Biological Control of Swallow-worts

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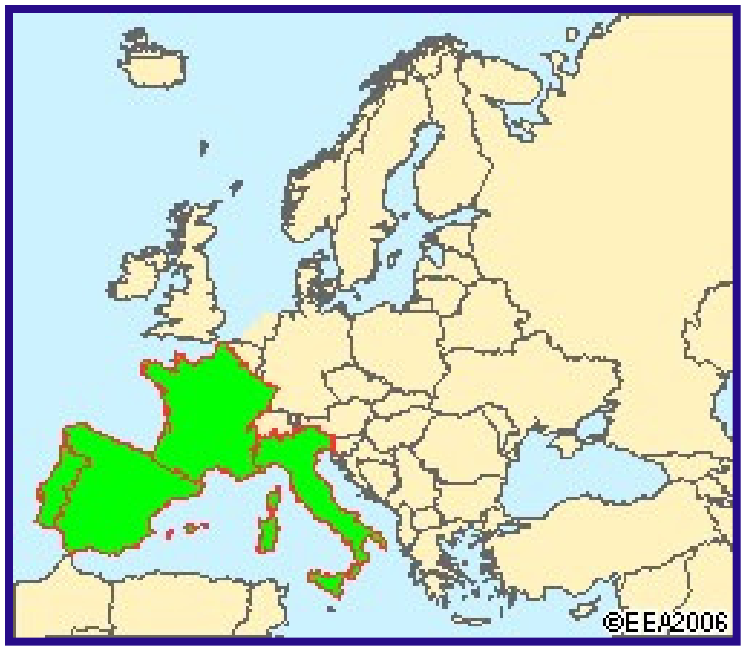
Non-native Swallow-worts

Black (***Vincetoxicum nigrum***)

Native to Spain, France, and Italy



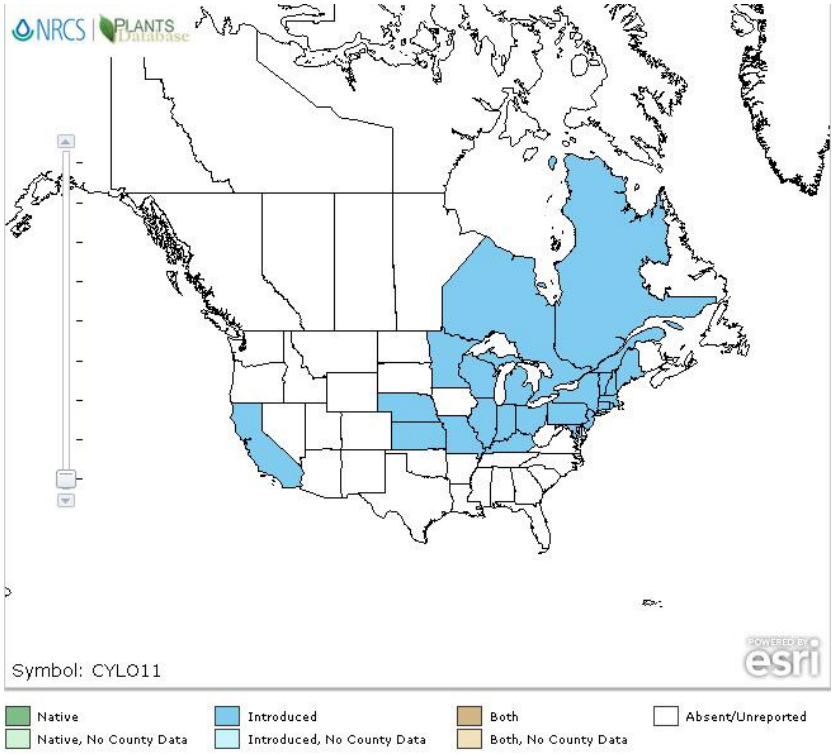

6/24/2003

Non-native Swallow-worts

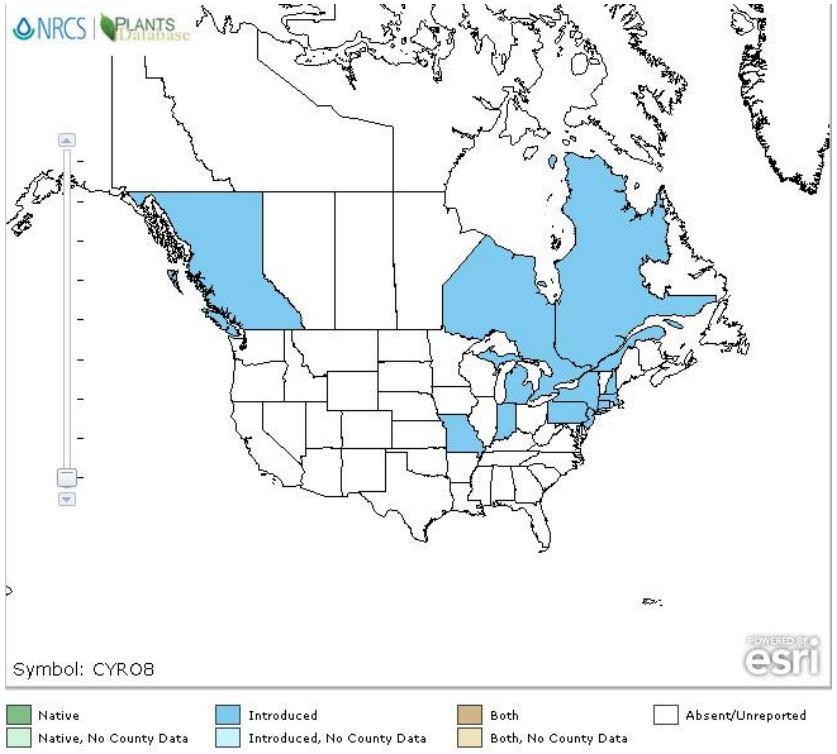
Pale (***V. rossicum***)

- Native to southwest Russia and Ukraine

North American Distribution



Vincetoxicum nigrum distribution in North America. USDA Plants database, 2015



Vincetoxicum rossicum distribution in North America. USDA Plants database, 2015

Swallow-wort Biology

- European natives
- Milkweed family (Apocynacae)
- Perennial, herbaceous plants
- Vining growth habit
- Insect and self-pollinated
- Coma-bearing seeds
- High tolerance and good plasticity to envir. conditions

Negative Ecological Effects of Swallow-worts in North America

- Disruption of plant successional patterns (Lawlor 2000)
- Threatens habitat of endangered plants (Lawlor 2000)
- Monocultures shade out background vegetation
- Monocultures decrease arthropod diversity and community composition (Ernst and Cappuccino 2005)
- Toxic to livestock

Potential Negative Effects on Monarch Butterflies

- Swallow-wort may have greater indirect impact on monarchs by competing with milkweed species

Monarch laying eggs on black swallow-wort

MONARCH JOINT VENTURE

Partnering across the U.S. to conserve the monarch migration

www.monarchjointventure.org

The Monarch Joint Venture is a partnership of federal and state agencies, non-governmental organizations, and academic programs that are working together to protect the monarch migration across the lower 48 United States.

PARTNERS

U.S. Forest Service
U.S. Fish and Wildlife Service
U.S. Geological Survey
Natural Resources Conservation Service
Iowa Department of

Invasive Species Alert:

Black swallow-wort (*Cynanchum louisea*) and pale swallow-wort (*Cynanchum rossicum*)

Monarchs and Swallow-wort

Monarch butterflies (*Danaus plexippus*) need milkweed plants (*Asclepias* species plus a few species in closely related genera) to survive; their caterpillars cannot feed on other host plants. Female monarchs have evolved to lay eggs on milkweed, ensuring that their offspring have adequate resources for development. Females find the milkweed plants using a combination of visual and chemical cues.

An alien invader is jeopardizing this process by confounding female monarchs during the egg laying process. Black swallow-wort (*Cynanchum louisea*

has heart shaped leaves and white flowers, and is native to North America.

Environmental Effects

Swallow-wort species reduce local biodiversity of native plants, invertebrates, and vertebrates. Studies show a decrease in arthropod biodiversity in areas covered by swallow-wort, when compared to similar old fields vegetated by native plants (DiTommaso et. al. 2005). Swallow-worts can take over open areas, which in turn leads to reduced grassland bird breeding and nesting. As the former Latin name, *Vincetoxicum*, implies, swallow-wort species are

Classical Biological Control

- **Locate natural enemies in pest's native range**
- **Determine impact on host population**
- **Determine host specificity (abroad)**
- **Return good candidates to N.A. quarantine**

Weed Biocontrol

- Regulated by USDA – APHIS
- Studies on biology & impact on target weed
- Host Range Testing: 50-100 Plants
  Close relatives, shared habitat, crops, T&E
- Release Petition Submitted
- Technical Advisory Group (TAG) Review
- Environmental Assessment
- Fish & Wildlife Review (again)
- A few more hurdles
- USDA Permission to Release
- State Permission

- 8 Years Minimum?

Host specificity

- Test plant list
  - Entire approved TAG list
    - Minus unavailable rare species
  - Included additional taxa with close phylogenetic relationship to herbivores
    - ***Artemisia*** spp./***Chrysolina a. asclepiadis***
    - Urticaceae/***Abrostola*** and ***Hypena***

Regulatory Issues

- **Plant Protection Act** – BC agent must not be a plant pest - APHIS
- **National Environmental Protection Act** – or risk to the environment
- **Endangered Species Act** – or any risk to a threatened or endangered species - USFWS

US T&E List: 1590 (692 animals, 898 plants)

Rhinocyllus conicus

- Native to Eurasia
- Released against musk thistle in USA in 1969
- Host range testing showed it to use many Cirsium species

European Exploration: Leaf feeders on swallow-worts (Aaron Weed)

Chrysolina a. asclepiadis

No longer under consideration: feeds on native milkweeds

Abrostola asclepiadis

Found in open field sites

Host specificity testing almost completed

Hypena opulenta

Found in forests and on forest edge

Submitted a petition for field release

Hypena opulenta

Found in wooded ravines on pale swallow-wort in southeastern Ukraine, host plants previously unknown.

Hypena opulenta
Larval host range

- Screened against 79 species total:
  - 48 species of Apocynaceae
  - 4 species of Gentianaceae
  - 1 species of Loganiaceae
  - 1 species of Gelsemiaceae
  - 9 species of Rubiaceae
  - 2 species of Scrophulariaceae
  - 6 species of Asteraceae
  - 1 species of Cannabaceae
  - 1 species of Convolvulaceae
  - 6 species of Urticaceae

- Successful development to pupal stage only on ***Vincetoxicum***

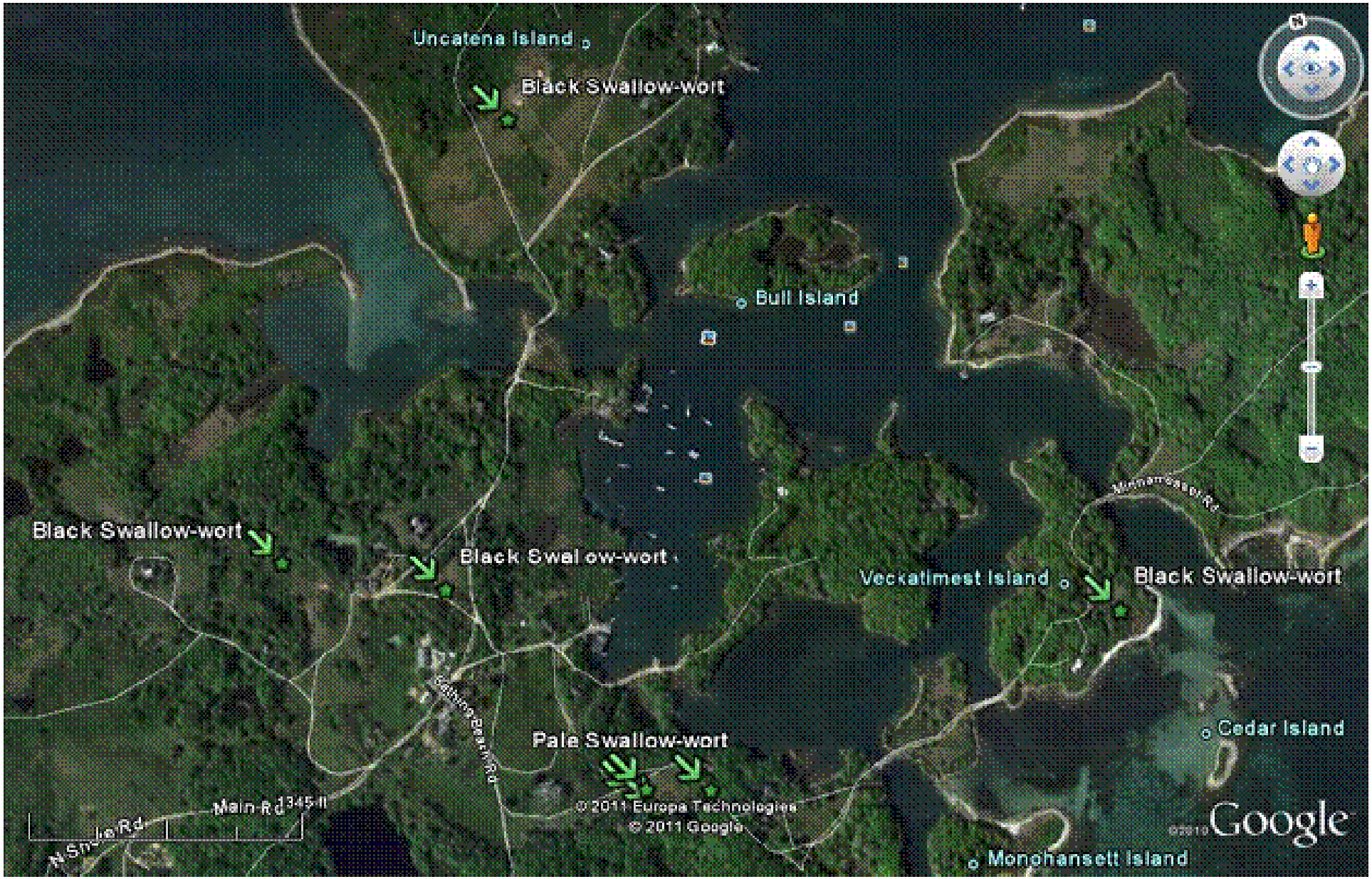
Swallow-wort Biocontrol

Hypena opulenta
TAG recommended release 9/4/2013
Released in Ottawa Canada 9/20/2013
Toronto and Ottawa in 2014
Anticipate US release 2017?

Abrostola asclepiadis
Host range testing complete

Ontario *Hypena opulenata* release July 2014

In Ottawa, Canada May 2015 confirmed overwintering of ***H. opulenta*** after a cage release in fall of 2014.



Swallow-wort sites on Naushon Island, MA. Release sites include sun and shade plots. We'll also survey distant sites (Uncatena and Veckatimest and a stand near the south end of the island) for agent spread and establishment.

Forested and open field sites of black swallow-wort on Naushon Island.