

WEED RISK ASSESSMENT FORM

Botanical name: Verbascum thapsus L.

Common name: common mullein, big taper, flannel mullein, flannel plant, great mullein, velvet dock, velvet plant, woolly mullein

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Outcome score:

A. Climatic Comparison		
This species is present or may potentially establish in the following eco-geographic regions:		
1 South Coastal	Yes	
2 Interior-Boreal	Yes	
3 Arctic-Alpine		No

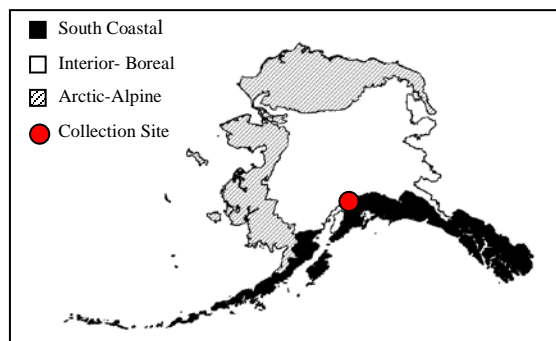
B.	Invasiveness Ranking	Total (Total Answered*) Possible	Total
1	Ecological impact	40 (40)	20
2	Biological characteristic and dispersal ability	25 (25)	9
3	Ecological amplitude and distribution	25 (25)	16
4	Feasibility of control	10 (10)	7
	Outcome score	100 (100) ^b	52 ^a
	Relative maximum score†		0.52

* For questions answered “unknown” do not include point value for the question in parentheses for “Total Answered Points Possible.”

† Calculated as ^a/_b.

A. CLIMATIC COMPARISON:

1.1. Has this species ever been collected or documented in Alaska?	
Yes	Yes – continue to 1.2
	No – continue to 2.1
1.2. Which eco-geographic region has it been collected or documented (see inset map)? <i>Proceed to Section B. Invasiveness Ranking.</i>	
	South Coastal
Yes	Interior-Boreal
	Arctic-Alpine



Identify ecosystem processes impacted:

Common mullein likely alters normal successional pathways. At the high densities common mullein appears to prevent the establishment of native herbs and grasses in burned or disturbed areas (Pitcairn 2000).

Rational:

Sources of information:

Pitcairn, M.F. 2000. *Verbascum thapsus* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 321-326.

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

5

Documentation:

Identify type of impact or alteration:

Common mullein is likely to create a new sparse herbaceous layer (Hoshovsky 2000).

Rational:

Sources of information:

Hoshovsky, M.C. 1986. Element stewardship abstract for *Verbascum thapsus* Common mullein. The Nature Conservancy, Arlington, Virginia.

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

5

Documentation:

Identify type of impact or alteration:

Common mullein is not often a problematic weed of natural areas; however, it can displace native species in sparsely vegetated meadows (Pitcairn 2000).

Rational:

Sources of information:

Pitcairn, M.F. 2000. *Verbascum thapsus* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 321-326.

1.4. Impact on higher trophic levels (cumulative impact of this species on the animals, fungi, microbes, and other organisms in the community it invades)

- A. Negligible perceived impact 0
- B. Minor alteration 3
- C. Moderate alteration (minor reduction in nesting/foraging sites, reduction in habitat connectivity, interference with native pollinators, injurious components such as spines, toxins) 7
- D. Severe alteration of higher trophic populations (extirpation or endangerment of an existing native species/population, or significant reduction in nesting or foraging sites) 10
- U. Unknown

Score

5

Documentation:

Identify type of impact or alteration:

Grazing animals avoid eating mullein (Rutledge and McLendon 1996). Its flowers are visited by a number of insects. Common mullein is also a host for numerous diseases and insect pests. Hybridization is known within the genus (Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.

Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page.

<http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

Total Possible

40

Total

20

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode of reproduction

- A. Not aggressive reproduction (few [0-10] seeds per plant and no vegetative reproduction) 0
- B. Somewhat aggressive (reproduces only by seeds (11-1,000/m²)) 1
- C. Moderately aggressive (reproduces vegetatively and/or by a moderate amount of seed, <1,000/m²) 2
- D. Highly aggressive reproduction (extensive vegetative spread and/or many seeded, >1,000/m²) 3
- U. Unknown

Score

3

Documentation:

Describe key reproductive characteristics (including seeds per plant):

Common mullein reproduces solely by seed. Seed production can be 100,000 to 180,000 seeds per plant (Gross 1980, Gross and Werner 1982).

Rational:

Sources of information:

Gross, K.L. 1980. Colonization by *Verbascum thapsus* (Mullein) of an old-field in Michigan: experiments on the effects of vegetation. *Journal of Ecology*. 68(3): 919-927.

Gross, K.L. and P.A. Werner. 1982. Colonizing abilities of 'biennial' plant species in relation to ground cover: implications for their distributions in a successional sere. *Ecology*. 63(4): 921-931.

2.2. Innate potential for long-distance dispersal (bird dispersal, sticks to animal hair, buoyant fruits, 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) 2
- C. Numerous opportunities for long-distance dispersal (species has adaptations such as pappus, hooked fruit-coats, etc.) 3
- U. Unknown

Score

0

Documentation:

Identify dispersal mechanisms:

Seeds are not adapted to long distance dispersal. Movement of the stalk by wind or large animals can disperse seeds as far as 11 m (Gross and Werner 1978, Hoshovsky

1986).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Hoshovsky, M.C. 1986. Element stewardship abstract for *Verbascum thapsus* Common mullein. The Nature Conservancy, Arlington, Virginia.

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, contamination, etc.)

- A. Does not occur 0
- B. Low (human dispersal is infrequent or inefficient) 1
- C. Moderate (human dispersal occurs) 2
- D. High (there are numerous opportunities for dispersal to new areas) 3
- U. Unknown

Score

Documentation:

Identify dispersal mechanisms:

Common mullein was introduced into North America as a medicinal herb. It is often grown as an ornamental (Hoshovsky 1986, Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Hoshovsky, M.C. 1986. Element stewardship abstract for *Verbascum thapsus* Common mullein. The Nature Conservancy, Arlington, Virginia.

2.4. Allelopathic

- A. No 0
- B. Yes 2
- U. Unknown

Score

Documentation:

Describe effect on adjacent plants:

This species is not known to be allelopathic (Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.

2.5. Competitive ability

- A. Poor competitor for limiting factors 0
- B. Moderately competitive for limiting factors 1
- C. Highly competitive for limiting factors and/or nitrogen fixing ability 3
- U. Unknown

Score

Documentation:

Evidence of competitive ability:

Common mullein is easily outcompeted by native plants (Hoshovsky 1986, Pitcairn 2000).

Rational:

Sources of information:

Hoshovsky, M.C. 1986. Element stewardship abstract for *Verbascum thapsus* Common mullein. The Nature Conservancy, Arlington, Virginia.

Pitcairn, M.F. 2000. *Verbascum thapsus* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 321-326.

2.6. Forms dense thickets, climbing or smothering growth habit, or otherwise taller than the surrounding vegetation

- A. No 0
- B. Forms dense thickets 1
- C. Has climbing or smothering growth habit, or otherwise taller than the surrounding vegetation 2
- U. Unknown

Score

Documentation:

Describe grow form:

Common mullein has been observed at densities of 5.2 flowering plants/m² in woodlands two years after timber harvest. Gross and Werner (1978) report densities of 1 plant/m² and 0.17 plant/m² in the 3 and 12 years old fields respectively. The stout flowering stem in the second year of growth can be up to 6 feet tall (Whitson et al. 2000).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Whitson, T. D., L. C. Burrill, S. A. Dewey, D. W. Cudney, B. E. Nelson, R. D. Lee and R. Parker. 2000. Weeds of the West. The Western Society of Weed Science in cooperation with the Western United States Land Grant Universities, Cooperative Extension Services. University of Wyoming. Laramie, Wyoming. 630 pp.

2.7. Germination requirements

- A. Requires open soil and disturbance to germinate 0
- B. Can germinate in vegetated areas but in a narrow range or in special conditions 2
- C. Can germinate in existing vegetation in a wide range of conditions 3
- U. Unknown

Score

Documentation:

Describe germination requirements:

Common mullein requires bare soil for successful establishment and growth.

Rational:

In experiments in Ohio and Michigan, 50% emergence of seedlings took 9 days on bare soil, but 30 days on vegetated plots. Seedling growth rates were 4-7 times faster on bare soils, producing 2000 times more biomass within the same time period (Gross 1984).

Sources of information:

Gross, K.L. 1984. Effect of seed size and growth form on seedling establishment of six monocarpic perennial plants. *The Journal of Ecology*. 72(2): 369-387.

2.8. Other species in the genus invasive in Alaska or elsewhere

- A. No 0
- B. Yes 3
- U. Unknown

Score

Documentation:

Species:

Verbascum blattaria L. is considered a noxious weed in Colorado (USDA 2002).

Sources of information:

USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-

2.9. Aquatic, wetland, or riparian species

- | | |
|--|---|
| A. Not invasive in wetland communities | 0 |
| B. Invasive in riparian communities | 1 |
| C. Invasive in wetland communities | 3 |
| U. Unknown | |

Score

0

Documentation:

Describe type of habitat:

Common mullein is a weed of pastures, abandoned fields, and roadsides (Gross and Werner 1978). It is also can be found in meadows and river bottoms (Rutledge and McLendon 1996).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.

Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page.

<http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

Total Possible

25

Total

9

3. DISTRIBUTION

3.1. Is the species highly domesticated or a weed of agriculture

- | | |
|--|---|
| A. No | 0 |
| B. Is occasionally an agricultural pest | 2 |
| C. Has been grown deliberately, bred, or is known as a significant agricultural pest | 4 |
| U. Unknown | |

Score

2

Documentation:

Identify reason for selection, or evidence of weedy history:

Common mullein is not a weed of agricultural crops, as it cannot tolerate tilling (Gross and Werner 1978, Pitcairn 2000). It is often grown as an ornamental (Hoshovsky 1986, Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.

Hoshovsky, M.C. 1986. Element stewardship abstract for *Verbascum thapsus* Common mullein. The Nature Conservancy, Arlington, Virginia.

Pitcairn, M.F. 2000. *Verbascum thapsus* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 321-326.

3.2. Known level of impact in natural areas

- | | |
|--|---|
| A. Not known to cause impact in any other natural area | 0 |
| B. Known to cause impacts in natural areas, but in dissimilar habitats and climate zones than exist in regions of Alaska | 1 |
| C. Known to cause low impact in natural areas in similar habitats and climate zones to those present in Alaska | 3 |
| D. Known to cause moderate impact in natural areas in similar habitat and climate zones | 4 |
| E. Known to cause high impact in natural areas in similar habitat and climate zones | 6 |

U. Unknown

Score 3

Documentation:

Identify type of habitat and states or provinces where it occurs:

Common mullein can invade undisturbed meadows, displacing native herbs and grasses in California. It is also been observed establishing in burns in the Sierra Nevada Mountains. High densities of rosettes prevent colonization by native species (Pitcairn 2000).

Common mullein was reported as not being a problem species in natural areas in Canada (White et al. 1993).

Common mullein invades river banks in open coniferous forest at British Columbia and Idaho border (J. Snyder – pers. com.).

Sources of information:

Pitcairn, M.F. 2000. *Verbascum thapsus* L. In: Invasive plants of California's wildlands. Edited by Bossard, C.C., J.M. Randall, and M.C. Hoshovsky. University of California Press. p. 321-326.

Snyder, J. UAF Cooperative Extension Service. 2221 E. Northern Lights Blvd. #118 Anchorage, AK 99508-4143 tel: (907) 786-6310 alt.tel: (907) 743-9448 – Pers. com.

White D.J., E. Haber and C. Keddy. 1993. Invasive plants of natural habitats in Canada: an integrated review of wetland and upland species and legislation governing their control. Canadian Wildlife Service, Ottawa, Canada. 121 pp.

3.3. Role of anthropogenic and natural 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 disturbances 3
- C. Can establish independent of any known natural or anthropogenic disturbances 5
- U. Unknown

Score 3

Documentation:

Identify type of disturbance:

Common mullein is an initial colonist in newly disturbed sites (Gross and Werner 1978, Pitcairn 2000).

Rational:

Seedling growth rates were faster, producing more biomass within the same time period on bare soils relative to vegetated soils (Gross 1984). Seedlings did not establish in small experimentally created openings, but they did colonize larger openings such as those created by animal digging. Only in the open plots did plants survive and produce seeds (Gross 1980).

Sources of information:

Gross, K.L. 1980. Colonization by *Verbascum thapsus* (Mullein) of an old-field in Michigan: experiments on the effects of vegetation. *Journal of Ecology*. 68(3): 919-927.

Gross, K.L. 1984. Effect of seed size and growth form on seedling establishment of six monocarpic perennial plants. *The Journal of Ecology*. 72(2): 369-387.

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. *Canadian Journal of Plant Science*. 58: 401-413.

3.4. Current global distribution

- A. Occurs in one or two continents or regions (e.g., Mediterranean region) 0
- B. Extends over three or more continents 3
- C. Extends over three or more continents, including successful introductions in arctic or subarctic regions 5
- U. Unknown

Score 3

Documentation:

Describe distribution:

Common mullein occurs throughout Europe to 64°N in Norway, east into Russia, and south to the Caucasus Mountains and Western Himalayas. It is also occurs in Asia

Minor and China (Lid and Lid 1994, Gross and Werner 1978, Gubanov et al. 1995).
Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Gubanov, I.A., K.B. Kiseleva, B.C. Novikov and B.N. Tihomirov. 1995. Flora of vascular plants of Center European Russia. Moscow. Argus. 558 pp.
Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.

3.5. Extent of the species U.S. range and/or occurrence of formal state or provincial listing

- A. 0-5% of the states 0
- B. 6-20% of the states 2
- C. 21-50%, and/or state listed as a problem weed (e.g., “Noxious,” or “Invasive”) in 1 state or Canadian province 4
- D. Greater than 50%, and/or identified as “Noxious” in 2 or more states or Canadian provinces 5
- U. Unknown

Score

5

Documentation:

Identify states invaded:

Common mullein occurs in nearly all of the United States (USDA 2002). In Canada it occurs mainly in Ontario, Quebec, the eastern provinces and British Columbia (Gross and Werner 1978). *Verbascum thapsus* is a noxious weed in Colorado, Hawaii, and Manitoba (Royer and Dickinson 1999, USDA 2002).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Total Possible

25

Total

16

4. FEASIBILITY OF CONTROL

4.1. Seed banks

- A. Seeds remain viable in the soil for less than 3 years 0
- B. Seeds remain viable in the soil for between 3 and 5 years 2
- C. Seeds remain viable in the soil for 5 years and more 3
- U. Unknown

Score

3

Documentation:

Identify longevity of seed bank:

Seeds may remain viable for over 100 years (Kivilaan and Bandurski 1981), and viable seeds have been found in soil samples archaeologically dated from A.D. 1300 (Ødum 1965, cited in Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.
Kivilaan, A. and R.S. Bandurski. 1981. The one hundred-year period for Dr.Beal’s

seed viability experiment. American Journal of Botany. 68(9): 1290-1292.
 Ødum, S. 1965. Germination of ancient seeds. Dan. Bot. Ark. 24: 70.

4.2. Vegetative regeneration

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

Score

1

Documentation:

Describe vegetative response:

Plants will not die if it is cut above the root crown. This will cause increased growth of lateral branches, which will produce flowers later (Gross and Werner 1978).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science 58: 401-413.

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; requires a minor investment in human and financial resources 2
- C. Management requires a major short-term investment of human and financial resources, or a moderate long-term investment 3
- D. Management requires a major, long-term investment of human and financial resources 4
- U. Unknown

Score

3

Documentation:

Identify types of control methods and time-term required:

Common mullein is difficult to control because of the large number of seed and long lived seedbank. Hairs on the leaves prevent herbicides from penetrating the leaf surface. Mechanical and biological control methods can be used for common mullein. Sowing sites with native grasses and forbs may decrease seed germination and the chance of successful establishment. A weevil specific to common mullein was introduced to North America from Europe. The larvae destroy up to 50% of the seeds (Gross and Werner 1978, Hoshovsky 1986, Pitcairn 2000, Rutledge and McLendon 1996).

Rational:

Sources of information:

Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. Canadian Journal of Plant Science. 58: 401-413.

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Rutledge, C.R. and T. McLendon. 1996. An Assessment of Exotic Plant Species of Rocky Mountain National Park. Department of Rangeland Ecosystem Science, Colorado State University. 97 pp. Northern Prairie Wildlife Research Center Home Page.

<http://www.npwrc.usgs.gov/resource/othrdata/Explant/explant.htm> (Version 15DEC98).

Total Possible

10

Total

7

Total for 4 sections Possible	100
Total for 4 sections	52

References:

- CLIMEX for Windows, Version 1.1a. 1999. CISRO Publishing, Australia.
- Gross, K.L. 1980. Colonization by *Verbascum thapsus* (Mullein) of an old-field in Michigan: experiments on the effects of vegetation. *Journal of Ecology*. 68(3): 919-927.
- Gross, K.L. 1984. Effect of seed size and growth form on seedling establishment of six monocarpic perennial plants. *The Journal of Ecology*. 72(2): 369-387.
- Gross, K.L. and P.A. Werner. 1978. The biology of Canadian weeds. 28. *Verbascum thapsus* L. and *V. blattaria* L. *Canadian Journal of Plant Science*. 58: 401-413.
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- Gubanov, I.A., K.B. Kiseleva, B.C. Novikov and B.N. Tihomirov. 1995. Flora of vascular plants of Center European Russia. Moscow. Argus. 558 pp.
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- Lid, J. and D. T. Lid. 1994. Flora of Norway. The Norske Samlaget, Oslo. Pp. 1014.
- Ødum, S. 1965. Germination of ancient seeds. *Dan. Bot. Ark.* 24: 70.
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- Royer, F. and R. Dickinson. 1999. Weeds of the Northern U.S. and Canada. The University of Alberta press. 434 pp.
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- USDA (United States Department of Agriculture), NRCS (Natural Resource Conservation Service). 2002. The PLANTS Database, Version 3.5 (<http://plants.usda.gov>). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.
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