# *Hypena opulenta* (Lepidoptera: Erebidae): the first biological control agent released for control of swallow-worts in North America

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## Introduction

Two species of European swallow-wort, *Vincetoxicum nigrum* and *Vincetoxicum rossicum*, have become increasingly invasive in North America, where there are no insect herbivores to suppress populations and deter further spread. Conventional control methods are largely unsuccessful in managing established infestations, and biological control appears to be the best option. These are the only species of *Vincetoxicum* established in North America. A European leaf-feeding moth, *Hypena opulenta*, was evaluated using no-choice larval development tests to determine its host range.

***V. nigrum* (black swallow-wort) infestation in the United States, *V. nigrum* flowers and pods.**

***V. rossicum* (dog strangling vine or pale swallow-wort) infestation in Canada, *V. rossicum* flowers and pods**

## No-choice Larval Host Range Tests

- Neonate *H. opulenta* were placed individually on a single leaf of a non-target plant in plastic cups and allowed to feed. We set up 10 replicates for 79 plant species and an additional 15 replicates of a subset group of 10 plant species.
- As each cohort of non-target tests was set up, 10 control replicates were also set up with *Vincetoxicum* species.
- None of the 79 non-target plant species allowed larval development of *H. opulenta* to pupation in tests where 75-80% of controls pupated.

## *Hypena opulenta*

- Collected on *Vincetoxicum rossicum* in Ukraine in 2006; previous to this no record of host plant.
- Multivoltine with several overlapping generations each year.
- Five to six weeks development from egg to adult; leaf-feeding larvae have five instars.
- Impact studies showed significantly reduced aboveground biomass, seedpod production, and seed production in *V. rossicum* from a range of densities.

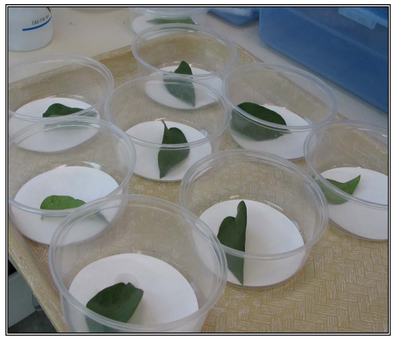
## *Hypena opulenta* life cycle

Eggs

Fifth instar

Pupa

Adult



No-choice test cups

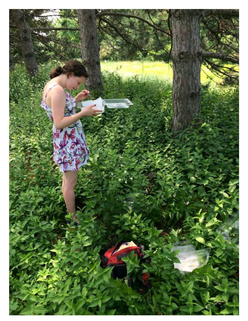
Screened against 79 species total:
48 species of Apocynaceae
4 species of Gentianaceae
1 species of Loganiaceae
1 species of Gelsemiaceae
9 species of Rubiaceae
2 species of Scrophulariaceae
6 species of Asteraceae
1 species of Cannabaceae
1 species of Convolvulaceae
6 species of Urticaceae

## Discussion

Host range testing shows that *H. opulenta larvae* are monophagous on *Vincetoxicum spp.* The multi-voltine populations of H. opulenta originate from an area of Ukraine with photoperiod and winter temperatures similar to New England and Southern Canada in North America.

The first North American release of *H. opulenta* larvae was made near Ottawa, Canada in Sept. 2013. Additional releases were made in Ottawa and Toronto in 2014. These releases led to at least one additional generation in the field, and caused a significant yellowing of damaged *V. rossicum* leaves in the release site.

The first US release is intended for Naushon Island in Massachusetts in 2014, pending a US release permit. Naushon has several stands of *V. rossicum* and *V. nigrum* with both species growing in open fields, in the forest, and on forest edge. We have six years of data from pre-release plots in these stands indicating stable to increasing *Vincetoxicum* densities. This experimental field release will allow determination of herbivore impact on both plant species under variable light conditions..



Canadian release site for *H. opulenta* with resulting yellowed foliage.

Open field site of black swallow-wort on Naushon Island, Massachusetts.

## Acknowledgements

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