CHAPTER 10

Pests and Diseases of Crops

PERFORMANCE OBJECTIVES

At the end of this chapter, students should be able to:

- *define pests and identify pests of certain plants indicating their control.*
- *classify pests based on their type and part of crops they attack.*
- *describe the life cycle of some pests.*
- *describe some eight common diseases caused by pests.*
- *describe pest control measures.*

INTRODUCTION

A pest is an organism that causes harm to other animals and plants and also destroys crops as well as lower the quality of their products. An animal could be regarded as a pest if it causes damage to the ecosystem or carries germs within human habitats.

▲ FIGURE 10.1 Insects and Diseases of Plants

▲ FIGURE 10.2 Caterpillar and a stem borer

Pests could be plants or animals. Plant pests are also called weeds, whereas animal pests could be vertebrates or invertebrates. Vertebrate pests include animals such as birds, rats and other small rodents. Invertebrate pests are more numerous and these include aphids, beetles, molluscs, nematodes, millipedes, centipedes, insects and their larvae.

Other organisms such as viruses, bacteria and fungi also act as pests on crops. Pests attack plant organs such as the leaves, stem, flowers, fruits and roots, which they damage.

CLASSIFICATION OF PESTS

Pests could be classified based on the following ways:

(i) The types of pest, for example, insect pest, nematode pest and fungal pest.

(ii) The part of the plant they attack, for example, leaf, stem or root-related pests.

(iii) The location of the pest, for example, soil- related pests.

CLASSIFICATION OF PESTS BY THE PART THEY ATTACK

Pests attack crops in different ways and by different forms or stages such as the adult, egg or larvae.

STEM BORERS: Stem borers are usually slender and legless. These are usually larvae of beetles and butterflies. The female adults of the particu- lar insects lay their eggs on the plants, and when the eggs hatch, the larvae feed on the leaves first and then bore into the stem, feeding on their tissues and thereby weakening the stem, which then breaks and bends over.

▲ FIGURE 10.3 Root feeders

Plants mostly attacked by stem borers include cereal plants such as rice and maize, Sugar cane, soybean and sorghum.

ROOT FEEDERS: Root feeders are pests that attack and feed on roots of crops, destroying them in the process and exposing the crops to further attack by other pests. These include adult insects and their larvae, and the plant parasitic nematodes. Root feeders are typically larval forms of weevils and beetles, e.g., the yam bee- tle.

Evidence of nematode attack on roots is seen as root knots. This is common on infected plants such as tomato.

LEAF FEEDERS: Leaf feeders are the most con- spicuous pests on plants. They damage the leaves by chewing away a layer of the leaf, thus leaving the veins. Leaf feeders are also known as defoliators. These include snails and lar- val stages of butterfly and moth (caterpillars).

Insect leaf feeder adults lay their eggs on the under surface of leaves of plants, and when these eggs hatch, the larvae eat up the leaves, thus affecting the ability of the plant to undergo photosynthesis. Spiders and mites also destroy leaves.

YOUNG SHOOT FEEDERS: These are plant pests that feed on young aerial parts of plants destroy- ing the apical buds, developing buds, young leaves and shoot. These include larvae of moth, plant bugs, beetle, grasshoppers or leaf hoppers, aphids and other sucking insects.

▲ FIGURE 10.4 Caterpillar (Leaf feeder)

▲ FIGURE 10.5 Aphid

SEED FEEDERS: Seed feeders such as birds, rodents, squirrels and monkeys attack the crops, while on the farm; beetles, weevils and fungi or moulds attack the stored seeds. These destroy the seeds entirely or reduce their aesthetic as well as market value. They also serve as vectors of other disease causing organisms.

ANIMAL TYPE OF PESTS

Animal type of pests consists of invertebrates and vertebrates. The invertebrate pests are more numerous than vertebrate pests. The invertebrate pests can be grouped into nematodes and arthro- pods such as insects and their larval stages, and snails. A wide array of insects functions as pests such as grasshoppers, locusts, beetles, butterflies and their larval stages, and aphids. The vertebrate pests are usually bigger in size and include animals such as birds, rats, squirrels and monkeys.

SUGGESTED PRACTICALS

ACTIVITY 1

(i) Teacher should take students out to the school garden or a nearby farm and ask them to observe the crops and collect various pests and affected plant parts.

(ii) Students should, under the supervision of teacher, classify the pests

TABLE 10.1 Crop Pests and their Effects on Crops

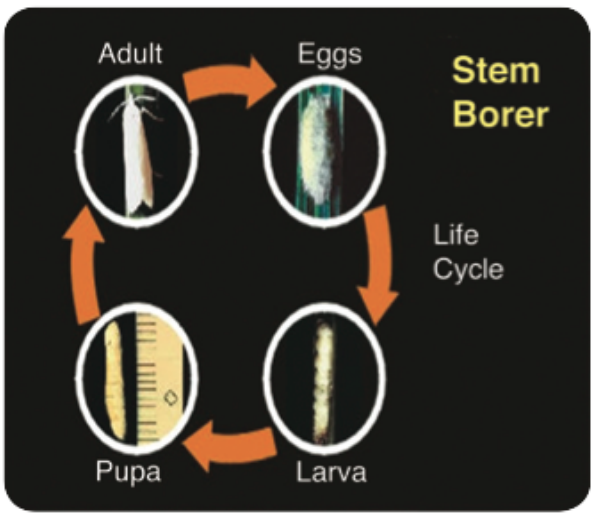
CROP	PEST	EFFECT OR DAMAGE
Maize	Caterpillar	Eats up leaves
	Fungus (*Puccinia*)	Produces spots on leaves which die off
	Birds	Attack fruits and eat up the grains
Yam	Beetle	Attack seedlings and mature yams
	Nematodes	Attack the tubers
Tomato	Insects	Attack the leaves and fruits
	Nematodes	Attack the roots
	Bacteria	Attack the seedlings
	Fungi	Attack the seedlings
Rice	Grasshoppers	Eat up the leaves
	Caterpillar	Eat up the leaves
	Rodents	Attack the roots
	Nematodes	Eat up the plant
	Weevils	Destroy stored grains

LIFE CYCLE OF PESTS

Most insects have the following stages in their life cycle, namely, adult, egg and larva.

The adults feed mostly on leaves of crops and fruits. The adult females lay eggs, which are either attached under the leaf surfaces, bark, stem or branches. The eggs hatch into larvae, which are legless and segmented.

The larvae chew through the bark and feed on the phloem causing damage to plant. The larvae often pupate when fully developed and further develop into adults, which emerge by



▲ FIGURE 10.6 Life cycle of an insect pest

chewing their way out through the bark leaving holes, which could serve as avenues

for entry of other disease causing agents.

DISEASES CAUSED BY PESTS AND THEIR AGENTS

FUNGAL DISEASES

The fungal diseases attack the leaves, roots and stem of plants. They take the form of blight, root rot and mildew. Leaf blight deforms the leaves, which become chlorotic along the veins with dis- crete brown patches and spore masses on the lower surface of the vein. Leaf blight could be caused by bacteria, e.g., Cassava leaf blight.

VIRAL DISEASES

Plants like every other living thing are attacked by viruses. Common symptoms include mottling or mosaics expressed as variegated patterns on leaf, fruit or flower. The leaves become curled or distorted. Viral diseases lead to huge losses in crops. Beetles and hoppers transmit viruses.

BACTERIAL DISEASES

Plant bacterial diseases are less common than fungal or viral diseases. Bacterial cells are small and can form resting spores. Bacterial diseases tend to form spotting of leaves, stems and fruits. Bacteria also cause soft rots.

Fungal Disease

Viral Disease

▲ FIGURE 10.7 Diseases of plants

CONTROL OF PESTS

Pest control refers to management and preven- tion of spread of pests, thus minimising their effect and maximising food production. This could be achieved by taking measures to reduce the pest population through the use of pesticides and farm practices that would not favour multiplication of the pests. Farm practices such as crop rota- tion, use of resistant varieties, mixed cropping and use biological agents could be adopted for pest controlling.

Apart from these a number of pest control methods are available. These include physical methods, cultural methods, chemical methods, bio- logical methods and integrated pest management.

PHYSICAL METHODS

The physical methods involve hand picking the pests and killing them and also attacking the pests physically. This method is applicable to large sized pests such as snails and beetles. It could be carried out on small plots, but it is a tedious as well as strenuous process.

CULTURAL METHODS

The cultural methods involve farm practices like bush fallowing, crop rotation and mixed cropping. This method is effective because most pests are specific to crops. By this method, infected crops are removed and burned, and the cultivation of resistant varieties is encouraged.

CHEMICAL METHODS

The chemical methods involve the use of pesti- cides such as insecticides, fungicides, herbicides and rodenticides. This method is effective, but now being discouraged as a result of the fact that the pests become resistant to the pesticide with time. Moreover, residues of the chemicals accu- mulate in the environment as well as in the food chain or web, thus affecting organisms along the line. Important and useful soil organisms may also be affected.

BIOLOGICAL METHODS

This involves the use of other organisms, which serve as predators or parasites on the pests. Extracts from plant sources are also used in pest control. In biological pest control, the pest popula- tion is reduced using natural enemies. Biological control is long lasting and inexpensive.

INTEGRATED PEST MANAGEMENT (IPM)

This is an effective and environmentally sensitive method of pest control. It relies on a combination of control practices and knowledge of the life cycle of the pest.

CHAPTER SUMMARY

â– Pests are organisms that attack other animals and plants causing harm to them as well as lowering their aesthetic quality and market value of their products. Pests could be plants or animals and show a wide variation in size.

â– These could be adult organisms, their eggs or larvae. These could be classified by their animal types such as invertebrate pests or vertebrate pests, and by the parts of crop they attack such as stem borers, root feeders and seed feeders.

â– Pest control measures are aimed at preventing their spread and also reducing the pest population by use of pesticides, which may be herbicides for weeds, insecti- cides for insect pests and nematicides for nematodes.

â– Natural methods of control could also be applied such as farm practices and use of biological agents. Diseases caused by pests may be viral, fungal or bacterial.

REVISION QUESTIONS

OBJECTIVE QUESTIONS

Choose the correct options to the following questions.

1. Which part of a plant is attacked by nematode pests?
a. Stem b. Leaves c. Vascular tissues d. Roots

2. The use of pesticides in control of pests is discouraged because

a. it affects the health of the farmer.
b. the pests become resistant after long usage. c. better methods have been discovered. d. it is very expensive.

3. Identify the crop attacked by stem-boring pests.
a. Okra b. Tomato c. Maize d. Yam

4. Birds are pests of one of the following crops.
a. Tomato b. Yam c. Rice d. Orange

5. The use of other organisms in the control of pests is classified as

a. cultural method. b. integrated Pest Management. c. biological method. d. physical method.

ESSAY QUESTIONS

1. Explain the term pest and give five examples of pests.
2. Discuss the different type of pests that attack crops.
3. Mention five pests stating the crops they attack and their effects on the crops. 4. Explain the life cycle of a named crop pest.
5. Explain pest control measures applicable to crops.