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Control of Canada Thistle in CRP and Other Noncrop Acreage

Conservation plantings provide a multitude of benefits, including wildlife habitat, soil protection and improved water quality. Many of these contain a diversity of desired plant types (i.e., grasses, legumes, broadleaves) and species. However, this creates a challenge when weed problems arise. There usually is no single approach that works in all cases but, rather, each depends on the composition of the stand, weed species, extent of the infestation, site conditions, time and money available, equipment and acceptability of nontarget mortality. This publication will help land managers effectively deal with Canada thistle problems in conservation plantings.

Identification and Development

Like all thistles, Canada thistle (*Cirsium arvense*) has spiny, deeply lobed leaves. The purple (occasionally white) flower heads of Canada thistle are smaller (1 inch or shorter) and more numerous than other thistles, and the stems lack the conspicuous spiny wings found on bull and musk thistle (Figure 1). A detailed account of the biology, identification and life cycle of Canada thistle is provided in the University of Nebraska-Lincoln Extension Publication EC171, *Noxious Weeds of Nebraska – Canada Thistle*.

Canada thistle is a perennial noxious weed that spreads by both seed and horizontal root shoots. New plants can develop from underground shoots which emerge from March through May (Figure 2). Plants usually reach the bud stage the first week in June, with full flowering in late June. After seed production, rosettes persist through late September into October or November until the first hard freeze.



Figure 1. Identification of thistles can be challenging. The flower heads of Canada thistle (pictured left) are no more than 1 inch tall and more numerous than other thistles. The stems of Canada thistle lack the conspicuous spiny wings found on bull thistle (*C. vulgare*) (pictured right).



Figure 2. Canada thistle rosettes appear after underground shoot growth in early spring and also after seed production in late September into October.

Control of Canada Thistle in Established Grass Stands

Always read herbicide labels before purchase to assure that the products are suitable and labeled for the situation and location. Always read and follow labels when using pesticides. Herbicide labels can be downloaded at www.cdms.net. Be especially careful to reduce drift potential in areas where sensitive plants and crops may exist. Many labels list drift preventative measures.

The control strategy outlined below (see Table 1 for complete list of herbicide options and application rates) lists the times of year and herbicides for the most effective control. A combination of spring and fall herbicide applications will be necessary in most situations. In general, apply herbicides at higher labeled rates for older, dense stands or for longer residual control (for some herbicides). Canada thistle may not be completely eliminated even after multiple herbicide applications over several years. New seedlings may continue to emerge for years in treated areas. The months listed below are an approximate range and will vary from year to year and north to south in the state. The most important factor in application timing is plant development stage (see Table 2).

March to May (rosette to bolting) — Treat rosettes using a herbicide containing clopyralid, aminopyralid or glyphosate. This is the ideal time to kill aboveground growth of Canada thistle while limiting damage to desirable plants. However, injury to the root system, and thus long-term effectiveness, is limited.

Mid-May to mid-June (prior to flowering) — Herbicide treatments containing clopyralid, aminopyralid or glyphosate when the plant is in bud to flower stage can be effective for reduction of the population. Alternatively, mechanically cut Canada thistle prior to flowering with a rotary mower set at the highest height. Mowing prior to flowering will help minimize and delay seed production of — but will not kill — Canada thistle.

September to October (rosette growth and shoot emergence) — Treat using a herbicide containing clopyralid, aminopyralid or glyphosate. Spot treat to avoid injury to nontarget plants. Some of these herbicides can be applied year-round, but late September through October before the first hard freeze is optimal, since it maximizes herbicide movement to root system. Do not apply herbicides to frozen ground.

Monitor the grass stand in June for signs of Canada thistle, repeating the steps above as necessary to kill thistle and reduce seed production. Regular spot treatments will minimize or eliminate the need for large-scale broadcast herbicide applications and the potential loss of desirable forb species.

Herbicides that are effective on Canada thistle will injure or kill most broadleaf plants (including legumes) and glyphosate will injure or kill grasses. In many areas, spot treatment of Canada thistle provides sufficient control of thistle while minimizing impacts to legumes and forbs. However, it may be more economical over the long term to treat large infestations using a broadcast herbicide application. Regardless, Canada thistle control likely will have to take place for more than one year. Apparent control on the surface can be deceiving. Destruction of the extensive underground root system of Canada thistle is imperative to assure that resprouting does not occur.

The decision to use a broadcast application or spot treatment to control Canada thistle will depend on a number of things unique to each situation, including available equipment, type of herbicide, skill and experience of the herbicide applicator, and acceptance of nontarget plant injury. A general threshold for broadcast applications is when Canada thistle covers more than 10-25 percent of areas at least one-fourth acre in size (see Table 1 for list of herbicides and rates) (Figure 3). Broadcast applications will kill desirable broadleaf plants (e.g., legumes and others) and the resulting exposed/disturbed soil may further create a competitive advantage for other weed species. Despite these downsides, broadcast applications may be the best option if the primary goal is the reduction of Canada thistle in the stand. Desired legumes and wildflowers can be overseeded once sufficient control is achieved. Some herbicides (e.g., aminopyralid, clopyralid) have residual activity that inhibits legume establishment. Follow herbicide label instructions for reseeding. Ideally, Canada thistle and other weeds should be controlled during site preparation prior to planting.

Overview of Control Options

The Farm Services Agency (FSA) provides allowances for controlling noxious weeds, including Canada thistle, in acreage enrolled in the Conservation Reserve Program (CRP). However, planned control must be approved ahead of time by the FSA County Committee. Control is best attained by incorporating an integrated pest management control program that includes mechanical control with the use of herbicides. Detailed herbicide application rates and timing are found in Table 1.

The above strategy will not work in all circumstances but should be effective in common situations across Indiana. This prescription may be modified to fit unique situations. Mowing, burning and tillage generally are not recommended alone as control measures for Canada thistle. The frequency at which these options must be used often is impractical for most landowners or may not be allowed in CRP acreage. However, these options may be combined with judicious use of herbicides to customize treatment for unique situations.

Mowing — Mowing just prior to flowering inhibits seed production and long-distance seed colonization. The colony can still spread on site via creeping lateral roots. Timing of mowing is critical to prevent seed production, as stems with flowers that have been open eight days or more still can develop viable seeds. Mowing can best be used as a temporary or stopgap measure to control seed dispersal until a total integrated pest management plan, incorporating appropriately timed herbicide applications, can be implemented.



Figure 3. Canada thistle forms dense clones or colonies. There is no definitive infestation rate on whether to use a broadcast herbicide application or spot treatment to control Canada thistle. Spot treatment of small areas as pictured here is typically recommended. Areas with many dense clones of thistle or plants scattered in a larger acreage may require broadcast applications.

Mowing alone to control Canada thistle generally is not recommended. A single mowing temporarily reduces standing biomass, but is not effective in eliminating Canada thistle. Work at Purdue University suggests that six mowing events in four consecutive growing seasons are required to control Canada thistle. This is an unattractive option for acreage enrolled in CRP since any mowing requires prior approval from the FSA (see below). Mowing twice a year, in mid-June and September, may reduce or contain Canada thistle but will not eliminate it. Mow high enough to leave more than nine leaves per stem, or more than 20 centimeters, of bare stem tissue, as mature Canada thistle leaves and stems independently inhibit development of shoots from root buds.

Prescribed Fire — Burning can be used in midcontract management in CRP Practice CP2 (native warm season grass plantings). Canada thistle response to fire is variable and control often depends on timing of the burn, soil moisture, fire intensity and location. Prescribed burning often can result in an increase in Canada thistle density initially, but is reported to decrease over time with continued prescribed burnings [Travnicek et al. 2005]. This initial increase in Canada thistle density is because of resprouting from its extensive root system, or through colonization via germinating seeds on bare ground. While empirical data is absent, it makes sense that prescribed burning could be used as a pretreatment to herbicide applications.

Tillage — Canada thistle shows varying effects from tillage. Shallow tilling does little to control Canada thistle. In fact, shallow tilling (2.5-4 inches) actually could increase thistle density. Roots are cut into fragments during tillage and the root elements spread to other parts of the field. Root fragments from a single, young Canada thistle plant can produce more than 900 shoots when cut into 10-centimeter fragments. Because of the issues with tillage, it should be used only as a last resort for CRP and similar noncrop situations. Regardless, it must be followed by a herbicide application.

Why combine herbicide with tillage? Tillage that results in small clods can stimulate seed germination of Canada thistle. Fields with extensive seed germination should be retilled or treated with herbicide within 40 days after the seeds germinate to prevent deep root development. After 40 days, the developed roots could survive disking or some herbicide treatments.

In the state of Indiana it is unlawful [IC 15-16-8, “Destruction of Detrimental Plants” law] to let Canada thistle reach maturity or bloom. This law was written in order to reduce the spread of Canada thistle in Indiana. At the very least any method that inhibits or stops flowering complies with the law. This can be achieved by mowing, tillage or herbicides. Mowing or the use of herbicides to control noxious weeds is allowed for CRP acreage at any time within the first three years of establishment, or prior to a Final Status Review, whichever comes first. Because Canada thistle is covered by Indiana law, CRP policy mandates that Canada thistle must be controlled. However, once a CRP practice

is established (three years after establishment or a Final Status Review has been issued), maintenance activities cannot occur during the primary nesting and brood rearing season unless prior-approved by the FSA County Committee. The primary nesting period is April 1 through Aug. 1, or March 1 through July 15, depending on the CRP program year the acreage was enrolled. Unfortunately, this is the optimum time to mow or apply some herbicides to Canada thistle. Canada thistle will bloom June through August. Approval to spot-treat Canada thistle can be granted by the FSA County Committee if the weeds adversely impact the approved cover, the treatment is needed to maintain the approved cover, and the spot treatment is limited to the affected area of the field.

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Websites

Indiana Select-A-Herb by Purdue University Weed Science — This Web tool provides herbicide response ratings for weeds/plants, and is designed to list herbicides by effectiveness ratings that control or suppress specific weeds in different crop categories.

<http://bntny.agriculture.purdue.edu/herbsel/>

USDA Plants Database — The PLANTS database provides standardized information about the vascular plants, mosses, liverworts, hornworts and lichens of the U.S. and its territories.

<http://plants.usda.gov/>

Table 1. Herbicide options for Canada thistle control labeled for use in new or established CRP stands as of July 2011. Always read and follow the label, which may require consulting with a local contracting office for approval of use of many products and/or timing of application listed in the table below. Additives can be added to some to increase efficacy. Choice of application method will depend on grass stand composition and impacts to nontarget species.

Active ingredient(s)	Example trade names ¹	CRP (newly seeded)	CRP (established)	Application method	Product rate	Timing	Estimated cost (\$) of herbicide/acre ²	
Clopyralid	Stinger, Transline		X	Spot or broadcast	0.67-1.3 pt/ac	Fall (rosette stage) or spring (rosette to flower)	30-40	Active against legumes and other desirable broadleaves. Can injure new grass seedlings. Can mix with 2,4-D.
Clopyralid+ 2,4-D	Curtail		X	Spot or broadcast	2-4 qt/ac (4 qt/ac/year max)	Fall (rosette stage) or spring (rosette to flower)	30-40	Active against legumes and other desirable broadleaves. Can injure new grass seedlings. Can mix with additional 2,4-D not to exceed 1.25 lb ae 2,4-D per application. Wait at least 30 days after application before seeding grasses.
Aminopyralid	Milestone VM		X	Spot or broadcast	7 oz/ac	Fall or spring-summer	15-25	Active against legumes. Should not be used in close proximity to desirable trees and shrubs. Do not overseed broadleaves in application area until following growing season or adequate field testing. Do not use plant material for mulch.
Aminopyralid + 2,4-D	Forefront R&P		X	Spot or broadcast	1.5-2.6 pt/ac	Fall or spring-summer	15-25	Provides a wide spectrum of control for broadleaf weeds. Should not be used in close proximity to desirable trees and shrubs. Do not overseed broadleaves in application area until following growing season or adequate field testing. Do not use plant material for mulch.
Dicamba +2,4-D	Weedmaster, KambaMaster	X	X	Spot or broadcast	0.5-4 pt/ac	Spring (rosette)-summer (bolting)	10-20	Active against legumes and other desirable forbs. Can be tank mixed with a variety of herbicides.
Glyphosate	Roundup Accord XRT II	X	X	Spot only	2% solution 128 oz/ac	Early spring or late fall	10-20	Nonselective herbicide that will injure contacted vegetation.
Diflufenzopyr + Dicamba	Overdrive		X	Spot or broadcast	4-8 oz/ac	Spring to summer	15-30	Active against legumes and other desirable broadleaves. Do not apply to areas where surface water is present.
Triclopyr+ 2,4-D	Crossbow		X	Spot or broadcast	1.5% solution 4 qt/ac	Spring to summer	40-60	Active against legumes and other desirable broadleaves. Top growth control only.
Aminopyralid + metsulfuron methyl	Opensight		X	Spot or broadcast	2.0-3.3 oz/ac	Spring to early flower or late fall		Use caution in application to cool season grass plantings. Do not overseed broadleaves in application area until following growing season or adequate field testing. Active against legumes. Should not be used in close proximity to desirable trees and shrubs.

¹ Trade names are for example purposes only. Purdue University Extension does not imply that these are the only products for use and are listed as university tested products only.

² Costs are presented as estimated costs of herbicide only, not to include application or surfactants.

Table 2. Explanation of seasons crucial to the control of Canada thistle. Please note that herbicide efficacy can vary dramatically based on plant development stage. Dates are provided as an approximate guide to plant development stage. Always read and follow label instructions.

Season (typical timing for Indiana)	Growth and/or developmental stage of Canada thistle	Opportunity for herbicide use
<p>Spring (early growing season)</p> <p>March 15-May 20</p>	<p>Thistle plants are in the rosette stage and may begin to bolt.</p> <p>Warm season grasses and wildflowers are dormant. Some wildflowers have green basal rosettes.</p>	<p>Ideal time for broadcast and spot treatments.</p> <p>General purpose is to burn down aboveground growth. Minimal root kill during this period.</p> <p>Low risk of killing desirable broadleaf species with broadcast treatments.</p>
<p>Early Summer (midgrowing season)</p> <p>May 21-Mid-June</p>	<p>Thistle plants are bolting but prior to flowering.</p> <p>Warm season grasses and wildflowers are actively growing.</p>	<p>Desired time for highest levels of control because of greatest leaf surface area and plant growth.</p> <p>Excellent time for spot treatments.</p> <p>High risk of killing desirable broadleaf species with broadcast treatments.</p>
<p>Late Summer</p> <p>Mid-June-Aug. 31</p>	<p>Thistle plants are in flower and set seed.</p> <p>Warm season grasses and wildflowers are actively growing; many wildflowers are in flower.</p>	<p>Spot treatments will have minimal impact because of plant growth stage.</p> <p>High risk of killing desirable broadleaf species with broadcast treatments.</p>
<p>Fall (late growing season)</p> <p>Sept. 1-Oct. 31 (or consistent frost)</p>	<p>Thistle is no longer flowering and new plants are sprouting to form rosettes.</p> <p>Warm season grasses and wildflowers are in flower or seed.</p>	<p>Ideal time for high levels of control. Translocating herbicides will result in high root kill.</p> <p>Excellent for broadcast treatments but still risk damage to some desirable broadleaf species.</p>
<p>Winter (dormant season)</p> <p>Nov. 1-March 15</p>	<p>Thistle are in the form of rosettes.</p> <p>Warm season grasses and wildflowers are dormant.</p>	<p>Early and late in this period is excellent for broadcast and spot treatments for <u>some</u> herbicides. Inspect potential treatment area for desired broadleaf plants with basal rosettes prior to broadcast application.</p>

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