

# **JOB ROLE – FLORICULTURIST (OPEN CULTIVATION)**

Sector – Agriculture

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PPT's for Class XI



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# **UNIT 6: INSECT PESTS, DISEASES AND WEED MAAGEMENT**

## **Session 1: Insect Pest Management**

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# Session Objectives

The student will be able to :

- Explain types of insects.
- Describe integrated pest management.
- Identify common pesticides and its formulations.

# Introduction

Insect pests, diseases and weeds are interlinked and complement each other. Individually, each one of these is responsible for a considerable loss by itself but if one remains neglected, it gives rise to the infestation of the other. Weeds serve as the alternate host for rust and other fungi, and also harbour insect pests. Therefore, for efficient insect pests and disease management, it is necessary to also manage weeds.

# Insect Pests

Knowledge of morphology, nature of damage, vulnerable stage of pest, damaging stage, pre-disposing factors, susceptible stages of host, natural enemies and predators help in preventing and controlling them effectively.

All insects belong to the class *Insecta*. Their body is segmented and mostly comprises three main segments, i.e., head, thorax and abdomen. Insects have two pair of wings and three pairs of legs.

# Insect Pests

According to structure of wing (*pteron*), they are classified into different orders, such as Coleoptera, Diptera, Hemiptera, Hymenoptera, Isoptera, Lepidoptera and Orthoptera, etc.

All these insects belonging to different orders may have different life cycles with different damaging stages and nature of damage. All these factors are important, but the most important is how (nature of damage) and when (damaging stage) they attack the host for better pest management.

# Types of Insects

Order	Characteristics	Damaging stage
<i>Diptera</i> - black flies, mosquitoes and flies		Adult and maggots
<i>Coleoptera</i> - Beetles and weevils		The larva known as grub is the damaging stage

# Types of Insects

Order	Characteristics	Damaging stage
<b><i>Hemiptera</i></b> - true bugs, hoppers and aphids, scale insects, <i>etc.</i>		Nymphs and adults
<b><i>Hymenoptera</i></b> - bees, wasps, ants and saw flies, <i>etc.</i>		Larvae and adults

# Types of Insects

Order	Characteristics	Damaging stage
<b>Isoptera-</b> termites		Workers feed on cellulose
<b>Lepidoptera-</b> butterflies and moths		Caterpillar

# Types of Insects

Order	Characteristics	Damaging stage
<b>Orthoptera-</b> Grasshoppers, crickets and locusts	 A close-up photograph of a green grasshopper with long hind legs, perched on a vibrant green leaf. The grasshopper's body is a mix of light and dark green, and its long antennae are clearly visible.	Nymphs and adults
<b><i>Thysanoptera-</i></b> Thrips	 A microscopic view of a thrips insect, showing its small, dark body, long antennae, and transparent wings with distinct venation. The insect is positioned centrally against a light, neutral background.	Adult, nymphs

# Nature of Insect Damage

## Chewing and cutting tissues of the host

These insects have biting and chewing type of mouth parts and may cut, chew and bite the tissues of the host. Mostly larvae and in some cases, adults are responsible for such damages. Larvae of the Lepidoptera (caterpillars) and the Coleoptera (grubs) are well-known damaging stages that cause such type of damage.



# Nature of Insect Damage

## Mining in the leaf

Larvae (maggots) of certain leaf minors by mining get inserted between upper and lower surface of the leaf.

Such infestation may be observed in ornamentals, such as chrysanthemum, dahlia, dianthus, salvia, verbena, etc.



# Nature of Insect Damage

## Boring in the host

Infestation of these pests can be identified by the presence of holes and bores that they make in several plant parts. Beetles, weevils, grubs, caterpillars and maggots are well known that bore into the host and feed on internal tissues. Flowering crops, such as China aster, chrysanthemum, dahlia, delphinium, iris, phlox and salvia, etc., are attacked by most of the borers.

# Nature of Insect Damage

## Yellowing and drying of foliage

The pest sucks cell sap of the host plant parts (leaves, shoots, floral buds, sepals, petals) to the extent that these are unable to cope up with plant growth and express yellowing, and premature drying or falling off. Nymphs and adults of aphids, jassids, whiteflies, thrips and bugs are found associated with such damages to almost all ornamentals.

## Galls

Mites suck cell sap and produce abnormal growth of pimple-like structure on the leaves. Tiny wasps also sometimes produce galls on leaves, stems and twigs of roses and other plants.

# Integrated Pest Management

IPM includes involvement of measures, such as cultural, physical, mechanical, chemical and biological methods against pests.

# Integrated Pest Management

## Insect pest control

Anything that interferes with the life of insect pests and makes them difficult to survive in the field or on plants either by killing them or through repelling so that their population is reduced is known as insect pest control. Various methods for their control are employed.

## Cultural methods

**Tillage:** Ploughing or flooding during summer season exposes hibernating stages like eggs, larvae, pupae of insect pests inside the soil.

# Integrated Pest Management

## Cultural methods

**Clean cultivation:** Cleaning of bunds and regular removing of weeds, pest population is minimised.

**Crop isolation:** Crop is isolated at a sufficient distance, the movement of pests from one field to another can be avoided, so their control becomes easier.

**Altering sowing or planting time:** This is a dodging strategy by which the host or its suitable stage is made unavailable for the pest, required for infestation.

# Integrated Pest Management

## Cultural methods

**Crop rotation:** Long crop rotation minimises the invasion of host-specific insect pests.

**Eradication of alternate hosts:** Weeds or other plants are removed to break the chain of host availability and control the pest population.

**Planting trap crops:** Trap crop of less economic value is planted before planting the main crop to attract insect pests towards it and the crop along with pest is destroyed completely before the insect reaches the reproductive phase.

# Integrated Pest Management

## Cultural methods

**Exclusion of infested plant or part:** Removal and destruction of infested plants and their parts reduce population and foci of pest in the field.

## Physical methods

These methods are mostly useful in controlling pests in a closed environment, like storage or greenhouse or pot plant. Low temperature of storage inhibits infestation. UV and  $\gamma$ -rays also prove lethal for pests.

# Integrated Pest Management

## Mechanical methods

**Hand picking and destroying:** The insects or their eggs can be handpicked and destroyed.

**Trenching the field:** This causes certain insects to be confined to a patch with no movement elsewhere as locusts.

**Screening:** Wire mesh protects crops from birds, moths and rodent attack.

**Sticky bands:** Ants, white ants and other tiny insects stick on the bands and die there without moving anywhere afterwards. Yellow colour attracts white flies.

# Integrated Pest Management

## Mechanical methods

**Light traps:** Phototropic insects such as borers (buds, pods and fruits) are attracted to light during night and provide effective control.

## Biological control of insect pest

Insects, bacteria and fungi are used as bio-agents. *Trichogramma*, Nabid bug, pentatomid bug, ladybird beetle tiger beetle, fruit fly, spider and mantids predate over insect pests, and hence, they are known as friendly insects. Spore formulation of *Verticilliumlacani* at the rate of 2.5–5g/litre of water is used to control larvae and nymphs of sucking pests.

# Integrated Pest Management

## Chemical method

**Dust:** Dry formulation with inert carrier. Available concentrations are from 1–10%, e.g., Quinolphos 4D, etc.

**Wettable (WP), dispersible powder (DP):** Dry formulation but can be applied with water, e.g., Carbaryl 75 wp.

**Emulsifiable concentrates (EC):** Liquid formulation with emulsifiable agents, which form emulsion in water. Most of the insecticides are available in this formulation, e.g., Cypermethrin 5EC, Malathion 50EC, etc.

# Integrated Pest Management

## Chemical method

**Granules:** Dry formulation, but particle size is more than found in powder. Applied in soil, e.g., Phorate 10G, Carbofuran 3G, etc.

**Water soluble concentrates (WSC):** Easily soluble in water, e.g., Monocrotophos 36WSC, etc.

**Fumigants:** They are found in liquid or solid form, e.g., methyl bromide, Aluminum phosphide, but these fumigants act in a gaseous state and are used in stored grain.

# Summary

In this session you have learnt about the types of insects, integrated pest management and common pesticides and its formulations.

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