قسم المحاصيل

Methods of Weed Control

Lecture (2)

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Lecture2:
Cultural methods of control

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Cultural strategies

Principle behind this is giving competitive advantage to the crop. **Cultural methods, alone cannot control weeds, but help in reducing weed population.**

- Farmers should keep in mind that cultural practices will impact weed interference and should always consider how effectively the methods employed can minimize weeds.

They should, therefore, be used in combination with other methods.

1. Maintenance of crop population and early seedling vigor.
2. Selective crop simulation
3. Proper application of fertilizer
4. Proper method of planting
5. Proper planting time
6. Adopting crop rotation
7. Adopting stale Seedbed
8. Smother cropping
9. Summer fallowing

1- Maintenance of crop stand and early seedling vigor

Uniform germination of crop seeds leading to optimum population maintenance and their development into vigorous crops leave less spaces for the weeds to grow amongst the crop plants.

Uneven and low crop populations and weak crop seedlings, on the contrary, permit thick growth of weeds.

Lack of adequate plant population is prone to heavy weed infestation, which becomes, difficult to control later.

- **Important steps in obtaining good germination and optimum stand of crops are:**

a. Selection of most **adopted crops** and crop **varieties**

b. The use of **high viability seeds.**

c. Pre plant seed and soil treatment with pesticides, dormancy breaking chemicals and germination boosters

d. **Adequate seed** rates are very important to obtain proper and uniform crop stand capable of offering competition to the weeds.

2- Selective crop simulation:

In crop weed competition, competitive advantage is in favor of can be achieved by selective simulation of crop growth. Vigorous crop plants compete better with weeds as they close the ground very quickly.

- **Selective simulation can be achieved by:**

a) application of soil amendments like gypsum or lime may correct the soil conditions in favour of crop growth

b) addition of FYM or synthetic soil conditioners to very light or heavy soils may improve the soil structure and maintaining better air water relationships and ultimately it improving the crop growth

c) manures and fertilizers application of proper kind in adequate quantities improve the crop growth.

D) Inoculation of crop seeds with suitable nitrogen fixing and phosphorous solubulising organisms may helps in selective simulation of some crops Eg: Legume crop and non legume weed. Selective simulation in wide row crops like maize, sugarcane, cotton can be achieved by foliar application of nutrients.

3- Proper application of fertilizer

- **Crops and weeds generally require and will compete for the same nutrients. Changes in soil fertility levels have a great influence on the competitive interactions between weeds and crops.**
- **Application of suitable fertilizers and manures in adequate quantities improves plant growth very much.**
- **Weeds respond in a positive manner to increasing nutrient levels, which allow them to better compete with the crop for other necessary growth factors.**

- **Nitrogen is generally the nutrient of greatest concern in weed competition. Increasing the nitrogen supply can increase crop yields, have no effect, or reduce crop yields when weeds are present.**
- **Final crop yield with increased nitrogen and weed competition is rarely as great as yield without competition**
- **One method to reduce some of these interactions is to band the fertilizer near the crop row to preferentially place the crop at a competitive advantage over weeds in accessing the nutrients.**
- **Foliar application of fertilizers to wide row crops like maize, sugarcane, and cotton, also amounts to their selective simulation.**

4- Proper method of planting

- **Plough planting and other minimum tillage planting methods have often proved very useful in minimizing early weed problems.**
- **Any planting method that leaves the soil surface rough and dry will discourage early growth. Plough planting (minimum tillage) methods proved to be very useful to reduce early weed growth.**

- **In summer, furrow planting of crops reduce the weed problems. Because in this method irrigation water restricted initially to the furrow only. In transplanted crops farmers get opportunity to prepare a weed free field for the placement of healthy crop seedlings. This gives a definite advantage to the crop over the later germinating weeds.**

Furrow method of irrigation

Surface irrigation method

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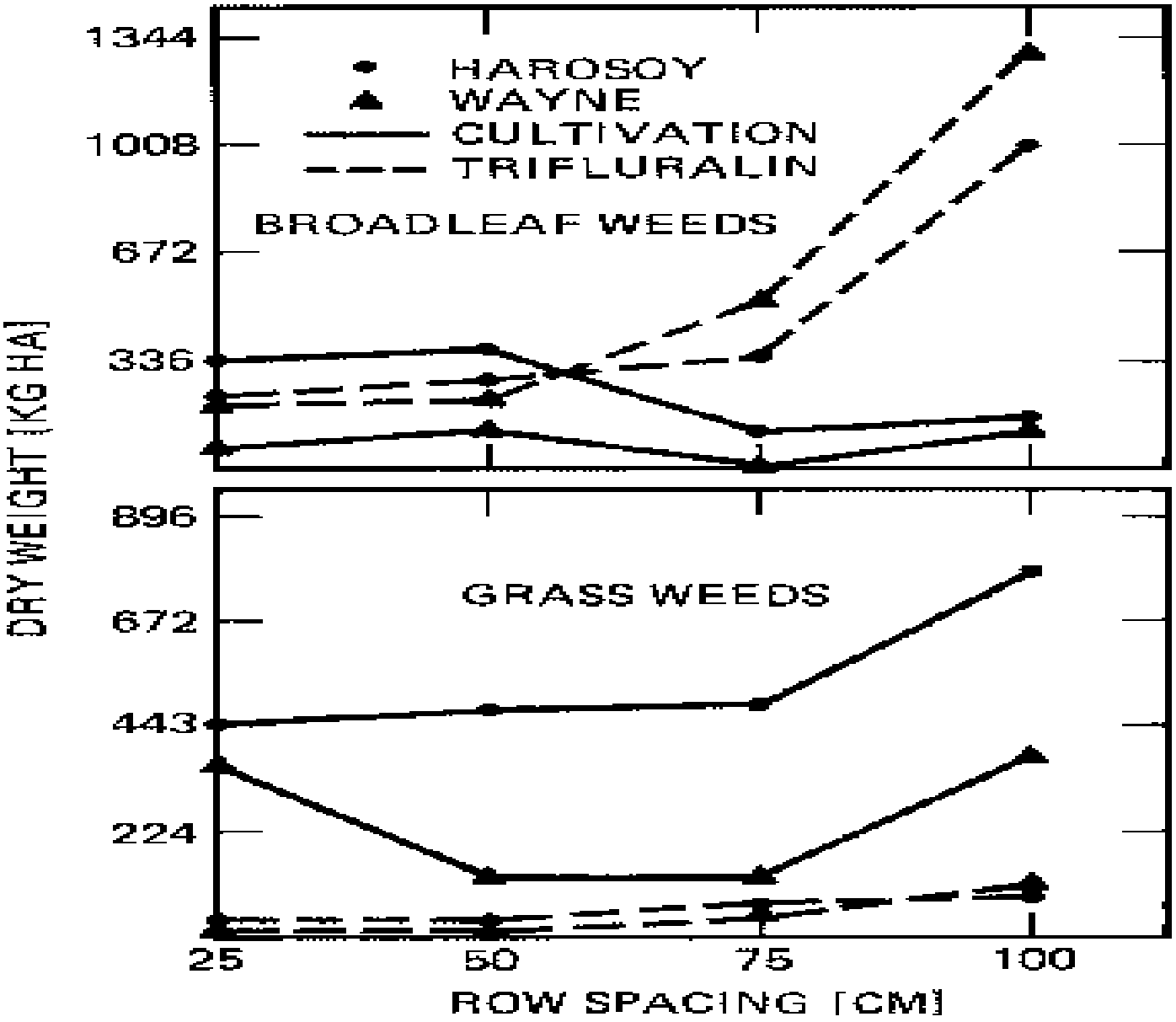
5- Proper planting time

- **In every agro-climate there is a peak period of germination of seasonal weeds. This period usually is also the optimum time of planting of several crops of the season. In fields with a bad history of weeds, crops can be made to escape early weed – crop competition by planting them either a little earlier or later than their normal planting time.**
- **Using photo insensitive varieties we can make adjustments with regarding to time of planting.**

- **The trend in crop production is for earlier planting to increase yields. The resulting longer exposure to sunlight is primarily responsible for the higher yields associated with this practice. Early planting can establish adapted crops before weeds emerge and provide the crop with a competitive edge.**
- **Late planting of dwarf varieties of wheat in winter season likewise reduces competition from the common farm weeds.**

- **There are some disadvantages to early planting for weed control. Early planting means soil-applied herbicides may have to persist longer in the environment for the most effective weed control. It also eliminates the cultivation done just before later planting, which often destroys the first flush of germinating weed seedlings.**



Effects of row spacing, soybean variety, and weed control method on weight of Weeds

6- Adopting crop rotation

- **Growing of different crops in recurrent succession on the same land is called as crop rotation. Monocropping favors persistence and association of some weeds.**

Crops	Weeds
Rice	Echinochloa spp
Wheat	Phalaris minor and chenopodium album
Sorghum	Striga spp
Maize , Pearl millet and Sugarcane	Striga spp
Tobacco	Orobanche spp

- **Crop rotation is effective in controlling of crop associated and crop bound weeds** such as *Avena fatua (wildoat)* in wheat and *Cuscuta spp* (dodder). Wildoat can be driven away from small grain fields by using pea and gram as break crops for 2 to 3 years. Dodder, on the other hand, can be eliminated from lucerne by turning the land to grain crops for some time. **The obnoxious weeds like *Cyperus rotundus* can be controlled effectively by including low land rice in crop rotation.**

- **Changing crops changes the cultural conditions (planting date, crop competition, fertility, etc.) that a weed must tolerate.**

- **Rotation will prevent a weed species from becoming dominant in a field but will also maintain a diversity of weed species in the same area.**

7- Adopting stale Seedbed

- **Stale seed bed is the one where one or two flushes of weeds are destroyed by harrowing before planting or sowing of the crop. Most weed seeds germinate from top 4 to 5 cm of surface soil. If a finally prepared seedbed is withheld from planting and it contains adequate moisture in its top 4 to 5 cm of soil, a flush of young weed seedlings will appear on it, in about a weeks time. This is achieved by soaking a well prepared field with either irrigation or rain and allowing the weeds to germinate.**

- **These newly emerged weeds are destroyed by harrow with spike tooth or blade harrow. This should be followed immediately by sowing the crop. Non selective herbicides like Glyphospahate or paraquat can be used to destroy weeds instead of harrowing or paraquat can be used to destroy weeds instead of harrowing or light tillage.**

8- Smother cropping / Competitive crop

- **The smother crops germinate very quickly and develop large canopy, capable of efficient photosynthesis within short period. They possess both surface and deep roots. Also called competitive crops, they suppress the weed seedlings by excluding light beneath and utilizing large quantities of nutrients from the soil, rapidly.**

- **However to utilize such competitive crops for weed suppression, one must ensure that weed seedlings appear after the crop has closed in, else the weeds can easily overrun even a competitive crop.**
- **Competitive crop smother the ground quickly than non competitive crop, hence lesser efforts are needed to control weeds in the competitive crops in comparison to the wide row crops. Cowpea, lucern, berseem, millets and barley are common smother crops. Besides, fodder crops of pearmillet, maize, and sorghum have substantial weed smothering effects.**

Cow pea (smother crop)

Growing of intercrops

- **Intercropping suppresses weeds better than sole cropping and thus provides an opportunity to utilize crops themselves as tools of weed management. Many short duration pulses viz., green gram and soybean effectively smother weeds without causing reduction in the yield of main crop.**

Intercropping

9- Summer fallowing

- **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. In the month of April, May and June farmers expose their lands to sun in order to control many soil born pests, including weeds. roots, rhizomes and tubers of shallow rooted perennials like bermuda grass and nutsedge are desiccated when these are brought to surface by tillage and exposed to air temperatures of 40 to 45 ^{o}C.**

- **Deep ploughing after harvest of the winter crop and exposing underground part of weeds to strong sunlight during summer months is helpful for destroying many annual and perennial weeds.**
- **During all this process of exposure of weeds to solar energy, one must ensure that the field under treatment does not get any water.**

Summer tillage

Zero tillage

Hence to achieve better control measure competitive crops may be produced by:

1) Manipulation of soil conditions to meet the optimum requirements of crop growth.
2) Selective placement of manures and fertilizers.
3) Maintaining high crop populations.
4) Sowing on stale seedbeds.
5) Practicing proper crop rotations.
6) Plough-plant planting of crops.
7) Field leveling, etc.


THANKS!