

Lecture - 1

WEEDS – HARMFUL AND BENEFICIAL EFFECTS

Weeds are plants that are unwanted in a given situation and may be harmful, dangerous or economically detrimental. Weeds are a serious threat to primary production and biodiversity. They reduce farm and forest productivity, displace native species and contribute significantly to land and water degradation. The costs of weeds to the natural environment are also high, with weed invasion being ranked second only to habitat loss in causing biodiversity decline.

Despite considerable government and private sector investment, weed invasion still represents a major threat to both the productive capacity of land and water and the integrity of our natural ecosystems. An efficient weed control program can only be developed after the weed has been properly identified. Weeds can be managed using many different methods. The most effective management of weeds is usually achieved through collaboration and co-operation, in partnerships between the community, land owners, agriculture, industry and the various levels of government, using a combination of methods in conjunction with a thorough follow-up campaign.

Weed management is an important component of plant protection improving the production potential of crops. It includes management of the weeds in a way that the crop sustains its production potential without being harmed by the weeds. Weed management is done through the mechanical, cultural and chemical means. Use of biological control methods in field crops is being considered, but still not much in use. Use of herbicides is an important method in the modern concept of weed management. New hand-tools and implements have also been designed to assist in weed-management programme.

Characteristics of weeds

Weeds are also like other plants but have special characteristics that tend to put them in the category of unwanted plants.

- Most of the weeds especially annuals produce enormous quantity of seeds, e.g. wild oats (*Avena fatua*), produces 250 seeds per plant, whereas wild amaranth (*Amaranthus viridis*) produces nearly 11 million seeds. It has been observed that among 61 perennial weeds, the average seed-production capacity was 26,500 per plant.
- Weeds have the capacity to withstand adverse conditions in the field, because they can modify their seed production and growth according to the availability of moisture and temperature. They can germinate under adverse soil-moisture conditions, have short period of plant growth, generally grow faster rate and produce seed earlier than most of the crops growing in association.

- Weed seeds remain viable for longer period without losing their viability, e.g. annual meadow grass (*Poa annua*) and scarlet pimpernel (*Anagallis arvensis*) remain viable for about 8 years; creeping thistle (*Cirsium arvense*) for 20 years and field bind weed (*Convolvulus arvensis*) for about 50 years.
- Weed seeds have a tremendous capacity to disperse from one place to another through wind, water and animals including man. Many of times, weed seeds mimic with the crop seeds due to their size and get transported from one place to another along with them.

Harmful effects

- Weeds have serious impacts on agricultural production. It is estimated that in general weeds cause 5% loss in agricultural production in most of developed countries, 10% loss in less developed countries and 25% loss in least developed countries.

In India, yield losses due to weeds are more than those from pest and diseases. Yield losses due to weeds vary with the crops. Every crop is exposed to severe competition from weeds. Most of these weeds are self-sown and they provide competition caused by their faster rate of growth in the initial stages of crop growth. In some crops, the yields are reduced by more than 50% due to weed infestation. These losses caused by weeds in some of the important crops are given in the following table.

Loss in crop yields due to weeds			
Crop	Reduction in yields due to weeds (%)	Crop	Reduction in yield due to weeds (%)
Rice	41.6	Groundnut	33.8
Wheat	16.0	Sugarcane	34.2
Maize	39.8	Sugar beet	70.3
Millets	29.5	Carrot	47.5
Soybean	30.5	Cotton	72.5
Gram	11.6	Onion	68.0
Pea	32.9	Potato	20.1

- Weeds compete with crops for water soil, nutrients, light, and space, and thus reduce the crop yields. An estimate shows that weeds can deprive the crops 47% N, 42% P, 50% K, 39% Ca and 24% Mg of their nutrient uptake.
- Weeds also act as alternate hosts that harbor insects, pests and diseases and other micro-organisms. Alternate hosts of some of the pest and diseases

Crop	Pest	Alternate host
Red gram	Gram caterpillar	<i>Amaranthus, Datura</i>
Castor	Hairy caterpillar	<i>Crotalaria sp</i>
Rice	Stem Borer	<i>Echinochloa, Panicum</i>
Wheat	Black Rust	<i>Agropyron repens</i>
Pearl Millet	Ergot	<i>Cenchrus ciliaris</i>
Maize	Downy Mildew	<i>Sacharum spontaneum</i>

- Some weeds release into the soil inhibitors of poisonous substances that may be harmful to the crop plants, human beings and livestock. Health problems caused by weeds to humans,

Health problem	Weed
Hay fever and Asthma	Pollen of Ambrosia and Franseria
Dermotitis	Parthenium, Ambrosia
Itching and Inflammation	<i>Utrica sp</i>
African sleeping sickness	Brush weeds
Malaria, encephalitis and filaria caused by mosquito	Aquatic weeds like <i>Pistia lanceolate</i> , <i>Salvinia auriculata</i>

- Weeds reduce the quality of marketable agricultural produce. Contamination of weed seeds of *Datura*, *Argemone*, *Brassica* etc., is harmful to human health and weed seeds present in the produce cause odd odour sometimes.
- Weeds not only reduce yield but also interfere with agricultural operations. Weeds make mechanical sowing a difficult process and render harvesting difficult, leading to increased expenditure on labour, equipment and chemicals for their removal.
- In aquatic environment, weeds block the flow of water in canals, water-transport system and drainage system, rendering navigation difficult. The dense growth of aquatic weeds pollutes water by deoxygenating it and killing the fishes.
- Weeds are also a nuisance and a fire hazard along railway lines, roads, right-of- ways, airports, forest and industrial sites.

Beneficial Effects

In spite of all the difficulties caused by weeds, they can offer some beneficial properties, particularly when occurring at low densities. These aspects should be utilised in the farming system, although this may make organic management more complicated than chemical based systems. Some of the potential benefits of weeds are listed below:

- Helping to conserve soil moisture and prevent erosion. A ground cover of weeds will reduce the amount of bare soil exposed helping to conserve nutrients, particularly nitrogen which could otherwise be leached away, especially on light soils.
- Food and shelter can be provided for natural enemies of pests and even alternative food sources for crop pests. The actual presence of weed cover may be a factor in increasing effectiveness of biological control of pests and reducing pest damage.
- Weeds can also be valuable indicators of growing conditions in a field, for example of water levels, compaction and pH.
- Weeds can be an important source of food for wildlife, especially birds. Bird populations have been declining on farmland over the last few decades and leaving weeds as a resource has been shown to help revive bird populations.

