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BIOFERTILIZER UNIT

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Biofertilizer

Definition:

Biofertilizer is a substance which contains living microorganism which, when applied to seed, plant surfaces, or soil, colonizes the rhizosphere or the interior of the plant and promotes growth by increasing the supply or availability of primary nutrients to the host plant.

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Objectives

1. To promote professional skills, entrepreneurship, knowledge and marketing skills through meaningful hands on experience and working in project mode.
2. To build confidence through end to end approach in product development.
3. To acquire enterprise management capabilities including skills for project development and execution, accountancy, national/international marketing, etc.

Outcomes

At the end of this course the student will be able to gain vivid idea regarding

1. Production procedure of different bioferilizers like Azotobacter, Azospirullum, Rhizobium ,Phosphorus solubilizing bacteria, Phosphorus mobilizing bacteria.

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Types of Biofertilizer

Nitrogen (N2) fixing Biofertilizers	
Free-living	*Azotobacter, Clostridium, Anabaena, Nostoc,*
Symbiotic	*Rhizobium, Frankia, Anabaena azollae*
Associative Symbiotic	*Azospirillum*

P Solubilizing Biofertilizers	
Bacteria	*Bacillus megaterium var. phosphaticum*
	Bacillus circulans, Pseudomonas striata
Fungi	*Penicillium sp, Aspergillus awamori*

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P Mobilizing Biofertilizers	
Arbuscular mycorrhiza	*Glomus sp.,Gigaspora sp.,Acaulospora sp.,*
	Scutellospora sp. & Sclerocystis sp.
Ectomycorrhiza	*Laccaria sp., Pisolithus sp., Boletus sp., Amanita sp.*
Orchid mycorrhiza	*Rhizoctonia solani*

Biofertilizers for Micro nutrients		
1	Silicate and Zinc solubilizers	*Bacillus sp.*
Plant Growth Promoting Rhizobacteria		
1	Pseudomonas	*Pseudomonas fluorescens*

3. Method of Application

a) Seed treatment, b) Seedling Root Dip and c)Soil Application

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Existing facility

Instruments

a. Autoclave - (2)
b. Hot Air Oven -(1)
c. Binocular Microscope-(1)
d. P^H Meter -(1)
e. Distillation Unit - (1)
f. Incubator Orbital Shaker - (1)
g. Deep Freezer (-20^o C)-1
i. Laminar Air Flow - (1)
j. Digital Balance -(1)
k. Refrigerator- (1)

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Media Preparation Room

Inoculation & Growth room

Mixing & Packaging Room

Distillation unit

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Procedure

Collection of soil sample from crop specific areas

↓

Serial dilution of fresh soil sample

↓

Isolation of bacterial strain on specific recommended media

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Morphological and biochemical characterization

↓

Sub culturing to maintain strain viability

↓

Incubation at 28.5^{o}C for 4-5 days

↓

Scaling up of production to 25lit

↓

Mixing of broth culture with the carrier (charcoal)

↓

Packaging and Storage

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Collection of soil sample

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Isolation of desired micro-organisms

Serial dilution

Media preparation and sterilization

Media Chemicals Weighing

Glassware sterilization

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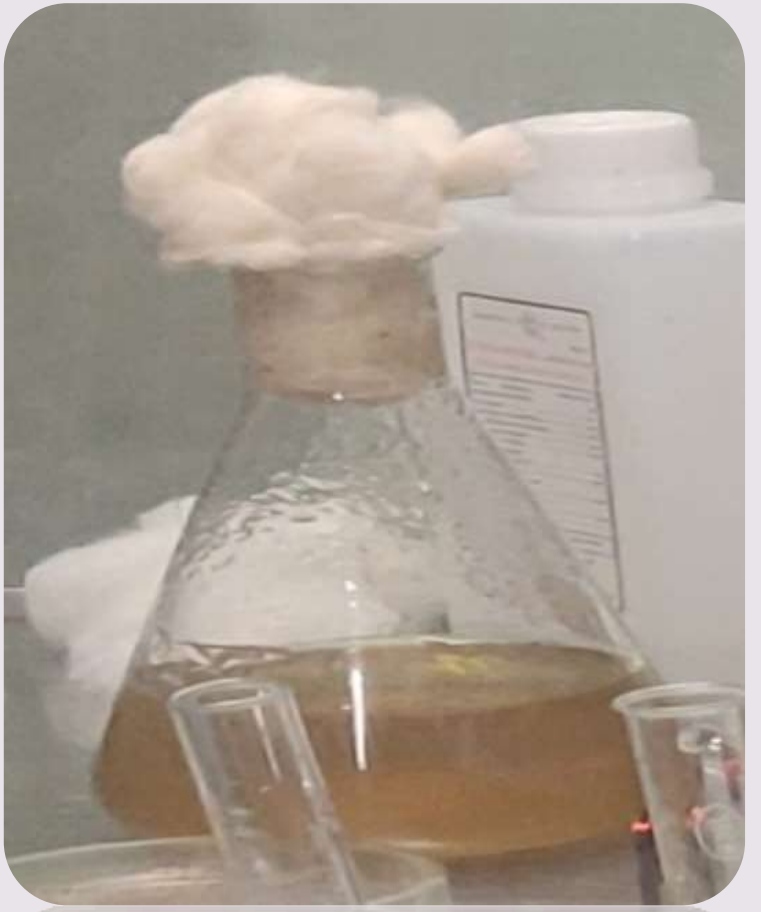
Media for Azotobacter & Rhizobium

Jensen's media for Azotobacter



Yeast mannitol agar for Rhizobium

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Sterilizing the media in Autoclave & Adjusting the pH

- Sterilizing the media in Autoclave

Adjusting the pH

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Inoculation and Incubation

INOCULATION

INCUBATION

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Incubation & Growth checking

Incubation of different dilution

Growth checking

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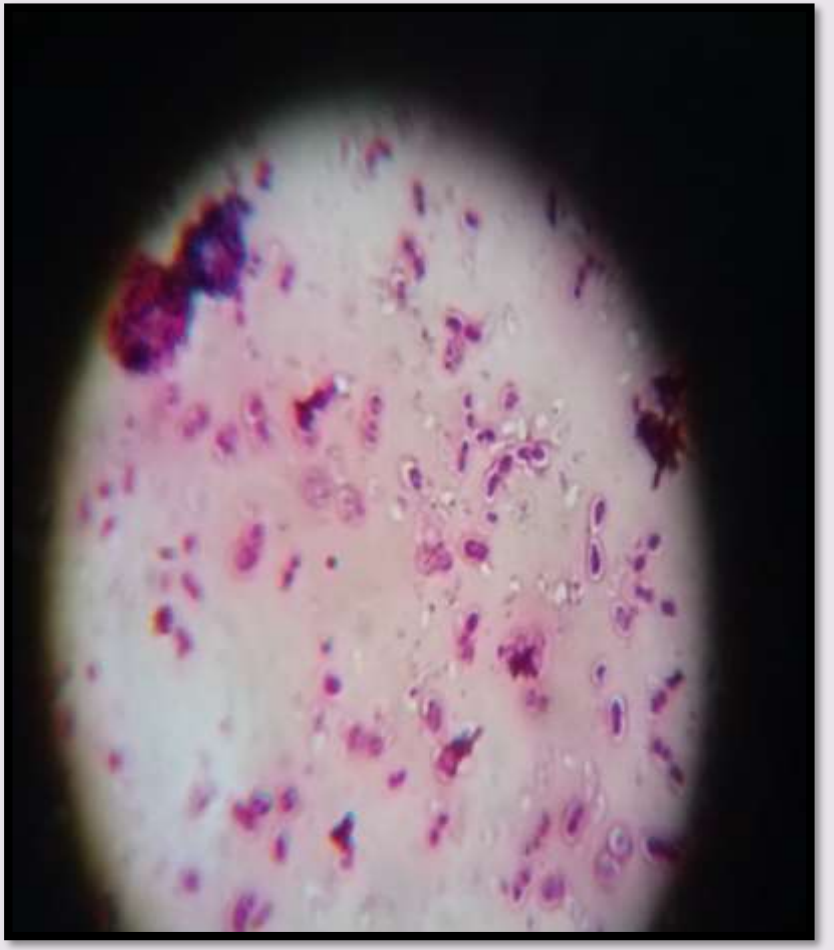
Confirmation test

Gram staining



Gram negative confirmed(pink colour)

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Production on large scale

- Production of Mother Culture and Scaling up the Production

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Preparation of carrier material

Charcoal crushing

Sieving of charcoal

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Mixing and packaging

Mixing

Packaging

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Biofertilizer Products

Product of Azotobacter

Product of Rhizobium

Product of liquid biofertilizer

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Existing Product and Capacity

1. Product Name: Azotobacter and Rhizobium
2. Product Type : Liquid and Solid
3. Production Capacity: 75 kg/month

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Future goal

1. Scaling Production: 1000kg/month

   Requirement: Fermenter (100L capacity).

2. Research: Screening, Isolation, Identification and Field trials.

3. Organic Farming Domain Course: AELP Linked with

   Domain (Practices in units/Field/Lab/Project)

   a. Project Based Learning.

   b. Publication.

   c. Marketing

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THANK YOU