Sevadal Education Society's

Sevadal Mahila Mahavidyalaya

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Sakkardara Square, Umrer Road, Nagpur- 440024 (M.S.)
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Website: www.sevadalmahilavidyalaya.org

Report

of

Certificate Course

in

'Biofertilizer and Biopesticide Production'

Course Coordinator: Dr. (Mrs.) K. V. Dubey
Professor, Dept. of Microbiology

Academic Session: 2023-2024

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Place for Higher Learning & Research (Research Academy)
Sakkardara Chowk, Umrer Road, Nagpur-440024

Date–8/1/2024

NOTICE

All the staff members of the Department of Microbiology are hereby informed that the meeting regarding the conduct of Certificate Course in the department will be held on 10/1/2024 at 12.30 pm in the chamber of Hon'ble Principal Sir. All the members are requested to remain present for the meeting.

Hon'ble Principal Sir will chair the meeting in presence of NAAC Coordinator Dr. A. P. Lambat, Associate professor, Dept of Home Science.

Agenda of the meeting:

1) To discuss various disciplines to be introduced in the certificate course.
2) To finalize the theme and designing of the syllabus of the certificate course
3) To discuss the conduct of Theory and Practical in the course.
4) To discuss about conducting exam.
5) Any other matter with the permission of the Chair.

(Dr. Mrs. K. V. Dubey)
Professor &
Course Coordinator
Department of Microbiology

(Dr. P. R. Bhandari)
Head
Department of Microbiology
Sevadal Mahila Mahavidyalaya,
Nagpur

Copy to:
NAAC Coordinator: Dr. A. P. Lambat, Associate Professor,
Dept of Home Science

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Minutes of the Meeting

'Biofertilizer and Biopesticide Production'

The meeting regarding the Certificate Course **'Biofertilizer and Biopesticide Production'** to be conducted in the Microbiology Department was held on 10/1/2024 at 12.30 pm in the Hon'ble Principal's Chamber. Hon'ble Principal Sir presided over the meeting.

Agenda of the meeting:

1. To discuss various disciplines to be introduced in the certificate courses.
2. To finalize the theme and designing of the syllabus of the certificate course
3. To discuss the conduct of Theory and Practical Examination in the course.
4. Any other matter with the permission of the Chair.

Following Members were present.

1) Prof. Pravin Charde,	Principal- Chairman
2) Dr. A. P. Lambat	NAAC Coordinator
3) Dr. P. R. Bhandari	HOD Microbiology
4) Dr. (Mrs.) Seema Nimbarte	Member
5) Dr.(Mrs.) K.V. Dubey	Course Coordinator

Dr. (Mrs.) K.V. Dubey Course Coordinator acted as secretary in the meeting. The Coordinator welcomed the Chairman, Hon'ble Principal and other members with the due permission of Chairman. The Coordinator read out the agenda of the meeting and subsequently discussed the matter.

Item No. 1: To discuss various disciplines to be introduced in the certificate course.

Resolution: Different disciplines for conducting Certificate Course through which entrepreneurial qualities in students can be developed were discussed. All the members actively participated and suggested the various themes for the certificate course,

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No.2: To finalize the theme and designing of the syllabus of the certificate course

Resolution: Title of the Certificate Course was Unanimously decided to be as **Biofertilizer and Biopesticide Production'.** It was also decided to implement the course from February 2/2/2024 in the academic session 2023-24. Course will consist of Theory and Practical of 20 hours duration respectively. Fpr seminar, workshop, guest lecture 10 hours will be devoted. All the members in the meeting unanimously approved the agenda.

ItemNo.3: To discuss the conduct of Theory and Practical Examination in the course

Resolution: Unanimously it was decided to conduct the theory and Practical Examination courses after completion of the courses during mid April 2024. .

ItemNo.4: Any other matter with the permission of Chair.

Resolution: As there was no other matter for further discussion the meeting ended with vote of thanks.

Name	Signature
1. Hon'ble Prof. Pravin Charde	
2. Dr. A. P. Lambat	
3. Dr.P.R.Bhandari	
4. Mrs. S. R. Nimbarte	
5. Dr.(Mrs.) K.V.Dubey	10/1/2024.

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Date–3/4/2024

NOTICE

All the staff members of the Department of Microbiology are hereby informed that the meeting regarding the conduct of Certificate Course **'Biofertilizer and Biopesticide Production'** in the department will be held on 04/4/2024 at 12.30 pm in the chamber of Hon'ble Principal. All the members are requested to remain present for the meeting.

Hon'ble Principal Sir will chair the meeting in presence of NAAC Coordinator Dr. A. P. Lambat, Associate professor, Dept of Home Science.

Agenda of the meeting:

1. To discuss progress terms of syllabus completion ,and number of students opted for certificate courses.
2. To discuss the conduct of Theory and Practical Examination in the course.
3. Any other matter with the permission of the Chair.

(Dr. Mrs. K. V. Dubey)
Professor &
Course Coordinator
Department of Microbiology

(Dr. P. R. Bhandari)
Head
Department of Microbiology
Sevadal Mahila Mahavidyalaya,
Nagpur

Copy to:

NAAC Coordinator: Dr. A. P. Lambat, Associate Professor,
Dept of Home Science

Off. Principal
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Sakkardara Chowk, Umrer Road, Nagpur-440024

Minutes of the Meeting

'Biofertilizer and Biopesticide Production'

The meeting regarding the Certificate Course to be conducted in the Microbiology Department was held on 04/4/2024 at 12.30 pm in the Hon'ble Principal's Chamber. Hon'ble Principal presided over the meeting.

Agenda of the meeting:

1. To discuss progress terms of syllabus completion, and number of students opted for certificate courses.
2. To discuss the schedule of conducting of Theory and Practical Examination in the course.
3. Any other matter with the permission of the Chair.

Following Members were present.

Prof. N. S. Dhoble,	Principal- Chairman
Dr. A. P. Lambat	NAAC Coordinator
Dr. P. R. Bhandari	HOD Microbiology
Dr. (Mrs.) Seema Nimbarte	Member
Dr.(Mrs.) K.V. Dubey	Course Coordinator

Dr. (Mrs.) K.V. Dubey Course Coordinator acted as secretary in the meeting. The Coordinator welcomed the Chairman, Hon'ble Principal and other members with the due permission of Chairman. The Coordinator read out the agenda of the meeting and subsequently discussed the matter.

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Item No. 1: To discuss progress terms of syllabus completion, and number of students opted for certificate courses.

Resolution: Progress of teaching in the certificate course and the schedule to conduct the examination were discussed in the meeting. Further it was briefed that in all 23 students opted for the certificate course.

ItemNo.2: To discuss the schedule of conducting Theory and Practical Examination in the course

Resolution: Unanimously it was decided to conduct the theory and Practical Examination after completion of the courses during mid April 2024. .

ItemNo.4: Any other matter with the permission of Chair.

Resolution: As there was no other matter for further discussion the meeting ended with vote of thanks.

Name	Signature
Hon'ble Prof. N. S. Dhoble	
Dr. A. P. Lambat	
Dr. P. R. Bhandari	
Dr. Mrs. S. R. Nimbarte	
Dr. Mrs. K.V. Dubey	04/4/2024.

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Course Title: Bio fertilizer and Bio pesticide Production

Course Outline (Theory):

Biofertilizers - Introduction, and scope. Structure and characteristic features of bacterial biofertilizers- Azotobacter, Rhizobium and Cynobacterial biofertilizers- Anabaena, Nostoc, fungal biofertilizers- AM mycorrhiza and ectomycorhiza. Nitrogen fixation –Free living and symbiotic nitrogen fixation. Mechanism of phosphate solubilization and phosphate mobilization. Production technology: Strain selection,sterilization, growth and fermentation, mass production of carrier based and liquid biofertilizers. Application technology, Biofertilizers -Storage, shelf life, quality control and marketing.

Biopesticides- Definitions, concepts and classification of biopesticides viz. pathogen, botanical pesticides, and biorationales. Botanicals and their uses. Mass production technology of bio-pesticides. Virulence, pathogenicity and symptoms of entomopathogenic pathogens and nematodes. Methods of application of biopesticides. Methods of quality control and techniques of biopesticides. Impediments and limitation in production and use of biopesticide.

Course Outline Lab

1. Isolation and purification of *Azotobacter*, Rhizobium, P-solubilizers and Cyanobacteria.

2. Mass multiplication and inoculums production of biofertilizers. Isolation of AM

3. Isolation and purification of important biopesticides: *Trichoderma, Pseudomonas, Bacillus,*

   Metarhyzium etc. and its production.

5. Identification of important botanicals.

4. Visit to biofertilizer and biopesticide laboratory in nearby area.

5. Quality control of biofertilizers and biopesticides.

Syllabus: (Total 50 hrs including Teaching, Lab, and Field visits)

Theory Syllabus:

UNIT –I Biofertilizers: **(05 Hour)**

Introduction and scope of bio fertilizers in India. Classification, microorganisms used as bio fertilizers. Bacterial, fungal and algal bio fertilizers. Symbiotic and a symbiotic microorganisms. Mechanism of nodulation and nitrogen fixation.

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UNIT – 2 Mycorrhizal biofertilizers: **(05 Hour)**

Importance, types, characteristic features of ecto- and endomycorrhiza. Mechanism of phosphorus solubilisation. Uptake of phosphates by the roots. Consortium based inoculums and significance.

UNIT-3 –Biopesticides: **(05 Hour)**

Definition and scope of bio pesticides. Classification - botanicals, bacterial, fungal and viral based bio pesticides. Mechanism of action of *Bocillus thuringiensis* and *Trichodermovi ridaeas*as bio control agents.

UNIT -4 - Isolation and Mass Production Techniques: **(05 Hour)**

Media, types, preparation of biofertilizers and biopesticides. Mass production and packing techniques. Preparation of carrier based inoculum. Sphagnum, peat, vermiculite as inoculums Carriers, Dosage standardization. Seed treatment, foliar application, root dressing and soil application techniques. Storage and maintenance of biofertilizer and biopesticide .

Practical syllabus: **(20 Hour)**

1. Preparation of Nutrient agar, YEMA, and PDA media

2. Isolation of Rhizobium from root nodules

3. Isolation of Azotobacter from soil samples

4. Isolation of Trichoderma

5. Gram staining of bacteria Rhizobium and Azotobacter

6. VAM root staining

7. Raising of legume seedlings with Rhizobium treatment

8. Biofertilizer and Biopesticide production in laboratory

Teaching Methodologies

➢ The course will be taught through both teaching of theory and Practical classes using chalk board, power point presentation mode as per the requirement of the syllabus.

➢ Lecture hours: 20 Hour

➢ Practical hours: 20 Hour

➢ Guest Lecture/ Seminar/ Workshop: 10 Hour

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- Field visit: 10 Hour
- Exam pattern: Offline: Theory -03 Hour and Practical Examination- 06 Hour
- Attendance: 75 % of attendance is compulsory

Proposed Guest Lectures and Workshops: **(10 Hour)**

Guest lectures by eminent scientists and teachers working on biofertilizer and biopesticide production will be conducted and experts will be invited for hands on training of biofertilizer and biopesticide production to the students through workshops.

- Visit to commercial biofertilizer and bio control units.
- Submission of field work report in the prescribed format by the students.
- Suggested format for field work book; Title page, student details, content page, introduction, work done, findings, conclusion and acknowledgments.

Assessment and Evaluation Methods:

Internal Assignments through seminars /group discussion on bio fertilizers and biopesticides. (20 Marks)

Question Paper Pattern: Theory paper setting will be as per RTM Nagpur University pattern.

Max. Marks: 50 of three hours duration.

Practical Examination will be of Max. 30 marks, containing:

One long experiment - 10 marks

Two short experiments - 5 marks each

Practical Record -05

Viva-voce-05

Learning outcomes:

On successful completion of the practical course, student shall be able to

1. Understand the importance of bio fertilizers for sustainable agriculture

2. Appreciate the role of VAM in P solubilization

3. Prepare bacterial and fungal media

4. Isolate and identify symbiotic and free living nitrogen fixing bacteria

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5. Define bio pesticide and its nature

6. Isolate bacterial and fungal bio control agents from soil and air samples.

7. Produce bio fertilizers and bio pesticides on larges scale

8. Able to prepare inoculum for field application

9. Develop skill for large scale production of microorganisms

10. Learn field application techniques of biofertilizers and biopesticides

References:

1. Biofertilizers: Commercial Production Technology and Quality Control, 2017 by Dr. P. Hyma

2. Biofertilizers Technology, 2010, by S.Kaniyan, K.Kumar and K. Govindarajan

3. Biofertilizers for Sustainable Agriculture, 2017; by Arun K Sharma

4. Advances In Plant Biopesticides 2021, by Dwijendra Singh, Springer lndia

5. A Textbook of Integrated Pest Management, 2013 by Ram Singh & Vikas Jinda, l. G. S. Dhaliwal

6. Biofertilizers in Agriculture and Forestry by N. S. Subba Rao, Medtech Publishers and Distributors.

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Department of Microbiology

Certificate Course
in
Biofertilizer and Biopesticide Production

Academic session 2023-24

List of Students Enrolled in the Certificate Course

1.	Aakanksha Pra Gathibandhe
2.	Akanksha Subhash Gadekar
3.	Ashlesha Dinesh Tupkar
4.	Chandani Ramesh Raghute
5.	Ishika Basant Waghmare
6.	Kamini Ranglal Thakre
7.	Kanchan Amolrao Kamble
8.	Komal Haribhau Bonde
9.	Madhavi Pramod Dandekar
10.	Mahek Vipin Samudre
11.	Monika Chanduji Nandurkar
12.	Nandini Gnshyam Jagbandhu
13.	Ruchika Rajendra Dunedar
14.	Sakshi Subhash Bipte
15.	Sanjana Vinayak Iraskar
16.	Sarika Rajendra Gulhane
17.	Sheikh Alishba Sheikh Nadeem
18.	Shweta Chanduji Nandurkar
19.	Tinkal Sharad Khedikar
20.	Vaishnavi Virendra Sahu
21.	Vidya Rajendra Fating
22.	Yogini Laxman Ingale
23.	Yukta Prashant Gijre

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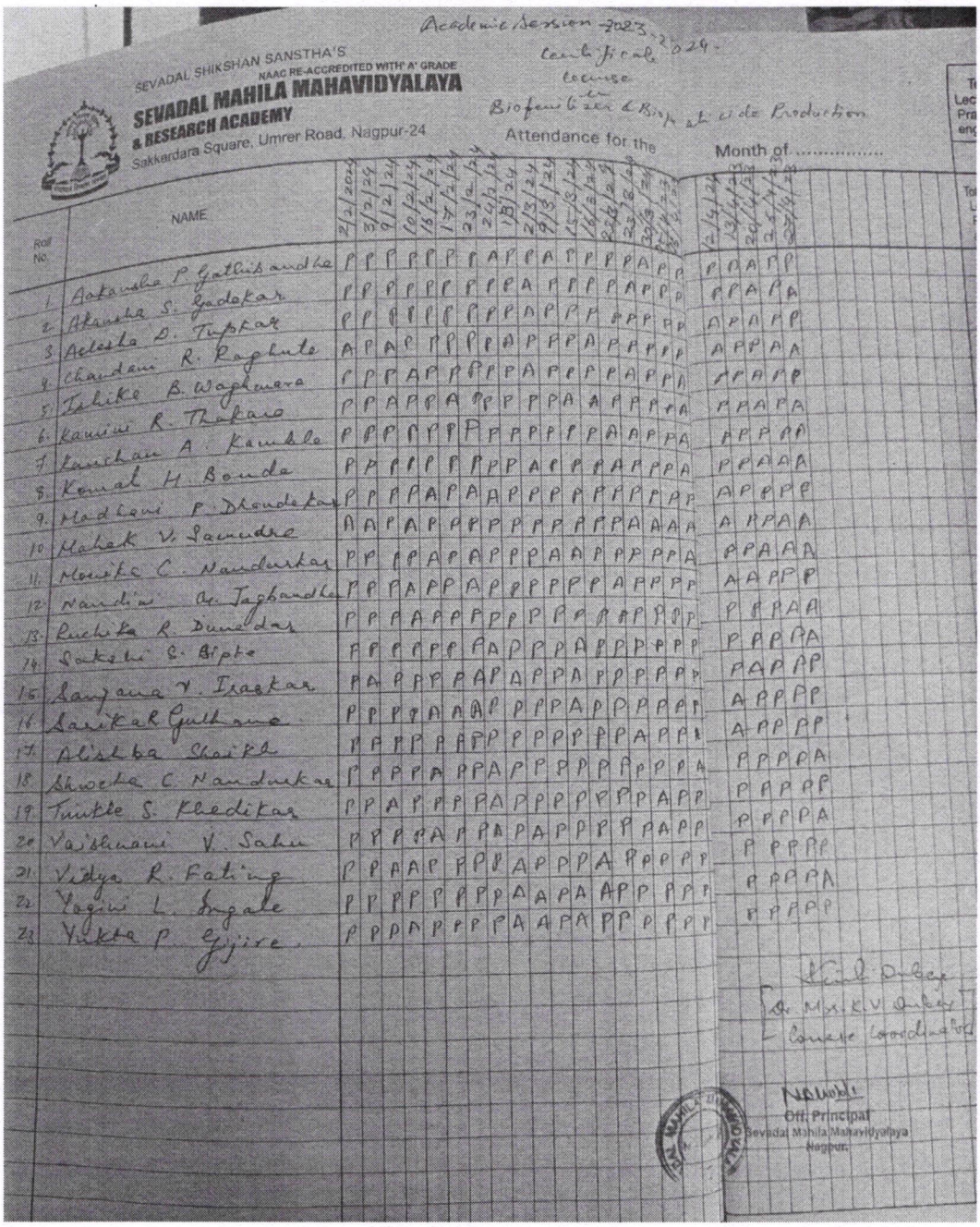

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& RESEARCH ACADEMY
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Academic Session 2023-2024
Certificate Course
Biofertilizer & Biopesticide Production
Attendance for the Month of .....

Roll No.	NAME	2/2/2024	3/2/24	9/2/24	10/2/24	16/2/24	17/2/24	23/2/24	24/2/24	1/3/24	2/3/24	9/3/24	15/3/24	16/3/24	22/3/24	23/3/24	29/3/24	30/3/24	12/4/24	13/4/24	20/4/24	27/4/24
1	Aatanshe P. Gathibandhe	P	P	P	P	P	P	P	A	P	P	A	P	P	P	P	A	P	P	A	P	P
2	Akansha S. Gadekar	P	P	P	P	P	P	P	P	A	P	P	P	P	A	P	P	P	P	P	A	A
3	Adesha D. Tupkar	P	P	P	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	A	P
4	Chandani R. Raghute	A	P	A	P	P	P	P	P	A	P	P	A	P	P	P	P	P	A	P	P	A
5	Ishika B. Waghmare	P	P	P	A	P	P	P	P	A	P	P	P	P	A	P	P	A	A	P	A	P
6	Kanika R. Thakare	P	P	A	P	P	A	P	P	P	P	A	A	P	P	P	P	A	P	P	A	P
7	Kanchan A. Kamble	P	P	P	P	P	P	P	P	P	P	P	P	A	A	P	P	A	P	P	P	P
8	Komal H. Bonda	P	P	P	P	P	P	P	P	A	P	P	P	A	P	P	P	A	P	P	P	A
9	Madhuri P. Dhondekar	P	P	P	P	A	P	A	P	P	P	P	P	P	P	P	P	P	A	P	P	P
10	Mahek V. Samudre	A	A	P	A	P	P	P	P	P	P	P	P	P	A	A	A	A	A	P	P	A
11	Monika C. Nandurkar	P	P	P	P	A	P	A	P	P	P	A	A	P	P	P	P	A	P	P	A	A
12	Nandini A. Jaybhandhe	P	P	P	A	P	P	A	P	P	P	P	P	A	P	P	P	P	A	A	P	P
13	Ruchika R. Dumedar	P	P	P	A	P	P	P	P	P	P	P	P	P	P	P	P	P	P	P	A	A
14	Sakshi C. Bipte	P	P	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P	P	A
15	Sanjana V. Iraskar	P	A	P	P	P	A	P	A	P	P	A	P	P	P	P	P	P	P	A	P	P
16	Sanika R. Gulhane	P	P	P	P	A	A	A	P	P	P	P	A	P	P	P	P	P	A	P	P	P
17	Alishba Shaikh	P	P	P	P	P	A	P	P	P	P	P	P	P	P	A	P	P	A	P	P	P
18	Shweta C. Nandurkar	P	P	P	P	A	P	P	A	P	P	P	P	P	P	P	P	A	P	P	P	A
19	Twinkle S. Khedikar	P	P	A	P	P	P	P	A	P	P	P	P	P	P	P	A	P	P	P	P	P
20	Vaishnavi V. Sahu	P	P	P	P	A	P	P	A	P	A	P	P	P	P	P	A	P	P	P	P	A
21	Vidya R. Fating	P	P	A	A	P	P	P	P	A	P	P	P	A	P	P	P	P	P	P	P	P
22	Yagini L. Ingale	P	P	P	P	P	P	P	P	A	A	P	A	A	P	P	P	P	P	P	P	A
23	Yukta P. Gijire	P	P	P	A	P	P	P	P	A	A	P	A	P	P	P	P	P	P	P	P	P

Dr. Mrs. K.V. Dakare
Course Coordinator

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Visual Depiction of Attendances of the student under certificate course '*BiofertilizerBiopesticide Production*' during academic session 2023-2024

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Department of Microbiology

Certificate Course

in

Biofertilizer and Biopesticide Production

Academic session 2023-24

Final Theory Examination Summer 2024

Time: Three Hours **Maximum Marks: 50**

N. B.:- (1) All questions are compulsory and carry equal marks
(2) Illustrate your answers with suitable diagram

Q. 1. Explain the mechanism of nodulation and nitrogen fixation in a legume plant **(10)**

OR

Describe bacterial, fungal and algal biofertizers and write their applications **(10)**

Q.2. Describe characteristic features of ecto- and endomycorrhiza **(10)**

OR

Describe the mechanism of phosphorus solubilisation and its uptake by the roots of host plants. **(10)**

Q. 3. a) Write definition and scope of bio pesticides **(05)**
b) Explain different types of bacterial biopesticides and its applications **(05)**

OR

c) Explain the types of viral biopesticides and its applications **(05)**
d) Explain the role of *Trichoderma* in the control of insect pest **(05)**

Q.4. a)Describe mass production of Rhizobium **(05)**
b) Describe various carrier materials used in biofertilizer production **(05)**

OR

c) Explain seed treatment and foliar application techniques used in biofertilizer application **(05)**
d) Explain root dressing and soil application techniques of biofertilizer application **(05)**

Q. 5. **Write short notes on:**

a) Scope of bio fertilizers in India **(2½)**
b) Significance of Consortium based inoculums preparation in agriculture **(2½)**
c) Mechanism of action of *Bocillus thuringiensis* as biocontrol agent **(2½)**
d) Storage and maintenance of biofertilizer **(2½)**

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Department of Microbiology

Certificate Course
in
Biofertilizer and Biopesticide Production

Academic session 2023-24

Performance of Students Enrolled in the Certificate Course

Sr. No.	Name of the student	Theory Marks out of 50	Practical Marks out of 30	Internal Assessment Marks out of 20 (Seminar Exam)
1.	AAKANKSHA P. GATHIBANDHE	42	28	18
2.	AKANKSHA SUBHASH GADEKAR	40	25	18
3.	ASHLESHA DINESH TUPKAR	40	27	18
4.	CHANDANI RAMESH RAGHUTE	39	27	18
5.	ISHIKA BASANT WAGHMARE	40	26	18
6.	KAMINI RANGLAL THAKRE	44	28	20
7.	KANCHAN AMOLRAO KAMBLE	40	26	18
8.	KOMAL HARIBHAU BONDE	41	25	16
9.	MADHAVI PRAMOD DANDEKAR	38	26	18
10.	MAHEK VIPIN SAMUDRE	40	25	17
11.	MONIKA CHANDUJI NANDURKAR	38	25	17
12.	NANDINI GNSHYAM	40	25	17

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	JAGBANDHU			
13.	RUCHIKA RAJENDRA DUNEDAR	40	26	17
14.	SAKSHI SUBHASH BIPTE	39	25	17
15.	SANJANA VINAYAK IRASKAR	36	25	17
16.	SARIKA RAJENDRA GULHANE	36	25	17
17.	SHEIKH ALISHBA SHEIKH NADEEM	43	28	19
18.	SHWETA CHANDUJI NANDURKAR	40	28	19
19.	TINKAL SHARAD KHEDIKAR	42	28	19
20.	VAISHNAVI VIRENDRA SAHU	40	28	19
21.	VIDYA RAJENDRA FATING	36	25	17
22.	YOGINI LAXMAN INGALE	42	28	19
23.	YUKTA PRASHANT GIJRE	36	25	17

Result analysis: Pass percentage of the students successfully completed the certificate course was 100% . To all the successful students certificates were provided.

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Certificate of Completion

This certificate is awarded to

Ms. Aakanksha P. Gathibande

she has successfully completed the Certificate Course in
"Biofertilizer and Biopesticide Production",
conducted by the Department of Microbiology.

Date : 30/04/2024

Dr. (Mrs.) Kirti V. Dubey
Course Coordinator

Prof. (Mrs.) Nirupama S. Dhoble
Off. Principal
Sevadal Mahila Mahavidyalaya, Nagpur

Photograph showing Sample Copy of the Certificate Issued to the Successful Student of the Certificate Course.

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