HISTORY AND ECOLOGY IN NORTH AMERICA

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Black swallow-wort
Vincetoxicum nigrum (L.) Moench
&
Pale swallow-wort
Vincetoxicum rossicum (Kleopow) Barbar.

INTRODUCTION

Swallow-worts belong to the dogbane family (Apocynaceae), along with milkweeds (*Asclepias* spp.), periwinkles (*Vinca* spp.), and dogbanes (*Apocynum* spp.). Members of this family typically have milky, poisonous sap (latex), opposite leaves, and pod fruits that split at maturity to release many winged or tufted seeds (**Fig. 1**). More specifically, swallow-worts are in the genus *Vincetoxicum*, which includes approximately 140 species all native to areas outside of North America. *Vincetoxicum* species are unique for having clear latex and fleshy, clustered roots. Of the three exotic *Vincetoxicum* species that have been introduced to North America, black swallow-wort and pale swallow-wort have escaped cultivation and become problematic in several states and provinces. These two species are the targets of a biological control program in North America and are the subjects of this publication. Both species have many similarities, differing largely in flower color and texture.

Figure 1. Pod fruit that splits at maturity to release winged or tufted seeds, characteristic of the dogbane family (Susan Elliott, iNaturalist.org CC BY-NC 4.0)

HISTORY AND DISTRIBUTION

Black swallow-wort is native to France, Spain, Portugal, and Italy; pale swallow-wort is native to Ukraine and Russia. Both were intentionally introduced to North America by the mid- to late 1800s as ornamentals before escaping cultivation and becoming invasive. Black swallow-wort has been reported from 22 states in the USA and three Canadian provinces (**Fig. 2a**); a single naturalized population recorded from California has reportedly died out. Pale swallow-wort has been reported from 13 states and four provinces (**Fig. 2b**); an early British Columbia record apparently has not persisted.

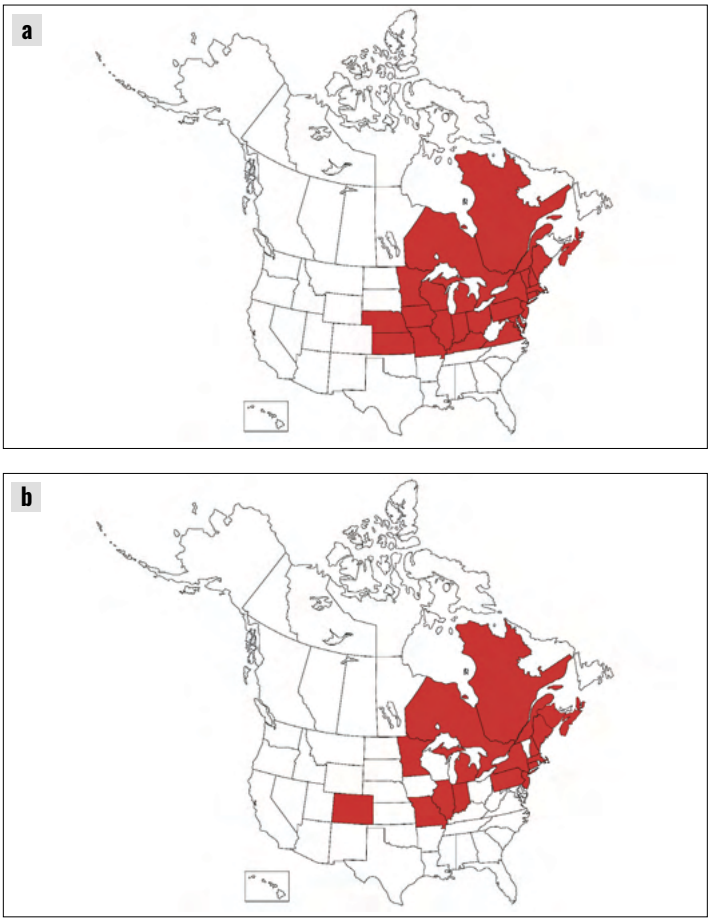

Figure 2. North American reported distribution of (a) black swallow-wort; (b) pale swallow-wort (Credit: EDDMapS, www.eddmaps.org; USDA PLANTS Database, plants.usda.gov; iNaturalist.org; all accessed 9 April 2023)

SYNONYMS

Black swallow-wort: black dog-strangling vine, *Cynanchum louiseae* Kartesz & Gandhi

Pale swallow-wort: dog-strangling vine, European swallow-wort, *Cynanchum rossicum* Kleopow

CLASSIFICATION

RANKING	SCIENTIFIC NAME	COMMON NAME
Kingdom	Plantae	Plants
Subkingdom	Tracheobionta	Vascular plants
Superdivision	Spermatophyta	Seed plants
Division	Magnoliophyta	Flowering plants
Class	Magnoliopsida	Dicotyledons
Subclass	Asteridae	
Order	Gentianales	
Family	Apocynaceae	Dogbane family
Genus	*Vincetoxicum*	
Species	*Vincetoxicum nigrum* (L.) Moench	Black swallow-wort
Species	*Vincetoxicum rossicum* (Kleopow) Barbar.	Pale swallow-wort

IMPACT

Both swallow-wort species grow rapidly, forming dense mats that smother and shade out other species (**Fig. 3a,b**). Large infestations are capable of altering plant communities by displacing native species, interfering with forest regeneration, reducing forage production, changing community structures, and disrupting ecological functions. Both species negatively impact monarch butterflies by replacing the monarch's native milkweed hosts. In addition, because swallow-worts are related to milkweeds, monarchs mistakenly lay eggs on swallow-worts, but larvae hatching from those eggs fail to develop.

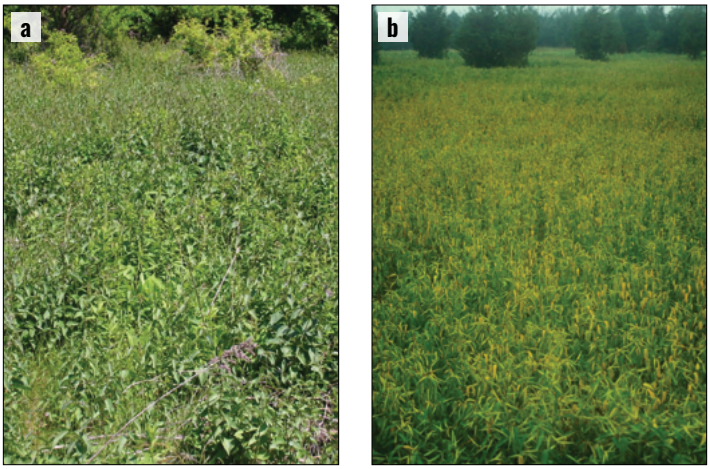

Figure 3. Black (a) and pale (b) swallow-wort form dense mats that smother out other vegetation (a: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org CC BY-3.0 US; b: John M. Randall, The Nature Conservancy, Bugwood.org CC BY-3.0 US)

HABITAT

Both species have a temperate distribution, and germination rates are highest where seeds are subjected to cold winter temperatures. They tolerate a wide range of light and moisture conditions from sunny and dry to moist and wooded. They capitalize on disturbance but can also invade undisturbed plant communities. They are found in or along fields, fencerows, talus slopes, alluvial woods, forest understories, forest openings, and riverbanks (**Fig. 4**).

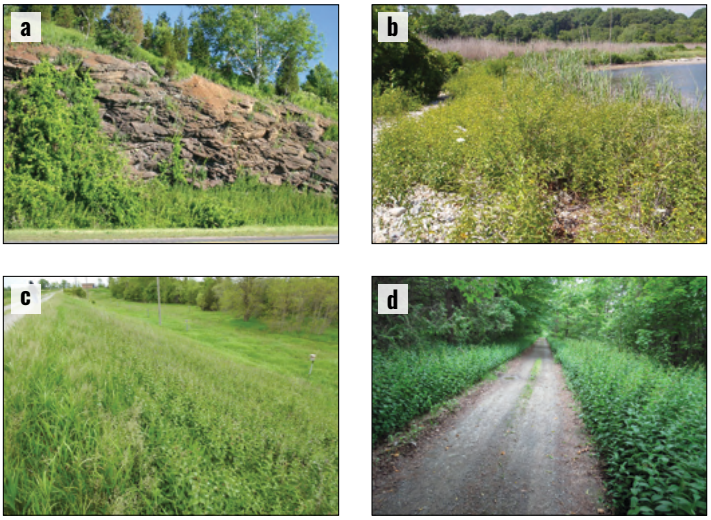

Figure 4. Swallow-worts are frequently found in or along (a) rocky slopes, (b) shorelines, and roadsides in (c) full sun and (d) shaded understory (a,b: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org CC BY-3.0 US; c: Mike Oldham, iNaturalist.org CC BY-NC 4.0; d: Owen Clarkin, iNaturalist.org CC BY-NC 4.0)

IDENTIFICATION

At a Glance

Black (**Fig. 5a**) and pale swallow-wort (**Fig. 5b**) are herbaceous, perennial, twining vines with single or multiple stems growing from an extensive fibrous root system. Stems

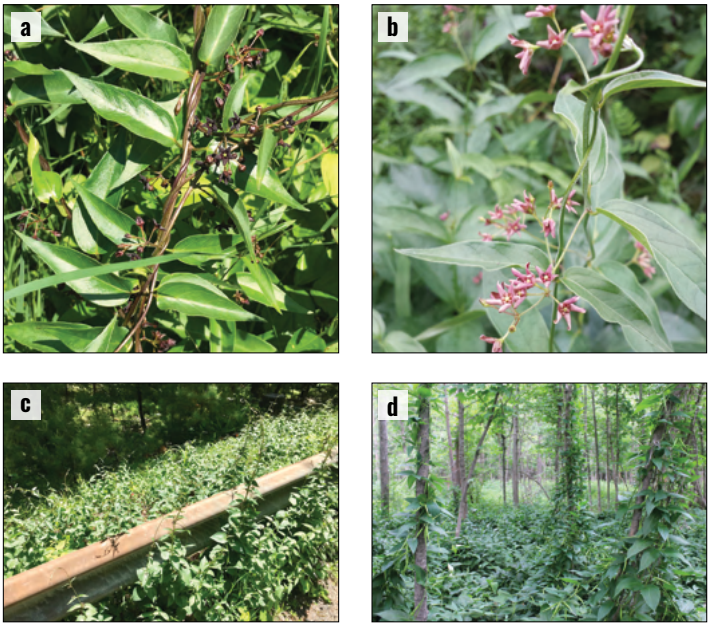

Figure 5. Vine sections of black (a) and pale (b) swallow-wort. Both species grow (c) shorter when in full sun with no supporting vegetation or structures and (d) longer when growing up tree trunks in shade (a: M. Sorensen, iNaturalist.org CC BY-NC 4.0; b: Serguei Ponomarenko, iNaturalist.org CC BY-NC 4.0; c: Arianeg, iNaturalist.org CC BY-NC-ND 4.0; d: David Nisbet, Bugwood.org CC BY-3.0 US)

are erect initially, but as plants mature they twine around adjacent vegetation or each other for support, often forming impenetrable thickets. Vines are typically 2–6½ ft (60–200 cm) long. Stems are green and darken with age. Leaves are opposite and elliptical with a pointed tip. Small, star-shaped flowers are produced in clusters at leaf axils. Each flower has five fleshy petals. Fruits are thin pods that often occur in pairs and contain numerous tufted, wind-borne seeds.

Roots

Both species have fleshy, fibrous roots (**Table 1a,b**). While some references state that most black swallow-wort plants and some pale swallow-wort plants have rhizomes, those statements have proven incorrect. Both species increase their stem number over time, but all stems and roots sprout from the same semi-woody rootstalk.

Stems and Leaves

The stems of both species are erect initially, but as plants mature they twine around adjacent vegetation or each other for support. Vines are typically 2–6½ ft (60–200 cm) long. They are shorter when growing in full sun and without supporting structures and longer when growing up trees in shaded settings (**Fig. 5c,d**). Stems of both species are green initially, and they darken with age. Both species also have stem hairs occurring in longitudinal bands (**Table 1c,d**). Leaves of both species are opposite, up to 4¾ in (12 cm) long, elliptical with a pointed tip, and rounded or heart-shaped at their base (**Table 1e,f**). Leaves on some plants may appear glossy, and leaves of pale swallow-wort are often a paler shade of green.

Flowers

Flowers of both species occur in clusters emerging from leaf axils. Each flower is up to ¼ in (7 mm) across, star-shaped, and has five fleshy petals. Black swallow-wort petals are purplish-black with white hairs (**Table 1g**). Pale swallow-wort petals may vary from maroon to pinkish, they are smooth with no hairs, and they are often twisted at their tips (**Table 1h**). In a few localities, pale swallow-wort plants have been observed producing white flowers; however these plants are very uncommon.

Fruits and Seeds

Fruits are thin pods up to 2¾ in (7 cm) long that often occur in pairs. They are bright green at first (**Table 1i,j**), but at maturity they are brown and split open (**Table 1k,l**) to release approximately 20 brown seeds, each topped by a tuft of long, fine, white hairs (**Table 1m,n**).

Table 1. Comparison of black and pale swallow-wort features.

BLACK SWALLOW-WORT	PALE SWALLOW-WORT
a	b
c	d
e	f
g	h
i	j
k	l
m	n

Table 1 photo credits. a,f,i: Leslie J. Mehrhoff, University of Connecticut, Bugwood.org CC BY-3.0 US; b: Ron Neville; c: Klips; d,k–n: Paul Abell; e: Paul MacLean; g: Sylvain Piry; h: Jonathan Mack; j: Vivian Zhang; a–e,g,h,j–n iNaturalist.org CC BY-NC 4.0)

ECOLOGY

Black and pale swallow-wort spread by seed. For both species, a single seed may yield up to four seedlings. Seed production for both swallow-worts is greatly reduced under low light. In North America, seeds germinate throughout the growing season. For both species, flowering often begins in mid-May to June; flowering ends by early August for pale swallow-wort but may extend until the first frost for black swallow-wort (unless cut short by dry conditions). Fruits are evident a few weeks after flowering, with seeds of both species dispersing from late July into the fall. Seeds of both species are readily transported by wind and water and are typically viable for no more than four years. Aboveground plant parts of both species die back in the fall and re-sprout from the root crown in spring.

Table 2. Key traits for differentiating black and pale swallow-wort from similar species established in North America.

SPECIES	SIMILARITIES	DIFFERENCES	PLANT	LEAVES	FLOWERS
White swallow-wort *Vincetoxicum hirundinaria* Apocynaceae Exotic perennial	Habitat; height; leaves opposite, with heart-shaped or rounded base; flower clusters at leaf axils; star-shaped flowers with 5 petals; fruits slender pods that split at maturity; seeds brown with tufts of long white hair	Not invasive in North America; flowers often slightly larger (½ in or 13 cm across); petals white, yellow, or greenish (note a few rare pale swallow-wort plants may produce white flowers); pods shorter (2 in or 5 cm long)			
Spreading dogbane *Apocynum androsaemifolium* Apocynaceae Native perennial	Leaves opposite; poisonous latex sap; flowers in clusters from axils, with 5 petals, similar size; fruits slender pods that split at maturity; seeds brown with tufts of long white hair	Often drier habitat; not a vine; sap milky; stems only grow to 3 ft (90 cm) long; leaves more elliptic; flowers drooping; petals more fused, with pink streaks; pods longer (3–6 in or 7½–15 cm long), more slender			
Climbing false buckwheat *Fallopia scandens* Polygonaceae Native perennial	Habitat; vine; most stems only grow to 5 ft (1½ m) long; leaf length	Leaves alternate, more heart-shaped; papery ocrea at leaf axils; flowers small, inconspicuous, greenish-white; fruit 3-winged			
Halberd-leaf tearthumb *Persicaria arifolia* Polygonaceae Native annual	Habitat; vine; plants form tangling thickets; most stems only to 6 ft (1.8 m) long; leaves similar size	Stems, leaf stalks, petioles all with recurved spines; leaves alternate, arrowhead-shaped; papery ocrea at leaf axils; flowers small, inconspicuous, white to pinkish; fruit tiny, brown			
Japanese honeysuckle *Lonicera japonica* Caprifoliaceae Exotic perennial	Habitat; vine; plants form dense thickets; leaves opposite, similar shape; flowers produced in clusters at leaf axils	Becomes woody; stems may climb 33 ft (10 m) or more; leaves smaller (1½–3 in or 4–7½ cm long); flowers with 2 lips and long extruding stamens; petals white to yellow; fruit black berry			

Photo credits: white swallow-wort plant (Guglielmo Vacirca, iNaturalist.org CC BY 4.0), leaf (Ирина, iNaturalist.org, CC BY-NC 4.0), flowers (Auricula_vermi, iNaturalist.org, CC BY-NC 4.0); spreading dogbane plant (Randy Bodkins, iNaturalist.org CC BY-NC 4.0), leaves (H.M. Hofling, iNaturalist.org CC BY-NC 4.0), flowers (Djclarknl, iNaturalist.org, CC BY-NC 4.0) climbing false buckwheat plant (Tom Norton, iNaturalist.org CC BY-NC 4.0), leaf (Laura Rainbow Dragon, iNaturalist.org CC BY-NC 4.0), flowers (Doug Sponsler, iNaturalist.org CC BY-NC 4.0); halberd-leaf tearthumb plant (Pat Deacon, iNaturalist.org CC BY-NC 4.0), leaf (Sara Rall, iNaturalist.org CC BY-NC 4.0), flowers (Chris Buelow, iNaturalist.org CC BY-NC 4.0); Japanese honeysuckle plant (Jacob Malcom, iNaturalist.org CC BY-NC-SA 4.0), leaves (Csmorosa, iNaturalist.org CC BY-NC 4.0), flowers (Andy Newman, iNaturalist.org CC BY-NC 4.0)

SIMILAR SPECIES

White swallow-wort (*Vincetoxicum hirundinaria*) is perhaps the species that most resembles black and pale swallow-wort. It is closely related and was also introduced to North America as an ornamental. Despite escaping cultivation, it has not become invasive as have the other two species. White swallow-wort has a very similar growth form and may occur in similar habitat where escaped. It can be differentiated by having white (or sometimes yellow or greenish) flowers. However, please note some mutant pale swallow-wort flowers may also appear white. Several other species present in North America (both exotic and native) resemble black and pale swallow-wort by having a similar overall growth form and creating dense thickets in similar habitat. Most can be readily differentiated by having alternate leaves and/or very different flowers. Species most closely resembling black and pale swallow-wort are described in greater detail in **Table 2**, along with key characteristics that can be used to differentiate the look-alikes.

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SUGGESTED CITATION

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