

# Leafy Spurge

## THE SILENT INVADER

### Introduction

Few plants introduced from Europe have had such an impact on North American native prairie as leafy spurge (*Euphorbia esula* L.). Introduced to the United States in 1827 as a contaminant of seed grain, it has marched a steady path across the mid-west and western plains states and the Canadian prairies. Its impact has been felt over a large area, as it now infests over 3,000,000 acres in 29 states; 340,000 acres in Manitoba; 45,000 acres in Saskatchewan and 15,000 acres in Alberta.

Leafy spurge is a tenacious plant that infests grazing lands, degrades wildlife habitat and associated recreational lands, decreases native prairie plant diversity as well as threatens their very survival through displacement. Land values on affected lands are dropping, as experienced recently by a landowner whose land infested with leafy spurge dropped from an assessed value of \$150 per acre to \$60.



Leafy spurge is usually found in dense patches which exclude most other plants.

### Identification

Leafy spurge is a long-lived, deep-rooted perennial that is most often found growing in dense patches. It has a hairless stem with pale blue-green or green leaves and grows from 16 - 32 inches tall (40 - 81 cm). The flowers are small, green and inconspicuous, appearing two weeks after the yellow-green, heart-shaped bracts which are often mistaken for the flowers. These appear in May, with flowering complete by mid-July. Seed matures and is dispersed in late July and early August.

### Biology

Few plants have the competitive advantage exhibited by leafy spurge. It has several mechanisms that enable it to exclude competition from other plants. These mechanisms include wide-spread seed dispersal, an aggressive root system, the ability to inhibit growth and development of nearby species, as well as a resistance to herbicide treatment.



Seeds, which form three to a capsule, "explode" when ripe, ejecting seed up to 15 feet (4.6 m) from the plant.

Seeds are produced three to a capsule and usually about 140 per stem. At maturity, the seed capsules "explode", projecting the seeds up to 15 feet (4.6 m) from the plant. The seeds are moved from place to place in a variety of ways, such as in mud picked up by vehicle tires (including recreational vehicles); in contaminated hay, gravel and topsoil or the hair and feet of animals. They also float on water, enabling infestations along waterways or flood plains. Sheep, goats, rodents, birds and deer ingest the seeds and deposit them some distance away in their dung. Viability of the seeds lasts up to eight years in the soil. The deeper the seeds are in the soil, the longer they last.

Leafy spurge has an aggressive root system. The roots of a mature plant can reach 26 feet (7.9 m) deep and move laterally 15 feet (4.6 m) annually. The root system has huge carbohydrate reserves which can support the plant through long periods, even years, of drought, grazing stress and herbicide damage. They regenerate quickly from the hundreds of buds along the roots, which can each produce a new, independent plant. New shoots appear quickly if the top growth is damaged or removed by hand-pulling, herbicide treatment, mowing, grazing or fire. These young shoots are highly competitive and aggressive.

Growth begins in early April, allowing the spurge to become well established before surrounding plants begin active growth. In this manner they monopolize surrounding moisture, light and nutrients. While the main growth period is from April to July, a second growth stage occurs in fall. In the absence of competition, seedling roots can grow three feet deep and spread up to 40 inches horizontally. Existing patches usually spread vegetatively up to four feet per year.

Tremendous genetic variability allows this plant to be extremely adaptable. It is found in tame or native pasture, native range, roadsides and ditches, woodland and farmland; from wet riparian areas to dry hillsides. Spurge is very successful in disturbed areas, including overgrazed pastures, where continual selection of desirable plant species by grazing animals and avoidance of leafy spurge enhance the weed's success.

## Management

Successful management of leafy spurge requires an integrated approach. All tools currently available should be used to gain a measure of control on its spread. Five control methods can be used - prevention, plant competition, physical control, biological control and chemical control. *Leafy spurge control must be considered a long-term management program.*

### Prevention –

New infestations of leafy spurge come from importation of either seeds or root pieces by a variety of means – recreational activities, agriculture and construction. Seeds stuck in mud on vehicle tires or feet of livestock serve as vectors for new infestations as are landscaping soil, fill dirt or gravel. It is well-advised to check and clean agricultural machinery when moving from infested to non-infested areas.

Livestock feed and crop seed can contain spurge seeds. Avoid using hay that comes from affected areas as it may be contaminated. Certified weed-free forage and grain seed is available. Before moving animals from infested areas, hold them in small paddocks or pastures for 6 to 11 days to allow seeds time to pass through their digestive tracts.

Herbicides such as 2,4-D Ester are used to reduce top growth and reduce seed production. *Sheep and goats will graze leafy spurge and are effective at controlling both the spread of the plant and seed production.*

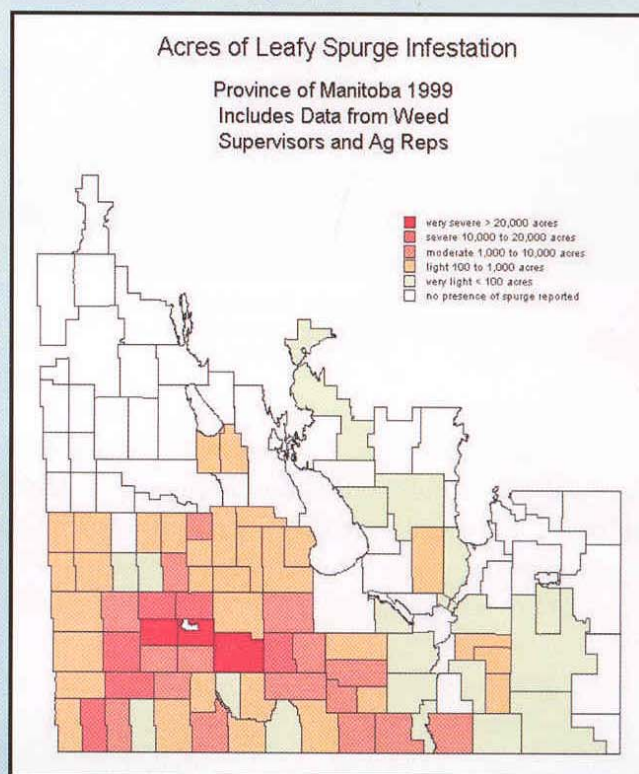
### Plant Competition –

Plant communities can be manipulated to favour one type of plant over others. The absence of grazing pressure on leafy spurge gives it an advantage over the more desirable grasses. By introducing grazing pressure on leafy spurge using sheep or goats, its competitive edge is reduced. Grazing rotations can be used to benefit the grasses, by introducing the sheep twice during the growing season - spring and fall. Each grazing period must be followed by a rest period to allow the grasses to re-grow. Schedule the rotations to prevent the leafy spurge going to seed, usually in May and June as well as August and September. Once the “yellow” is gone, the sheep can be moved to another location. Stocking rates will vary, but a starting point is three to six ewes per acre of leafy spurge per month, or one to two ewes with lambs per acre per summer. Adjust the stocking rate as required by the carrying capacity of the pasture.

Goats are also used to graze leafy spurge and are more effective especially in rough terrain. The stocking rate must also be flexible, but three to four goats per acre of leafy spurge for four months is a good place to start.

### Physical Control –

Cultivation can be used to control leafy spurge in cropland, beginning in spring when the stems are three to four inches tall. Repeated cultivation throughout the growing season will help



Leafy Spurge Distribution in Manitoba, 1999

control its spread. This treatment must however be continued for up to two growing seasons. Plants can reform from root pieces as small as 1/2 inch long (1.5 cm) and 1/10 inch diameter (1.5 mm). Care should be taken to prevent transporting root pieces from one field to another.

Mowing and burning stimulate new plant formation. Either can be used however to remove ground litter and allow uniform re-growth for more effective herbicide treatment. Mowing will reduce the plant's ability to form seed if it is repeated every two to four weeks during the growing season.

Hand weeding is impractical except with small patches of leafy spurge. It does however prevent seed production if done at regular intervals.



The black dot spurge beetle (*Aphthona nigriscutis*) is one of the insects used as a biological tool to control of leafy spurge.  
Actual size – ●

#### Biological Control –

Biological control refers to using a plant's natural enemies to adversely affect growth and reproduction. These enemies may be insects, fungi, bacteria or some other organism. Their actions may selectively retard the plant's growth, prevent seed development or kill the plant completely. These controls serve as an environmentally-friendly method of weed control especially where other techniques cannot be used or in combination with other control methods.

Several insects have been imported from Europe to North America to support long-term leafy spurge biological control programs. Most successful so far have been spurge beetles of the *Aphthona* family. The black dot spurge beetle (*A. nigriscutis*) has been most successful when released on an open, south-facing hillside with well-drained sandy or sandy-loam soils. A leafy spurge density of 150 - 200 plants is desirable. Other spurge beetles are the brown dot (*A. cyparissiae*), and *A. czwalinae*. These flea beetles range in size from 2 to 3.5 mm and tend to congregate for feeding, mating and egg-laying. They feed on leafy spurge leaves and bracts in the summer.

The spurge leaf roller, which as an adult is a moth (*Lobesia euphorbiana*) whose larvae feed on the flowers, has become well established in some areas of southwest Manitoba especially in the Shilo and Brandon area.

Site selection is very important for the success of insect biological controls. The spurge beetles do most of their damage while in the larval stage. The spurge beetles have the greatest effect on plant grown in loam, silt loam, silt clay and sandy loam soils. The sites should be well-drained, usually a south-facing slope, away from shady areas. It is also recommended that placement of beetles occurs in patches of moderate infestation (60 - 90 stems per square meter), rather than in heavy infestations. They will move into those heavier areas once established. At each new site, at least 1,000 beetles should be released to produce an effect on the plants and to facilitate population establishment.

From late June through July, the adult female lays her eggs at or near the base of the plant. In 8 to 10 days, the eggs hatch and the larvae burrow through the soil to the roots. For maximum benefit, the roots should be located no more than two to three inches below the soil surface. The larvae feed on the roots through summer and fall, hibernating during winter. With the insect damage to the root system, the plant becomes weakened and often cannot flower the following year. As the beetle population increases, the plants may die. In spring, the larvae will feed for about three weeks before pupating and emerging as adults.

Care of the release site is very important. Avoid herbicide application at the release site except around the perimeter. Refrain from spraying insecticides within half a kilometer of the site. Chemical drift may adversely affect the spurge beetles. Cultivation and burning at a site will reduce the number of beetles considerably. It is only through ever-increasing numbers of beetles that control may be obtained. Allow three years for the insect population to increase before collection of beetles for introduction to a new site.



A cattle pasture where no control measures have been taken to control leafy spurge. Assessed land values are now dropping as a result of leafy spurge infestations.

## *Economic Impacts of Leafy Spurge Infestation*

- **Income losses from grazing capacity reductions (ie. – a 40% leafy spurge infestation results in a 50% reduction in carrying capacity)**
- **Lost livestock sales**
- **Reduced grazing land values in the absence of alternative uses**
- **Reduction of plant diversity reduces a site's value as wildlife habitat**
- **\$20 million in economic impact annually in Manitoba**

### Chemical Control –

Herbicides have been used to help control leafy spurge on agricultural lands, but their effectiveness is generally short-lived. 2,4-D has been used to temporarily kill top growth. Both the ester and amine formulations are effective. Proper timing of the spraying has produced the best results and is most cost effective. Two applications annually give the best results - in spring, just prior to true flowering and in fall during the re-growth phase. Avoid using 2,4-D around trees, as it may affect their growth if it gets onto the green wood or leaves.

Picloram (Tordon®) is effective on clay-based soils however not cost effective with repeated applications. It is 90% effective in its first year of application, but the plants' recovery reduces this to 70% after three years and more rapidly after that. Picloram is not recommended in sandy or sandy-loam soils because it is very slow to break down in soil and its movement in ground water can be considerable. Only licensed chemical spray operators can obtain the chemical.

Glyphosate (Roundup®) will give effective control in combination with 2,4-D; however, one must be aware that as a non-selective herbicide, it will kill surrounding vegetation. Good results have been achieved from spraying between mid-July to early-September, when many of the cool-season grasses are

semi-dormant. Warm-season grasses will still be affected as this is their active growth period. Fall applications of this combination are effective in controlling spurge and with little damage to the grasses, which are inactive by then.

### *Conclusion*

Leafy spurge is a tenacious, resourceful plant that is difficult to control. For a successful suppression program, one must use all the current tools available. An effective spurge management program will be long-term and need to be constantly monitored. Every program will require adjustment as plant populations and conditions change. Success in reduction and eradication of this weed is possible, but only with commitment, time and persistence.

**For more information, contact your local Weed Supervisor or Manitoba Agriculture and Food representative.**

#### **Project Partners:**

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