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Invasive Plant Series: **Swallow-worts**

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black (*Vincetoxicum nigrum* or *Cynanchum louiseae*)
pale (*Vincetoxicum rossicum* or *Cynanchum rossicum*)

The swallow-worts (also called dog-strangling vine) are perennial, herbaceous, twining vines. The two species of principal concern in North America are black and pale swallow-wort. Black swallow-wort is native to southwest Europe; pale swallow-wort is native to Ukraine and parts of Russia. Both were introduced to North America in the 1800s as potential ornamental plants. However, they never became popular for gardening. Black swallow-wort is currently the more widely distributed of the two species in North America. It occurs in Ontario, Canada, and in the Northeast and Upper Midwestern U.S., including relatively small populations in scattered counties in central and northern Indiana. As of the writing of this publication, pale swallow-wort occurs

primarily in Northeastern states, Michigan and southern Canada. Populations are found in Michigan counties bordering northern Indiana, but none have been reported for Indiana.

Swallow-worts thrive in a wide range of growing conditions, soil types and soil pH. They are shade-tolerant and grow best in full sun to partial shade. Heavy shade was found to greatly reduce swallow-wort seedling survival; partial shade did not. They have some drought tolerance while also exhibiting tolerance to brief periods of flooding, but not to prolonged periods of inundation. They are most commonly found growing in disturbed environments such as roadsides, old fields, pastures, forest edges, and similar habitats.

Although swallow-worts are perennial plants, they are also herbaceous plants, meaning that their foliage and vines die back at the end of each growing season. Their vines grow vigorously and twine around and climb anything nearby, such as trees and shrubs or even man-made structures. If there is nothing else to climb,

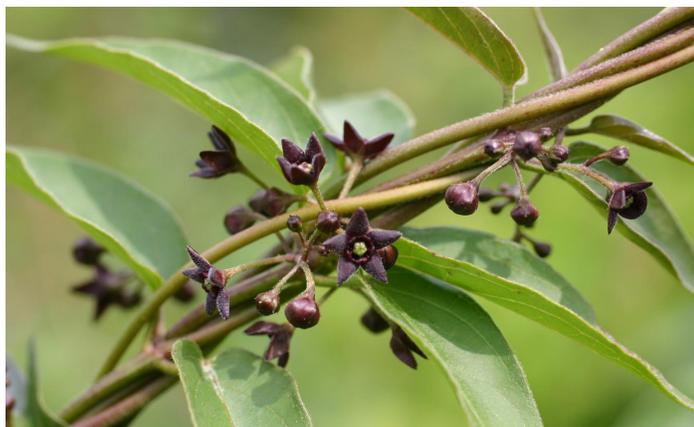


Figure 1. Swallow-wort's twining growth results in "rope"-like growth when it twines around itself. Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

neighboring swallow-wort vines will twine around one another, often forming thick "ropes." (Fig. 1) Vines grow to a length of 3 to 6 1/2 feet. Their leaves are narrowly oval to heart-shaped, 2 to 5 inches long and 1 to 2 1/2 inches wide, forming a long, sharp-pointed tip, with smooth margins. Leaves are shiny and dark green and grow in an opposite arrangement along the vine. (Fig. 2)



Figure 2. Swallow-wort's opposite leaf arrangement. Photo credit: Emma Erler, University of New Hampshire, Bugwood.org

Small, five-petaled flowers grow in tight clusters that attach at the base of leaves. They are reported to produce a rotting fruit scent.

Black swallow-wort flowers are dark purple, with fine, light hairs and bluntly triangular petals that are about as wide as they are long. (Fig. 3) Pale swallow-wort flowers range from pink to deep burgundy in color with narrow petals that are



Figure 3. Black swallow-wort flowers. Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Figure 4. Pale swallow-wort flowers. Photo credit: Rob Routledge, Sault College, Bugwood.org

longer than they are wide. (Fig. 4) Blooming begins from mid- to late May for pale swallow-wort, peaking in early to mid-June. For black swallow-wort, blooming peaks from mid- to late June. For shade-growing plants, bloom may be delayed up to one month. Fruits are milkweed-type pods, 1 1/2 to 3 inches long, that turn from green



Figure 5. Immature swallow-wort seed pods. Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

to brown as they mature. (Fig. 5) When fully ripe, they split open, revealing numerous flat, brown seeds, each



Figure 6. Mature swallow-wort seed pod opening to reveal silky, downy hairs attached to flat, brown seeds, similar in appearance to milkweed seeds. Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org

with downy hairs attached, allowing for their dispersal on the wind. (Fig. 6) Seeds may be released for dispersal beginning mid-July for pale swallow-wort and mid-August for black swallow-wort.

Seed dispersal may continue through October. Swallow-worts spread primarily by seed dispersal. Since they can self-pollinate, a single seed is capable of starting a new colony. Some seeds contain more than one embryo, allowing them to produce multiple seedlings. Seedling survival is high. Seedling densities commonly range from 5,000 to 10,000 per square meter, with one report as high as 32,000 seedlings per square meter. Initial growth is slow. It takes several years to establish a new colony and for individual plants to begin flowering and producing seed.

The black and pale swallow-worts may be confused with honeyvine (*Cynanchum laeve*, also called sandvine, bluevine milkweed, and smooth swallow-wort), a native perennial herbaceous vine growing in habitats similar to those where swallow-worts are commonly found. (Fig. 7) It has a similar twining vine growth habit and opposite, heart-shaped leaves. The flower has five petals, as do the swallow-worts, but the petals are white or sometimes white tipped with pink. Honeyvine produces the milkweed-like seed pod and flat seeds with attached downy hairs, similar to the swallow-worts. Other possible look-a-likes include our native milkweeds (*Aesclepias*), which are in the same family as swallow-worts (*Apocynaceae*). (Fig. 8)



Figure 7. Look-a-like: honeyvine (*Cynanchum laeve*, also called sandvine, bluevine milkweed, and smooth swallow-wort), a native perennial herbaceous vine growing in habitats similar to those where swallow-worts are commonly found. Photo credit: Ohio State Weed Lab, The Ohio State University, Bugwood.org

Milkweed species often have opposite leaf arrangement and similar-looking fruit pods and seeds, but are upright herbaceous plants, not vines, and have a milky sap as opposed to the clear sap of the swallow-worts. Bindweeds (*Convolvulus*) and morning glories (*Ipomoea*) are herbaceous twining vines like swallow-wort, but have alternate leaf arrangement and large, showy horn- or funnel-shaped flowers. (Fig. 9)



Photo credit: Karen A. Rawlins, University of Georgia, Bugwood.org



Photo credit: Howard F. Schwartz, Colorado State University, Bugwood.org

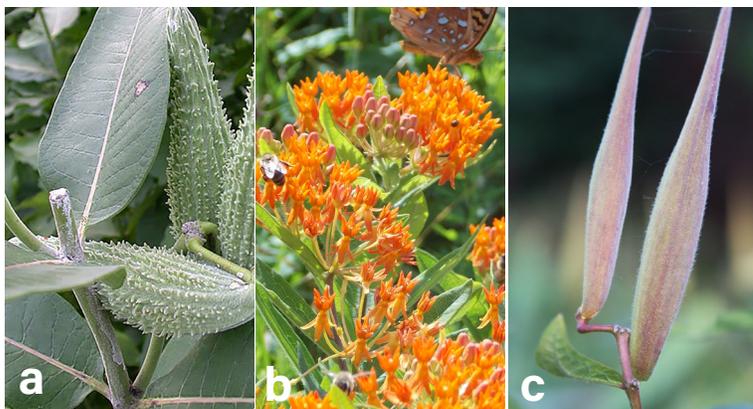


Figure 8. Look-a-like: milkweeds, including **a.** common milkweed (*Aesclepias syriaca*) and **b.** and **c.** butterfly weed (*Aesclepias tuberosa*) have seed pods and seeds that have a similar appearance to those of the swallow-worts, but are upright, perennial herbaceous plants, not vines.

Photo credit: **a** Peter Dziuk, Minnesota Department of Agriculture, Bugwood.org **b** Summer Rathfon **c** Steven Katovich, Bugwood.org

Distribution

At the time of writing, nine counties in central and northern Indiana reported small populations of black swallow-wort ranging in size from 10 square feet to 2,500 square feet of infested area. Along Indiana's border, two Michigan counties and the Chicago area report significant populations of black swallow-wort. No records of pale swallow-wort have been reported for Indiana. Two Michigan counties bordering northern Indiana and a central Illinois county are the nearest reported populations of pale swallow-wort. It's likely that the swallow-worts are more widely distributed than currently reported on EDDMapS online invasive species geodatabase reporting system.

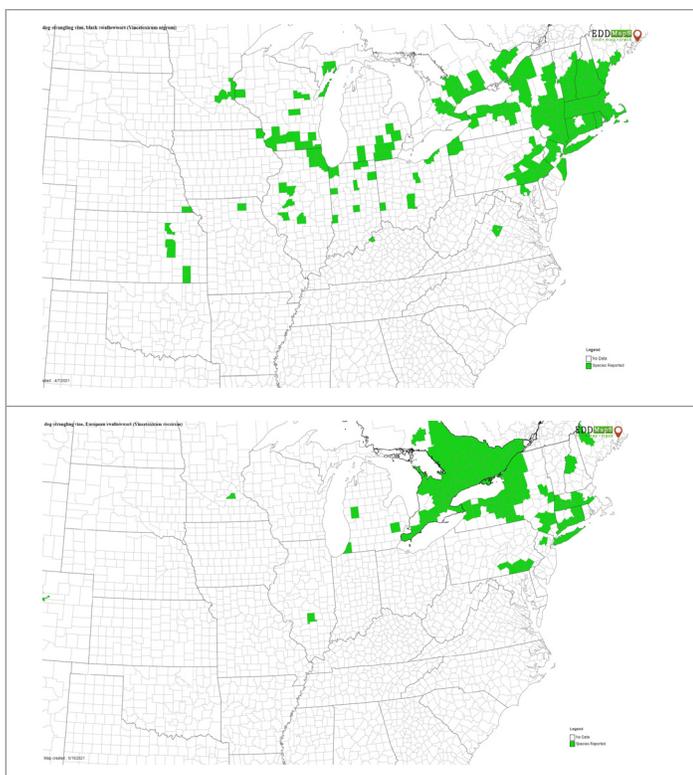


Figure 10. Current reported distribution of black swallow-wort (top map) and pale swallow-wort (bottom map).

EDDMapS. 2021. Early Detection & Distribution Mapping System. The University of Georgia – Center for Invasive Species and Ecosystem Health. Available online at <http://www.eddmaps.org/>; last accessed May 19, 2021.

Impacts

Swallow-wort is highly invasive. Because of its rapid growth and abundant viable seed production, swallow-wort vines quickly twine around and climb neighboring plants, overwhelming them by physically shading them, weighing them down, causing stem breakage, and competing for moisture and nutrients. After years of unchecked growth and spread, it can cover large



Photo credit: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org



Photo credit: David Nisbet, Invasive Species Centre, Bugwood.org

Figure 11. Invasive swallow-worts form dense colonies that crowd out native plants in both **a.** sunlit, open environments and **b.** shaded woodland edges and closed-canopy forests.

areas with a dense, tangled thicket where little else can live. It invades fields, fence rows, woodland edges, and even shaded forest environments (Fig. 11). It threatens pollinator habitat and rare plant communities such as glades, fens, prairie remnants, and savannahs. Forest regeneration and conservation tree plantings may also be harmed. Swallow-wort can invade pastures and can be toxic to livestock if consumed in large enough quantities.

There is evidence that swallow-wort produces an allelopathic effect, secreting a chemical into the soil that inhibits the growth of neighboring plants. Swallow-wort also produces chemicals that are distasteful to many insects and even toxic to some, including monarch butterfly larvae. One study suggests that monarchs will lay eggs on swallow-wort plants even if their preferred hosts, milkweeds, are present. Another study claims monarchs tend not to lay their eggs on swallow-wort, but when they do, due to lack of preferred hosts (milkweeds), their larvae cannot survive. Other studies find lower insect diversity and abundance in swallow-wort infestations, which then impacts the entire food chain, resulting in reductions in grassland bird breeding and nesting.

Management

Since the swallow-worts are not yet well established in Indiana, greater effort should be made to increase awareness of them among land/natural resource managers and landowners. Informed resource managers and landowners can assist in identifying new populations so we can more accurately determine their distribution and map their occurrences. If you think you have found swallow-wort, please report it to your local Purdue Cooperative Extension Educator, your local Cooperative Invasive Species Management (CISMA) specialist (see under *Additional Information* at end of publication), or report directly to the online invasive species mapping service EDDMapS.

Reasonable effort should be made to prevent the introduction of pale swallow-wort to Indiana and the spread of black swallow-wort from existing populations within and from without Indiana. For large, well-established populations and the management of lands and natural resources near them, a management plan should be developed based on the following principles:

- Prevention of spread;
- Early detection of and rapid response to new populations; and
- Properly timed and targeted control measures that consider long-term effectiveness, impact on non-target or desirable species, soil/site disturbance, cost, and available labor and equipment.

Because new populations of swallow-wort require several years to reach maturity and begin flowering and seed production, initial control efforts should focus on reducing new seed production in well-established, older populations and eradicating smaller, satellite populations before they are able to produce seed. Because swallow-wort populations growing in full sunlight environments flower and set seed sooner in the growing season, these populations should generally be treated first, before shade-grown populations. Swallow-wort seed may remain viable in the soil for up to three to five years. Even if no new seed production is permitted, follow-up treatments and monitoring will be needed for several years after the initial treatments.

Prevention

The Indiana Terrestrial Invasive Plant Rule prohibits the sale, transport, or planting of both pale and black swallow-worts. Avoid disturbing areas where swallow-wort is present until it has been eradicated for several years. Mowing, road maintenance, and agricultural equipment can inadvertently spread swallow-wort seed.

Mow infested areas along roadsides, ditch banks, utility rights-of-way, and field edges before seed pods begin maturing in mid- to late June for pale swallow-wort, and early to mid-July for black swallow-wort. Swallow-wort seed maturation dates may vary from year to year, depending on weather patterns. Avoid working or recreating in, or walking or driving through, infested areas during seed dispersal periods. Clean clothing, shoes, ATVs, or vehicles after activity in infested areas.

Control

Manual – Swallow-worts have thick fibrous roots with large root crowns, making them difficult to hand pull. Attempts at hand pulling usually result in breaking stems from the root crown while leaving roots intact to grow new shoots. Individual plants or small populations may be dug from the ground. Hand digging is not practical for larger populations and results in excessive soil disturbance. Hand picking of seed pods to prevent new seed production may be employed when, for various reasons, actual plant control cannot be employed in a timely manner. This is practical only for individual plants or small populations, unless larger numbers of volunteers are available. Be sure to destroy or otherwise properly dispose of the pods to prevent starting new populations. This may be done by thoroughly burning or bagging and disposing through normal refuse collection services or official trash collection sites or landfills.

Cutting/Mowing – Cutting or mowing stimulates the growth of new sprouts from the root crown, resulting in more dense growth. It can be used to buy more time to later apply a more effective treatment. The best time to cut or mow is just after flowering, as seed pods are just beginning to develop. Plants will flower again, but on shorter stems. Repeated cutting or mowing several times in a growing season can greatly reduce, but not completely eliminate, seed production.

Biological – Two species of moths native to the invasive swallow-worts' European range have been tested as biological control agents for use in North America. Thus far, both the *Abrostola asclepiadis* and *Hypena opulenta* moths do not seem to provide the level of damage to swallow-wort in North America that may be needed for a successful control program. Only *Hypena opulenta* has been approved for release in the United States.

Chemical – Herbicide, applied as a foliar spray, is the most practical, effective, and economical means of controlling swallow-wort. Spraying should be done around the time that flowering begins and small seedpods start developing. For black swallow-wort in central and northern Indiana, this would occur mid-June to early July. Application timing for pale swallow-wort

would precede that of black swallow-wort by several weeks. Spraying prior to this stage of plant development may be less effective because there isn't enough leaf area to absorb sufficient herbicide into the plant to kill the roots. Of course, spraying after this stage of development may be too late to stop viable seed from being produced. A single herbicide application will likely not provide complete eradication of swallow-wort. The site should be monitored to determine treatment effectiveness and to identify individuals that were missed or otherwise survived. A follow-up spraying should be done later in the summer. If seed pods have developed on surviving plants, these should be picked and destroyed or properly disposed of prior to this second spraying. A combination of cutting or mowing during the flowering/early seedpod development stage, followed by a foliar herbicide application after sufficient regrowth a month-and-a-half later, provides excellent control of swallow-wort. The shorter swallow-wort plants will likely require less herbicide to treat and will be easier to find in the matrix of all the other vegetation growing with it.

Triclopyr (Garlon 3A, Garlon 4, Vastlan, other generic products) and glyphosate (Roundup, Glyphomax, Glystar, Glypro, others) both are effective at controlling established swallow-wort plants. Triclopyr is a broadleaf-specific herbicide, and applied at proper rates will not harm grasses and sedges. Glyphosate is a broad-spectrum herbicide and will damage all classes of plants. On degraded sites lacking high-quality plant communities, glyphosate is the cost-effective choice. Where desirable grasses and other monocot plants occur, triclopyr provides more selective control. A non-ionic surfactant or seed oil adjuvant should be used to increase herbicide uptake.

Swallow-wort may grow on stream and riverbanks or near open water. Use caution to follow label restrictions regarding overspray, drift, or movement of herbicide into surface waters. Only herbicides and surfactants with an aquatic use label should be applied in these circumstances. Accord, Rodeo, Aquaneat (i.e., glyphosate products) and Garlon 3A and Vastlan (i.e., amine and choline triclopyr products) are labeled for use in or near aquatic areas.

Glyphosate (41–54% active ingredient) may be applied as a directed foliar spray at a 2–4% rate in water. Triclopyr amine (Garlon 3A) should be applied at 2–4% in water and triclopyr ester (Garlon 4) and triclopyr choline (Vastlan) should be applied at 1.5–3% in water as a directed spray. A tank mix of 2% triclopyr ester and 2 oz metsulfuron methyl (Escort XP, others) per 100 gal of water has been used successfully for swallow-wort control in Indiana. Consult product labels for proper use rates when applying as a broadcast application.

ALWAYS READ AND FOLLOW THE LABEL.
Consult with Purdue Cooperative Extension or state natural resource professionals for guidance on herbicide recommendations and application techniques.

Prescribed Fire – On sites where fire is prescribed for habitat management, swallow-wort should be controlled prior to the start of a fire regimen. Fire stimulates vigorous regrowth of swallow-wort when used alone as a management tool. However, it can be effectively used in conjunction with herbicide control methods by killing new swallow-wort seedlings. Fire can also reduce height of sprouts, making them easier to see among the surrounding vegetation, thus reducing the amount of herbicide needed and the time required to spray it. Multiple years of burning can help exhaust swallow-wort's soil seed bank.

Cultural – Cultivation and planting an annual crop may be a cost-effective way to manage swallow-wort on more open field sites that are heavily infested. Cultivation includes both plowing and weed control using herbicides recommended for the crop. For well-established swallow-wort, annual cultivation over a three- to five-year period would likely be needed to deplete the soil seed bank. Plowing or tilling by itself would only exacerbate a swallow-wort infestation by reducing competing vegetation and breaking up root crowns into more fragments that each would grow new plants.

Other disturbance activities that would open up the plant canopy and allow more sunlight to the ground, such as timber harvesting, should be avoided until swallow-wort is controlled.

Follow-up

Controlling invasive plant infestations involves a commitment to repeated treatments and site monitoring. Always inspect your treatment areas to evaluate your results and control missed or newly emerging plants. Keep records of your control methods, treatment timing, and results. This will help you refine and improve your methods and results and save you money in the long run. Complete eradication of well-established plant populations may not be feasible in the short term. Preventing new seed production and containing the spread of the invasive plants keeps them manageable, allowing you to continue managing for desired natural resource outcomes.

To report an invasive species location:

Early Detection and Distribution Mapping System (EDDMapS): <https://www.eddmaps.org/report/>

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Additional Information

Southern Indiana Cooperative Invasive Species Management (SICIM) <http://www.sicim.info/>

Indiana Cooperative Agricultural Pest Survey

<https://caps.ceris.purdue.edu/>

Indiana Invasive Species Council

<https://www.entm.purdue.edu/iisc/>

Indiana Native Plant Society

<https://indiananativeplants.org/>

Midwest Invasive Plant Network (MIPN):

<https://www.mipn.org/>

Center for Invasive Species and Ecosystem Health:

<https://www.invasive.org/>

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