# 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: | Pueraria montana | USDA Plants Code: PUMO |
| Common names: | Kudzu | |
| Native distribution: | East Asia | |
| Date assessed: | April 20, 2011 | |
| Assessors: | Pia Marie Paulone and Ellen Jacquart | |
| Reviewers: | Ken Cote and Jason Larson | |
| Date Approved: | September 21, 2012 | |

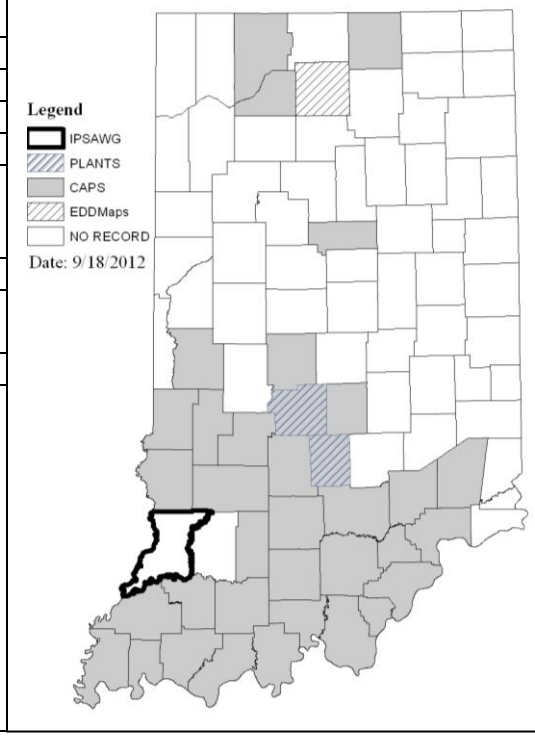
**Indiana Invasiveness Rank:** Very High (Relative Maximum Score >80.00)

| **Invasiveness Ranking Summary** (see details under appropriate sub-section) | | Total (Total Answered*) Possible | Total |
|---|---|---|---|
| 1 | Ecological impact | 40 (30) | 30 |
| 2 | Biological characteristic and dispersal ability | 25 (25) | 19 |
| 3 | Ecological amplitude and distribution | 25 (25) | 20 |
| 4 | Difficulty of control | 10 (10) | 8 |
| | Outcome score | 100 (90)[b] | 77[a] |
| | Relative maximum score † | | 85.55 |
| | Indiana Invasiveness Rank § | Very High (Relative Maximum Score >80.00) | |

* 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 |
| | |
| | |
| A2What 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://eddmaps.org/

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** | **Wetland Habitats** | **Upland Habitats** |
|---|---|---|
| Rivers/streams | **Marshes** | **Forest** |
| Natural lakes and ponds | Fens | **Savannas** |
| Reservoirs/impoundments* | Bogs | Barrens |
| | Shrub swamps | **Prairies** |
| | **Forested wetlands/riparian** | **Cultivated*** |
| | **Beaches/dunes** | **Old Fields*** |
| | Ditches* | **Roadsides*** |

Other potential or known suitable habitats within Indiana:
RR grades, urban woodlots and fields.

Documentation:
Sources of information:
Mitich, 2000; Lu, 2004;Brooklyn Botanic Garden, 2008, Jacquart pers. observation.

**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 10

Documentation:
Identify ecosystem processes impacted (or if applicable, justify choosing answer A in the absence of impact information)
Kudzu increases soil nitrification; substantial reduction in light availability.
Sources of information:
Mitich, 2000; Lu, 2004; Hickman & Lerdau, 2006.

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 10

Documentation:
Identify type of impact or alteration:
Forms mats that may be more than 2 m thick. Blankets trees with a dense canopy through which little light can penetrate. One study found only 20% as many juvenile trees in invaded sites as in uninvaded sites.
Sources of information:
Lu, 2004; Hickman & Lerdau, 2006.

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:
Can quickly cover shrubs and trees with a dense tangle of stems, smothering and shading out the other vegetation. Able to smother trees up to 35 m tall. Kills or degrades other plants by smothering them under a solid blanket of leaves, girdling woody stems and tree trunks, and breaking branches or uprooting entire trees and shrubs through the sheer force of its weight.
Sources of information:
Lu, 2004.

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:
Soil nitrification may impact soil microflora but no published data known. Native lupines are also susceptible to the rust that is carried by kudzu.
Sources of information:
Lu, 2004.

| | |
|---|---|
| Total Possible | 30 |
| Section One Total | 30 |

*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):
Spreads mainly by rampant (10 to 30 m in a growing season, up to 30 cm a day) vegetative growth, but does have some seed spread in areas where a pollinator, the giant resin bee, occurs.
Sources of information:
Mitich, 2000; Lu, 2004.

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 4

Documentation:
Identify dispersal mechanisms:
Seeds reportedly are dispersed by birds and mammals; although some sources (Mitich, 2000) state this is infrequent.
Sources of information:
Mitich, 2000; Lu, 2004.

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 1

Documentation:
Identify dispersal mechanisms:
Formerly for planted soil stabilization and cattle forage- but this practice now discontinued. Has been noted to be grown in people's yards.
Sources of information:
Lu, 2004.

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:
Nitrogen fixing (Rhizobium symbiosis), fast-growing (10 to 30 m in a growing season, up to 30 cm a day) perennial, stems easily root at nodes. One investigation found that shoot growth is maximized in the early part of the growing season (and during seedling growth) which results in greater success in dominating a habitat and outcompeting competitors (Sasek & Strain, 1988). Kudzu's tap roots may burrow 2 m or more into the ground, enabling the plant to survive northeastern winters and act as water reservoirs, allowing kudzu to withstand fairly dry climates.

Kudzu flourishes on many soil types, including nutrient-deficient, sandy, clayey, or loamy soils.

One Chinese study isolated an aciduric Rhizobium strain from a kudzu nodule which could grow under pH 4.6- distinct from the optimal pH 6.5 to 7.5 for Rhizobium (Gu et al., 2006).

Possesses superior hydraulic conductance, one study suggest that kudzu has a large capacity for the transverse movement of water in xylem (Taneda & Tateno, 2007).

Population studies of Pueraria from the southeastern US have shown high levels of genetic diversity (Pappert, et al., 2000; Jewett et al., 2003; Sun et al., 2005), which may enchance ecological amplitude.
Sources of information:
Sasek & Strain, 1988; Mitich, 2000; Pappert, et al., 2000; Jewett et al., 2003; Lu, 2004; Sun et al., 2005; Gu et al., 2006; Taneda & Tateno, 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 2

Documentation:
Describe growth form:
Has climbing and smothering habit.
Sources of information:
Mitich, 2000; Lu, 2004.

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:
The reports of germination have been mixed- Mitich reported the seeds are difficult to germinate and kudzu seedlings are surprisingly delicate, competing poorly with aggressive weeds.
Susko and McClain reported that while Pueraria seed possesses physical dormancy; seed is capable of germinating in a variety of climatic and edaphic conditions. Scarified kudzu seed germinated at 94-100% across all temperature regimes, whereas germination for nonscarified seed was at 17% or less. Seed does not require light for germination and should germinate when shaded by litter or a leaf canopy or following burial in soil. Seed germinates over a wide range of pH.

Sources of information:
Susko et al., 1999; Susko et al., 2001; Mitich, 2000; McClain et al., 2006.

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

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

Score 0

Documentation:
Species:
Weldy & Werier, 2005; USDA, 2008.

| | |
|---|---|
| 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:
Kudzu populations in Indiana have been mapped by DNR – Division of Entomology and Plant Pathology; many large, dense stands have been mapped but all are in somewhat disturbed landscapes.
Sources of information:
Invasives.in.gov; Jacquart personal observations.

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 |
| 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 6

Documentation:
Identify type of habitats where it occurs and degree/type of impacts:
See A2.3.
Sources of information:
Mitich, 2000; Lu, 2004;Brooklyn Botanic Garden, 2008.

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:
Usually invades habitats with disturbance but may occasionally invade an undisturbed area (e.g., natural forest) from the disturbed region where it originally established.
Sources of information:

Lu, 2004; Jacquart pers. obs.

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 3

Documentation:
Describe what part of the native range is similar in climate to Indiana:
China, Japan. It is growing and persisting throughout Indiana, including northern counties.
Sources of information:
Mitich, 2000; Lu, 2004.

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, DC, DE, IL, IN, KY, MA, MD, ME, NJ, NY, OH, PA, VA, WV.
Sources of information:
See known introduced range in plants.usda.gov, and update with information from states and Canadian provinces.
U.S.D.A., 2008.

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 3

Documentation:
Describe distribution:
See A1.1
Sources of information:

| | |
|---|---|
| Total Possible | 25 |
| Section Three Total | 20 |

*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:
No definitive studies located- one study suggests that because the seed possesses physical dormancy, a persistent seedbank may result once P. montana becomes established at a site. No evidence for viability beyond ten years.
Sources of information:
Susko et al., 1999.

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 2

Documentation:
Describe vegetative response:
Easily roots at nodes and from large tuberous undergound system.
Sources of information:
Lu, 2004.

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 4

Documentation:

Identify types of control methods and time-term required:
Once established, this plant is difficult to control- can take up to ten years to control well-established stands. Persistent eradication of all root material is the key to its control. Control includes grazing by goats, persistent weeding or mowing, and chemical control. This can be accomplished through using systemic herbicides, cutting vines, or close mowing every month for two growing seasons. Also can be controlled by flaming to defoliate the plant (Mitich, 2000; Lu, 2004).

Biocontrol: one investigation found the bacterial plant pathogen Pseudomonas syringae pv. phaseolicola was ineffective in controlling kudzu (Zidack & Backman, 1996).
Several indigenous Chinese species are being investigated for potential as biological control agents for kudzu in the US- the cerambycid beetle Paraleprodera diophthalma (Pascoe), which caused considerable damage to roots; and the imitation rust, caused by Synchytrium ininutinn, was the most commonly observed disease of kudzu (Sun et al., 2006).
Two insect species from China, Gonioctena tredecimmaculata (Jacoby) (Coleoptera: Chrysomelidae) and Ornatalcides (Mesalcidodes) trifidus (Pascoe) (Coleoptera: Curculionidae) are also currently being evaluated for kudzu control (Frye et al., 2007).
One study suggests that the fungus Myrothecium verrucaria, when properly formulated, has potential for controlling kudzu (Boyette et al., 2002).

Other studies focused on integrated methods of kudzu control:
1. Combinations of herbicides and induced pine competition- none of the treatments eradicated kudzu, but did delayed its recovery (Harrington et al., 2003).
2. Combinations of the fungal pathogen, Myrothecium verrucaria, with the commercial formulations of the herbicides: amniopyralid (Milestone*), metsulfuron (Escort XP), and fluroxypyr (Vista) is currently under investigation. M. verrucaria was highly tolerant to all concentrations of amniopyralid and metsulfuron for up to two days in simulated tank-mixes, while mixtures with fluroxypyr resulted in a gradual loss of spore viability (Weaver & Lyn, 2007).
3. Aplication of Myrothecium verrucaria with glyphosate [N-(phosphonomethyl) glycine]. Results suggest that timing of glyphosate application in relation to combined treatment with M. verrucaria can improve the control of kudzu (Boyette et al., 2006).

Sources of information:
Zidack & Backman, 1996; Mitich, 2000; Boyette et al., 2002; Harrington et al., 2003; Lu, 2004; Boyette et al., 2006; Sun et al., 2006: Frye et a., 2007: Weaver & Lyn, 2007.

| | |
|---|---|
| Total Possible | 10 |
| Section Four Total | 8 |
| **Total for 4 sections Possible** | 90 |
| **Total for 4 sections** | 77 |

**References for species assessment:**

Boyette, C. D., H. L.Walker, & H. K. Abbas. 2002. Biological control of kudzu (Pueraria lobata) with an isolate of Myrothecium verrucaria. Biocontrol Science & Technology. 12(1):75-82.

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Gu J. P., L. Zhang, S. Q. Wei, Q. Zhang, & D. H. Qin. 2006. Primary study on acid tolerance mechanism of a wild aciduric Rhizobium strain isolated from Pueraria lobata. Weishengwu Xuebao. 46(4):653-656.

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Hickman, J. E. & M. Lerdau. 2006. Nitrogen fixation by kudzu: impacts on invaded communities and ecosystems. Ecological Restoration. 24(3):200-201.

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Sun, J. H., Z. C. Li, D. K. Jewett, K. Britton, W. H. Ye, & X. J. Ge. 2005. Genetic diversity of Pueraria lobata (kudzu) and closely related taxa as revealed by inter-simple sequence repeat analysis. Weed Research (Oxford). 45(4):255-260.

Sun, J. H., Z. D. Liu, K. O. Britton, P. Cai, Ping, D. Orr, & J. Hough-Goldstein. 2006. Survey of phytophagous insects and foliar pathogens in China for a biocontrol perspective on kudzu, Pueraria montana var. lobata (Willd.) Maesen and S. almeida (Fabaceae). Biological Control. 36(1):22-31.

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