Control Methods

Background

Scientists and managers strive for managing and controlling invasive plant species to allow native plants to survive in the environment rather than attempting to eradicate all invasives. Invasive plants have many adaptations that allow them to survive in a variety of environmental conditions, such as their seeds lying dormant in soil for years. These adaptations make it very difficult, if not impossible, to remove them completely from an ecosystem.

The following methods are used by land managers to control invasive plants. The most successful method is usually to use a combination of methods.

I. Prevention

Prevention is the best way to control invasive plants. It is much less expensive and more effective to take preventative measures against invasive plants as compared to managing them once they are established in an area. Types of prevention vary according to land use. Farmers and ranchers purchase certified "weed free" seeds for planting and hay or straw for feeding livestock. Anyone planting plants should be sure to purchase plants that do not have invasive seeds, roots, or other unwanted plant parts. Heavy equipment for landscaping, forestry work, or road construction should be cleaned and inspected each time it leaves and enters work sites. Educational signs on invasive species and proper trail etiquette (staying on designated trails, keeping dogs on leashes) can be posted on recreational land to decrease the chance of introducing invasive plant species.

II. Chemical

Herbicides are used in chemical control of invasive plant species. These chemicals interfere with plant physiology and slow or stop plant growth and function. Herbicides kill invasives relatively quickly, can be used in both large and small affected areas, and some are species specific , only killing specific species. However, there are several drawbacks to chemical control methods. Herbicides can be very expensive. They can harm or kill non-target plants or animals in the area. If herbicides run off into bodies of water it can harm aquatic life and contaminate drinking water for animals and humans. Exposure to herbicides during application is another threat of chemical control to people. Finally, herbicide resistance can become a problem in target invasive populations when one herbicide is used repeatedly.

III. Biological

Biological control methods involve introducing a biological agent to an area to kill invasive species. Agents are generally small organisms such as diseases and insects and are natural predators of the invasive plant in its native ecosystem. If the plan is successful, this method is very safe for the environment. However, introducing any new species to an environment can be risky. Biological control agents have become invasive species themselves, causing even more environmental damage. To take preventative measures against this, scientists typically spend years studying the interactions between

the invasive plant, the biological agent, and the environment. The need to wait for this lengthy study time before using biological control can be a disadvantage to this form of invasive plant control. Another disadvantage is that it can take several years for the biological control agent to have a significant effect on the area.

IV. Mechanical (also known as Physical)

Mechanical methods are another common invasive plant control method. This involves any physical activity to remove invasives, such as hand-pulling, digging up, or cutting plants. Plowing, livestock grazing (sometimes classified as biological or cultural control), and burning are also considered mechanical methods. This is a very time consuming treatment method, and it can be difficult to recruit enough volunteers to help implement, thus can be expensive to hire people to perform mechanical control. Mechanical control has a low environmental impact.

V. Cultural and Mulches

Cultural methods and mulches are two other types of invasive plant control. These methods are more likely to be used in agricultural setting and around people's property than on more natural lands such as national forests and open spaces. Crop rotations (sometimes classified as mechanical control), planting more competitive native plants, and specific irrigation methods are common cultural methods. Compared to biological and chemical methods, cultural methods are time and labor intensive, yet generally have a low environmental impact. The used of mulch in landscaping and planting prevents the growth of invasive plants by creating a barrier between the soil and the air. The use of plastic over the soil increases the soil temperature and kills invasive plant seeds. The use of mulch is also a time and labor intensive endeavor.

VII. Integrated Weed Management Programs (IWM)

Integrated weed management is usually the most effective means of controlling invasive plants. This involves utilizing practices from the different types of methods to control invasive plants. When practicing IWM, the invasive plants are less able to adapt due to the variety of changes in the environment. A general example of IWM over a period of time would be to bring in livestock to graze on a field of invasive plants, applying an herbicide, and then replant native plants to outcompete the remaining invasive plants.

The following information comes from the Minnesota Department of Agriculture website:

"For example, an IWM program for Canada thistle, *Cirsium arvense*, may consists of multiple management scenarios throughout the growing season to achieve the most efficient suppression of this invasive weed in contrast to using any one given management practice by itself. Below are listed steps throughout the growing season that may be followed in a one-year Canada thistle IWM management strategy.

1. Fall (Late September, October): Spot spray or broadcast thistle plants/rosettes, overseed area with competitive native grasses and forbs.

2. Early Spring (April - early May): Spot spray (or selectively broadcast) thistle rosettes with a selected herbicide; use a controlled burn to destroy remnant vegetation and seeds on the soil surface.
3. Late Spring (May - early June): Spot spray any emerging thistle plants.
4. Summer (Late June, July, early August): Mow thistle patches prior to seed development; release Canada thistle biological control agents.
5. Fall (Late September, October): Spot spray remaining thistle plants and/or rosettes."

Resources:

Integrated Weed Management. CSIRO. http://www.csiro.au/Outcomes/Food-and-Agriculture/IWM.aspx.

Invasive Plants: Methods of Control. National Invasive Species Information Center. http://alic.arid.arizona.edu/invasive/sub3/p7.shtml.

"Under/Out of Control." Invasives: Plants on the Move. March 2012. http://www.weedinvasion.org/pdfs/Control/under_out_of_control.pdf.

What is Integrated Weed Management? Minnesota Department of Agriculture. http://www.mda.state.mn.us/plants/pestmanagement/weedcontrol/whatisiwm.aspx.