Chapter 2.
Vegetation Control Options for Rights-of-Way Managers

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Important Terms

allelopathy
biological control
chemical control
competition
cultural control
manual control
mechanical control

Managers have many control options available to them as they try to reduce undesirable weed species in their rights-of-way. Vegetation control methods either stress the undesired weeds or enhance the environment for desired plants. Control methods can be categorized as: 1) biological, 2) cultural, 3) manual, 4) mechanical, and 5) chemical. Any large-scale vegetation management program will include combinations of these methods because no single method is effective in all situations. When taken together, integrated right-of-way vegetation management uses a combination of the best control method(s) for the given situation while maintaining safe and reliable rights-of-way at an affordable cost.

BIOLOGICAL CONTROL

Biological control relies on living organisms (insects, animals, or plant pathogens) to control undesired vegetation. The organism is purposefully introduced to control a specific plant species. The introduction of insects and plant disease organisms are normally done by state and federal agencies with the hope that the introduced organism will provide long-term control. For instance, the insect may reduce the specific weed species by burrowing into the seed head or by feeding on the plants roots. As time passes, the insect numbers continue to grow which continues to reduce the number of weeds on the right-of-way. Examples of successful insect introductions include the *Chrysolina* beetle to control St. Johnswort (Figure 1a and 1b), two

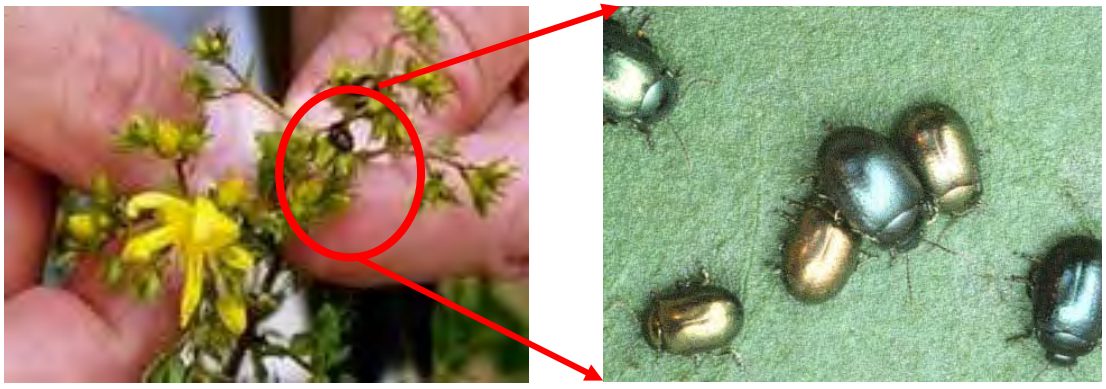

Figure 1a. The *Chrysolina* beetle is an example of biological control for St. Johnswort.
Figure 1b. *Chrysolina* beetle close-up

species of *Microlarinus* weevils to control puncturevine, the flea beetle to control alligatorweed, head weevil to control nodding thistle, and the cinnabar moth to control tansy ragwort. Currently, the use of plant pathogens is very limited. Although biological controls are inexpensive to maintain, their populations always lag behind the development of weed populations and are slow to show results. Biological controls are very weed species specific. The inability to adequately control a variety of weeds in a timely manner on rights-of-way limits their effectiveness as a management tool. Biological controls are usually regional programs targeted at specific weed populations and rights-of-way are incidental beneficiaries.

CULTURAL CONTROL

Cultural controls often control weeds indirectly. Cultural control of weeds can include revegetation with native plant materials, such as wildflowers or perennial grasses. These can prevent undesired weeds from becoming established through competition and allelopathy. **Competition** is the interaction between plants for important resources, including nutrients, moisture, and light. **Allelopathy** is the release of one or more chemicals by one plant species that inhibits the establishment and growth of other neighboring species. The specific plant communities found on various rights-of-way are likely to be the result of both processes. Plants living and growing in groups or communities typically compete throughout their life cycles. Taller plants shade shorter ones; dense sod prevents seeds from germinating and other plants becoming established. Cultural control also includes plant selection such as salt tolerant grass species to be used along highways treated with salt in winter months. Also, drought resistant grass species, native grasses, and wildflowers are selected for site conditions so they will keep the ground covered to prevent weeds from taking over. Native wildflowers may provide an attractive display of colors while they prevent or slow undesirable weed invasions (Figure 2).

Figure 2. Wildflowers add beauty while providing competition to invading weeds.

Other forms of cultural control methods encourage the growth and development of desired vegetation but do not involve mechanical or chemical methods. Examples include timing of treatment, height of cutting, fertilizers, lime, mulches, and fire. Fertilization is an effective way to produce dense grass cover that prevents the growth of weeds and woody plants. Liming soils reduces the acidity or increases the pH. This can inhibit the establishment

and growth of some plants, such as broomsedge. Mulches are particularly useful in established landscape plantings. Improving soil texture and fertility through the use of fertilizers, mulch, and compost can significantly increase the density of desirable vegetative species on rights-of-way. Fire can be used in some situations to promote desired vegetation, particularly prairie plants.

Figure 3. Fire provides a temporary suppression of vegetation.

Confining fire to the right-of-way and the safety hazard caused by dense smoke can be potential problems (Figure 3). It may be used to control limited infestations of annual or biennial weeds. Because fire destroys only the aboveground parts of plants, it is seldom effective against herbaceous perennial weeds or brush species. Also, many states have regulations restricting the use of fire and open burning.

MANUAL CONTROL

Manual control methods include an array of handheld equipment such as string trimmers, chain saws, brushhooks, machetes, hoes, and shovels. Most of theses tools are sharp so special safety equipment is necessary during use. Protection for eyes, ears, legs, hands and feet is required when using these tools. In addition to hazards associated with manual equipment, the operators are more exposed to the hazards of road traffic and walking over uneven ground that can result in trips and falls.

Figure 4. Manual control provides immediate guide rail visibility.

Manual methods are commonly used for small areas. They are effective for treating areas where obstacles prohibit other methods. Manual weed control is labor intensive and expensive when compared to other methods. In some cases the cut debris must be removed from the site. In addition, cut plants may not be killed and often resprout (Figure 4). Small equipment allows the operator to be more selective in controlling specific weeds than larger equipment does. Using a

chain saw to selectively cut only those trees that are unwanted is much less disruptive to the right-of-way ecosystem than using large mowers to cut down everything.

MECHANICAL CONTROL

Mechanical control includes machines or physical barriers to control weeds. Mowers are the most common method of mechanical control on rights-of-way. Mowers cut all above ground vegetation but do not directly injure the roots of plants. Consequently, many plants resprout in greater numbers, especially perennials, including broadleaf woody species. Mowing can also be used to prevent flowering and seeding of annual or biennial weeds, or to remove brush and woody plants. Grasses that are cut too short encourage broadleaf weed invasion and close cutting and sod scalping can cause erosion. Other problems can occur when cut material smothers desirable grasses, becomes a fire hazard, or blocks culverts and drains during heavy rains.

Several types of cutting heads are used, including flail, reel, sicklebar, and rotary blades. They range in size from 4-6 feet wide for two lane local and county roads to 12-24 feet wide for large-scale Interstate mowing operations (Figure 5). There is a risk of flying debris during a mowing operation especially along a roadside. Brush cutting is usually done with machines that are larger and heavier versions of rotary or flail mowers like Hydro-Ax and Kershaw.

Figure 5. Some mechanical equipment can remove large trees on the right-of-way.

Flexible geotextile mats or polymer barriers, as well as radiant heat, hot water, and steam are also occasionally used to prevent the spread of weeds, reduce an infestation, or sufficiently alter the environment to suppress weed populations. These alternative methods are not used for large scale clearing or maintenance.

CHEMICAL CONTROL

Chemical control methods utilize herbicides or plant growth regulators (Figure 6). Using herbicides can often be more complex, difficult, and require more precision than other forms of weed control. The complexity lies in the fact that the applicator must take into account major factors when using herbicides including: application equipment, herbicide strengths and weaknesses, targeted weed(s), and management goals.

Figure 6. Herbicides have a lasting effect on the vegetation occurring on a right-of-way.

There is no single herbicide that can meet the needs of every weed situation found on rights-of-way. Each herbicide has a specific spectrum of weeds controlled. By selecting the proper herbicide, application method, rate, and timing, it is possible to 1) selectively control broadleaf plants, grasses, or trees without injuring other desirable plants, 2) control all vegetation for short or long time periods, 3) suppress grass seedhead production, and 4) reduce the growth of plant stems and foliage. Proper use of chemicals and application equipment is important because desirable plants on or off rights-of-way can be injured by inappropriate actions. Chemical control methods are usually less expensive and present less hazard to the operators than mechanical and manual methods.

SUMMARY

Rights-of-way vegetation management is necessary for public safety and system reliability. Managing rights-of-way vegetation requires a variety of weed control methods. Each method has advantages and disadvantages, and no single method can be used for all weed control problems. It is through the integration of several control methods that the most economical and effective program can be developed with the least environmental disturbance.

Chapter 2 Example Test Questions

1. Flail mowers are an example of which weed control option?
   A. Manual control
   B. Chemical control
   C. Mechanical control
   D. Biological control

2. Plants resprouting in greater numbers, especially trees, close cutting, and sod scalping can be associated with which type of control?
   A. Manual control
   B. Chemical control
   C. Mechanical control
   D. Biological control

3. Use of the herbicide 2,4-D to control broadleaf weeds is an example of:
   A. Manual control
   B. Chemical control
   C. Mechanical control
   D. Biological control

4. Weedeaters, string trimmers, and chain saws are examples of:
   A. Manual control
   B. Chemical control
   C. Mechanical control
   D. Biological control

5. When one plant produces chemicals that inhibit the establishment and growth of another plant, this is termed:
   A. Synergism
   B. Competition
   C. Allelopathy
   D. Antagonism

6. Use of the cinnabar moth, the gorse seed weevil, or the Chrysolina beetle to control specific weeds is an example of
   A. Manual control
   B. Chemical control
   C. Mechanical control
   D. Biological control

7. Integrated Vegetation Management (IVM) means the weed control program:
   A. Depends mainly on manual methods
   B. Uses only chemical methods
   C. Is dependent on biological control methods
   D. Uses a combination of the best control method(s).

8. The control method that is very weed species specific, but inexpensive to maintain, is:
   A. Biological control
   B. Manual control
   C. Chemical control
   D. Mechanical control

9. Fertilizers, mulches, height of cutting, and fire are examples of
   A. Biological control
   B. Manual control
   C. Cultural control
   D. Mechanical control

10. Of the various control methods, the one most highly regulated is:
    A. Biological control
    B. Manual control
    C. Chemical control
    D. Mechanical control

Answers:

1.	C	3.	B	5.	C	7.	D	9.	C
2.	C	4.	A	6.	D	8.	A	10.	C

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