Step I

1. Is this plant known to occur in the state and listed as "noxious" on any federal or Ohio Department of Agriculture list? Yes. Place an "X" in the Score column next to the selected answer to each of these 18 questions.

   ① 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?① Yes. Place an "X" in the Score column next to the selected answer to each of these 18 questions.

   ① 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. Place an "X" in the Score column next to the selected answer to each of these 18 questions.

   ① No. Place an "X" in the Score column next to the selected answer to each of these 18 questions. Is considered to have allelopathic properties.

   ① 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?② Yes. Place an "X" in the Score column next to the selected answer to each of these 18 questions.

   ① No. Place an "X" in the Score column next to the selected answer to each of these 18 questions. Not in IN, MI, or PA.

   ① 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 I: Outcome

If the answer was "No" for both questions 3 and 4, the plant is not considered invasive and no further investigation is warranted.

Step II: Invasion Status

1. Current Invasion in Ohio
   - plant is not found in natural areas (0 pts.)
   - plant is found in natural areas but only because it persists from previous planting (1 pt.)
   - plant is lost in two regions in Ohio (2 pts.)
   - plant is lost in three regions in Ohio (3 pts.)
   - plant is lost in four regions in Ohio (4 pts.)
   - plant is lost in five regions in Ohio (5 pts.)
   - Information unknown (U)

   ① Score: 0

2. State Distribution①
   - 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.)
   - plant is naturalized in five regions in Ohio (5 pts.)
   - Information unknown (U)

   ① Score: 0

3. Regional/US Distribution
   - plant is not considered to be a problem in any other state (0 pts.)
   - plant has been reported as a widespread problem in another non-neighboring state within the USDA Plant Hardiness Zones 5-6 (1 pt.)
   - plant has been reported to be a widespread problem in 1-2 adjoining states (3 pts.)
   - plant has been reported to be a widespread problem in 3 or more adjoining states (5 pts.)
   - plant has been reported to be a widespread problem in different habitat outside the US (1 pt.)
   - Information unknown (U)

   ① Score: 0

4. Vegetative Reproduction
   - no vegetative reproduction (0 pts.)
   - reproduces readily within the original site (1 pt.)
   - reproduces readily within the original site (1 pt.)

   ① Score: 0

Step II: Biological Characters

- Plant can be propagated vegetatively, but it is
- doubtful if reproduces in the wild. Ref 11
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)

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.)
- Information unknown (U)

12. Impact on Rare Organisms
- no known negative impact on Ohio State-listed or federal-listed plants or animals (0 pts.)
- Information unknown (U)

6. Number of Viable Seeds or Propagules per Plant
- few (0-10) (1 pt.)
- moderate (11-1,000) (3 pts.)
- prolific (>1,000) (5 pts.)
- Information unknown (U)

7. Flowering Period
- one month or less per year (0 pts.)
- two months (1 pt.)
- three to five months (2 pts.)
- longer than five months (3 pts.)
- Information unknown (U)

8. Dispersal Ability
- low potential for long-distance seed/propagule dispersal (>1km) (0 pts.)
- medium potential for long-distance seed/propagule dispersal (3 pts.)
- high potential for long-distance seed/propagule dispersal (5 pts.)
- Information unknown (U)

9. Generation Time
- 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)

11: One event per year; 10: produces hermaphroditic flowers but individuals usually show temporal patterns of sex expression during the season AND individuals trees are capable of self-pollination (species is wind-pollinated). 11: pollination in the native range is usually by small bees.

0: states that "feebly suckers are occasionally formed but are of no importance as a means of propagation" in the native range.

9, 10, 11: states that "very few individuals flower and reproduce successfully in the native range, but the seed production is moderate to high". 11: states that "the species is capable of reproducing in the native range".

11: Although most trees produce seeds each year, the average number of seeds produced per tree is not provided. Ref 10 also mentions that samaras in the native range are dispersed in autumn and in forests, dispersal is likely restricted to the neighborhood of the tree, although in open areas seeds may be dispersed much further and in areas not suited for seed germination.

9: species produces viable seeds. 11: In the native range, good seed production per tree is sporadic although most trees produce seeds each year. Trees have been observed to produce seeds "heavily" in the native range. Average tree produces up to 12 fruit per inflorescence, each fruit of 2 seeds. Ref 11 also mentions that in the native range, only 5-10% of seed germinate right away and the rest need a dormant period (resulting in up to 74% germination). [Note: the 3 pts answer here is most likely conservative]

0: species is slow growing, but specific generation times are not provided. 11: Typical assumption is that trees begin fruiting at 25 years of age in native range, but it has been observed in 16-20 year old trees.

11: In the native range, it "is not a pioneer species in the invasion of grassland, etc."
13. Impact on Native Animals
- no known negative impact on animals (0 pts.)
- documented direct or indirect negative effects on animal taxa (3 pts.)

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.)

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.)

16. Population Density
- occurs only as small, sporadic populations or individuals (1 pt.)
- 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.)

17. Role in Succession in Natural Areas
- successional information is unknown (0 pts.)
- is an early successional species that temporarily invades a disturbed site but does not persist as the site matures (0 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 barrens, big bluestem prairie, little bluestem prairie (xeric limestone prairie*+), post oak opening*+

Wetlands: Bog*, fen*, twigrush-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.
+ = xeric limestone prairies or cedar glades and post oak openings are unique to the Interior Low Plateau Region of Adams, Highland and Pike counties, and are not included in Schneider and Cochran (1997).

- not found in any natural habitats in Ohio (0 pts.)
- only found in 1 broad category (1 pt.)
- found in 2 broad categories or 2 rare habitat types (3 pts.)
- found in 3 broad categories or 3 rare habitat types (4 pts.)
- found in 4 or more rare habitat types (5 pts.)

Total Points: 0
Outcome: Not Known to be Invasive