OPTIMIZING PERENNIAL WEED MANAGEMENT

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Herbaceous perennial weeds are common pests in agricultural production systems. Plants with this life history have proven to be especially competitive as they have the ability to regenerate from perennial organs that persist belowground. This trait allows plants to tolerate management methods, compete with other plants, and survive stressful growing conditions. These traits can cause significant reductions in crop yield and may account for why herbaceous perennial weed species are increasing in frequency throughout Canada, the Midwestern United States and Wisconsin.

Herbicides, mowing, tillage, burning, seeding competitive plants, and biological control have been effective in managing perennial weeds if applied correctly. Management methods typically target reducing stored resources in perennial storage organs and shading of shoots. Often combining techniques that integrate both strategies work the best. Due to the range of species biology and phenology, no recommendations are effective across all weed species. Often, it is useful to determine if perennial weeds are simple or creeping perennial weeds as biology and spread have subtle, but important differences for each life history. Correct identification of this type of life history is also useful in selecting the appropriate management methods. Below is a summary of biology, spread, and general management recommendations for simple and creeping perennial weeds along with a table of common perennial weeds found in Wisconsin. This presentation will provide an overview of the biology of perennial weeds and important factors to consider when using a range of management methods for these weed species.

Table 1. Common perennial weeds found in Wisconsin.

Common name	Scientific name	Type of perennial
hemp dogbane	*Apocynum cannabinum*	Creeping
common milkweed	*Asclepias syriaca*	Creeping
yellow rocket	*Barbarea vulgaris*	Simple
hoary alyssum	*Berteroa incana*	Simple
Canada thistle	*Cirsium arvense*	Creeping
field bindweed	*Convolvulus arvensis*	Creeping
yellow nutsedge	*Cyperus esculentus*	Creeping/Simple
quackgrass	*Elytrigia repens*	Creeping
field horsetail	*Equisetum arvense*	Creeping
leafy spurge	*Euphorbia esula*	Creeping
wirestem muhly	*Muhlenbergia frondosa*	Creeping
blackseed plantain	*Plantago rugelli*	Simple
curly dock	*Rumex crispus*	Simple
white cockle	*Silene latifolia*	Simple
perennial sowthistle	*Sonchus arvensis*	Creeping
dandelion	*Taraxacum officinale*	Simple

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Biology and Spread of Perennial Weeds

Simple perennial weeds typically establish from seeds that can germinate anytime when appropriate conditions exist. After germination, plants quickly develop a tap root and a group of leaves, called a rosette, clustered around the base of the root at the soil surface. Plants can be found as rosettes in the fall and spring, but will produce stems and flowers in the late spring to summer. After flowering, shoots die back, but lower leaves often resprout in the fall and remain green until winter. The following spring, shoots resprout from perennial organs. Organs can last for several years and often increases both in size and its ability to tolerate management. Simple perennials spread throughout fields by seed. While plants can resprout from perennial taproots, this rarely results in spread unless equipment spreads roots into uninfested areas. Therefore, management should focus on identifying and eliminating seed production as well as nearby sources of seed.

Creeping perennial weeds can also establish from seeds or perennial vegetative organs. Often, seedlings initially devote resources to developing a root system and perennial organs; therefore, plants may not flower during the establishment year. Creeping perennial weeds have organs, including rhizomes, tubers, stolons, bulbs, corms, or creeping roots, that enable plants to expand by growing or "creeping" away from the parent plant, producing additional shoots along the way. This growth is often visible as discrete circular patches within fields. Like simple perennials these structures can last for several years and often increase in size and stored resources, making management more difficult. Creeping perennial weeds spread throughout fields by seed movement and by creeping stems or roots. They must be managed carefully, as inappropriate methods can lead to further spread. Long-term management plans should be developed for these species, focusing on preventing seed spread, controlling plants while they are seedlings, and managing the resprouts of older plants without spreading perennial organs to uninfested areas.

Management Methods for Perennial Weeds

Prevention

Preventing the introduction and establishment of any weed is the most cost-effective management strategy. This can be achieved by maintaining a healthy stand of desirable vegetation which can resist weed invasion, and by monitoring sites to detect and remove new weed invaders. Perennial crops like alfalfa and pasture grasses are an excellent tool to prevent invasion as they are good competitors with these weed species and can prevent establishment. Edges of fields are often vulnerable to invasion, so pay attention to these areas to prevent new invasions from getting established. If equipment is to be used within the field, remove all dirt and debris which may contain seeds or other vegetative tissue as these are additional sources for new invasions.

Physical/Mechanical

Mechanical or physical methods that sever roots below the soil surface (cultivation) can be effective in suppressing perennial weeds, but once cut the belowground organs typically resprout and compete. Therefore, these methods have to be repeated several times to be effective each season. The best results are seen several weeks after new regrowth has emerged, but before plants have begun to flower. The benefits of these methods are alleviation of above ground competition and if repeated enough (multiple times per year for multiple years), populations can be reduced significantly in size. Deep plowing is much more effective than cultivation, but if belowground perennial organs are large enough, particularly with creeping perennials, they can often survive. Some perennial organs are sensitive to cold temperatures and/or dry conditions and tillage conducted prior to extended periods of either of these environmental factors can lead to extensive

mortality. Severed roots/rhizomes from this type of management can spread to previously uninfested areas of the field. Therefore this management method is not recommended if only a small portion of the field is infested.

Mowing/Grazing

Mowing/grazing perennial weeds repeatedly over the growing season and over multiple years can suppress perennial weed growth, especially if conducted in conjunction with competitive plant species (e.g. alfalfa). Mowing can prevent the production of seeds if it is carried out prior to the opening of flower buds. This method will not kill the plant and repeating it more than once per season is typically required to eliminate seed production similar to physical and mechanical methods. If possible, mow plants before they produce flower buds as this will reduce the most stored energy in perennial tissue. Some plants low growth form, prevent this method from being effective as most plant tissue avoids any mowing, but often grazing animals will select for these species.

Biological Control

Natural or introduced insects or diseases can also be used to manage invasive weeds. If biological control agents are released and established, they can help suppress weed populations. However, success of agents is typically specific to the weed species, and due to the interdependency of the agent and the host populations are only reduced, not eliminated. Results may not be visible for several years with this technique as populations released need to increase in size to see a visible effect on populations. Biological control is recommended for common weeds that are extensively found in fields and surrounding areas, but not on species that are new and just establishing as eradication of populations will likely not occur from biological control.

Herbicides

Several herbicides are effective at controlling these weedy species, but results are species and timing specific. A wide range of selective herbicides are available for use in a range of crops in Wisconsin. For specific information in a crop of interest please consult Pest Management in Wisconsin Field Crops (A3646). The timing of herbicide application is also very important as it can affect the level of control. With systemic herbicides like glyphosate results are best when applied in the just prior to flowering or in the fall to actively growing green tissue as these timings maximize the herbicide movement into perennial organs. Plant growth can be suppressed with spring applications, but often plants resprout later in the year. Fall-applied herbicides should be applied prior to a killing frost to avoid reductions in herbicide absorption from damaged/senesced leaf tissue.

Additional Considerations

While perennial weeds can be managed with a range of options, often an integrated approach that uses multiple methods works best. Use of competitive perennial crops in the rotation of the infested fields will provide additional suppression and should be considered. Realize that even when utilizing all of these techniques fields that have large infestations will take many years to reduce population sizes to a level that will require minimal management, and eradication may never occur. Of all the management methods considered, early detection of perennial weeds followed by intensive management before they become extensive is the most cost effective approach at controlling these weed species.