



Impact of crop rotation on weed management

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The agriculture aimed at meeting the needs of present generation without endangering the resource base of future generation. The change from a high input and chemically intensive agriculture to a sustainable form to control weeds relies on use of low or non-monetary inputs like selection of crops and their variety, balanced nutrition, crop geometry, tillage practices, crop rotation etc. The power for investment on costly and hazardous inputs like weedicides without considering threshold levels is increasing day by day in want of higher crop production. Weedicides are also applied from field preparation to harvesting and post harvesting caused a considerable improvement in but damaged drastically the resources like soil health, crop environment, microbiota etc. and threatened by developing resistance against them. Under such circumstances, crop rotation, a part of agronomical management changes micro climate in favour of crop. The use of less persistence and highly effective herbicides either shift the weed flora or cause resistance to herbicides and endangered some crop species and damaged biodiversity.

Here, we tried to explain the role of crop rotation in short as well as long term on complex crop environment and its impact on occurrences of weeds. Crop rotation helps the growers for better understanding the principles and their applications in weed management practices based on minimum to minimum dependency on high external inputs either low energy or high energy.

Crop rotation : Crop rotation is a process of growing different crops in succession on a piece of land in specific period of time, with an object to get maximum profit from least investment without impairing the soil fertility. Crop rotation is a critical feature of all cropping systems as it provides the principal mechanism for building healthy soils,

a natural way to control weeds, and a variety of other benefits that develop profitable farms to support farm families. Crop rotation is a principle of production and a tool of management. Crop rotation is one of the oldest and most effective cultural control strategies and is an axel to the success of farming. The planned rotation may vary from one year or longer increases the security and stability of income and total production of the farm if the



different inputs as well as outputs are added together. The knowledge of botany and physiology of crop plants and species selected will increase the efficiency of external inputs planned for crop rotation for annual cropping systems.

Impact of crop rotation on weed management: Crop rotation cut down the weed infestation, cost of cultivation and improve sustainability in brief under following crop management practices. The most sustainable weed management practices are usually those that maintain a high degree of biodiversity in the field, use the least amount of energy and off farm inputs, and are most cost effective.

- In crop rotation, growing of non host plants for weed management will reduce the problem of crop associated and parasitic weeds seed in the soil by reducing viability that will result in negligible crop competition.

- Crop rotation with different crops or different

resistant varieties of same species divesting many potentially weeds life cycles and reduce the problem to a greater extent.

- The nutrition recycling by adopting crop rotation plays key role in boosting crop vigor.

- At present the use of “holistic approach involving Integrated weed Management (INM) enhances input use efficiency and adoption of region- specific promising cropping systems would be the best strategy to control weeds.

- Inclusion of legumes and deep rooted crops in crop rotation helps in increasing water holding capacity by improving infiltration, reducing runoff and uptake by capillary movement ultimately have more smothering effect on weeds.

- Weeds occur naturally, especially when agricultural soil is left uncovered or the crop is poor competitor. Inclusion of cover crops in crop rotations or crop mixtures grown between perennial trees, vines, bushes, between crop rows, or on fields between cropping seasons having suppressing or shading effect on weeds to reduce their vigor. Many short duration pulses *viz.*, green gram and soybean effectively smother weeds without causing reduction in the yield of main crop.

- Crop rotation over monoculture improves the genetic base of crops and other plants to conserve natural habitats for beneficial insects. Diverse agricultural systems also support populations of predators and parasites that keep weed populations at manageable levels to a great extent.

- Adoption of crop rotation not only reduces but also decreases the relevance on weedicides. The use of plant varieties tolerant or resistant weed infestation is a proven, effective, economical and safe method of weed control.

- Although the impact of crop rotation on weeds will not be seen as quickly as the impact of crop rotation decrease weed density in longer times as the viability of weed seed is longer.

- Rotations changed the habitat ultimately influence germination of weeds seed adversely.

- Rotation decreases the residual effect of some persistent herbicides and also decreases the dormancy of weed seeds.

- Crop rotation is effective in controlling of crop associated and crop bound weeds such as *Avena fatua* in wheat and *Cuscuta* in lucerne. Wheat-pea and gram break the *Avena* in wheat, Lucern-grain crop rotation control

Cuscuta.

- The obnoxious weeds like *Cyperus rotundus* can be controlled effectively by including low land rice in crop rotation.

- In certain parts of India, crop rotation using marigold (*Tagetes* spp.) during rainy season, instead of the usual crop, is found effective in reducing *Parthenium* infestation in cultivated areas.

- Crop rotation with legumes or other trap crops helps to germinate *Striga* seeds but makes *Striga* not to form haustoria.

- Crop rotation also helpful for weed control with phenomenon of allelopathy: the inhibition of growth of weedy plants by chemical released by the crop plants has not been extensively explored but may have great potential e.g. Cucumber, oat, sunflower and soybean collections. Inclusion of trap and catch crops in rotation for reducing the population of harmful weed flora is of great importance.

Challenges : To maintain long term supply of food, fodder and fibre, patience is a prime requirement because its impact is slow but steady and clearly defines our goals and challenges to change mind set on the concept of inputs and crop management and build traditional knowledge and IWM technologies. The following are the major challenges:

- Longer viability in many parasitic weed seeds defies short-term crop rotation measure. Crop-bound weeds because of their large/huge species diversity also infest a large number of crops of economic importance.

- Adoption of agroclimatically best suited cropping systems and rotation for profitable production.

- Incorporation of green manure crop in crop rotation is a type of waste of land in uneconomical crop.

- Poor extension services is a major challenges among scientist and policy makers to popularize a new innovation as and when it develop for higher adaptation.

Conclusion : Crop rotation should be focused on growing diversified crops in rotation in present context from limited resources particularly land to control or manage weeds and conserves nutrients to protect environment from degradation. It is today’s utmost need to maintain the fields free from weeds will minimize the incidence of insecticides and diseases because these are secondary/ alternate host for many insect and disease carrying pests. The concept of crop rotation, a non-monetary input to agriculture serves a pivotal role in sustainable farming.