leafy spurge
Euphorbia esula L.

Synonyms: *Euphorbia croizatii* Hurusawa, *E. cyparissias* Linnaeus, *E. distincta* Stscheglejew, *E. eriophylla* Karelin & Kirilov, *E. esula* var. *latifolia* Ledebour, *E. leoncroizatii* Oudejans, *E. unulata* Bunge, *E. maackii* Meinshausen, *E. mandshurica* Maximowicz, *E. minxianensis* W. T. Wang, *E. nakaiana* H. Léveillé, *E. octoradiata* H. Léveillé & Vaniot, *E. subcordata* C. A. Meyer ex Ledebour, *E. takouensis* H. Léveillé & Vaniot, *E. tarokoensis* Hayata, *Tithymalus esula* (Linnaeus) Hill, *T. lunulatus* (Bunge) Soják, *T. mandshuricus* (Maximowicz) Soják, *T. subcordatus* Klotzsch & Garcke
Other common names: spurge, wolf's milk
Family: Euphorbiaceae

Introduction
There is no consensus among taxonomists as to whether leafy spurge is a single species or a complex of several species, varieties, and hybrids. The invasive leafy spurge known in North America may be a hybrid, or a series of hybrids, of two or more species (Crompton et al. 1990, Kreps 2000).

Invasiveness Rank: **84** The invasiveness rank is calculated based on a species' ecological impacts, biological attributes, distribution, and response to control measures. The ranks are scaled from 0 to 100, with 0 representing a plant that poses no threat to native ecosystems and 100 representing a plant that poses a major threat to native ecosystems.

Description
Leafy spurge is a perennial herb that grows from an extensive rootstock, which can reach depths of 4 ½ meters or more. Numerous buds on horizontal roots give rise to new shoots. Stems are erect, glabrous, branched above, and somewhat woody. They grow up to 91 cm tall. The entire plant contains milky sap from the seedling stage onward. The leaves are bluish green, alternate (but often crowded enough to appear opposite or whorled), sessile, broadly linear, up to 7 ½ cm long, and 6 mm wide. Flowers are very reduced. The female flower consists of a single pistil and the male flower consists of a solitary stamen. Generally, one female flower is surrounded by 11 to 21 male flowers, all of which are arranged inside a cup-like involucre of five fused bracts. Four crescent-shaped glands are present in each floral cluster. Three floral clusters are enclosed by paired, heart-shaped, yellow-green bracts. Seeds are ovate to oblong, smooth, and light gray to yellow-brown. They have yellow flecks (Koutnik 1993, Royer and Dickinson 1999, Kreps 2000).
Similar species: Cypress spurge (*Euphorbia cyparissias*) was introduced to North America as an ornamental plant. Cypress spurge can be distinguished from leafy spurge by the presence of narrower and shorter leaves, numerous axillary branches that are crowded with leaves, and slender stems (Alex and Switzer 1976). Leafy spurge is not easy to mistake for any species native to Alaska.


Euphorbia esula L. Photo by B. Rice.

Ecological Impact
Impact on community composition, structure, and interactions: Leafy spurge can reduce species richness and exclude native forbs and grasses (Kreps 2000, Butler and Cogan 2004). It is unpalatable and often toxic to most vertebrate herbivores, including deer, elk,

and antelope. Insect herbivores also avoid feeding on leafy spurge (Kreps 2000). The milky sap can cause severe skin rashes to humans (Royer and Dickinson 1999, Whitson et al. 2000). Over sixty species of pollinating insects have been observed on leafy spurge flowers (Butterfield et al. 1996). Decomposing plant tissues release allelopathic chemicals that inhibit the growth and development of surrounding vegetation (Steenhagen and Zimdahl 1979, Butterfield et al. 1996, Royer and Dickinson 1999).

Impact on ecosystem processes: The impacts of leafy spurge on ecosystem processes are largely unknown. It is likely that leafy spurge infestations promote the establishment of other invasive species (Belcher and Wilson 1989).

Biology and Invasive Potential

Reproductive potential: Leafy spurge reproduces sexually by seeds and vegetatively from rhizomes and root fragments. Root buds form new shoots if the upper portion of the plant is damaged. Pieces of roots as small as 13 mm long can produce new plants. Seeds of leafy spurge mature 30 days after the first flowers appear. Each stem is capable of producing 250 seeds. Seeds can remain viable in the soil for 5 to 8 years (Selleck et al. 1962, Butterfield et al. 1996, Royer and Dickinson 1999, Kreps 2000).

Role of disturbance in establishment: Disturbances promote the establishment of leafy spurge (Selleck et al. 1962, Belcher and Wilson 1989). However, this species is also known to invade undisturbed prairies and woodlands (Selleck et al. 1962, Frankton and Mulligan 1970, Dunn 1979, Kreps 2000).

Potential for long-distance dispersal: Fruits open explosively and scatter seeds up to 4 ½ meters from the parent plant (Selleck et al. 1962, Whitson et al. 2000). Seeds are likely dispersed long distances by animals (Best et al. 1980). Seeds float and can geminate in water (Masters and Kappler 2000).

Potential to be spread by human activity: There were multiple introductions of leafy spurge into North America from contaminated ship ballast and crop grain from Russia (Dunn 1985). Leafy spurge can be spread in commercial seed, forage, and hay. Fragments of roots and rhizomes can be carried on road maintenance or farm equipment (Butterfield et al. 1996, Kreps 2000, Masters and Kappler 2002).

Germination requirements: Temperatures between 20°C and 30°C are optimal for the germination of leafy spurge. Alternating freezing and thawing along with prolonged periods of darkness promote germination. With adequate soil moisture, seeds germinate throughout the growing season. Seedlings can emerge through several inches of soil, but the optimal burial depth for seeds ranges from 13 to 51 mm (Selleck et al. 1962).

Growth requirements: Leafy spurge grows on all soil types, but it grows most abundantly in coarse soils. It can tolerate flooding for over 4 months, and it is only slightly shade intolerant (Selleck et al. 1962).

Congeneric weeds: Cypress spurge (*Euphorbia cyparissias*), toothed spurge (*E. dentata*), madwoman's milk (*E. helioscopia*), myrtle spurge (*E. myrsinites*), eggleaf spurge (*E. oblongata*), serrate spurge (*E. serrata*), and Geraldton carnation weed (*E. terracina*) are each considered noxious weeds in one or more state of the U.S. or province of Canada (Invaders 2010, USDA 2010).

Legal Listings

- ☐ Has not been declared noxious
- ☒ Listed noxious in Alaska
- ☒ Listed noxious by other states (AZ, CA, CO, CT, HI, IA, ID, MN, KS, MA, MN, MT, ND, NE, NM, NV, OR, SD, UT, WA, WI, WY)
- ☐ Federal noxious weed
- ☒ Listed noxious in Canada or other countries (AB, BC, MB, ON, SK)

Distribution and abundance

Leafy spurge commonly grows in pastures, rangelands, woodlands, prairies, roadsides, stream banks, ditches, and waste areas (Biesboer 1996, Butterfield et al. 1996, USDA 2010).

Native and current distribution: Leafy spurge is native to Eurasia. It grows throughout the world, except in Australia. It has been documented from 35 states of the U.S. and grows throughout most of Canada (USDA 2010). This species has not been recorded in Alaska (AKEPIC 2010, UAM 2010).

Management

Leafy spurge is extremely difficult to control. The best approach is the early detection and elimination of new infestations. Mechanical, chemical, cultural, and biological control methods have all been used with varying levels of success. Most control methods will have a detrimental effect on surrounding vegetation, and all will cause disturbances that promote the reestablishment of leafy spurge or other exotic species. Controlled areas must be monitored for 10 years after leafy spurge has been eradicated (Biesboer 1996, Lym 1998, Masters and Kappler 2002).

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