

Managing Biennial Weeds in Fields Enrolled in the Conservation Reserve Program

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Biennial weeds are herbaceous, non-woody plants that live two years. They germinate and grow for an entire year before flowering, producing seed and dying in the second year. These plants only reproduce by seed. They do not resprout from roots.

Biology

Biennial plants germinate from seed in the soil in the spring, summer, or fall and develop a rosette plant (plant with no visible stem, just leaves). Rosette plants continue to develop during the establishment year and plants over-winter in this stage. During the second year, plants develop a stem that will produce flowers, and then the plant will die. Occasionally biennial plants can germinate, flower, and die in one year. Certain species like wild parsnip persist as rosette plants for one to several years before flowering. These plants are managed in a similar manner as biennial plants, but the correct botanical term for these plants is monocarpic perennial (MP) because they die after flowering.

Method of spread

All biennials and monocarpic perennials spread by seed movement only. Therefore, management should focus on identifying plants and eliminating seed production and nearby sources of seed.

Conservation Reserve Program (CRP) Management Restrictions

The ideal time to manage weeds is prior to establishment of the desired cover. Once conservation cover is established, weed management becomes more difficult because of management restrictions designed to minimize impact to nesting birds. When developing weed management plans in CRP fields, there are specific restrictions one must be aware of, including the following:

- During the seeding year, mowing can be conducted to suppress weed competition and allow for the establishment of desirable cover. All other maintenance and management must occur outside of the primary nesting season,

Listed Undesirable/invasive BIENNIAL WEEDS on CRP grasslands BY NRCS WISCONSIN JOB SHEET 397

Cat. 1: No tolerance, must attempt to eliminate:

- Cutleaf teasel (MP)
- Common teasel (MP)
- Poison hemlock

Cat. 2: Cannot go to seed, keep < 10% coverage, no patch > 1 acre, individual species or in combination:

- Garlic mustard
- Japanese hedge parsley
- Marsh thistle
- Musk thistle
- Plumeless thistle
- White sweet clover
- Wild parsnip (MP)
- Yellow sweet clover

Cat. 3: Species of concern, keep < 30% coverage, no patch > 1 acre, individual species or in combination:

- Burdock
- Queen Anne's Lace (Wild carrot)

unless approved by the local Farm Service Agency (FSA) County Committee. These dates have varied over time and are specified in the CRP contract. The current primary nesting season for new CRP contracts is May 15 to August 1.

- CRP participants are required to control invasive and weedy plant species before they produce viable seed. Unfortunately, the optimum timing for control typically conflicts with the primary nesting season. Participants can either contact their local FSA to ask for approval to manage during the primary nesting season, or conduct management before or after the nesting season.

- Management techniques that disrupt CRP cover on a recurring schedule (e.g. broadcast herbicide applications) require prior approval from the local FSA County Committee.
- If mowed plant material is removed from the site, as with haying or grazing, a reduction in the annual CRP payment will occur. Haying and grazing are only allowed once every three years and also require prior approval from FSA.

Management Methods

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. Pay particular attention to roadsides, storage areas, dump sites, and other areas subjected to repeated disturbances, as invasions typically begin here. If equipment is to be used within the field, remove all dirt and debris which may contain seeds or other vegetative tissue that could lead to new invasions.

Physical/Mechanical

Hand pulling of weeds can be effective if the crown (where the shoot and roots of the plant meet) is removed from the soil. Usually, this is only possible when the soil is sandy and/or moist. Other tools, such as a shovel, that sever roots below the soil surface can be effective in controlling biennial and monocarpic perennial weeds¹. When crowns are large, resprouting can occur if the shoots are severed at the soil surface. To ensure no regrowth, sever the crown two to four inches below the soil surface.

Biennials can also be managed with cultivation; however, this is only an option prior to the establishment of a CRP cover crop. After establishment of a CRP cover crop, most physical weed control methods, such as tillage or cultivation, are not feasible, as they will cause extensive damage to desirable plants. In some cases, however, hand tools can be used on a small scale to control weed patches.

Mowing

Mowing biennial weeds repeatedly throughout the growing season and over multiple years can be used to suppress biennial weed growth. CRP contracts in

Wisconsin, however, typically do not allow mowing during the nesting season (see CRP Management Restrictions section), in order to protect ground nesting birds and young wildlife. This is often when many biennial weeds flower or resprout and flower after early season mowing. Because of this, mowing alone is not a good biennial weed control option on CRP land. If listed weeds are present, FSA may grant permission to conduct mowing during restricted times. Mowing when flower buds are present, but not yet open, can prevent weed seed production, and may kill second year biennial plants. Mowing can be more effective if it is followed by the application of an herbicide to plant regrowth and first-year rosettes. Mowed material must be uniformly distributed over the site to avoid smothering existing desirable vegetation.

Burning²

While burning can be effective in controlling biennial weeds if there is ample fuel for a fire, rosette plants often survive (DiTomaso and Johnson, 2006). Fire is most effective on biennial weeds if the burn is conducted before they flower and is repeated for consecutive years. If a second-year burn is not feasible, control can be increased by combining burning with other management methods (DiTomaso and Johnson, 2006). If the fire is hot enough, weed seeds can be killed on the soil surface, but those that survive may be stimulated to germinate. Burning is effective in removing thatch and improving conditions for some species, but may also damage desirable vegetation if the fire is too hot and/or timed incorrectly. Like mowing, the timing of a burn may be governed by CRP restrictions designed to protect nesting birds and young wildlife.

Flaming of individual plants or small patches of weeds using a propane torch is very effective on biennial weed seedlings. This method is recommended for small areas at the appropriate timing when the risk of fire ignition and escape is low (Tu et al., 2001).

Biological control

Natural or introduced insects or diseases can also be used to manage invasive weeds. If agents are released and established, they can help suppress weed populations for years. However, success of

¹ Plants pulled or dug after flowers appear should be removed from the site and carefully disposed of to destroy viable seed contained in the flowers.

² NRCS, local resource managers, and fire authorities often can assist landowners in developing burn plans and safe burn implementation. Burning should be conducted using a burn plan based on Wisconsin's Conservation Practice Standard 338 (Prescribed Burning) and in compliance with all local, state, and federal authorities, including the local air quality control board.

agents is typically specific to the weed, and results may not be visible for several years. Biological control is not appropriate for Category 1 listed weeds. If you are interested in using biological control agents, consult local agencies for more detailed information.

Grazing

The grazing of animals such as cattle, sheep, and/or goats can effectively suppress some weed species. Success of grazing as a management method may vary, depending on the species of weed and grazing animal, timing of implementation, density of weed species, and number of animals used. Fencing animals within infested areas can enhance suppression. Like mowing, grazing may need to be done more than once to be effective. The ideal timing, although somewhat species-dependent, is just prior to flower and seed development. Avoid overgrazing sites, as this can increase populations of some weed species. Some livestock avoid grazing many of these weeds as they have spines or are poisonous.


Herbicides

While several herbicides effectively control biennial weeds, especially in the rosette stage, results are species- and timing-specific. Caution should be exercised when using herbicides, as desirable plants (e.g. wildflowers, legumes) can also be injured. This can be avoided through the use of selective herbicides and/or selective application techniques. While a wide range of selective herbicides are available that will not harm specific plant groups (e.g. grasses, broadleaf plants), in CRP fields it is difficult to select an herbicide that will control the target weed species and not harm all desirable plants. If broadcast treatments to a large area are being considered, consult the local FSA County Committee

prior to any application, as legumes are highly susceptible to most herbicides. Another approach is to use non-selective herbicides, such as glyphosate, with a selective application technique (e.g. spot applications using a backpack sprayer). One may also choose to combine both selective herbicides and selective application techniques for maximum protection of non-target species.

The timing of herbicide application is also very important, as it can affect the level of control. Due to restrictions in management of CRP fields, applications are permitted only during periods outside of the primary nesting season (see CRP Management Restrictions section). Applications should, if possible, target rosettes, as they are more susceptible. If plants are bolting, treat them prior to flowering. Fall applications prior to a killing frost when air temperatures are above 50 F are recommended as results are more consistent than spring applications.

It is important to read the herbicide label BEFORE making any application, as different herbicides have different requirements and restrictions.

See **Table 1** on the following page for a list of herbicides and their effectiveness on listed biennial weeds. 

References:

DiTomaso, J.M. and D.W. Johnson (eds.). 2006. The Use of Fire as a Tool for Controlling Invasive Plants. Cal-IPC Publication 2006-01. California Invasive Plant Council: Berkeley, CA. 56 pp.

Tu, M., Hurd, C., & J.M. Randall, 2001. Weed Control Methods Handbook, The Nature Conservancy. Retrieved December 27, 2007 from <http://tncweeds.ucdavis.edu/handbook.html>

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Table 1. Effectiveness of herbicides registered in CRP for managing listed biennial weeds.

Active ingredient	Example product	Japanese hedge parsley	Burdock	Garlic mustard	Marsh thistle	Musk thistle	Plumeless thistle	Poison hemlock	Queen Anne's Lace	White / yellow sweet clover	Cutleaf/common teasel	Wild parsnip
2,4-D	Many	-	G/E	F	-	G/E	G/E	F	G/E	F/G	G	G/E
2,4-D + Aminopyralid	Forefront	-	G/E	-	-	E	G/E	P	G	G/E	G/E	G
2,4-D + Clopyralid	Curtail	-	G	-	-	G	G/E	P	G	-	G/E	G
2,4-D + Dicamba	Weedmaster	-	G	F	-	G/E	G/E	G	G/E	E	G/E	G/E
2,4-D + Picloram *	Grazon	-	E	-	-	E	E	F/G	G	E	G	G
2,4-D + Triclopyr	Crossbow	-	G/E	-	-	G/E	G/E	F/G	G	G/E	G	G
Aminopyralid	Milestone	-	G/E	-	-	E	E	P	F	G/E	E	F
Chlorsulfuron	Telar	-	G	-	-	G/E	-	G/E	G/E	P/F	G/E	G/E
Clopyralid	Stinger	-	G/E	-	G	G/E	G/E	P	P	G/E	G/E	F
Clopyralid + Triclopyr	Redeem	-	G/E	-	-	G/E	G/E	F/G	G/E	E	E	F
Dicamba	Banvel	-	G	F	-	G/E	G/E	P/F	G	G/E	G/E	F
Dicamba + Diflufenzopyr	Overdrive	-	G	-	-	G/E	G/E	P	G/E	F	G/E	G/E
Flumioxazin	Valor	-	-	F/G	-	-	-	-	-	-	-	-
Glyphosate	Roundup	G	G	G/E	F/G	G/E	G/E	G	G/E	P/F	G/E	G/E
Imazapic	Plateau	-	-	G/E	-	F	-	G/E	G/E	N	G	P
Imazapic + Glyphosate	Journey	-	-	G/E	-	F/G	-	G/E	G/E	P/F	G	F
Imazapyr	Habitat	-	G	G/E	-	F/G	-	G/E	G/E	P/F	G/E	-
MCPA	Many	-	-	-	-	-	-	F/G	-	N	-	-
Metsulfuron	Escort	-	G/E	G/E	G	G/E	G/E	G/E	E	G/E	F/G	E
Metsulfuron + 2,4-D + Dicamba	Cimarron max	-	G/E	-	-	E	E	G/E	E	G/E	G/E	-
Metsulfuron + Chlorsulfuron	Cimarron plus	-	-	-	-	G/E	-	E	G/E	G	F/G	-
Paraquat *	Gramoxone	P/F	P/F	P/F	P/F	P/F	P/F	P/F	P/F	P/F	P	P
Picloram *	Tordon	-	G/E	-	-	G/E	G/E	G	G	E	G/E	-
Sulfometuron	Oust	-	-	G/E	-	G	-	-	-	G/E	F	-
Sulfosulfuron	Outrider	-	-	G	-	-	-	-	-	-	N/P	-
Triclopyr	Garlon	G	G/E	G	-	F/G	F	G/E	G	E	-	F

E = excellent (90-100%) control; G = good (80-90%) control; F = fair (60-80%) control; P = poor (<60%) control; N = no (0%) control; - no information.

* = Herbicides with these active ingredients are restricted-use products in Wisconsin.