NEW YORK
NON-NATIVE PLANT INVASIVENESS RANKING FORM

Scientific name:	Euphorbia lathyris	USDA Plants Code: EULA4
Common names:	Caper Spurge; moleplant	
Native distribution:	Probably originally native to the eastern and central Mediterranean	
Date assessed:	March 12, 2009	
Assessors:	Steve Glenn, Gerry Moore	
Reviewers:	LIISMA SRC	
Date Approved:	1 Apr. 2009	Form version date: 3 March 2009

New York Invasiveness Rank: Moderate (Relative Maximum Score 50.00-69.99)

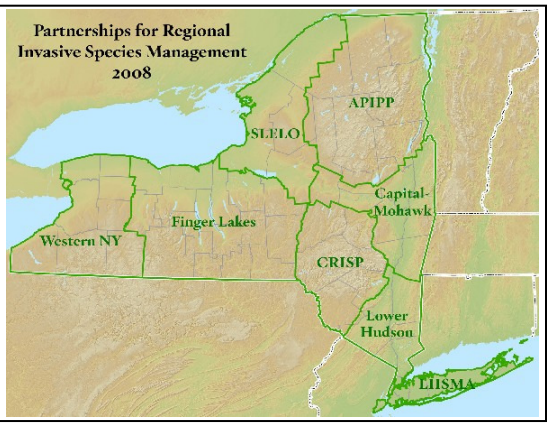
Distribution and Invasiveness Rank (*Obtain from PRISM invasiveness ranking form*)			
	Status of this species in each PRISM:	Current Distribution	PRISM Invasiveness Rank
1	Adirondack Park Invasive Program	Not Assessed	Not Assessed
2	Capital/Mohawk	Not Assessed	Not Assessed
3	Catskill Regional Invasive Species Partnership	Not Assessed	Not Assessed
4	Finger Lakes	Not Assessed	Not Assessed
5	Long Island Invasive Species Management Area	Restricted	Moderate
6	Lower Hudson	Not Assessed	Not Assessed
7	Saint Lawrence/Eastern Lake Ontario	Not Assessed	Not Assessed
8	Western New York	Not Assessed	Not Assessed

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (30)	13
2	Biological characteristic and dispersal ability	25 (25)	19
3	Ecological amplitude and distribution	25 (21)	11
4	Difficulty of control	10 (10)	6
	Outcome score	100 (86)[b]	49[a]
	Relative maximum score †		56.98
	New York Invasiveness Rank §	Moderate (Relative Maximum Score 50.00-69.99)	

* For questions answered "unknown" do not include point value in "Total Answered Points Possible." If "Total Answered Points Possible" is less than 70.00 points, then the overall invasive rank should be listed as "Unknown."
†Calculated as 100(a/b) to two decimal places.
§Very High >80.00; High 70.00–80.00; Moderate 50.00–69.99; Low 40.00–49.99; Insignificant <40.00

A. DISTRIBUTION (KNOWN/POTENTIAL): Summarized from individual PRISM forms

A1.1. Has this species been documented to persist without cultivation in NY? (reliable source; voucher not required)	
☒	Yes – continue to A1.2
☐	No – continue to A2.1
A1.2. In which PRISMs is it known (see inset map)?	
☐	Adirondack Park Invasive Program
☐	Capital/Mohawk
☐	Catskill Regional Invasive Species Partnership
☒	Finger Lakes
☒	Long Island Invasive Species Management Area
☐	Lower Hudson
☐	Saint Lawrence/Eastern Lake Ontario



☒	Western New York

Documentation:
Sources of information:
Lamont & Young, 2006; Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

A2.1. What is the likelihood that this species will occur and persist outside of cultivation, given the climate in the following PRISMs? (obtain from PRISM invasiveness ranking form)

Not Assessed	Adirondack Park Invasive Program
Not Assessed	Capital/Mohawk
Not Assessed	Catskill Regional Invasive Species Partnership
Not Assessed	Finger Lakes
Very Likely	Long Island Invasive Species Management Area
Not Assessed	Lower Hudson
Not Assessed	Saint Lawrence/Eastern Lake Ontario
Not Assessed	Western New York

Documentation:
Sources of information (e.g.: distribution models, literature, expert opinions):

If the species does not occur and is not likely to occur with any of the PRISMs, then stop here as there is no need to assess the species.

A2.2. What is the current distribution of the species in each PRISM? (obtain rank *from PRISM invasiveness ranking forms*)

	Distribution
Adirondack Park Invasive Program	Not Assessed
Capital/Mohawk	Not Assessed
Catskill Regional Invasive Species Partnership	Not Assessed
Finger Lakes	Not Assessed
Long Island Invasive Species Management Area	Restricted
Lower Hudson	Not Assessed
Saint Lawrence/Eastern Lake Ontario	Not Assessed
Western New York	Not Assessed

Documentation:
Sources of information:
Brooklyn Botanic Garden, 2009

A2.3. Describe the potential or known suitable habitats within New York. Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats	Wetland Habitats	Upland Habitats
☐ Salt/brackish waters	☐ Salt/brackish marshes	☒ Cultivated*
☐ Freshwater tidal	☐ Freshwater marshes	☒ Grasslands/old fields
☐ Rivers/streams	☐ Peatlands	☐ Shrublands
☐ Natural lakes and ponds	☐ Shrub swamps	☐ Forests/woodlands
☐ Vernal pools	☐ Forested wetlands/riparian	☐ Alpine
☐ Reservoirs/impoundments*	☐ Ditches*	☒ Roadsides*
	☐ Beaches and/or coastal dunes	

Other potential or known suitable habitats within New York:
Edge of pitch pine-oak forest.

Documentation:
Sources of information:
Lamont & Young, 2006; Brooklyn Botanic Garden, 2009; author's (Moore's) pers. obs.

B. INVASIVENESS RANKING

Questions apply to areas similar in climate and habitats to New York unless specified otherwise.

1. ECOLOGICAL IMPACT

1.1. Impact on Natural Ecosystem Processes and System-Wide Parameters (e.g. fire regime, geomorphological changes (erosion, sedimentation rates), hydrologic regime, nutrient and mineral dynamics, light availability, salinity, pH)

A.	No perceivable impact on ecosystem processes based on research studies, or the absence of impact information if a species is widespread (>10 occurrences in minimally managed areas), has been well-studied (>10 reports/publications), and has been present in the northeast for >100 years.	0
B.	Influences ecosystem processes to a minor degree (e.g., has a perceivable but mild influence on soil nutrient availability)	3
C.	Significant alteration of ecosystem processes (e.g., increases sedimentation rates along streams or coastlines, reduces open water that are important to waterfowl)	7
D.	Major, possibly irreversible, alteration or disruption of ecosystem processes (e.g., the species alters geomorphology and/or hydrology, affects fire frequency, alters soil pH, or fixes substantial levels of nitrogen in the soil making soil unlikely to support certain native plants or more likely to favor non-native species)	10
U.	Unknown	

Score: 3

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Gravuer (2007): "No reports of impacts on ecosystem processes or system-wide parameters were found. It is possible that impacts may exist." Two stands that have been observed in New Jersey are clearly reducing light availability to the lower herbs in the herb layer. No evidence of significant or major alteration or disruption of ecosystem processes or system-wide parameters. More studies needed to document additional impacts to ecosystem processes and system wide parameters.
Sources of information:
Gravuer, 2007; author's (Moore's) pers. obs.

1.2. Impact on Natural Community Structure

A.	No perceived impact; establishes in an existing layer without influencing its structure	0
B.	Influences structure in one layer (e.g., changes the density of one layer)	3
C.	Significant impact in at least one layer (e.g., creation of a new layer or elimination of an existing layer)	7
D.	Major alteration of structure (e.g., covers canopy, eradicating most or all layers below)	10
U.	Unknown	

Score: 7

Documentation:
Identify type of impact or alteration:
Stands observed in New Jersey (by Moore) and Long Island (SRC) are significantly impacting the herb layer by increasing the density and height of that layer. Gravuer (2007): "Parsons and Cuthbertson (2001) noted that it is 'highly sensitive to weed competition', and it was observed to be out-competed by Japanese knotweed at a site in Boston, MA (Rice 2006)."
Sources of information:
Parsons & Cuthbertson, 2001; Rice, 2006; Gravuer, 2007; author's (Moore's) pers. obs.

1.3. Impact on Natural Community Composition

A.	No perceived impact; causes no apparent change in native populations	0
B.	Influences community composition (e.g., reduces the number of individuals in one or more native species in the community)	3
C.	Significantly alters community composition (e.g., produces a significant reduction in the population size of one or more native species in the community)	7
D.	Causes major alteration in community composition (e.g., results in the extirpation of one or several native species, reducing biodiversity or change the community composition towards species exotic to the natural community)	10
U.	Unknown	

Score: 3

Documentation:
Identify type of impact or alteration:
Stands in New Jersey shown to be reducing the number of individuals of native species in the community. No evidence of significant or major alterations in community composition.
Sources of information:
Author's (Moore's) pers. obs.

1.4. Impact on other species or species groups (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades. Examples include reduction in nesting/foraging sites; reduction in habitat connectivity; injurious components such as spines, thorns, burrs, toxins; suppresses soil/sediment microflora; interferes with native pollinators and/or pollination of a native species; hybridizes with a native species; hosts a non-native disease which impacts a native species)

A.	Negligible perceived impact	0
B.	Minor impact	3
C.	Moderate impact	7
D.	Severe impact on other species or species groups	10
U.	Unknown	

Score: U

Documentation:
Identify type of impact or alteration:
One study found the effects of the water extract from E. lathyris produced an inhibition of body growth as well as impairment of the development in the frogs, Rana temporaria. Not clear, however, how local water sources that may be used by frogs could be impacted by E. lathyris, which usually occurs in dry areas.
Sources of information:
Paulov, 1993.

Total Possible: 30
Section One Total: 13

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction (provisional thresholds, more investigation needed)

A.	No reproduction by seeds or vegetative propagules (i.e. plant sterile with no sexual or asexual reproduction).	0
B.	Limited reproduction (fewer than 10 viable seeds per plant AND no vegetative reproduction; if viability is not known, then maximum seed production is less than 100 seeds per plant and no vegetative reproduction)	1
C.	Moderate reproduction (fewer than 100 viable seeds per plant - if viability is not known, then maximum seed production is less than 1000 seeds per plant - OR limited successful vegetative spread documented)	2

D. Abundant reproduction with vegetative asexual spread documented as one of the plants prime reproductive means OR more than 100 viable seeds per plant (if viability is not known, then maximum seed production reported to be greater than 1000 seeds per plant.) 4

U. Unknown

Score 4

Documentation:
Describe key reproductive characteristics (including seeds per plant):
Various sources cite seed production, but not quantified. SRC members familiar with the plant believe it is likely that 1000 seeds or 100 viable seeds are produced by an individual plant.
Sources of information:
Grauver, 2007; SRC pers. comm.

2.2. Innate potential for long-distance dispersal (e.g. bird dispersal, sticks to animal hair, buoyant fruits, pappus for wind-dispersal)

A. Does not occur (no long-distance dispersal mechanisms) 0

B. Infrequent or inefficient long-distance dispersal (occurs occasionally despite lack of adaptations) 1

C. Moderate opportunities for long-distance dispersal (adaptations exist for long-distance dispersal, but studies report that 95% of seeds land within 100 meters of the parent plant) 2

D. Numerous opportunities for long-distance dispersal (adaptations exist for long-distance dispersal and evidence that many seeds disperse greater than 100 meters from the parent plant) 4

U. Unknown

Score 2

Documentation:
Identify dispersal mechanisms:
Myrmecochory: elaiosomes on seeds (Krochmal, 1952; Pemberton & Irving, 1990) may lead to ant dispersal, there have been reports of some ant species foraging further than 100 meters from the nest (Steck et al., 2009). Gravuer (2007): "Natural dispersal is ballistic, with seeds thrown several meters when ripe fruits burst open (Parsons and Cuthbertson 2001); also disperses occasionally by water (Parsons and Cuthbertson 2001, Fox 2004)."
Sources of information:
Krochmal, 1952; Pemberton & Irving, 1990; Steck et al., 2009.

2.3. Potential to be spread by human activities (both directly and indirectly – possible mechanisms include: commercial sales, use as forage/revegetation, spread along highways, transport on boats, contaminated compost, land and vegetation management equipment such as mowers and excavators, etc.)

A. Does not occur 0

B. Low (human dispersal to new areas occurs almost exclusively by direct means and is infrequent or inefficient) 1

C. Moderate (human dispersal to new areas occurs by direct and indirect means to a moderate extent) 2

D. High (opportunities for human dispersal to new areas by direct and indirect means are numerous, frequent, and successful) 3

U. Unknown

Score 2

Documentation:
Identify dispersal mechanisms:
Touted as a potential biofuel in the early 1980s (Kingsolver, 1982; Calvin, 1983; Duke, 1983); although nothing found in recent literature suggesting that this species is still under consideration for biofuel production. Seeds for sale in the US commercial seed trade since the 1800s (Mack, 1991) and for sale on the internet (authors' pers. obs. 2009). Reportedly

introduced via landscape rubbish (Lamont & Young, 2006). Also reportedly introduced "to repel rodents in an orchard" (Duke, 1983).
Sources of information:
Kingsolver, 1982; Calvin, 1983; Duke, 1983; Mack, 1991; Lamont & Young, 2006; authors' pers. obs., 2009.

2.4. Characteristics that increase competitive advantage, such as shade tolerance, ability to grow on infertile soils, perennial habit, fast growth, nitrogen fixation, allelopathy, etc.

A. Possesses no characteristics that increase competitive advantage 0
B. Possesses one characteristic that increases competitive advantage 3
C. Possesses two or more characteristics that increase competitive advantage 6
U. Unknown

Score 6

Documentation:
Evidence of competitive ability:
Reported as an annual (Zhengyi & Raven, 2008), biennial (Tutin & Heywood, 1968), or even a perennial (Duke, 1983). Reported to be moderately drought resistance (Duke, 1983; Venta et al., 1988) and tolerant of poor soils (Duke, 1983). Also reported to grow and spread rapidly (Gravuer, 2007). More studies needed on possible allelopathic effects of the latex.
Sources of information:
Tutin & Heywood, 1968; Duke, 1983; Ventas et al., 1988; Gravuer, 2007; Zhengyi & Raven, 2008.

2.5. Growth vigor

A. Does not form thickets or have a climbing or smothering growth habit 0
B. Has climbing or smothering growth habit, forms a dense layer above shorter vegetation, forms dense thickets, or forms a dense floating mat in aquatic systems where it smothers other vegetation or organisms 2
U. Unknown

Score 0

Documentation:
Describe growth form:
Not reported to form thicket or exhibit smothering growth habit. One study found poor competitive ability of E. lathyris against weeds.
Sources of information:
Garcia-Baudin et al., 1985; Gravuer, 2007; author's (Moore's) pers. obs.

2.6. Germination/Regeneration

A. Requires open soil or water and disturbance for seed germination, or regeneration from vegetative propagules. 0
B. Can germinate/regenerate in vegetated areas but in a narrow range or in special conditions 2
C. Can germinate/regenerate in existing vegetation in a wide range of conditions 3
U. Unknown (No studies have been completed)

Score 2

Documentation:
Describe germination requirements:
One controled study found germinations rates as high as 98% under optimum conditions; but the role of disturbance was not addressed. Observed to be germinating in vegetated areas in narrow conditions (dry, open areas).
Sources of information:
Mingo-Castel et al., 1984; SRC pers. obs.

2.7. Other species in the genus invasive in New York or elsewhere

A.	No	0
B.	Yes	3
U.	Unknown	

Score: 3

Documentation:
Species:
Euphorbia esula, E. cyparissias- Brooklyn Botanic Garden, 2009;Weldy & Werier, 2009.

Total Possible: 25
Section Two Total: 19

3. ECOLOGICAL AMPLITUDE AND DISTRIBUTION

3.1. Density of stands in natural areas in the northeastern USA and eastern Canada (use same definition as Gleason & Cronquist which is: "The part of the United States covered extends from the Atlantic Ocean west to the western boundaries of Minnesota, Iowa, northern Missouri, and southern Illinois, south to the southern boundaries of Virginia, Kentucky, and Illinois, and south to the Missouri River in Missouri. In Canada the area covered includes Nova Scotia, Prince Edward Island, New Brunswick, and parts of Quebec and Ontario lying south of the 47th parallel of latitude")

A.	No large stands (no areas greater than 1/4 acre or 1000 square meters)	0
B.	Large dense stands present in areas with numerous invasive species already present or disturbed landscapes	2
C.	Large dense stands present in areas with few other invasive species present (i.e. ability to invade relatively pristine natural areas)	4
U.	Unknown	

Score: U

Documentation:
Identify reason for selection, or evidence of weedy history:
One report from Long Island stated an adventive population of 200 to 300 plants, but physical size not a 1/4 acre before it was removed. One recently established site in New Jersey is spreading rapidly and may soon approach 1/4 acre. Since only recently observed eventual sizes of stands not known.
Sources of information:
Lamont & Young, 2006; author's (Moore's) pers. obs.

3.2. Number of habitats the species may invade

A.	Not known to invade any natural habitats given at A2.3	0
B.	Known to occur in two or more of the habitats given at A2.3, with at least one a natural habitat.	1
C.	Known to occur in three or more of the habitats given at A2.3, with at least two a natural habitat.	2
D.	Known to occur in four or more of the habitats given at A2.3, with at least three a natural habitat.	4
E.	Known to occur in more than four of the habitats given at A2.3, with at least four a natural habitat.	6
U.	Unknown	

Score: 1

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.3.
Sources of information:

Lamont & Young, 2006; Brooklyn Botanic Garden, 2009; author's (Moore's) pers. obs.

3.3. Role of disturbance in establishment

A. Requires anthropogenic disturbances to establish. 0
B. May occasionally establish in undisturbed areas but can readily establish in areas with natural or anthropogenic disturbances. 2
C. Can establish independent of any known natural or anthropogenic disturbances. 4
U. Unknown

Score 2

Documentation:
Identify type of disturbance:
Readily establishes in disturbed areas. No evidence that anthropogenic disturbance is required for establishment.
Sources of information:
Gravuer, 2007; author's (Moore's) pers. obs.

3.4. Climate in native range

A. Native range does not include climates similar to New York 0
B. Native range possibly includes climates similar to at least part of New York. 1
C. Native range includes climates similar to those in New York 3
U. Unknown

Score 1

Documentation:
Describe what part of the native range is similar in climate to New York:
Probably originally native to the eastern and central Mediterranean; adventive in northern Europe and northern China (Zhengyi & Raven, 2008) where climates are more similar to ours but long term persistance of stands not documented.
Sources of information:
Zhengyi & Raven, 2008.

3.5. Current introduced distribution in the northeastern USA and eastern Canada (see question 3.1 for definition of geographic scope)

A. Not known from the northeastern US and adjacent Canada 0
B. Present as a non-native in one northeastern USA state and/or eastern Canadian province. 1
C. Present as a non-native in 2 or 3 northeastern USA states and/or eastern Canadian provinces. 2
D. Present as a non-native in 4–8 northeastern USA states and/or eastern Canadian provinces, and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 1 northeastern state or eastern Canadian province. 3
E. Present as a non-native in >8 northeastern USA states and/or eastern Canadian provinces. and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 2 northeastern states or eastern Canadian provinces. 4
U. Unknown

Score 4

Documentation:
Identify states and provinces invaded:
CT, IL, KY, MA, MD, NJ, NY, OH, PA, VA, WV; Ontario, Quebec.
Sources of information: See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
USDA, 2009.

3.6. Current introduced distribution of the species in natural areas in the eight New York State PRISMs (Partnerships for Regional Invasive Species Management)

A. Present in none of the PRISMs 0

B. Present in 1 PRISM 1
C. Present in 2 PRISMs 2
D. Present in 3 PRISMs 3
E. Present in more than 3 PRISMs or on the Federal noxious weed lists 4
U. Unknown

Score 3

Documentation:
Describe distribution:
See A1.1.
Sources of information:
Lamont & Young, 2006; Brooklyn Botanic Garden, 2009; Weldy & Werier, 2009.

Total Possible 21
Section Three Total 11

4. DIFFICULTY OF CONTROL

4.1. Seed banks

A. Seeds (or vegetative propagules) remain viable in soil for less than 1 year, or does not make viable seeds or persistent propagules. 0
B. Seeds (or vegetative propagules) remain viable in soil for at least 1 to 10 years 2
C. Seeds (or vegetative propagules) remain viable in soil for more than 10 years 3
U. Unknown

Score 2

Documentation:
Identify longevity of seed bank:
After an eradication effort on a adventive population on Long Island , an expanded population was found the following year, indicating at least a one year seed banking potential. No evidence for viability longer than 10 years.
Sources of information:
Lamont & Young, 2006; Gravuer, 2007.

4.2. Vegetative regeneration

A. No regrowth following removal of aboveground growth 0
B. Regrowth from ground-level meristems 1
C. Regrowth from extensive underground system 2
D. Any plant part is a viable propagule 3
U. Unknown

Score 1

Documentation:
Describe vegetative response:
Reported to form adventitious shoots and repsrouts after cutting.
Sources of information:
Roper, 1824; Gravuer, 2007..

4.3. Level of effort required

A. Management is not required: e.g., species does not persist without repeated anthropogenic disturbance. 0
B. Management is relatively easy and inexpensive: e.g. 10 or fewer person-hours of manual effort (pulling, cutting and/or digging) can eradicate a 1 acre infestation in 1 year (infestation averages 50% cover or 1 plant/100 ft^2). 2

C.	Management requires a major short-term investment: e.g. 100 or fewer person-hours/year of manual effort, or up to 10 person-hours/year using mechanical equipment (chain saws, mowers, etc.) for 2-5 years to suppress a 1 acre infestation. Eradication is difficult, but possible (infestation as above).	3
D.	Management requires a major investment: e.g. more than 100 person-hours/year of manual effort, or more than 10 person hours/year using mechanical equipment, or the use of herbicide, grazing animals, fire, etc. for more than 5 years to suppress a 1 acre infestation. Eradication may be impossible (infestation as above).	4
U.	Unknown	

Score	3

Documentation:
Identify types of control methods and time-term required:
Gravuer (2007): "Hand-pulling is an effective means of control, but is complicated by the plant's production of a milky sap which irritates skin; gloves are therefore a must and care in needed (Plants for a Future 2001, Jordan 2006). At the Bodega Marine Reserve in California, it was noted that follow-up treatments would "certainly be necessary" after initial control by hand-pulling (Rice 2006). This species is also susceptible to a range of herbicides (Parsons and Cuthbertson 2001), including glyphosate (2 - 3%) (Jordan 2006). Grazing is not a viable means of control, however, as the plant is ignored by grazing animals (Duke 1983). Where feasible, control may also be achieved by cultivation followed by re-planting of more desirable species (Parsons and Cuthbertson 2001).
Sources of information:
Garcia-Baudin et al., 1985; Gravuer, 2007.

Total Possible	10
Section Four Total	6

Total for 4 sections Possible	86
Total for 4 sections	49

C. STATUS OF CULTIVARS AND HYBRIDS:

At the present time (May 2008) there is no protocol or criteria for assessing the invasiveness of cultivars independent of the species to which they belong. Such a protocol is needed, and individuals with the appropriate expertise should address this issue in the future. Such a protocol will likely require data on cultivar fertility and identification in both experimental and natural settings.

Hybrids (crosses between different parent species) should be assessed individually and separately from the parent species wherever taxonomically possible, since their invasiveness may differ from that of the parent species. An exception should be made if the taxonomy of the species and hybrids are uncertain, and species and hybrids can not be clearly distinguished in the field. In such cases it is not feasible to distinguish species and hybrids, and they can only be assessed as a single unit.

Some cultivars of the species known to be available:

References for species assessment:

Brooklyn Botanic Garden. 2009. AILANTHUS database. [Accessed on 12 March 2009].

Calvin, M. 1983. New sources for fuel and materials. Science. 219(4580):24-26.

Duke, J. A. 1983. Handbook of Energy Crops. Euphorbia lathyris. unpublished. <http://www.hort.purdue.edu/newcrop/duke_energy/Euphorbia_lathyris.html>. [Accessed on 12 March 2009].

Fox, J. 2004. Part IV. Plant Assessment Form, for use with "Criteria for Categorizing Invasive Non-Native Plants that Threaten Wildlands" by the California Exotic Pest Plant Council and the Southwest Vegetation Management Association: Euphorbia lathyris L. <portal.cal-ipc.org/files/PAFs/Euphorbia%20lathyris.pdf> (Accessed March 12, 2009).

Garcia-Baudin, J. M., A. R. Lansac, L. Ayerbe, J. L. Tenorio, & E. Cadahiae. 1985. Use of substituted urea herbicides for weed control in Euphorbia lathyris; a potential fuel-producing crop. Weed Research. 25(5):319-322.

Gravuer, K. 2007. Euphorbia lathyris. U.S. Invasive Species Impact Rank (I-Rank). NatureServe Explorer. <www.natureserve.org>. [Accessed on March 12, 2009.]

Jordan, M. 2006. New weed sighting: Euphorbia lathyris (New York, USA). Posting to TNC Invasive Species Listserve: Digest #147 (August 2006). <tncweeds.ucdavis.edu/listserv.html> [Accessed March 12, 2009.]

Kingsolver, B. E. 1982. Euphorbia lathyris reconsidered: its potentila as an energy crop for lands. Biomass. 2:281-298.

Krochmal, A. 1952. Seeds of weedy Euphorbia species and their identification. Weeds. 1(3):243-255.

Lamont, E. E. & S. M. Young. 2006. Noteworthy plants reported from the Torrey Range - 2004 and 2005. Journal of the Torrey Botanical Society. 133(4): 648-659.

Mack, R. N. 1991. The commercial seed trade: an early disperser of weeds in the United States. Economic Botany. 45(2):257-273.

Mingo-Castel, A. M. & A. M. A. Pelacho. 1984. Physiological studies in Euphorbia lathyris 1. germination and vernalization. Anales del Instituto Nacional de Investigaciones Agrarias Serie Agricola. 25:13-30.

Parsons, W. T. and E. G. Cuthbertson. 2001. Noxious weeds of Australia. Second edition. CSIRO Publishing, Collingwood, Victoria, Australia. 712 pp.

Paulov, S. 1993. Potential environmental impact of extract from euphorbia plants (Euphorbia lathyris L.) on the model amphibians (Rana temporaria L.). Biologia (Bratislava). 48(5):567-569.

Pemberton, R. W. & D. W. Irving. 1990. Elaiosomes on weed seeds and the potential for myrmecochory in naturalized plants. Weed Science. 38(6):615-619.

Plants for a Future. 2001, February 2002 last update. Plants for a future database. <www.ibiblio.org/pfaf/D_search.html> [Accessed March 12, 2009.]

Rice, B. 2006. Euphorbia lathyris sightings (Various states, USA). Posting to TNC Invasive Species Listserve: Digest #148 <tncweeds.ucdavis.edu/listserv.html> [Accessed March 12, 2007.]

Roper, J. 1824. Enumeratio Euphorbiarum. Typis Caroli Eduardi Rosenbusch. Goittingae. 71 pp. [as cited by Langston, V. B. et al., 1984. Potential for adventitious regeneration of selected weed species. Weed Science. 32(3):360-363.]

Steck, K. B. S. Hansson, & M. Knaden. 2009. Smells like home: desert ants, Cataglyphis fortis, use olfactory landmarks to pinpoint the nest. Frontiers in Zoology. 6:5.

Tutin, T. G. & V. H. Heywood (eds.). 1968. Flora Europea, Vol. 2. Cambridge Univ. Press, London, UK. 455 pp.

United States Department of Agriculture, National Resources Conservation Service. 2009. The PLANTS Database. National Plant Data Center, Baton Rouge, Louisiana [Accessed on 12 March 2009].

Ventas, P., J. L. Tenorio, E. Funes, B. Rodriguez-Maribona, & L. Ayerbe. 1988. Influence of water stress and temperature on Euphorbia lathyris growth. Investigacion Agraria Produccion y Proteccion Vegetales. 3(1):7-24.

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Acknowledgments: The NY form incorporates components and approaches used in several other systems, cited in the references below. Valuable contributions by members of the Long Island Invasive Species Management Area's Scientific Review Committee were incorporated in revisions of this form. Original members of the LIISMA SRC included representatives of the Brooklyn Botanic Garden; The Nature Conservancy; New York Natural Heritage Program, New York Sea Grant; New York State Office of Parks, Recreation and Historic Preservation; National Park Service; Brookhaven National Laboratory; New York State Department of Environmental Conservation Region 1; Cornell Cooperative Extension of Suffolk/Nassau Counties; Long Island Nursery and Landscape Association; Long Island Farm Bureau; SUNY Farmingdale Ornamental Horticulture Department; Queens College Biology Department; Long Island Botanical Society; Long Island Weed Information Management System database manager; Suffolk County Department of Parks, Recreation and Conservation; Nassau County Department of Parks, Recreation and Museums; Suffolk County Soil & Water Conservation District.

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