Plant Diversity Website

Celastrus orbiculatus Thunb.

Common Names: Oriental bittersweet, Asian bittersweet, Asiatic bittersweet, climbing spindleberry, round-leaved bittersweet

Etymology: *Celastrus* comes from the ancient Greek word *kelastros*, a name for an evergreen tree. *Orbiculatus* means disc-shaped or round (1, 7).

Botanical synonyms:
Celastrus articulatus Thunb.
Celastrus insularis Koidz.
Celastrus jeholensis Nakai
Celastrus lancifolius Nakai
Celastrus stephanotiifolius Makino
Celastrus strigulosus Nakai
Celastrus tatarinowii Rupr.
Celastrus versicolor Nakai (10)

FAMILY: Celastraceae (the staff-vine family)

Quick Notable Features:
¬ Woody, dark brown stem with pale lenticels
¬ Yellow to orange fruits, often dehiscent to expose bright red to orange arils covering seeds.
¬ Twining stem, no tendrils

Plant Height: Mature plants climb to 18m tall and reach 13cm dbh (1).

Subspecies/varieties recognized: none found.

Most Likely Confused with: American bittersweet *Celastrus scandens*, a native to Michigan. The genus is the only vining genus in Michigan with simple alternate crenate leaves.

Habitat Preference: Open woods and thickets, roadsides, fence-rows. However it is shade-tolerant and can grow under a forest canopy (3, 6, 16).

Geographic Distribution in Michigan: The USDA reports it as present in only three counties in southern Michigan: Berrien, St. Joseph, and Washtenaw (6). However the Michigan Flora Online data base lists it in 11 counties and we anticipate this will increase over time (18).

Known Elevational Distribution: 450-2200m (10).

Complete Geographic Distribution: Native to Japan, Korea, and northeastern China. Invasive in North America, covering the northeastern states. Extends north to Quebec, south to Georgia, and west to Iowa and Arkansas (2).

Vegetative Plant Description: Deciduous, perennial, woody vine with leaves variable in shape, ranging from ovate to obovate to suborbicular, 5-13 × 3-9 cm in size. Leaf margins are serrate, bases are obtuse to rounded, apices acute to rounded. Serrations are often rounded. Midvein is prominent with 3 to 4 pairs of ascending secondaries per side. Petioles are light green and 1-3 cm long (1, 8, 9, 17, 19). Twigs are brown with pale lenticels, larger stems are pale grey-brown with elliptically shaped lenticel patches (see image). Seedlings have fleshy, ovate, entire cotyledons (pers. obs.).

Climbing Mechanism: Plants climb by apical stem twining; no tendrils or adventitious roots. Plant stems twine dextrally (left to right).

Flower Description: Flowers are white or yellow to green and inconspicuous, borne in axillary cymes (1-3cm) of 1-7 small flowers, but male plants sometimes grow in terminal inflorescences (19). Plants can be monoecious or dioecious. Flowers are functionally unisexual and 5-merous. Staminate flowers with petals 3-4 × 2-2.5 mm, 5 stamens 2-3 mm (or slightly longer) inserted on the margin of a cup-shaped disk, and a vestigial pistil. Pistillate flowers bear petals slightly shorter than in male flowers, and have vestigial stamens and a well-developed superior ovary. The style is stout and columnar, 1.5cm long; the stigma is 3-lobed. There are two ovules per locule (1, 8, 9, 19).

Flowering Time: Mid to late spring (May and June), in Ohio (9).

Pollinator: The flowers are bee and wind pollinated (1).

Fruit Type and Description: The fruit is a yellow or orangish-yellow globose capsule, 0.8-1.3cm. When ripe, the capsule splits open to reveal an orange to red fleshy aril covering seeds. Capsules have three valves; each valve contains one or two seeds (8,19).

Seed Description: Seeds are ellipsoid and yellow to light-orange, covered in a fleshy scarlet aril (personal observation, Susu Yuan, Oct 26, 2006). Reported to have best germination in low light (13).

Dispersal Syndrome: Seeds are bird dispersed (16). Fruits are toxic to humans. However, human dispersal is also prominent as the showy inflorescences are often used in the florist trade. Plants also reproduce by rhizomes. Root collar sprouting also occurs (1).

Distinguished by: When distinguishing between *C. scandens* and *C. orbiculaus*, floral or reproductive characters are the most reliable. Inflorescences of *C. orbiculatus* are axillary cymes; those of *C. scandens* are terminal panicles. When fruiting, the valves of *C. scandens* are orange, whereas the valves of *C. orbiculatus* are generally yellow.

Due to the variability of leaf size and shape of *C. orbiculatus*, leaf morphology is not a reliable character according to Voss (6). However, a recent study (15) suggests differences in leaf morphology are sufficient for plant identification. The most reliable of these is leaf ptyxis (leaf folding in bud): *C. orbiculatus* has a conduplicate folding, while that of *C. scandens* is involute (margins inrolled).

The study also suggests that if the length-to-width ratio of the leaf "is greater than or equal to 2, there is a 90% chance of the plant being [*C. scandens*], while if the ratio is less than or equal to 1.4, there is a 90% chance of it being [*C. orbiculatus*]….Plants with leaf tips of 1.5 cm or longer have a 90% chance of being [*C. scandens*], while plants with leaf tips of 0.3 cm or less have a 90% chance of being [*C. orbiculatus*]" (15).

Other members of the family in Michigan (number species): *Celastrus scandens, Euonymus (6)*

Ethnobotanical Uses: Attractive fruits makes this a popular species for ornamental plantings or cuttings (10).

Phylogenetic Information: Families Celastraceae and Lepidobotryaceae both are members of the order Celastrales. Celastrales belong in the Eurosids I. They form a monophyletic group with the Malpighiales and Oxidales. They are part of the rosids inside the eudicots. Celastrales are angiosperms (4).

Interesting Quotation or Other Interesting Factoid:

- Bittersweet is a "functionally dioecious" species because on a single plant either the male or female flowers will abort. Some plants can produce both unisexual and bisexual flowers however, making the breeding system quite complicated (20)
- Bittersweet can kill host trees by girdling if allowed to reach sufficient sizes (11).
- Recent experimental evidence suggests that *Celastrus orbiculatus* tolerates herbivory better than the native bittersweet, which may contribute to its ability to invade (14).
- Oriental bittersweet is yet another invasive plant introduced from Asia as an ornamental plant, this one introduced about 1860 (16).

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1) Image of fruiting specimen courtesy of Hugh H. Iltis, Robert W. Freckmann Herbarium, University of Wisconsin, Stevens Point. http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=CELORB

2) Image of immature fruiting specimen with leaves courtesy of Steve C. Garske, Robert W. Freckmann Herbarium, University of Wisconsin, Stevens Point. http://wisplants.uwsp.edu/scripts/detail.asp?SpCode=CELORB
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5) Image of flower, Robyn J. Burnham

PRIMARY AUTHOR: Susu Yuan; editing and additions by Robyn J. Burnham, ReBecca Sonday, and Cristine V. Santanna

For additional information on Michigan Plant Diversity web pages please contact Robyn J. Burnham via email: rburnham“at”umich.edu