

Shiv Chhatrapati Shikshan Sanstha's

Rajarshi Shahu Mahavidyalaya, Latur



(Empowered Autonomous Institute)

NAAC A+ Grade (4th Cycle) with 3.49 CGPA, UGC-CPE (Phase-III) & DST-FIST Status

Structure and Curriculum of Certificate Course

in

Bio-inoculant Production

(Under PM-USHA)

For UG and PG Students

Approved by

Board of Studies in Microbiology

Rajarshi Shahu Mahavidyalaya, Latur (Empowered Autonomous Institute)

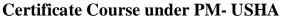
w. e. f. December, 2025





Rajarshi Shahu Mahavidyalaya, Latur

(Empowered Autonomous Institute)



Bioinoculant Production SYLLABUS

(Free of Cost Certificate Course)



Credits: 02 Max. Marks: 50 Lectures: 30 Hrs.

Learning Objectives:

LO.1 To Understand concept and history of microbial inoculants

LO.2 To Understand the importance of PGPR

LO.3 To Understand the Bioremediation of environmental pollution.

Course Outcomes:

After completion of course the student will be able to-

CO.1 Describe the basis of beneficial plant microbe interaction

CO.2 Describe the nutrient supplement to plants by beneficial soil microorganisms

CO.3 Describe the microbial process for bioremediation of environmental pollution

Unit No.	Title of Unit & Contents	Hrs.
I	Introduction to Bioinoculants	06
	 History of Bioinoculants Concepts and types of Bioinoculants – Bacterial, Fungal, Algal and <i>Actinorhizal</i>. Biological nitrogen fixation Importance of biofertilizers 	
	Unit outcomes: Students will be able to	
1	UT 1: Understand concept of microbial inoculants UT 2: Understand Importance of bioinoculants in agricultural development	
II	PGPR	4
	 Introduction for Fermenter Characteristics of <i>Rhizobium</i>, <i>Azospirillum</i> and <i>Azotobacter</i>. Studies on <i>Pseudomonas</i>. Rhizobium legume symbiosis- nodule formation and N2 fixation Mechanism of Nitrogen fixation – biochemistry of Nitrogen fixation. Mycorrhizae- types of mycorrhizae mechanisms of 'P' mobilizers P solubilizes Phosphobacterial – Mechanism of 'P' solubilization Unit outcomes: Students will be able to UT 1: Understand importance of PGPR in sustainable agricultural development UT 2: Understand various Plant Growth Promoting mechanisms 	
Ш	Bioinoculants for Remediation of environmental pollution	3
	 Microbial remediation and its importance Remediation of organic pollutants, dyes, polycyclic aromatic hydrocarbons and pesticides Microbial detoxification of inorganic pollutants: Heavy metals Unit outcomes: Students will be able to 	

Understand importance of environmental pollution cleanliness Understand environmental Bioremediation processes ourse	20
	20
* 1 1 0 271 1 1 0 1	
Isolation of <i>Rhizobium</i> from legume root nodules Isolation of <i>Azotobacter</i> Isolation of Potassium mobilizing bacteria Isolation of Phosphate solubilizing bacteria Isolation of dye degrading microorganisms	
	Isolation of Phosphate solubilizing bacteria

Learning Resources:

- 1. Adhya, T.K., Lal, B., Mohapatra, B., Paul, D. and Das, S. Advances in Soil Microbiology; Recent Trends and Future Prospects. Springer Publi., UK.
- Barabara. E., Schulz Christein J.C. Boyle Thomas N. Sieber (Eds.) 2006. Microbial Root Endophytes. Springer publications, germany.
- 3. Coyne, M.S. 2000. Soil Microbiology, CBS Publications, New Delhi.
- 4. Dixon, G.R., Tilston, Emma L. (Eds.) 2010 Soil Microbiology and Sustainable Crop Production, Springer publisher.
- 5. Eldor paul, 2015.Soil Microbiology, Ecology and Biochemistry, fourth edition, acadmic press, wyman St. Waltham.
- 6. Mukerji, K.G., C. Manoharachary and J. Singh (Eds.) 2006. Microbial Activity in the Rhizosphere Sereies: Soil Biology, Vol. 7XVI, 349 p. 35 illus, UK.
- 7. Paul E.A and F.E. Clark 1996. Soil Microbiology and Biochemistry, Academic Press. California.
- 8. Stephane Declerck, D. and G. Strullu. 2005. In Vitro Culture of Mycorrhizas. Springer Science and Business Media.
- 9. Subba Rao, N.S 2001. Soil Microbiology, Oxford and IBH publishing House. India
- 10. Varma, Ajit, Kharkwal and Amit C. (Eds). 2008. Symbiotic Fungi. Springer Publi., UK

पाएम-उषा V PM-UShA

Dr.Deepak Vedpathak

Chairman

Board of Studies in Microbiology

Rajarshi Shahu Mahavidyalaya, Latur

(Empowered Autonomous Institute)

Dr. Mahadev Gavhane

Principal

Rajarshi Shahu Mahavidyalaya, Latur

(Empowered Autonomous Institute)