Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

THE JENTSCH LAB

INSECT BIOLOGY, ECOLOGY, AND MANAGEMENT IN HUDSON VALLEY AGRICULTURAL COMMODITIES

Plant Protection Presentations

Recent presentations:

Management Strategies for the Pear Psylla, Cacopsylla pyricola (foerster) in Northeast Pear Orchards; To the CONNECTICUT POMOLOGICAL SOCIETY Annual Meeting, Tuesday, December 1, 2015.

Update on the Incidence and Management of Invasive Species in the Hudson Valley. Winter Fruit School, Day 1: Tuesday Feb 10th AM Session. Best Western Plus, Kingston, NY

Managing the Brown Marmorated Stink Bug, Halyomorpha halys (Stål) in New York State and Managing the Spotted Wing Drosophila in New York State
Given to the 589th Meeting of the New England Vegetable and Berry Growers' Association And New England Cooperative Extension Saturday, January 31, 2015 Hudson Lodge of Elks, Hudson, MA

Search

ARCHIVES

- November 2015
- October 2015
- September 2015
- August 2015
- July 2015
- June 2015
- May 2015
- April 2015
- March 2015
- February 2015
- January 2015
- December 2014
- November 2014
- October 2014
- September 2014
- August 2014
- July 2014
- June 2014
- May 2014

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

Hudson Valley Research Laboratory

Management Strategies for the Pear Psylla, *Cacopsylla pyricola* (foerster) in Northeast Pear Orchards.

THE CONNECTICUT POMOLOGICAL SOCIETY
Annual Meeting
Tuesday, December 1, 2015

Cornell University
College of Agriculture and Life Sciences

Peter Jentsch
Senior Extension Associate – Entomology

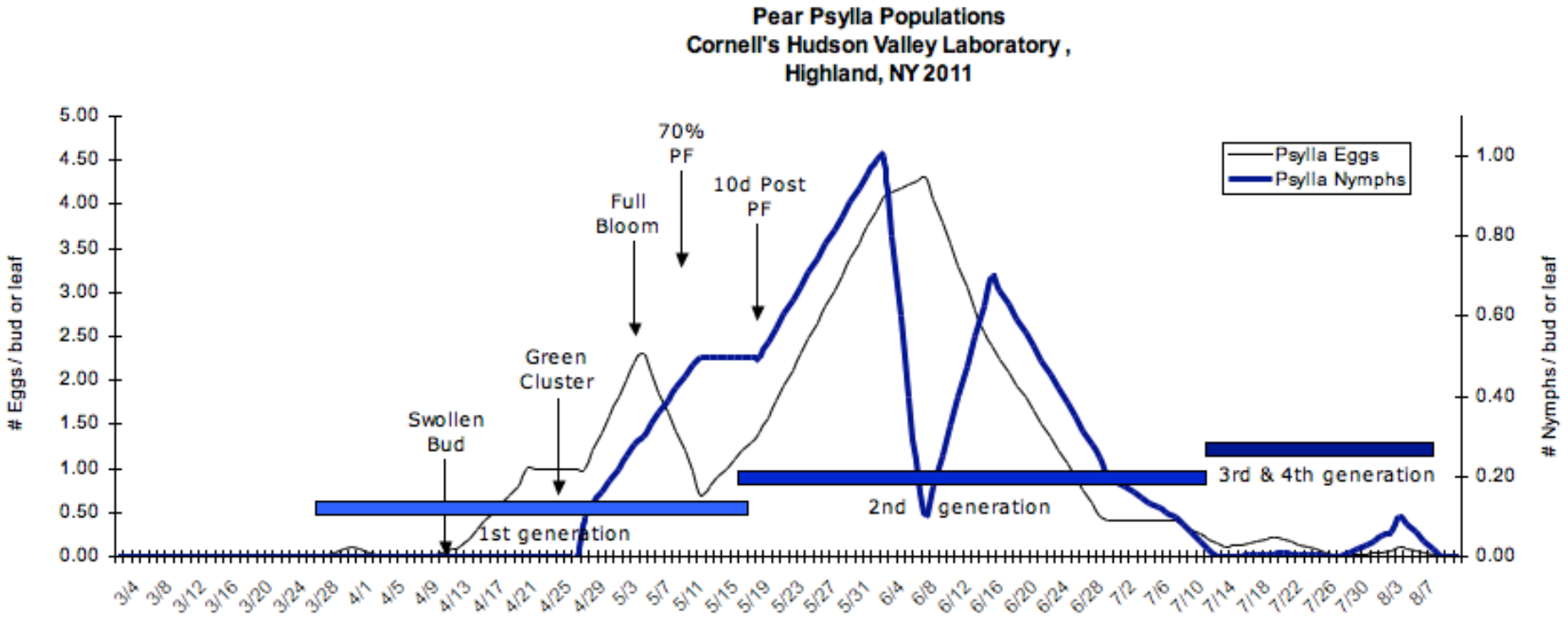
Hudson Valley Research Laboratory

Pear Psylla Biology

Pear Psylla, *Cacopsylla pyricola* (foerster)

- **Invasive pest:** accidentally *introduced* into Connecticut in about 1832 from Europe
- Feeds on European host varieties such as Bosc, Bartlett, Seckle
- Pear psylla has three life stages, egg, nymph & adult, **3-4 gen./yr.**
- Overwinters in the adult stage within and outside orchards
- Spring migration and egg laying begins prior to bud break
- Nymphs undergo 5 instars, last instar 'Hardshell' less susceptible
- Nymphs pierce leaf & stem to feed on sap, inject toxic saliva
- Excess sap shunted as concentrated 'honeydew', used for protection
- Sap phytotoxic to foliage & fruit; defoliation, russet, tree decline

Pear Psylla Biology

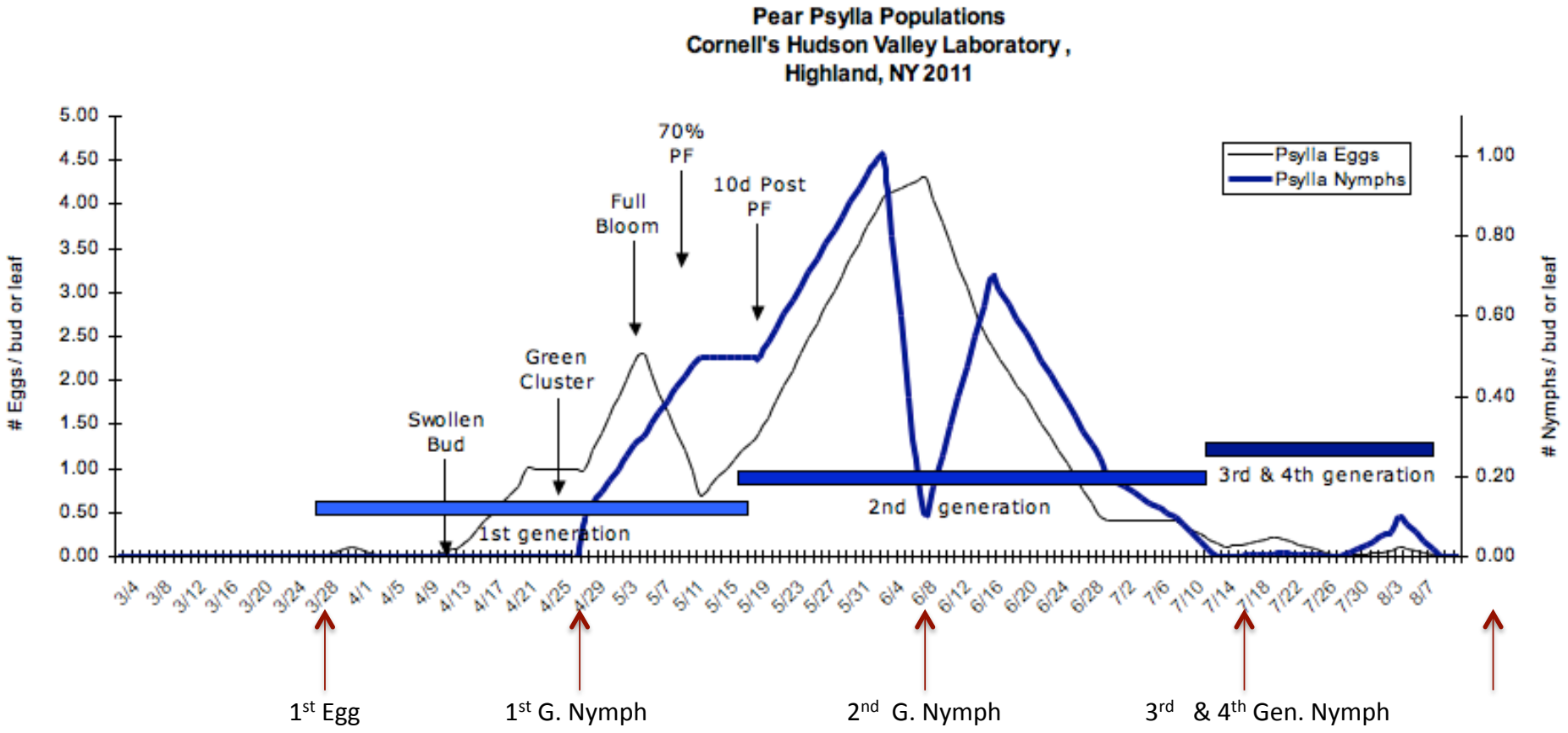


- 3 – 4 Generations Per Season; Varietal, Site and Weather Dependent
- Nymphs emerge in mid-late April
- Shunt excess sugar from sap feeding causing sooty mold, russeting and Bosc decline

Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory

Pear Psylla Biology

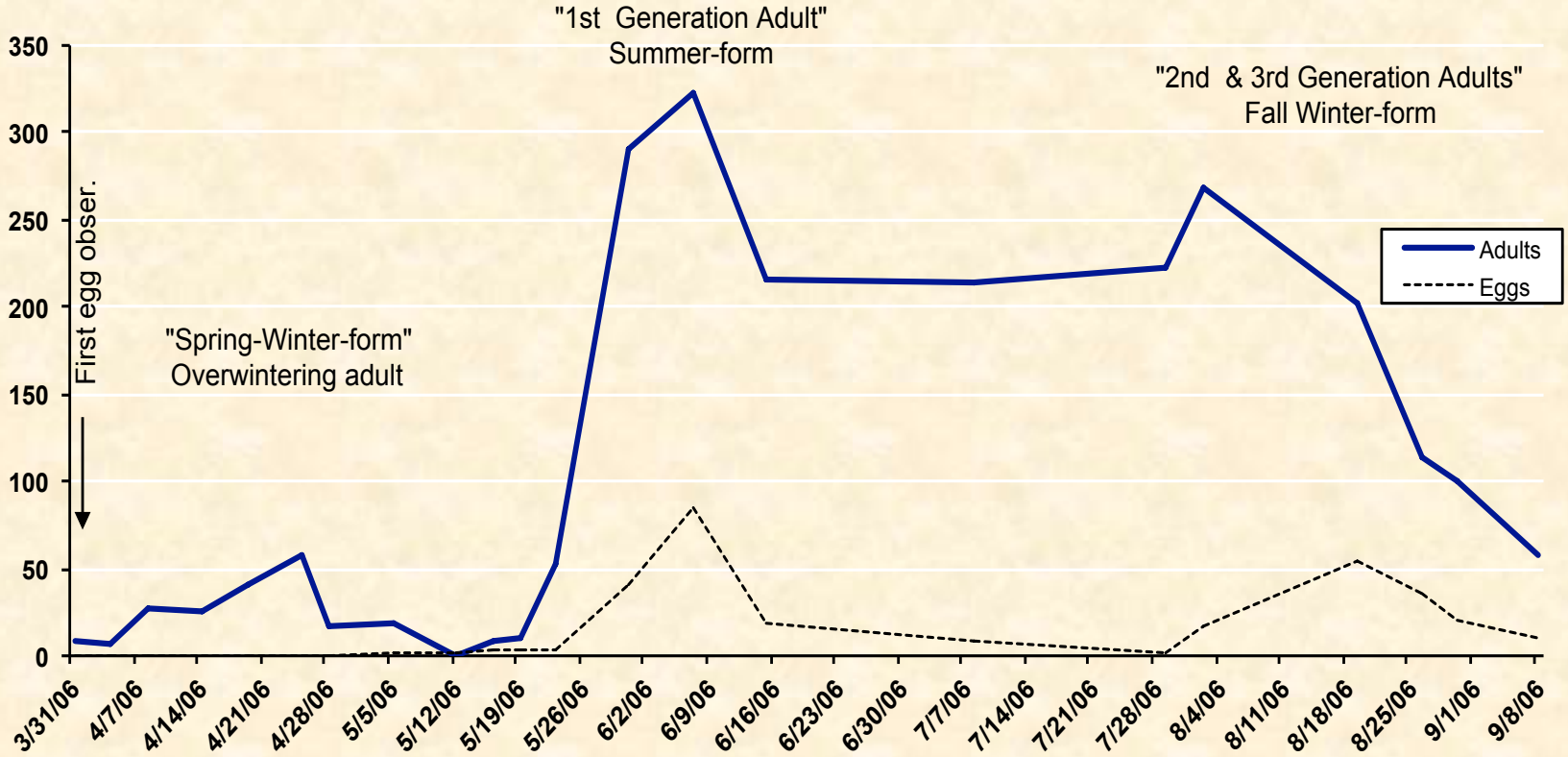


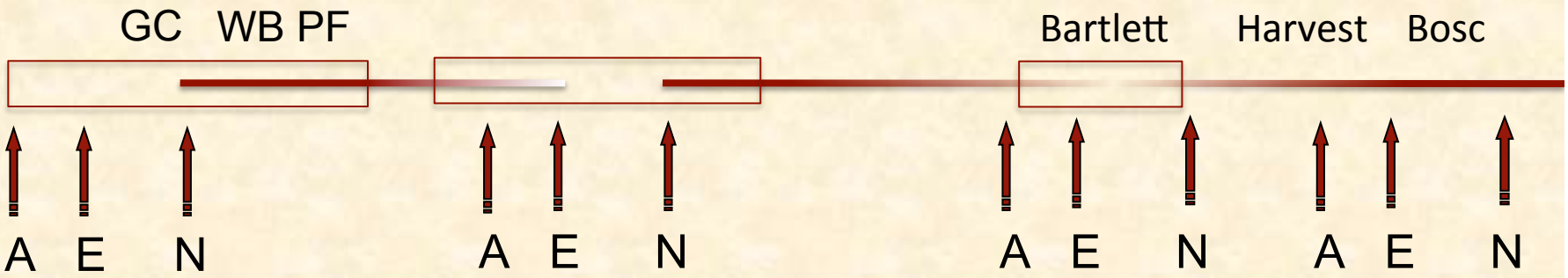
- Near season long presence of nymphs in some orchards

Cornell University
College of Agriculture and Life Sciences

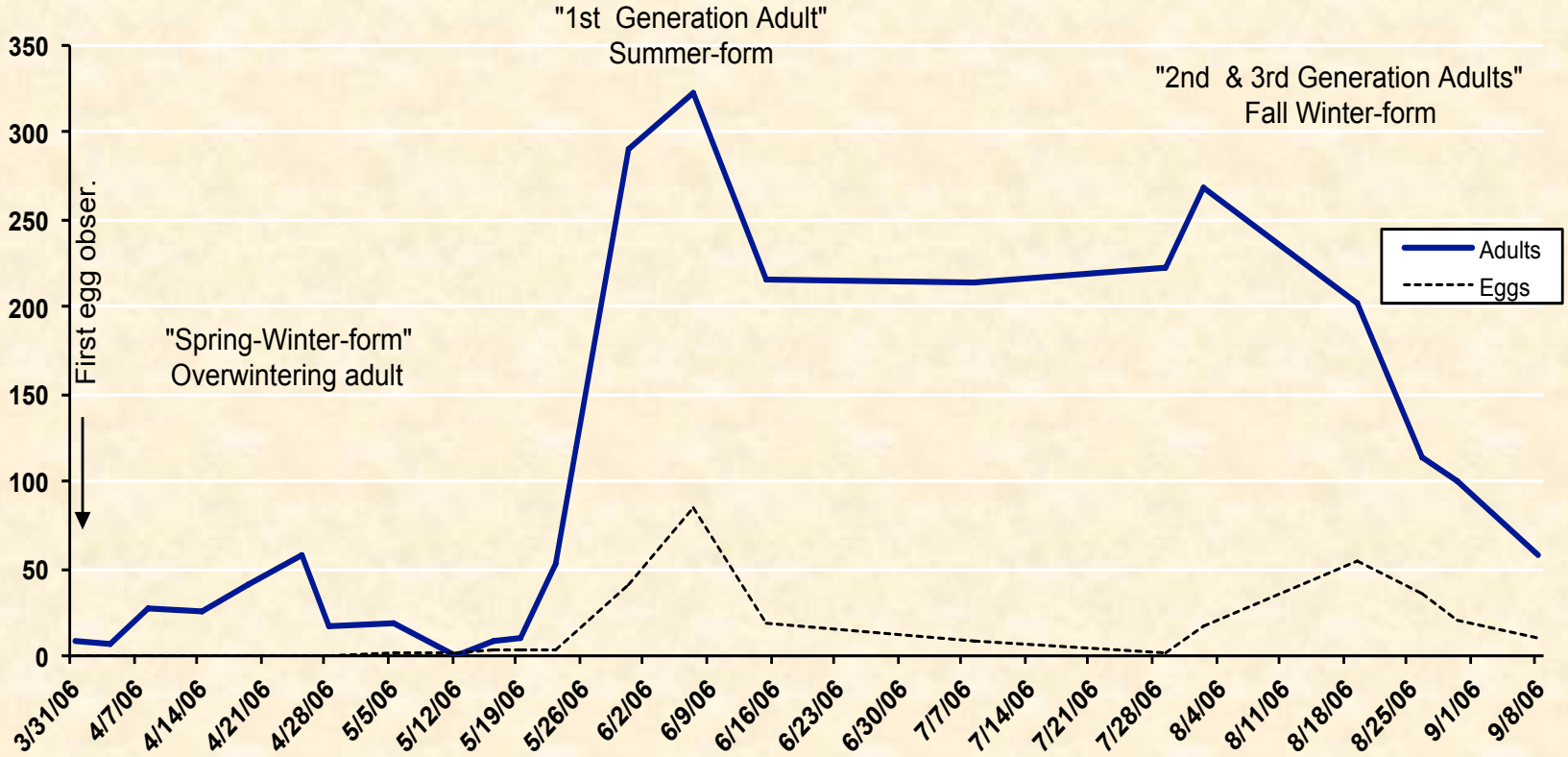
Hudson Valley Research Laboratory

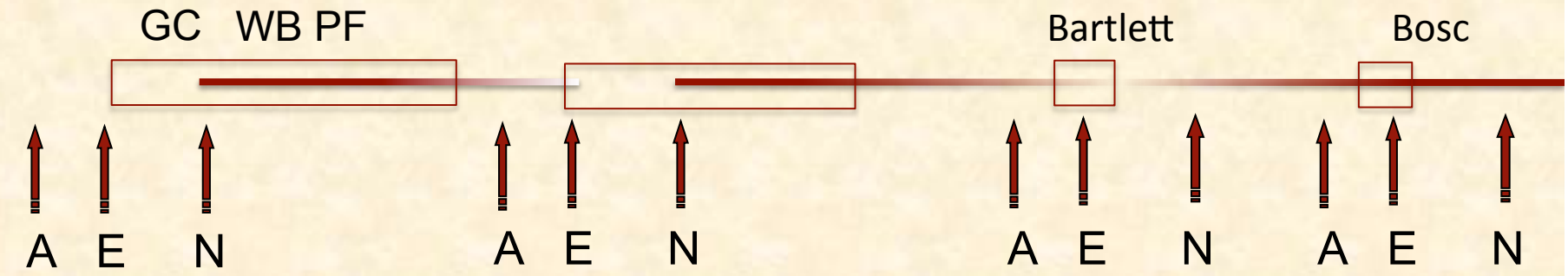
Seasonal Psylla **Adult** Management



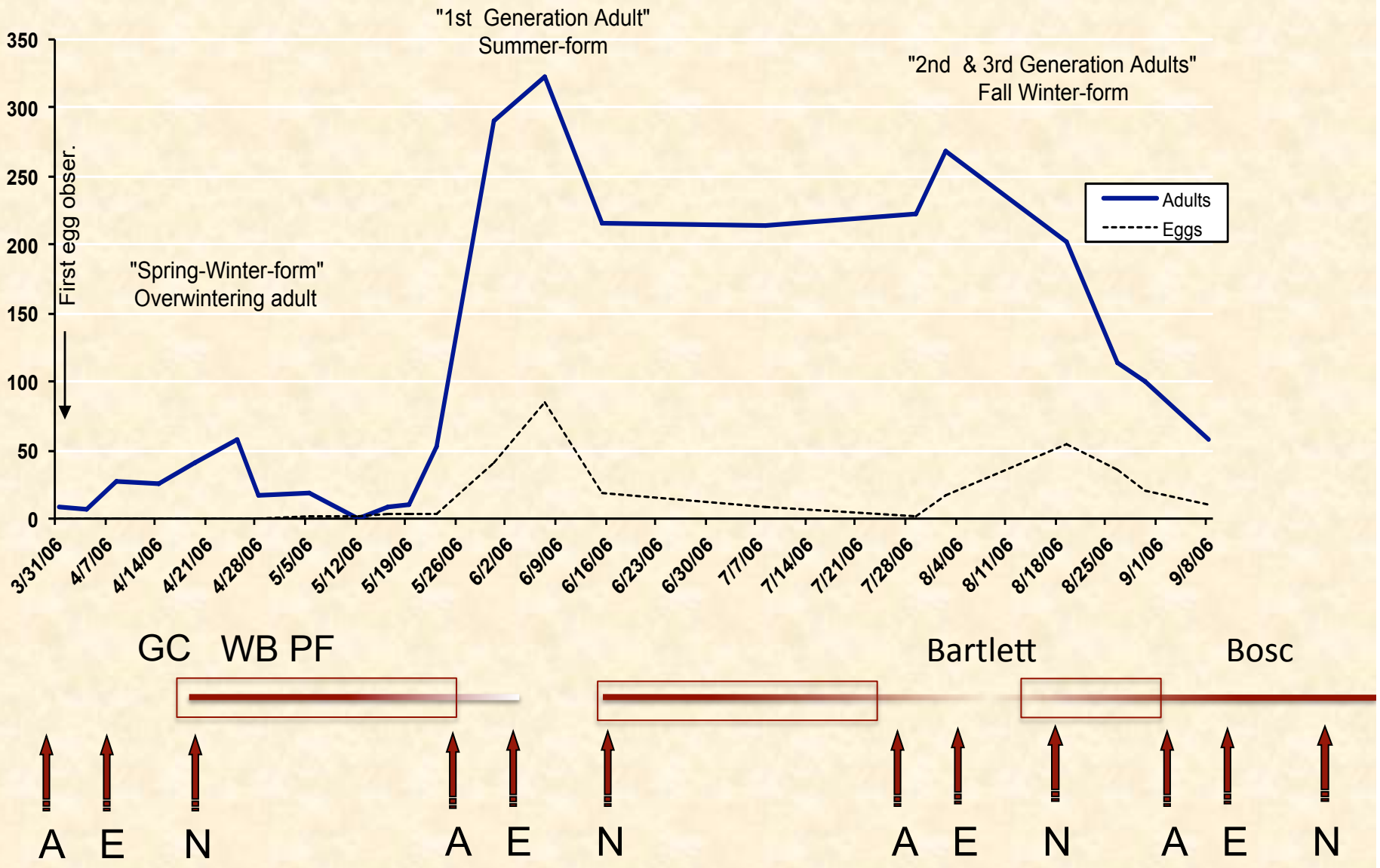


Seasonal Pear Psylla **Egg** Management





Seasonal Pear Psylla **Nymph** Management



Management Options for Pear Psylla

Cultural Control Option:

- **2nd generation pear psylla**: critical population to control.
- Egg laying from Mid-May through mid-June
- Pear psylla adults lay eggs on new succulent foliage during the onset of the 2nd generation (interior shoots; water sprouts).

- Removal of new shoots acts as an Attract and Kill strategy for psylla management.
- **Begin shoot removal shortly after 2nd generation nymphs hatch in early-mid June**
  - Hand pull shoots while succulent during dry periods to avoid fireblight
  - Mark and maintain specific shoots for limb renewal

Management Options for Pear Psylla

Biological Control: Anthocorid bugs, predaceous plant bugs, lacewings reduces pear psylla yet ineffective in maintaining psylla in commercial pear production.

Mating Disruption: 13-methylheptacosane is a sex attractant pheromone for *C. pyricola* winterform males (first identification of a sex pheromone in the Psylloidea).

Management Options for Pear Psylla

Chemical Control Options:

I. Adulticides

Toxicants: AgriMek, Pyrethroids, Neonicotinoids

II. Adult Repellents / Ovipositional Deterrents

Barrier films: Kaolin Clay & Horticultural oil

II. Insect Growth Regulators

Esteem, Rimon, Portal

II. Ovicides

Liquid lime sulfur (literature – burns succulent foliage)

II. Nymphicides

Neonicotinoids

Alternative Materials and Strategies to Manage Pear Psylla Life Stages in Each Generation

Eggs

Overwintering Adults
(Susceptible)

Summer Adults
(Less Susceptible)

Nymphs - 1st Instar
(Susceptible)

Nymphs (4-5th Instar
Less Susceptible)

Cornell University
College of Agriculture and Life Sciences

Hudson Valley
Research Laboratory

Pear Psylla Resistance Management

Insecticide resistance likely to occur in psylla populations:

* *reside in the orchard (PP OW in the orchard)*
* have *multiple generations (2-4 gen)*
* are exposed to insecticides with the same *mode of action (pyrethroids / seasonal AgriMek)*

Practical Management for Insecticide Resistance

- Target Population Developmental Stages with Single AI's
- Rotate AI's for Each Generation
- Use Barrier Film and Oil to Reduce Resistance Potential as these materials do not induce insecticide resistance

Pear Psylla Insecticide Management

I. Adulticides

- Pyrethroids **IRAC 3A**
  - Ambush 25WP **(Permethrin)**
  - Asana XL 0.66EC **(Esfenvalerate)**
  - Danitol 2.4EC **(Fenpropathrin)**
  - Pounce 25 WP **(Permethrin)**
  - Warrior II ZT **(Lambda-cyhalothrin)**

- Neonicotinoids **IRAC 4A**
  - Actara 25WDG **(Thiamethoxam)**
  - Assail 30SG **(Acetamiprid)**

- Nicotinic (nAChR) allosteric modulators **IRAC 4A**
  - Delegate **(Spinetoram)**

- Abamectin **IRAC 6A**
  - AgriMek

Pear Psylla Insecticide Management Groupings for Specific Applications

II. Adult Deterrents

Barrier Film & Repellent

Begin at the onset of adult presence

- Surround WP (**Kaolin Clay**) IRAC Un-MoA

  25-50#/A Dilute; Premix

- Bio-Cover (**Horticultural Oil**) IRAC Un-MoA

  1% volume to volume (1 gal. oil /100 gal. water)

- Aza-Direct 1.2L (**Azadirachtin**) IRAC Un-MoA

Pear Psylla Insecticide Management Grouping for Specific Applications

III. Insect Growth Regulators

- Application at the onset of 1st oviposition
- Pre-bloom – low toxicity to beneficials

- Esteem (**Pyriproxyfen) (IRAC 7C)** J. hormone analog, causing sterility; ovicidal
- Centaur (**Buprofezin) (IRAC 16)** chitin biosynthesis, suppresses oviposition
- *Rimon (**Novaluron**)* disrupts chitin synthesis in immature insects and eggs
  - Impacts eggs deposited on residue

Pear Psylla Insecticide Management
Grouping for Specific Applications

IV. Ovicides

- Early oviposition prior to hatch
  - IGR's
  - **Liquid lime sulfur** (contact – caustic), <u>will burn foliage after bud break</u>
    - 21d between LLS and oil applications
    - Not to be used on sensitive var. (**d'Anjou, Comice or Seckle)**

Pear Psylla Insecticide Management Grouping for Specific Applications

IV. Nymphicides

Applied at first or early hatch

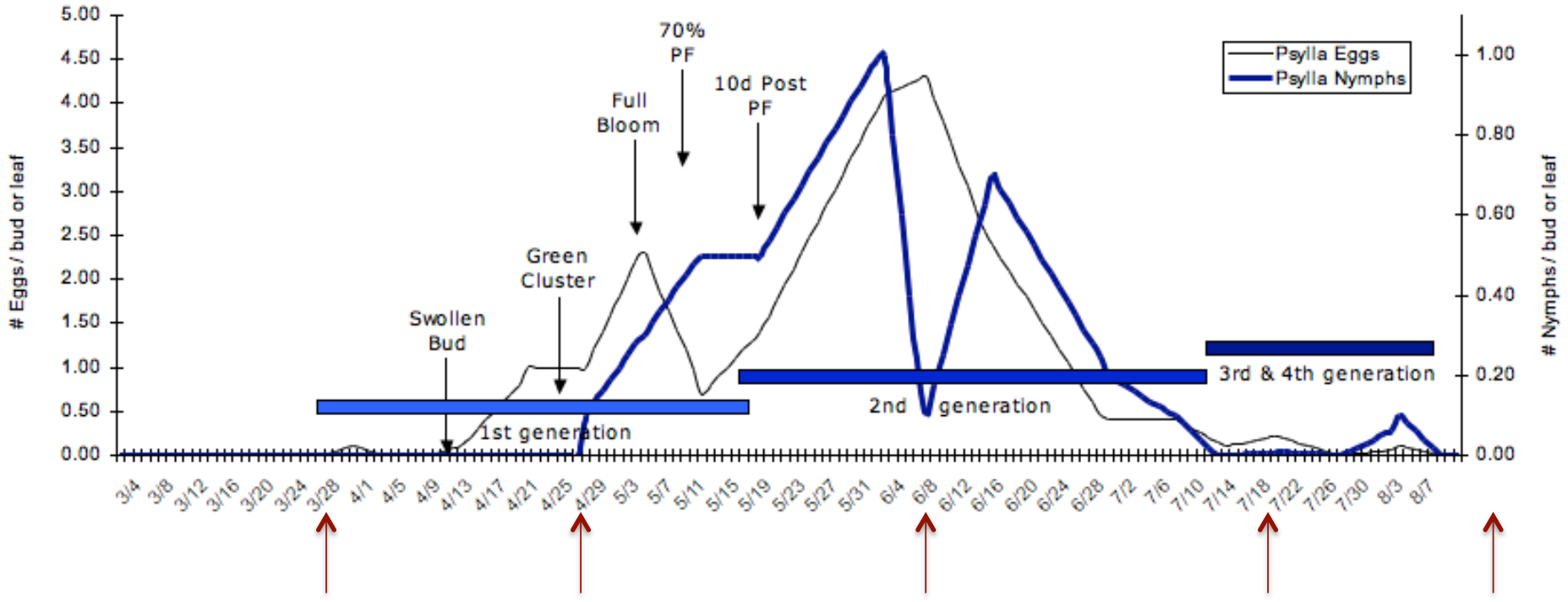
- Portal **(Fenpyroximate) +** penitrant (NIS, oil at 0.25%) **IRAC 21A**
- AgriMek **(Abamectin)** + penitrant (NIS, oil at 0.25%) **IRAC 6**
- Delegate **(Spinetoram)** **IRAC 5**
- Movento (**Spirotetramat**) + penitrant (NIS, 0.25%) – Systemic **IRAC 23**
- Neonicotinoid
  - Actara (**Thiamethoxam),** Assail (Acetamiprid) **IRAC 4**

Pear Psylla Insecticide Management Grouping for Specific Applications

IV. Nymphicides

- Pre-mix group
  - Agri-Flex SC (**Thiamethoxam/Abamectin**) **IRAC 4A/6**
  - Gladiator (**Zeta-Cypermethrin/Avermectin B1)** **IRAC 3A/6**
  - Voliam Flexi WDG (**Chlorantraniliprole/Thiamethoxam)** **IRAC 4A/28**

Pear Psylla Management



Adults / 1st Egg

1st G. Nymph

2nd G. Nymph

3rd & 4th Gen. Nymph

Hort. Oil
Pyrethroid
+ PBO

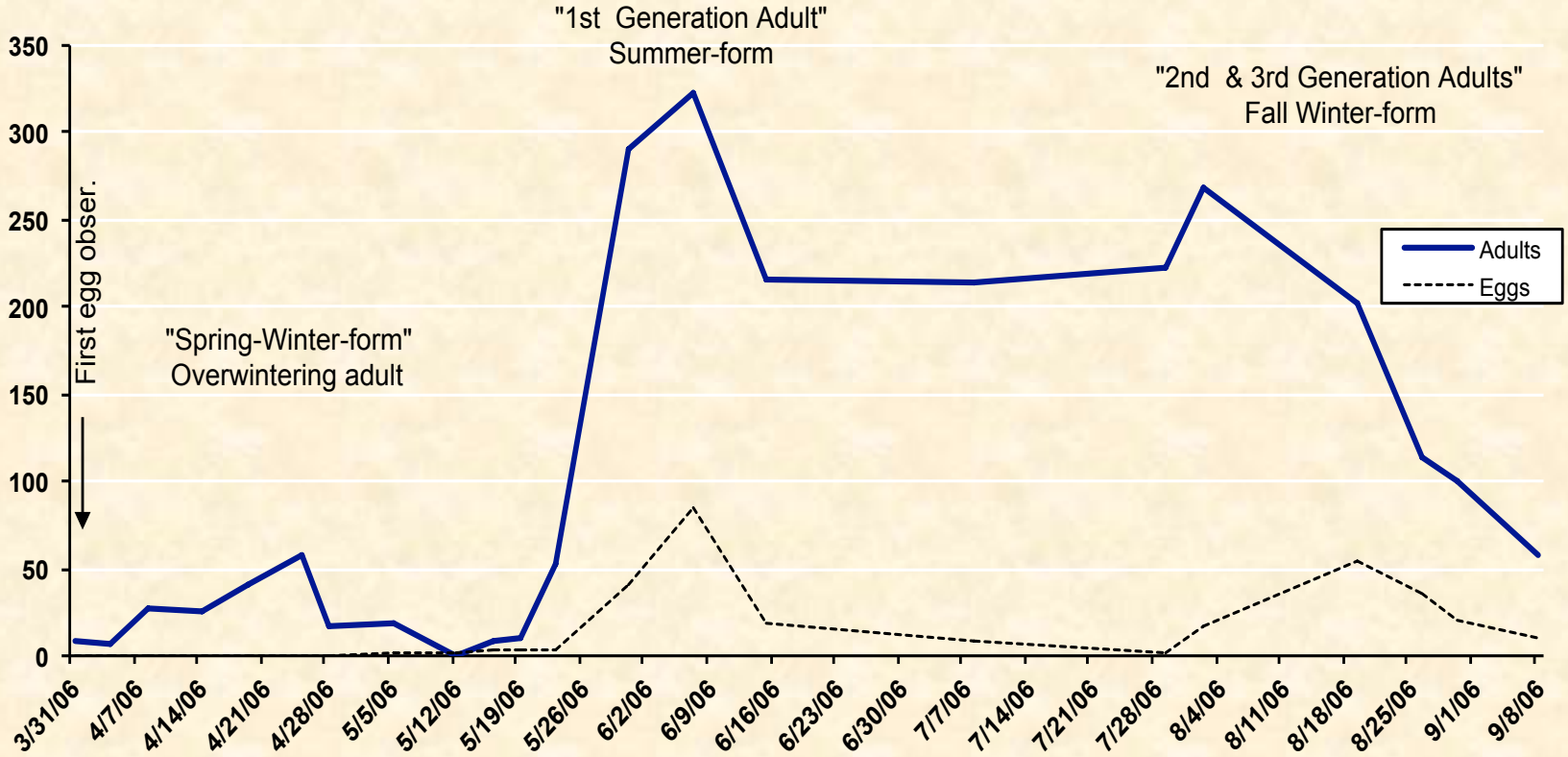
Hort. Oil
Pyrethroid
+ PBO

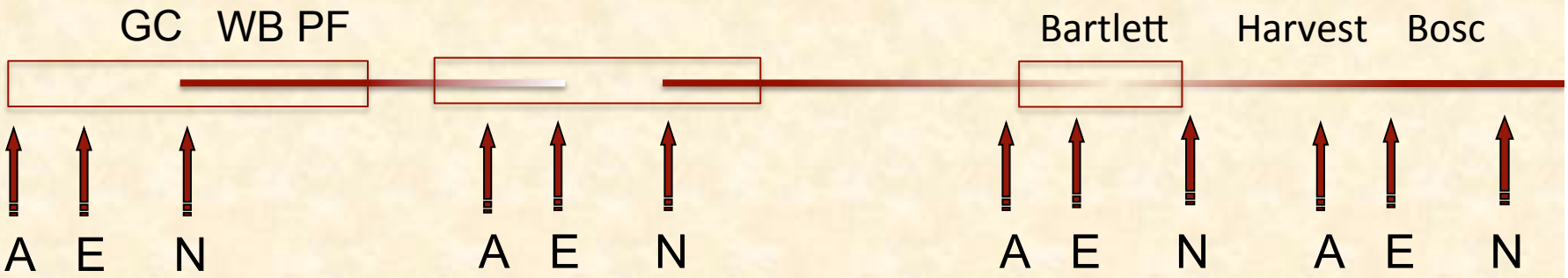
Actara
(PC)

Cornell University
College of Agriculture and Life Sciences

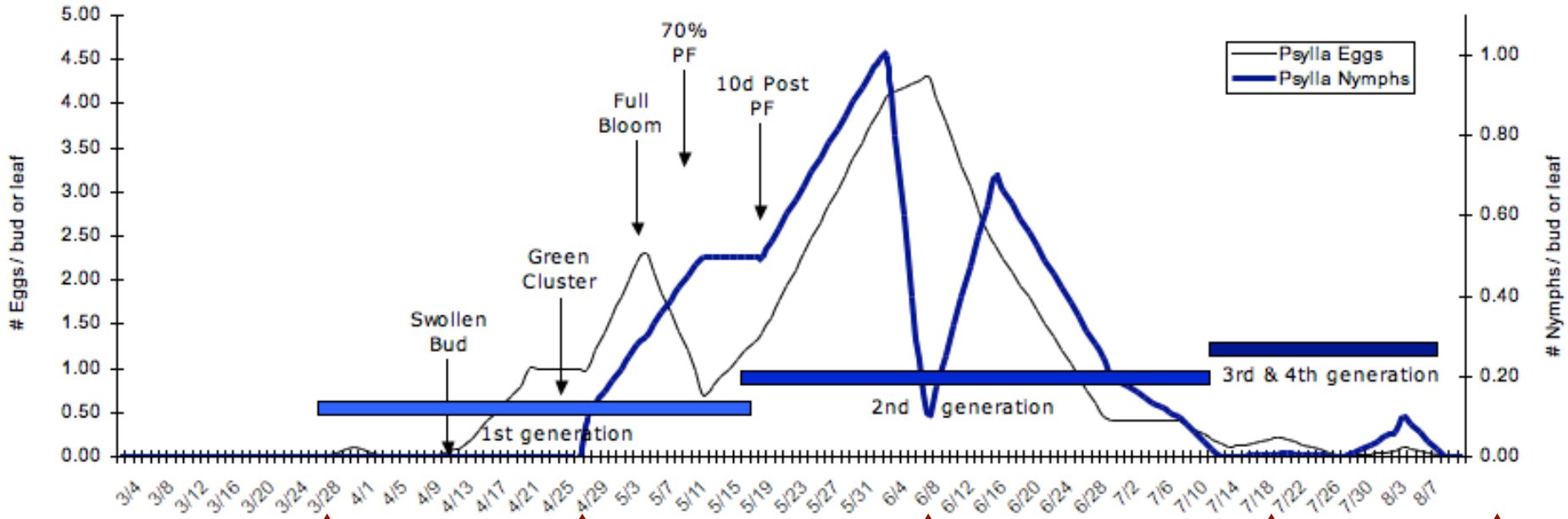
Hudson Valley Research Laboratory

Seasonal Psylla **Adult** Management





Pear Psylla Management



Adults / 1st Egg

Hort. Oil
Pyrethroid
+ PBO

1st G. Nymph

Hort. Oil
Pyrethroid
+ PBO

AgriMek + oil

Actara + oil
(PC)

2nd G. Nymph

AgriMek +

Delegate
(OBLR)

3rd & 4th Gen. Nymph

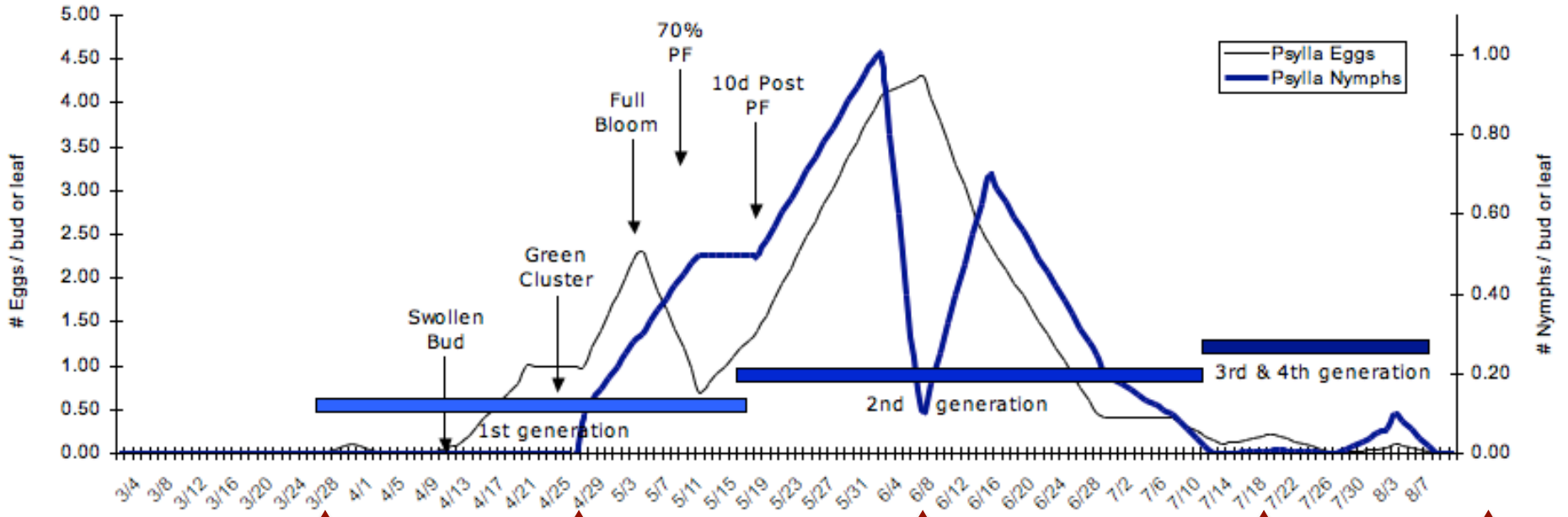
Movento +

Assail +

Cornell University
College of Agriculture and Life Sciences

Hudson Valley
Research Laboratory

Pear Psylla Management



Adults / 1st Egg

Surround WP

1st G. Nymph

Surround WB

Horticultural oil 1% dilute

Surround WP

2nd G. Nymph

Horticultural oil 1% dilute

Horticultural oil 1% dilute

3rd & 4th Gen. Nymph

Horticultural oil 1% dilute

Horticultural oil 1% dilute

Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory

Evaluations of insecticide schedules against summerform pear psylla adults on Bartlett pear[1]. Hudson Valley Lab., Highland, N.Y.-2005.

Treatment	Formulation amt. /100 gal.	Appl. Dates	7/5 SF Adults[1] # / 3 min.	7/15 SF Adults[1] # / 3 min.	% Reduct. SF Adults
Actara 25WP	1.4 oz.	14 July	32.2 a	9.5 a	70.5
AgriMek Damoil	2.5 oz. 32.0 oz.	14 July	37.7 a	11.9 a	68.4
Asana XL Incite	5.8 oz. 2.0 oz.	14 July	34.5 a	11.9 a	65.5
Assail 70WP Damoil	0.85 oz. 32.0 oz.	14 July	54.2 a	17.8 a	67.2
Warrior	1.71 oz.	14 July	30.4 a	58.8 b	- 93.4
Asana XL	5.8 oz.	14 July	34.2 a	89.7 b	- 162.3
Damoil	1.0 gal.	14 July	13.3	33.3	- 150.4
Untreated	-	-	62.8	140.3 c	- 123.4

Incite - Piperonyl butoxide (a P450-dependent monooxygenase inhibitor)

Evaluations of insecticide schedules against summerform pear psylla adults on Bartlett pear[1]. Hudson Valley Lab., Highland, N.Y.-2005.

Treatment	Formulation amt. /100 gal.	Appl. Dates	7/5 SF Adults[1] # / 3 min.	7/15 SF Adults[1] # / 3 min.	% Reduct. SF Adults
Actara 25WP	1.4 oz.	14 July	32.2 a	9.5 a	70.5
AgriMek Damoil	2.5 oz. 32.0 oz.	14 July	37.7 a	11.9 a	68.4
Asana XL Incite	5.8 oz. 2.0 oz.	14 July	34.5 a	11.9 a	65.5
Assail 70WP Damoil	0.85 oz. 32.0 oz.	14 July	54.2 a	17.8 a	67.2
Warrior	1.71 oz.	14 July	30.4 a	58.8 b	- 93.4
Asana XL	5.8 oz.	14 July	34.2 a	89.7 b	- 162.3
Damoil	1.0 gal.	14 July	13.3	33.3	- 150.4
Untreated	-	-	62.8	140.3 c	- 123.4

Incite - Piperonyl butoxide (a P450-dependent monooxygenase inhibitor)

Evaluations of insecticide schedules against summerform pear psylla adults on Bartlett pear[1]. Hudson Valley Lab., Highland, N.Y.-2005.

Treatment	Formulation amt./100 gal.	Application Dates	7/8 nymphs[1]	7/18 nymphs[1]	% Reduct. nymphs[1]
Actara 25WP	1.4 oz.	14 July	2.1 abc	1.0 cd	52.3
AgriMek Damoil	2.5 oz. 32.0 oz.	14 July	6.3 d	1.3 d	79.5
Asana XL Incite	5.8 oz.	14 July 2.0 oz.	1.2 a	0.1 a	94.4
Assail 70WP	0.85 oz.	14 July	1.8 ab	0.4 b	79.2
Warrior	1.71 oz.	14 July	5.0 bcd	1.8 de	64.1
Asana XL	5.8 oz.	14 July	5.5 cd	2.8 ef	50.0
M-Pede 49L	1 gal.	14 July	1.1 a	0.9 ab	20.0
Damoil	32.0 oz.	14 July	0.9 a	2.3 b	- 172.0
Damoil	0.5 gal.	14 July	1.8 a	0.8 ab	57.2
Damoil	1.0 gal.	14 July	0.8 a	0.2 a	80.4
Untreated	-		6.6 d	4.1 f	36.8

Evaluations of insecticide schedules against 1s generation pear psylla adults and nymphs on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2005.

Treatment	Formulation amt./100 gal.	Application Dates	Adults[1] # / 3 min.	Nymph	Egg
Damoil	2.0 gal. / 100	BB	1.0 a	0.9 a	6.1 a
Asana	5.8 oz. / 100	WB			
AgriMek 0.15EC	2.5 oz. / 100	10dp PF			
+ Damoil	0.25% V/V	10dp PF			
AgriMek 0.15EC	2.5 oz. / 100	10dp PF	0.5 a	1.2 ab	7.7 ab
+ Damoil	0.25% V/V	10dp PF			
Esteem 35WP	1.25 oz. / 100	DD, 10dp PF	1.5 ab	0.7 a	14.6 bc
+ Damoil	0.25% V/V	DD, 10dp PF			
Warrior	1.71 oz./100	WB, PF – 1C	0.7 a	2.8 bc	11.0 ab
Aza-Direct	4.0 oz. / 100	SB, 1C	3.5 c	3.2 c	29.0 cd
Untreated control			2.5 bc	4.0 c	32.7 d

Data taken from Bartlett on 6 June

Management of pear psylla with applications directed toward adults, HVL. – 2004

Treatment	Rate * oz. / 100	Summerform (1st gen. adults) 6/14 (10d)	% Redn.
Actara 25WG	1.4	1.2 a	92.5
Agri-Mek 0.15 EC	5.0	1.2 a	72.5
Assail 70WP	0.8	3.1 a	52.0
UNTREATED	-	28.0 b	-

Applied using handgun at 400 GPA
All applications included 0.25% horticultural oil

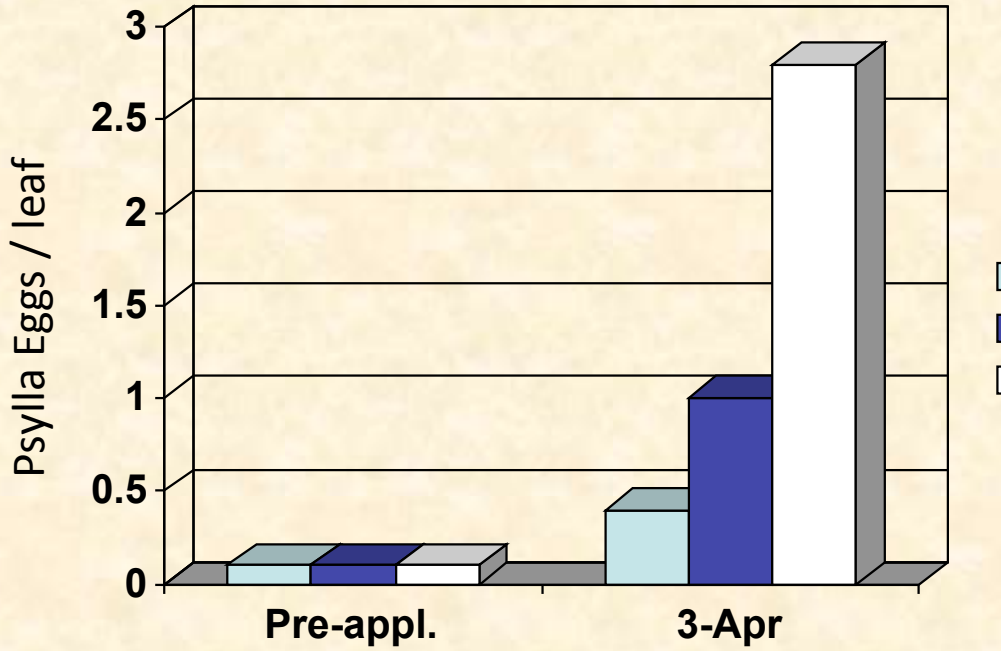
Evaluations of insecticide schedules against summerform pear psylla adults on Bartlett pear[1]. Hudson Valley Lab., Highland, N.Y.-2005.

Treatment	Formulation amt. /100 gal.	Appl. Dates	7/5 SF Adults[1] # / 3 min.	7/15 SF Adults[1] # / 3 min.	% Reduct. SF Adults
Actara 25WP	1.4 oz.	14 July	32.2 a	9.5 a	70.5
AgriMek Damoil	2.5 oz. 32.0 oz.	14 July	37.7 a	11.9 a	68.4
Asana XL Incite	5.8 oz.	14 July 2.0 oz.	34.5 a	11.9 a	65.5
Assail 70WP Damoil	0.85 oz. 32.0 oz.	14 July	54.2 a	17.8 a	67.2
Warrior	1.71 oz.	14 July	30.4 a	58.8 b	- 93.4
Asana XL	5.8 oz.	14 July	34.2 a	89.7 b	- 162.3
Damoil	1.0 gal.	14 July	13.3	33.3	- 150.4
Untreated	-	-	62.8	140.3 c	- 123.4

Incite - Piperonyl butoxide (a P450-dependent monooxygenase inhibitor)

Management Options for Pear Psylla

Barrier / Particle Films: Surround WP acts as an ovipositional deterrent
Kaolin clay formulation produces a reflective white film and texture to disorient and repel adults from trees.



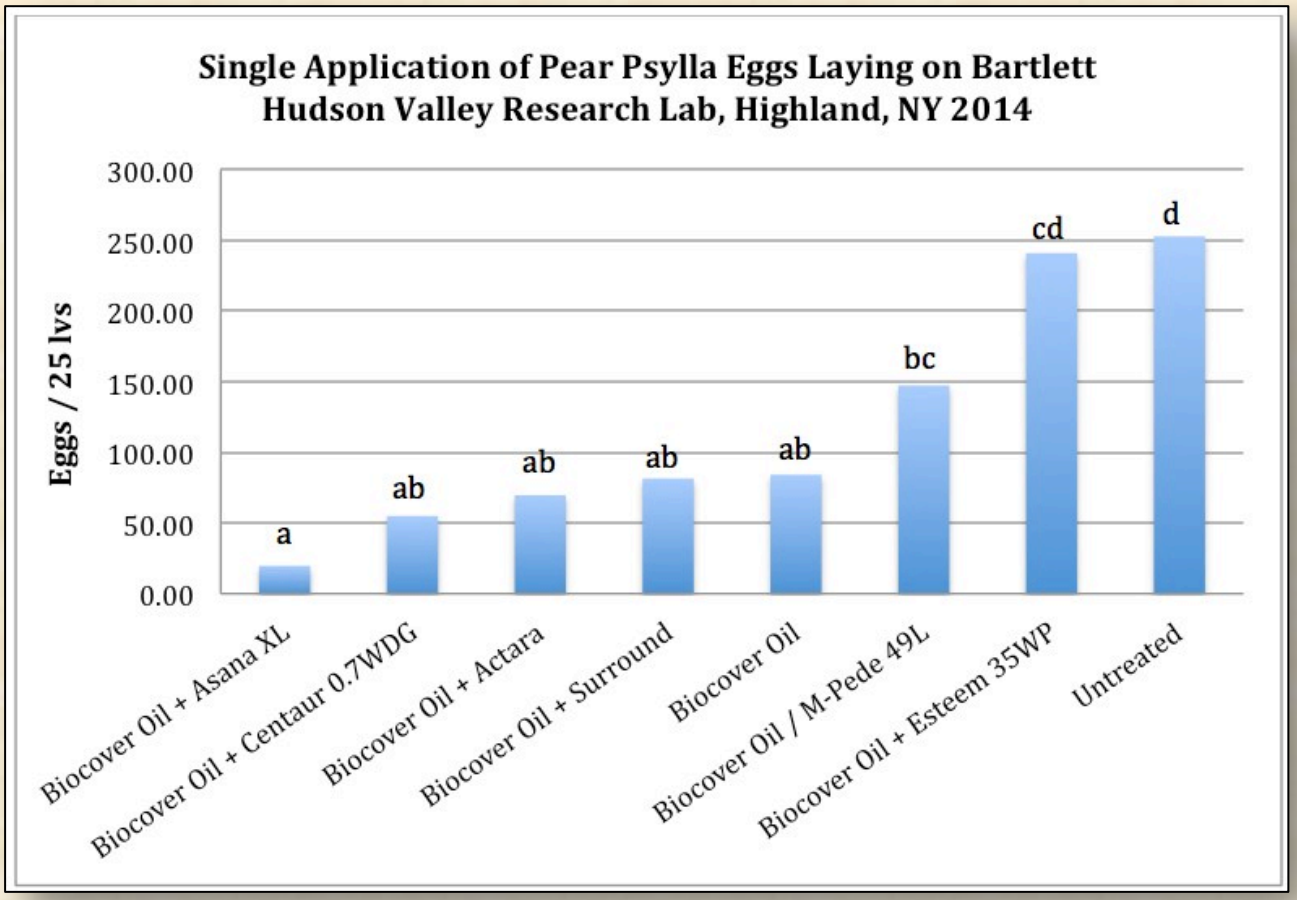
2011: F=20.7, P=.0001

Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory

Management Options for Pear Psylla

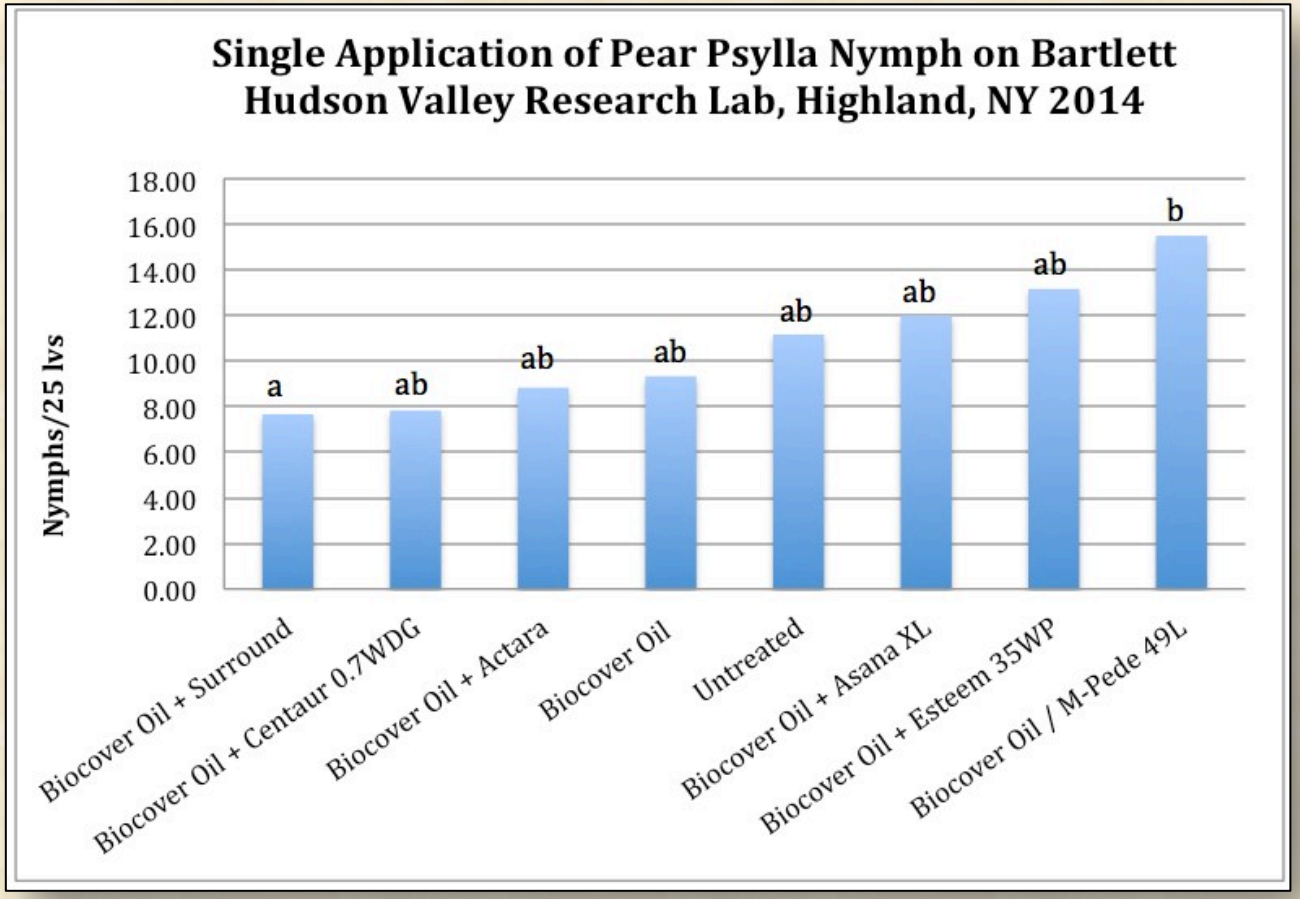
Surround WP as an ovipositional deterrent at DD, GC, WB for 1st generation
Actara at PF
Horticultural oil at 10-14d intervals to end of season.



Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory

Barrier Film: Surround WP impact on nymph populations.



Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory

Thank You

Technical staff and assistants

Support: NYS Ag & Mkts, ARDP, NEIPM, EDDMaps, HATCH, Bayer, Dow, Nichino, Syngenta, Gowan

Cornell University
College of Agriculture and Life Sciences

Hudson Valley Research Laboratory