Eastern Lake Ontario

Swallow-wort collaborative

Linking People, Information & Action Through Enhanced Communication

2/2/24 @ 1pm-2:15pm EST

Via Zoom

Get the latest updates on swallow-wort biocontrol research & field applicaiton from professionals with:

SUNY ESF, University of Rhode Island-Biocontrol Lab,

Michigan State University,

Agriculture & Agri-Food Canada, and SLELO PRISM.

A recording will be emailed & available at:
swallowwortcollaborative.org

Continuing Education Credits

You must stay for the FULL webinar to receive credits
Attendance will be checked and a poll at the end will be given to collect your CEU credentials.

SAF Category 1

- 1 Hour

Master Naturalist: 1 Hour
(Self report @ NY Master Naturalist Program Website)

ISA- ISA:

- BCMA Science:0.5
- Certified Arborist: 1.25
- Practice:0.75

Eastern Lake Ontario

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Become an ELOSC Collaborator: email robert.l.smith@tnc.org

INVASIVE SPECIES MANAGEMENT
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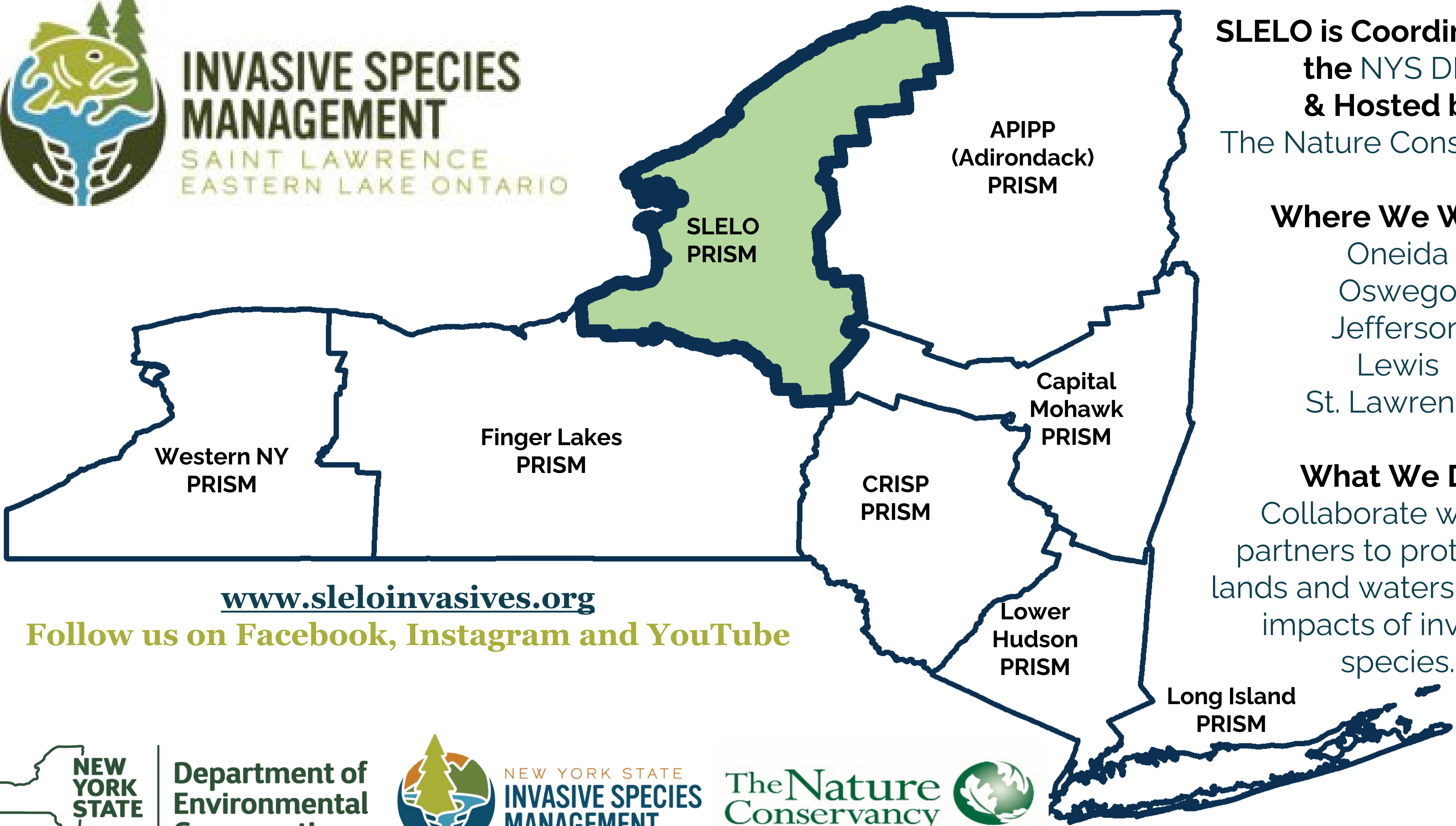

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What We Do:
Collaborate with our partners to protect our lands and waters from the impacts of invasive species.

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NEW YORK STATE | Department of Environmental Conservation

NEW YORK STATE INVASIVE SPECIES MANAGEMENT

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Guest Presenters:

Dr. Lisa Tewksbury
Director, URI Biocontrol Lab

Dr. Marianna Szucs
Michigan State University

Dr. Ian Jones
University of Toronto
- Announce AIS experience

Agriculture and Agri-Food Canada

Dr. Dylan Parry
SUNY ESF

Robert Smith
SLELO PRISM

Evaluation of Field Releases of *Hypena opulenta* (Lepidoptera: Erebidae) a Biological Control Agent of Invasive *Vincetoxicum spp.* in New England

Lisa Tewksbury, Alexandra Johnson
Dept. of Plant Science and Entomology
University of Rhode Island

Non-native Swallow-worts

Black Swallow-wort

(*Vincetoxicum nigrum*)

Native to Spain, France, and Italy

Invasive in the northeast (CT, RI, MA)

Pale Swallow-wort
(*V. rossicum*)
Native to southwest Russia and Ukraine

Invasive in Canada, NY, CT, MA

Characteristics of Swallow-worts

- Milkweed family (Apocynaceae)
- Perennial, herbaceous plants
- Vining growth habit
- Reproduces primarily by wind blown seeds and vegetatively by rhizomes and shoots from the root crown
- High tolerance and good plasticity to environmental conditions

Impacts of Swallow-worts

- Form monocultures which decrease arthropod diversity and community composition

- Threaten habitat of endangered species

- Toxic to livestock

Invasive Swallow-worts

- Problematic growth
  - Agricultural settings
    - Pastures, row crops, and nurseries
  - Natural Areas
    - Field margins, and forest understories
- Difficult to control
  - Repeated herbicide applications
  - Need selective methods
  - Mowing is not effective, although it results in seed reduction

Hypena opulenta

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

Young, J. and A.S. Weed. 2014. J. of the Lep. Soc. 68(3):162-166

Weed, A.S. and R.A. Casagrande. 2010. Biol. Control. 53:214-222

Hypena opulenta Life Cycle

5-6 weeks (20˚C), multiple generations are possible

Adult

Eggs

1st instar

5th instar

Overwinter as pupae in leaf litter or soil

Hypena opulenta larval no choice host range testing

- Screened against (77 species total):
  - 47 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 Convolvulaceae
  - 6 species of Urticaceae

- Successful development to pupal stage only on *Vincetoxicum*

Hazlehurst, A.F., A.S. Weed, L. Tewksbury and R.A. Casagrande. 2012. Environ. Entomol. 41:841-848

1) Conduct field cage releases of *H. opulenta*

Objectives

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1) Conduct field cage releases of *H. opulenta*

2) At three locations pair cage releases in full sun and in shade

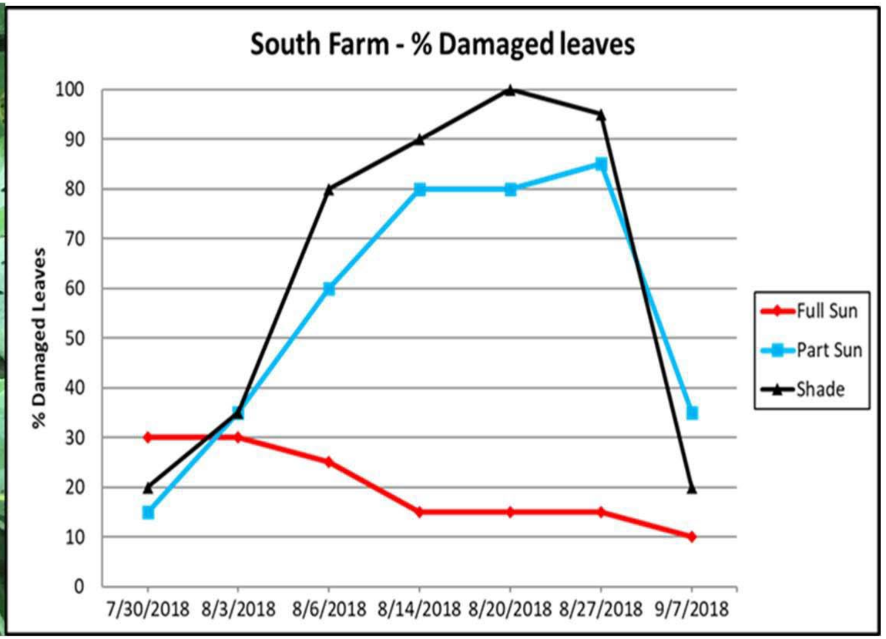
Objectives

1) Conduct field cage releases of *H. opulenta*

2) At three locations pair cage releases in full sun and in shade

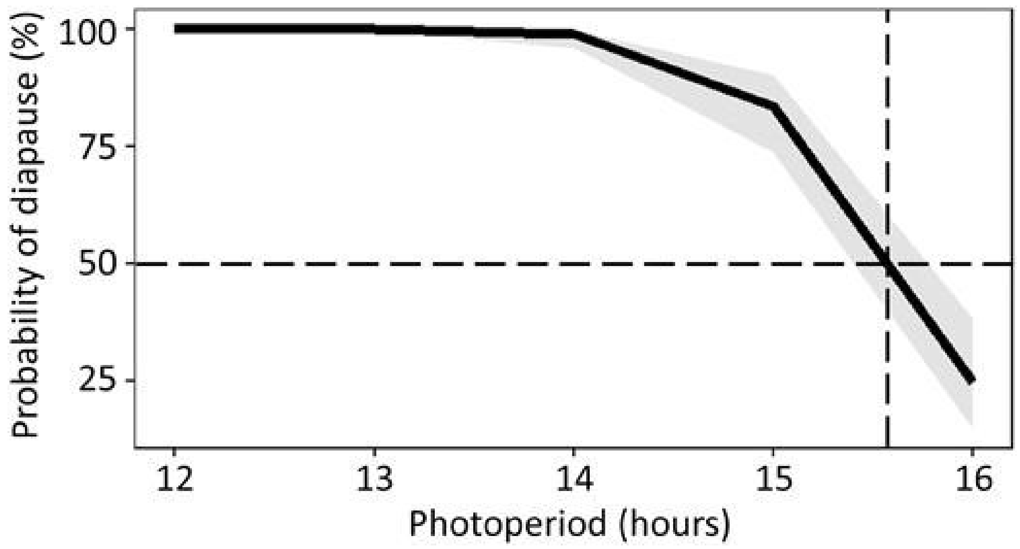
3) Monitor overwintering, feeding damage and establishment, temperature and light intensity

- Cage monitoring for percent damage
- Post release field monitoring
- Post release adult trapping
  - ➢ Mothing with a blacklight and a sheet
  - ➢ Overnight trapping with a LED light


South Farm - % Damaged leaves
% Damaged Leaves
100
90
80
70
60
50
40
30
20
10
0
7/30/2018
8/3/2018
8/6/2018
8/14/2018
8/20/2018
8/27/2018
9/7/2018
Full Sun
Part Sun
Shade

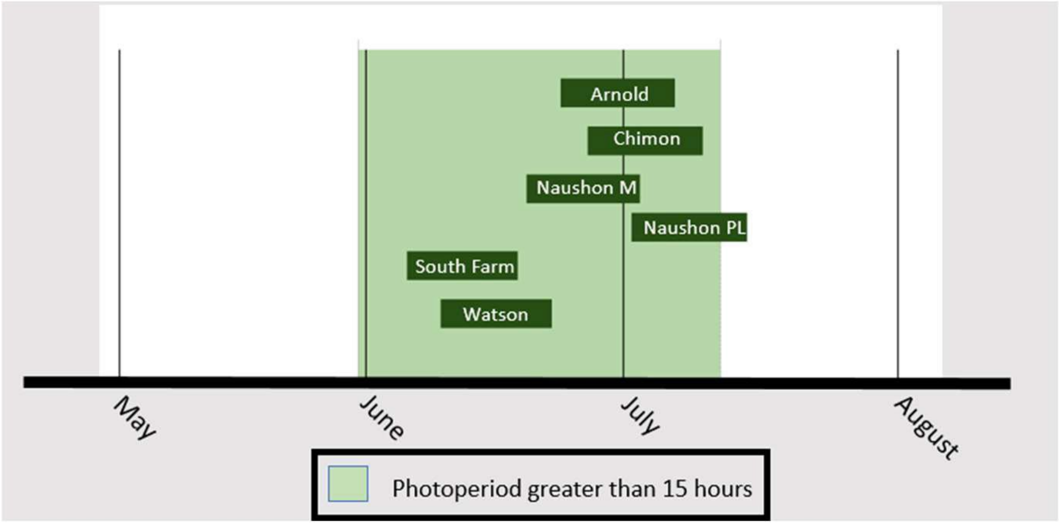
2019 Cage Releases of Adult *H. opulenta*

Release site	Release dates	# Adults Released	Date Larvae seen	Cage removal date	Percent damaged leaves/20	Distance damage from cage
Charlestown, RI	6/6/2019, 6/12/19	40	6/24/19	7/10/19	55%	4 meters
Jamestown, RI	6/10/19, 6/15/19	40	6/26/19	7/5/19	95%	4 meters
Naushon_M, MA	6/20/19	40	7/2/19	7/18/19	100%	2 meters
Naushon_P, MA	7/2/19	18	7/2/19	7/18/19	75%	2 meters
Arnold Arboretum, MA	6/24/19	37	7/3/19	7/15/19	100%	4 meters
Chimon Island, CT	6/27/19	37	7/11/19	7/24/19	100%	4 meters
Redding, CT	7/11/19	25	7/25/19*	8/8/19	NA	NA
*evidence of larval feeding observed						



Jones, I.M., M.L. Seehausen, R.S. Bourchier, S.W. Smith, 2020. Environ. Ent. 49(3): 580-585

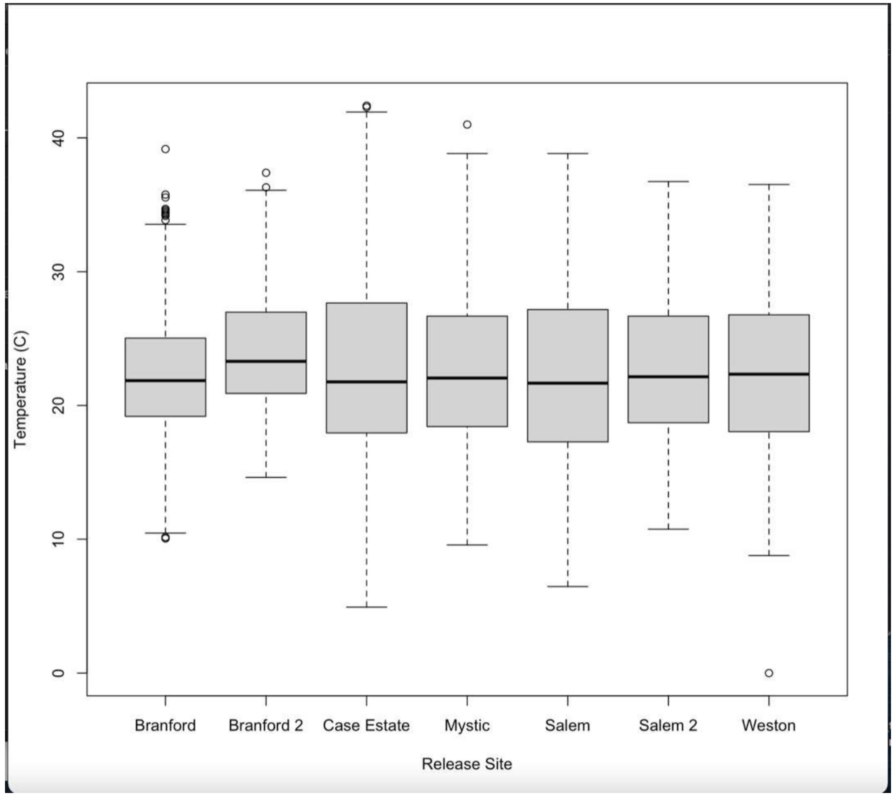
Intersection of dashed lines = 15 hrs 35 minutes where diapause was induced in 50% of individuals



Summary of All *H. opulenta* Releases

		Total *H. opulenta* Released: Life Stage	
State	Release year(s)	Larvae	Adults
MA	2017-2022	1,580	1,217
CT	2019-2022	0	401
RI	2017-2022	3,255	144
NY	2019-2020	0	68
ME	2018	81	0

2022 Temperature and Light Intensity Data



Duration of cage set-up ave. Approx. 23 ° C

- Ave. photoperiod during cage set up – 15 hours of daylight
- Our area may not be able to support a second generation of *H. opulenta*
- Earlier releases in May are a possible solution

Detection of minor feeding damage in Jamestown, RI in 2022, late in the season

Earlier intensive monitoring planned for 2023

Hypena baltimoralis

			Results	
Location	# of Nights Set		(Native) *Hypena baltimoralis* Caught	
	Sheet Mothing	Moonlander	Sheet Mothing	Moonlander
South farm	5	13	2	0
Watson farm	0	7	0	0

Summary

- Improved performance of *H. opulenta* in the shade was suspected, but field releases have confirmed this.

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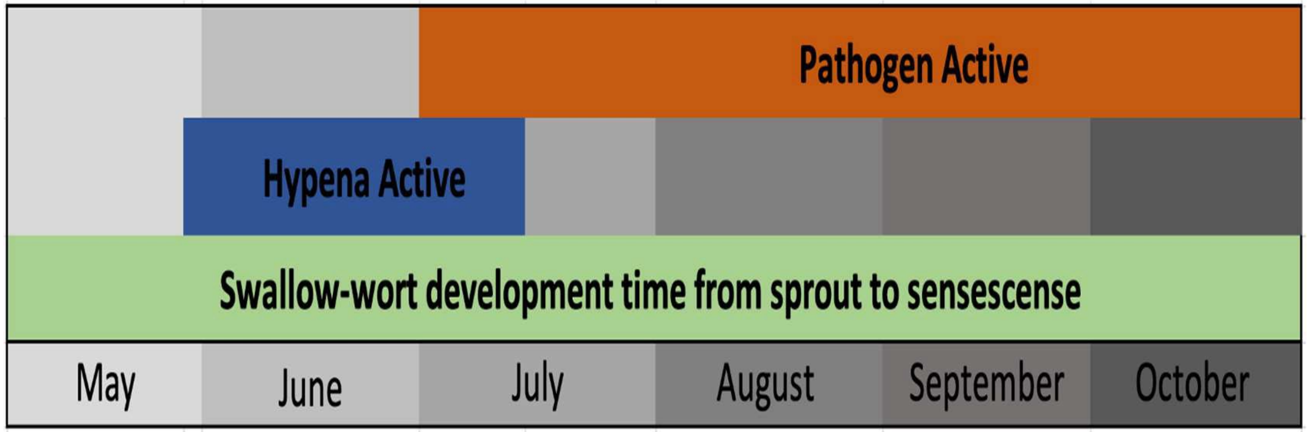
Summary

- Improved performance of *H. opulenta* in the shade was suspected, but field releases have confirmed this.
- Adult releases were more successful than larval releases
- Larvae disperse onto new foliage after cage removal
- Earlier adult releases will improve our chances of getting a second generation
- Both field monitoring and light trapping techniques need to be evaluated for improved success

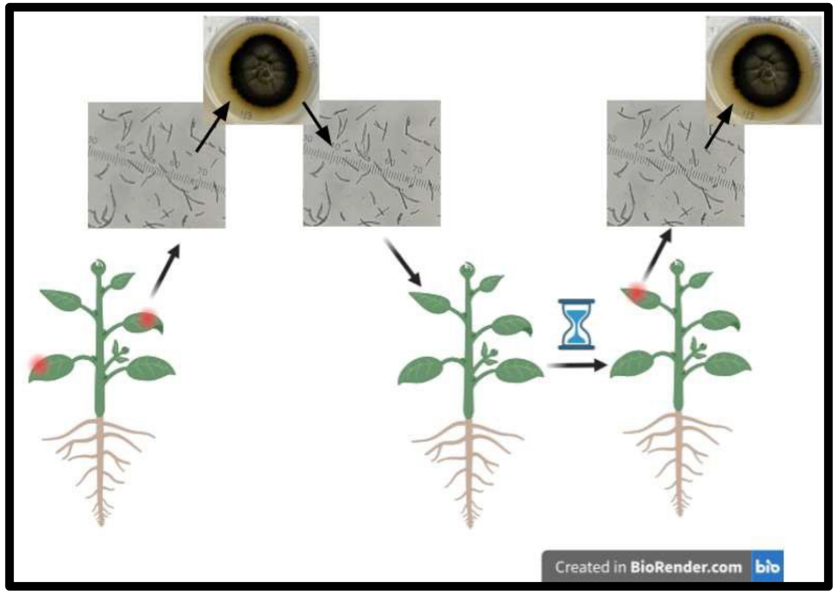
Other biocontrol agent already working for us?

Passalora bellynckii (Westend.) U. Braun (primary?) and Stenocephalopsis sp. (secondary?) were identified by Lisa Castlebury from USDAARS Mycology & Nematology Genetic Diversity & Biology Laboratory

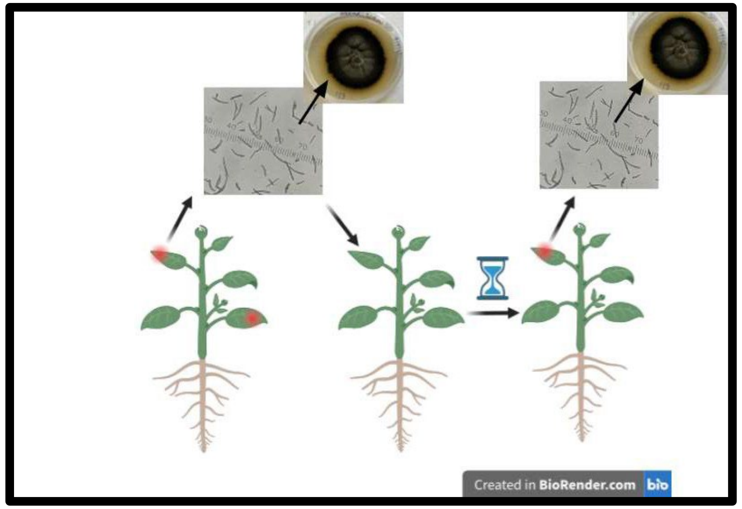
Poster at ESA 2022 Vancouver: Johnson, A.E. Evaluation of feeding and development of a biocontrol agent of *Vincetoxicum spp.* (*Hypena opulenta*), fed V. nigrum foliage infected by a leaf spot pathogen.



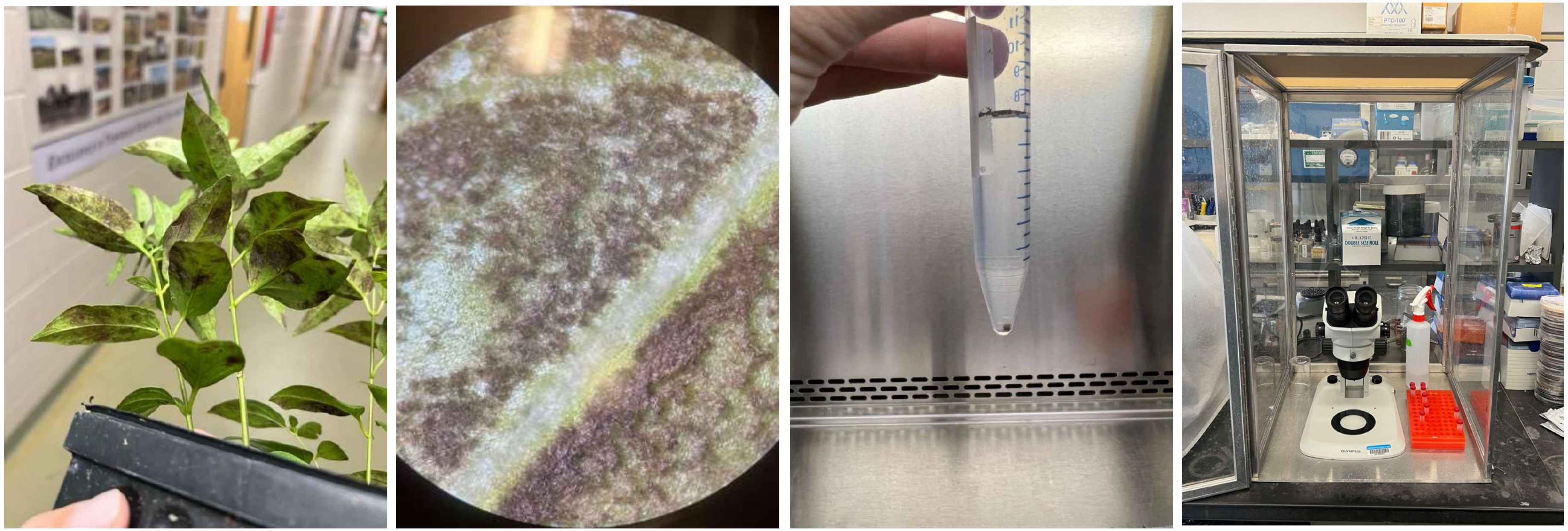
Estimated timeline showing the potential overlap in phenology of *H. opulenta* and the fungal pathogen in the field on their shared host: *Vincetoxicum* spp.



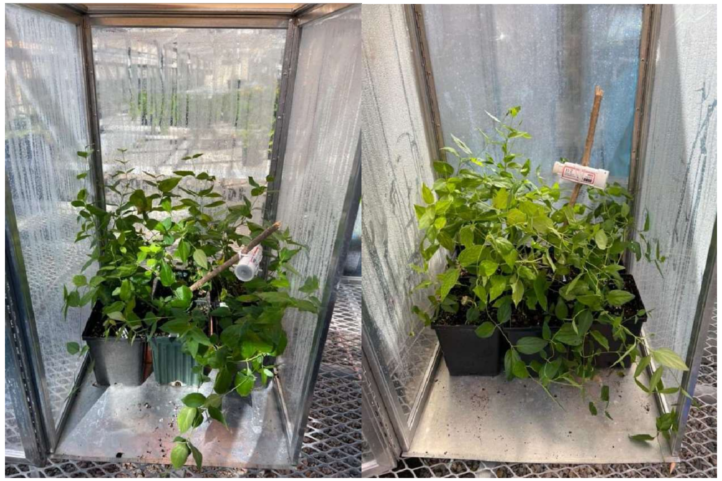
Order of Koch's Postulates: observe symptoms, isolate, observe sporulation in isolated culture, inoculate a healthy plant from this culture, observe the original symptoms and isolate the same organism.



Order of Modified Koch's postulates: observe symptoms, isolate and inoculate a healthy plant from the same sample, identification of initial isolate, observation of same symptoms and isolation of same organism from the inoculated plant.

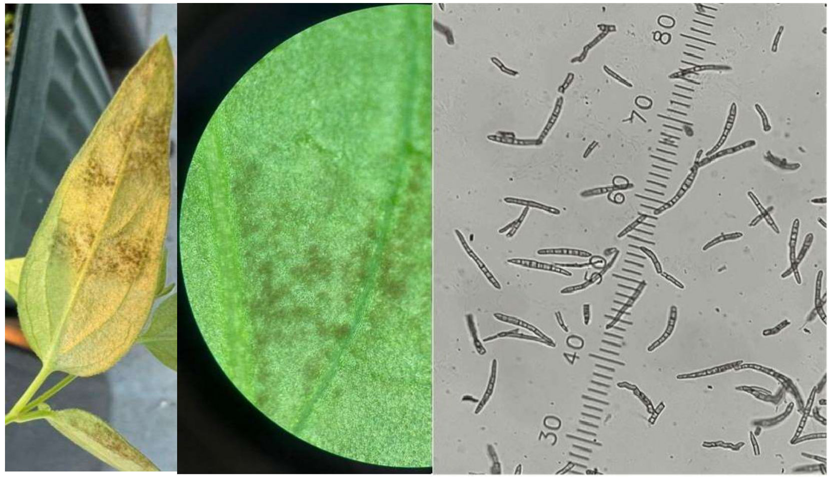


• Diseased plant used to make conidial inoculum; Magnification (35X) showing masses of conidia emerging from abaxial leaf surface; collected conidia after being concentrated in the centrifuge; Vinyl cage used when collecting conidia for the SSI technique.



Left Cage: Solution was applied to six *Vincetoxicum nigrum* plants contained in a sealed vinyl cage in the URI Greenhouse under ambient lighting and temperature **Right Cage:** a control was also prepared using sterile deionized water sprayed until run-off on six *V. nigrum* plants in an identically sealed vinyl cage under the same conditions

Spores were collected and prepared using single spore isolation (SSI), DNA extraction, and identification using PCR sanger sequencing. Identifications made from the conidial inoculum and the resultant conidia from the Koch's postulates were a 99% match for *Amycosphaerella Africana.*



Amycosphaerella africana (Crous & M.J. Wingf.) Quaedvl. & Crous

- A*. africana* was identified through Koch's postulates using conidia (asexual spores) collected from V. nigrum by Alexandra Johnson

- *A. africana* was first isolated from *Eucalyptus viminalis* Labill. from ascospores (sexual spores), in South Africa and originally named *Mycosphaerella Africana*

- The species *Passalora bellynckii* (Westend.) U. Braun (==*Cercospora bellynckii****),*** identified morphologically by Dr. John Mckemy (USDAARS) from samples collected in RI in 2018, clusters extremely close to *A. africana* in phylogenies of Mycosphaerellaceae

- Phylogenic data support the hypothesis that the conidia Cercospora-like fungi (Cercosporoid) isolated from *Vincetoxicum nigrum* that were identified as *A. africana* could represent an undescribed anamorph (asexual stage) (Crous et al., 2009a).

- Slow-growing fungus difficult to identify – pathogenicity testing needed, so more to come.

Thank You!

Acknowledgements:
Funding Provided by USDAAPHIS PPQ Biological Control

Coastal and Science and Engineering Fellows Rebecca Donegan, Lexi Johnson, Karina Camacho, Hazelynn Rios, as well as many undergraduate assistants and volunteers in the URI biocontrol lab.

Using hybridization to increase fitness of *Hypena opulenta*

Marianna Szűcs, Brianna Foster

Eastern Lake Ontario Swallow-wort collaborative

Feb 2, 2024

MICHIGAN STATE UNIVERSITY | Department of Entomology

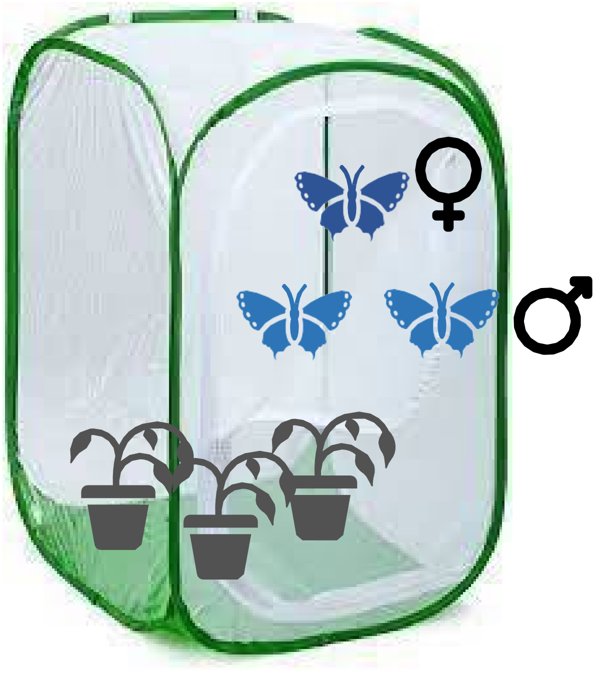
DEPARTMENT OF NATURAL RESOURCES · MICHIGAN · DNR

Could the fitness of *H. opulenta* populations be increased by hybridization?

Brianna Foster
Ph.D. student

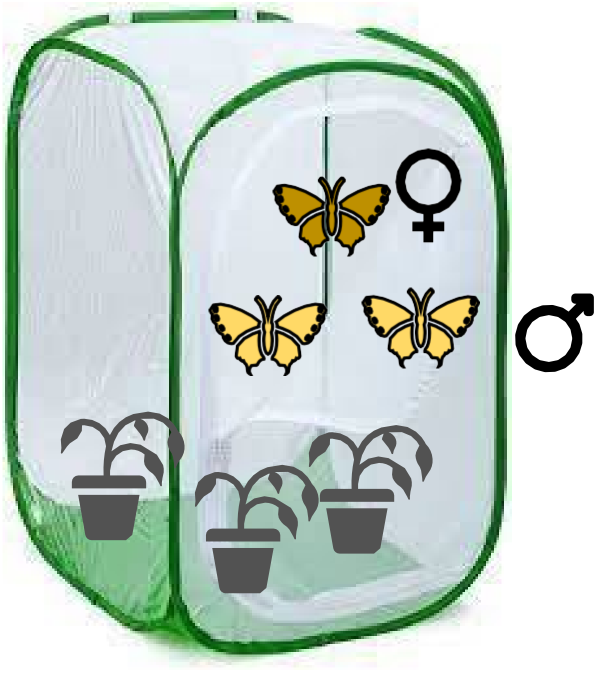
MSU Lab Colony

- Founded in 2018 by 19 ♀
- Likely inbred



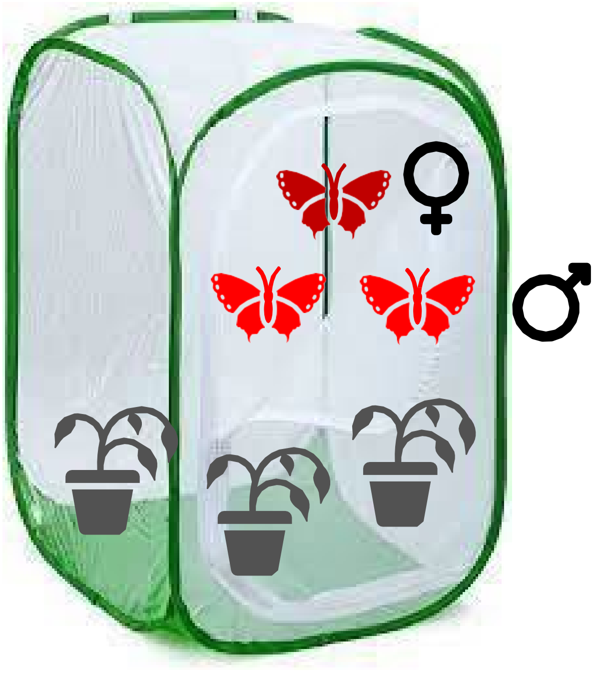
Canadian Colony

- Field release 2013
- Establish by 2015
- Received in 2020



Outbred Colony

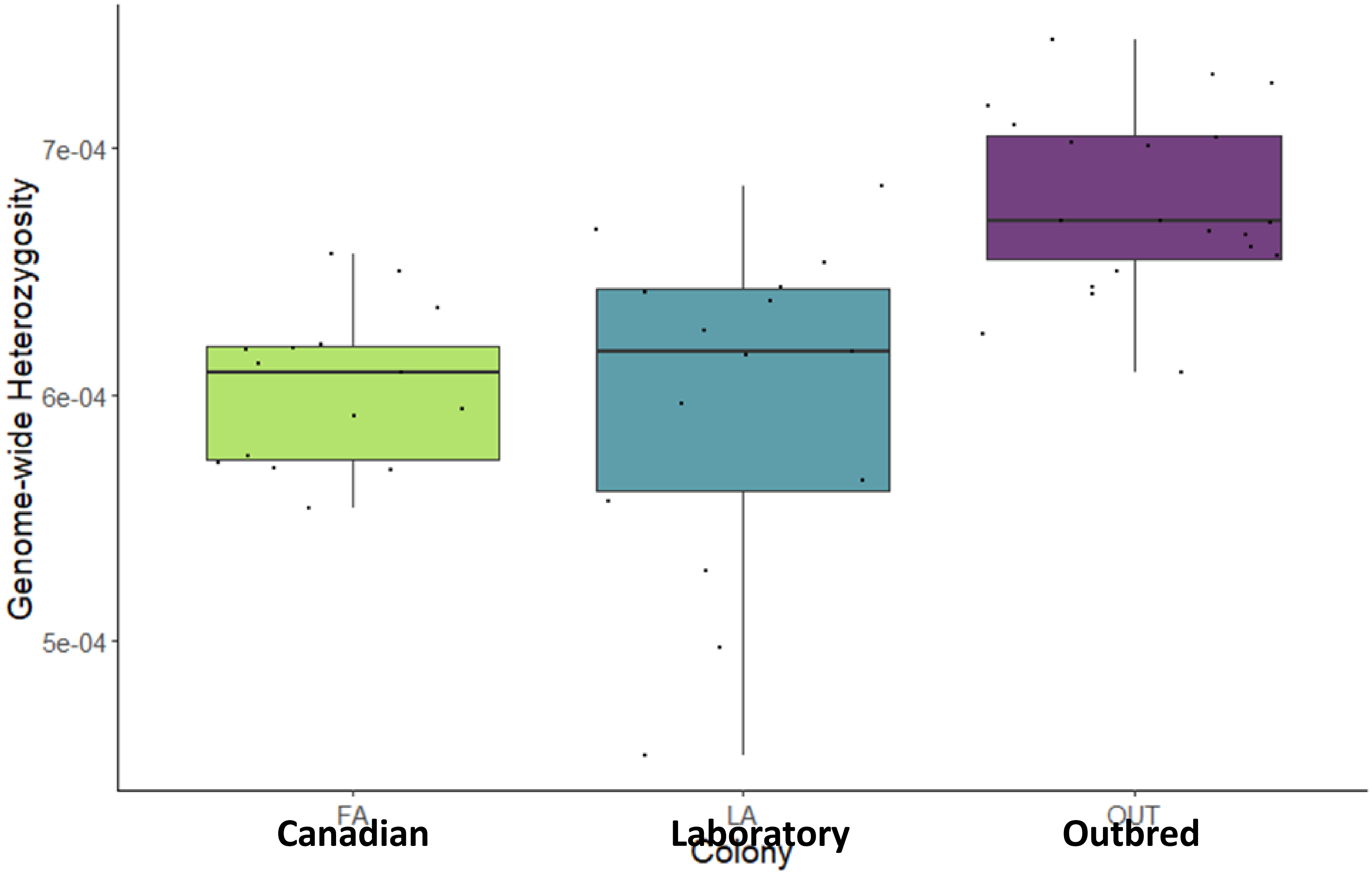
- Reciprocal crosses of MSU lab and Canadian colonies in 2020



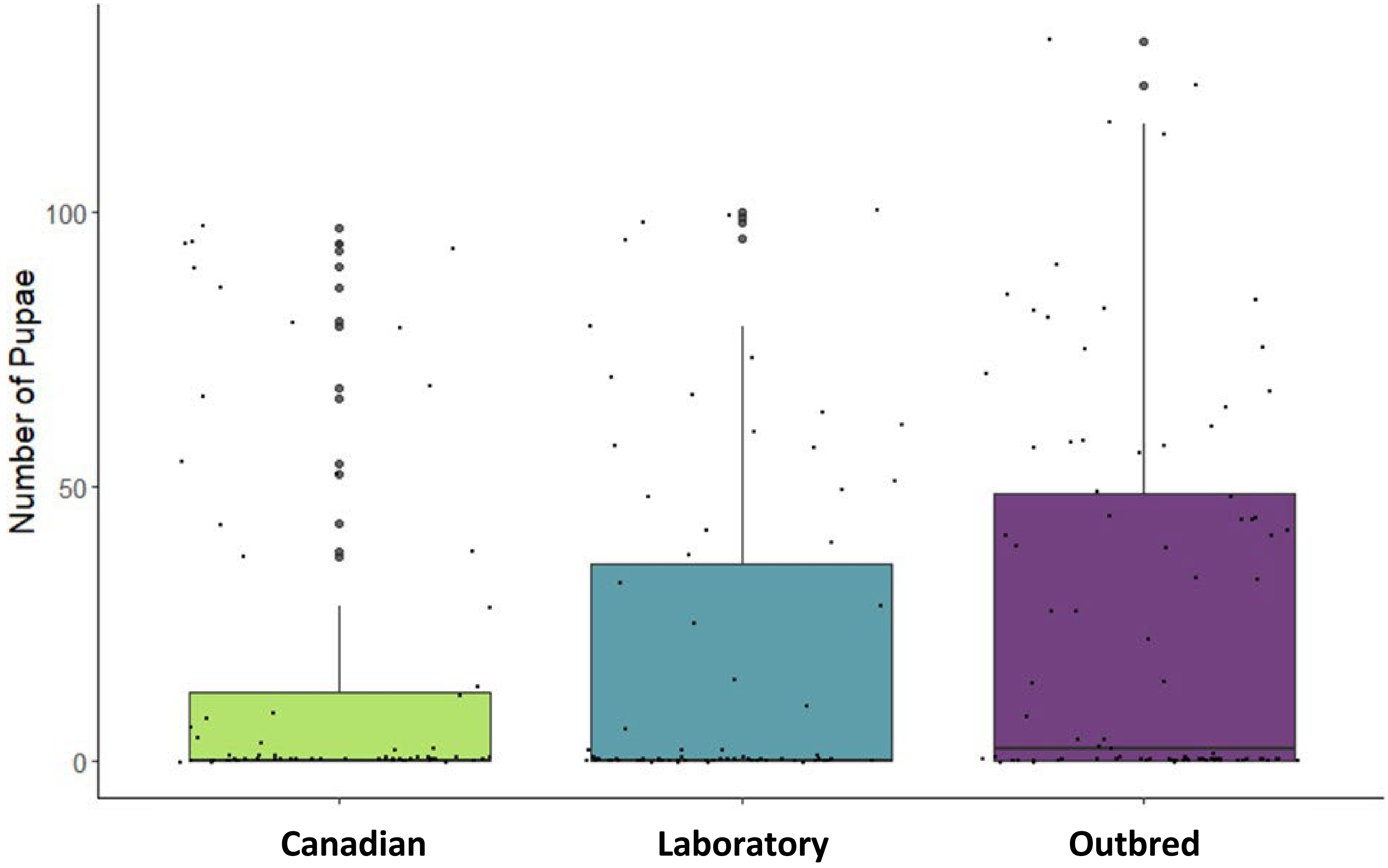
12 replications per colony


PHILIPS

Hybridization increased genetic diversity



Hybridization led to higher pupae production



Prepared by Marianna Szucs, Michigan State University

The role of genetic background in the field

Summer 2023

- 3 treatments
  - Canadian
  - Lab colony
  - Outbred

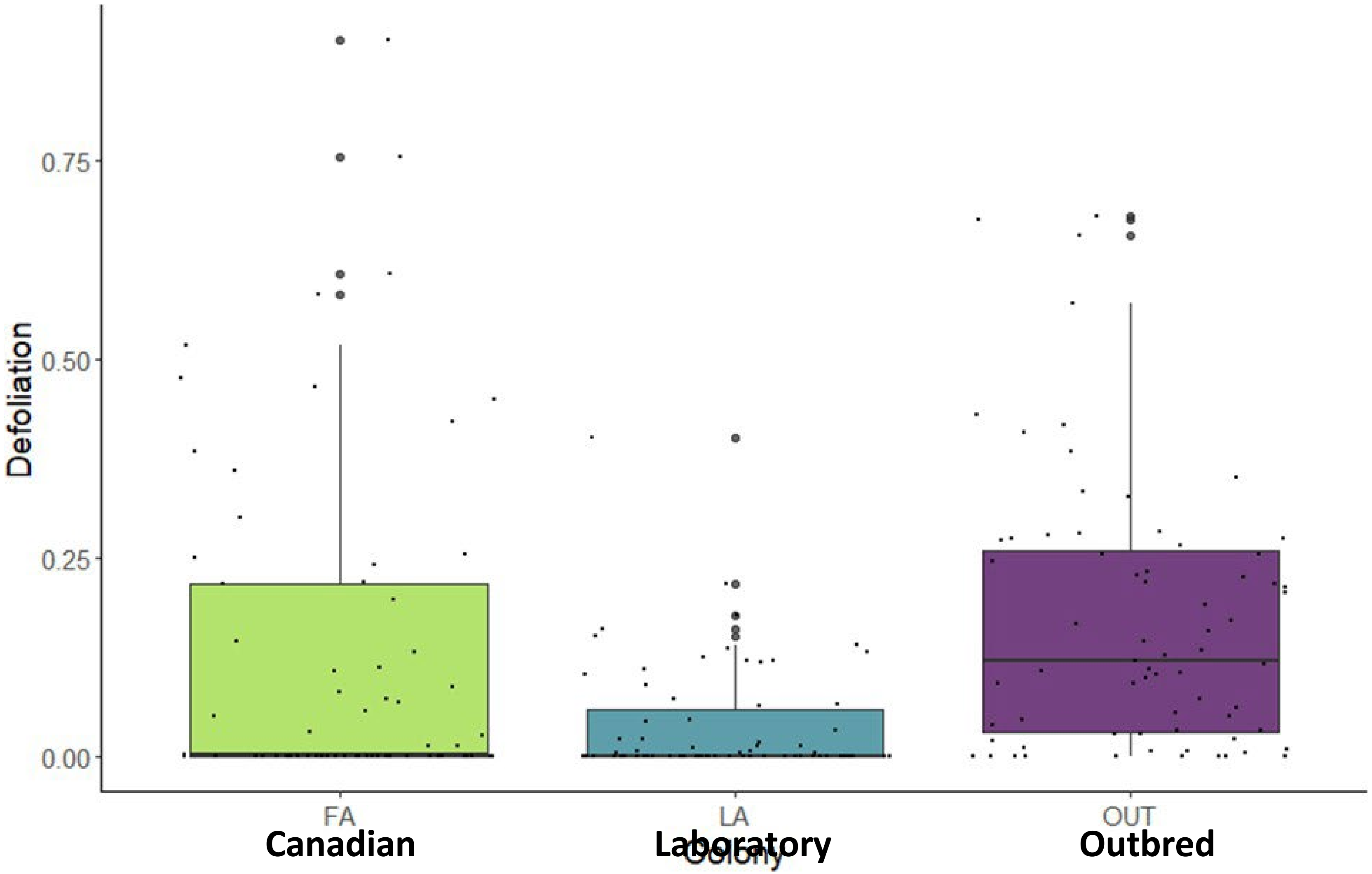
- 14 replications/trt
  42 cages total
  - 5 ♀ 5♂ released/cage

<u>Monitor:</u>
- Defoliation
- Larvae/Adult emergence

Photo: B. Foster

Hybridization increased larval damage to sww

- Larvae production
  - Lab colony 71%
  - Canadian 62%
  - Outbred 93%
- Adult emergence
  - Highest in Outbred
    - Mean 4.02 (CI: 1.3, 17.55)
    - Lab and Canadian similar

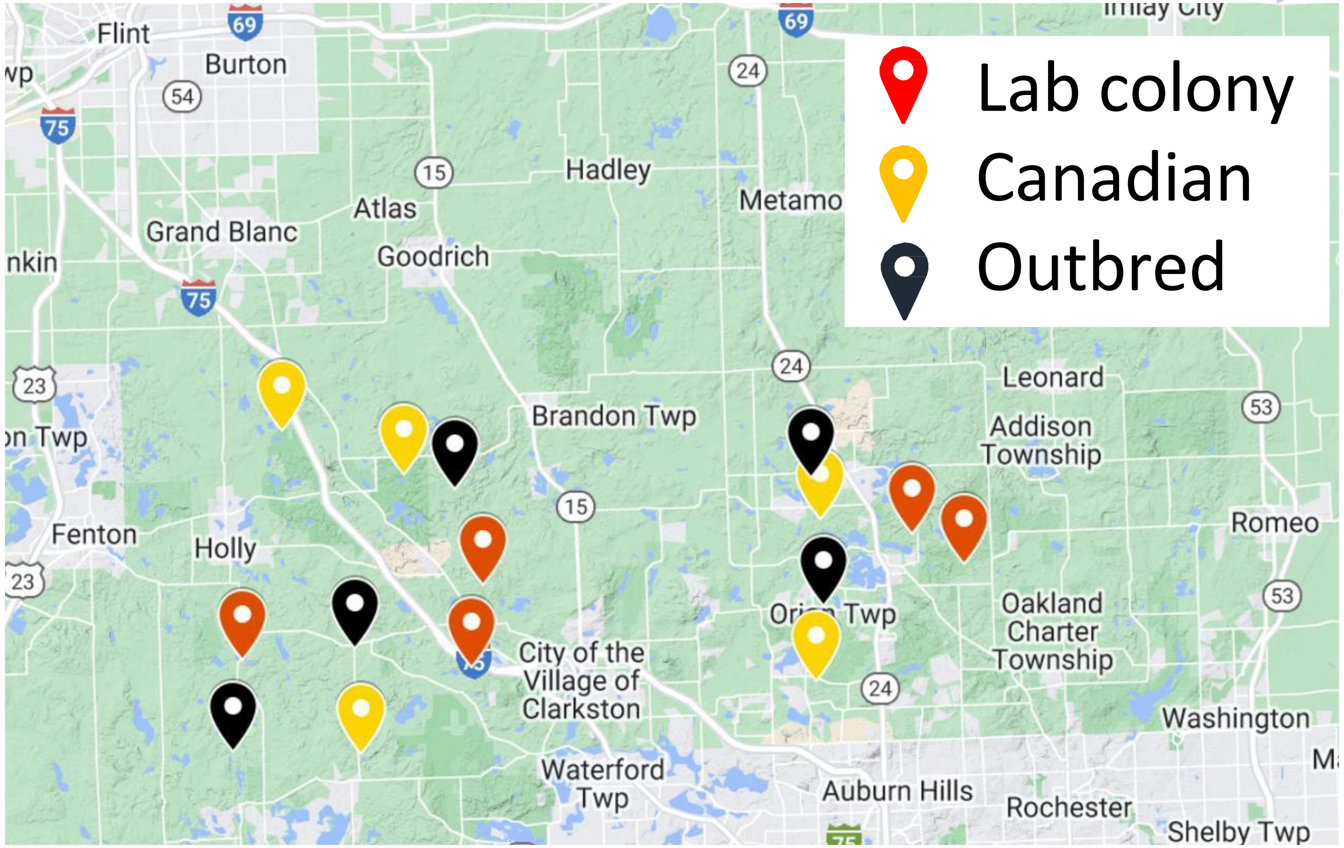


Field releases of *H. opulenta* in Michigan in 2022

Treatments:

- Lab colony
- Canadian
- Outbred

5 replicates/trt



Summer solstice

	June		June (after summer solstice)	July	August	Total/site (rep)	
Lab colony	6 ♀ 5 ♂		16 ♀ 14 ♂		12 ♀ 16 ♂	34 ♀ 35 ♂	
Canadian	19 ♀ 10 ♂	37 larvae	6 ♀ 6 ♂		12 ♀ 16 ♂	37 ♀ 32 ♂	37 larvae
Outbred	19 ♀ 10 ♂	37 larvae	6 ♀ 6 ♂		12♀ 16 ♂	37 ♀ 32 ♂	37 larvae

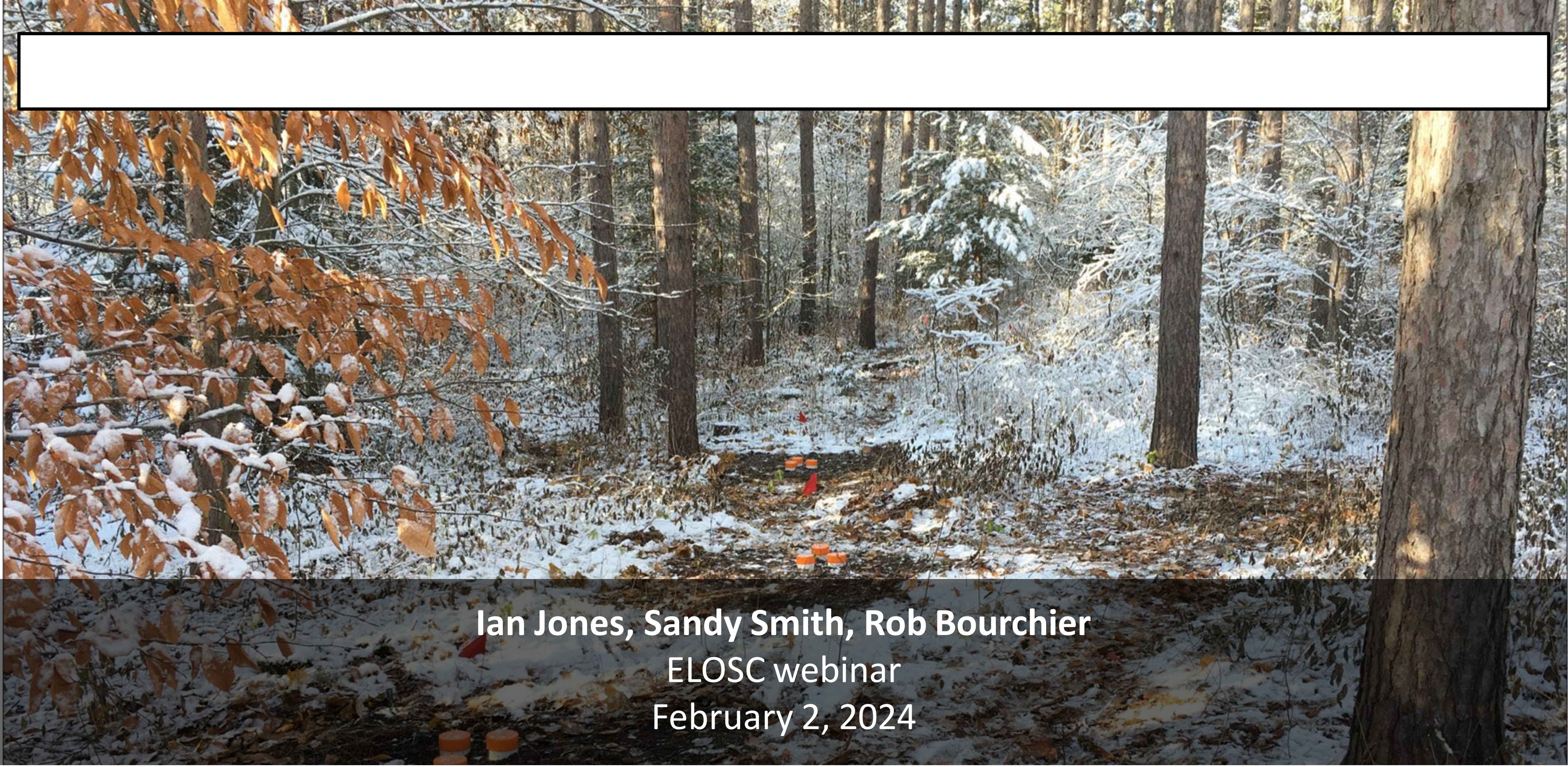
H. opulenta field releases in MI

Defoliation in a release cage in 2022
Photo: B. Foster

Acknowledgements

Ruth Hufbauer (CSU), Lisa Tewksbury (URI), Rob Bourchier (Agrifood Canada)

Technicians: A. Jain, C. Hernandez, M. Hamlyn, N. Tabara, J. Okuniewicz, J. Lee



Ian Jones, Sandy Smith, Rob Bourchier

ELOSC webinar

February 2, 2024

UNIVERSITY OF TORONTO

Agriculture and Agri-Food Canada

Mitacs

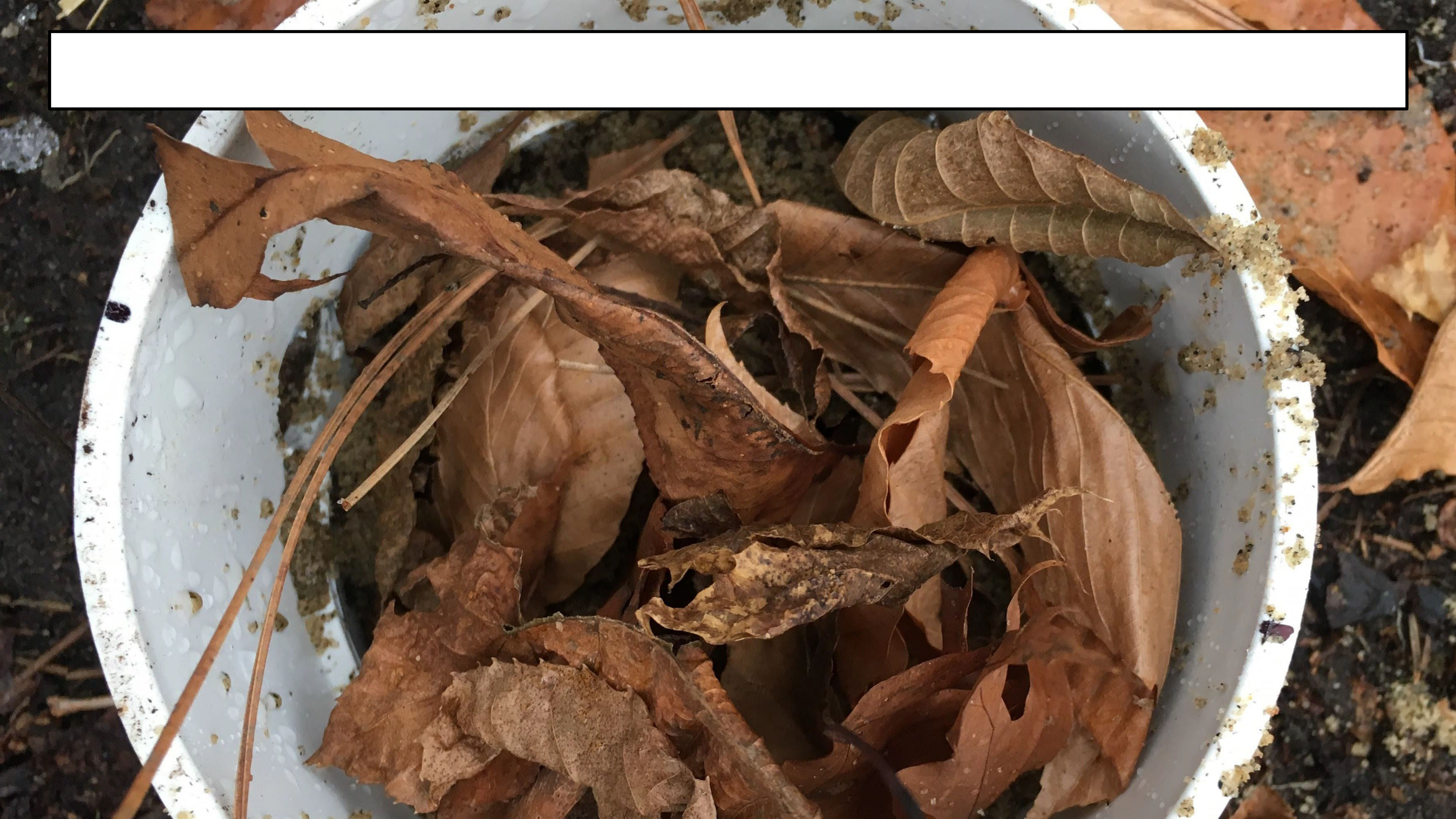
Ducks Unlimited Canada
Conserving Canada's Wetlands

- **Field experiment to identify key pupal mortality factors**

- **Identifying the supercooling point and cold tolerance strategy of *Hypena opulenta***

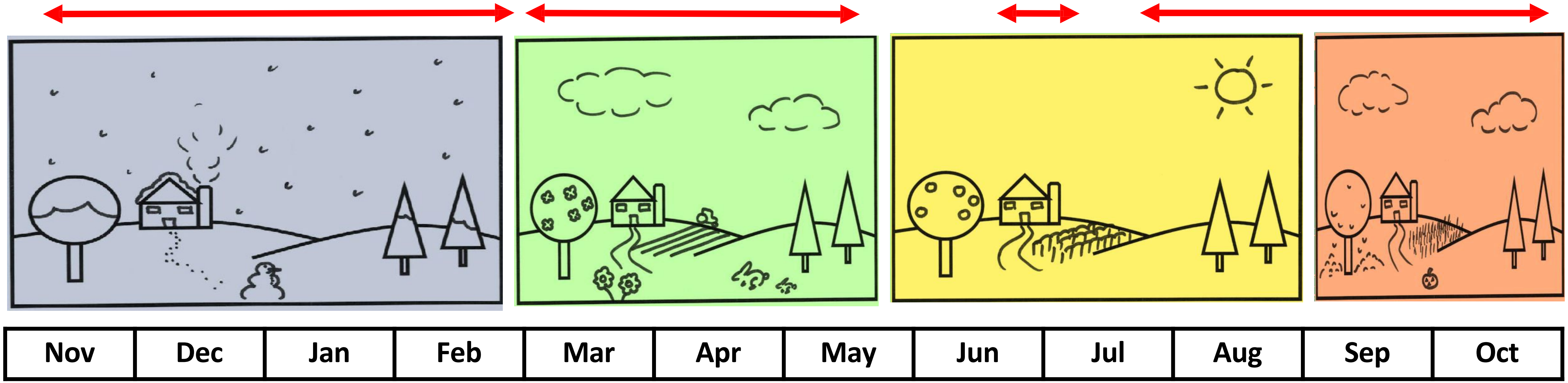
- **Exploring the effect of soil moisture in *Hypena opulenta* cold tolerance**

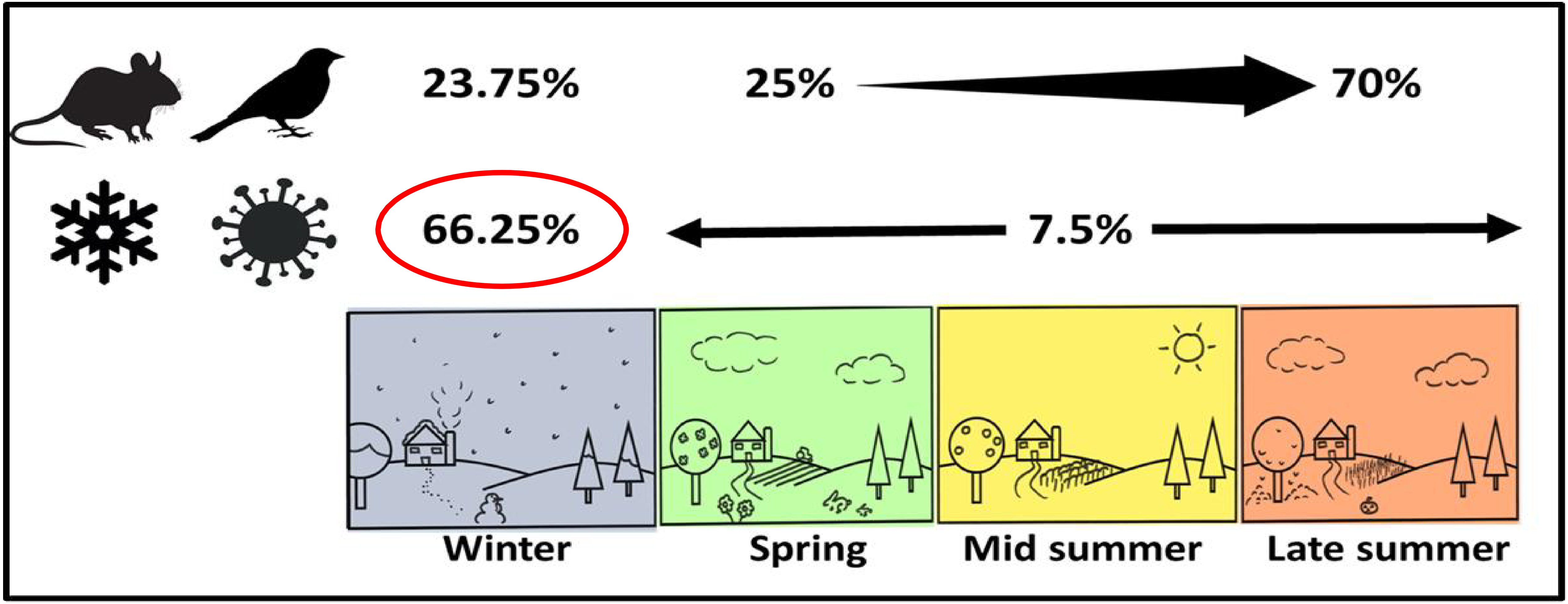

Control: No Predator Access
Treatment 1: Large predators
Treatment 2: small predators

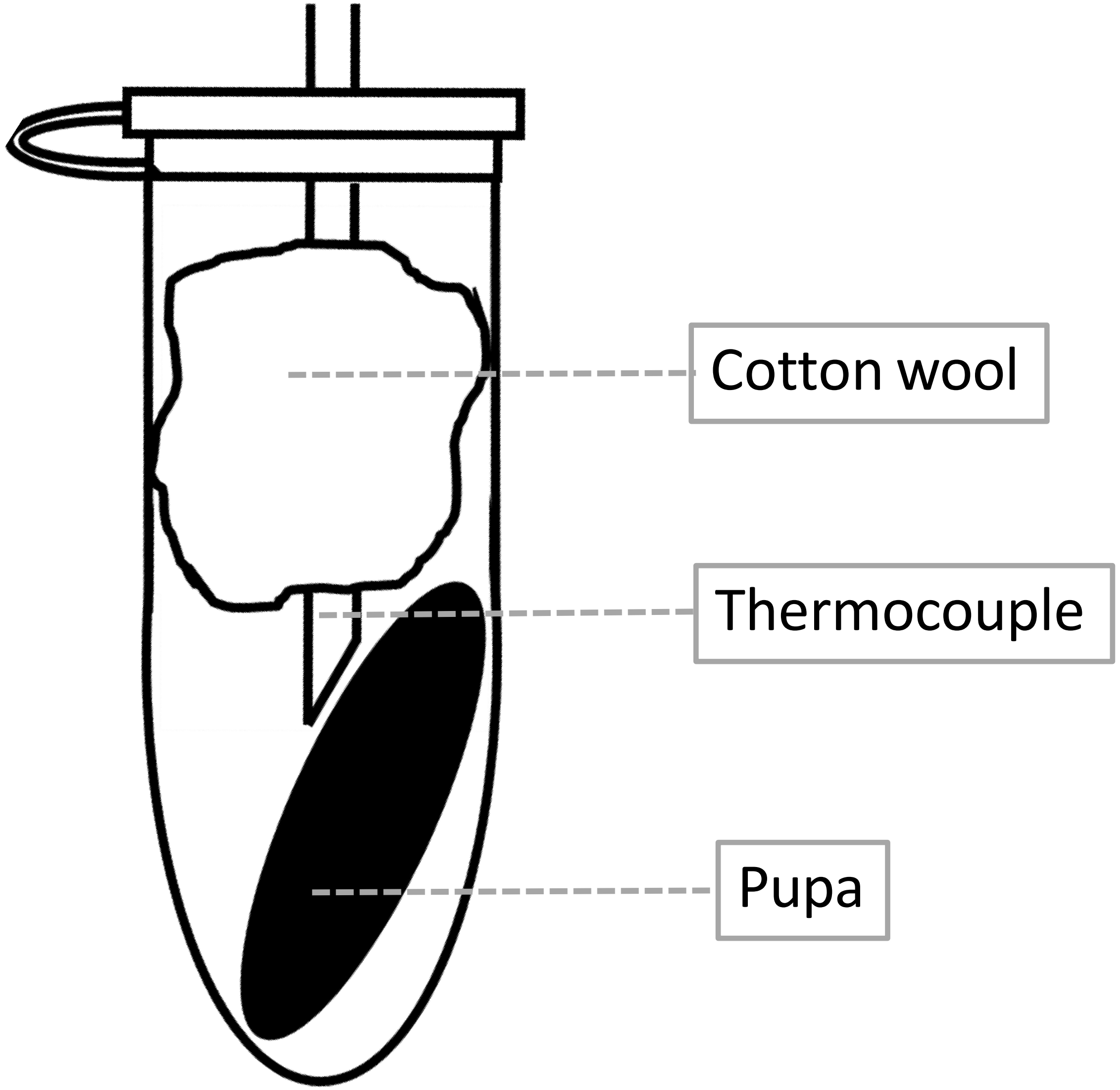


Treatment	Replicates	Pupae Per Replicate	Total Pupae
Control: No Predator Access	10	4	40
Treatment 1: Large Predators	10	4	40
Treatment 2: Small Predators	10	4	40
Total	**30**		**120**

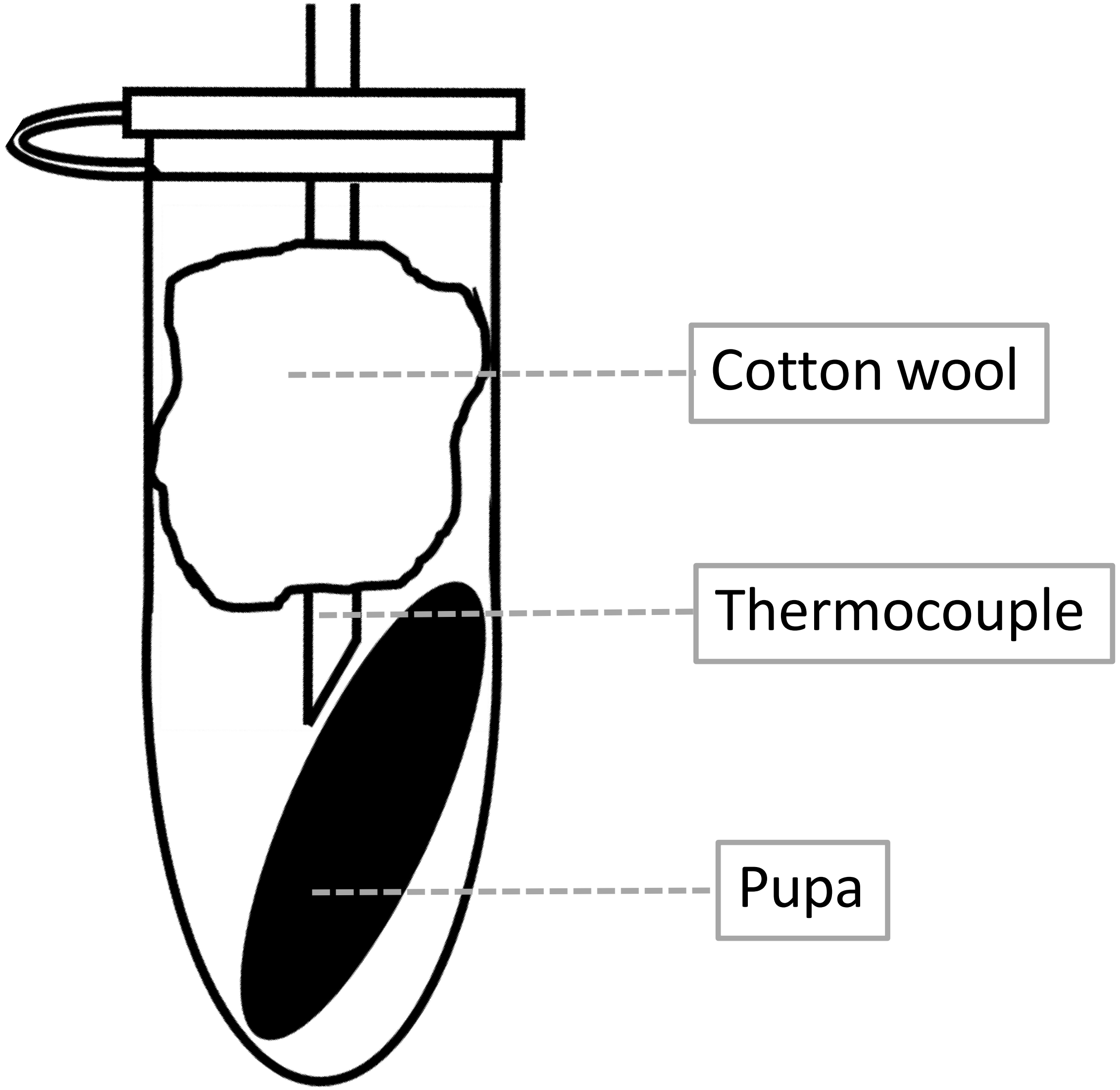
- The experiment was repeated 4 times, exposing pupae for relevant time periods at different times of year

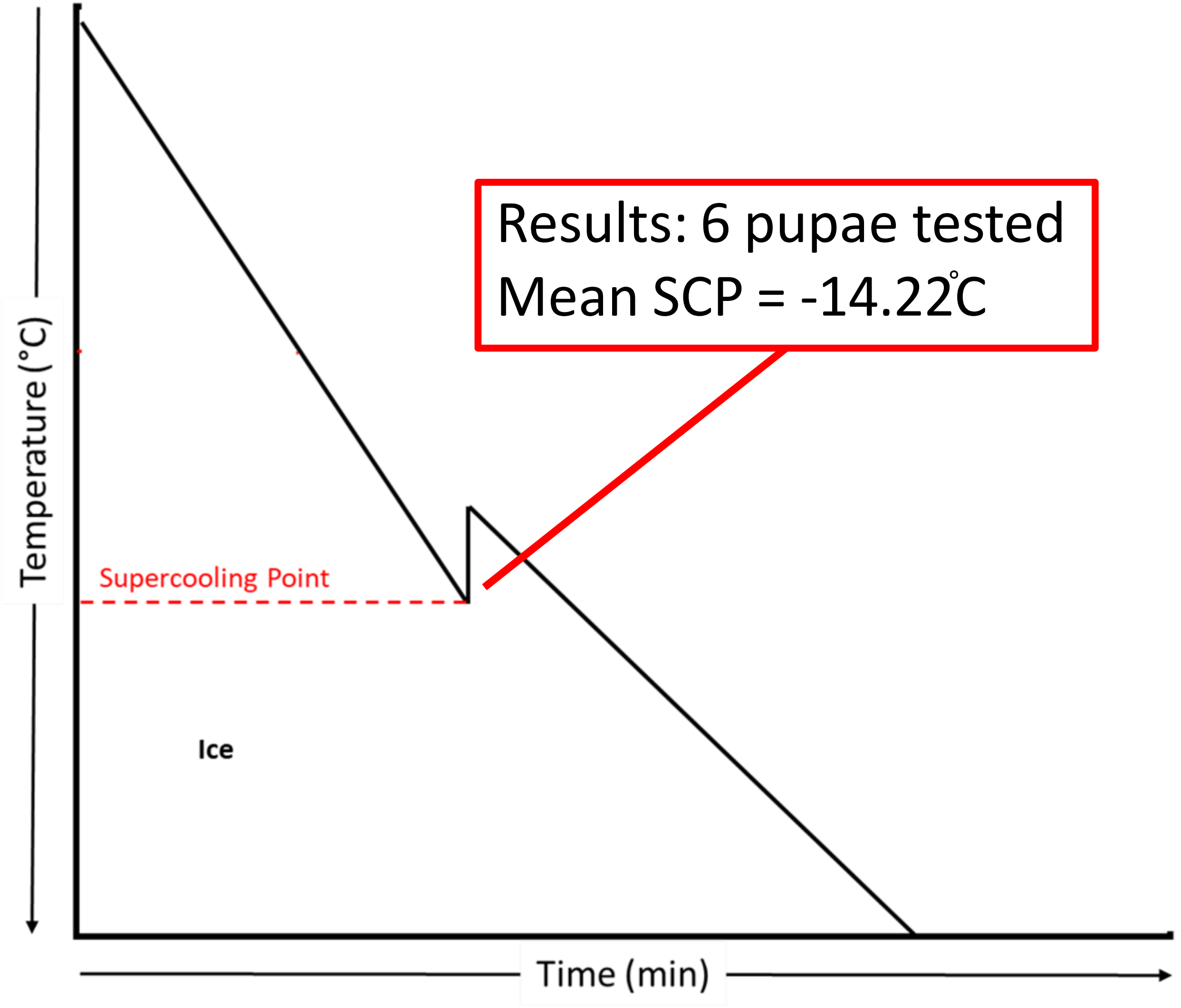



23.75%
25%
70%
66.25%
7.5%
Winter
Spring
Mid summer
Late summer



- Place setup in saltwater bath and reduce temperature
- Thermocouple detects the latent heat associated with ice crystallization.
- The lowest temperature that precedes this point (exotherm) is the supercooling point.


Cotton wool
Thermocouple
Pupa

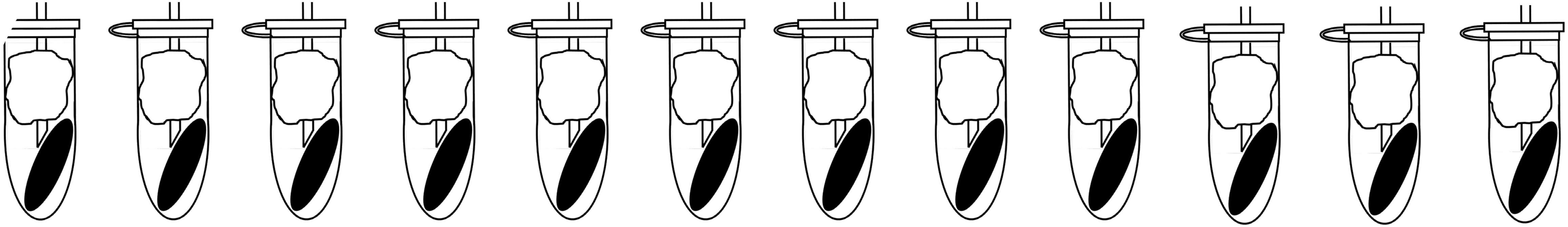

Temperature (°C)
Supercooling Point
Ice
Time (min)
Results: 6 pupae tested
Mean SCP = -14.22̊C

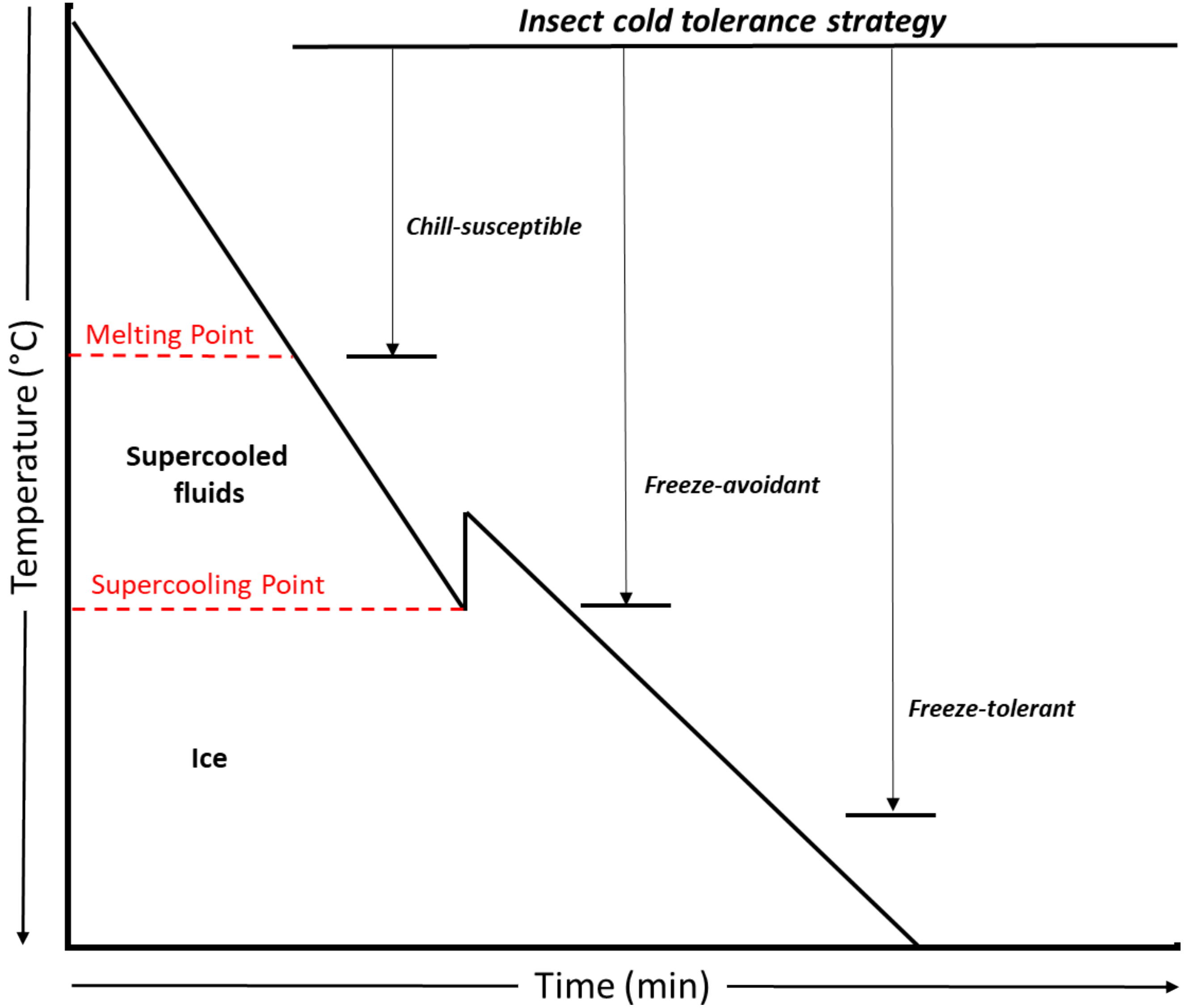
- **Chill-susceptible**
- **Freeze-avoidant**
- **Freeze tolerant**

- Cool groups of pupae to a temperature around the SCP until half of the individuals have frozen

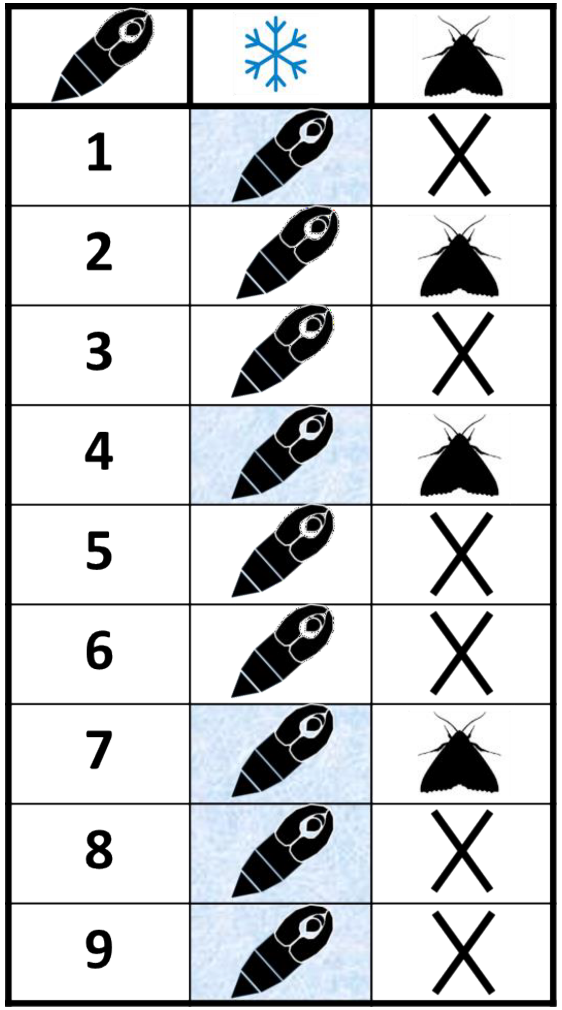
- Return the pupae to room temperature and assess their mortality

  - LT50>SCP = chill susceptible
  - LT50=SCP = freeze avoidant
  - LT50<SCP = freeze tolerant




Insect cold tolerance strategy
Chill-susceptible
Freeze-avoidant
Freeze-tolerant
Melting Point
Supercooled fluids
Supercooling Point
Ice
Temperature (°C)
Time (min)

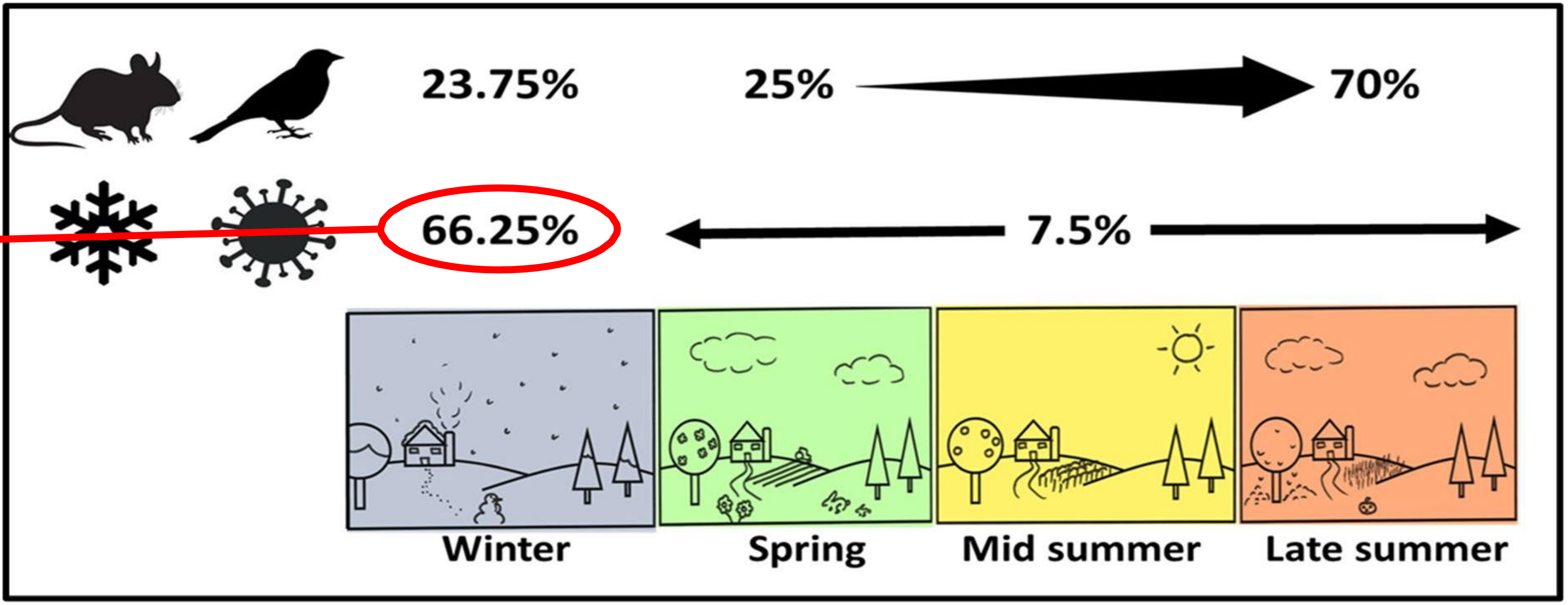
Results

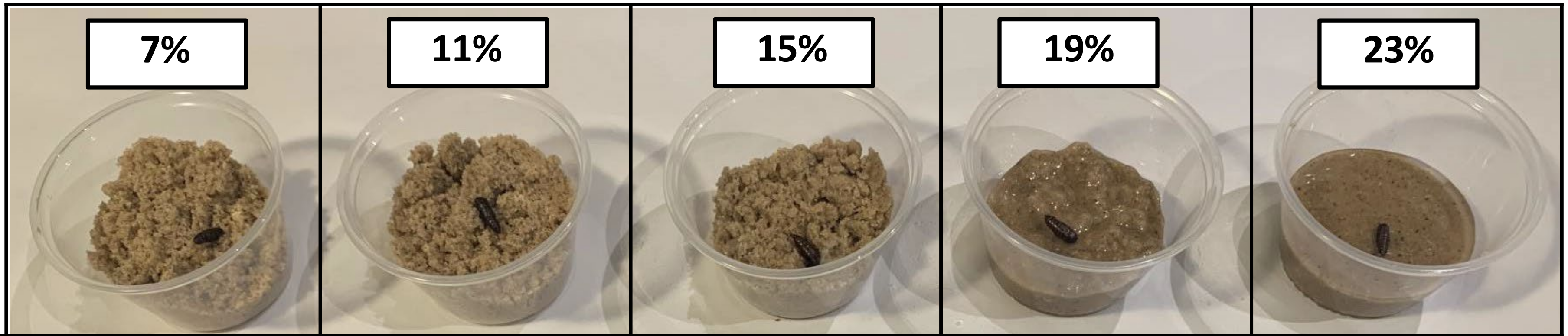

1
2
3
4
5
6
7
8
9

- **Supercooling point (SCP):** ≈-14.22℃

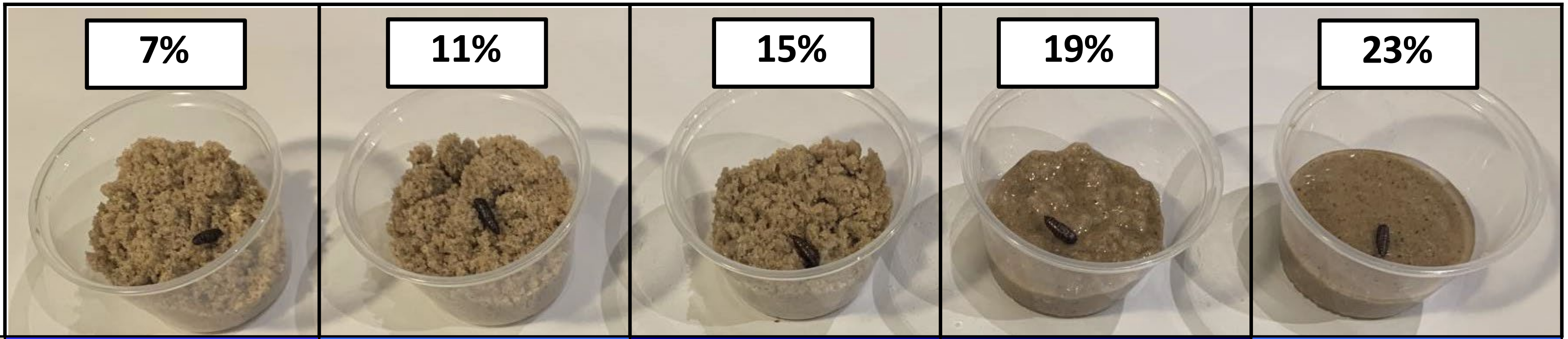
- **Cold tolerance strategy:** Freeze tolerant

Why is winter mortality so high?

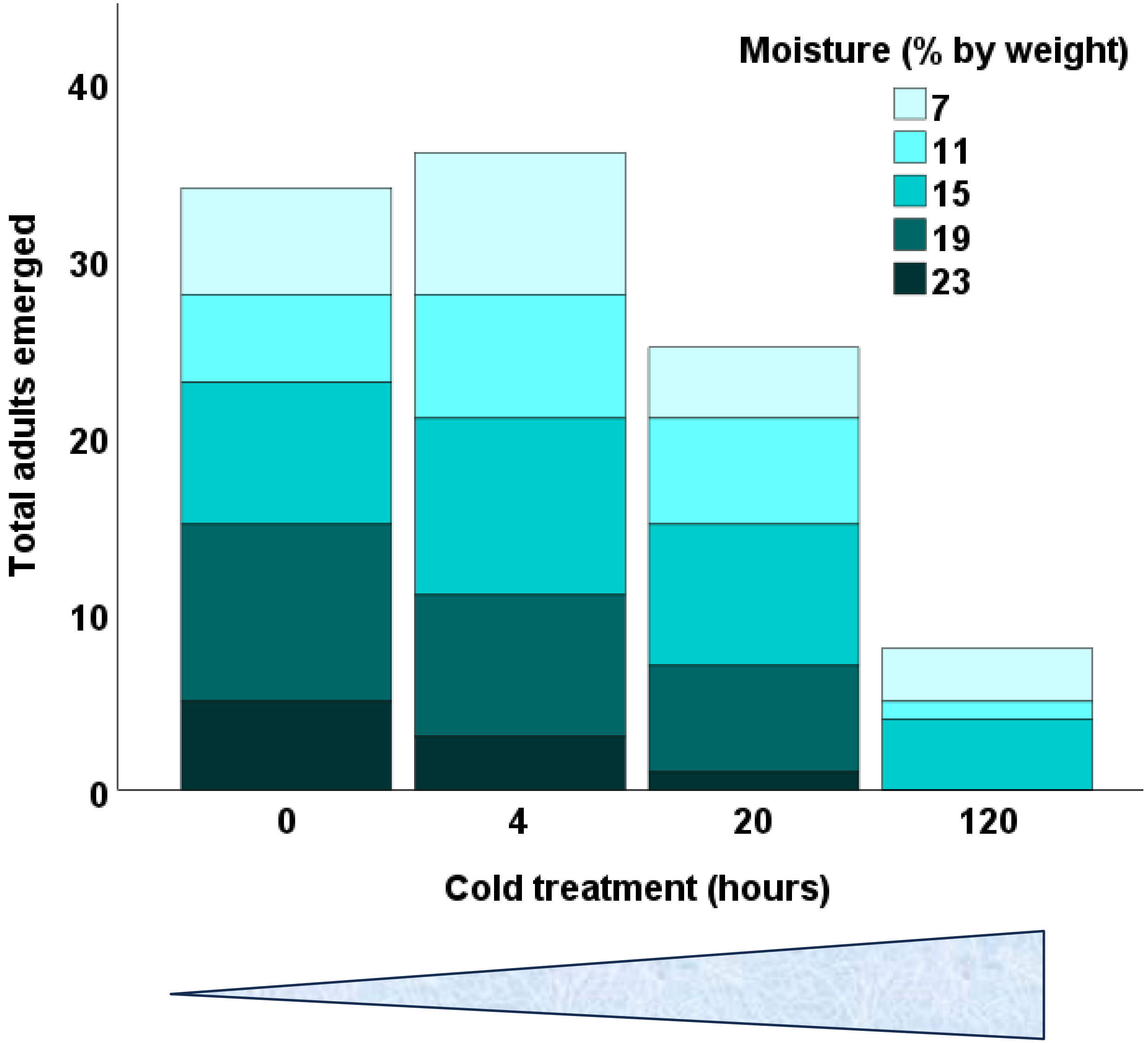




Cold treatment -10°C (hours)		7%	11%	15%	19%	23%
	0	16	16	16	16	16
	4	16	16	16	16	16
	20	16	16	16	16	16
	120	16	16	16	16	16



Cold treatment -10°C (hours)		7%	11%	15%	19%	23%
	0	6	5	8	10	5
	4	8	7	10	8	3
	20	4	6	8	6	1
	120	3	1	4	0	0


Moisture (% by weight)
7
11
15
19
23
Total adults emerged
0
10
20
30
40
0
4
20
120
Cold treatment (hours)

- **Winter mortality of *H. opulenta* pupae is high.**

- **The supercooling point (SCP) and cold tolerance strategy of *H. opulenta* suggests a high probability of surviving Ontario winters.**

- **Soil moisture levels appear to affect *H. opulenta* cold tolerance.**

Current Status and Future Directions for Swallow-wort Biocontrol in New York State

Dylan Parry (SUNY, College of Environmental Science and Forestry)

Andrea Davalos (SUNY Cortland)

Jaclyn Schnurr (Wells College)

Carrie Brown-Lima (Cornell University)

Cooperator: Lindsey Milbrath (USDA ARS)

Special thanks – Audrey Bowe (Cornell University)

ESF State University of New York College of Environmental Science and Forestry

Wells College

SUNY Cortland

nationalgrid

NEW YORK STATE OF OPPORTUNITY. Parks, Recreation and Historic Preservation

USDA United States Department of Agriculture Agricultural Research Service

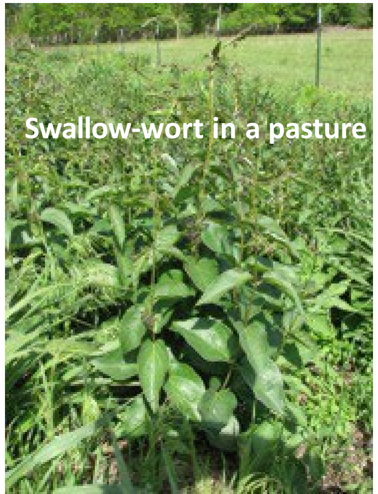
NEW YORK STATE OF OPPORTUNITY. Department of Transportation

Threats

- In New York, swallow-wort's cause both ecological and economic harm.
- Ecologically
  - Associated with declines in native plant diversity
  - Affect grassland bird and insect communities
  - Particularly threatening to rare plants in alvar ecosystems
  - In NYS, now prevalent in the habitats of the federally listed Hart's tongue fern and Chittenango ovate amber snail
- Economically
  - Rights-of-way management
  - Christmas tree farms
  - Organic pasture & no-till farms


American Hart's tongue fern


Chittenango Falls


Swallow-wort in a pasture


Dense swallow-wort along powerline right-of-way adjoining Clark Reservation SP, Onondaga County

Management Challenges

- Swallow-wort's present a significant management challenge
- Tolerant of mowing and some herbicides, difficult to remove manually
- Have multiple means of reproduction
  - Large numbers of windblown seeds,
  - Perennial root crowns produce multiple stems
  - Polyembryonic seeds, each producing 2-8 plants
- Once established, long-lived, persistent and highly competitive

Root crowns


Seed pods


Root mat


Seedlings

The Case for Biological Control

- Very little herbivory in North America!
  - Deer will not eat it
  - Only one native insect feeds on it regularly
- No closely related plants in North America,
  - Milkweeds and milkvines are distantly related (at the taxonomic tribe level).
- Wide distribution in natural and disturbed areas, often as the dominant species.
- High density populations negatively affecting threatened and endangered native species
- Biological control offers the only viable current solution that can be used at scale

Hypena opulenta (Lepidoptera:

Hypena opulenta: Moth, caterpillars feed on foliage. Defoliates swallow-wort in native range. Multiple generations annually

- Host-range testing: 82 native plants and crop species. No non-target feeding.
- Petition submitted to USDA-APHIS and Canadian authorities. Approved for release in Canada in 2013 and the US (2017)
- My permit granted in 2018 with rearing commencing in 2019

1st instar 'windowpane' feeding

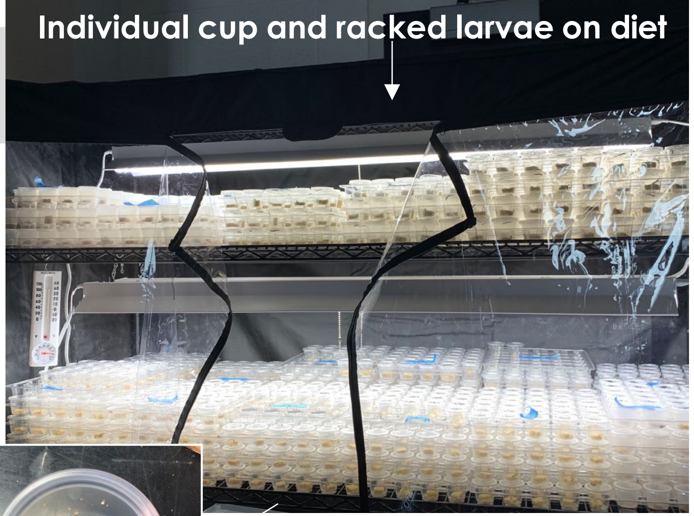
2nd instar shot-hole feeding

Complete defoliation

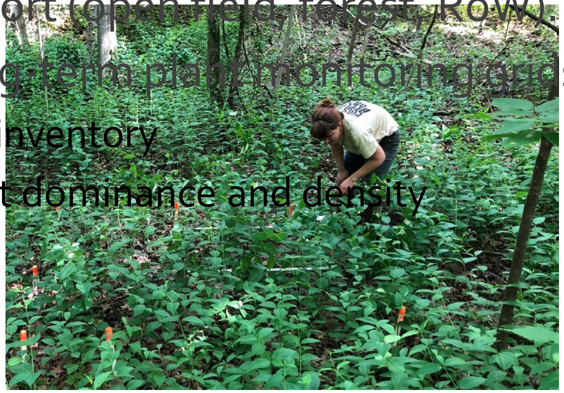
Mature larva

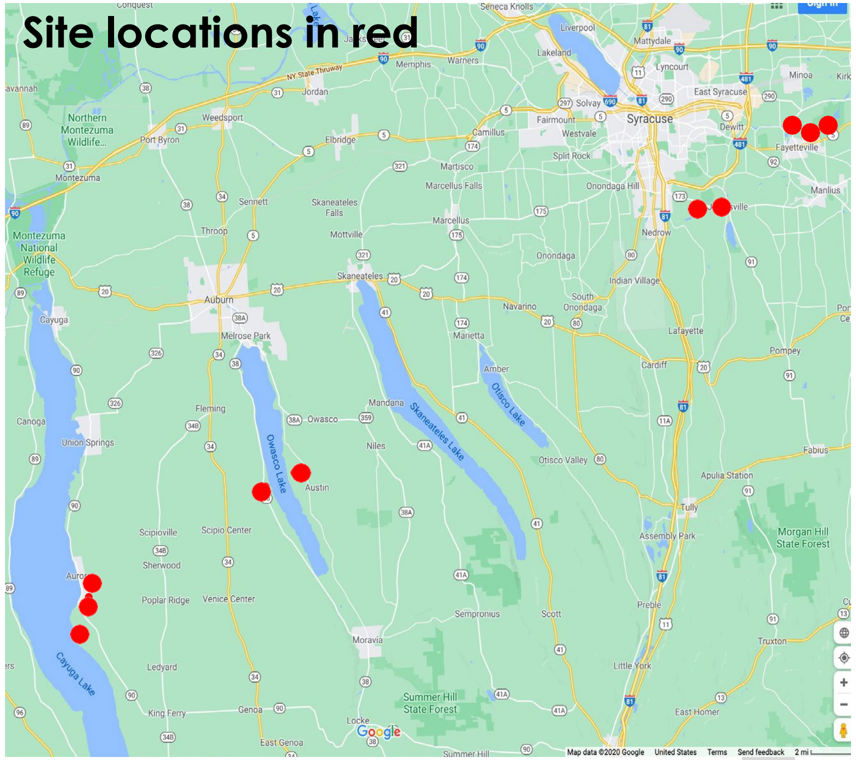
NYS Biological Control Program

- **2018** - Received first insects from Rhode Island
- **2019** – developed mass rearing using artificial diet
  - Oviposition/early instar on plants, switch 3rd instars to solitary rearing on artificial diet through pupation
  - Cut mortality to < 20% on ~ 5000 larvae



- Established 10 plots in Central NY and in 2022 & 2023 added six supplemental plots with partner organizations in other areas of NY.
  - Plots represent three habitat types, all with pale swallow-wort (open field, forest, RoW)
  - Established long-term plant monitoring grids
    - Native plant inventory
    - Swallow-wort dominance and density





2020/2021 Field Releases

Generation 1: Early June

- 2–3-day old male/female moths released into field cages.

Generation 2: Late July

- 3rd/4th instar caterpillars released uncaged at each site

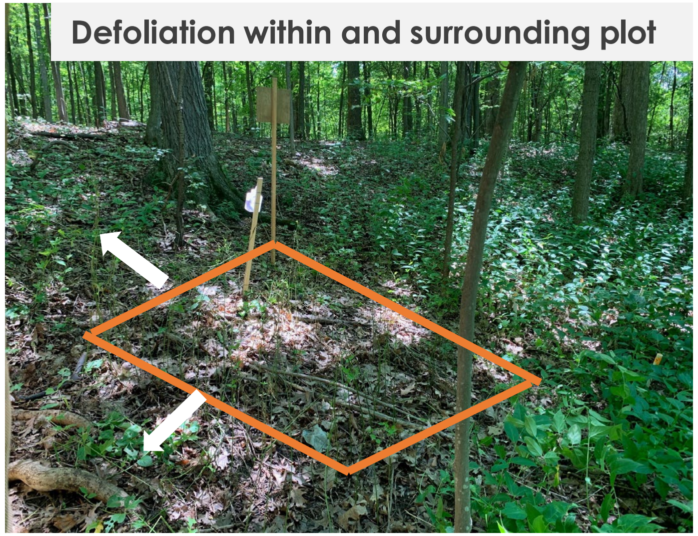
Site	Habitat	Gen 1 Release Adult (M/F)		Gen 2 Release (Larvae)	
		2020	2021	2020	2021
Clark Res.	Forest	30/30	30/30	125	400
Green Lk	Forest	30/30	30/30	150	400
Wells	Forest	30/30	30/30	200	400
FLLT	Forest	30/30	30/30	125	400
Wells	Field	30/30	30/30	125	400
Long Point	Field	30/30	30/30	125	400
Green Lk	Field	30/30	30/30	150	400
Nat. Grid	Field	30/30	30/30	100	400
NY Rt 257	RoW	30/30	30/30	200	400
Ny Rt 38	RoW	30/30	30/30	150	400

Outcomes

- Significant defoliation in the cages and outwards up to 3 meters as caterpillars moved from cages (cage edges lifted so larvae could disperse and/or move to new plants)
  - Adults observed in the field as well as some second-generation larval feeding later in the summer
  - Oviposition and significant feeding damage occurred in cages in all habitat types (field, forest, RoW).

Estimated Defoliation (%)

Site	Habitat	Generation 1 Defoliation		Generation 2 Defoliation	
		2020	2021	2020	2021
Clark Reservation SP	Forest	100	100	>10	>10
Green Lakes SP	Forest	90	80	>10	>10
Wells College	Forest	100	100	>10	>10
Long Point SP	Field	75	40	>10	>10
Finger Lakes Land Trust	Forest	50	50	>10	>10
National Grid RoW	Field	100	25	>10	>10
Wells College	Field	100	75	>10	>10
Green Lakes State Park	Field	75	25	>10	>10
NYS Route 257	RoW	50	>10	>10	>10
NYS Route 38	RoW	50	>10	>10	>10
NYS Route 257 (Supplementary)	RoW	N/A	N/A	Not estimated	>10
NYS Route 38 (Supplementary)	RoW	N/A	N/A	Not estimated	>10



Success!!!

- In 2021, we found *H. opulenta* feeding damage at four sites, 5-15 m from previous year cage locations
- We found **two caterpillars** at one site in 2021 prior to any releases that year.
- Demonstrates overwintering and reproduction in nature.
- **But does it indicate establishment ???**

- **Probably not** – we did not detect the distinctive feeding damage, larvae, or moths at any release site in 2022 or 2023 despite intensive searching at our ten research sites
- Our partners found no evidence of establishment at our six supplementary sites in 2023
- We estimate that we have released >75,000 individuals across 16 sites 2020-23.
- There is no evidence for establishment

Current Status of Other Agents

Chrysochus asclepiadeus: Beetle, adults feed on foliage, larvae on roots

- Host Range Testing Underway
- USDA-EBCL (France) & CABI (Switzerland) and SUNY-ESF conducting choice/no-choice testing.
- No survival on non-target plants in an experimental field setting

Euphranta connexa: Fly, larvae feed in seed pods and destroy developing seeds

- Preliminary host-range testing in progress at CABI in Switzerland.
- Difficult to rear, targets only one method of swallow-wort propagation
- Not ready for approval process

Abrostola asclepiadis: Moth, caterpillars feed on foliage. One generation annually

- Host range testing complete. No non-target feeding on 78 native and crop species.
- Not submitted for approval - yet
- One generation/year, may not be sufficient by itself

Chrysochus asclepiadeus

- Broadly distributed across Europe.
  - Adults feed modestly on swallow-wort leaves.
  - Females lay eggs at the soil-plant interface and hatched larvae burrow down and feed on the roots for 1-2 years.
- Roots are key to swallow-wort success – investing heavily in a large, long-lived root biomass. *Chrysochus* larvae consume all but the largest roots, stunting plant growth or even killing plants outright.
- Root damage, especially if coupled with defoliation from another agent, may be an important strategy.


Cluster of adult beetles on *V. hirundinaria* in France - 2023


Larvae of *Chrysochus asclepiadeus* and damage to the roots eight months after infestation, in May 2023.


Healthy swallow-wort roots

- In 2023, my lab obtained a USDA-APHIS permit to bring *C. asclepiadeus* from Europe to our containment facility
- In July, my PhD student David Harris visited CABI to learn rearing techniques from Ghislaine Cortet and Phil Weyl. He collected beetles with Rene Sforza (USDA European Biocontrol Lab in France) and shipped 300 adults back to my lab
- Despite getting held up in customs and spending 11 days in transit, survival was very high – these beetles are durable!
- We initiated a colony and inoculated potted swallow-wort and select non-target plants with eggs

- CABI generated an extensive host-range testing list comprised of 90 non-target species.
  - In collaboration, we are testing plants they had difficulty obtaining or growing in Europe including 17 milkweed species.
  - Thus far, extensive feeding and good survival on two target swallow worts (*V. rossicum*, and *V, nigrum*) and no survival/feeding on other species after >175 days of no-choice testing.
- Both CABI and the USDA-EBCL have been conducting field tests of companion plantings of two North American milkweeds interspersed with two swallow-wort species
- David will present summary results from both CABI's and our data set at the Eastern Branch Entomological Society meeting in Morgantown later this spring.

V. Rossicum (target)

V. Hirundinaria (host)

Take Home

- *H. opulenta* - difficult to establish and challenging to rear in quantities required for wide distribution.
- Even if establishment in the US occurs Canadian data suggest that it will not control swallow-worts alone.
- The beetle, *C. asclepiadeus,* shows promise and could act synergistically with a defoliating species such as *Abrostola* and / or *Hypena*.

Acknowledgements

- Thanks to the many people that have assisted with this project – especially Julia Rushton and Emily Booth – who managed the lab rearing in 2020-2022 (and supervised an army of undergraduate techs).
- A special thanks to Lisa Tewksbury (URI). Thanks to Rene Sforza (USDA-ARS European Biocontrol Lab – France) and Ghislaine Cortet/Phil Weyl at CABI (Switzerland) for hosting my grad student and facilitating collection and shipment of beetles.
- NYS DOT Funding (Project C-18-01) (Christine Colley and Peter Dunleavy Project Managers)

2023 *Hypena opulenta* Release Season Summary

SLELO PRISM

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COLLEGE OF THE ENVIRONMENT AND LIFE SCIENCES

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

New York State Parks, Recreation and Historic Preservation

New York Invasive Species Research Institute

The Nature Conservancy

History of *Hypena opulenta* Releases in SLELO PRISM

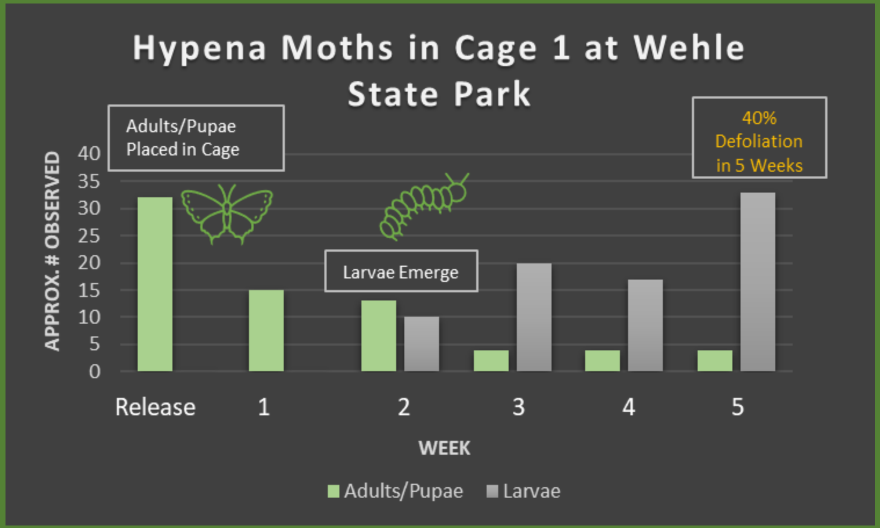
- Wehle State Park
  - 2018-2023
  - 2 Cages
  - Larvae released from cages in 2018, 2020, 2022, 2023

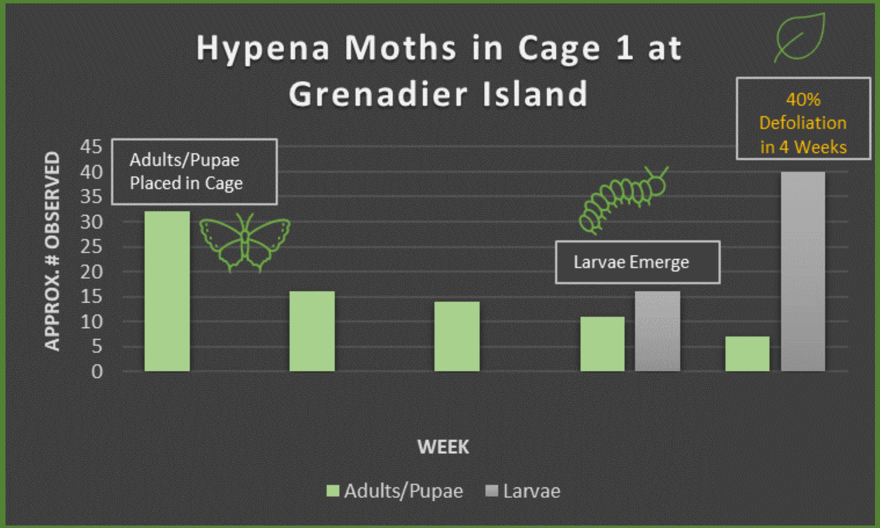
- Grenadier Island
  - 2020 – 1 Cage
  - 2021-2023 – 2 Cages
  - Larvae released from cages in 2021, 2022, 2023

- Carleton Island
  - 2020 – 1 Cage
  - Larvae failed to emerge

History of *Hypena opulenta* Releases in SLELO PRISM

- 20-40 Moths (Adult or Pupae) are placed in each cage
- Larvae Released from Cages from July-August
    - > 50% Leaf Defoliation
    - Pupating
- Moths maintained in cages for 2 generations in 2021-2022
- 2023 Initial Release of Pupae on June 6 failed
- Additional Release occurred on July 24
- 2023 Cage Defoliation
  Wehle
  Cage 1: 40%
  Cage 2: 5%
- Grenadier Island
  Cage 1: 40%
  Cage 2: 10%





Overwintering Surveys

- Basic Survey (2021-2023):
    - 5 x 5 m Area around Hypena Release Site
    - Look for evidence of Hypena presence
        - Defoliation
        - Larvae/Adults/Pupae/Frass/Window-paning
        - Record Findings
- Expanded Survey (2023)
    - Trail Survey at Wehle State Park
        - Partnership between OPRHP and SLELO PRISM
        - Conduct Trail Surveys from June to August
        - Three Teams conduct surveys
        - 10 feet from trail on both sides
    - Hypena Identification Video provided to Wehle State Park Staff

2023 Expanded Survey Efforts

- Expanded Surveys (2023)
  - Community Science Project on Grenadier Island
    - Partnership between Residents and SLELO PRISM
    - Conduct Informal Road/Trail/Property Surveys
    - Observe for Evidence of Hypena opulenta Presence

Expanded Survey Expectations

Expanded Survey Effort

- Increase Search Time
- Increase Area Searched
- More Time + More Area = Increased chance of finding Hypena
- No Evidence of Hypena found in 2023!

Continuing Education Credits

For the Poll: Include your name, email, CEUs applying for and corresponding credentials.

SAF Category 1

- 1 Hour

Master Naturalist: 1 Hour

(Self report @ NY Master Naturalist Program Website)

ISA- ISA:

- BCMA Science:0.5
- Certified Arborist: 1.25
- Practice:0.75

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Linking People, Information & Action Through Enhanced Communication

OPEN DISCUSSION SESSION

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