

## Ohio Invasive Plant Assessment Protocol

Botanical Name: *Celastrus orbiculatus*  
 Common Name: Oriental Bittersweet  
 Family Name: Celastraceae  
 Assessment conducted by: OIPC Team

Step I Outcome: **Invasive**  
 Step II Score: **59**  
 Step II Outcome: **Invasive**

**Score**

**Notes**

**References**

*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.

X

**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?<sup>a</sup>** Yes. Place on invasive plant list, no further investigation needed. **STOP**  
 No. Continue on to question 3.

X

Species identified in 2 regions according to USDA Plants database. 12=> species naturalized in 3 regions; 13=> species in all 5 regions

1,12,13

**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

x

Species occurs in at least 3 regions of Ohio and is considered to alter natural areas.

1,2,4,8,9,10,12,13

**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?<sup>b,c</sup>** Yes  
 No  
 Unknown

x

IN,MI,PA (also in KY)

2,3, 4,5

*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 is only expanding from sites of previous planting (**1 pt.**)
- plant occurs in natural areas away from site of planting (**3 pts.**)
- Information unknown (**U**)

3

12,13

**2. State Distribution<sup>a</sup>**

- 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)

5

Regions 1-5

12,13

### 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 similar habitat outside the US (1 pt.)
- Information unknown (U)

5

2=>IN, 4=>MI, 5=>PA (3=>KY, but not counted here)

2,3,4,5,6,7

## Step II: Biological Characters

### 4. Vegetative Reproduction

- no vegetative reproduction (0 pts.)
- reproduces readily within the original site (1 pt.)
- has runners or spreading rhizomes that root easily (3 pts.)
- fragments easily and fragments can be easily dispersed (4 pts.)
- has runners or spreading rhizomes that root easily AND fragments easily and fragments can be easily dispersed (5 pts.)
- Information unknown (U)

3

1=>"rapid veg. spread"; 4,6=>reproduction by "spreading underground roots that form new stems."; 5=>"expands vegetatively by stolons (above-ground stems), and rhizomes (underground stems), and through root suckering, the ability to send shoots up from the roots."; 9=>"develops and expands by layering stolons and root suckers."

1,4,5,6,9

### 5. Sexual Reproduction

- no sexual reproduction (0 pts.)
- frequent sexual reproduction, but high variation among years in seed production (3 pts.)
- frequent sexual reproduction (one or more events per year) (5 pts.)

5

4,5,7=>species has prolific seed production, but does not provide # of events per year. But individual plants set prolific amounts of seeds annually; 9=>"Seedling germination is generally high (up to 95%) and begins in mid to late spring. The highest rate of seed germination is in lower light intensities." 20=>average 67% pollen germination (sign. more than native *Galactrus* sp.)

4,5,7,9,20

- Information unknown (U)		germination (sign. more than native <i>Celastrus</i> sp.) and 88% seed germination (more than native sp.).	
<b>6. Number of Viable Seeds or Propagules per Plant</b>		4,5=>"prolific" but no # given. 6=>seed germination rates are high for this sp., in both shade and lightened settings, but no numbers given. 30=>mean number of seeds per fruit is 4.1 in Indiana. [Due to the lack of actual numbers for OH, the response is 'moderate' to err on the conservative side....This answer may change to 'prolific' with more evidence.]	4,5,6,30
- few (0-10) (1 pt.)	3		
- moderate (11-1,000) (3 pts.)		4=>May & June; 8,9 & 11=>May; 20=>flowers collected from late May to early June	4,8,9,11,20
- prolific (>1,000) (5 pts.)	0		
- Information unknown (U)		5=> species has long range dispersal b/c many birds eat fruit; 9=>"long range dispersal"; 6=>seeds are dispersed by birds and mammals (and humans) and that avian consumption aids seed dispersal; 10=>"fruits are eaten by birds which provide more widespread dispersal."	5, 9,10,11
<b>7. Flowering Period</b>		8=> species matures in 2 years	8
- one month or less per year (0 pts.)	3		
- two months (1 pt.)		2,10=>"forms nearly pure stands in forests", 6=>sp.	
- three to five months (2 pts.)			
- longer than five months (3 pts.)			
- Information unknown (U)			
<b>8. Dispersal Ability</b>			
- 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)			
<b>9. Generation Time</b>			
- 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)			
<b>10. Establishment</b>			
- 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)

6

Will germinate in low light (forest interior) areas and persists "indefinitely" until environmental conditions change (canopy gap) and then it grows aggressively; 9=>can establish in a multitude of

2,6,9,10,14,15,21,24,26

## Step II: Ecological Importance

### 11. Impact on Ecosystem Processes

- no known effect on ecosystem-level processes (0 pts.)

6

10=> creates monocultures and shades out other spp., not thru changes created in soil. 2,4=>"It can strangle shrubs and small trees, and weaken mature trees by girdling the trunk and weighting the crown. There is some evidence that it can hybridize with American bittersweet, thus threatening the genetic integrity of the native species."; 9=>"Oriental bittersweet is a serious threat to plant communities due to its high reproductive rate, long range dispersal, ability to root sucker, and rapid growth rate. Climbing Oriental bittersweet vines severely damage native vegetation by constricting and girdling stems. Vines can shade, suppress, and ultimately kill native vegetation." 15=>"this vine overgrows shrubby vegetation and occasionally trees...excluding the growth of other woody taxa." 16=>"Common exotic vines, such as kudzu, oriental bittersweet, Japanese honeysuckle (Lonicera japonica Thunb.), and English ivy (Hedera helix L.), have spread over large parts of North America and have proven to be successful invaders that compete for nutrients with surrounding plants, alter forest structure and succession, decrease local diversity, and cause physical damage to hosts." 18=>Celastrus orbiculatus

2,4,8,9,10,15,16,18,25

- 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.)

**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.)

**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.)

overcompensated for damage and had higher growth rates after clipping (simulated herbivory). 6=> "exhibits a 'sit and wait' strategy by establishing and persisting indefinitely in undisturbed, closed canopy forest and responding to canopy disturbance with rapid growth, often overtopping trees." 25=>"Plots with *C. orbiculatus* had significantly higher soil pH, potassium, calcium and magnesium levels. Furthermore, nitrogen mineralization and litter decomposition rates were higher in plots with *C. orbiculatus*."

0

Native bittersweet *Celastrus scandens* considered relatively rare, but it is not listed.

7

0

6=> overtops plants, shading them out. Also trees more susceptible to wind throw by increasing the canopy weight, which in turn, increases the disturbance rates of the forest. 7=>highly competitive with native veg. 2,4,9=>might hybridize with native bittersweet ("threatens genetic integrity"), 14=>"in the presence of mycorrhizae or sufficient phosphorus, *C. orbiculatus* can respond by preferentially allocating energy to above-ground growth, thus supporting its liana growth form onto trees and allowing the exotic to

2,4,6,7,9,14,16,22,28

- impacts native plants to such an extent that community structure is greatly altered (6 pts.)

3

outcompete native species for light resources." 16=> in comparison to native American bittersweet, this species achieved greater biomass and retained leaves longer. 22=> vine decreases growth of native tree species on which it twines. 28=> vine can strangle trees, often leading to their death.

#### 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.)

3

8=> a female *C. scandens* was pollinated by *C. orbiculatus* in a controlled experiment. Viable seed was produced from the cross. 2,4,9=>might

2,4,8,9

#### 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 area where population occurs (absolute cover 15-50%) (4 pts.)
- forms an extensive, monospecific stand (absolute cover >50%) (5 pts.)

4

Can form nearly pure stands in forests, but does not say specifically absolute percent per whole area

2,6,7,8,9,10

#### 17. Role in Succession in Natural Areas

- successional information is unknown (0 pts.)

1

22=> invasion at the site relatively new, not known yet if species impacts succession. 23=>"*Celastrus orbiculatus* has drastically modified the course of vegetation development...The *Celastrus*-dominated vine community has suppressed or eliminated pre-existing growth to form a relatively stable community where a forest vegetation is the regional vegetation type. *Celastrus* also appears to be facilitating a native vine (*Vitis labrusca*) by forming a 'ladder' for its advance." 29=>"Thus, fire and litter removal did not increase the susceptibility of these habitats to germination and survival of *C. orbiculatus*". 31=>"Our results suggest that the low litter mass and mesic soil conditions that are characteristic of tulip poplar stands may confer higher invasibility and explain the higher abundance of *C. orbiculatus* in

22,23,29,31

- 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.)

areas with successional overstory communities associated with historically cultivated forests.[only 1 pts. given here but may be 4 pts. with more data, especially in Ohio]

**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

**Wetlands:** Bog\*, fen\*, twigrush-wiregrass wet prairie\*, marsh, buttonbush swamp, mixed shrub swamp, hemlock-hardwood swamp\*, maple-ash-oak

\* 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,

- 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.)

2=>forests; 4=>"found in grasslands, open woods, woodland edges, undisturbed forests, roadsides and fence rows."; 5=>"Oriental bittersweet infests forest edges, woodlands, early successional fields, hedgerows, coastal areas and salt marsh edges, particularly those suffering some form of land disturbance. While often found in more open, sunny sites, its tolerance for shade allows oriental bittersweet to invade forested areas."; 2,4,5,9,15,19,27,29  
 9=>"including roadsides, old homesites, thickets, and alluvial woods" and can grow in closed canopy forests. 15=>wetlands. 19=>forested areas. 27=>along edges in mountains in North Carolina, especially along railroads. 29=>"sand savanna/woodland, sand prairie, moraine prairie, sand oak forest, beech-maple forest, and oak-hickory forest"

**Total Score:**

59

**Number of Unknowns:**

0

**Outcome:**

Invasive

Total Points	Assessment Decision
4 or more U	Insufficient Data
0-34	Not Known to be Invasive
35-44	Pending Further Review
45-80	Invasive