

NAME OF SPECIES: Euphorbia esula L.	
Synonyms: Euphorbia intercedens Podp. ex Harrington; Euphorbia poderae Croizat.; Galarhoeus esula (L.) Rydb.; Tithymalus esula (L.) Hill.	
Common Name: leafy spurge, wolf's milk	
A. CURRENT STATUS AND DISTRIBUTION	
I. In Wisconsin?	1. YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
	2. <u>Abundance</u> : Widespread distribution throughout Wisconsin (1).
	3. <u>Geographic Range</u> : Documented in 30 counties in Wisconsin (1).
	4. <u>Habitat Invaded</u> : Dry (S3, G3) and dry-mesic (S2, G3) open grasslands. Disturbed Areas <input checked="" type="checkbox"/> Undisturbed Areas <input checked="" type="checkbox"/>
	5. <u>Historical Status and Rate of Spread in Wisconsin</u> : Earliest herbarium specimen was collected in 1916 in Door and Oconto Counties (1).
	6. <u>Proportion of potential range occupied</u> : Presently expanding.
II. Invasive in Similar Climate Zones	1. YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>
	<u>Where (include trends)</u> : First detected in the United States in 1827 (2), and is thought to have been brought here as a contaminant in agricultural seed or as an ornamental plant (2). Invasive throughout northern North America in in the southwestern United States (3).
III. Invasive in Similar Habitat Types	1. Upland <input checked="" type="checkbox"/> Wetland <input type="checkbox"/> Dune <input checked="" type="checkbox"/> Prairie <input checked="" type="checkbox"/> Aquatic <input type="checkbox"/> Forest <input checked="" type="checkbox"/> Grassland <input checked="" type="checkbox"/> Bog <input type="checkbox"/> Fen <input type="checkbox"/> Swamp <input type="checkbox"/> Marsh <input type="checkbox"/> Lake <input type="checkbox"/> Stream <input type="checkbox"/> Other: Non-cropland habitats, savannas, roadsides, railroad right-of-ways, pastures, abandoned fields.
	IV. Habitat Affected
IV. Habitat Affected	1. <u>Soil types favored or tolerated</u> : Can invade a variety of dry soils, does best in sand (4) (5).
	2. <u>Conservation significance of threatened habitats</u> : Dry (S3, G3) and dry-mesic (S2, G3) prairies. Grassland communities provide ecosystem services (carbon sequestration) and habitat for arthropods and birds.
V. Native Habitat	1. <u>List countries and native habitat types</u> : Eurasia (2).
VI. Legal Classification	1. <u>Listed by government entities?</u> Noxious weed: AK, HI, ID, KS, NE, NV, SD, UT, WI, WY, MT, CA, CO, WA, IA, AZ, MN; Regulated: MA, CT, OR, SD (3).
	2. <u>Illegal to sell in WI?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: It is also illegal to sell in the following states: AK, AZ, CA, CO, CT, HI, IA, ID, KS, MA, MN, MT, NE, NV, OR, SD, UT, WA, WY
B. ESTABLISHMENT POTENTIAL AND LIFE HISTORY TRAITS	
I. Life History	1. <u>Type of plant</u> : Annual <input type="checkbox"/> Biennial <input type="checkbox"/> Monocarpic Perennial <input type="checkbox"/> Herbaceous Perennial <input checked="" type="checkbox"/> Vine <input type="checkbox"/> Shrub <input type="checkbox"/> Tree <input type="checkbox"/>
	2. <u>Time to Maturity</u> : At least two growing seasons.

	<p>3. <u>Length of Seed Viability</u>: Greater than 60 months (6), five years (8), perhaps eight years (4).</p> <p>4. <u>Methods of Reproduction</u>: Asexual <input checked="" type="checkbox"/> Sexual <input checked="" type="checkbox"/> <u>Notes</u>: Vegetative reproduction from both crown and root buds (2) (5). Underground propagules are capable of 35 feet of lateral spread (2). Each stalk can produce up to 800 seeds with a germination rate of 60-80% (5). Seeds shatter up to 15 feet from capsules (2). Established populations may possess substantial seedbanks (9).</p> <p>5. <u>Hybridization potential</u>: High. Hybrids among <i>Euphorbia</i> species are collectively referred to as <i>Euphorbia esula</i> (2).</p>
II. Climate	<p>1. <u>Climate restrictions</u>: Unknown. Probably has wide climatic amplitude; invasive in Alaska as well as Hawaii (3).</p> <p>2. <u>Effects of potential climate change</u>: Unknown.</p>
III. Dispersal Potential	<p>1. <u>Pathways - Please check all that apply</u>: <u>Unintentional</u>: Bird <input type="checkbox"/> Animal <input checked="" type="checkbox"/> Vehicles/Human <input checked="" type="checkbox"/> Wind <input type="checkbox"/> Water <input type="checkbox"/> Other: Spread by DOT mower decks along highways (2). <u>Intentional</u>: Ornamental <input checked="" type="checkbox"/> Forage/Erosion control <input type="checkbox"/> Medicine/Food: Other:</p> <p>2. <u>Distinguishing characteristics that aid in its survival and/or inhibit its control</u>: Very deep tap roots, particularly in sandy soils. Tap roots may extend 15 feet or deeper (2) (4). Dormant during the hottest parts of July and August, control is probably less effective during dry periods (2). Plastic sap inhibits translocation of many herbicides, and plants produce thick cuticles, possess sunken stomates, and a thick cork layer surrounds its roots (8).</p>
IV. Ability to go Undetected	1. HIGH <input type="checkbox"/> MEDIUM <input type="checkbox"/> LOW <input checked="" type="checkbox"/>
C. DAMAGE POTENTIAL	
I. Competitive Ability	<p>1. <u>Presence of Natural Enemies</u>: At least 15 biocontrol insects have been introduced to control <i>Euphorbia esula</i> and <i>E. cyparassias</i> (7).</p> <p>2. <u>Competition with native species</u>: Intense competitor. Can produce dense stands of 1,800 stems per square yard. Shades competitors and sequesters available moisture and nutrients in dry communities (2). Reed (10) classified leafy spurge as a serious threat to native communities.</p> <p>2. <u>Rate of Spread</u>: -changes in relative dominance over time: -change in acreage over time: HIGH (1-3 yrs) <input checked="" type="checkbox"/> MEDIUM (4-6 yrs) <input type="checkbox"/> LOW (7-10 yrs) <input type="checkbox"/> <u>Notes</u>: Capable of rapid spread, with seeds shattering from capsules up to 15 feet from the parent plant. Can displace native grasses and forbs in only a couple of growing seasons (2).</p>
II. Environmental Effects	<p>1. <u>Alteration of ecosystem/community composition?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> <u>Notes</u>: Reduces native species diversity (2).</p>

	<p>2. <u>Alteration of ecosystem/community structure?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: Reduces habitat quality for wildlife (2), reduced habitat heterogeneity.</p>
	<p>3. <u>Alteration of ecosystem/community functions and processes?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes:</p>
	<p>4. <u>Allelopathic properties?</u> YES <input checked="" type="checkbox"/> NO <input type="checkbox"/> Notes: Produces chemicals that impede the growth and spread of competing species (2).</p>
D. SOCIO-ECONOMIC EFFECTS	
I. Positive aspects of the species to the economy/society:	Notes: None.
II. Potential socio-economic effects of restricting use:	Notes: Positive. <i>Euphorbia esula</i> can reduce the productivity of grazing land by 50 - 75 percent (2). If ingested by cattle it can cause scours and weakness, which could result in death (11).
III. Direct and indirect effects :	Notes: In South Dakota, a study showed the decrease in pasture quality, which greatly decreased profits for farmers in turn decreased their economic input into the local economy (12)
IV. Increased cost to a sector:	Notes: Loss of pasture quality.
V. Effects on human health:	Notes: Some humans can develop dermatitis and irritation from the latex (13).
E. CONTROL AND PREVENTION	
I. Costs of Prevention (please be as specific as possible):	Notes: N/A
II. Responsiveness to prevention efforts:	Notes: Heidel (8) advocates an all-or-none effort, and postulates that genotypic differentiation may necessitate an adaptive control strategy. Results of control efforts are variable (4). Control appears to be more effective in loamy soils as opposed to sandy soils (4).
III. Effective Control tactics:	<p>Mechanical <input checked="" type="checkbox"/> Biological <input checked="" type="checkbox"/> Chemical <input checked="" type="checkbox"/> Times and uses: Herbicides provide short-term control, but multiple-year applications are typically necessary (5). Effects of biological control (flea beetles, genus <i>Aphthona</i>) are not always uniform (4). Mowing can be effective, but must be done repeatedly over several consecutive growing seasons. Mowed stems can resprout in seven days (8). Repeated plowing has also been found to be effective (8). Prescribed fire (spring or autumn) should be used in conjunction with other treatments, particularly biocontrol, as the flea beetles require bare soil to lay eggs (4).</p>
IV. Minimum Effort:	Notes: At least two growing seasons (4). Exceedingly difficult to control.
V. Costs of Control:	Notes: Variable and site-specific. Control appears to me more costly in sandy soils (4).
VI. Cost of prevention or control vs. Cost of allowing invasion to occur:	Notes: N/A
VII. Non-Target Effects of Control:	Notes: Broad-spectrum and composite/legume-specific herbicides can harm or eliminate desired vegetation. Mowing in mid-summer

	can be detrimental to nesting birds.
VIII. Efficacy of monitoring:	Notes: Can be eradicated if detected early. Subsequent monitoring is usually necessary.
IX. Legal and landowner issues:	Notes: Listed in Wisconsin as a noxious weed; landowners are legally compelled to attempt to eradicate this species, although enforcement of this law seems lacking.

F. REFERENCES USED:

- UW Herbarium
- WI DNR
- TNC
- Native Plant Conservation Alliance
- IPANE
- USDA Plants

Number	Reference
1	Wisconsin State Herbarium. 2007. WISFLORA: Wisconsin vascular plant species (http://www.botany.wisc.edu/wisflora/). Dept. Botany, Univ. Wisconsin, Madison, WI 53706-1381 USA.
2	Hoffman, R. A. and S. K. Kearns. 1997. <i>Wisconsin Manual of Control Recommendations for Ecologically Invasive Plants</i> . WDNR Publication Publ ER-090 97.
3	USDA, NRCS. 2007. The PLANTS Database (http://plants.usda.gov , 16 March 2007). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
4	Kim Mello. Kimmer@Tomah.com, Personal Communication.
5	Cole, M.A.R. 1991. Vegetation management guideline: Leafy spurge (<i>Euphorbia esula</i> L.). <i>Natural Areas Journal</i> 11(3):171-172
6	Comes, R. D., V. F. Bruns and A. D. Kelley. 1978. Longevity of certain weed and crop seeds in fresh water. <i>Weed Science</i> 26(4):336-344.
7	Spencer, N. R., G. Compobasso, G. Terragitti and M. Y. Dolgovskaya. 2004. Leafy spurge: The search for natural enemies. <i>Ecological Restoration</i> 22(4):302.
8	Heidel, B. 1982. Leafy spurge (<i>Euphorbia esula</i> L.): A challenge in natural areas management. <i>Natural Areas Journal</i> 2(2):10-13.
9	Sterling, J. J. 1999. Seed bank study of a leafy spurge infestation. <i>Leafy Spurge News</i> 22(3):10.
10	Reed, C. C. 2004. Keeping invasive plants out of restorations. <i>Ecological Restoration</i> 22(3):210-216.
11	Muenscher, W.C. 1940. Poisonous plants of the United States. Macmillan Co. New York pp.142-1
12	FLINT THOMPSON, F. LARRY LEISTRITZ, and JAY A. LEITCH. 1990. Economic impact of leafy spurge in NorthDakota. NDSU No. 257.
13	Kingsbury, J. M. 1964. Poisonous plants of the United States and Canada. Prentice-Hall Inc., Englewood Cliffs, N.J., USA. 626 pp.
14	Wade Oehmichen wade.oehmichen@wisconsin.gov

Author(s), Draft number, and date completed: Craig A. Annen, Draft 1, May 26, 2007.

Editor and date: Chris Reyes, 6-28-07

Reviewer(s) and date reviewed: Wade Oehmichen, July 31, 2007. Jerry Doll, September 27, 2007.

Approved and Completed Date: