

Monica Bhatnagar

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Current position: Professor, Department of Microbiology, Maharshi Dayanand Saraswati University, Ajmer 305009 Rajasthan, India.

Other assignments: Assistant Director, Technology Development & Capacity Building, Algae Biofuel & Biomolecules Centre
Assistant Centre Superintendent of Examinations
Proctor, Maharshi Dayanand Saraswati University, Ajmer

Education

Ph.D. Microbiology, Indian Agricultural Research Institute, New Delhi, India, 1997

M.Sc. Microbiology, Indian Agricultural Research Institute, New Delhi, India, 1993 **IARI Gold Medal**

B.Sc. (Hons) Botany, University of Delhi, Delhi, India, 1991

Field of specialization:

Main field	Specialization	Sub/Super specialization
Microbiology	Biomaterials	Wound care products
	Bioremediation	Biosorption
	Stress Biology	Osmotic, fluoride stress
	Bioprospecting	Algae Biofuel, biopolymers

Awards/Recognitions

Awarded Best Oral Paper Presentation: n Third Global Sustainable Biotech Congress, 2014. Dec 1-5, for Wound Healing by soluble plant biopolymer of Moringa oleifera organized by North Maharashtra University, Jalgaon, Global Biotech Forum, Nagpur and Cetys University, Mexico.

2nd best poster award to Neetu Manglani for the poster paper titled Production and optimization of alkaline serine keratinase exhibiting potential dehairing activity. Neetu Mangalani, **Monica Bhatnagar**, Ashish Bhatnagar in the International Conference on Biotechnology: A rendezvous with Basic Sciences for Global Prosperity. 26-27 Dec 2012, New Delhi. Society for Plant Research, New Delhi

Third Best Poster Award to Laxmi Parwani in the International Conference on Biotechnology: A Rendezvous with Basic Sciences for Global Prosperity for the Poster paper titled Potential of Gum Acacia in wound management: A new approach by Laxmi Parwani, **Monica Bhatnagar**, Ashish Bhatnagar held at NASC Complex, New Delhi December 26-27, 2012

Third position for Young Scientist Award to Laxmi Parwani in the International Conference on Microorganisms in Environmental Management and Biotechnology for the oral presentation titled

Biocompatible polymers from desert cyanobacteria for wound management by Laxmi Parwani, **Monica Bhatnagar**, Ashish Bhatnagar, Vinay Sharma held at Barkatullah University Bhopal July 1-3, 2011

Third Best Poster Award to Laxmi Parwani for the poster paper titled A novel biocompatible wound dressing based on gum Acacia by Laxmi Parwani, **Monica Bhatnagar**, Ashish Bhatnagar, Vinay Sharma in the International Conference on Green Chemistry at Jaipur organized by Central University of Rajasthan December 7-9, 2011

IARI Senior Research Fellow1993-1997

Qualified Council for Scientific & Industrial Research & University Grants Commission National Eligibility Test for Junior Research Fellowship in Life Science 1997

Qualified-Indian Council for Agricultural Research National Eligibility Test for Senior Research Fellowship and Lecturership in Microbiology 1994

IARI Gold medal 1993

IARI Junior Research Fellow1991-1993

Qualified National Talent Search Contest of the Central Institute of General Knowledge Learning, 1986

Research and Technology contributions

Techniques developed

1. *Synthesized cyanobacterial exopolymer based hydrogel dressings that could heal the wounds faster (Applying Indian patent)*
2. *First to indicate possibility for biosorptive removal of fluoride that generated a series of papers by Venkat Mohan et al. (Fluoride 33, 2000; Biotech Lett 24, 2002)*
3. *Developed a novel method of interactive biosorption for anion (as fluoride) removal (Biotech Lett 24, 2002). Though majority of work on biosorption has been done by Voleski's lab, yet we set a priority on removal of anions that too by an interactive method removing cation sorption followed by anion sorption.*
4. *Mixotrophic algae can be grown in waste extracts of poultry litter (AE 88, 2011)*

Mechanism deciphered

1. *Reactive oxygen species control by the biopolymers of Acacia, Moringa and Cyanobacteria might be contributing to a quicker healing of wounds (IJPPS, JAP)*
2. *Resistance of green algae and susceptibility of cyanobacteria to fluoride (Fluoride 33, 2000)*
3. *Solid surfaces alleviate thermal stress in desert algae (IJA 16, 2014)*
4. *Survival mechanisms against thermal stress in desert algae are triggered when undergoing matrix stress and not osmotic stress (IJA 16, 2014).*

Management cues suggested

1. *Plant diversity in deserts needs to be conserved for the conservation of cyanobacterial diversity (JAE 72, 2008)*

Discovered

1. *Chroococcus cohaerens* (2412), an isolate from sedimentary rock grit, - a true osmophile requiring -0.5 MPa osmotic water potential for optimal growth that died at 50 °C over dry sand (IJA 16, 2014)
2. *Chlorella minutissima* from wastewater is a versatile and potent remediation agent* (ABB 161, 2010)
3. Wide spread fluoride tolerance in cyanobacteria and green algae (IJM 44, 2004)
4. Cyanobacteria are more susceptible to fluoride than green algae (Fluoride 33, 2000)
5. Cyanobacterial exopolymers as novel blood clotting agents for wound management (JAP 26, 2014; CP 99, 2014)
6. Antioxidant and iron chelating activity in cyanobacterial polymers showing good wound healing ability (JAP 26, 2014)
7. Flocculant, emulsifier, viscosity modifier, high water sorbing exopolymer from *Anabaena variabilis* from desert (JAP 24, 2012)
8. Wound healing polymers from *Acacia* sp. and *Moringa* sp. (IJEB 51, 2013)
9. Waste from fermentation industry can be used for sorptive removal of fluoride (IJB 2, 2013)
10. Majority of lithophytic cyanobacteria produce emulsifying molecules (turbidity at 30' varied from 11-37% of 0 min) (unpublished)
11. Cyanobacteria are known to avoid plant vicinity in general but since plant cover in desert does not create shade, the diversity increases near plants (JAE 72, 2008)
12. First estimate of morphotypic diversity of cyanobacteria in Thar desert (JAE 72, 2008), saline playas and exposed rock surfaces and outcrops
13. Rajasthan is a big treasure house of mucilaginous, filamentous and heterocystous cyanobacteria (JAE 72, 2008)
14. Low species richness of cyanobacteria but habitat variation even at short local scale adds more and more new forms (JAE 72, 2008)
15. Chlorophyll a is a deceptive parameter to determine survival under desiccation (IJA 16, 2014).

Pioneered establishment of

- An Interdisciplinary Research Centre: **Algae Biofuel & Biomolecules Centre**, and
- **Resource Centre**: Germplasm collection of desert microorganisms: Maintain 59 strains of cyanobacteria and algae, 21 strains of bacteria

Publications: 28

DNA Sequences submitted: 30

Citations indices based on Google Scholar

	All	Since 2014
Citations	795	564
h-index	9	9
i10-index	9	9

Innovation in Pedagogy

Microsphere:<https://microsphere.wooqer.com/loginRegister.do#> A platform provided by Wooqer to deliver presentations (powerpoint and video) to the students, obtain assignments, provide literature and extra teaching material to the students.

Research Projects

1. Co-Principal Investigator in Department of Biotechnology, Government of India funded **Satellite Centre for Microalgal Biodiversity in Arid Zones of Rajasthan**. Outlay: Rs. 1.9 million (completed on 31.10.02).
2. Principal Investigator in Ministry of Environment & Forests funded **Prosthecate Bacteria & Micrococcus Centre (ProMiC)**, Outlay: Rs. 2.5 million 2012.
3. Assistant Director, Technology Development & Capacity Building, **Algae Biofuel & Biomolecules Centre**: An Study Centre established for Interdisciplinary Research & Outreach Program involving Faculty from Microbiology, Food Science & Nutrition, Environmental Science, Economics and Management
4. Co-Principal Investigator in Department of Biotechnology, Government of India funded project: **Developing low water demanding cultivation system of algae for Rajasthan**. Outlay: Rs. 46.45 lakh (30.1.17 to 30 July 2018).
5. Principal Investigator in Parenteral Drug Association India Chapter funded project: **Moist bioactive cellulose biocomposites for advanced wound care**. Outlay Rs. 50 lakh (20.3.2017-19.3.2022).

Ph.D. projects

S No	Name of Research Scholar	Topic	Date of Registration	Awarded
1	Sanjay Pareek	Studies on the production, characterization and biotechnological potential of exopolymers liberated by some desert inhabiting cyanobacteria	7.5.2005	2009
2	AshwantiTaks hak	Diversity of proteases in Gram positive aerobic cocci	28.12.2004	2012
3	Om Prakash	Comparative studies on desiccation response	11.9.2006	2012

	Chahar	of some poikilohydric organisms		
4	Moshumi Dasgupta	Diversity of thermo – and xerotolerant Cyanobacteria in some arid and semi arid habitats	4.4.2005	2013
5	Neetu Manglani	Studies on keratinases of bacteria in feather deposits of poultry and wetlands at Ajmer	31.7.2008	2013
Co-Supervised student at Bansathali Vidyapeeth, Banasthali with Prof Vinay Sharma				
6	Laxmi Parwani	Prospecting Biocompatible Carbohydrate Polymers from Desert Microorganisms for Wound Management		2014

Publications

Biopolymers and Wound Care

2001. Monica Bhatnagar & Ashish Bhatnagar. Biotechnological potential of desert algae. In: Algal Biotechnology. P.C. Trivedi (ed). Pointer Publ., Jaipur. pp.338-56. Citations 2
2012. M Bhatnagar, S Pareek, J Ganguly, A Bhatnagar. Rheology and composition of a multi-utility exopolymer from a desert borne cyanobacterium *Anabaena variabilis*. Journal of Applied Phycology 24 (6), 1387-1394. JIF 2.326. Citations 5
2012. L Parwani, M Bhatnagar, A Bhatnagar, V Sharma. Reactive oxygen species control by plant biopolymers intended to be used in wound dressings. International Journal of Pharmacy and Pharmaceutical Sciences 4 (5), 506-510. Citations 6.
2013. Monica Bhatnagar, Laxmi Parwani, Vinay Sharma, Jhuma Ganguli, Ashish Bhatnagar. Hemostatic antibacterial biopolymers from *Acacia Arabica* (Lam.) Willd. and *Moringa oleifera* (Lam.) as potential wound dressing materials. Indian Journal of Experimental Biology 51:804-810. NISCAIR India JIF 1.19536. Citations 21.
2014. Laxmi Parwani, Monica Bhatnagar, Vinay Sharma, Ashish Bhatnagar. Antioxidant activity of cyanobacterial exopolymers with potential wound healing ability. Journal of Applied Phycology 26: 1473-1482. Springer JIF 2.326 Citations 4
2014. Monica Bhatnagar, Laxmi Parwani, Jhuma Ganguly, Vinay Sharma and Ashish Bhatnagar. 2013. Exopolymers from *Tolypothrix tenuis* and three *Anabaena* sp (Cyanobacteriaceae) as novel blood clotting agents for wound management. Carbohydrate Polymers. 99:692-699. Elsevier. JIF 3.479. Citations 12
2014. Monica Bhatnagar, Sanjay Pareek, Ashish Bhatnagar, Jhuma Ganguly. Rheology and characterization of a low viscosity emulsifying exopolymer from desert borne *Nostoccalcicola*. Indian Journal of Biotechnology 13:241-246. NISCAIR India JIF 0.477. Citation 1
- 2015 Monica Bhatnagar & Ashish Bhatnagar. Wound Dressings from Algal Polymers. In: Marine Algae Extracts - Processes, Products, and Applications. Se-Kwon Kim, Katarzyna Chojnacka (eds). Wiley-VCH Verlag GmbH & Co. KGaA. pp 523-556. Citation 1
2016. Laxmi Parwani, Monica Bhatnagar, Ashish Bhatnagar, Veena Sharma and Vinay Sharma. Evaluation of *Moringa oleifera* seed biopolymer-PVA composite hydrogel in wound healing dressing. Iranian Polymer Journal. 25 (11): 919-931. Citations

10. 2019. Monica Bhatnagar and Ashish Bhatnagar. Diversity of polysaccharides in cyanobacteria. In: Microbial Diversity in Human Welfare. (BN Johri, T Satyanarayana and S. Das). Pub. Springer (In print)
11. 2019. Laxmi Parwani, Monica Bhatnagar, Ashish Bhatnagar, Veena Sharma and Vinay Sharma Gum Acacia-PVA hydrogel blends for wound healing. *Vegetos* 32(1):78-91. Springer Singapore

Biosorption

12. 2001. Monica Bhatnagar, Ashish Bhatnagar & Sapna Jha. Interactive biosorption by microalgal biomass as a tool for fluoride removal. *Biotechnology Letters*. (JIF 1.853). 24 (13): 1079-1081. Kluwer Academic Pub, The Netherlands. Citations 37.
13. 2010. Monica Bhatnagar, Ashish Bhatnagar. Assessing algal potential to remove fluoride by biosorption In: *Protocols on Algal and Cyanobacterial Research*. Bagchi SN, Kleiner D. and Mohanty P. (eds). Narosa International Pub., New Delhi.
14. 2013. H Chhipa, R Acharya, M Bhatnagar, A Bhatnagar. Determination of sorption potential of fermentation industry waste for fluoride removal. *International Journal of Bioassays* 2 (3), 568-574. Citations 4

Stress Biology

15. 2000. Monica Bhatnagar & Ashish Bhatnagar. Algal and Cyanobacterial responses to fluoride. *Fluoride* (JIF 0.758) 33(2):55-85. Elsevier Pub. Citations 31.
16. 2004. Monica Bhatnagar & Ashish Bhatnagar. Physiology of *Anabaena khannae* and *Chlorococcum humicola* under fluoride stress. *Folia Microbiologica* (JIF 0.791). 49(3): 291-296. Citation 5
17. 2004. Monica Bhatnagar, Ashish Bhatnagar & S.K. Goyal. pH dependent fluoride toxicity in algae and cyanobacteria. *Indian Journal of Microbiology*. 44 (2):125-128. JIF 0.457
18. 2013. R Sharma, OP Chahar, M Bhatnagar, A Bhatnagar. Impact of osmotic stress and temperature on pigments and proteins of *Anabaena* strains. *Journal of Environmental Biology* 34 (5): 941-943. JIF 0.684 Citations 6
19. 2014. Ashish Bhatnagar, Monica Bhatnagar & Mukesh K. Garg. Solid Surfaces Alleviate Thermal Stress in Desert Microalgae. *International Journal on Algae*. 16(1):68-85.

Microbial Ecology and Diversity

20. 2005. Ashish Bhatnagar and Monica Bhatnagar. Microbial diversity in desert ecosystems. *Current Science* (JIF 0.935). 89 (1): 91-100. Citations 112.
21. 2008. Ashish Bhatnagar, Mahammad Basha Makandar, Mukesh Kumar Garg & Monica Bhatnagar. Community structure and diversity of cyanobacteria and green algae in Thar desert of India. *Journal of Arid Environments* (JIF 1.772) 72:73-83. Citations 33.
22. 2016. Subramanya Rao, Yuki Chan, Donnabella C. Bugler-Lacap, Ashish Bhatnagar, Monica Bhatnagar, Stephen B. Pointing. Microbial Diversity in Soil, Sand Dune and Rock Substrates of the Thar Monsoon Desert, India. *Indian Journal of Microbiology*. 56 (1): 35-45. Citations 7
23. 2017. Luke R. Thompson, Jon G. Sanders et al. and The Earth Microbiome Project Consortium. A communal catalogue reveals Earth's multiscale microbial diversity. *Nature* 551: 457-463. Citations 9

Bioremediation and Algae Biofuel

24. 1998. Ashish Bhatnagar&Monica Bhatnagar. Algae based wastewater remediation systems. In: Advances in Phycology. B.N. Verma, AN Kargupta& SK Goyal (eds).pp. 381-98. APC Publ. Pvt. Ltd., New Delhi.

Citations 1

25. 2001. Ashish Bhatnagar& Monica Bhatnagar. Strategies to employ algae and cyanobacteria for wastewater remediation. In: Innovative Approaches in Microbiology. D.K. Maheshwari & R.C. Dubey (eds). Bishen Singh Mahendra Pal singh, Dehra Dun. pp. 379-403. Citations 3

26. 2010. Ashish Bhatnagar, Monica Bhatnagar, Senthil Chinnasamy and K. C. Das. Chlorella minutissima—A Promising Fuel Alga for Cultivation in Municipal Wastewaters. Applied Biochemistry & Biotechnology 161 (1): 523-536. Springer. JIF 1.893. Citations 159.

27. 2011. Monica Bhatnagar, Ashish Bhatnagar, Senthil Chinnasamy& K.C. Das. Curbing eutrophication by growing mixotrophic algae for biofuel feedstocks. Algae Biofuels. Subodh Bhatnagar (Ed). Studium Press, LLC, Houston, USA. Citation 1.

Others

28. 1999. Surendra Bhatnagar, Monica Bhatnagar&Ashish Bhatnagar. *Homo sapiens cyberneticus*: the management man of future. In: Perspectives in Environment (Prof. R.R. Das Commemoration Volume). S.K. Agarwal, J.P. Kaushik, K.K. Koul & A.K. Jain (eds).pp. 261-7. APH Pub. Corp., New Delhi.

DNA Sequences submitted

1-10. Chhipa, H., Bhatnagar, M., Goswami, Pawas and Bhatnagar, Ashish. 2009. Partial sequences of 16S rRNA gene of Gram positive cocci. Accession numbers GQ290212-GQ290221.

11-21. 2010. Bhatnagar M., Chhipa H., Goswami P. and Bhatnagar Ashish. Submitted the sequences of 16S rRNA gene of Gram positive cocci in Genbank at site www.ncbi.nlm.nih.gov with accession numbers HM595364-74.

22-26. 2010. Chhipa,H., Bhatnagar,M., Goswami,P. and Bhatnagar,A. 201016S ribosomal RNA sequence analysis of environmental bacterial isolates from semi arid region of Rajasthan HM 803960-64.

27-30. Sequences obtained and submitted at site www.ncbi.nlm.nih.gov Gram positive keratinolytic bacilli