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Thistles: Canada Thistle Perennial Sowthistle

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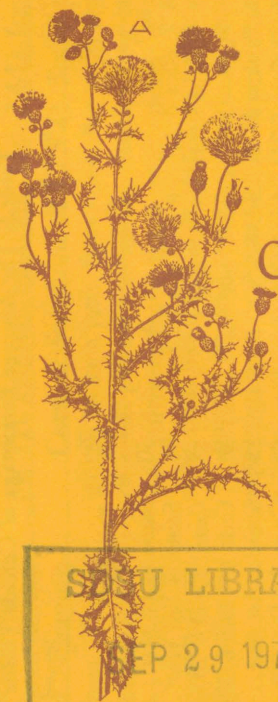
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Thistles



Canada Thistle



Perennial Sowthistle

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Thistles

Canada Thistle

Perennial Sowthistle

FS 450
(Second Revision)

By Lyle A. Derscheid, Extension Agronomist, and
Leon J. Wrage, Extension Agronomist—Weeds

Canada thistle¹ and perennial sowthistle² are deep-rooted perennials that spread by seeds and underground parts. They emerge later in the spring and are less difficult to kill than leafy spurge, Russian knapweed, or hoary cress. They emerge about the same time as bindweed.

They are cross-pollinated so flowers must be open before seed can be produced. Seeds are developed early and are ready to germinate 8 to 10 days after the flowers have opened. Each seed is attached to a tiny parachute that can be carried miles by air currents.

Canada thistle infests about 363,000 acres on 24,000 farms in South Dakota, while perennial sowthistle infests about 315,000 acres on 13,000 farms.

Single plants spread by means of seeds and roots to develop patches. Seeds scattered by the wind develop into sprinklings of plants throughout the countryside, which creates a different problem than that associated with other noxious weeds. These light infestations sometimes are not recognized as a crop hazard. They do reduce yields, however. In one test 2 Canada thistle plants per square yard reduced wheat yield 18%, while 19 plants per square yard reduced yields 36%. A patch of sowthistle caused a 69% reduction of oats yields.

Some Canada thistle plants are susceptible to 2,4-D, some are resistant to the herbicide, and some are intermediate in reaction. Most Canada thistle infestations contain some plants of each group. Spraying kills the susceptible plants, but resistant ones remain and produce more resistant plants.

To control or eliminate these thistles, use intensive cultivation, nonselective chemicals, certain competitive crops, selective herbicides, or several combinations of cultivation, crops and chemicals.

REDUCE STANDS 75 TO 90%

Combinations of cultivation, cropping, and chemicals can reduce the stand of thistles 75% or more in 1 year.

Intensive Cultivation. Cultivate every 3 weeks during good growing conditions and every 4 weeks

during dry, hot weather when plants are growing less rapidly. This generally means cultivating at 3-week intervals during June and July and at 4-week intervals during August, September, and early October.

Cultivation from spring until freeze-up will kill a high percentage of thistle plants. However, cultivation from immediately after harvest of small grain one year until freeze-up the next year is more effective.

A duckfoot field cultivator or blade is the most satisfactory implement; a one-way disk is also fairly effective. If there is considerable plant residue on the area to be cultivated, it may be necessary to use the moldboard plow for the first operation. Equip the cultivator with wide sweeps (12 to 60 inches) that overlap 3 to 4 inches. Keep them sharp; be sure they are kept flat when in the soil and operating at a depth of 4 to 5 inches. The same is true for the one-way disk. Keep the disks sharp and operate at a depth of 4 to 5 inches. Each thistle root must be cut by each cultivation.

It takes 10 to 15 days for new shoots to emerge after the roots have been cut. Another 10 to 15 days elapse before there are enough leaves to produce more food than is needed for growth. Therefore, little plant food is stored in the roots and the root reserves are being used for plant growth for a period of 3 to 4 weeks. Cultivation at the end of each 3- or 4-week period causes a continuous drain on the root reserves. The food supply in the roots is eventually depleted and the plants die.

Combining intensive cultivation for part of the season with the production of a crop and chemical application is generally more practical than an entire season of cultivation. Income from the crop is obtained and erosion hazards resulting from a full season of cultivating are greatly reduced.

Regulations concerning the use of these herbicides on cropland, pasture or range change from time to time. Therefore, it is necessary to read the label on the chemical container or consult the local county agent to determine if the chemical is cleared for use on cropland or grazing land.

Safety First

Read and follow all label directions and precautions. Federal regulations and label directions concerning the uses of chemicals are subject to change.

¹*Cirsium arvense* L.

²*Sonchus arvensis* L. and *S. uliginosus* Bieb.

Small Grain, Spraying, and Cultivation. Use $\frac{3}{4}$ pound of 2,4-D or MCPA per acre when grain is in the 5-leaf stage of growth (early June) to kill susceptible plants, prevent seed production, and weaken resistant plants. Use an amine form of 2,4-D or MCPA because an ester form frequently kills the tops of the thistles without killing the roots. After harvest use a treatment that will kill plants that are weakened but not killed by the spray.

There are several systems that can be used.

1. Spray in the grain with $\frac{3}{4}$ pound of 2,4-D amine per acre. In experimental tests, one application of 2,4-D at $\frac{3}{4}$ pound per acre in small grain reduced the stand 30%. (Table 1) A second application after small grain harvest reduced the stand an additional 30 to 40%, giving a total stand reduction of 60% to 70% at the end of one season. This system is less effective than fall cultivation because spraying kills only the susceptible plants. During seasons when poor fall growing conditions exist, fall spraying is less effective than tillage.
2. A better system is to spray in the grain with $\frac{3}{4}$ pound of 2,4-D amine per acre to reduce stands 30% and cultivate three to four times after harvest. The stand of thistles was reduced an additional 58% when the stubble was plowed shortly after harvest and cultivated two times in September. This reduced the stand of thistles 88% after one season, and 100% after two seasons. The cultivation was done with a duckfoot cultivator equipped with 12-inch sweeps. A cultivator equipped with wider sweeps used for all three cultivations would probably give the same results and would leave crop residue on the surface to reduce hazards of erosion.
3. Other systems involve fall plowing. In experimental tests, fall plowing shortly after harvest and spraying the thistles that emerged on the plowing was as effective as plowing and two cultivations, resulting in an 88% stand reduction. Under field conditions this type of fall treatment is less satisfactory. First, there is no way to leave a residue to prevent erosion. Second, thistles sometimes do not emerge early enough to be sprayed—spraying should be done at least a week before frost. Third, thistles not killed by the first application of 2,4-D or MCPA are frequently not affected by a second application — this can be partially remedied by using one herbicide in the grain and the other in the fall.
4. Another system involving fall plowing is to spray in the stubble and plow in October. In experimental tests, spraying in the grain and again in the stubble after harvest reduced the stand of thistles 79%. Late fall plowing after the two sprayings kill an additional 10% for a total of 89% elimination in one year. This treatment leaves the land bare over

winter.

Cultivation and Summer Crops. Cultivate with duckfoot cultivator or blade three times before seeding a close-drilled crop of soybeans, forage sorghum, sudangrass, or buckwheat during late June. Harvest the crop, fall plow, and cultivate once or twice. This system reduces the stand of thistles 75 to 80% in 1 year.

Cultivation and Forage Crops. Cultivate with a duckfoot cultivator or blade every 3 weeks between June 1 and August 15. Seed alfalfa at the rate of 8 pounds per acre, or a mixture of alfalfa and a perennial grass. In a mixture use brome grass or intermediate wheatgrass at the rate of 12 pounds per acre. The stand of thistles is generally reduced 80 to 90% by this system. The cultivation is essential to reduce the competition from a thick stand of thistles so that the crop can get established. However, in thin stands of thistles, equally good results have been obtained when the forage crop was underseeded with a companion crop that was clipped during late June.

REDUCE STANDS 10 TO 50%

Combinations of crops, cultivation, and 2,4-D or MCPA spraying reduce the stands of Canada and perennial sowthistle 50% in one year.

Small Grain and 2,4-D or MCPA. Use $\frac{3}{4}$ pound of 2,4-D or MCPA per acre when spring grain is in the 5-leaf stage to kill susceptible plants, to prevent others from going to seed, and to weaken resistant plants. Spray again after harvest. In experimental tests the first spraying reduced the stand about 30%. The small grain got ahead of the resistant plants and held them in check until harvest. The second spraying (about 2 weeks after harvest) with $\frac{3}{4}$ pound of 2,4-D per acre reduced the stand an additional 30 to 40%. It is seldom advisable to use this practice more than 1 year out of three. Two sprayings generally kill most of the susceptible plants, and spraying in subsequent years generally allows resistant plants to reproduce. Better results may be obtained by using MCPA for one spraying and 2,4-D for the other.

Corn or Sorghum and 2,4-D. Spray corn or sorghum twice a year. Spray in either crop with $\frac{1}{2}$ pound of 2,4-D per acre when the thistles have emerged. Do not cultivate for 1 week after spraying. Spray again after corn has tasseled or sorghum has headed. Apply $\frac{3}{4}$ pound of 2,4-D with a high clearance sprayer equipped with crop nozzles. In experimental tests, this system reduced thistle stands 10 to 30%. It is not advisable to use this system more than 2 years out of three as resistant plants are allowed to reproduce.

Corn and dicamba. Experimental tests indicate spraying with $\frac{1}{4}$ pound of dicamba (tradename "Banvel") gives equal or slightly better Canada thistle control than one application of 2,4-D. There appears

to be less risk of crop injury than from 2,4-D. Spray growing thistles before the corn is 36 inches tall or until 10 days before tasseling. Use drop nozzles for better weed plant coverage after the corn becomes too tall. Avoid drift to susceptible crops such as soybeans.

Alfalfa. A good stand of alfalfa or alfalfa-grass mixture also reduces the stand of thistles 10 to 20% each year. Two years of alfalfa or alfalfa-grass mixture is useful as a follow-up of the system that includes a season of cultivation and a fall seeding of the crop.

Perennial grass and 2, 4-D. Spray in smooth brome-grass or wheatgrass (other sod forming grasses may be as effective in areas where adapted) with $\frac{3}{4}$ pound of 2, 4-D or MCPA when the thistles are starting to form buds and again in August. This system reduced the stand of thistles 10 to 25% each year in experimental tests. It is useful as a follow-up to a system that includes a season of cultivation prior to seeding the grass. Two sprayings a year in already established grass seldom gives 100% elimination, even when repeated for several years. The spray kills susceptible plants, but allows resistant plants to reproduce. Better results may be obtained by using MCPA for one spraying and 2, 4-D for the other.

PREVENT SPREADING

Spraying once a year with 2,4-D in small grain, corn, sorghum or perennial grass reduces the stand of thistles slightly and keeps them from spreading to any great degree. Spray either crop with $\frac{1}{2}$ pound of 2,4-D per acre.

PREVENT SEED PRODUCTION

Mow before flowers have been open 1 week or spray before blooming to prevent seed production.

Prevention of seed production is more important for thistles than for most noxious weeds. It can be done by mowing or spraying at the proper time. Since a high percentage of seeds are ready to germi-

nate after flowers have been open 8 to 10 days, mowing cannot be delayed more than 1 week after blooming. Likewise, spraying with $\frac{1}{3}$ to $\frac{1}{2}$ pound of 2,4-D must be done before blooming.

You need not be concerned about thistle buds in seed grain. They must open before pollination takes place and they must be open over a week before seeds are mature enough to germinate. Although there is no possibility of the buds containing viable seeds, there is still a possibility that older heads were threshed.

THREE-YEAR PROGRAMS

A total of 56 combinations of crops, cultivation, and spraying were tested. Fifty of them reduced the stand of thistles over 90%, while half of them gave complete elimination. Results from several of the combinations are given in table 1.

SEMISELECTIVE AND NONSELECTIVE HERBICIDES

Numerous chemicals are effective for eliminating patches (weed nurseries) with one treatment applied to the patch and a band 6 or 8 feet wide around the outside of the patch. It kills plants in the patch and roots that extend beyond the patch. Seedling growth may appear after two or three years. These young plants can be eliminated with a 2, 4-D application. Many new semiselective chemicals do not permanently injure perennial grasses, but will prevent crop growth for two or more years.

The chemicals listed in Table 2 generally give 95 to 100% elimination when applied at the rates designated. Rates are given in pounds, pints, or fluid ounces of commercial product for each square rod. Use the higher rates for summer application for those chemicals indicating a range of treatment rate.

U.S.D.A. regulations concerning the use of these herbicides on cropland, pasture or range change from time to time. Therefore, it is necessary to read the label on the chemical container or consult the local county agent to determine if the chemical is cleared

Table 1. The Average Percentage of Canada Thistle Killed in Three Years

First Year		Second Year		Third Year	
Treatment*	% Kill	Treatment*	% Kill	Treatment*	% Kill
Grain; 2,4-D 6/7	30	Same as 1st year	40	Same as 1st year	50
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Same as last year	100	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Corn; 2,4-D 6/20 and 8/20	95	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; cult. 9/5 and 9/25	88	Cult. 6/7 and 6/20; Sudan	99	Flax; $\frac{1}{4}$ lb. MCPA	99
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Same as 1st year	98	Same as 1st year	100
Grain; 2,4-D 6/7; plow 8/11; 2,4-D 9/25	88	Corn; 2,4-D 6/20 and 8/20	98	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Same as 1st year	100	Same as 1st year	100
Grain; 2,4-D 6/7 and 8/25; plow 10/15	89	Corn; 2,4-D 6/20 and 8/20	92	Same as 1st year	98
Cult. 6/7, 6/28, 7/19, 8/9; alfalfa 8/15	88	Harvest hay	98	Harvest hay	100
Cult. 6/7, 6/28, 7/19, 8/9; brome 8/15	88	Harvest hay	93	Harvest hay	100
Alfalfa underseeded in oats; clip 6/20	62	Harvest hay	89	Harvest hay	100

*All 2,4-D applications were at the rate of $\frac{3}{4}$ lb./A. of an amine form; cultivations were performed with duckfoot cultivator equipped with 12-inch sweeps. Spraying and cultivating were done on the dates designated.

for use on cropland or grazing land.

Amitrole-T in Noncropland. Use 4 to 6 pounds active ingredient of amitrole-T (tradename "Cytrol" or "Amitrol-T") in 40 to 50 gallons of water per acre when thistles are starting to bud. In experimental tests, this treatment reduced the stand of Canada thistle about 90% in 90% of the trials. Similar treatments on thistles 6 to 8 inches tall generally gave good top kill, but very little root kill. Excellent results are sometimes obtained by treating regrowth of thistles that have been mowed or plowed.

Amitrole-T is a non-selective spray. It is somewhat expensive, but is frequently useful for eliminating patches. It is generally less effective on sowthistle than on Canada thistle. Food or feed should not be harvested or grazed from treated areas.

REDUCE STANDS IN SHELTERBELTS

AMS as suggested in Table 2 has been used to drastically reduce stands of leafy spurge in tree plantings. No injury to trees has been reported; however, AMS

currently is not labeled for use in tree plantings. The manufacturer of the chemical is not responsible for any problems which result from this use. None of the other chemicals listed in Table 2 should be applied closer to a tree than the "drip line." Or use 4 to 6 pounds active ingredient of Amitrole-T (brand names "Cytrol" or "Amitrole-T") in 40 to 50 gallons of water per acre. Amitrole-T can be safely used in tree plantings if spray is not allowed to contact the leaves. This chemical may be used in noncropland areas only; therefore, food or feed should not be harvested or grazed from treated areas.

To reduce stands 10 to 25% in one year, use 1½ lbs. 2, 4-D acid equivalent per acre twice each season (early June and late August). Use very low volatile formulations of 2, 4-D such as an emulsifiable acid formulation (brand name "Weedone 638"), an oil soluble amine formulation (brand names "Emulmine 3E" or "Dacamine"), or the lithium salt of 2, 4-D (brand name "Lithate"). Do not allow spray drift to contact leaves of trees; it will cause injury.

Table 2. Amount of Semiselective Herbicide Required to Kill Canada and Perennial Sowthistle

Chemical	Amount per Square Rod	Cost per Square Rod*	Amount per Acre	Cost per Acre
AMS (1)	4-6 lbs.	\$1.04-2.52		
2,3,6-TBA (2)	¾ pt.	0.32	15 lbs. (7½ gal.)	\$51.75
Fenac (3)	½ pt.	0.59	15 lbs. (10 gal.)	95.00
Dicamba (4)	1.6 fl. oz.	0.37	8 lbs. (2 gal.)	60.00
Picloram-2,4-D Mixture (5)	1.2 fl. oz.	0.23	1½ + 3 lbs. (1½ gal.)	36.90
Picloram-Borate Mixture (6)	¾ lb.	0.47	120 lbs.	74.40

*Approximate retail cost of chemical for 1 square rod at lower rates of application.

Cost decreases for large areas and varies somewhat with local situations.

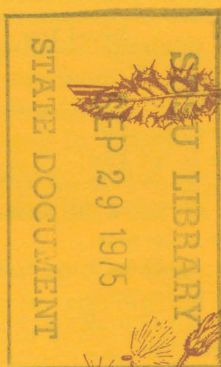
- (1) Brand Name "Ammate X." Use 2 qts. of spreader-sticker/100 gal. spray solution (approved for use on non-cropland only).
- (2) Brand Names "Benzac 1281," "Trysben 200" (approved for use on noncropland only).
- (3) Brand Name "Fenac" (approved for use on noncropland only).
- (4) Brand Names "Banvel" and "Dicamba" (rates up to 8 lbs./A may be used in grassland, higher rates approved for non-cropland only).
- (5) Brand Name "Tordon 212" (approved for use on noncropland only).
- (6) Brand Name "Tordon Beads" and "Borolin" (approved for use on noncropland only).

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