

INDIANA

NON-NATIVE PLANT INVASIVENESS RANKING FORM

ASSESSMENT FOR INVASIVE PLANTS NOT IN TRADE
Form originally created for use in New York
Indiana Form version date: November 1, 2010

Scientific name: *Polygonum perfoliatum* USDA Plants Code: POPE10
 Common names: Mile-a-minute Vine, Asiatic Tearthumb
 Native distribution: India to Eastern Asia, China, the islands from Japan to the Philippines, Nepal, Burma, Manchuria, Korea, Taiwan and the Malay Peninsula.
 Date assessed: 7-23-2013
 Assessors: Zach Deitch, Ellen Jacquart
 Reviewers: Scott Namestnik
 Date Approved: 8-20-2013

Indiana Invasiveness Rank:

Invasiveness Ranking Summary (see details under appropriate sub-section)		Total (Total Answered*) Possible	Total
1	Ecological impact	40 (<u>40</u>)	31
2	Biological characteristic and dispersal ability	25 (<u>25</u>)	19
3	Ecological amplitude and distribution	25 (<u>25</u>)	13
4	Difficulty of control	10 (<u>10</u>)	7
	Outcome score	100 (<u>100</u>) ^b	70 ^a
	Relative maximum score [†]		70
	Indiana Invasiveness Rank [§]	High	

* 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):

A1 Has this species been documented to persist without cultivation in IN? (reliable source; voucher not required)

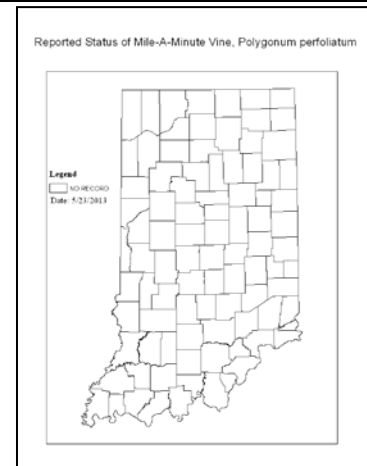
Yes – continue to A2.2

No – continue to A2.1

A2 What is the likelihood that this species will occur and persist outside of cultivation given the climate in Indiana? (obtain from occurrence data in other states with similar climates)

Likely – continue to A3

Not likely – stop here. There is no need to assess the species



Documentation:

Sources of information: Range maps compiled from PLANTS database, <http://plants.usda.gov/java/>; Indiana CAPS database, <http://extension.entm.purdue.edu/CAPS/index.html>; Indiana IPSAWG reports (unpublished); and EDDMapS reports, <http://eddmeps.org/>

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A3 Describe the potential or known suitable habitats within Indiana (underlined). Natural habitats include all habitats not under active human management. Managed habitats are indicated with an asterisk.

Aquatic Habitats Rivers/streams Natural lakes and ponds Reservoirs/impoundments*	Wetland Habitats Marshes Fens Bogs Shrub swamps <u>Forested wetlands/riparian</u> Beaches/dunes <u>Ditches*</u>	Upland Habitats <u>Forest</u> Savannas Barrens Prairies <u>Cultivated*</u> <u>Old Fields*</u> <u>Roadsides*</u>
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Other potential or known suitable habitats within Indiana:

Documentation: *This species is commonly found in roadsides, ditches, rights-of-way, vacant lots, clearcuts and young tree farms, and other disturbed habitats. It may also be found in wet meadows that may support rare wetland plants and in natural riparian and floodplain areas.*

Sources of information:
 Clef, 2011.
 Sheehan, 2007.

B. INVASIVENESS RANKING

Questions apply to areas similar in climate and habitats to Indiana 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 7

Documentation:

Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)

Mile-a-minute weed is a threat to ecosystems as it has the ability to outgrow other species.

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Sources of information:
Clef, 2011.

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:

Smothers native plants by growing up to 6" in one day.

In more open areas and forest edges this vine can form a dense mat that covers everything, blocking light from small trees and shrubs.

Sources of information:

Binion, 2005.

Wisconsin Department of Natural Resources, 2012.

Sheehan, 2007.

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

10

Documentation:

Identify type of impact or alteration:

Mile-a-minute weed grows rapidly, scrambling over shrubs and other vegetation, blocking the foliage of covered plants from available light, and reducing their ability to photosynthesize, which stresses and weakens them. If left unchecked, the lack of photosynthesis will kill a plant. Large infestations of mile-a-minute weed eventually reduce native plant species in natural areas. Small populations of extremely rare plants may be eliminated entirely.

The vine rapidly spreads and could present as great a threat to native biodiversity.

Overgrows and outcompetes native vegetation.

Sources of information:

Clef, 2011.

Gerlach Okay *et al.*, 2010.

Pierce, 2012.

Sheehan, 2007.

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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

7

Documentation:
Identify type of impact or alteration:
Loss of native plant species diversity from mile-a-minute weed affects wildlife species by reducing or eliminating their food plants and habitats.

It has delicate reddish stems that are covered with barbs.

Sources of information:
Binion, 2005.
Wisconsin Department of Natural Resources, 2012.
Sheehan, 2007.

Total Possible	<table border="1" style="display: inline-table; width: 50px; height: 20px;"><tr><td style="text-align: center;">40</td></tr></table>	40
40		
Section One Total	<table border="1" style="display: inline-table; width: 50px; height: 20px;"><tr><td style="text-align: center;">31</td></tr></table>	31
31		

2. BIOLOGICAL CHARACTERISTICS AND DISPERSAL ABILITY

2.1. Mode and rate of reproduction

- | | | |
|----|---|---|
| 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):
It is a self-pollinating plant that can reach 66 seeds per square meter on the date of peak production.
It is a rapid growing herbaceous annual vine. Mile-a-minute has a preference for moist soils, but can survive relatively low soil moisture, especially areas with abundant leaf litter.

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It also occurs in environments that are extremely wet with poor soil structure. Can reach reproductive maturity very early in the season and can alter the allocation of energy from vegetative growth to earlier reproduction when intraspecific competition is high. It also fruits in September.
Sources of information:
Clef, 2011.
Wisconsin Department of Natural Resources, 2012.
Sheehan, 2007.

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

Documentation:
Identify dispersal mechanisms:
Spread by water, birds, ants, and other animals. Birds can disperse the seeds moderately long distances as can water.

Sources of information:
Clef, 2011.
Wisconsin Department of Natural Resources, 2012.
Sheehan, 2007.

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

Documentation:
Identify dispersal mechanisms:
Intentional:
Unintentional: *Spread by vehicles/humans, water, birds, ants, and other animals. Seeds are also inadvertently transported in nursery stock. Transport of seeds short distances by native ant species has been observed.*

Sources of information:

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Wisconsin Department of Natural Resources, 2012.
Sheehan, 2007.

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

Documentation:

Rate of Spread:

HIGH(1-3 yrs) Notes: Many sources note that this species is spreading rapidly, and it is estimated that the current range is only about 20 percent of the estimated possible range for this species.

Evidence of competitive ability:

This incredibly fast growing, annual vine can reach 20 - 25 ft. in 6 - 8 weeks. The ability of mile-a-minute to attach to other plants with its recurved barbs and climb over the plants to reach an area of high light intensity is a key to its survival. Can reach reproductive maturity very early in the season and can alter the allocation of energy from vegetative growth to earlier reproduction when intraspecific competition is high.

Sources of information:

Sheehan, 2007.

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

Documentation:

Describe growth form:

It has a climbing growth habit that can eventually block sunlight to other plants and kill them.

Sources of information:

Clef, 2011.

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

Documentation:

Describe germination requirements:

Will produce seeds as early as July, and seeds can germinate as early as March. The seeds must undergo a minimum 8 week period of temperatures 10 degrees C or below in order to

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break dormancy and germinate

Mile-a-minute has a preference for moist soils, but can survive relatively low soil moisture, especially areas with abundant leaf litter. It also occurs in environments that are extremely wet with poor soil structure.

Sources of information:
 Sheehan, 2007.

2.7. Other species in the genus invasive in Indiana or elsewhere

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

Score

0

Documentation:

No other species in the genus invasive in Indiana; however, the closely related genus Fallopia has two invasive species in Indiana (F. japonica and F. sachalinensis).

Species:

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

2

Documentation:

Identify reason for selection, or evidence of weedy history:

Sources of information:

3.2. Number of habitats the species may invade

- A. Not known to invade any natural habitats given at A2.2 0
- B. Known to occur in two or more of the habitats given at A2.2, with at least one a natural habitat. 1

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- C. Known to occur in three or more of the habitats given at A2.2, with at least two a natural habitat. 2
- D. Known to occur in four or more of the habitats given at A2.2, with at least three a natural habitat. 4
- E. Known to occur in more than four of the habitats given at A2.2, with at least four a natural habitat. 6
- U. Unknown

Score

Documentation:

Identify type of habitats where it occurs and degree/type of impacts:
Six habitats identified with two being natural in A3.

Sources of information:
See A3.

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

Documentation:

Identify type of disturbance:
Generally colonizes open, disturbed areas. Light---at least 63% of the available sunlight--- is required for this species to successfully colonize a site.

Sources of information:
Clef, 2011.
Sheehan, 2007.

3.4. Climate in native range

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

Score

Documentation:

Describe what part of the native range is similar in climate to Indiana:
The plant is a tender annual and dies at the first frost. A temperature of 10°C or below must be sustained for an eight week period to stimulate germination.

Sources of information:
Gerlach Okay *et al.* 2010.
Sheehan, 2007.

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, 3

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and/or categorized as a problem weed (e.g., “Noxious” or “Invasive”) in 1 northeastern state or eastern Canadian province.

- 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:
It occurs in eastern states from the Carolinas to New York west to Ohio, and Oregon.

Sources of information:
USDA. NRCS. 2007.

3.6. Current introduced distribution of the species in natural areas in Indiana

- A. Present in no Indiana counties 0
- B. Present in 1-10 Indiana counties 1
- C. Present in 11-20 Indiana counties 2
- D. Present in 21-50 Indiana counties 3
- E. Present in more than 50 Indiana counties or on Federal noxious weed list 4
- U. Unknown

Score

0

Documentation:
Describe distribution:
Documented in 0 Indiana counties.

Sources of information:
See A1

Total Possible

25

Section Three Total

13

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:
Seed can remain viable in the soil for three years but could last as long as 6 years.

Sources of information:
Gerlach Okay *et al.*, 2010.
Sheehan, 2007.

4.2. Vegetative regeneration

- A. No regrowth following removal of aboveground growth 0

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- 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:

Has a taproot.

Vegetative propagation from roots has not been successful for this plant.

Sources of information:

Clef, 2011.

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 ft²). 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 4

Documentation:

Identify types of control methods and time-term required:

Mechanical: Pull populations and let dehydrate in sun for several days. Repeated mowing or cutting will prevent flowering and seed production. WEAR THICK GLOVES!

Chemical: Glyphosate and clopyralid can be used for foliar sprays. Applying a pre-emergence that is effect against broad leaf weeds in late spring will prevent the annual germinating seeds from emerging.

*Biological: A small weevil, *Rhinioncomimus latipes* Korotyaev, was found to be host-specific to mile-a-minute weed, and field release was approved by USDA-APHIS in 2004. Weevil adults feed on mile-a-minute foliage, and larvae feed within nodes and can suppress growth and reduce seed production.*

Cultural: Maintain vegetation continuity and avoid creating gaps in existing vegetation. Maintain vegetative buffers along streams and forest edges to prevent establishment of and seed dispersal.

With seed survival at least 3 years, monitoring needs to be continued for at least that long.

Sources of information:

Binion, 2005.

Clef, 2011.

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Gerlach Okay *et al.* 2010.
Wisconsin Department of Natural Resources, 2012.
Sheehan, 2007.

Total Possible	10
Section Four Total	7

Total for 4 sections Possible	100
Total for 4 sections	73

References for species assessment:

Binion, D. E. 2005. "Pest Alert, Mile-A-Minute Weed". USDA Forest Service.
<http://extension.entm.purdue.edu/CAPS/pdf/datasheets/Mile-A-MinuteWeed.pdf>.

Clef, M. V. 2011. "Persicaria perfoliata (L.) H. Gross (=Polygonum perfoliatum L.)". Global Invasive Species Database. <http://www.issg.org/database/species/ecology.asp?si=582&fr=1&sts=>.

Gerlach Okay, J.A., Hough-Goldstein, J., Swearingen, J. 2010. "Mile-A-Minute". Plant Conservation Alliance's Alien Plant Working Group Least Wanted. <http://www.nps.gov/plants/alien/fact/pepe1.htm>.

MIPN, 2006. "Keep a Lookout for New Invasive Plants in the Midwest". Midwest Invasive Plant Network.
<http://www.mipn.org/New%20Invasives%20Flyer.pdf>.

Pierce, C. M.F. 2012. "Mile-A-Minute Weed". Indiana's Most Unwanted Invasive Plant Pests.
<http://extension.entm.purdue.edu/CAPS/pestInfo/mileAminute.htm>.

USDA, NRCS. 2007. The PLANTS Database (<http://plants.usda.gov>, 16 March 2007). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

Wisconsin Department of Natural Resources. 2012. "Invasive Species".
<http://dnr.wi.gov/topic/Invasives/fact/MileAMinuteVine.html>. Date Accessed: 25 June 2013.

Sheehan, M. 2007. Wisconsin Invasive Plant Assessment for *Polygonum perfoliatum*.
http://dnr.wi.gov/topic/Invasives/documents/classification/LR_Polygonum_perfoliatum.pdf. Date Accessed: 25 June 2013.

Wisconsin State Herbarium. 2007. WISFLORA: Wisconsin Vascular Plant Species (<http://www.botany.wisc.edu/wisflora/>). Dept. Botany, Univ. Wisconsin, Madison, WI 53706-1381 USA.

Citation: This IN ranking form may be cited as: Jacquart, E.M. 2011. Invasiveness ranking system for non-native plants of Indiana. Unpublished. Invasive Plant Advisory Committee (IPAC) to the Indiana Invasive Species Council, Indianapolis, IN.

Acknowledgments: The IN ranking form is an adaptation for Indiana use of the form created for New York by Jordan et al. (2009), cited below. Documentation for species assessed for New York are used for Indiana where they are applicable. The Invasive Plant Advisory Committee was created by the Indiana Invasive Species Council in October 2010, and is made up of the original members of the Indiana Invasive Plant Assessment Working Group (IPSAWG). Original members of IPSAWG included representatives of the The Nature Conservancy; Indiana Native Plant and Wildflower Society; Indiana Nursery and Landscape Association; Indiana Chapter of the American Society of Landscape Architects; Indiana Forage Council; Indiana Wildlife Federation; Indiana State Beekeepers

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Association; Indiana Beekeeper's Association; Department of Natural Resources; Hoosier National Forest; Indiana Academy of Science; Natural Resources Conservation Service; Indiana Department of Environmental Management; Indiana Department of Transportation; Purdue Cooperative Extension Service; Seed Administrator, Office of the Indiana State Chemist.

References for the Indiana ranking form:

Jordan, M.J., G. Moore, and T.W. Weldy. 2009. Invasiveness ranking system for non-native plants of New York. Unpublished. The Nature Conservancy, Cold Spring Harbor, NY; Brooklyn Botanic Garden, Brooklyn, NY; The Nature Conservancy, Albany, NY.

References for the New York ranking form:

Carlson, Matthew L., Irina V. Lapina, Michael Shephard, Jeffery S. Conn, Roseann Densmore, Page Spencer, Jeff Heys, Julie Riley, Jamie Nielsen. 2008. Invasiveness ranking system for non-native plants of Alaska. Technical Paper R10-TPXX, USDA Forest Service, Alaska Region, Anchorage, AK XX9. Alaska Weed Ranking Project may be viewed at: http://akweeds.uaa.alaska.edu/akweeds_ranking_page.htm.

Heffernan, K.E., P.P. Coulling, J.F. Townsend, and C.J. Hutto. 2001. Ranking Invasive Exotic Plant Species in Virginia. Natural Heritage Technical Report 01-13. Virginia Dept. of Conservation and Recreation, Division of Natural Heritage, Richmond, Virginia. 27 pp. plus appendices (total 149 p.).

Morse, L.E., J.M. Randall, N. Benton, R. Hiebert, and S. Lu. 2004. An Invasive Species Assessment Protocol: Evaluating Non-Native Plants for Their Impact on Biodiversity. Version 1. NatureServe, Arlington, Virginia. <http://www.natureserve.org/getData/plantData.jsp>

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