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Methods of Weed Control

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Abstract

For designing any weed control programme in a given area, one must know the nature and habitat of the weeds in that area, how they react to environmental changes & how they respond to herbicides. Before selecting a method of weed control one, much have information on the number of viable seeds nature of dispersal of seeds, dormancy of seeds, longevity of buried seeds and ability to survive under adverse conditions, life span of the weed, soil textures moisture and in case of soil applied volatile herbicides, the herbicide will be successful only in sandy loam soil but not in clayey soil. Flooding as a method of weed control will be successful only in heavy soil and net in sandy soil the area to be controlled.

Introduction

Weeds affect the growth of plants surrounding them by competing for nutrients, soil, water, and space. In cases of younger or smaller plants, some weeds even overpower their young plant parts. Weeds not only affect the plants around them, but they can bring unnecessary trouble to the entire farm. For one, some types of weeds block drainage pipes, while some weeds, if left unchecked may obstruct the function of farm machinery that is used for cultivation. Matter of fact, weeds can cause more manual labour for farmers like oneself. Weed control and weed management are the two terms used in weed science. Weed control is the process of limiting infestation of the weed plant so that crops can be grown profitably. Weed management includes prevention, eradication and control by regulated use, restricting invasion, suppression of growth, prevention of seed production and complete destruction.

Mechanical Weed Control

Tillage

Tillage removes weeds from the soil resulting in their death. It may weaken plants through injury of root and stem pruning, reducing their competitiveness or regenerative capacity. Tillage also buries weeds. Tillage operation includes ploughing, discing, harrowing and leveling which is used to promote the germination of weeds through soil turnover and exposure of seeds to sunlight, which can be destroyed effectively later. In case of perennials, both top and underground growth is injured and destroyed by tillage (Figure 1).

Hoeing

Hoe has been the most appropriate and widely used weeding tool for centuries. It is however, still a very useful implement to obtain results effectively and

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Figure 1: Tillage

cheaply. It supplements the cultivator in row crops. Hoeing is particularly more effective on annuals and biennials as weed growth can be completely destroyed. In case of perennials, it destroyed the top growth with little effect on underground plant parts resulting in re-growth (Fugre 2).

Figure 2: Hoeing

Hand Weeding

It is done by physical removal or pulling out of weeds by hand or removal by implements called khurpi, which resembles sickle. It is probably the oldest method of controlling weeds and it is still a practical and efficient method of eliminating weeds in cropped and non-cropped lands. It is very effective against annuals, biennials and controls only upper portions of perennials (Bleasdale and Salter, 1991).

Cultural Weed Control

Several cultural practices like tillage, planting, fertilizer application, irrigation etc., are employed for creating favorable condition for the crop. These practices if used properly help in controlling weeds. Cultural methods, alone cannot control weeds, but help in reducing weed population. They should, therefore, be used in combination with other methods. In cultural methods, tillage, fertilizer application and irrigation are important. In addition, aspects like selection of variety, time of sowing, cropping system, cleanliness of the farm etc., are also useful in controlling weeds.

Field Preparation

The field has to be kept weed free. Flowering of weeds should not be allowed. This helps in prevention of buildup of weed seed population.

Summer Tillage

The practice of summer tillage or off-season tillage is one of the effective cultural methods to check the growth of perennial weed population in crop cultivation. Initial tillage before cropping should encourage clod formation. These clods, which have the weed propagules, upon drying desiccate the same. Subsequent tillage operations should break the clods into small units to further expose the shriveled weeds to the hot sun.

Maintenance of Optimum Plant Population

Lack of adequate plant population is prone to heavy weed infestation, which becomes, difficult to control later. Therefore practices like selection of proper seed, right method of sowing, adequate seed rate protection of seed from soil borne pests and diseases etc. are very important to obtain proper and uniform crop stand capable of offering competition to the weeds.

Crop Rotation

The possibility of a certain weed species or group of species occurring is greater if the same crop is grown year after year. In many instances, crop rotation can eliminate at least reduce difficult weed problems. The obnoxious weeds like *Cyperus rotundus* can be controlled effectively by including low land rice in crop rotation.

Mulching

Mulch is a protective covering of material maintained on soil surface. Mulching has smothering effect on weed control by excluding light from the photosynthetic portions of a plant and thus inhibiting the top growth. It is very effective against annual weeds and some perennial weeds like *Cynodon dactylon.* Mulching is done by dry or green crop residues, plastic sheet or polythene film. To be effective the mulch should be thick enough to prevent

light transmission and eliminate photosynthesis.

Solarisation

This is another method of utilization of solar energy for the desiccation of weeds. In this method, the soil temperature is further raised by 5–10 °C by covering a pre-soaked fallow field with thin transparent plastic sheet. The plastic sheet checks the long wave back radiation from the soil and prevents loss of energy by hindering moisture evaporation (Rao et al., 1971).

Chemical Control

There are three types of herbicides, depending upon their effects on plants: contact, growth regulators and soil sterilants. Contact herbicide cause rapid drying of planting tissue. Herbicides such as paraquat (Gramoxone) are non-selective contact herbicides. Growth regulating herbicides control physiological processes of plants such as cell division or expansion. Some also inhibit the plant ability to convert light into food energy. Examples are 2,4-D (sold under various trade names). Soil sterilants are non-selective or selective herbicides used at high rates and are applied for the elimination of all plant growth. There are two categories of soil sterilants, persistent and non-persistent. The persistent sterilants are normally used on noncropland areas such as railroads, highway barriers, etc. and around buildings. Non-persistent sterilants such as Vapam and methyl bromide dissipate readily from the soil and are used in vegetable production prior to the growing season.

Conclusion

In recent times, biological and integrated weed control is gaining popularity over the traditional methods of mechanical and chemical because the latter have been noted to be more expensive, energy and labour intensive and require repeated applications. Mechanical methods cause soil disturbance and possible erosion while chemical herbicides lead to pollution of the environment and the aftermath. Some weed species have developed resistance to some chemical herbicides and biological control readily comes as a viable alternative. Classical method of biological weed control has been the most popular and widely adopted and practiced; it involves the introduction and release of agents in form of exotic insects, mites or pathogens to give permanent control.

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