Vol. 1, No. 7 (Rev.). Approved 5/26/2017

Illinois Nature Preserves Commission

VEGETATION MANAGEMENT GUIDELINE

Canada thistle (*Cirsium arvense* (L.) Scop.)

SPECIES CHARACTER

DESCRIPTION

Canada thistle is a 2 to 5 foot (0.6 to 1.5 meter) tall forb with deep, wide spreading, horizontal roots. Rosettes may form in fall or spring and will bolt into an active shoot that will flower during summer. The grooved, slender stems branch only at the top and are slightly hairy when young, becoming covered with hair as the plant grows. The oblong, tapering, sessile leaves are deeply divided, with prickly margins. Leaves are usually green, smooth on both sides, but may be whitened on the lower surface when downy hairs are present. It has numerous small, compact (3/4 inch or 1.9 cm diameter) heads with the involucre (bracts that subtend the head) being less 3/4 inch tall. The bracts of the involucre are usually without spines although the outer bracts may have spines up to 2mm (1/16 inch) long. Staminate (pollen-producing) and pistillate (seed-producing) flowers are born on separate plants. The rose-purple or rarely white flowers appear on upper stems from June to September with most occurring in early summer. Staminate flowers turn brown as they mature while pistillate flowers have a vanilla-like aroma and develop copious white seed hairs (pappus). Seeds are small (0.5 cm or 3/16 inch long), light brown, smooth and slightly tapered with a tuft of tan hair loosely attached to the tip.

SIMILAR SPECIES

Several native thistles are similar to Canada thistle, but it is distinguished from them by its deep-running perennial rootstocks. *Cirsium altissimum* (tall thistle) is a robust fibrous-rooted perennial. Its leaves are large, coarsely toothed or shallowly lobed with weak spines on the margins and dense, white-wooly lower leaf surfaces. The involucre is(1-11/2 inches) long with spines up 5cm (1/4 inch long). *Cirsium discolor* (pasture thistle) is similar to tall thistle, but its leaves are deeply lobed and the spines are stout. *Cirsium hillii* (Hill's thistle) is a biennial with slightly thickened roots that have hollow longitudinal chambers. The involucre is 2.5 - 3.5 cm long. Canada thistle should be accurately identified before attempting any control measures. If identification of the species is in doubt, the plant's identity should be confirmed by a knowledgeable individual or by consulting plant identification manuals or keys.

DISTRIBUTION

Canada thistle is naturalized from Europe. It was introduced in the northeast sometime in the 17th century and was declared a noxious weed by Vermont in 1795. Twenty five states had declared it a noxious weed as early as 1918. By 1954, it had been declared a noxious weed in 43 states. It is common in the northern half of Illinois and rare in the southern half. This species is very rare in southern

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Indiana and is not a serious problem in Missouri natural areas.

HABITAT

Canada thistle grows on but waterlogged, poorly aerated soils and grows best in disturbed areas (overgrazed pastures, old fields, waste places, fence rows, along roadsides). It sometimes occurs in wetter areas, such as stream banks and ditches, where water levels fluctuate and can invade sedge meadows, prairies, barrens, glades, and savannas from adjacent disturbed sites. Canada thistle is not shade tolerant. Its growth is reduced when light falls to 60-70% of full daylight and death occurs when light is reduced to 20% of full sun (Butterfield et al. 1996). It does not grow well in undisturbed prairies, good to excellent pastures, or in woodlands. Plants are spindly with few flowers on sites that are shaded most of the day and do not persist in tallgrass prairies in good to excellent condition.

LIFE HISTORY

This dioecious, weedy perennial occurs in patches, commonly in disturbed areas. Pollination is mostly by honeybees; wind pollination is limited. Introduction to new areas occurs mostly by windborn seed or sometimes by run-off in ditches. Seeds mature quickly and are capable of germination within 8 to 10 days of the flowers opening. Most seeds buried less than 1.5 cm (½ inch) deep germinate within one year, but seeds that are buried deeper can remain viable for more than 20 years.

Canada thistle has an extensive root system that includes both lateral roots and a fibrous taproot. Lateral roots usually grow within 15 to30 cm (6 to 12 inches) of the soil surface and give rise to aerial shoots at 5 to 15 cm (2 to 6 inch) intervals. They typically grow in a straight line for 60 to 90 cm (2 to 3 feet) then bend down and grow vertically. Vertical roots can grow as deep as 6.8 meters (22 feet) and store water and nutrients in their branches. To prevent seedlings from becoming perennial, they must be killed before three weeks of age (Haderlie et al. 1991). Shoot growth must be prevented for at least two year two years to deplete roots and kill Canada thistle.

Basal leaves are produced the first year; flowering stems the next. Some seeds immediately produce rosettes before winter and emerge to flower the next spring. Emergence occurs in early May, with vertical growth in mid-to-late June. Flowering usually occurs in June or early July and most seed is set from late June to early August. As the frequency of Canada thistle increases at a site, species diversity decreases, possibly due to allelopathic substances.

EFFECTS UPON NATURAL AREAS

Canada thistle is a non-native species capable of crowding out and replacing native grasses and forbs. It is detrimental to natural areas where it occurs, particularly non-forested communities, and it can change the natural structure and species composition if it becomes well-established. Prairies, barrens, savannas, and glades are susceptible, particularly those sites that have been disturbed and are reverting naturally to native species. Canada thistle is an aggressive invader of prairie reconstructions and other areas undergoing manipulative restoration management.

CURRENT STATUS

Canada thistle is a noxious weed under Illinois law.

CONTROL RECOMMENDATIONS

Many researchers emphasize that there is no one single method to control Canada thistle and it is often necessary to use two or more methods at any given site. Once established, Canada thistle is very tenacious and difficult to control. Early detection is critical and management must be sustained over several years to be successful.

RECOMMENDED PRACTICES IN HIGH QUALITY NATURAL COMMUNITIES

Effort in areas of heavy infestation

Prescribed fire followed by treatment with herbicide can be an effective deterrent for this species. Late spring burns, between April and June are most detrimental to this noxious weed and should be used when possible. Burning can result in greater visibility of rosettes and increase exposure of rosettes to chemical spray. Burning should be followed by cutting or spot treatment with a 2.5 % solution of glyphosate (Roundup) when plants are in late bud stage or early bloom stage (usually June) and root reserves are lowest. Cutting should be done prior to flowering because seeds will continue to mature even if the plants are cut. Plants cut during flowering should be burned to prevent spreading of seed.

Care should be taken to avoid contacting non-target plants. **Do not spray so heavily that herbicide drips off the target species.** The herbicide should be applied while backing away from the area to avoid walking through wet herbicide. By law, herbicides may only be applied as per label instructions and by licensed herbicide applicators or operators when working on public properties

Clopyralid (Transline) with surfactant applied to rosettes or bolting plants prior to flowering has proven effective. For high pressure systems, Transline should be applied as a 0.06% active ingredient solution. For spot treatments with backpack spray systems, Transline should be applied as a 0.15% active ingredient solution. While Transline is more selective than some other herbicides, it is very effective on all legumes and many composites, nightshades, and smartweeds. Transline is not recommended for use in areas with sandy soils.

Cutting or mowing of non-flowering Canada thistle in late July followed by treatment with glyphosate about four weeks later can also be effective. Haderlie et.al. (1991) suggests that herbicide application in the fall is ideal if the plant has young leaves and there is adequate soil moisture for growth.

Effort in areas of light infestation

Spot application of the amine formulation of 2,4-D is selective for broadleaf plants. Platoon, Savage CA, Weedar 64 applied at the rates of 0.5%, 0.4% and 0.8% active ingredient solutions according to label instructions can control this plant. The herbicide 2,4-D amine To reduce vapor drift, use an amine formulation of 2,4-D rather than an ester formulation. Individual plants of Canada thistle should be treated with a wick applicator or hand sprayer. For control near water, apply a 1.0% active ingredient

solution of glyphosate trade name (Rodeo, etc) at the rate of plus surfactant in the spring and again in the fall. Follow this program for two to three years.

Maintenance control

Management practices that maintain and encourage the development of healthy stands of native species will help prevent the establishment of Canada thistle or help shade and weaken plants on sites already infested.

Repeated and frequent pulling or hand-cutting of individual plants can be effective at preventing flowering and seed production. Cutting or pulling should occur at least three times each season, in June, August, and September. This treatment is feasible for light and moderate infestations, but may be too time consuming in heavy infestations.

RECOMMENDED PRACTICES ON BUFFER AND SEVERELY DISTURBED SITES

Effort in areas of heavy infestation

Control procedures recommended above for high quality natural communities are also applicable to buffer and severely disturbed sites. Additional control measures are as follows. Large sites (old fields, ditch banks, roadsides) with heavy infestations should be mowed as close to the ground as possible shortly before flowering to prevent seed production. Some spot mowing may be needed in August-September to prevent flowering and seed production before winter. Mowing equipment should be inspected, and cleaned if necessary, to prevent spread of thistle seed.

Clopyralid plus 2,4-D (tradename Curtail) applied as a 0.3% active ingredient solution has shown consistent control of Canada thistle in agricultural areas. Other practices used in highly disturbed areas of heavy infestations, such as cropland or abandoned cropland, are the bare fallow or summer fallow method which involves plowing an area without planting a crop (Johnson 1912; Cox 1913: Hansen 1918: Donald 1990). **Plowing should be shallow enough to avoid the horizontal root system (<less than 4 inches deep); disturbing the root system during the growing season only serves to spread the plant**. For the remainder of the growing season, the area should be cultivated with a disk harrow or sweep often enough to keep the thistle shorter than 3 inches. Keeping down the top growth is essential and serves to exhaust the root resources. The site could be plowed and sowed to a cover crop (wheat, alfalfa, rye), if practical and desirable. The following May, the cover crop should be plowed under and desired native species seeded. Planting a glyphosate-resistant crop (soybeans), followed by two applications of glyphosate per growing season can greatly reduce, but not eliminate Canada thistle.

Effort in areas of light infestation

A foliar application of a 1.0% solution of glyphosate (trade name Roundup, etc) applied in spring when plants are 15 - 25 cm (6-10 inches) tall is an effective herbicide treatment. Individual plants can be spot-treated with a wick applicator or backpack sprayer. Roundup normally kills the entire plant, including the roots, when applied in this manner. Roundup is a nonselective herbicide and precautions should be taken to avoid contacting non-target plants with the solution. Do not spray so heavily that herbicide drips off the target species. As with 2,4-D amine, Roundup should be applied

while backing away from the areas to avoid walking through the wet herbicide. Roundup should not be used in high-quality natural areas during the growing season because of the possibility of harming non-target plants.

Cattle and goats will sometimes gaze on Canada thistle despite the prickly leaves. Trampling by cattle also seems to reduce the vigor of the clones.

BIOLOGICAL CONTROL

Natural enemies of Canada thistle include the leaf-feeding tortoise beetle (*Cassida rubiginosa*), the seed-head fly (*Terellia ruficauda*), stem and shoot gall fly (*Urophora cardui*), the root-feeding weevil (*Cleonis pigra*), the seed-head weevils (*Larinus planus* and *Rhinocyllus conicus*) a stem mining weevil (*Ceutorhynchus litura*), the bacterium *Pseudomonas syringae* pv. *tagatis*, and the rust *Puccina punctiformis*. However, Canada thistle is a significant agricultural weed in its native range, suggesting that natural enemies are not very effective in limiting its range. Additionally, use of biological control agents is not recommended at this time, as most are not host-specific and can have deleterious impacts on populations of native thistles, including listed species.

FAILED, INEFFECTIVE OR NOT RECOMMENDED PRACTICES

Mowing reduces above ground biomass, but will not kill Canada thistle unless repeated at 7 to 28day intervals for up to four years.

Mulching is not practical and may enhance overwinter survival of Canada thistle.

Cattle and horses will not graze on Canada thistle. Goats and sheep will feed on very young plants, but grazing may encourage the spread of Canada thistle. Seeds can also be dispersed in animal droppings.

Fire early in the growing season can increase sprouting and reproduction.

Drought stress can reduce the effectiveness of most herbicides on Canada thistle.

Treatment of Canada thistle immediately before the first frost is not effective.

Application of systematic herbicides during the dormant season do not appear to be effective and portions of the root system that were inactive at the time of application can produce vigorous growth.

Deep, single pass tillage is not an effective control for Canada thistle as it can readily regenerate from root fragments less than an inch in length. Single pass tillage may provide ideal conditions for by other nonnative species and failure to properly clean equipment of root fragments can further spread Canada thistle.

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