قسم المحاصيل

Methods of Weed Control

Lecture (1)

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First Steps in Weed Management

- **To effectively manage weeds you should know:**
  1. **What weed you are dealing with – correct identification.**
  2. **Consider impact of the weed.**
  3. **Life cycle of the weed.**

- **Weed biology influences methods and optimum time for management strategies.**
- **In order to manage weeds you will need to correctly identify the weed, consider the impact of the weed, and also know the life cycle.**
- **Many weed management techniques exploit the life cycles of weeds and use weed biology characteristics in the development of control strategies.**

Understanding the biology of weeds is a key to their control

STEPS TAKEN PRIOR TO CHOOSING WC STRATEGY

1. Identify the weed problem.
2. Know what control methods are Available
3. Evaluate the benefit/risk of each method/combination of methods.
4. Choose the methods: most effective with least harm to himself and environment.
5. Know the correct use of weed control method.


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DYNAMITE
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"That's your idea of weed control ?"

WEED MANAGEMENT STRATEGIES

1. Preventive Measures
2. Eradication Methods
3. Management/Control Methods

- **Weed management is the application of certain principles and suitable methods that will improve the vigor and uniform stand of the crop.**
- **At the same time ignore or discourage the invasion and growth of weeds.**

CONTROL V/S ERADICATION

- Weed eradication is the complete removal of all live plant parts and seeds from an area.
- It is an expansive adventure since it costs more than that of the land.
- Besides complete elimination of all vegetation is not warranted as many of them are useful.
- Eradication of some noxious weeds such as Cuscuta and Lantana needed.
- Eradication should start when the weeds are small and limited in growth and spread.

WEED CONTROL V/S WEED MANAGEMENT

- **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 and other activities of man conducted efficiently.**
- **Weed management includes prevention, eradication and control by regulated use, restricting invasion, suppression of growth, prevention of seed production and complete destruction.**
- **Thus weed control is one of the aspects of weed management.**

- **In weed control we seek to limit the growth of unwanted plants, both in space and time, without any attempt to eliminate them from the scene.**
- **The extent to which any weed growth is desired to be limited will depend upon the cost of weed control and the benefits anticipated from the operation.**

The aim of weed control is to manage the vegetation on land and in water bodies in such a way it will encourage the growth of plants beneficial to our interests at a particular place and time, and suppress the remaining , relatively unwanted plant species.

1-Prevention weed control

Prevent the entry and establishment of weeds into uninfected area.

- **Prevention is concerned with measures taken to prevent the introduction and/or establishment of specified weed species in areas that are not currently infested with these plant species. Such areas may be local, regional or national in size.**

- **It also includes farm hygiene that prevents the every year production of seeds, tubers and rhizomes of the weed species already present in the farm. Hence, any physical or chemical method adopted with main objective of not allowing the weeds to set viable seeds is to be considered apart of prevention.**

- **No weed control programmed is successful if adequate preventive measures are not taken to reduce weed infestation.**
- **Weeds producing seeds in current season are the inoculums for next season. If some how they do not produce seeds in current season, this is also one of the preventive measures. Thus controlling weeds at flowering stage, which will prevent contamination in other season, is also a preventive measure.**
- **The following preventive control measures are suggested for adoption, wherever possible and practicable.**

Preventive control measures

A. Prevention by crop management practices.
B. Prevention by use of weed – free crop seeds.
C. Prevention by avoiding contamination of manure pits.
D. Prevention by arresting weed seed movement by proper farm practices.
E. Prevention by keeping non-crop areas clean.
F. Prevention by keeping vigil.
G. Prevention by seed certification.
H. Prevention by weed laws.

A. Prevention by crop management practices

Good crop management practices that play an important role in weed prevention are as follows:

- **Cultivating fast growing crop varieties that serve as better competitors with their leaf canopy covering the ground rapidly to enable, them to smother the establishing weeds.**
- **Preventing the weed seed production in cropped and non-cropped areas. The persistence of annual and biennial weeds depend upon their ability to produce seeds to re-infest the soil.**

One equal eventually eliminate most of the weeds, if the seed production in weeds are avoided. This could be achieved by cutting, mowing or killing (by using pre-emergence herbicides) the weeds, before they bloom and set seeds.

- Besides, proper placement of fertilizer, better irrigation practices, higher plant population per unit area and proper crop rotation prevent successful establishment of weeds.
- Inter cropping with quick growing crops smother weed in interspaces of row drilled crops.

B- Prevention by use of weed – free crop seeds

- The seeds of most crops are contaminated with weed seeds.
- Some weeds have similar life cycle as that of crops and set seeds as the crops do. While harvesting the weed seeds admix with seeds of crops.
- Some of the weed seeds resemble crop seeds in size and shape.

- **When seeds are certified with one percent weeds or less, the consequences are detrimental to crop production. For example, a 1% weed seed contamination will plant about 1 kg of weed seeds per hectare in the case of wheat.**

- **In case of microscopic sized weed seeds like striga even one gram of weed seed is enough to infest a hectare of crop land.**

Table 1. Impurity of farmer's crop seed from different sources (Bengtsson, 1983)

Crop	Other crop seed (%)	Weed seed (%)	Inert matter (%)	Weed seed (No./kg crop seed)	
				Avena sp	*Lolium sp*
Wheat	0.6	1.4	0.8	84	439
Barley	0.6	1.3	1.9	800	692
Teff	0.0	2.1	0.3	103	118
Broad bean	0.2	0.7	0.0	0	0
Field pea	0.8	1.2	0.6	247	139
Linseed	0.2	5.6	4.1	276	691

WEED FREE CROP SEEDS CAN BE ACHIEVED BY:

- Production of weed free crop seeds at Government farms or at farmers field itself with frequent inspection
- Cleaning the crop seeds before storage as well as at sowing time, using seed cleaning devices
- Use farm machinery free from weed seeds

Hence use of weed-free crop seeds is ulmost important as measure of prevention. This might be possible by the following precautionary measures:

- **Separating crop seeds from admixture of crop and weed seeds using physical differences like size, colour, weight, texture and electrical properties.**
- **Using air-screen cleaners and specific gravity separators which differentiate seeds on the basis of seed size, shape, surface area and specific gravity.**

- **The weed seeds that are separated should be destroyed by burning after collection and on no account they should be permitted to reach the soil, manure pits or animal feed as the weed seeds ire not fully devitalized in manure pits and digestive tracts of animals.**

WHEAT AND CONVOLVULUS ARVENSIS

C- Prevention by avoiding contamination of manure pits

- Avoid feeding of screenings, grain or hey containing weed **seeds to live stock without destroying their viability by grinding, cooking and ensiling.**
- **Use well rotten\decomposed organic manure Avoid reaching of weed seeds into the compost pit.** A composting temperature of 65 to 90^{O}C should be maintained for 4-5 months. Treat the FYM with chemicals like acrocyanamide, SMDC (metham), DMTT (mylone) and ammonium thiocyanate or uramon (synthetic urea).

- FYM serves as notorious source
- Composting temperature of 65-95ºC maintained for 4-5 months to devitablize weed seeds.
- Vermicompost may also be a potential source/medium of weed seed dispersal.

WEEDS INFESTING FYM

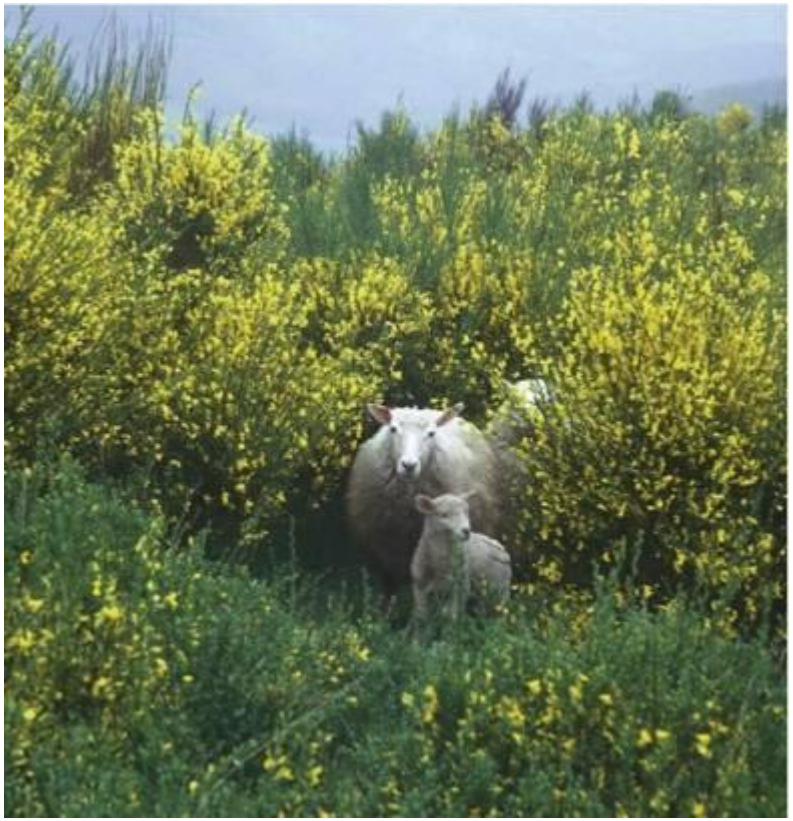
VERMIWEEDS

D- Prevention by arresting weed seed movement by proper farm practices

- **Prevent movement of weeds with other farm resources i.e don't permit live stock from weed infested area to clean areas. Clean the harvesters, seed cleaners, hey balers and other farm implements before moving them from infested area. Avoid use of gravel, sand and soil from weed infested area. Inspection of nursery stock for presence of weed seeds, tubers, rhizomes of perennial weeds.**

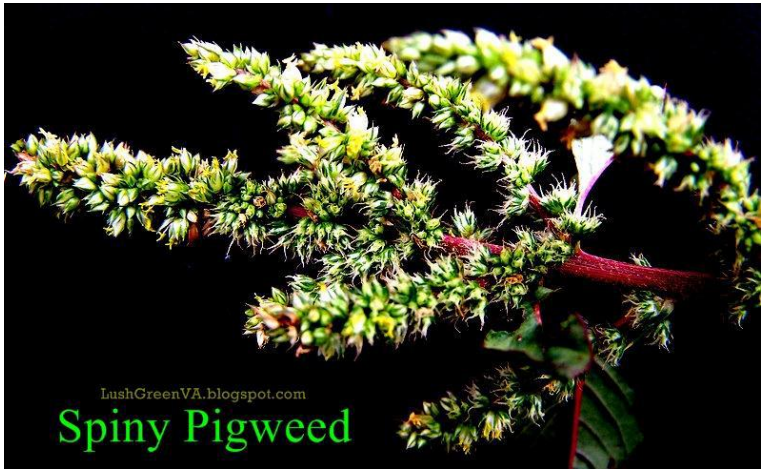
MOVEMENT OF WEEDS WITH OTHER FARM RESOURCES:

- **Livestock**
- **Farm machinery**
- **Nursery stock (*Echinochloa Spp. & Oryza sativa var. fatua)***
- **Gravel, sand, Soil**



XANTHIUM SP

Bidens pilosa



Achyranthes aspera L

E- Prevention by keeping non-crop areas clean

- Keep irrigation & drainage channel, fence lines, road sides, fence corners and all other non cropped areas free from weeds.
- Prevent the dissemination of mature seeds to the main land.

- ❑ Irrigation & drainage ditches
- ❑ Fence lines
- ❑ Farm boundaries
- ❑ Terrace risers and Bunds
- ❑ Non-cropped area
- ❑ Paths, roads and railway lines

F- Prevention by keeping vigil

- A farmer should inspect his farm periodically for strange looking new weed. Farmer knows the weed flora in his field. So when a new weed spp is seen then prevent its establishment. So that it does not add to existing weed flora.

G- Prevention by seed certification

Seed certification helps in supplying genetically pure seeds and propagating materials of crops to farmers. Strict regulations are to be enforced to produce absolutely, weed-free crop seeds by the seed growers.

Adequate precautions must be taken by the farmers while using their own seeds or seeds of their previous harvest to prevent weed seed contamination with crop seeds.

H- Prevention by weed laws

- **Weed laws are important in reducing the spread of weed species and in increasing the use of well adapted high quality seeds. They help in protecting the farmers from using mislabeled or contaminated seeds and also legally prohibiting seeds of noxious weeds from entering the country.**
- **There is no weed law in India except Karnataka which declared *Parthenium hysterophorus* as a noxious weed. For the purpose of declaring weed laws, the noxious weeds can be separated into prohibited and restricted weeds.**

- **Prohibited noxious weeds are those perennial weeds that not only reproduce by seeds but by underground roots, stems and other reproductive parts as well are difficult to control.**
- **Restricted noxious weeds are those perennial weeds which are objectionable in cropping areas but can be controlled.**

- **Follow legal & quarantine measures:** Quarantine measures should be strict. Legal measures are necessary to check inter state and inter country movement of noxious weeds.

- An enactment is always required to check movement of noxious and pernicious weeds such as Striga sp, Orobanche sp, Parthenium hysterophorus, Eichhornia crassipes, Chromolaena (=Eupatorium) odoratum, Salvinia molesta, Lantana camara etc. It could be both inter-state and inter-country movement. Weed law prevents dissemination by manual, physical or mechanical ways of weed species in general and noxious weeds in particular across regions, states or countries. It also prevents farmers from using mislabelled or contaminated crop seeds.

- **Quarantine Laws: These enforces isolation of an area where a serious weed has established and prevents further movement of the weed into a non-infested area. To achieve this, import of weed seeds separately or as admixture with crop, should be prevented strictly.**
- **All noxious weeds of the world should be identified and enlisted before declaring weed laws.**

- **There are numerous federal (Federal Seed Act of 1939, Federal Noxious Weed Act of 1974), state, and local noxious weed and seed laws governing control, movement, and distribution of contaminated crop seed and importation and movement of noxious and alien species. These laws were written and are enforced to prevent weed problems.**

2- Eradication

- Eradication is the ideal weed control, rarely achieved.
- Eradication infers that a given weed species, its seed and vegetative parts, have been killed or completely removed from a given area and that the weed will not reappear unless reintroduced to the area.
- Because of its difficulty and high cost, eradication is usually attempted only in relatively small areas, such as few hectares, afew thousand m2 or less.

- **Eradication of some noxious weeds such as Cuscuta and Lantana needed.**
- **Practices aimed at eradication are often used in high value areas, such as green houses, ornamental plant beds and containers.**
- **The greatest difficulty in achieving eradication is the killing of the weed seeds and vegetative reproductive parts present in the soil.**

3- Control

- Control encompasses those practices whereby weed infestations are reduced, but not necessarily eliminated.
- Control is the process of limiting weed infestations. In crops, the weeds are limited so that they have minimal effect on crop growth and yield.
- The degree of control is usually a matter of economics, a balance between the costs involved and the increase in profits due to the control of the weeds and the types of production systems and tools being used.

The various methods of weed control are grouped as:

- Cultural methods
- Physical and mechanical methods
- Biological methods.
- Chemical methods.


THANKS!