Course :	ELE PATH 243		Credit:	3(2+1)	Semester-IV
Course title:	Biofertilizers, biocontrol agents and biopesticides				

Lecture 1. Introduction and types and importance of biofertilizers, Biopesticides and bioagents in agriculture and organic farming system

Q.1…….media is used for isolation of PSB.

a) Jensen's

b) Fogg's

c) Pikovaskayas

d) Carrot agar

Q. 2. Which of the following media is used for isolating Azotobacter?

a) CRYEMA

b) Jensen's

c) Alexandrov agar

d) Both B and C

Q. 3. NFB media is used for isolation of…….

a) Acetobacter

b) Rhizobium

c) BGA

d) Azospirillum

Q.4. Diameter of standard glass petriplate used in culturing microbes is…..

a) 70mm

b) 80mm

c) 90mm

d) 100mm

Q. 5. Congo red is used in isolation of……..

a) Acetobacter

b) Rhizobium

c) Azospirillum

d) None of these

Q. 6. Direct dry heat is the principle of……..

a) Hot air oven

b) Spirit lamp
c) Autoclave
d) Both A and B

Q. 7. ……...is the principle used in autoclave.
a) Dry heat
b) Direct Wet heat
c) Steam sterilization
d) Both B and C

Q. 8. Glasswares are sterilized in ……
a) Autoclave
b) Hot air oven
c) Laminar air flow
d) BOD incubator

Q. 9. Autoclave is used for sterilization of……
a) Soil
b) Media
c) Glasswares
d) Both A and B

Q. 10. Agar agar is obtained from…….
a) Gelidium spp.
b) Red algae
c) Sea weed
d) All of the above

Lecture 2. History of biofertilizers production.
Q. 11. Which filters are used in laminar air flow?
a) Pre
b) HEPA
c) Both A and B
d) Particulate

Q. 12. Culture plates of microbes are kept in……...for growth.
a) BOD incubator
b) Refrigerator

c) Laminar air flow
d) Oven

Q. 13. Laminar air flow is used for…….
a) Pouring media into petriplates
b) Isolation of microbes
c) Both A and B
d) Sterilization of glasswares

Q. 14. ……..is the cross innoculating group of *Rhizobium* in Soybean.
a) Rhizobium japonicum
b) Rhizobium phaseoli
c) Rhizobium leguminosarum
d) Rhizobium melilotii

Q. 15. Temperature and pressure required for sterilization in autoclave are….
a) 121∘C, 15psi
b) 180∘C, 20psi
c) 160∘C, 15psi
d) 151∘C, 20 psi

Q. 16. BGA is used in …….crop.
a) Paddy
b) Rhizobium
c) Azospirillum
d) Acetobacter

Q. 17. In Sugar containing crops …….. biofertilizer is used.
a) Azotobacter
b) Acetobacter
c) Rhizobium
d) BGA

Q. 18. ….gm of dextrose is used in PDA.
a) 15

b) 20
c) 28
d) 25

Q. 19. …….%mercuric chloride solution is used for surface sterilization.
a) 1
b) 0.1
c) 2
d) 1.5

Q. 20. Mannitol is constituent of……..media.
a) Rhizobium
b) Azospirillum
c) YEMA
d) Acetobacter

Lecture 3. Classification of biofertilizers microorganisms used in biofertilizers production

Q. 21. Which of the following is an example of phosphate solubilizing bacteria……
a) Bacillus subtillis
b) Pseudomonas striata
c) Bacillus megatherium var. phosphaticum
d) All of these

Q. 22. Cellulose agar media is used for……
a) Azotobacter
b) PSB
c) Organic matter decomposer
d) Sulphur oxidising microbes

Q. 23. ……% calcium carbonate is added with carrier for solid biofertilizer Production.
a) 5
b) 2
c) 1
d) 3

Q. 24. Carrier used for solid biofertilizer Production having …...mesh size.
a) 250-300
b) 200-250
c) 100-150
d) Both A and B

Q. 25. Thickness of biofertilizer packing bag is……..
a) 0.2mm
b) 0.5mm
c) 0.6mm
d) 0.4mm

Q. 26. Broth culture is added to carrier powder in….. proportion by weight.
a) 1:2
b) 2:1
c) 1:1
d) 2:2

Q. 27. In mycorrhiza, vesicles are referred as…….
a) Store house of nutrients
b) Absorption
c) Both A and B
d) None of these

Q. 28. ……..is Sulphur oxidising bacteria
a) Clostridium
b) Thiobacillus thiooxidans
c) Bacillus subtillis
d) Azotobacter spp.

Q. 29. Malic acid is constituent of……..media.
a) NFB
b) CRYEMA
c) Jensen
d) Bristol

Q. 30. …….fixes atomospheric nitrogen freely i.e. non-symbiotically.

a) Azotobacter
b) Rhizobium
c) Azolla
d) Bacillus subtillis

Lecture 5. A study of growth characteristics of various microbes used in biofertilizers production

Q.31 Azolla is used as biofertilizer as it has……

a) Rhizobium
b) Cyanobacteria
c) Mycorrhiza
d) large quantity of humus

Q.32 Organisms associated with sorghum and cotton, which provide nutrition to them, are……

a) Azospirillium, Azotobacter
b) Azotobacter, Azospirillum
c) Anabaena, Rhizobium
d) Rhizobium, Azotobacter

Q.33 Azolla as biofertilizer, increases the yield of rice fields by….

a) 10%
b) 20%
c) 30%
d) 50%

Q.34 The boifertilizers are……..

a) Cowdung and farm wastes
b) Azolla and BGA
c) Quick growing crop ploughed under soil
d) All of these

Q.35 Which of the following is the pair of biofertilizers?

a) Rhizobium and grasses
b) Azolla and BGA
c) Nostoc and legume

d) Salmonella and E.coli

Q.36 A good example of biofertilizer which improves phosphorous uptake is

a) Azospirillum
b) Rhizobium
c) Actinomycetes
d) All of these

Q. 37 Diazotrophs are

a) Nitrogen fixers
b) Phosphorus solubilizers
c) Sulphur oxidizers
d) PGPR

Q.38A biofertilizer which involves a pteridophyte host is

(a) Rhizobium
(b) Anabaena
(c) Clostridium
(d) Azotobacter

Q.39 A fern commonly inoculated to paddy fields is

(a) Azolla
(b) Marsilea
(c) Salvinia
(d) Anabaena

Q.40 A free living nitrogen fixing bacterium is

(a) Clostridium
(b) Azotobacter
(c) Rhizobium
(d) Both A and B

Lecture 6. Nitrogen cycle in Nature and its importance

Q.41 A free living nitrogen fixing cyanobacterium which can also form symbiotic association with Azolla is

(a) Nostoc
(b) Anabaena

(c) Tolypothrix
(d) Gleocapsa

Q.42 Nitrogen fixing blue green alga is

(a) Ulothrix
(b) Spirogyra
(c) Anabaena
(d) Rhizobium

Q.43 Aquatic fern which is an excellent biofertilizer

(a) Salvinia
(b) Azolla
(c) Marsilea
(d) Pteridium

Q.44 Azolla is used as biofertilizer because it

(a) Multiplies very fast to produce massive biomass
(b) Has association of nitrogen fixing Rhizobium
(c) Has association of nitrogen fixing cyanobacteria
(d) Has association of mycorrhiza

Q.45 Azotobacter and bacillus polymyxa are

(a) Decomposers
(b) Nonsymbiotic nitrogen fixers
(c) Symbiotic nitrogen fixers
(d) pathogenic bacteria

Q.46 Bacterial fertilizer is

(a) Anabaena
(b) Nostoc
(c) Rhizobium
(d) Phycomyces

Q.47 Biofertilizers include

(a) Cowdung manure and farmyard waste
(b) A quick growing crop ploughed back

(c) BGA / Anabaena and Azolla
(d) All the above

Q.48 Farmers have reported 50% higher yield of rice by using biofertilizer

(a) Azolla pinnata
(b) Legume – Rhizobium symbiosis
(c) Cyanobacteria
(d) Mycorrhiza

Q.49 Heterocyst are found in

(a) Green algae
(b) Cyanobacteria
(c) Fungi
(d) Red algae

Q.50 Heterocyst contains enzyme

(a) Pectinase
(b) Cellulase
(c) Nitrogenase
(d) Phosphorylase

Lecture 7. Process of nodule formation ,Role of Nif and Nod gene in Biological Nitrogen fixation

Q.51 If wheat field is inoculated with Rhizobium

(a) Soil will become nitrogen rich
(b) No effect on soil nitrogen
(c) Soil will be depleted of nitrogen
(d) Soil will become rich in calcium

Q.52 Leaves of plant used as biofertilizer belong to

(a) Hibiscus
(b) Mango
(c) Anabaena
(d) Azolla

Q.53 Leghaemoglobin is found in

(a) Root nodules of legumes
(b) Mycorrhiza
(c) coralloid roots
(d) Cyanobacteria

Q.54 Leghaemoglobin occurs in

(a) Coralloid root
(b) BGA
(c) Around bacteriods
(d) Mycorrhiza

Q.55 Leghaemoglobin takes part in

(a) Energy release
(b) Stimulating growth of Rhizobium
(c) N2 absorption
(d) protecting nitrogenase

Q.56 Leguminous plants are able to fix atmospheric nitrogen through symbiotic process. Which is not true about it?

(a) Leghaemoglobin scavenges oxygen and is pinkish in colour
(b) Nitrogenase is insensitive to Oxygen
(c) Nodules act as site for nitrogen fixation
(d) Enzyme nitrogenase catalyses conversion at atmospheric nitrogen to NH3

Q.57 Main sources of biofertilizers are

(a) Bacteria
(b) Cyanobacteria
(c) Fungi
(d) All the above

Q.58 Most famous nitrogen fixing bacterium / biofertililzer is

(a) Nitrobacter
(b) Nitrosomonas
(c) Nitrococcus
(d) Rhizobium

Q.59 Most suitable fertilizer of paddy fields is

(a) Mycorrhiza
(b) Azotobacter and clostridium
(c) Symbiotic and nonsymbiotic cyanobacteria
(d) Rhizobium

Q.60 Mycorrhiza is helpful in

(a) Synthesis of food
(b) Getting nutrients from soil
(c) Providing resistance against different regulators
(d) Increase the fertility of soil

Lecture 8. Enzyme nitrogenase and its component

Q.61 Mycorrhiza is symbiotic association between

(a) Fungus and gymnosperm stem
(b) Fungus with angiosperm leaves
(c) Fungus with legume fruits
(d) Fungus with Gymnosperm and angiosperm roots

Q.62 Nitrogen fixation is

(a) Nitrogen - Ammonia
(b) Nitrogen - Nitrates
(c) Nitrogen - Amino acids
(d) Both A and B

Q.63 Red pigment (leghaemoglobin) having affinity for oxygen is present in the roots of

(a) Mustard
(b) Soybean
(c) Carrot
(d) Radish

Q.64 Rhizobium induced root nodules are internally pinkish due to

(a) Carotene
(b) Leghaemoglobin
(c) Haemoglobin
(d) Xanthophyll

Q. 65 Some blue-green algae can be used as biofertilizers as they are

(a) Photosynthetic
(b) Surrounded by mucilage
(c) Growing everywhere
(d) Capable of fixing nitrogen

Q.66 The best fertilizer for paddy is

(a) Azolla pinnata
(b) Bacillus megatherium
(c) Rhizobium meliloti
(d) Bacillus polymyxa

Q.67 What should be added to increase efficiency of biofertilizer?

(a) Calcium
(b) Potassium
(c) Phosphorus
(d) Zinc

Q.68 Which is correct about nitrogen fixation by legumes? They Fix nitrogen through

(a) Specialized bacteria in their roots
(b) Specialized bacteria in their leaves
(c) Independent of bacteria that live in their roots
(d) The statement is wrong

Q.69 Which of the following can use molecular nitrogen as nutrient?

(a) Methanomonas
(b) Mucor
(c) Rhizobium
(d) Spirogyra

Q.70 Which of the following is free living aerobic and nonphotosynthetic nitrogen fixing bacterium?

(a) Rhizobium
(b) Nostoc

(c) Azospirillum
(d) Azotobacter

Lecture 9. Biochemistry of nitrogen fixation,

Q.71 Which one is a biofertilizer?

(a) NPK mixture
(b) Rhizobia in legume roots
(c) Rhizobia in farmyard manure
(d) Green manure
Q.72 Which one of the following is free living nitrogen fixing bacterium

(a) Azotobacter
(b) Anabaena azollae
(c) Pseudomonas
(d) Cyanobacterium

Q.73 Heterocysts are

a) Biological fertilizers
b) Biofertilizers
c) Specialized cells for nitrogen fixation
d) Enzymes required for nitrogen fixation

Q.74 Rhizobium enters the plant through

a) Leaf
b) Stem
c) Flower
d) Root hair

Q.75 Symbiotic biofertilizer is

a) Nitrosomonas
b) Rhizobia
c) Azotobacter
d) Azospirillum

Q.76 Biofertilizers are

a) Urea
b) Potassium

c) Microorganisms
d) None of these

Q.77 The compound required by rhizobium to fix atmospheric nitrogen is called

a) Lectins
b) Alkaloids
c) Glycoside
d) Leghaemoglobin

Q.78 BGA secrete

a) Uric acid
b) IAA
c) Alcohol
d) Antibiotic

Q.79 The composition of Rhizobium biofertilizer is

a) Peat+garden soil+charcoal+Rhizobia culture
b) Lignite+garden soil+FYM+Rhizobia culture
c) Both a and b
d) Peat+garden soil+cowdung+Rhizobia

Q.80 In which of the following parts of Azolla is Anabaena present?

a) Leaf cavities
b) Stem cavities
c) Stomata
d) Nodules

Lecture 10. Cross inoculation groups amongst *Rhizobium*,
Q.81 Oscillatoria, a cyanobacterium yet not used as biofertilizer because

a) Its rate of growth is slow
b) It releases toxins in water
c) It does not fix nitrogen
d) It absorbs nutrients & compete with crop plants

Q.82 Azotobacter is preferred over Rhizobium because

a) They are not host specific
b) They are cost effective

c) Azotobacter can be easily cultured
d) They add more organic matter to soil

Q.83 Free living nitrogen fixing bacteria are

a) Azotobacter
b) Clostridium
c) Both a & b
d) None of these

Q.84 Nitrogen fixation by Rhizobium takes place in

a) Soil
b) Root cells
c) Root nodules
d) Root cortex

Q.85 an asymbiotic blue green algae is

a) Anabaena
b) Azolla
c) Nostoc
d) All of these

Q.86 Which of the following used as biofertilizer in paddy?

a) Non symbiotic and symbiotic cyanobacteria
b) Non symbiotic and symbiotic bacteria
c) only symbiotic bacteria
d) only non symbiotic cyanobacteria

Q.87 Root nodules have pink colour due to

a) Nitrogenase
b) Leghaemoglobin
c) Meristimatic cells
d) All of these

Q.88 Root nodules for nitrogen fixation of non leguminous tree posses

a) Frankia
b) Rhizobium
c) Azotobacter

d) Thiobacillus

Q.89 Leghaemoglobin acts as……

a) Nitrogen carrier
b) Oxygen carrier
c) Nitrogenase carrier
d) Rhizobium carrier

Q.90 Leguminous plant and Rhizobium shows…..
a) Parasitic association
b) Saprophytic association
c) Symbiotic association
d) Asymbiotic association

Lecture 11. Methods used for the studying selection of efficient strain of *Rhizobium*

Lecture 12. Quality standard for biofertilizers, ,.

Lecture 13. Different methods of application of biofertilizers, biopesticides and bioagents

1.CIB& RC located at …….
a.Faridabad
b.Bengaluru
c.Mumbai
d.Kolkata

2.NBAIR is located at.....
a.Faridabad
b.Bengaluru
c.Mumbai
d.Kolkata

3.All bio-pesticides comes under Insecticide Act which is passed in Year ....
a.1971
b.1968
c.1978
d.1981

4.Carrier for WP formulation.....
A Glycerin
B CMC
C Talc Powder
D Bentonite

5. Cryptolaemus beetle from insect order
A Hemiptera

B Hymenoptera
C Nuroptera
D Coleoptera

6. Chrysoperla is from order.....
A Hemiptera
B Hymenoptera
C Nuroptera
D Coleoptera

7. Role of Agar in Adult diet of Cryptolamous
A. Ant sterility
B. Increase fecundity
C. Increase Shelf life
D. Solidification

8. ……parasitizing the eggs of pink bollworm of cotton
A Trichogramma chilonus
B Trichogramma japonicum
C Trichogramma bactrae
D None of above

9. ……is used in Rice for control of stem borer
A Trichogramma chilonus
B Trichogramma japonicum
C Trichogramma bactrae
D None of above

10. ……is used in Sugarcane for control of stem borer *1 point
A Trichogramma chilonus
B Trichogramma japonicum
C Trichogramma bactrae
D None of above

Lecture 14. Methods of quality control assessment in respect of biofertilizers

Lecture 15. Strategies of Mass multiplication and packing Registration of biofertilizers

Lecture 16. Strategies of marking and Registration with CIB of bioagents and biopesticides

25. One LE is equal to…….POB

A.6X 10^9

B.60X10^9

C.1X10^9

D.16 X10^9

26. ….is a predator of mealy bug

A Trichogramma chilonus

B Trichogramma japonicum
C Cryptolaemus

D.Neochetinabruchi

27. ….is weed killer

A Lady bird beetle

B Trichogramma japonicum
C Cryptolaemus beetle

D.Neochetinabruchi

28……used to control Parthenium weed

A.Zygogrammabiocolorata
B Trichogramma japonicum
C Cryptolaemus

D.Neochetinabruchi

29. Bacillus subtillissecrets…….

A.Endotoxin

B.Exotoxin

C.Iturins
D.Destruxin

30.Bacillusthurngenisisvar.kustaki produce …….size of protein

A.130-140 kDa

B.120-125 kDa

C.65-75 kDa

D.160-170 kDa

31……is saprophytic fungi can be used as decomposing organism

A.Verticilium lecanii

B.Beavaria Bassiana

C.Metarhiziumanisopliae

D.Trichodermaviridae

32……..shows fluorescence under UV light

A.Bacillus subtilis

B. Bacillus thuringensis

C.Psudomonas fluorescence

D.Trichodermaviridae

33.For mass production of Psudomonas fluorescence……..media used

A. Jaggery Yeast Media

B.Potato Dextrose Media

C. Maltose Yeast Media

D.Kings B Media

34. …….it is bacterial media.

A. Jaggery Yeast Media

B.Potato Dextrose Media

C. Nutrient Agar Media

D.Carrot Dextrose Media

35……it is basic media for fungi growth.

A. Kings B Media

B. Pikovaskiya Media

C. Nutrient Agar Media

D. Potato Dextrose Media

36. Common name of *Zygogramma bicolorata.*

A.Lady Bird Beetle

B.Mealy bug Destroyer

C. Mexican beetle

D.Green lace Wing

37. Common name of Chrysoperla carnea

A.Lady Bird Beetle

B.Australian Lady bird Beetle

C. Mexican beetle

D.Green lace Wing

38. Cryptolaemus montrouzieri known with…….common name..

A.Flea Beetle

B.Australian Lady bird Beetle

C. Mexican beetle

D.Green lace Wing

39. Host of Neochetina sppis……

A. Lantana camera

B.Mealy bug

C.Aphids

D.Water hyacinth

40……it is factious host for*T.chilonis.*

A.Corcyra cephalonica

B.Cryptolaemus montrouzieri

C.Acerophagous papaya

D. None of Above