



This presentation is about the management of weeds.

Timeliness of weed control

- Weeds are best controlled within the first several weeks after a crop is planted
- Herbicides are more effective against smaller weeds
- Smaller weeds are less competitive than larger weeds



Weed control within the first several weeks after crops are planted is critical in order to avoid a yield reduction from weeds. The effectiveness of any weed control program depends largely on timeliness of the control. Preventative, cultural, mechanical, and chemical weed management methods all are most effective if applied at the correct time. Fields that are kept free of weeds for the first several weeks after planting give the crop a competitive edge that allows the crop to shade out or out compete weeds that emerge later in the season.

Maximize profit

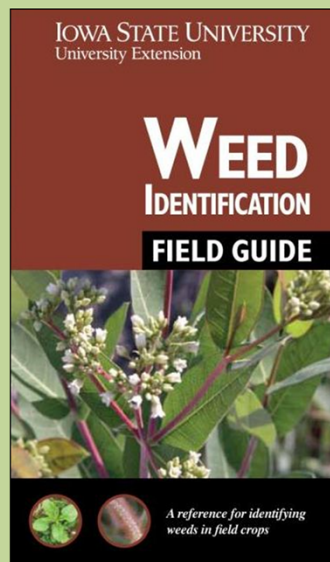
- Weed management programs should maximize profit, not just weed control
- Some weeds may need 100% control if they are particularly competitive, persistent, or difficult to control



Is 100% control of all weeds necessary? Most successful producers design control programs to maximize profit, not just weed control. While it is true that crops can tolerate certain numbers of weeds without suffering a yield reduction, it is important to consider individual weed problems. There are some weeds where 100% control may be desirable because they are particularly competitive, persistent, or difficult to control. These include some annual weeds such as giant ragweed – as shown in this picture (page 49, Weed ID Guide), common cocklebur (page 58), burcucumber (page 74), or shattercane (page 36), and several perennial weeds such as Canada thistle (page 52), bindweeds (page 71), quackgrass (page 26), and hemp dogbane (page 45).

Proper identification

Identifying weeds is important for developing effective management plans



Accurate weed identification is the first step to successfully managing weeds. Since weeds vary in their ability to compete with crops and reduce yields and also vary in their response to different management strategies, proper identification is essential to develop effective management plans.

Weed Control

- **Preventative**
- **Cultural**
- **Mechanical**
- **Chemical**

There are four main systems of controlling weeds: Preventative (not letting weeds become established), cultural (practices like adjusting planting date that aid or deter weed development), mechanical (cultivation or hand pulling as examples), and chemical (herbicide application).

Weed Control – Prevention

Not allowing weeds to become established

- Control in non-cropland areas
- Plant weed-free crop seed
- Not spreading manure, hay, or crop residue on fields that is contaminated with weed seeds
- Clean machinery between fields
- Eliminate “new” weeds that appear



Following are several preventative cultural practices that do not allow weeds to become established and spread:

- Control weeds in non-cropland areas, including fencerows, drainage ditch banks, and rights-of-way
- Plant only high quality weed-free crop seed
- Do not spread manure, hay, crop residues, etc. contaminated with weed seed on cropland
- Clean farm machinery between fields to avoid transport of weed seed, rhizomes, tubers, and rootstocks
- If “new” or unfamiliar weeds appear, have them identified quickly and take appropriate control measures if necessary

Weed Control – Cultural

Altering the environment

- Crop rotation
- Cover crops and canopies



Photos courtesy Laura Greiner

Some different techniques used in cultural control include altering the environment by planting different crops with different life cycles and using cover crops or canopies to shade out weed species.

[Images show soybeans which were planted in soil covered by a rye cover crop.]

Weed Control – Cultural

Giving crops competitive edge

- Narrow row spacing (soybeans)
- Proper planting date and seeding rate
- Using resistant varieties
- Insect control
- Adequate soil fertility
- Adequate drainage
- Seed treatments (soybeans)



Any practice that provides optimum conditions for early and vigorous growth of crops helps give them a competitive edge over weeds. Following are some of these practices:

- Narrow row spacing (15 inches or less) for soybeans
- Proper planting date and seeding rate
- Use of disease- and nematode-resistant varieties
- Insect control
- Adequate soil fertility
- Adequate drainage
- Seed treatments – most corn is treated with seed treatments; soybeans may need seed treatments to help with early season growth, especially if planting early in the season.

Weed Control – Mechanical

Physical disruption of the environment

- Tillage (both vegetative and seed)
- Cultivation and rotary hoeing
- Mowing
- Mulching



Mechanical weed control involves physically disrupting the environment around the weeds. This can be accomplished by using tillage to disrupt vegetative and seed reproduction, using cultivation or rotary hoeing to kill emerged weeds, mowing weeds to cut off reproductive structures and/or decrease food storage and energy reserves, and mulching to inhibit germination of weed seeds.

Weed Control - Chemical

Herbicide use

- Selective
- Nonselective
 - Burn-down treatment
- Rate and timing are critical



It is important to select herbicides based on the weeds present in a field.

Chemical weed control involves the use of herbicides to suppress or kill weeds. There are many different herbicides available and some knowledge about how particular herbicides work is necessary before applying herbicides. Herbicide rate and application timing are always important factors to consider when using herbicides.

Selective herbicides will control certain plant species and leave others (the crop) relatively unharmed.

Nonselective herbicides will typically control all vegetation contacted by the herbicide application. A burn-down treatment that is used to control all vegetation prior to crop emergence is an example of nonselective herbicide use.

Herbicide Decisions

Soil-applied herbicides (preemergence)

- Control weeds as seeds germinate
- Reduce early-season weed competition
- Protect yield potential
- Provide residual activity
- Provide greater flexibility in timing of postemergence herbicides



Herbicide applications are made at different times depending on the herbicide, crop, and weeds present and crop and weed growth stages. Herbicide programs typically include soil-applied (e.g., preemergence) and postemergence products. Soil-applied herbicides control weeds as seeds germinate, reducing early-season weed competition and protecting yield potential. They also provide residual activity and greater flexibility in timing of postemergence herbicides.

Soil-applied herbicide application factors

Factors particularly important to consider for soil-applied products include soil type, environmental impacts such as leaching or runoff potential, and possible interactions with insecticides or other herbicides. Rates should be based on soil type, target weeds, and objectives of the application (full-season weed control versus set up for planned postemergence herbicide).

Herbicide Decisions

Postemergence herbicides

- Target weed species not controlled by soil applications
- Some control weeds emerged at the time of application
- Others control emerged weeds and provide residual activity against later emerging weeds



Postemergence herbicide applications target weed species not controlled by soil applications. Some postemergence herbicides only control weeds emerged at the time of application. Others control emerged weeds and provide residual activity against later emerging weeds.

Postemergence herbicide application timing factors

Field scouting is particularly important when selecting postemergence herbicides. Fields should be scouted frequently following crop emergence to determine the need and appropriate timing of postemergence weed control. Weed species, density, and growth rates are critical factors influencing how long weeds can compete with the crop before yields are reduced. Treat fields with heavy infestations as soon as possible after weeds emerge.

The initial growth of weeds is relatively slow, but their growth rate increases rapidly as time progresses. Weeds as small as two inches tall can reduce crop yields if present at high densities. Crop yield loss per day increases due to increasing competition of larger weeds.

Selecting Herbicides

Considerations from the previous year

- Weed escapes the previous year
- Environmental conditions that may be favorable for carryover
- Herbicide-tolerant crops used



A well designed weed management plan involves field scouting and protects crops from weed competition, prevents weed populations from increasing over time, minimizes herbicide injury, and delays or prevents herbicide resistant weed development.

Considerations from the previous year

- Weed escapes or problems the previous year
- Environmental conditions the previous year, including conditions favorable for herbicide carryover
- Herbicide tolerant crops used the previous year

Selecting Herbicides

Considerations for the current year

- Weeds present
- Herbicide-tolerant crop plans
- Tillage plans
- Herbicide resistance development
- Timing
- Crop rotations for future years (carryover)
- Label restrictions

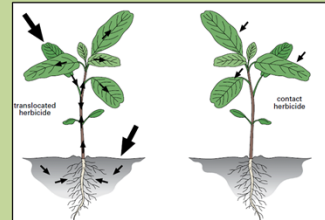
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Considerations for the current year

- Weeds present
- Herbicide tolerant crops planned for the current year
- Tillage plans for the current season
- Using herbicides with different sites of action to delay or prevent herbicide resistant weed development
- Using timely herbicide applications that prevent early-season weed competition and provide residual control for late-emerging weed species
- Crop rotation plans for the next year (carryover)
- Postemergence herbicide label restrictions based on crop and weed growth stage and/or height

Herbicide Classes

- Different classes of herbicides
- Mode of action - mechanism by which a herbicide kills a plant
- Site of action - Specific protein to which a herbicide binds, disrupting a physiological process in plants
- Herbicides with the same mode of action may or may not have the same site of action



There are different classes of herbicides with different modes of action (how they disrupt plant processes) and sites of action (where in the plant they affect plant processes). Some herbicides have the ability to move throughout the plant (translocated) and others damage only the parts of the plant they are sprayed on (contact).

The Weed ID Guide (pages 8-10) briefly explains herbicide resistance, but also shows the different sites of action of different herbicides. For more information on herbicide resistance, see presentation #12 in this series.

Summary

- Weed management is vital for maximizing crop production.
- Because weed species vary in their response to different management strategies, proper identification is essential to develop effective management plans.
- Weed management plans include preventative, cultural, mechanical, or chemical control methods that are specific to the particular cropping system and weeds present.
- Control methods must be employed at the appropriate time for optimum results.

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- Accurate weed identification is the first step to successfully managing weeds. Because weed species vary in their response to different management strategies, proper identification is essential to develop effective management plans.
- These plans include preventative, cultural, mechanical, or chemical control methods that are specific to the particular cropping system and weeds present.
- Control methods must be employed at the appropriate time for optimum results.

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