

Agronomy: Insects and Diseases

This discussion will cover following seven areas:

- Insect control methods
- Reproduction and dissemination of diseases
- Selection of control method
- Types of diseases
- Classification of insecticides
- Fungicides
- Diseases

Any insect, disease, nematode or weed that causes economic loss to farmers by damaging his crop is a pest. However, sometimes the term "pest" is used to describe only insects.

An important aspect of agronomy is identification and control of such pests to minimize losses. There are several methods of controlling pests. Methods for controlling weeds have been discussed in another section (see Herbicides). Methods for controlling insect pests and diseases are described in this section.

Physical or mechanical control

this includes measures such as collection of egg masses, removal and destruction of infested plant parts or whole plants and beating of drums on tins. These methods are usually practiced by a group of farmers together.

Cultural control

This is a preventive technique and includes steps such as deep ploughing after harvesting a crop to expose hidden or resting insects, removing and destroying the stubble and other remains, adjust sowing time, clean cultivation, removing alternative hosts, catch crops (crops deliberately planted to attract pest insects), and suitable crop rotation.

Biological control

Practically every insect has natural enemies in the form of predators, parasites and disease-causing organisms. Biological control involves a large-scale multiplication and release of such agents (or creating conditions under which naturally occurring agents can act effectively). This type of control cannot be undertaken by individual farmers and has to be carried out by specialized agencies.

Legislative and Regulatory Methods

These methods are employed to prevent the spread of an insect pest from other countries and to prevent the spread of an insect pest from one area to another. This method is obtained through specific regulations and plant quarantine laws. Some states have special pest acts that make it obligatory for the cultivators and the government authorities to take appropriate steps to control a particular pest when it takes on an endemic form.

Chemical Control

This method uses chemicals to control insect pests and is by far the most popular method among farmers. Many insecticides are now available to control different insect pests. These are used mainly as dusts, sprays and granules. Some of these can be incorporated into the soil for controlling soil-inhabiting insects.

Host plant resistance

This is a cultural method that utilises the inherent property of certain strains or varieties of crops that are less affected than other strains or other varieties of the same crop. Bollgard^a (insect resistant cotton) is an excellent example of this method.

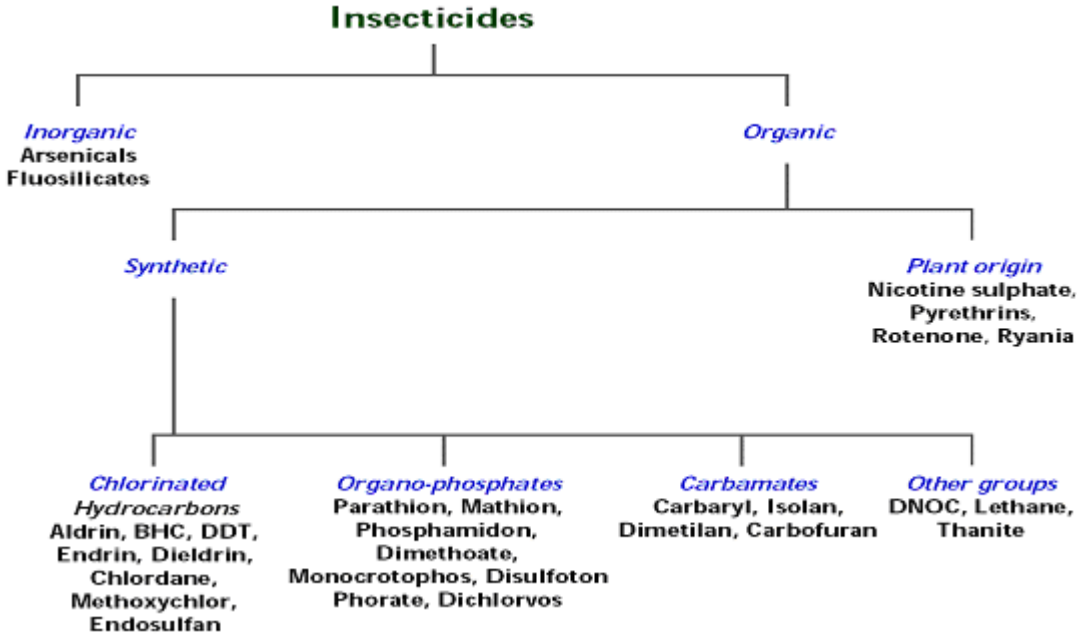
The choice of a control method depends to a great extent on financial limitation, on whether the method gives rise to related problems, and on what effect it has on the natural enemies of insect pests. Choice becomes easier when the biology and habitat of the insects are known and its most vulnerable stage determined. No single method can be as efficient as a multi-pronged approach.

Precaution While Using Insecticides

Most insecticides are toxic or harmful to varying degrees for man and animals and have to be handled with care. Precautions to be taken while handling insecticides are:

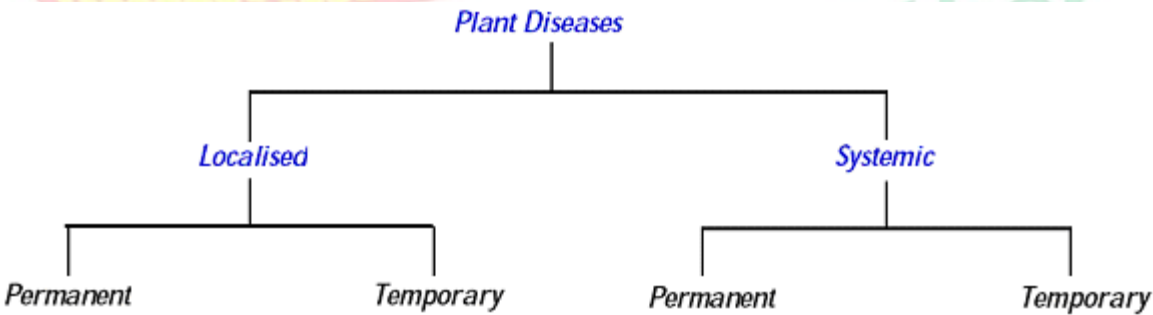
- Keep insecticide closed in properly labeled containers in a dry, cool place, away from food and fodder and the reach of children and animals,
- Follow instructions on dosage and usage given on the container,
- Avoid dermal contact with the insecticide. Also avoid inhaling dusts, vapours and mists, and
- Wear rubber gloves, cover eyes and nose, do not smoke, eat or drink simultaneously with application, wash up later and disinfect clothes used after

application.



While inorganic insecticides were widely used before synthetic insecticides were developed, today, the use of insecticides of synthetic origin predominates.

A plant disease is a physiological or structural abnormality that affects the plant, or reduces its economic value. A diseases may either be localized (that is, limited to a specific part of the plant), or systemic (in which case its infection is generalized and spreads throughout the plant). It may be temporary or permanent, depending on the speed of recovery of the plant.



Plant diseases are caused by pathogens (microorganisms such as fungi, bacteria, viruses and nematodes). Most plant diseases are caused by fungi that reproduce and disseminate mainly by spores. Wind, water, seeds, diseased plants, cuttings and tubers, animals, men, insect and soil all act as carriers. Most of the fungi and bacteria erupt or ooze from the surface after the host tissues have been damaged. Viruses work internally. The best way to control diseases is to prevent infection as it is sometimes very difficult to kill fungi or bacterial or inactivate viruses inside host plants.

Seed-borne diseases

The pathogens of these diseases are carried either on the surface of the seed or within it. When a pathogen is external, it may be destroyed with the help of chemicals.

For internal seed-borne diseases, hot water treatment and solar treatment are very effective. Hot water treatment involves soaking seeds in water at room temperature and then immersing it in hot water. Solar treatment is carried out on bright sunny days during the summer. The seeds in this case are soaked in water for about four hours in the morning and are then spread in a thin layer on sheets of cloth.

Systemic organic compounds are also effective in eradicating both externally and internally borne seed infections.

Soil-borne disease

These are infections in the soil that harm seeds and seedlings. Chemicals are either sprayed, fumigated, broadcasted or placed in furrows in the soil to eradicate these.

Air-borne disease

In the case of air-borne diseases, application of chemicals to the foliage is the most effective method of control. However, the degree of control attained is usually not very satisfactory.

Fungicides

Fungicides are used for controlling diseases in plants. Copper, Sulphur, Organo-Sulphur and Organo-Mercury compounds, antibiotics and systemic organic compounds are the most important fungicides. The choice of fungicide is governed by the nature of the disease and by the susceptibility of the crop. Fungicides are available as dusts or wettable powders and sometimes in liquid form. The method of applying them depends on the availability of water, equipment, nature of crop, area to be covered and availability of labour.

Sources and Links

- Department of Primary Industries, Victoria, Australia. Available online at:
- <http://www.dpi.vic.gov.au/dpi/nreninf.nsf/childdocs/-2BAF4D73531CD1544A2568B3000505AF-57D1EB72F146450ECA256BC80004E8DD-966D71ECF369B7C44A256DEA0027B670-CEF81C761FD5A8F8CA256BCF000BBE82?open>
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- <http://www.agric.nsw.gov.au/reader/vsp-soiltesting/vsp-d4.pdf?MIvalObj=6704&doctype=document&MItypeObj=application/pdf&name=/vsp-d4.pdf>
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