

Weed management flashcard



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Parasitic plants are difficult to manage due to various adaptive, biological or ecological factors.

With continued use of chemical herbicides, parasitic plants develop resistance mechanisms, making further use ineffective. The herbicide effective for a particular weed may also affect desired plants (crops). In biological control, it is difficult to synchronize the life cycles of the biological agent and the parasitic plant. At the same time, it is difficult to use biological agents which cannot discriminate weeds from crops.

In cases where the desired plant fails to either metabolize the herbicide or out-grow the chemical barrier, it could also be affected by the herbicide. Critical period of weed control (CWC) is the stage of plant growth during which it must be kept free from weeds to avoid yield loss. The CWC for corn is between the 3-14 leaf stages. This is the period of foliage growth, and weed interference reduces the space available for leaves to develop (Hall, et al, 1992). The weeds that infest corn during this period gap include pig weed, giant rag weed and wild mustard.

Two factors are taken into consideration during herbicide application. The first is the duration of weed control to avoid yield loss, and the second is the time span that weeds can stay in a crop before causing harm. This knowledge guides weed management in that residual herbicides which have long term side effects are avoided. Allelopathy is the effect that a plant can have upon another plant, either beneficial or harmful. Beneficial effect takes place in symbiotic relations, while harmful effects occur in parasitic

relationships. In this case, the parasitic plant siphons nutrients from the host plant leading to stunted growth, or injects harmful toxins.

In weed management, allelopathy is applied in controlling weed growth and s-infestation. Knowledge in allelopathy helps to determine the effects that a certain weed will have on a particular crop. This guides crop rotations to avoid adverse effects, while the use of cover crops to inhibit weed growth by shutting off sunlight. Cover crops are also used to make parasitic plants dormant by reducing soil temperature. In addition, cultivars such as rice are used to inhibit weed activity by outgrowing the weed plants. Lastly, weed and plant extracts with herbicide properties are used as foliar sprays on the plants they have harmful effects.

Biological controls are difficult to use in annual cropping systems due to the following factors: ? Difficult to precisely determine the ecology of the targeted weed ? Limited number of potential biological control agents ? It does not eradicate weeds, but only controls their growth Cultural methods applied in weed management include: Cultivar choice: crops that grow rapidly such as wheat and rice outcompete them for nutrients, thus limiting the growth of potential parasitic plants. In addition, they reach maturation before the weeds establish themselves. By the time the weeds colonize an ecosystem, the crops could have been harvested. Crop rotation: by practicing annual crop rotation, plants with allelopathic properties are planted in the same season when the targeted weeds are in high activity. Similarly, crop rotation avoids the chances of parasitic weeds harmful to certain crops affecting them, since the crops are grown when weeds are dormant.

Plant spacing: it controls weed infestation by minimizing the space for weed growth. Close spacing cuts off sunlight thus reducing chemical activities of the weeds. The eventually wither due to lack of nutrients and space to develop their root system. Multiple cropping: by growing different varieties of crops together, weed infestation is significantly reduced as each crop bears an allelopathic effect upon a given parasitic plant. Thus, multi-cropping works by creating a combination of unfavorable conditions for various weeds.

Mowing is a method of weed control because it entails limiting the level of infestation of a given plant, despite its desirability. Ideally, a weed is any crop/plant which grows where it is not required. However, some weeds are normally ignored when their effects are insignificant, such as small plants in a plantation of eucalyptus. Similarly, grass is normally not considered a weed, but becomes one when it outgrows its desirable levels. At the same time, mowing controls other weeds which could grow among the grass. Since grass is not a crop, it is affected by most herbicides that are used on weeds.

Therefore, it is difficult to control weed growth on a lawn without equally affecting the grass. In this light, the only viable way of controlling weed infestation is through mowing. Nonetheless, it should not be assumed that the grass necessarily becomes a weed once it outgrows its desired level. On the contrary, it creates favorable conditions for rapid weed activity. Mowing reduces the chances of weed growth by way of denying the weeds a chance to outgrow the grass itself. Thus, mowing is a means of minimizing the conditions in which weeds thrive, and therefore it is a preventive measure.

Sulfonylurea herbicide: it is applied before planting (Pre-plant incorporated), pre-emergence and post-emergence periods of growth. The herbicide is used for the prevention of Canada thistle and wild garlic common in small grain plants. It is also effective in controlling quackgrass and shattercane in corn. Herbicide selectivity is the discriminative quality of a herbicide to selectively kill weeds without affecting the plants with which they grow.

Herbicide selectivity takes place through the following mechanisms:

Metabolism: the desired crop species have a different metabolic activity from weed plants, and therefore are able to convert the herbicide into less toxic forms. The herbicide is converted into a harmless compound and stored in a form that do not affect the plant's cell activity. Bio-chemical reactions initiated by the plant's defense mechanism degrades the herbicide into non-toxic compounds, thereby rendering the herbicide ineffective.

Decomposition: it takes place through the plant's capacity to degrade the herbicide, actions of micro-organisms and temperatures to disintegrate the herbicide's chemical compositions.

Through photodecomposition, the herbicide is degraded into forms that could not affect crops. **Adsorption:** the applied herbicide is either transferred or transported to regions of the soil in which plant cell activity is low. In adsorption, the herbicide is concentrated at the chemical barrier level, through which germinating plants grow quickly before the herbicide could affect them. Similarly, in plants with deep root system, the chemicals concentrating near the surface are not absorbed into the plant.

Similarly, adsorbed herbicide is inactive since it is not in solution form, which means it cannot diffuse into the plant cells. The transportation of soil applied herbicides takes place via translocation. The chemical molecules diffuse through the epidermis into the parenchyma cells. It then gets diffused through the endodermis layer into the xylem. It gets dissolved in the xylem, and then carried into different parts of the remote parts of the plant such as leaves and shoots. Foliar applied herbicides dissolve into the sugars in the leaf phloem.

Due to the high pressure in the leaves, the solution is forced down via the sieving plate and into the sink, from where it is absorbed into the parenchyma through active transport. It then diffuses into the stem xylem from where it is conducted into the cells of the cytoplasm. Finally, it penetrates into the root tip through the cuticle and epidermis. Broomrapes (*Orobanchaceae* spp.

) is a parasitic plant that feeds on most cereal plants. Due to its lack of chlorophyll, it cannot produce its own food. It attaches to the roots of the host plant and draws nutrients from the vascular tissues through a transfer organ called the haustorium. The parasitic plant has intermittent stages of growth, which varies from dormancy to active growth, besides evolving quickly into new forms (Perez, Moreno and Rubiales, 1993). The prevention mechanism applied is the development of resistant genotypes which are introduced into cultivars.

The difficulty encountered, however, is the lack of resistance in available cultivars. In response, researchers are using wild occurring relative plants to

develop genotypes. F. Sandy soils have a lower Cation Exchange Capacity (CEC), and therefore less herbicide molecules are bound to soil colloids. Consequently, much of the herbicide remains in active solution form in the soil, thus requiring lower rates of application.

References Hall, R. , et al. The Critical Period of Weed Control in Grain Corn. Journal of Weed Science, Vol.

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