha Singh	Mechanism of degradation of chlorpyriphos by Synechocystis sp. PUPCCC 64	Registered
21.	Minakshi	Mechanism of lead tolerance in the cyanobacterium *Desmonostoc muscorum* PUPCCC 405.10	Registered
22.	Kirti	Biochemical and molecular mechanism of pesticide tolerance in *Synechocystis* sp. PUPCCC64	Registered

17. M.Phil. Students guided:

S. No.	Name of the Student	Title of Thesis	Year of Completion
1.	Kanwaldeep Kaur	Effect of anilofos on photosynthesis, respiration and nitrogen assimilation of *Oscillatoria simplicissima* and *Anabena torulosa*	2009
2.	Harjinder Singh	Akinete differentiation in the cyanobacterium *Anabaena naviculoides* in response to carbon and nitrogen sources	2010
3.	Navdeep Kaur	Isolation and characterization of exopolysaccharides produced by *Nostoc spongiaeforme* and *Nostoc muscorum*	2011
4.	Preeti Bansal	Characterization of exopolysaccharides produced by *Nostoc spongiaeforme* and *Phormidium molle* in response to heavy metal stress	2012
5.	Jeevan Jyoti	Characterization of pretilachlor tolerant strain of the cyanobacterium *Nostoc spongiaeforme*	2013
6.	Shamabhvi	Screening of Cyanobacteria from diverse habitats for antimicrobial activity	2015
7.	Anjana Sasramta	Screening of cyanobacterial strains from diverse habitats for mycosporine-like amino acids	2016

18. List of Papers/Courses taught at P.G. and U.G. Level

S. No.	Paper	Class
1.	Phycology	M. Sc. I
2.	Bryology	M. Sc. I
3.	Molecular Biology	M. Sc. II
4.	Plant Physiology, Morphogenesis and Biochemistry	M. Sc. II
5.	Pteridology	M. Sc. II
6.	Plant Biotechnology	M. Sc. II
7.	Genetic Engineering and Biotechnology	M. Sc. II
8.	Microbiology	M. Sc. I
9.	Plant Metabolism	M. Sc. I
10.	Plant Physiology	M. Sc. I
11.	Cell Biology	M. Sc. I
12.	Basics of Biochemistry	M.Sc. I (Five Year Integrated Course)
13.	Basic Research Techniques	M.Sc. V ((Five Year Integrated Course)
14.	Advanced Phycology	M.Sc. V ((Five Year Integrated Course)
15.	Biology for chemists	M. Sc. I (Chemistry)
16.	Research Techniques	M. Phil/ Ph.D. Course work
17.	Phycology (Special Paper)	M. Sc., M. Phil.
18.	Advances in Botany I	M. Phil./Ph.D. Course work
19.	Research Techniques	M. Phil/Ph.D. course work

19. Technical Proficiency

1. Tissue culture techniques
2. Biotechnology techniques
3. Microbiological Techniques
4. Biochemical Techniques
5. Molecular Biology Techniques

20. List of Papers Published

(A) Books

1. Algal Biology and Biotechnology (2009) (Eds. J. I. S. Khattar, D. P. Singh and Gurpreet Kaur) I. K. International Publishers, New Delhi, India.

(B) Research Papers:

1. Jindal, N., **Khattar, J.I.S.** and Singh D.P. (2021). Isolation of Microbial polysaccharides. In: Oliveira, J., Radhouani, H and Reis, R.L. (eds). Polysaccharides of Mircrobial Origin. Springer, Cham. https://doi.org/10.1007/978-3-030-35734-4_27-1
2. Rajput, A., Singh, D.P., **Khattar, J.I.S.**, Swatch, G.K. and Singh, Y. (2021). Evaluation of growth and carotenoids production by a green microalga *Scenedesmus quadricauda* PUMCC 4.1.40 under optimized culture conditions. *J. Basic Microbiol.* DOI: 10.1002/jobm.202100285
3. Thapa, K, **J.I.S. Khattar**, Singh, D.P. and Singh, Y (2021). New records of desmids from Ropar wetland (a Ramsar Site) of Punjab, India. *Plant Sci. Today* 8(4):885-896. DOI:10.14719/pst.2021.8.4.1229
4. Singh, Y., Singh, G., **Khattar, J.I.S.**, Barinova, S., Kaur, J., Kumar, S. and Singh, D.P. (2021). Assessment of water quality condition and spatiotemporal patterns in selected wetlands of Punjab, India. *Environ. Sci. Pollu. Res*. DOI:10.1007/s11356-021-15590-y
5. Bhat, M.A., Singh, D.P., **Khattar, J.I.S.** and Singh, R.S. (2021). Toxicological effect of pendimethalin on some physiological parameters of the diazotrophic cyanobacterium *Desmonostoc muscorum* PUPCCC 405.10. *J. Appl. Biol. Biotech.* 9(4) 10-18. DOI: 10.7324/JABB.2021.9402
6. Swatch, G.K., Singh, D.P.**, Khattar, J.I.S.** and Mohapatra, P.K. (2020). Interaction of pretilachlor with PS-II activity of the cyanobacterium *Desmonostoc muscorum* PUPCCC 405.10. *J. Basic Microbiol.* 60(6): 532-542. DOI.org 10.1002/jobm.201900706
7. Singh, D.P., **Khattar, J.I.S.**, Rajput. A., Chaudhary, R and Singh, R. S. (2019). High production of carotenoids by the green microalga *Asterarcys quadricellulare* PUMCC 5.1.1 under optimized culture conditions. *PLoS ONE 1*4(9): e0221930. https://doi.org/10.1371/journal.pone.0221930
8. Kaur, S., **Khattar, J.I.S.,** Singh, Y., Singh, D.P. and Ahluwalia, A.S. (2019). Extraction, purification and charterisation of Phycocyanin from *Anabaena fertilissima* PUPCCC 410.5: as a natural and food grade stable pigment. *J. Appl. Phycol.* http://doi.org/10.1007/s10811-018-1722-9
9. Jyoti, J., **Khattar, J.I.S**., Gulati, A. and Singh, D.P. (2019). Optimization of conditions and partial characterization of cyanophycin synthetase from a thermophilic cyanobacterium *Chlorogloeopsis fritschii. Biocat. Agric. Biotechnol.* 17:339-346. https://doi.org/10.1016/j.bcab.2018.12.011
10. Thakar, M.K., Luthra, D. and Khattar, J.I.S. (2018). Developing paradigms of drowning deaths in the state of Haryana, Punjab. *The Indian Police J*. 65(4): 48-57.

11. Thakar, M.K., Luthra, D. and **Khattar, J.I.S.** (2018).Forensic studies of phytoplankton ecology of two water bodies of Kurukshetra area of Haryana state in India. *Egyp. J. Forensic Sci.*. 8:38. https://doi.org/10.1186/s41935-018-0068-4

12. Jindal, N. and **Khattar, J.I.S.** (2018). Microbial polysaccharides in food industry. In: *Handbook of food bioengineering. Vol 20: Biopolymers for food design.* (Eds). A. M. Grumezescu and A.M. Hoban. Academic Press, U.K. pp. 95-123. http//dx.doi.org/10.1016/B978-0-12-811449-0.00004-9

13. Singh, Y., Gulati, A., Singh, D.P. and **Khattar, J.I.S.** (2018). Cyanobacterial community structure in hot water springs of Indian North-Western Hiamalayas: A Morphological, molecular and ecological approach. *Algal Research*. 29:179-192. DOI: 10.1016/j.algal.2017.11.023.

14. Chaudhary, R., **Khattar, J.I.S.** and Singh, D.P. (2017). Growth and lipid production by *Desmodesmus subspicatus* and potential of lipids for biodiesel production. *Journal of Energy and Environmental Sustainability*. 4:58-63.

15. Singh R. S., Walia A.K., Pratibha, **Khattar, J.I.S**. and Singh, D. P. (2017). New cell surface lectins with complex carbohydrate specificity. *Indian J. Experimental Biol*. 55: 514-522.

16. Singh, R.S., Walia, A.K., **Khattar, J.I.S**., Singh, D.P. and Kennedy, J.F. (2017). Cyanobacterial lectins Characteristics and their role as antiviral agents. *Intr. J. Biological Macromol*. 102:475-496. https://doi.org/10.1016/j.ijbiomac.2017.04.041

17. Kaushal, S., Singh, Y., **Khattar, J.I.S.** and Singh, D.P. (2017). Phycobiliprotein production by a novel cold desert cyanobacterium *Nodularia sphaerocarpa* PUPCCC 420.1. *J. Appl. Phycol*. DOI. 10.1007/s10811-017-1093-7.

18. Khattar, J.I.S., Singh, Y., Parveen, S. and Singh, D.P. (2017). Microalgal Biofuels: Flexible Bioenergies for Sustainable Development. In: *Biofuels: Production and Future Perspectives*. Singh, R.S., Pandey, A. and Gnansounou, E. (Eds). CRC Press, New York. 331-362.

19. **Khattar, J.I.S**., Kaur, M. and Singh, D.P. (2016). Sulphide ameliorates thermal induced oxidative stress in a mesophilic cyanobacterium *Westiellopsis prolifica. J. Adv. Biol. Biotech*. 9(4): 1-12 DOI: 10.9734/JABB/2016/27501

20. Singh, D.P. and **Khattar J.I.S.** (2016)**.** Impact of insecticides on cyanobacteria. *Seeweed Res. Utiln*. 38(1) 165-180.

21. Singh, D.P., **Khattar, J.I.S.,** Kaur, G. and Singh, Y. (2016). Toxicological impact of herbicides on cyanobacteria. *Ann. Res. Rev. Biol*. 9(4):1-39 DOI: 10.9734/ARRB/2016/22614

22. Singh, D. P., **Khattar, J.I.S.,** Alka, Kaur, G. and Singh, Y. (2016). Toxicological effect of pretilachlor on some physiological processes of cyanobacterium *Synechocystis* sp. strain PUPCCC 64. *J. Appl. Biol. Biotech.* 4(01):012-019 DOI. 10.7324/JABB.2016.40103

23. **Khattar, J.I.S**., Kaur, S., Kaushal, S., Singh, Y., Singh, D.P., Rana, S. and Gulati, A. (2015). Hyperproduction of phycobiliproteins by the cyanobacterium *Anabaena fertilissima* PUPCCC 410.5 under optimized culture conditions. *Algal Res.* 12:463-469. https://doi.org/10.1016/j.algal.2015.10.007

24. Singh, D.P., **Khattar, J.I.S**., Kaur, G., Gupta, M. and Singh, Y. (2015). Effect of pretilachlor on nitrogen uptake and assimilation by the cyanobacterium *Desmonostoc muscorum* PUPCCC 405.10. *Acta Physiol. Plant*. 37:177 DOI 10.1007/s11738-015-1923-7
25. Shahnaz, P. **Khattar, J.I.S**. and Singh, D.P. (2015).The cyanobacterium *Synechocystis* sp. PUPCCC 62: a potential candidate for biotransformation of Cr (VI) to Cr (III) in the presence of sulphate. *Environ. Sci. Pollut. Res.* (22):10661-10668. https://doi.org/10.1007/s11356-015-4260-x
26. **Khattar, J.I.S**., Shahnaz, P., Singh, D.P. and Gulati, A. (2015). Intracellular uptake and reduction of hexavalent chromium by the cyanobacterium *Synechocystis* sp. PUPCCC 62. *J. Appl. Phycol.* DOI 10.1007/s10811-014-0374-7

27. Singh, H., **Khattar, J.I.S**. and Ahluwalia, A.S. (2014). Cyanobacteria and agriculture crops. *Vegetos* 27:37-44.
28. Singh, Y. **Khattar, J.I.S**., Singh D.P. and Gulati, A. (2014). Limnology and cyanobacterial diversity of high altitude lakes of Lahaul-Spiti in Himachal Pradesh, India. *J. Biosci.* 39:643-657. https://doi.org/10.1007/s12038-014-9458-4
29. Choudhary, R., **Khattar, J.I.S**. and Singh, D.P. (2014). Microalgae as feedstock for biofuel: biomass yield, lipid content and fatty acid composition as selection criteria. *Internatl. J. Power Renew. Energ. Syst.* (1) : 62-71.
30. Singh, D.P., **Khattar, J.I.S**., Gupta, M. and Kaur, G. (2014). Evaluation of toxicological impact of crtap hydrochloride on some physiological activities of a non-heterocystous cyanobacterium *Leptolyngbya foveolarum*. *Pestic. Biochem. Physiol.* 110:63-70. DOI org/10.1016/j.pestbp.2014.03.002
31. Singh, H., Ahluwalia, A.S. and Khattar, J.I.S. (2013). Induction of sporulation by selected carbon sources in *Anabaena naviculoides*, a diazotrophic strain capable of colonizing paddy fields of Punjab (India). *Phycos* 43(2): 18-25.
32. Singh, H., Ahluwalia, A.S. and **Khattar, J.I.S.** (2013) Induction of sporulation by different nitrogen sources in *Anabaena naviculoides*, a dizotrophic strain capable of colonizing paddy fields of Punjab, India. *Vegetos.* 26(1)283-292
33. Jindal, N., Singh, D.P. and **Khattar, J.I.S.** (2013). Optimization, characterization, and flow properties of exopolysaccharides produced by the cyanobacterium *Lyngbya stagnina*. *J. Basic Microbiol.* 53(11): 902-912. DOI 10.1002/jobm.201200201
34. Singh, D.P., **Khattar, J.I.S**., Kaur, M., Kaur, G., Gupta, M. and Singh, Y. (2013). Anilofos tolerance and mineralization by the cyanobacterium *Synechocystis* sp. strain PUPCCC 64. *PLoS One* 8(1):e53445. Doi:10.1371/journal.pone0053445
35. Singh, D.P., **Khattar, J.I.S**., Kaur, K., Sandhu, B.S. and Singh, Y. (2012). Toxicological impacts of anilofos on some physiological processes of a rice field cyanobacterium *Anabaena torulosa*. *Toxicol. Environ. Chem.* 94(7):1304-1318. DOI. Org/10.1080/02772248.2012.703203.
36. Singh, D. P., **Khattar, J.I.S**., Amita, Kaur, G. and Cheema, P. (2012). Toxicity of herbicides to diazotrophic cyanobacterium *Nostoc muscorum. J. Pb. Acad. Sci.* 9-10(1&2):67-71.

37. Singh, H., **Khattar, J.I.S**. and Ahluwalia, A.S. (2011). Cyanobacterial differentiation with special reference to akinetes. *J. Pb. Acad. Sc.* 7-8: 49-58.
38. Jindal, N., Singh, D.P. and **Khattar, J.I.S.** (2011). Kinetics and physico-chemical characterization of exopolysaccharides produced by the cyanobacterium *Oscillatoria formosa. World J Microbiol. Biotechnol.* 27: 2139-2146. DOI 10.1007/s11274-011- 0678-6
39. Singh, D.P., Khattar, J.I.S., Nadda, J., Singh, Y., Garg, N., and Gulati, A. (2011). Chlorpyrifos degradation by cyanobacterium *Synechocystis* sp. PUPCCC64. *Enviorn. Sci. Pollut. Res.* 18: 1351-1359. https://doi.org/10.1007/s11356-011-0472-x
40. **Khattar, J.I.S.,**, Singh, D.P., Jindal, N., Kaur, N., Singh, Y., Rahi, P. and Gulati, A. (2010). Isolation and characterization of exopolysaccharides produced by the cyanobacterium *Limnothrix redekei* PUPCCC 116. *Appl. Biochem. Biotechnol.* 162:1327- 1338. https://doi.org/10.1007/s12010-010-8922-3
41. Jindal, N., Singh, D. P. and **Khattar, J.I.S.** (2010) Isolation and Screening of Exopolysaccharides Producing Strains of Cyanobacteria. *J. Pb. Acad. Sci.* 6-7: 52-58.
42. **Khattar, J.I.S**. and Shailza (2009) Optimization of copper removal by the cynaobacterium *Oscilltoria chlorina. J. Pb. Acad. Sci.* 5-6(1&2): 101-106.
43. Kaur, G., **Khattar, J.I.S**., Singh, D.P., Singh, Y. and Nadda, J. (2009). Microalgae: A Source of Natural Colours. In : *Algal Biology and Biotechnology*. (J.I.S. Khattar, D.P. Singh and G. Kaur eds.), I.K. International Publishing House Pvt. Ltd., New Delhi. pp. 129-150.
44. Singh, D.P., **Khattar, J.I.S**. and Singh, Y. (2009). Effect of pesticides on the distribution pattern of cyanobacteria in a rice field ecosystem. *J. Indian Bot. Soc.* **88:** 163-169.
45. Singh, D.P., **J.I.S. Khattar**, G. Kaur & Y. Singh (2009). Cyanobacterial diversity in rice fields of Malwa region of Punjab and their tolerance to chlorpyrifos. *J. Pb. Acad. Sci.* 4 (1&2): 106-113.
46. **Khattar, J. I. S.** and Shailza (2009) Optimization of Cd^{2+} removal by the cyanobacterium *Synechocystis pevalekii* using the response surface methodology. *Process Biochemistry* 44: 118-121. https://doi.org/10.1016/j.procbio.2008.09.015
47. **Khattar, J.I.S** and Jindal, N. (2008). Isolation and characterization of exopolysaccharides produced by the cyanobacterium *Phormidium valderianum. J. Biotechnol.* **113S :** S423- S424.
48. Ahuja, G., **Khattar, J.I.S.** and T.A. Sarma. (2008) Interaction between carbon and nitrogen metabolism during akinete development in the cyanobacterium *Anabaena torulosa*. *J. Basic Micrboiol.*. 48:125-129. https://doi.org/10.1002/jobm.200700302
49. **Khattar, J.I.S**., Sarma, T.A. & Sharma, A. (2007) Optimization of Chromium removal by the chromium resistant mutant of cyanobacterium *Anacystis nidulans* in a continuous flow biorecactor. *J. Chem. Technol. Biotechnol.* 82: 652-657. https://doi.org/10.1002/jctb.1722

50. Sarma, T.A., G. Ahuja & **J.I.S. Khattar** (2004). Nutrient stress causes akinete differentiation inn cyanobacterium *Anabaena torulosa* with concomitant increase in nitrogen reserve substances. *Folia Microbiol*. 49: 557-562. https://doi.org/10.1007/BF02931533
51. **Khattar, J.I.S**., Sarma, T.A . & Sharma, A. (2004) Effect of Cr^{6+} stress on photosynthetic pigments and certain physiological processes of *Anacystis nidulans* and its chromium resistant strain. *J. Microbiol. Biotechnol.* (14):1211-1216.
52. **Khattar, J.I.S**., Sarma, T.A. & Sharma, A. (2004). Criteria for determining resistance of the cyanobacterium *Anacystis nidulans* and its mutants towards nicke. In: *Plant Diversity in India*. J.S. Dargan & T.A. Sarma (eds). Bishen Singh Mahendrapal Singh Publishers, Dehra Dun pp. 361-369.
53. **Khattar, J.I.S**., Singh, D.P. & Sarma, T. A. (2002) Characterization and optimization of chromium uptake by alginate cells of *Anacystis nidulans* in a continuous flow bioreactor.In : *Biotechnology in Agriculture and Environment* . S.S Marwaha and Rajesh Grover (Eds) Asia Tech. Publishers, New Delhi. pp.182-189.
54. **Khattar, J.I.S**, Sarma, T.A., Singh, D.P. & Sharma,A. (2002). Bioaccumulation of chromium ions by immobilized cells of a filamentous cyanobacterium *Anabaena variabilis. J. Microbiol. Biotechnol.* 12: 137-141.
55. Sarma , T.A., Ahuja, G. and Khattar, J.I.S. (2000) Effect of nutrients and aeration on O_2 evolution and photosynthetic pigments of *Anabaena torulsoa* during akinete differentiation. *Folia Microbiol.* 45: 434-438. https://doi.org/10.1007/BF02817617
56. **Khattar, J.I.S.**, Sarma , T.A. & Singh, D.P. (1999). Removal of chromium ions by agar immobilized cells of the cyanobacterium *Anacystis nidulans* in a continuous flow bioreactor. *Enz. Microbial Technol.* 25 : 564-568. https://doi.org/10.1016/S0141-0229(99)00092-7
57. Sarma, T.A., **Khattar, J.I.S**., Gurpreet Ahuja & Veena Saini (1998). Influence of aeration and nutrients on akinete differentiation in the cyanobacterium *Anabaena torulsoa* . In : *Cyanobacterial Biotechnology*. G. Subramanian, B.D. Kaushik and G.S. Venkataraman (eds.) Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi. pp 99-102.
58. **Khattar, J.I.S.** and Sarma, T.A. (1996) Nitrate utilization and sporulation in *Anabaena torulosa* in the presence and absence of inhibitors. In :*Current Researches in Plant Sciences*. Vol II. T.A. Sarma, S. S. Saini, M.L. Trivedi and M. Sharma (eds.). Bishen Singh Mahendra Pal Singh Publisher, Dehra Deun. pp. 29-34.
59. Sarma, T.A. and **Khattar, J.I.S.** (1994). Glucose-6-phosphate dehydrogenase (G6PDH) activity in *Anabaena torulosa* in relation to sporulation. In: *Recent*

advances in Phycology. A.K.Kashyap and H.D. Kumar (eds). Rastogi Publishers, Meerut. pp. 107- 112.

60. Sarma, T.A. and **Khattar, J.I.S.** (1994). Photoheterotrophic and chemoheterotrophic nitrogen fixation and nitrate utilization by the cyanobacterium *Anabaena torulosa. Folia Microbiol.* 39: 404-408. https://doi.org/10.1007/BF02814447
61. Sarma, T.A. and **Khattar, J.I.S.** (1993). Akinete differentiation in phototrophic, photoheterotrphic and chemoheterotrophic conditions in *Anabaena torulosa. Folia Microbiol.* 38: 335-340. https://doi.org/10.1007/BF02898604
62. Sarma, T.A. and **Khattar, J.I.S.** (1992). Phosphorus deficiency, nitrogen assimilation and akinete differentiation in the cyanobacterium *Anabaena torulosa. Folia Microbiol*. 37 :223-226. https://doi.org/10.1007/BF02933152
63. Sarma, T.A. and **Khattar, J.I.S.** (1986). Accumulation of reserve products during sporulation in the cyanobacterium *Anabaena torulosa* under photoheterotrophic and heterotrophic conditions. *Biochem. Physiol. Pflanz*. 181:541-549.
64. Sarma, T.A. and **Khattar, J.I.S.** (1986). Accumulation of cyanophycin and glycogen during sporulation in the cyanobacterium *Anabaena torulosa. Biochem. Physio. Pflanz.* 181:155-164.

21. NCBI submissions:

List of Accession number obtained from NCBI GenBank

Organism	Accession number		
	16S rRNA gene	***rbcL* gene**	**PC-IGS**
Cyanobium parvum PUPCCC 007.1	KJ705090	KM377021	KM377069
Synechococcus elongatus PUPCCC 010.5	KM376977	KM376999	KM377059
Synechocystis pevalekii PUPCCC 062.1	KM384741	KM377022	KM377070
Synechocystis sp. PUPCCC 62	KF475890	-	KF573457
Synechocystis sp. PUPCCC 64	GQ907237	-	-
Gloeocapsa gelatinosa PUPCCC 009.2	KM376978	KM377000	KM377060
Gloeocapsopsis pleurocapsoides PUPCCC 008.2	KJ705091	KM377023	KM377071
Gloeocapsopsis thermalis PUPCCC 008.4	KM376979	KM377001	KM377061
Chroococcidiopsis cubana PUPCCC 005.5	KM384742	KM377024	KM377072
Pseudanabaena limnetica PUPCCC 106.2	KM376978	KM377002	-
Pseudanabaena thermalis PUPCCC 106.4	KM376979	KM377003	-
Pseudanabaena sp. PUPCCC 106.7	KJ705103	KM377025	-

Geitlerinema sulphureum PUPCCC 110.2	KM376980	KM377004	-
Limnothrix redekei PUPCCC 116	GU552680	-	-
Limnothrix redekei PUPCCC 116.2	KJ705099	KM377026	-
Geitlerinema acutissimum PUPCCC 110.4	KJ705093	KM377027	-
Leptolyngbya antarctica PUPCCC 112.2	KJ705094	KM377028	-
Leptolyngbya benthonica PUPCCC 112.5	KM384743	KM377029	-
Leptolyngbya carnea PUPCCC 112.15	KM376981	KM377005	-
Leptolyngbya cebennensis PUPCCC 112.4	KM384744	KM377030	-
Leptolyngbya copelandii PUPCCC 112.16	KM376982	KM377006	-
Leptolyngbya foveolarum PUPCCC 112.8	KJ705095	KM377031	-
Leptolyngbya frigida PUPCCC 112.1	KJ705096	KM377032	-
Leptolyngbya gelatinosa PUPCCC 112.19	KM376983	KM377007	-
Leptolyngbya laminosa PUPCCC 112.17	KM376984	KM377008	-
Leptolyngbya lurida PUPCCC 112.6	KJ705097	KM377033	-
Leptolyngbya orientalis PUPCCC 112.18	KM376985	KM377009	-
Leptolyngbya ramosa PUPCCC 112.21	KM376986	KM377010	-
Leptolyngbya subtilis PUPCCC 112.12	KM384745	KM377034	-
Leptolyngbya subtruncata PUPCCC 112.10	KM384746	KM377035	-
Leptolyngbya thermarum PUPCCC 112.23	KM376987	KM377011	-
Leptolyngbya thermobia PUPCCC 112.20	KM376988	KM377012	-
Leptolyngbya sp. PUPCCC 112.7	KJ705098	KM377036	-
Leptolyngbya sp. PUPCCC 112.9	KM384747	KM377037	-
Leptolyngbya sp. PUPCCC 112.11	KM384748	KM377038	-
Leptolyngbya sp. PUPCCC 112.22	KM376989	KM377013	-
Nodosilinea epilithica PUPCCC 111.2	KM384749	KM377039	KM377073
Planktothrix clathrata PUPCCC 108.8	KM384750	KM377040	KM377074
Planktothrix sp. PUPCCC 108.5	KJ705102	KM377041	KM377075
Planktothrix sp. PUPCCC 108.6	KM384751	KM377042	KM377076
Phormidium ambiguum PUPCCC 118.1	KM376990	KM377014	KM377062
Phormidium autumnale PUPCCC 118.4	KM384752	KM377043	KM377077
Phormidium chalybeum PUPCCC118.8	KM384753	KM377044	KM377078
Phormidium sp. PUPCCC 118.3	KM376991	KM377015	KM377063
Phormidium sp. PUPCCC 118.2	KM376992	KM377016	KM377064
Microcoleus acremanii PUPCCC 120.2	KM384754	KM377045	KM377079
Microcoleus vaginatus PUPCCC120.5	KM384755	KM377046	KM377080
Anabaena fertilissima PUPCCC 410.5	KT270438	-	KT270439
Anabaena variabilis PUPCCC 410.2	KM384756	KM377047	KM377081
Desmonostoc muscorum PUPCCC 405.10	KM 225636	KM 225637	-
Nodularia sphaerocarpa PUPCCC 420.1	KM384757	KM377048	KM377082

Nodularia spumigena PUPCCC 420.5	KJ705107	KM377049	KM377083
Nostoc commune PUPCCC 405.1	KM384758	KM377050	KM377084
Nostoc muscorum PUPCCC 405.4	KM384759	KM377051	KM377085
Nostoc sp. PUPCCC 405.2	KJ705104	KM377052	KM377086
Nostoc sp. PUPCCC 405.3	KM384760	KM377053	KM377087
Nostoc sp. PUPCCC 405.6	KJ705105	KM377054	KM377088
Nostoc sp. PUPCCC 405.7	KM384761	KM377055	KM377089
Nostoc sp. PUPCCC 405.8	KJ705106	KM377056	KM377090
Nostoc sp. PUPCCC 405.9	KM384762	KM377057	KM377091
Tolypothrix sp. PUPCCC 415.2	KM384763	KM377058	KM377092
Microcoleus chthonoplastes PUPCCC 120.4	KM376993	KM377017	KM377065
Chlorogloeopsis fritschii PUPCCC 505.4	KM376994	KM377018	KM377066
Fischerella thermalis PUPCCC 510.2	KM376995	KM377019	KM377067
Mastigocladus laminosus PUPCCC 515.6	KM376996	KM377020	KM377068
Nostoc sp. PAN 549	KF 921498		