CHAPTER 6

WEED MANAGEMENT

LEARNING OBJECTIVES

After completely studying this chapter, you should:

- Define a weed.
- Describe and give examples of annual, biennial and perennial weeds.
- Describe and give examples of grassy and broadleaf weeds.
- Define and identify examples of mechanical and cultural weed controls.
- Identify the characteristics of the various methods of herbicide application.
- Understand herbicide carryover and injury and ways to prevent it.
- Know what herbicide adjuvants are.

Weeds are plants growing where they are not wanted. They compete with desired plants for soil moisture and nutrients and often serve as hosts for insects, nematodes and diseases. Weeds may also provide cover for rodents that attack tree trunks during winter months. Certain noxious weeds, such as poison ivy or Canada thistle, can make harvesting fruit unpleasant. The establishment of a healthy orchard requires optimum growing conditions for the first few seasons to produce healthy trees with strong trunks. Weed control plays an important role in establishing an orchard, vineyard or small fruit planting.

LIFE CYCLES OF WEEDS

Weeds can be classified according to their life cycle. The three types of plant life cycles for weeds are annual, biennial and perennial.

ANNUAL

Plants that complete their life cycle in one year are **annuals**. They germinate from seed, grow, mature, produce seed and die in one year or less. Annuals reproduce by seed only and do not have any vegetative reproductive parts. Summer annuals may germinate from seed in the spring, flower and produce seed during the summer and die in the summer or fall. Winter annuals germinate from seed in the fall and reproduce and die the following year. Annual weeds are easiest to control at the seedling stage.

Cocklebur is an annual.

BIENNIAL

Biennials complete their growth cycle in two years. The first year, the plant produces leaves and stores food. The second year, it produces fruits and seeds. Biennial weeds are most commonly found in no-till fields, pastures and unmowed fencerows. They are easiest to control in the seedling stage.

Bull thistle is a biennial.

PERENNIAL

Johnsongrass is a creeping perennial.

Perennials are plants that live for two or more years. Perennials can reproduce by seed or vegetatively. The plant parts that allow perennials to spread without producing seeds are **stolons** (creeping aboveground stems — e.g., white clover and strawberries), **rhizomes** (creeping belowground stems — e.g., milkweed, quackgrass), **tubers** (enlarged underground stems — e.g., potato, yellow nutsedge) and **bulbs** (underground stem covered by fleshy leaves – e.g., tulip). Because perennial weeds can propagate (spread) underground, they can be the most difficult weeds to control. Removing the aboveground vegetation will not stop the weed from spreading.

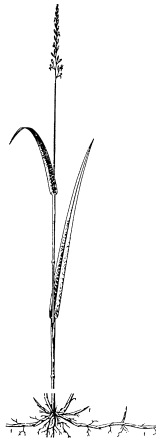
Annuals, biennials and perennials can reproduce from seed. Many weeds produce large quantities of seeds. Seeds are easily dispersed across a field by wind, rain, machinery, animals and people. Weed seeds can germinate after being dormant for long periods. They can also tolerate extremes in weather such as temperature and moisture. To prevent seed dispersal, control weeds before they produce seeds.

COMMON WEEDS IN MICHIGAN

GRASS AND GRASSLIKE WEEDS

Annuals

- Barnyard grass
- Large crabgrass
- Smooth crabgrass
- Giant foxtail
- Yellow foxtail
- Green foxtail
- Fall panicum
- Wild-proso millet
- Witchgrass



Monocot or grass plant.

Perennials

- Johnsongrass
- Yellow nutsedge
- Quackgrass

BROADLEAF WEEDS

Annuals

- Lady's thumb
- Pennsylvania smartweed
- Wild buckwheat
- Common lambsquarters
- Redroot pigweed
- Eastern black nightshade
- Common cocklebur
- Jimsonweed
- Common purslane
- Common ragweed
- Giant ragweed
- Velvetleaf
- Common chickweed
- Shepherd's purse
- Horseweed (marestail)
- Prickly lettuce
- Wild mustard
- Yellow rocket

Yellow nutsedge.

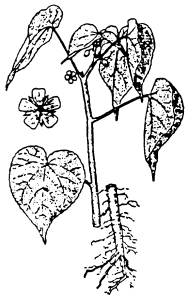
Biennials

- White campion
- Wild carrot
- Bull thistle

Redroot pigweed.

Perennials

- Milkweed
- Hemp dogbane
- Canadian thistle
- Dandelion
- Field bindweed
- Perennial sow thistle
- Swamp smartweed
- Goldenrod
- Plantain



Velvetleaf.

INTEGRATED WEED CONTROL

Objectives of a weed control program may include one or more of the following:

- Preparing the planting site.
- Increasing the survival, nutrition and growth of newly planted trees or plants by eliminating competition.
- Reducing rodent damage.
- Permitting easier pruning and harvest.
- Reducing the probability of diseases.

An integrated weed management program may include cultural, mechanical and / or chemical methods to prevent and manage weeds and will include continual evaluation. These components are described below.

CULTURAL CONTROL

Cultural weed control is simply using practices that favor the growth of the fruit crop and make it more competitive with weeds. Crop competition is a very useful method of weed control. Production practices that optimize crop growth help enable the crop plants to compete effectively with weeds. Crop management practices that can improve the competitive ability of the crop are crop and variety selection, planting date, spacing, soil fertility, drainage, etc. Recommended crop production practices are also beneficial weed control practices. Fruit trees are not usually competitive with weeds, but well maintained cover crops or sod can be.

Crop rotation may also be helpful in maintaining adequate weed control in small fruit plantings. Many weeds cannot tolerate crop rotation.

MECHANICAL CONTROL

Mechanical means of weed control can include:

- Tilling or turning over soil to expose roots of weeds to drying conditions.
- Mulching.
- Mowing or removing weeds in or near fields.

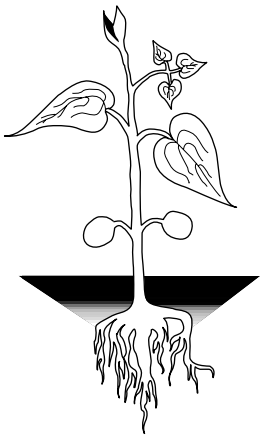
Tillage buries weeds or destroys their underground plant parts. Annual and biennial weeds are more effectively controlled with tillage in the seedling stage. Disturbing the soil, however, can bring new weed seeds near the soil surface and create more weed problems. Tillage and cultivation in orchards or plantings can also injure fruit crops. In small fields, hoes and other implements may be the safest way to control weeds through cultivation.

Mulches can limit the germination of weed seeds by shading the soil. Mulches can also provide other benefits, including decreased soil packing and crusting, conservation of soil moisture during the growing season and alteration of soil temperature. In small fruit plantings, sawdust, straw and other organic mulches are more common than plastic mulches. Be aware that straw mulches frequently contain weed seeds and can make a weed problem worse.

Mowing in orchards does not kill most weeds but can reduce competition, favor grasses and provide a sod area that supports vehicle travel and controls erosion. Removing or mowing vegetation in fencerows can help decrease the number of weed seeds introduced into the field. Well timed mowing once or twice a season can help prevent seeding, depending on the weed species that are present.

CHEMICAL CONTROL

Chemical weed control can be one component of an integrated weed control program. Pesticides used to control weeds and other plants are called herbicides. Herbicides disrupt the physiology of plants. The result is death or a severe reduction in growth. The first step in the successful use of chemical weed control is the correct identification of the weeds. Once the target weed species have been identified, the correct herbicide, formulation, rate, water volume, method of application and time of treatment must be determined. Before using any pesticide, read the entire label.



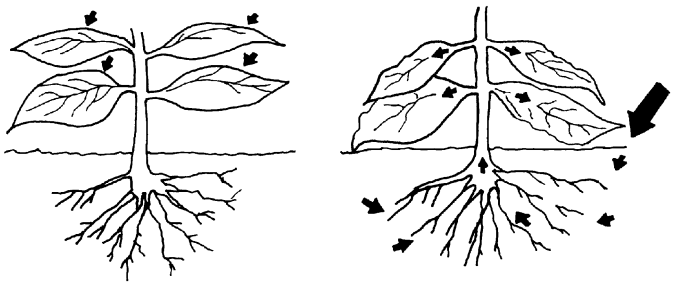
Broadleaf plant

Herbicides are generally applied as preplant incorporated, preemergence or postemergence treatments.

Preplant herbicide applications are applied before planting. Incorporation is required for some herbicides to prevent them from volatilizing (becoming a gas) or breaking down in the sun. This type of application is more common with annual crops than with fruit systems.

Preemergence herbicide applications are applied to the soil surface after the crop has been planted but before the weed seedlings emerge. Typically, preemergence herbicide applications require rainfall within one week following the application to ensure that the herbicide moves through the soil.

Postemergence herbicide applications are applied to the foliage of emerged weeds. There are two types of postemergence herbicides: contact and systemic. **Contact herbicides** kill only the plant parts that they touch and



Contact herbicide

Translocated herbicide

are commonly used to control annuals. Typically, the aboveground parts of a weed, such as the leaves and stems, turn brown and die. **Systemic or translocated herbicides** are absorbed by the weed's roots or leaves and moved throughout the plant. Systemic herbicides are more effective against perennial weeds because the herbicide reaches all parts of the plant. However, systemic herbicides may take up to three weeks to kill the weeds.

EVALUATING THE RESULTS

After using any weed management method, inspect the area to evaluate the results. Keep in mind the type and species of weeds treated, soil types, and weather conditions during and after the application. Evaluation should be a continual activity. It allows you to make adjustments in rates, products and timing of applications, and to plan any additional control measures that may be needed.

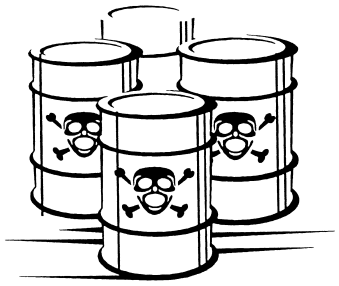
HERBICIDE ISSUES

HERBICIDE CARRYOVER AND INJURY

A potential problem of herbicide applications is **herbicide carryover**. This occurs when a herbicide does not break down during the season of application and persists in sufficient quantities to injure succeeding crops. This may be an issue when starting a new fruit planting. The breakdown of herbicides is a chemical and/or microbial process. Generally the rate of breakdown increases with soil temperature. Very dry conditions during the summer and early fall often increase the potential for carryover of many herbicides.

Herbicide carryover is also influenced by the rate and time of application, herbicide distribution across a field and soil type. When herbicides are used above the labeled rate and/or not uniformly distributed, herbicide carryover problems may result. Poor distribution is generally the result of improper calibration or agitation or sprayer overlapping.

Fruit trees are not completely immune to herbicide injury but will often tolerate dosages much higher than those required to kill weeds. Generally, trees gain herbicide tolerance with age. Newly planted trees may be susceptible to herbicide injury, gain some tolerance when 2 to 3 years old and become very tolerant when older. Trees growing on sandy soils low in organic matter are more susceptible to soil-applied herbicides than trees growing on heavier loam soils.



To reduce the potential of herbicide carryover and injury, read and follow all directions on the pesticide label. Herbicide labels contain restrictions on the age of the crop, applications and harvest. Consult the current version of MSU Extension bulletin E-154, *Michigan Fruit Management Guide*, for more information on herbicides.

HERBICIDE COMBINATIONS

Herbicides are commonly combined and applied as a tank mix. Combinations are used to give more consistent control or a broader spectrum weed control, to decrease herbicide carryover or to obtain adequate weed control. Proper application methods must be followed for each herbicide detailed on the pesticide label. Always remember to read the pesticide label before combining or applying herbicides.

HERBICIDE ADDITIVES (ADJUVANTS)

An **adjuvant** is any substance added to a herbicide to enhance its effectiveness. Many commercially available herbicide formulations contain a particular set of adjuvants to optimize the performance, mixing and handling of the active ingredient. Sometimes additional additives are required for specific applications or herbicide combinations. The pesticide label will explain how and when to use adjuvants.

Additives are used primarily with postemergence herbicide applications to improve coverage and increase herbicide penetration into the leaf. Additives do not increase the effectiveness of soil-applied herbicides.

HERBICIDE COMPATIBILITY PROBLEMS

Compatibility problems in tank-mixed herbicides usually occur when applicators do not follow mixing directions. Some common causes of compatibility problems are mixing two herbicides in the wrong order (for example, adding an emulsifiable concentrate to the spray tank before suspending a wettable powder), insufficient agitation, excessive agitation and air leaks. Problems can also occur when the carrier is a fertilizer such as 28 percent nitrogen or other non-water substances. You should test for herbicide compatibility in a small container before mixing a large tank. If compatibility problems occur, adding compatibility agents may help.

CHAPTER 6

Review Questions

Chapter 6: Weed Management

Write the answers to the following questions and then check your answers with those in the back of the manual.

1. Define a weed.

Match the following terms with their definitions.

A. Annual
B. Winter annual
C. Biennial
D. Perennial

2. _____ Plants that complete their life cycle in two years.
3. _____ Plants that complete their life cycle in one year.
4. _____ Plants that complete their life cycle in one year but germinate in the fall and flower in the spring or summer.
5. _____ Plants that live for two or more years.

Match the following terms with their definitions.

A. Bulb
B. Rhizome
C. Stolon
D. Tuber

6. _____ Creeping aboveground stem
7. _____ Creeping belowground stem
8. _____ Enlarged underground stem
9. _____ Underground stem covered by fleshy leaves

10. Which of the following is an example of a broadleaf weed?

A. Quackgrass.
B. Green foxtail.
C. Wild-proso millet.
D. Common ragweed.

11. An example of a perennial grass weed is:

A. Quackgrass.
B. Wild carrot.
C. Barnyard grass.
D. Smooth crabgrass.

Match the following examples with the type of weed control they describe. Letters may be used more than once.

A. Chemical
B. Cultural
C. Mechanical

12. _____ Maintaining healthy cover crops and sod.
13. _____ Mowing.
14. _____ Contact herbicide application.
15. _____ Using optimum spacing, site and variety selection.
16. _____ Tillage.

17. Timely mowing can help weed control by preventing seeding.

A. True.
B. False.

18. Preemergence herbicides generally require rainfall within a week of application to move the herbicide through the soil.

A. True.
B. False.

19. Systemic herbicides kill weeds on contact.

A. True.
B. False.

20. A grower applied a broad-spectrum herbicide to kill sod growing under his apple trees. Which type of herbicide application did he use?

A. Preplant soil incorporated.
B. Postemergence.
C. Preemergence.
D. None of the above.

21. The best way to reduce the potential of herbicide carryover is to follow the pesticide label directions.

    A. True.

    B. False.

22. Define herbicide carryover and describe conditions that increase carryover risk.

23. What is a herbicide adjuvant?

24. It is not necessary to test for herbicide compatibility before mixing a large tank.

    A. True.

    B. False.