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Leafy spurge: biology and management

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Quick Facts

- Leafy spurge is a creeping perennial that reproduces from seed and vegetative root buds.
- It can reduce cattle carrying capacity of rangeland or pastures by 50 percent to 75 percent.
- Leafy spurge is difficult to control. Its extensive root system has vast nutrient stores that allow recovery following control attempts.
- Combine control methods into a system to achieve best results.
- Persistence in control efforts is imperative to return leafy spurge infested ground to a productive state.

Leafy spurge is a creeping, herbaceous perennial weed that reproduces from seed and vegetative root buds. It was introduced from Europe during the 19th century as a seed contaminant of small grains and grass seed. It can reduce rangeland cattle carrying capacity by 50 to 75 percent. About half of this loss is from decreased grass production. Cattle won't graze in dense leafy spurge stands, and these areas are a 100 percent loss to producers. The cattle industry loses millions of dollars annually to leafy spurge infestations.

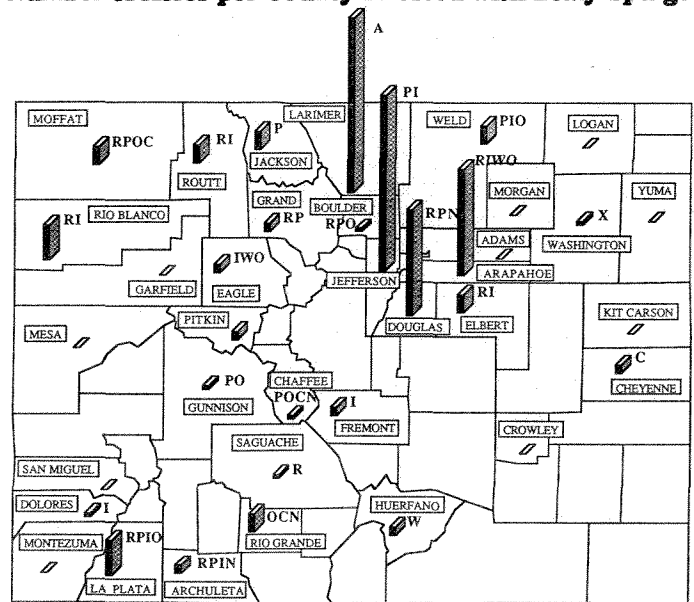
Distribution

Leafy spurge infests over 2.5 million acres in North America. Over 1 million acres in North Dakota and Montana are infested with leafy spurge and about 50,000 acres in Wyoming. There are approximately 45,000 infested acres in Colorado. Leafy spurge occupies a broad ecological range. Although it frequently establishes in moist areas, such as along waterways in eastern Colorado where it is spreading rapidly, it also adapts well to dry, upland sites and shallow, rocky soils.

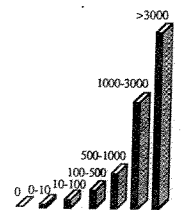
Description

Leafy spurge is an erect plant and grows 1 to 3 feet tall. Leaves are bluish-green, with smooth mar-

Number of Acres per County Infested with Leafy Spurge



- | | | | |
|---|-----------|---|-------------------|
| R | Rangeland | C | Cropland |
| P | Pasture | N | Non-cropland |
| I | Riparian | D | Irrigation Ditch |
| W | Wetlands | A | All habitat types |
| O | Roadside | X | No habitat listed |



gins. They are narrow, 0.25 inch to 0.5 inch wide, and 1 inch to 4 inches long. Umbel flowers are surrounded by heart-shaped, showy yellow-green bracts (an umbel looks similar to the stays of an umbrella if it is held upside down). Flowers occur in numerous clusters toward the top of the plant. Seeds are round to oblong, about 1/12-inch long, gray or mottled brown with a dark line on one side.

Leafy spurge contains a white milky latex in all plant parts. Latex distinguishes leafy spurge from other weeds (yellow toadflax) particularly when plants are in a vegetative growth stage.

Leafy spurge has an extensive root system that is abundant in the top foot of soil but may grow 15 feet

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deep. Roots contain substantial nutrient reserves that allow the weed to recover from stress, including control efforts. Numerous vegetative buds along roots make new shoots. This contributes to its persistence and spread.

Phenology

Leafy spurge shoots originate early spring from crown tissue just below the soil surface and from sporadic buds along the root system. Leafy spurge is competitive, one of the first plants to emerge each spring, and uses moisture and nutrients that otherwise would be available for desirable vegetation.

Flowering occurs in April and May, but may occur through fall. Bracts emerge about two weeks before flowers and give leafy spurge the appearance of flowering. It is important to recognize true flower emergence for optimum herbicide application timing. Seeds are expelled up to 15 feet when capsules dry. An average of 140 seeds per flowering shoot are produced, which averages 2400 seeds/yc². Seeds are viable up to eight years in soil. Water, birds, animals, and human activities aid seed dispersal. Seeds readily float and waterways (in eastern Colorado) are good sources for new infestations.

Peak seed germination generally occurs in May. Seedlings quickly develop a perennial habit, i.e., the ability to reproduce vegetatively. Perennial leafy spurge is much more difficult to control than seedlings. Seedlings develop vegetative buds within 10 to 12 days after emergence.

Management

Leafy spurge, like all weeds, should be managed with a combination of control methods. It is extremely difficult to manage and it can recover from almost any control effort. Therefore, a management scheme that combines control methods over four to five years is recommended. Even after that time, infestations should be monitored for leafy spurge recurrence and a maintenance program adopted to prevent reinfestation.

Cultural control. Vigorous grass growth is a very important aspect to leafy spurge control. Overgrazing stresses grasses and makes them much less competitive with weeds, leafy spurge in particular. Fertility and irrigation maintenance, where applicable, also may favor grass growth and make it more competitive with leafy spurge.

Chemical control. Timing of herbicide application for optimum leafy spurge control is imperative. Research from North Dakota State University indicates that 2,4-D, dicamba (Banvel), and picloram (Tordon 22K) are most effective when applied in spring when true flowers emerge (not just bracts). Fall application to leafy spurge regrowth also is good timing for these herbicides. Glyphosate (Roundup) is most effective when applied sequentially (7.0 lb ai/A) at one month intervals, coupled with fall grass seeding.

Picloram is the most effective herbicide for leafy spurge control. Treat large, readily accessible areas with 0.5 pound ai/A for three to four consecutive years. More remote areas may be treated with 1 pound ai/A for two consecutive years or once every other year for three years depending on leafy spurge recovery after the first treatment. With either treatment, monitor infestations and

retreat with 0.5 pound ai/A of picloram when shoot control is less than 75 percent. Inaccessible areas may be treated with 2 pounds ai/A of picloram. This treatment may not be economically feasible or environmentally safe, depending on location. Research indicates that picloram may be tank-mixed with 2,4-D and provide adequate control. Apply 0.25 to 0.375 pound ai/A of picloram mixed with 1 to 1.5 pounds ai/A of 2,4-D in spring when leafy spurge flowers. When this application is made for three to five consecutive years, leafy spurge shoot control is generally 80 percent to 90 percent and cattle will feed in the area again.

Dicamba also is effective against leafy spurge and should be applied at 2 pounds ai/A in spring for three consecutive years. Often control is not very good in the first year, but improves over the next two years. At that time, a maintenance schedule that uses low rates of dicamba + 2,4-D (0.125 to 0.25 + 0.5 - 1 pound ai/A), or picloram + 2,4-D (0.25 + 1.0 pound ai/A) as needed can be used to keep infestations under control.

NOTE: AVOID USING SOIL ACTIVE HERBICIDES SUCH AS TORDON OR BANVEL NEAR WINDBREAK PLANT OR OTHER DESIRABLE WOODY VEGETATION. PLANT INJURY OR DEATH CAN OCCUR. ALSO, DO NOT ALLOW ANY HERBICIDE TO DRIFT ONTO DESIRABLE WOODY VEGETATION FOR THE SAME REASONS.

Biological control. Sheep or goats can be used to help control leafy spurge. Research from Montana State University indicates that 50 percent of a sheep's diet is leafy spurge with no deleterious signs. Introduce sheep to spurge early spring when the weed is succulent. Goats will consume leafy spurge at almost any time during the growing season. Rotate pastures to prevent seed production and allow desirable forage plants to regain vigor. If stock graze leafy spurge after seed formation, hold animals in a corral for at least seven days before moving them to an uninfested area. This reduces viable seed passage. Using sheep or goats followed by fall herbicide treatment may be an effective, integrated means to use infested ground and control the weed. Grazing most likely keeps leafy spurge in a stressed condition throughout the growing season causing it to draw upon nutrient reserves in its root system to build new shoots. This lowers stored food reserves and makes the weed more susceptible to fall herbicide applications. (Research at Colorado State is in process to test this concept. Such a management program would combine biological and chemical control methods.)

Several insects are being examined by the USDA for leafy spurge control. The Colorado Department of Agriculture Insectary received two flea beetles (*Apthona nigricutis* and *A. flava*) to rear for future release. Their larvae feed on leafy spurge root hairs and within roots, while adults feed on foliage. Other insects may become available in the future and most likely a combination of insects will be necessary to adequately control leafy spurge. Insects would be most advantageous in areas where herbicide use is difficult or risky.

Regardless of the management system used, a combination of methods is essential to return leafy spurge infested ground to a productive state. The key to control leafy spurge or any creeping perennial is to exhaust the root nutrient stores causing it to collapse. Persistence is imperative to gain control.