



Winter Moth

Detection and Management

Heather Faubert
University of Rhode Island
Plant Sciences Department



Winter moth

- Damage & History
- Biology
- Monitoring
- Control
- Biocontrol

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Winter moth adults

Called winter moths because moths out in 'winter'



male

Photo Bob Childs, UMass



female

Other 'Winter' fliers

- Fall cankerworm
- Bruce spanworm – look just like winter moth
 - Emerge ~ 2 weeks earlier
 - Lots of BS moths in western MA 2015



Photo Dan Gilrein







Typical winter moth damage on Oaks

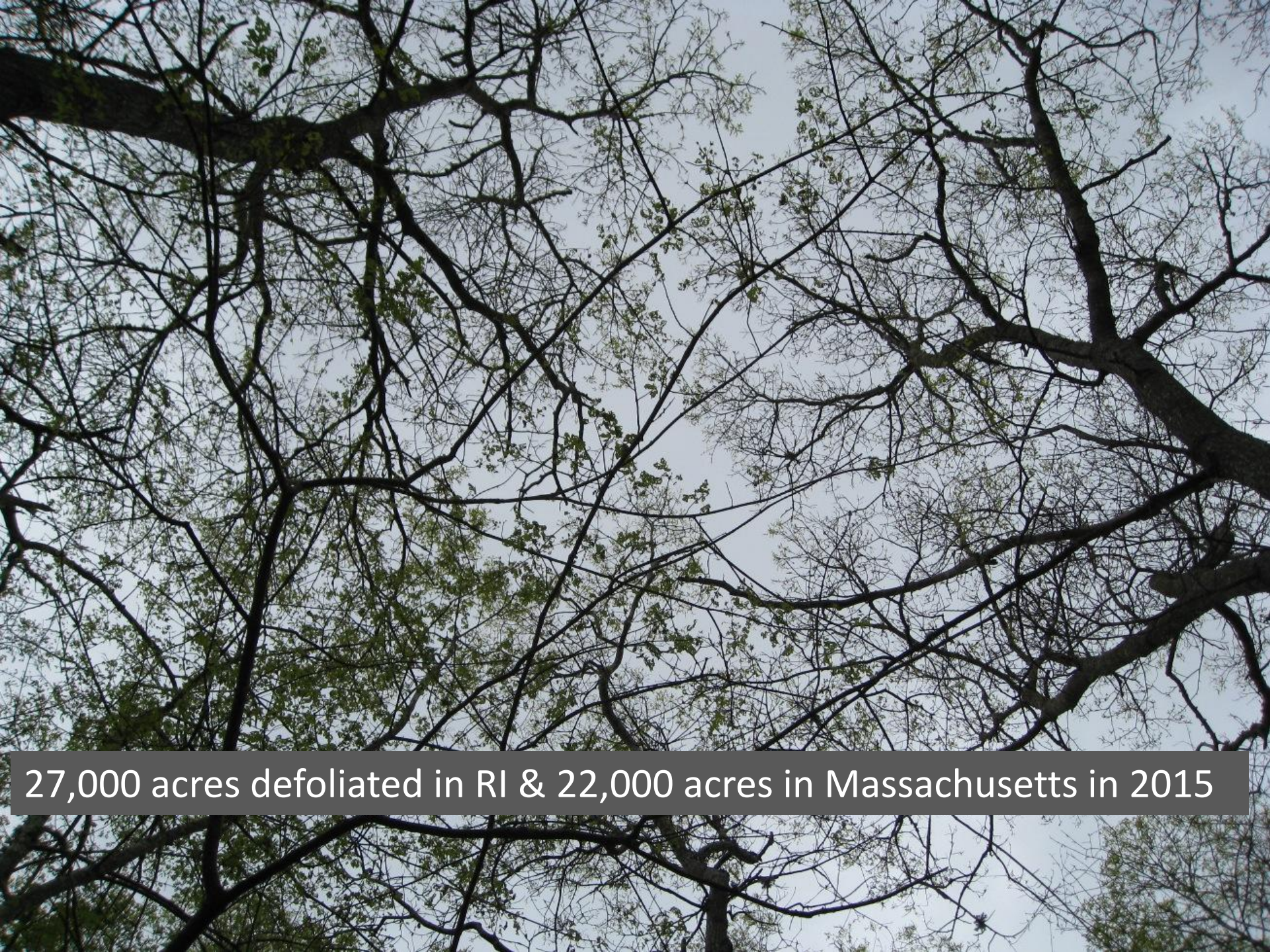












27,000 acres defoliated in RI & 22,000 acres in Massachusetts in 2015

Invasion History

Invasive insect from Europe



High density pest

- Almost continuous outbreaking
- Defoliation on deciduous trees
- Pest on apple and blueberry



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Winter Moth

Operophtera brumata



Hosts: maple, oak, crabapple, apple, cherry, basswood, ash, white elm, linden, viburnum, blueberry, birch, beech, spruce, rhododendron





Eggs overwinter,
larvae hatch early
spring



Winter -> Spring

Winter Moth Life Cycle

Adults emerge
Nov-Dec, mate,
lay eggs and die.

Winter <- Fall

Spring -> Summer

Larvae feed
early spring
and pupate
in late May

Fall <- Summer

Pupae in soil
all summer
and early fall



UGA1220055



- Moths emerge
Thanksgiving - Christmas
- Females climb up &
deposit eggs singly on
bark





Egg hatch ~ April 10

3/21/2012

4/21/2007

2016

March 24 in
Warwick



Seems like dead winter when hatch







Tiny caterpillars wriggle
into buds



All eggs hatch in ~ 8 days

- Caterpillars don't feed while entering buds





10 days after eggs start hatching















Late May mature larvae drop to ground to pupate





Form pupae inside pupal cell







ENTOMOLOGY



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Early November – set up tree bands





Shelter Tree
North Attleboro, MA









Remove
bands in March



Eggs congregated below band

How to see the eggs...







Eggs turn blue ~2 days before hatching

Monitoring network

Email list for winter moth egg hatch

hhf@uri.edu

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Spray apples, pears, blueberries when eggs start hatching

- Stop caterpillars from entering buds
- Imidan, Sevin, Malathion, Delegate fine
- Entrust (OMRI spinosad) fair
- Bt needs to be ingested, so not effective against newly hatched caterpillars
- If heavy rain before all eggs hatch, spray again, otherwise wait till buds open and see if need to spray again.

Adding dormant oil *may* help



Additional fruit sprays

- Don't spray again until buds are open and caterpillars climbing around
- Caterpillars safe inside these buds....
- Same list of insecticides plus Bt





Spray landscape trees when buds open



- Bt products good choice
 - DiPel, Thuricide, Biobit
 - Best against young larvae
 - Lasts 3-5 days
- Conserve (spinosad)



Additional sprays depend on:

- High population?
- Woods nearby?
- Insecticide used



Using tree wraps for control

- Perhaps work on isolated tree – not close to other trees
- Need multiply bands per tree
- Homemade band – insulation, duct tape, petroleum jelly
- Need to spray oil on trunk in spring to suffocate eggs



Kingston, RI

Set up bands in early November.

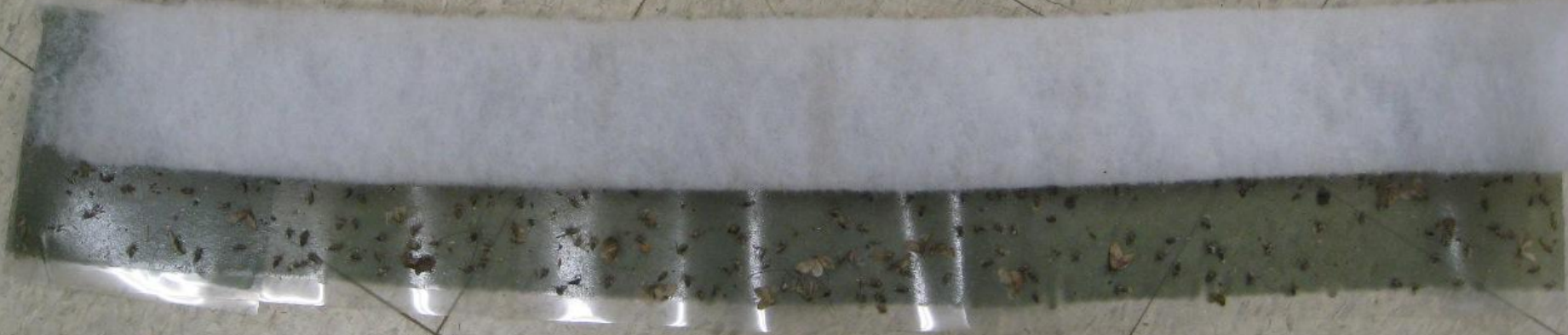
Doubt it worked well.



Upper band: 138 female winter moths



Lower band: 207 female winter moths



Homemade tree wraps



See only 2 females



If wrap tree in Fall be sure
to spray trunk with oil in
Spring before eggs hatch



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Winter moth Biological Control

- Parasitoid - *Cyzenis albicans*







Eggs are laid on surface of injured leaves



Photo: Thijs de Graaf

Caterpillars accidentally eat eggs



Winter moth biocontrol

- Nonparasitized larva – moth emerges in winter



- Parasitized larva – fly emerges following spring



Establishment:

- 17 of 49 sites established
- All 2005 – 2011 sites est.
- Highest % in Wellesley site

Cyzenis albicans Release and Recovery Locations 2005-2015



2005-2011 Releases
All Currently Established



2011 Release



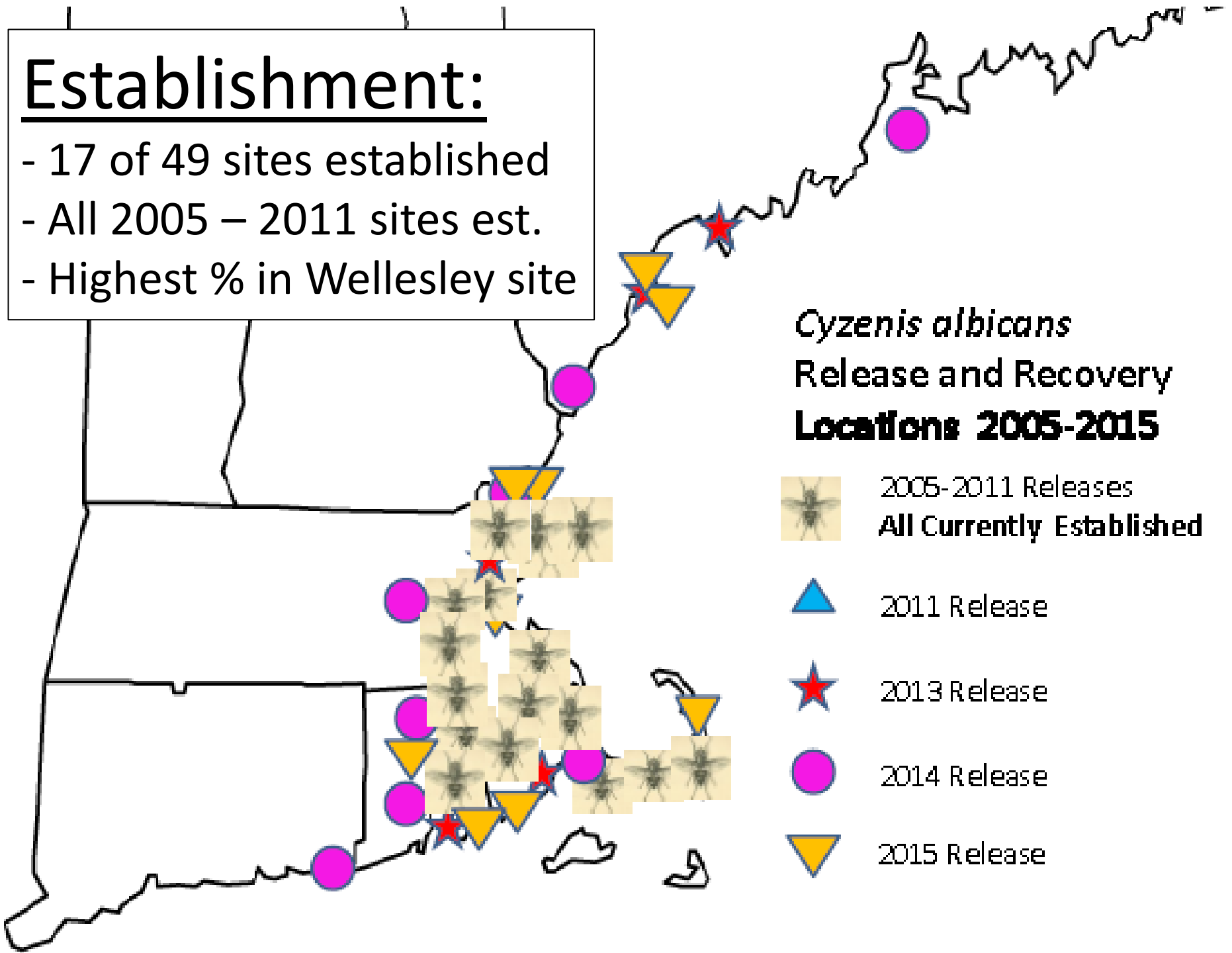
2013 Release



2014 Release



2015 Release



Parasitic fly release sites

- 2011 – Warwick, Goddard Park
- 2013 – Jamestown & Bristol
- 2014 – South Kingstown & Cumberland
- 2015 – Little Compton & Lincoln



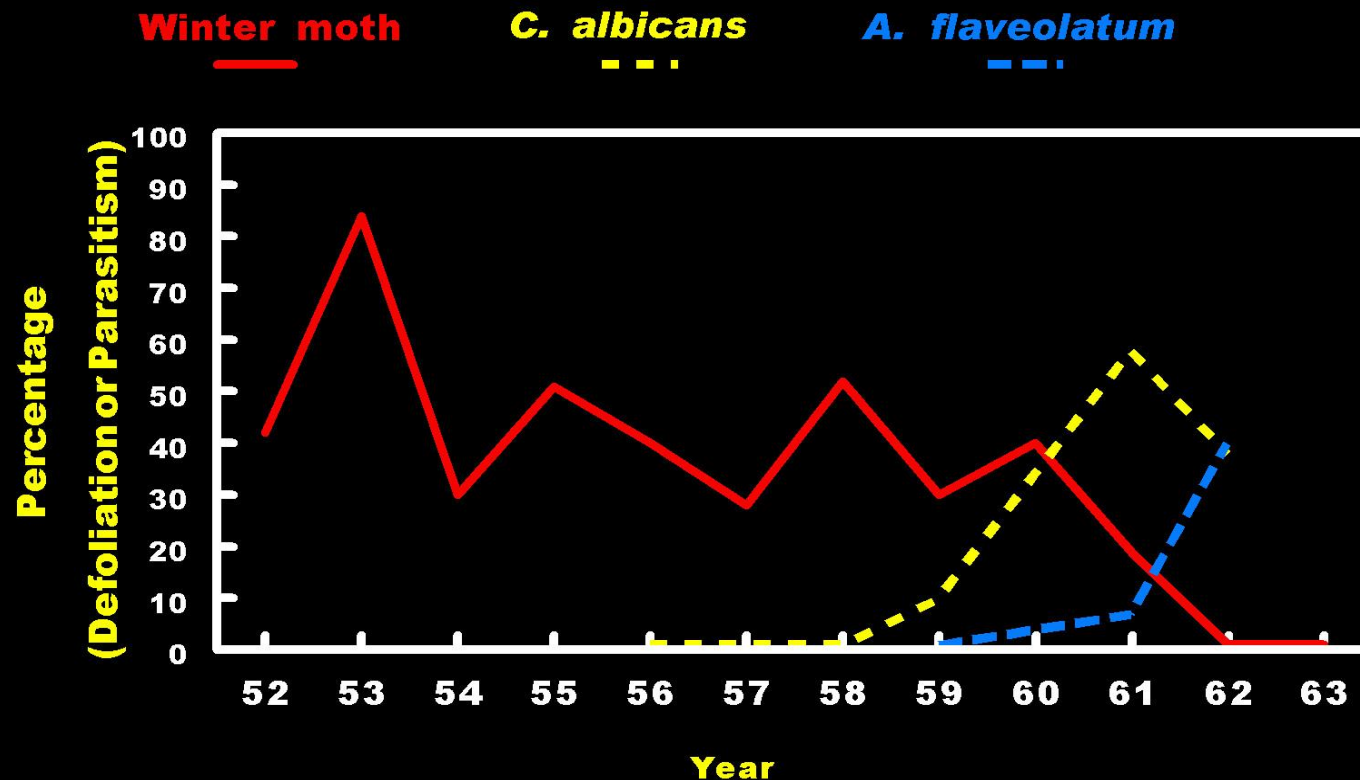
Late May
collect larvae to
check for parasitism



Late May

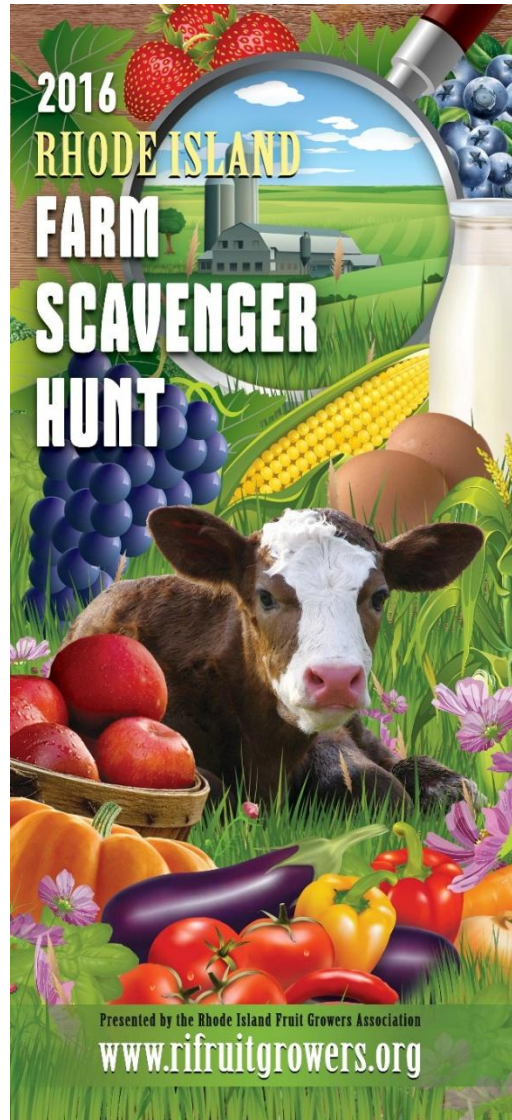
Nova Scotia - 5 years to recover flies

- then 2 years to get high levels of parasitism
- In MA, took 5 years to recover flies...



Before I forget...

Runs May 1 – December 31





FARM LISTINGS

- 1 Appleland Orchard**
 135 Smith Avenue, Greenville
 401.949.3690 applelandorchardri.com
 Open: Daily 8am - 6pm
 Late August - December
 Map location: C6 
- 2 Barden Family Orchard**
 56 Elmdale Rd, North Scituate
 401.934.1413 bardenfamilyorchard.com
 Open: Mon - Fri, 9am - 6pm, Sat & Sun
 9am - 5pm, Aug 1 - Halloween, Nov TBA
 Map location: B6 
- 3 Clark Farms Garden Center**
 2984 Comd. Oliver Hazard Perry
 Highway, Route 1, Wakefield
 401.783.1331 clarkfarms.com
 Open Daily: 9am - 5pm, April - Halloween
 Map location: D2 
- 4 Confreda Greenhouse & Farms**
 2150 Scituate Avenue,
 Route 12, Cranston
 401.823.1150 confredafarms.com
 Open Daily: Check website for hours
 Map location: D4 
- 5 Dame Farm and Orchards**
 918 Brown Avenue, Johnston
 401.949.3657 damefarmandorchards.com
 Open: July 8 - Oct 31 9am - 5pm
 closed Sundays in July/August
 Map location: D6 
- 6 Earth Care Farm**
 89A Country Drive, Charlestown
 401.364.9930 earthcarefarm.com
 Open Year-Round: Mon - Fri 8am -
 4pm, Saturdays 8am - noon
 Map location: D2 
- 7 Fantastic Umbrella Factory**
 4820 Old Post Road, Charlestown
 401.364.1060 fantasticumbrellafactory.com
 Open: Year-Round Daily 10am - 5pm
 July & August 10am - 6pm
 Map location: C1 
- 8 The Farmer's Daughter**
 716 Mooresfield Rd, S. Kingstown
 401.792.1340 thefarmersdaughterri.com
 Open: Daily 9am - 6pm, Mar - Dec
 Map location: D2 
- 9 Festival Farm**
 2 Canonchet Road, Hope Valley
 401.742.5575 festivalfarmri.com
 Open: Wknds, 9am - 6pm
 Self-serve Mon - Fri, 9am - 5pm
 Map location: A2 
- 10 Goodwin Brothers Farm**
 458 Greenville Rd, N. Smithfield
 401.651.8788 goodwinsfarm.com
 Open: Daily, June - Oct, 9am - 6pm
 Map location: D8 
- 11 Greenvale Vineyards**
 582 Wapping Rd, Portsmouth
 401.847.3777 greenvale.com
 Open: Mon - Sat, 10am - 5pm
 Sun, noon - 5pm, Year-Round
 Map location: H2 
- 12 Hill Orchards**
 25 Sanderson Rd, Rt.5, Smithfield
 401.949.2940 hillorchards.com
 Open: Tues - Sun, 10am - 5pm
 Labor Day - December 24
 Map location: D6 
- 13 Indian Rock Farm**
 99 Burnt Hill Road, Scituate
 401.265.3868 indianrockfarmri.com
 Open: Tues - Sun, 10am - 5pm
 Labor Day - December 24
 Map location: C4 
- 14 Jaswell's Farm**
 50 Swan Rd, Smithfield
 401.231.9043 jaswellsfarm.com
 Open Daily: 8am - 5pm, June 1 - Oct 31,
 8am - 4pm, Nov. 1 - Dec. 24
 Map location: C7 
- 15 Knight Farm**
 1 Snake Hill Road, N. Scituate
 401.349.4408 knightfarm.com
 Open Daily: 7am - 1:30pm
 Summer, 7am - 9pm
 Map location: C6 
- 16 Langworthy Farm Winery**
 308 Shore Rd (Rt. 1A), Westerly
 401.322.7791 langworthyfarm.com
 Open: noon - 5pm daily, July 4 - Labor
 Day: Wed - Sun in June and Oct - Dec
 Map location: A1 
- 17 Magnolia Ridge Farm**
 312 Tomaquag Road, Ashaway
 401.315.5753 magnoliaridgefarm.net
 Open: May - Oct 31, Tues - Sun 10am - 6pm
 Nov & April, Tues - Sun 10am - 4pm
 Map location: A2 
- 18 Morris Farm**
 2779 Warwick Avenue, Warwick
 401.738.1036 Open: April - June,
 9am - 5pm, July - Oct, 9am - 6pm
 farmfresh.org/food/farm.php?farm=15
 Map location: F4 
- 19 Newport Vineyards & Winery**
 909 E. Main Rd (Rt 138), Middletown
 401.848.5161 newportvineyards.com
 Open: Mon - Sat 10am - 5pm, Sun noon -
 5pm. Seasonal winter hours see website
 Map location: H1 
- 20 Nickle Creek Vineyard**
 12 King Road, Foster
 401.369.3694 nicklecreekvineyards.com
 Open: Friday noon - 5pm, Weekends
 11am - 5pm, May - December
 Map location: B4 
- 21 Phantom Farms**
 2920 Diamond Hill Rd, Cumberland
 401.333.2240 phantomfarms.com
 Open: Year Round, Mon - Fri, 6am - 6pm
 Weekends 7am - 6pm
 Map location: G8 
- 22 Roots & Shoots**
 2677 Broncos Hwy, Harrisville
 401.766.7333 rootsandshootsri.com
 Open: Mon - Fri 8am - 5pm, Sat 8am - 3pm,
 Sun 9am - 1pm. Closed Sun - July, Aug, Nov
 Map location: C8
- 23 Sakonnet Farm**
 4042 Main Road, Tiverton
 401.624.4004 sakonnetfarm.com
 Open: Self-serve, 9am - 5pm
 Map location: I2 
- 24 Scharfner Farms**
 Rt. 2 and One Arnold Place, Exeter
 401.294.2044 scharfnerfarms.com
 Open Daily: 8am - 6:30pm
 Year-Round
 Map location: D3 
- 25 Scituate Nursery**
 767 Hartford Pike, N. Scituate
 401.934.0581 scituenursery.com
 Open Daily: April - December
 Map location: B5
- 26 Steere Orchard**
 150 Austin Ave, Greenville
 401.949.1456 steereorchard.com
 Open: 9am - 5pm wknds in August
 and Daily, September - January
 Map location: C7 
- 27 Sweet Berry Farm**
 915 Mitchell's Lane, Middletown
 401.847.3912 sweetberryfarmri.com
 Open Daily: 8am - 7pm
 mid April - December 31
 Map location: H1 
- 28 Walker's Roadside Stand**
 261 West Main Rd, Little Compton
 401.635.4719 facebook.com/walkersstand
 Open Daily: 8am - 6pm
 June 21 - October 31
 Map location: I2 
- 29 West Beach Farm**
 16 West Beach Road, Charlestown
 385.628.7143 facebook.com/westbeachfarm
 10am - 6pm: Wknds May & June, Daily June 20 -
 Labor Day, Tues - Sun Labor Day - Oct.
 Map location: C1 
- 30 Windmist Farm**
 71 Weeden Lane, Jamestown
 401.423.9767 windmistfarm.com
 Open: Fri 1 - 6pm, Sat 10am - 4pm, Sun 11am -
 4pm, July & Aug also Tues - Thurs 1 - 6pm
 Map location: F1 
- 31 Wrights Dairy Farm & Bakery**
 200 Woonsocket Hill Rd, N. Smithfield
 401.767.3014 wrightsdairyfarm.com
 Open: Mon - Sat, 8am - 7pm
 Sunday 8am - 4pm, Year-Round
 Map location: D8 
- 32 Young Family Farm**
 260 West Main Road, Little Compton
 401.635.0110 youngfamilyfarm.com
 Open: May 21 - Oct 31 Thurs - Sun,
 9am-6pm, 7 days July/Aug 9am-7pm
 Map location: I2 

hhf@uri.edu