### Ohio Invasive Plant Assessment Protocol

<table>
<thead>
<tr>
<th>Botanical Name:</th>
<th>Pueraria lobata</th>
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<tbody>
<tr>
<td>Common Name:</td>
<td>Kudzu</td>
</tr>
<tr>
<td>Family:</td>
<td>Fabaceae</td>
</tr>
<tr>
<td>Posted Date:</td>
<td>7/30/16</td>
</tr>
<tr>
<td>Initial assessment conducted by:</td>
<td>Allison Mastaler</td>
</tr>
</tbody>
</table>

#### Step I

**Directions:** Place an “X” in the Score column next to the selected answer to each of the four questions.

1. **Is this plant known to occur in the state and listed as "noxious" on any federal or Ohio Department of Agriculture plant list?**
   - Yes. Place on invasive plant list, no further investigation needed. **STOP**
   - No. Continue on to question 2.

2. **Has this plant demonstrated widespread dispersion and establishment (i.e., high numbers of individuals forming dense stands) in natural areas across two or more regions in Ohio?**
   - Yes. Place on invasive plant list, no further investigation needed. **STOP**
   - No. Continue on to question 3.

3. **Does this plant form self-replicating populations outside of cultivation in Ohio and is it documented to alter the composition, structure, or normal processes or functions of a natural ecosystem?**
   - Yes
   - No
   - Unknown

4. **Is the plant listed as invasive in an adjoining state or a nearby state east of the Mississippi within the USDA Plant Hardiness zones 5-6?**
   - Yes
   - No
   - Unknown

If the answer was yes for both questions 3 and 4, the plant is placed on the invasive plant list and no further research is needed. Stop here. If the answer is no for both questions 3 and 4, the plant is not considered invasive and no further investigation is warranted. Otherwise, proceed to Step II.

#### Step II: Invasion Status

**Directions:** Place the appropriate numerical score (or "U") in the Score column next to the selected answer to each of these 18 questions.

1. **Current Invasion in Ohio**
   - plant is not found in natural areas (0 pts.)
   - plant is found in natural areas but only because it persist from previous planting in that location (e.g., old home sites) (0 pts.)
   - plant occurs in natural areas away from site of planting (1 pt.)
   - information unknown (U)

2. **State Distribution**
   - plant is not naturalized in any region of Ohio (0 pts.)
   - plant is naturalized in only one region in Ohio (1 pt.)
   - plant is naturalized in two regions in Ohio (2 pts.)
   - plant is naturalized in three regions in Ohio (3 pts.)
   - plant is naturalized in four regions in Ohio (4 pts.)

3. **Score**  
   - 0 pts.
   - 1 pt.
   - 2 pts.
   - 3 pts.
   - 4 pts.

4. **Notes**  
   - Species occurs in counties located next to the Ohio river (regions 4 & 5), but information is lacking about individual populations
   - Self-replicating populations are occurring in counties along the Ohio river. Kudzu infestations are documented to significantly alter soil carbon and nitrogen content and cycling, as well as fungal and bacteria biomasses. Kudzu forms dense populations that overtop and completely smother native vegetation, altering structural and compositional elements (flora and fauna) of invaded habitats. Kudzu can interfere with forest stand recovery after storms because its rapid growth in tree fall gaps prevents pioneer species from establishing. Species has been documented to alter water and fire cycles. By increasing the availability of nitrates in the soil, water systems can ultimately become eutrophic, and impact aquatic biodiversity. Species also releases phenolic compounds into soils at amounts considered to be allelopathic.

5. **References**
   - 1, 8
   - 7, 9, 10, 11, 12
   - 1, 2, 3, 4, 5, 6

6. **Regions**
   - Regions 3, 4, 5
   - Regions 1, 8, 10, 21

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**Score**  
- 0 pts.
- 1 pt.
- 2 pts.
- 3 pts.
# Ohio Invasive Plant Assessment Protocol

**Botanical Name:** Pueraria lobata  
**Common Name:** Kudzu  
**Family Name:** Fabaceae  
**Post Date:** 7/20/16  
**Initial assessment conducted by:** Allison Mastalerz

### Step I: Outcome
- **Step I Outcome:** Invasive

<table>
<thead>
<tr>
<th>Score</th>
<th>Notes</th>
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<tbody>
<tr>
<td>5</td>
<td>PA, IN, MI, WV, NY, CT, MA, KY, IL</td>
<td>1,2,3,4,5,6,14</td>
</tr>
<tr>
<td>1</td>
<td>15: Major method of spread is vegetative; species can root when vines touch the ground (explained in detail in this reference).</td>
<td>8,15</td>
</tr>
<tr>
<td>1</td>
<td>15: Most of spread of this species is due to vegetative growth with seed production very limited (0 to 3.3% seed set of ovules).</td>
<td>8,9,15</td>
</tr>
<tr>
<td>1</td>
<td>8: &quot;Low overall investment combined with low seed set and low recruitment suggests that sexual reproduction and subsequent seedling recruitment are not currently major factors in dispersal and establishment.&quot; 15: Seed production is usually less than 3% and varies extensively among populations; seeds require scarification. 18: Some populations have copious seeds while others have none. 20: Seeds can germinate in a variety of conditions, but not with flooding.</td>
<td>8,9,15,18,20</td>
</tr>
<tr>
<td>2</td>
<td>8: July-Sept., but can be impacted by sun exposure, patch size and other factors. 18: Flowering is mid-to late-summer.</td>
<td>8,18</td>
</tr>
<tr>
<td>3</td>
<td>8: The primary introduction route is intentional</td>
<td>8,18</td>
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### Step II: Biological Characters

#### Step II: Score:
- **Step II Score:** 56
- **Step II Outcome:** Invasive

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<tr>
<td>3. Regional/US Distribution</td>
<td>5</td>
<td>PA, IN, MI, WV, NY, CT, MA, KY, IL</td>
<td>1,2,3,4,5,6,14</td>
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<td>4. Vegetative Reproduction</td>
<td>5</td>
<td>15: Major method of spread is vegetative; species can root when vines touch the ground (explained in detail in this reference).</td>
<td>8,15</td>
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<td>5. Sexual Reproduction</td>
<td>1</td>
<td>15: Most of spread of this species is due to vegetative growth with seed production very limited (0 to 3.3% seed set of ovules).</td>
<td>8,9,15</td>
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<td>6. Number of Viable Seeds or Propagules per Plant</td>
<td>1</td>
<td>8: &quot;Low overall investment combined with low seed set and low recruitment suggests that sexual reproduction and subsequent seedling recruitment are not currently major factors in dispersal and establishment.&quot; 15: Seed production is usually less than 3% and varies extensively among populations; seeds require scarification. 18: Some populations have copious seeds while others have none. 20: Seeds can germinate in a variety of conditions, but not with flooding.</td>
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<td>7. Flowering Period</td>
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<td>8: July-Sept., but can be impacted by sun exposure, patch size and other factors. 18: Flowering is mid-to late-summer.</td>
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<td>8. Dispersal Ability</td>
<td>3</td>
<td>8: The primary introduction route is intentional</td>
<td>8,18</td>
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### Step III: Generation Time
- **Generation Time:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step IV: Dispersal Ability
- **Dispersal Ability:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step V: Flowering Period
- **Flowering Period:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step VI: Number of Viable Seeds or Propagules per Plant
- **Number of Viable Seeds or Propagules per Plant:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step VII: Vegetative Reproduction
- **Vegetative Reproduction:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step VIII: Sexual Reproduction
- **Sexual Reproduction:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step IX: Regional/US Distribution
- **Regional/US Distribution:** Information unknown (U)
- **Rating:** Information unknown (U)

### Step X: Notes
- **Notes:** Information unknown (U)
- **Rating:** Information unknown (U)

### References
- **References:** Information unknown (U)
- **Rating:** Information unknown (U)
### Step I: Initial Assessment

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**Step I Outcome:** Invasive

**Step II Outcome:** Invasive

### Step II: Ecological Importance

#### 10. Establishment
- Unable to invade natural areas (0 pts.)
- Can only colonize certain habitat stages (e.g., early successional habitats) (1 pt.)
- Aggressively colonizes and establishes in edge habitats (3 pts.)
- Aggressively colonizes and establishes in intact and healthy natural areas (6 pts.)
- Information unknown (U)

**Score:** 3

**Notes:**
- 14: Species will advance northward with climate change.
- 17: Genetic study shows that clones of kudzu interdigitate with one another; species has high genetic diversity consistent with multiple introductions.

**References:** 8, 14, 17

#### 11. Impact on Ecosystem Processes
- No known effect on ecosystem-level processes (0 pts.)
- Moderate effects on ecosystem-level processes (e.g., changes in nutrient cycling) (3 pts.)
- Causes long-term, substantial alterations in the ecosystem (e.g., changing fire regime of an area, changing hydrology of wetlands) (6 pts.)

**Score:** 6

**Notes:**
- 8: Species has been documented affecting mycological communities, nutrient, water and fire cycles.
- 9: Can lead to changes in an area’s nitrogen cycling and trace N gas emission; impact may extend to the atmosphere by contributing to increased concentrations of tropospheric ozone.
- 15: Species is a nitrogen-fixer; this reference reviews known ecosystem effects; species also emits isoprene gas, which contributes to ozone depletion.
- 16: Kudzu contributed to ozone pollution.
- 19: Kudzu is recommended as a biofuel source.

**References:** 7, 8, 9, 15, 16, 19

#### 12. Impact on Rare Organisms
- No known negative impact on Ohio State-listed or federal-listed plants or animals (0 pts.)
- Negatively impacts listed species, such as through displacement or interbreeding (3 pts.)

**Score:** 0

**Notes:**
- No evidence available.

**References:** 8, 13

#### 13. Impact on Native Animals
- No known negative impact on animals (0 pts.)
- Documented direct or indirect negative effects on animal taxa (3 pts.)

**Score:** 0

**Notes:**
- 8: Through altering plant community, nutrient cycles, water cycles and fire regimes, many native terrestrial and aquatic animal populations are negatively impacted, but no empirical evidence was provided.
- 13: Plant can be partially controlled by the bioherbicidal fungus Myrothecium verrucaria.

**References:** 8, 13

#### 14. Impact on Native Plants
- No known negative effects on native plants (0 pts.)
- Negatively impacts some native plants (increasing their mortality and/or recruitment of certain taxa) (3 pts.)
- Impacts native plants to such an extent that community structure is greatly altered (6 pts.)

**Score:** 6

**Notes:**
- 8: Kudzu can be allelopathic and its growth overtops and smothers native vegetation.
- 9: "...community composition is directly and immediately altered by kudzu invasion." 15: Reviewed as depressing growth of native tree and understory species.

**References:** 8, 15

#### 15. Hybridization
- No known instances of hybridization with other plant species (0 pts.)
- Can hybridize with native Ohio plants or commercially-available species, but seeds are inviable (1 pt.)
- Can hybridize with native Ohio plants or commercially-available species, producing viable seed (3 pts.)

**Score:** 0

**Notes:**
- Evidence is unclear.

**References:** 8

#### 16. Population Density
- Long juvenile period (<5 or more years for trees, 3 or more years for other growth forms) (0 pts.)
- Short juvenile period (<5 years for trees, <3 years for other forms) (3 pts.)
- Information unknown (U)

**Score:** 3

**Notes:**
- 12: Species has been documented affecting mycological communities, nutrient, water and fire cycles.
- 13: Plant can be partially controlled by the bioherbicidal fungus Myrothecium verrucaria.

**References:** 8, 13

### Notes

- Evidence is unclear.

### References

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### 17. Role in Succession in Natural Areas
- Successional information is unknown (0 pts.)
- It is an early successional species that temporarily invades a disturbed site but does not persist as the site matures (4 pts.)
- Readily invades disturbed sites and persists, but does not interfere with succession (1 pt.)
- Readily invades disturbed sites, persists and interferes with succession of native plants (4 pts.)

### 18. Number of Habitats Invaded

#### Forestlands:
- Floodplain forest, hemlock-hardwood forest, mixed mesophytic forest, beech-maple forest, oak-maple forest, oak-hickory forest.

#### Grasslands:*
- Alvar*, beach-dune community*, bur oak savanna*, slough-grass-bluejoint prairie*, sand barren*, big bluestem prairie, little bluestem prairie (xeric limestone prairie*), post oak opening*.

#### Wetlands:*
- Bog*, fen*, twigmarsh-wiregrass wet prairie*, marsh, buttonbush swamp, mixed shrub swamp, hemlock-hardwood swamp*, maple-ash-oak swamp, white pine-red maple swamp*

* Considered a rare plant community in Ohio by ODW’s Biodiversity Database Program.

- Site occurs only as small, sporadic populations or individuals (3 pts.)
- Typically forms small, monospecific patches (3 pts.)
- Is a dominant plant in an area where population occurs (absolute cover 15-50%) (4 pts.)
- Forms an extensive, monospecific stand (absolute cover >50%) (5 pts.)

### Total Score:
56

### Number of Unknowns:
0

### Outcome:
Invasive

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8: "Kudzu may also interfere with forest stand recovery after storms. Resulting tree fall gaps may be quickly dominated by kudzu, which prevents pioneer species from establishing".

8, 9

8

3

8

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8, 9

8, 9