

PLANT PROTECTION MEASURES

Various measures adopted to control or reduce insects or diseases on crop plants are:

CULTURAL OR INDIRECT MEASURE

Healthy and clean seed

Seed should be selected from that field which has not been affected to insects or disease attack. This applies particularly to wheat which can carry the fungal spores of loose smut, present inside. In stored seed should be sundried before sowing to kill larvae of pink borer present within seed shell.

Sowing time

Soil and climatic temperature required for different insects and diseases varies very widely. So crops may be sown early or late enough to avoid the disease or insect attack. Wheat sown in 3 or 4 week of October is less likely to be infested with flag smut. Cotton sowing in April or June remains free from wilt or root rot as compared to crops sowing in May. Gram wilt can be controlled by delayed sowing.

Sowing method

Sowing of rice through nursery can check borers and disease attack. Because affected seedlings are discarded before transplanting. Crops sown in lines with proper plant to plant distance facilitate air circulation and light penetration which is helpful in checking certain insects like aphid, jassid and white fly of cotton. Attack of these insects is more in high density population.

Fertilizer and irrigation

Timely application of irrigation and fertilizer (K and P) can reduce insect or disease attack by creating resistance in plants. A poor growing crop is more susceptible to attack.

v. **Mixed sowing**

Mixed sowing of wheat and gram can reduce the fungal attack on gram because wheat plants act as barrier in way of spread of fungal spores. Sowing of moth in cotton can check cotton wilt or root rot.

vi. **Field sanitation or clean farming**

Field should be free from weeds and crop residues etc. because these are alternate host for diseases and insects.

vii. **Resistant varieties**

Resistant crop varieties are the best way to minimize insect and disease attack. In cotton varieties with rough and hairy leaves are less attacked by sucking insects because it is difficult to suck sap. Stiff stem sugarcane (BL-19) is less affected by borer and wild boar.

viii. **Removal of diseased plants**

Removal of diseased plants from field is necessary to control further spread, e.g., plants of sugarcane affected by smut and red rot spikes of wheat with loose smut should be removed from field.

ix. **Harvesting**

Certain insects which passes their winter season in stubbles can be controlled by harvesting plants near to soil level e.g., in rice, sugarcane, maize and cotton.

x. **Ratoon crop**

Ratooning in sugarcane should be avoided if there is severe attack of borers.

xi. **Burying or burning of stubbles**

Borers of rice, sugarcane, maize and sorghum pass their unfavorable period in stubbles of previous crop. Therefore stubbles should be buried in soil with mould board plow followed by planking. Best way to destroy insects is burning of stubbles.

xii. **Crop rotation**

Crop rotation can avoid an accumulation of insects or disease causing organisms. When the host plants are not present in the field parasite will be starved to death. On the other hand if the host plant is continuously grown in the same field for many successive years, then the parasites will increase in large number. In case of severe attack of gram

(residue in same field)

Advantages

- No need
- Harmless
- Easy and
- No damage
- Insects hidden

CHEMICAL

- Quick
- More
- More
- Time
- Less
- Insect group

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(residue born) and potato blight (soils born) crop should not be sown same field for 2-3 years.

Advantages

No need of pesticides, machinery and technical guidance

Harmless and is a preventive measure.

Easy and practicable in every season.

No damage to beneficial insects.

Insects are controlled in pupa or larvae stage and when they are hidden in stubbles.

CHEMICAL CONTROL

Quick and complete.

More beneficial.

More economical.

Time saving.

Less laborious.

Insecticides which are used to kill the insects are divided into main groups as following:

Chlorinated Hydrocarbons

Chlorine, hydrogen and carbon are the constituent of these insecticides. In addition to these some have oxygen and sulphur. These have long lasting residual effects. DDT, BHC, Heptachlore, Endrin, Eldrin, Aldrin. Suitable for grasshopper, cutworm, army worm, toka etc. Kill the insects by reaching in stomach on chewing or swallowing or by contact. Corrode the skin, paralyse nervous system by entering blood.

Organophosphate

Phosphorous is the principal constituent of such insecticides which are responsible for killing. This group is suitable for sucking type insects (aphid, Jassid, Whitefly, Mites etc.). This group is further divided into.

a) **Systemic insecticides**

These are absorbed by leaves after spray, enters into vital fluid and reach every where in plants. Insects are killed when they suck the sap or chew the leaves of such plants.

b) **Non-systemic**

These are absorbed by plant leaves or tissues after spray but not translocated. Killing action is the same as above.

a. **SYSTEMIC**

i. **Dimethoate**

Rogal, Perfekthain, Ciagon, Sistoet.

ii. **Methamidophos**

Sundaphos, Master, Monitor, Timaron.

iii. **Fenothoat**

Cidel, Elsan.

iv. **Endosulfan**

Thiodan, Thioluxan.

v. **Phosphamidan**

Dimecran, Pilarwan.

vi. **Diazinon,**

Diazinon, Basudin.

b. **NON -SYSTEMIC**

i. **Monocrotophos**

Nuvacron, Pillardin, Apadrin, Nokout, Monophos, Suncrotophos.

ii. **Milothian**

Ematos

iii. **Methacerephos**

Nogas, Phostac

3. **CARBAMATE**

Carbolic a
Suitable fo
ust form.
Diazinon,

PYRETH

Absorbe
ct action.

Cyperm

Arivo, C

Perme

Ambu

Finol

Sumi

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Carbolic acid is the basic ingredient. These are absorbed through
Suitable for maize, rice and sugarcane borers. Available in granules
dust form. Thimet, Padan, Curator, Furadon, Agrilex, Primos, Acalex,
Diazinon, Seven and Linate dust.

PYRETHROID

Absorbed through leaves to kill insects on chewing or kill through
contact action. Effect is very rapid, systemic.

Cypermethrin

Arivo, Cymbush, Nurale, Shurpa.

Permethrin

Ambush, Permasect

Finolret.

Sumicidan, Funkil

Phenophthrin

Dinitol

Ciflomethrin

Bythroid

Bifinthin

Talstar

Deltamethrin

Decis

Flovelent

Mevrik.

W

Akamran Taj

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The most convenient definition of the weed is "A plant which grows where it is not wanted" or "A plant out of its proper place" or any plant that is objectionable and interferes with man activities or welfare.

ADVERSE OR HARMFUL EFFECTS OF WEEDS

1. Compete with crop plants

- example*
- (i) ⇒ Weeds compete with crop plants for moisture. They use 225 liters of water to produce 1/2 kg dry matter. They can produce 225 kg of dry matter from one acre by using 1 lac litres of water. This quantity of water comes to about $\frac{3}{4}$ of an acre inch which is sufficient for 4 days for an acre of maize crop.
- (ii) ⇒ The CO_2 consumption is higher in most of the weeds as compared with cultivated crops. It is due to relatively more leaf area of weeds (e.g. leaf area of wild mustard and wheat at blooming stage is 7300 and 140 cm^2).
- (iii) ⇒ Weeds compete with crop plants for space. e.g. plant of itsit covers 3.5 m^2 area.
- (iv) ⇒ They use relatively more light and respond better than the cultivated crops to high light intensities.
- (v) ⇒ Weeds like fat hen and pigweed (chulai) consume double the quantity of N and P and triple the dose of K as compared to those crops with which they compete.

2. Yield reduction / High infestation

Weeds reduce the yields by competing, shading and smothering crops. It is said that with each kilogram of weeds produced, one kilogram of wheat is reduced.

3. Spoil the quality

Weeds can spoil the quality of a crop and so lower its value. (e.g. wild onion bulbs in wheat. Wild onion may also taint milk when eaten by cows.)