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MAHARASHTRA AGRICULTURAL UNIVERSITIES EXAMINATION BOARD, PUNE
SEMESTER END THEORY EXAMINATION

MODEL ANSWER

B.Sc. (Hons.) Agriculture

Semester- III (New)

Term – I

Academic year- 2023-24

Course No- ENTO 232

**Course Title- Insect Ecology and
Integrated Pest Management**

Credits-2 (1+1)

Day and Date -

Time -

Total Marks-40

SECTION 'A'

**Marks
allotted**

Q.1 Define the term 'Insecticide'. Give the classification of insecticides on the basis of chemical composition with one example each.

Ans. **Definition of Insecticide :-** The chemical which is applied for the control of insect pests is designated as insecticide. 1

Classification of insecticides on the basis of chemical composition with one example each

1. Inorganic Compounds:

- i. Arsenicals – eg. Lead arsenate, Sodium arsenite, Paris green
- ii. Fluorides – eg. Sodium fluoride, Sodium fluosilicate, cryolite.
- iii. Other compounds – eg Sulphur and lime sulphur, Barium carbonate, Zinc phosphide etc.

3

2. Organic compounds:

- i. Hydrocarbon oils – eg petroleum or mineral oils, coal tar oils.
- ii. Animal origin – eg Nereistoxin / Cartap
- iii. Plant origin – eg Nicotine, Pyrethroids, Rotenoids, Neem extract.
- iv. Synthetic organic compounds:-
 - a) Dinitrophenols – eg DNOC
 - b) Thiocynates – eg Thanite, Loro
 - c) Organochlorines – eg DDT, BHC, Endosulfan
 - d) Organophosphorus compounds – eg Malathion, Dimethoate, Phorate
 - e) Carbamates – eg Carbaryl, Carbofuran
 - f) Synthetic pyrethroids – eg Cypermethrin, Fenvalerate
 - g) Neonicotinoids – eg Imidaclopride, Acetamipride
 - h) Fixed oils and soaps
- 1. Fumigants – eg Aluminium phosphide, methyl bromide.

Q.2 Define the term 'Pest'. Give different categories of pests.

Ans. **Pest:** Any animal, pathogen or plant which causes damage or annoyance to man, his animals, crops or possessions.

1) **Regular Pests:** Certain insects occur most frequently on a crop & such insects have close association with a particular crop. E.g. Thrips on chilies, aphids on cotton, fruit borers on brinjal and lady's finger, Epilachna beetle on brinjal.

2) **Occasional pests:** Many insects occur rather infrequently and there is no close association with a particular crop. E.g. Caseworm of rice, mango stem borer.

3) **Seasonal pests:** Insects which occur mostly during a particular part of the year are called seasonal pests. E.g. Red hairy caterpillar on groundnut in kharif, grasshoppers on safflower in kharif, emergence of white grub beetles.

4) **Persistent Pests:** Insect which occurs on a crop almost throughout the year is called persistent pests. E.g. Scales and mealy bugs on a number of crops, chilli thrips.

5) **Sporadic pests:** Insects which occur in a few isolated localities are known as sporadic pests. E.g. Occurrence of rice ear head bug.

6) **Epidemic:** When the infestation occurs in a severe form in a region or locality at a particular season or time it is known as epidemic. E.g. locust damage.

7) **Endemic:** If the infestation is of a regular feature and confined mostly to a particular area or locality. E.g. White grubs on sugarcane and paddy on river banks of Kumbhi kasari in Kolhapur or on jowar, groundnut in Digraj in Sangali, Rice stem borer in Raigad district.

Q.3 Enlist different methods of pest control. Explain the cultural method of pest control with suitable examples.

Ans. **Different methods of pest control :**

1

1. Natural control
2. Artificial methods of pest control :
 - i) Cultural method
 - ii) Physical method
 - iii) Mechanical method
 - iv) Biological method
 - v) Legal method

vi) Chemical method

vii) Newer methods : Attractants, Repellents, Pheromones/

Semiochemicals, Antifeedants, Sterility technique, Hormones,

Biotechnology/Genetic engineering/Transgenic plants, Host plant resistance, IGRs, etc.,

Details regarding the cultural method of pest control with suitable examples: 3

1. Tillage operation, Crop rotation, Trap cropping, Sanitation of field or Destruction of Crop residues, Weeds and Trash time of sowing/Planting, Use of Resistant varieties, Adoption of high seed, pruning of dried twigs or branches, clipping of leaf tips, Early earthing-up, Flooding the field, Mix cropping, Trap cropping, etc.

Q.4 Define the term 'Biological control' Explain the techniques of biological control.

Ans. **Definition-** The action of parasites, predators or pathogens in maintaining another organism's population density at a lower average than would occur in their absence 1

Details regarding the techniques of biological control:

1. Conservation 3
2. Introduction
3. Augmentation: Inoculative release, Inundative release

Q.5 Define 'IPM'. Write in brief about concepts of 'IPM'.

Ans **Definition of IPM:** - 'It is pest management system in the context of associated environment and the population dynamics of pest species utilizes all the suitable techniques and methods in as compatible manner as possible and maintains pest populations at level below those causing economic injury.' 1

Concepts of 'IPM': - Concepts with description 3

1. Understanding agroecosystem
2. Planning agroecosystem
3. Identification of insect pest(s)
4. Life history and behavior of the pest
5. Cost/Benefit and Benefit/risk
6. Tolerance of pest damage
7. Leave a pest residue
8. Timing of treatments
9. Selection of suitable control measures
10. Public understanding and acceptance

Q.6 a) Enlist different categories of legislation

- Ans. 1. Legislation to prevent the introduction of new pests, diseases and weeds from foreign countries. 2
2. Legislation to prevent the spread of already established pests, diseases and weeds from one part of the country to another.
3. Legislation to enforce upon the farmers the application of effective control measures to prevent damage by already established pests, diseases or weeds.
4. Legislation to prevent the adulteration and misbranding of insecticides and to determine their permissible residue tolerances in food stuffs.
5. Legislation to regulate the activities of men engaged in pest control operations and the application of hazardous insecticides.

b) State the characteristics of ideal parasitoid.

Ans. **Characteristics of ideal parasitoid:** 2

- i. Adaptability: should be adapted in varied environmental condition and survive in all habitats of pests.
- ii. Specific: Should be host specific.
- iii. Fast multiplication: short life cycle, high fecundity and high female: male ratio.
- iv. High host searching capacity
- v. Easy rearing & mass multiplication in laboratory
- vi. Disperse quickly in locality
- vii. Should be free from hyperparasites
- viii. Should not harmful to other beneficial species
- ix. Should be small and tiny
- x. Should not feed on plant species
- xi. Should withstand refrigeration.

Q.7 Define 'Insect Ecology'. Explain the effect of temperature on insects with suitable examples.

Ans. **Definition of Insect Ecology:** - The science which deals with the relationships of insects to their environment. 1

Details regarding the effect of temperature on insects with suitable examples: 3

Q.8 a) Describe the types of pheromone.

Ans. **Details regarding the types of pheromone with suitable examples:** 2

1. Sex Pheromone
2. Alarm pheromone
3. Trail marking pheromone

4. Aggregation pheromone

5. Ovipositional lures

b) Enlist the causes of pest outbreak.

Ans. **The causes of pest outbreak:**

2

1. Biotic factors: - Food, Natural enemies.

2. Abiotic factors: Temperature, Moisture/Humidity, etc.

3. Genetic factors

General causes of pest outbreak: -

a) Destruction of forests or bringing forest area under cultivation

b) Destruction of natural enemies of pest

c) Intensive and extensive cultivation of crops

d) Introduction of new crops and improved strains

e) Improved agronomic practices

f) Introduction of a new pest in a new area

g) Accidental introduction of foreign pests

h) Resurgence of sucking pests

i) Large scale storage of food grains.

j) Lack of adopting IPM strategy.

Q.9 What is insecticidal formulation? Enlist different types of formulation with one example each.

Ans. **Insecticidal formulation:**

1

Definition: Incorporation of pesticide into a suitable carrier, solvent and the supplementary agents or adjuvants is known as formulation.

Types of Formulations with one example each:

3

Dusts, Wettable powders, Granules, Emulsifiables concentrates, Solutions, Aerosols, Fumigants.

Q.10 Write short notes (Any Two)

i) **Mechanism of Host Plant Resistance with description: -**

2

Ans

a) Antixenosis

b) Antibiosis

c) Tolerance

ii) **Antifeedants**

2

Ans

A chemical compound which prevents feeding of phytophagous and other insects without killing or repelling is known antifeedent or feeding deterrents.

e.g. 1) Triazines: Inhibits feeding of caterpillars, beetles, cockroaches

2) Botanical extracts: Pyrethrum is a gustatory repellent against the biting flies.

3) Neem extracts (Azadirachtin): Many hemipterous and lepidopterous insect.

iii) **Role of IGRs in pest management with description and suitable examples:**

2

Ans

a) Ecdysoids

b) Juvenoids (JH mimics)

c) Anti JH or precocenes

d) Chitin synthesis inhibitors

e) IGR from other sources

SECTION 'B'


4

Q.11 Define the following terms.

- i) **Biotic potential:** - It is the innate ability of the population to reproduce and survive
- ii) **Legislative control:** - It is the method of controlling pest by imposing various laws or legal restrictions in order to prevent the entry of foreign pests or to prevent the spread of pest within the country.
- iii) **Attractants:** - These are the chemicals that cause insect to make oriented movements towards their source
- iv) **LC₅₀:** - It is the concentration of the toxicant required to kill 50 per cent of pest population under test.

Q. 12 Match the pairs

- | | | | |
|---|-----------------|------|--------------------|
| 1 | BHC | b) 1 | Michael Faraday |
| 2 | Silent spring | a) 2 | Rachel Carlson |
| 3 | Genetic control | d) 3 | E. F. Knipling |
| 4 | Synergist | c) 4 | Piperonil butoxide |




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