Chhatrapati Shahu Ji Maharaj University, Kanpur

Answer Script Details
Barcode 7391596

Roll No. 22031000195
Total Mark 45/50.00

Exam B.SC IN AGRICULTURE BSCAG_ODD-EXAM-DEC-24
Subject AGE5017 - BIO PESTICIDES AND BIOFERTILIZERS

Question wise Mark Summary

Q.No	Mark	Q.No	Mark	Q.No	Mark	Q.No	Mark
1A	4/5						
1B	5/5						
1C	5/5						
1D	5/5						
1E	5/5						
1F	4/5						
2	9/10						
3	NA/10						
4	NA/10						
5	NA/10						
6	NA/10						
7	NA/10						
8	NA/10						
9	8/10						

Chhatrapati Shahu Ji Maharaj University
Kanpur, Uttar Pradesh

PART-II

Date of Exam	12/02/25	Shift	III rd	Room No.	56
Paper Code	AG-5017	Subject	Biochemistry & Biotechnology	Semester	5th
Name of Candidate	KUMAR VAIBHAV				
Roll No.	2203100019 5				

Signature of Candidate: कुमार वैभव

Signature of Invigilator: B Kishan

COE Facsimile

MARKS OBTAINED										
Q.	1	2	3	4	5	6	7	8	9	10
(a)										
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Total										
Total Marks in Figures									Max. Marks	
Total Marks in Words										

Paper Code: AG5017

Signature of Evaluator

Course: B.Sc. (Ag.)

Session: 2024-25 Year/Semester: 5th

Subject Name: Biochemistry & Biotechnology

Medium: English ○ Hindi ●

Paper Code: AG5017

Exam Date: 12022025

Name of Candidate: KUMAR VAIBHAV

Father's Name: VINOD KUMAR VERMA

महाविद्यालय का कोड College Code: AU02

परीक्षा केन्द्र का कोड Exam Centre Code: AU02

परीक्षा का प्रकार Type of Exam: Regular ● Ex-Student ○ / Private ○ Back Paper Exam ○

ANSWER BOOKLET NO.: 7391596

Paper Code: AG5017

नामांकन संख्या Enrollment Number: CSJMA220000407 12

परीक्षार्थी अनुक्रमांक संख्या Candidate's Roll Number: 2203100019 5

पेपर कोड Paper Code: AG5017

Signature of Candidate: कुमार वैभव

Signature of Invigilator: B Kishan

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नोट:- 1. परीक्षार्थी को निर्देशित किया जाता है कि आवरण पत्रके मुख भाग पर अंकित सभी निर्देशों को सावधानी पूर्वक पढ़ें।
2. कॉलम में भरी जाने वाली प्रविष्टियाँ काली तरफ से शुरू की जायें। 3. गोलों को काले या नीले बॉलपेन से भरा जायें।

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-I

1. Read the instructions carefully given on the answer script and admit card.
2. Write Date of Exam, Shift, Paper Code & Name of Subject Correctly.
3. Write Name & Roll No. Correctly.
4. Write Semester & Branch Correctly.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-III

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ boxes.
2. Carefully study the example before you start marking.
3. As shown in the example below, blacken the circles completely.

Correct Method	Incorrect Method
① ● ③ ④	✓ ✗ ● ④

4. Make no Stray marks on this sheet.

5.DO NOT WRITE OR MARK ON THE BAR CODE.

IN ORDER TO AVOD UFM (UNFAIR MEANS) :

1. The Roll No. and Answer Book no. found elsewhere or any other symbol found in the answer book will be treated as unfair means.
2. Any tempering of Bar Code and Booklet no shall be treated as Unfair Means.
3. Do Not bring the materials like slip of paper/mobile/digital diaries/ study material/ revision notes in examination hall. Possession of the mobiles/ digital diaries/electronic/digital/ watch and any other electronic gadget except memory less scientific calculator shall be considered as UFM case.
4. Do not keep or paste currency note in answer script it shall be consider as UFM.

अनुचित साधन से बचने हेतु :

1. उत्तर पुस्तिका के निर्दिष्ट स्थान को छोड़कर अनुक्रमांक एवं उत्तरपुस्तिका का क्रमांक कहीं और न लिखे तथा कोई भी चिन्ह न बनायें क्योंकि यह अनुचित साधन प्रयोग की परिधि में आता है।
2. उत्तर पुस्तिका के बारकोड अथवा उत्तर पुस्तिका संख्या पर छेड़ छाड़ करने पर अनुचित साधन प्रयोग माना जायेगा।
3. परीक्षा कक्ष में निम्न वस्तुएं साथ न लायें, जैसे लिखे हुए कागज के टुकड़ें, मोबाईल, डिजिटल डायरी, डिजिटल घड़ी, घड़ी, पुस्तक यह सभी वस्तुएं जो अनुचित साधन के अन्तर्गत आती है। केवल संबंधित प्रश्नपत्र में ही मेमोरी लेस साइंटफिक कैलकुलेटर ले जाने की अनुमन्यता होगी।
4. उत्तर पुस्तिकाओं में कच्चे न लगे न ही उत्तर पुस्तिका में चिपकायें। ऐसा करना अनुचित साधन प्रयोग की परिधि में आता है।

परीक्षार्थियों की लिए निर्देश

1. प्रवेश पत्र एवं उत्तर पुस्तिका पर दिये गये निर्देशों को ध्यान से पढ़ें।
2. कवर पृष्ठ के दूसरी तरफ कुछ न लिखें।
3. उत्तर पुस्तिका के पृष्ठों पर दोनों तरफ लिखें।
4. प्रश्न पत्र पर अपने अनुक्रमांक के अतिरिक्त कुछ न लिखें।
5. प्रश्न पत्र कोड एवं प्रश्न पत्र ID सावधानी पूर्वक लिखें।
6. अपनी स्थिति स्पष्ट लिखें।
7. उत्तर पुस्तिका के पृष्ठों की संख्या देखें। अगर उत्तर पुस्तिका में पृष्ठ (1-24) से कम है या कटे हुए है, तो परीक्षा शुरू होने के पूर्व दूसरी उत्तर पुस्तिका ले लें।
8. प्रश्नपत्र को देख, यदि प्रश्नपत्र के विषय कोड, विषय का नाम तथा प्रश्न में कोई त्रुटि है तो उसके परीक्षा प्रारंभ होने के 30 मिनट के अन्दर कक्ष निरीक्षक को तत्काल सूचित करें, उसके बाद विश्वविद्यालय द्वारा कोई सुधार नहीं की जायेगी।
9. प्रश्नों के उत्तर लिखने के लिये पेंसिल का प्रयोग न करें।
10. बी कोपी या अतिरिक्त ग्राफ नहीं दिया जायेगा।

INSTRUCTION TO THE CANDIDATE

1. Read the instructions carefully given on the Question Paper, Admit Card & Answer Script.
2. Do not write anything on back side of the cover page.
3. Write on both sides of pages of answer book.
4. Do not write anything on question paper except Roll Number.
5. Write Paper Code & Question Paper Id carefully.
6. CHECK the number of pages (1-24) or any other kind of damage in your answer script, if found than change the answer script immediately before the commencement of examination.
7. CHECK the Question Paper for any kind of discrepancy e.g. Subject Code, Subject Name, and Question of the Question Paper during first THIRTY MINUTES of the commencement of the exam, so that it can be corrected in TIME. After that no corrections shall be entertained by the university.
8. Do not use pencil for answering the question.
9. Write status correctly e.g. those appearing in carry over papers should fill in status as Carry Over. Those appearing as Ex- Students should fill in status as ex.
10. No supplementary answer book & graph paper will be provided.

INSTRUCTION TO THE CANDIDATE FOR FILLING PART-IV

1. Use blue or black ball point pen for writing alphabets & numerals in ☐ Boxes.
2. Use blue or black ball point pen for filling the circles.

	1	8	1	5	4	3	2	1	6	9
0	0	0	0	0	0	0	0	0	0	0
1	●	1	●	1	1	1	1	●	1	1
2	2	2	2	2	2	2	●	2	2	2
3	3	3	3	3	3	●	3	3	3	3
4	4	4	4	4	●	4	4	4	4	4
5	5	5	5	●	5	5	5	5	5	5
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8	8	●	8	8	8	8	8	8	8	8
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Note- If your Roll No. is of 10 digits. Please leave first three columns .

Paper Code
PGS017

1

-: Section-A :-

-: Ans-1 (A) :-

Blue Green Algae :-

- Blue green algae एक प्रकार का biofertilizer है। यह मुख्यतः एक cynobacteria है।
- BGA वायुमंडलीय नाइट्रोजन को पौधों के लिए उपलब्ध कराता है।
- BGA मृदा में 20-40 kg N_2/ha स्थिरीकरण कर देता है।
- BGA के गुण मुख्य रूप से bacteria से मिलते हैं परन्तु इसमें Xanthophyll Pigment पाया जाता है जिस कारण ये Photosynthesis करके अपना भोजन स्वयं बनाते हैं।
- ये Free living biofertilizer हैं।
- Blue green algae मुख्यतः धान के खेत में Soil पर रहते Water पर रहते हैं।
- Blue green algae को जैव उर्वरक के रूप में nostoc sp use करते हैं। eg- Rice & other cereal crops में use किया जाता है।

:- Ans-1(B) :-

Predatory :-

These are the insects which predate another insect & kill them. They act as a biocontrol agent of pests. They are a type of natural enemy biopesticide.

- Predatory are larger than host body.
- Predatory kill both nymph & adult of host insect.
- Predatory kill & feed on insect pests.
- They require more than 1 host for complete their life cycle.
- Predatory are economically 2-4% suited for pest ctrl.
- Examples :-
  i). Rodolia cardinalis prey upon Icerya purchasi.
  ii). Mantis religiosa (Praying mantid)
  iii). Coccinella septumpunctata (7 spot lady bird beetle).

Parasite :-

They also serve as a natural enemy of insect-pests.

- Parasite are smaller than host
- They kill its nymph & adult

Paper Count
PG 5 0 1 7

3

- Parasite feed on host without kill the host
- They requires 1 or 2 host for life cycle
- Parasite can be some type of nematode which spend life on another host & feed their body nutrition

Eg →

Aedes aegypti

Ans-2(C):-

Phosphate Solubilizing Micro-organisms

भूमि में कुछ ऐसे भी micro-organism पाये जाते हैं जो Fixed phosphorus को solubilize करके Plants को available करते हैं, phosphate solubilizing micro-organism या bio-fertilizer कहलाते हैं।

भूमि में मुख्यतः Acidic soil के साथ phosphorus Fe व Al के साथ मिल कर आयरन फास्फेट व एल्युमिनियम फास्फेट बनाकर fix हो जाते हैं तथा alkali soil में Ca व Mg के साथ मिलकर कैल्शियम फास्फेट बना कर $Ca_3(PO_4)_2$ व फिक्स हो जाते हैं।

PSB का use करके P का mobilize plant को available बनाया जा सकता है।

Biofertilizer :-

i) Bacillus polymyxa
ii) Pseudomonas striata
iii). Aspergillus awamori

Mechanism:-

$$S + 2O_2 \longrightarrow SO_4$$
$$SO_4 + H_2O \longrightarrow H_2SO_4$$

Soil colloid] charge(−) + Fe-P ⟶ Fe^{++} + PO_4^{--}

इस प्रकार P Plants को PO_4^{--} के रूप में मिल जाता है।

:Ans- 5(b):-

Rhizobium:-

Rhizobium एक प्रकार का biofertilizer है जो liqume crops की roots के साथ Symbiotic relationship बनाकर N_2 fixation करता है root से nutrient लेकर अपना जीवन निर्वाह करता है।

- Rhizobium can add 50-120 kg N_2/ha per year.
- Rhizobium increase yield 25-30% & left the 40-60 kg N_2 in soil for the subsequent crop.
- Rhizobium consists 4 Genus of family Rhizobiacea
  - i) Rhizobium
  - ii). Bradyrhizobium
  - iii) Sinorhizobium (Soyabean)
  - iv). Azorhizobium (Sesbania)

7 cross inoculation group of Rhizobium has been identified :-

Rhizobium sp.	Cross-Inocul. Group
Rhizobium trifoli	→ Trifoli group
Rhizobium meliloti	→ Alfa-alfa group
Rhizobium phaseoli	→ Bean group
Rhizobium lupini	→ lupine group
Rhizobium leguminosarum	→ Pea group
Rhizobium japonicum	→ Soyabean group
Rhizobium sp (miscellany)	→ Clover (miscellany) group

- Rhizobium make nodule in roots of legume, nitrogenase ~~+nt~~ in nodule, which act as a nitrogen-fixation enzyme.

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MGS017

7

Ans-1(E) :-

Virulence :-

Virulence may be defined as an ability of microbial strain to develope / cause disease in host either plant or human or another organism.

eg-

M. tuberculosis & polio has both type of strain one is virulence cause disease & another is non virulent has vaccine strain.

• "Virulence is also defined as degree of disease caused by pathogen."

Virulence Effect :-

i). Virulence factor helps pathogen to develope metabolites that destruct the plant cells.
ii). Virulence factor helps pathogen to evade the immune system of host.
iii). When the plant is less susceptible, virulence factor became it more susceptible for pathogen.

Factor Affecting Virulence :-

a). Immune system & capacity of host.
b). Temperature & moisture
c). Genetic factor of host

e). antibiotics produced by plants.
e) Host susceptibility.
f). Presence of micro-organism that helps to plant, protect from pathogens.

-: Any-1(F) :-

Biopesticide :-

"Biopesticidy are those biological agent which are used to control the pathogen like bacteria, fungus & pests like weed & harmful insects."

OR

"Biopesticidy are naturally occuring substancy derived from the living organism such as- animal, bacteria & plants, which control pests by non-toxic mechanism in a eco-friendly manner."

Advantages of Biopesticidy :-

a). Biopesticidy are inherently less toxic than conventional pesticidy.

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b). Biopesticidy are target specific & kill only targeted pest & closely related organism.

c). Biopesticides are effective in less quantity & have lower residual effect, that minimize environmental hazard

d). Biopesticidy are required less quantity than conventional pesticide & used as a component of IPM & yield remains same.

e). It is difficult to develope resistance / resurgence against bio[illegible]cide for pests.

Examples :-

1). Microbial bio pesticide : Bacillus thuringensis, Baculovirus, Metarhizium anisopali, Trichoderma sp.

2). Biochemical bio pesticide : pheromone, Canola oil, Garlic oil

3). Plant incorporated Protectants :- Bt added in cotton, tomato, brinjal

4). Botanical biopesticide :- Ry[illegible]ia, Azadirachtin, [illegible]ocimum ordorum

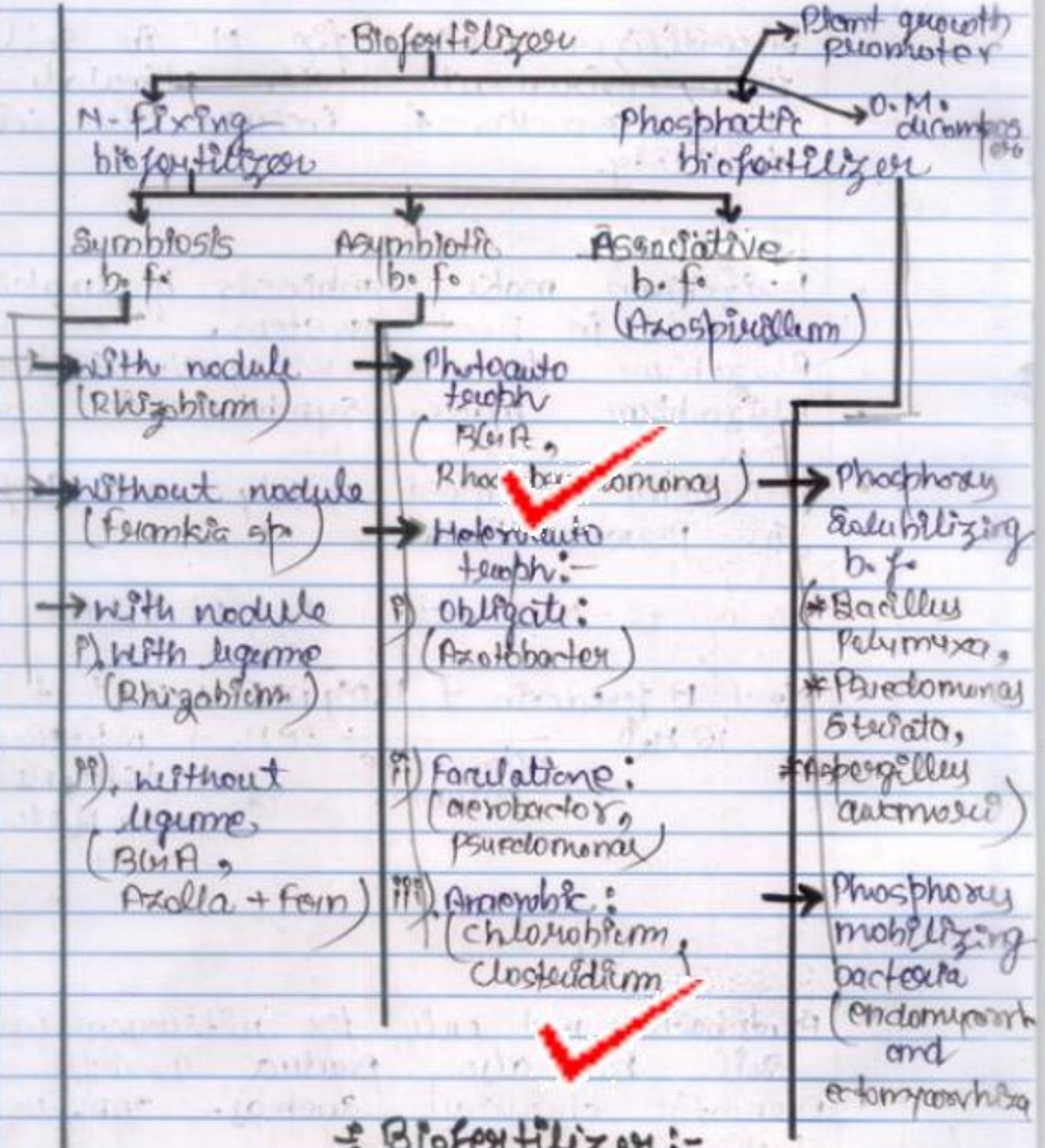
-: Section - B :-

-: Any - 2 :-

Biofertilizer :-

Biofertilizers are also called 'microbial inoculants.'' Microbial inoculants are carrier based inoculum or material which contains micro-organism in living state, and are intended to seed & soil application & designed for the increasing plant growth & benificial micro-organism which improve the soil-fertility.'' The carrier material used in biofertilizer are charcoal, clay, peat, lignite etc.

- Biofertilizer can increase soil fertility.
- B.f. improve soil health.
- Rhizobium fix 60-120 kg N_2/ha
- They are technologically feasible & locally acceptable.
- The increase the yield of crop.
- The mobilize different type of fixed nutrients in soil.



∴ Biofertilizer :-

1). N-fixing Biofertilizer :-

Thiyo are the

biofertilizer which fix N- in soil from environment which stimulate the plant growth & increase the soil fertility.

A). Rhizobium :-

- Rhizobium make symbiosis by making nodule in root system.
- Rhizobium fix 60 - 80 kg N_2 /ha/ year
- Rhizobium make symbiosis in legume crop.
- Rhizobium is most widely used b.f. in present time.

Biological - N- fixation by Rhizobium :-

$$N_2 + 8 \text{ ferredoxin} + 16 Mg\,ATP + 8H^+ + 10 H_2O \xrightarrow[\text{enzyme}]{\text{nitrogenase}} 2NH_3 + 8 \text{ Ferredoxin} + 16 Mg\,ADP + 10 H_2PO_4^- + 8H^+$$

B) Azotobacter :-

- Azotobacter not only fix nitrogen in soil but also produce growth promotic chemicals such as- IAA, IBA, GA, GA3, Vit. ions.
- Azotobacter produce antibiotics which helps plant to protect himself from pathogen so called biofertilizer

Paper Code
BAS017

13

c). **Azolla :-**

It is also a type of symbiotic relation between fern & azolla. azolla eats & survive on foliage of fern.

- It is mostly used in submergence field in crops like - rice.

D). **BGA :-**

It is a type of cynobacteria which has xanthophyll pigment make their food himself. It fix nitrogen 20-40 kg/ha

- It is found on soil & water surface.

2). **PSB :-** ये bacteria भूमि में P को available करते हैं। fixed phosphorus को solubilize करके plants के लिए transfer करते हैं। में plant roots में help करते

3). **P.M.B :-**

phosphorus mobilizing bacteria

Ectomycorrhiza :- ये plants की epidermis cell में या outer symbiosis करते हैं इसीलिए ये पूर्ण रूप से मिले होती है

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Plant को P. mobilize कर पहुचाते है और नहीं खुद प्रकृति! पीड़ित रह जाते है Plant roots पर।

Endomycorrhiza :- ये Plants की root की cortex cells के साथ सहजीवन बनाते है। ये mobilize कर Plant को adequate मात्रा में पहुचाते है।

- इनकी efficiency ectomycorrhiza से अधिक होती है।
- IARI द्वारा developed NUTRILINK है endomycorrhiza
- इन्हे VAM (Vascular Arbuscule mycorrhiza) भी कहते है।
- ये Plant roots में घुलकर symbiosis बनाती है।

Paper Code
AGSO17

15

Section-C :-

Biopesticidy :-

Biopesticidy are those biological agents which are used to ctrl the pests like- weeds, insect & pathogen.

"Biopesticidy are naturally occuring substances which are derived from living organism such as bacteria, plant etc. & ctrl the pests by non-toxic mechanism in a eco-friendly manner."

Bacillus Thuringinesis :-

It is a type of biopesticidy which is also used as microbial biopesticide or gene of b.t introduced in different plant as cotton etc.

- B.t was first isolatid by Japanese scientist.
- B.t produce toxin that kills the insect.
- The main straing from B.t is produced are kurustaki, tendalimy etc.
- B.t. destroy the epithilial cells of insect.
- B.t. produce toxin called β-endotoxin.
- B.t endotoxin contains protein called crystal.

- Bt to containg Enes → Cry-2AC gene
  → Cry-1AB gene
- Cry 2AC & AB control ⇒ cotton ball worm
- Cry 1Ab → Corn borer

Mechanism :-

Bacillus thuringinesis
↓ produce
toxin that contain protein called crystal which is normally inactive.
↓ feeded by
the insect on the cotton plant & it reaching to midgut of insect
↓ after that
protein endotoxin found the alkali pH & become active in midgut of insect
↓
B. endotoxin lysis the epithilial cells of midgut & swelling occurs.
↓

Insect die due to starvation because the destruction of midgut of pest.

- B.t. is introduced by genetic engineering in to different plants.
  eg-
  B.t. Brinjal
  B.t. cotton
  B.t. tomato
- In India B.t. cotton was commercially accepted in 2002.
- B.t. is a bacteria that acts as a biopesticide!

Character of B.t.:-

- Gram +ve bacteria, soil dwelling.
- Sporulating bacteria
- Purple colour
- Form large creamy whitish colony
- total 2 species is isolated
- B.t. attacks caterpillars, borers etc.

Brand name → Dipel DF
species → B.t. kurustaki
appl. → spraying.

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18

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