RESULTS OF 2015 INSECTICIDE AND ACARICIDE STUDIES IN EASTERN NEW YORK

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OUTSIDE RESEARCH OR DEVELOPMENT GROUPS

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Formulation	Materials Tested	Company
	Apple	
Insecticides		
Actara 25WDG		Syngenta
Altacor 35WG		E.I. DuPont De Nemours & Co.
Assail 30SG		United Phosphorus Inc.
Belt SC		Bayer CropScience
BioCover (NIS)		Crop Protection Services
Centaur 0.7 WDG		Nichino America Inc.
Closer		Dow AgroSciences
Compound XA		NA
Compound XB		NA
Dipel DF		Valent
Delegate WG		Dow AgroSciences
Entrust SC		Dow AgroSciences
Esteem 35WP		Dow AgroSciences
Exirel (Cyazypyr)		E.I. DuPont De Nemours & Co.
LI700 (NIS)		Crop Protection Services
Leverage 360		Bayer CropScience
Lorsban 4E		Dow AgroSciences
Movento 240SC		Bayer CropScience
Sivanto		Bayer CropScience
Surround WP		Tessenderlo Kerley
Fungicides		
Captan 80WDG		Arysta LifeScience NA Corp.
Flint		Bayer CropScience
Fontelis		E.I. DuPont De Nemours & Co.
Indar		Dow AgroSciences
Luna Sensation		Bayer CropScience
Luna Tranquility		Bayer CropScience
Manzate		United Phosphorus Inc.
Marivon		BASF
Microthiol Sulfur		NuFarm
Regalia		Marrone Bio Innovations
	Pear	
AgriMek 0.15EC		Syngenta
BioCover (NIS)		Crop Protection Services
Centaur 0.7WG		Nichino America Inc.
Esteem 35WP		Dow AgroSciences
M-Pede 49L		Gowan Co.
Surround WP		Tessenderlo Kerley

Factors Contributing To The 2015 Hudson Valley Insect Pest Management Anomalies.

The start of the 2015 season began very dry in March increasing above the average through April and May with **rainfall accumulations** of 2.20" in March (3.6" Ave.), 4.40" in April (3.8" Ave.), and 2.55" in May (4.4" Ave.). The month of June saw a significant increase in rain events totaling 7.31" (4.4" Ave.), with enough rain to produce moderate levels of apple scab infection, especially in newly planted blocks. Each week in July had less than 0.5" of rain requiring near daily irrigation as only 1.23" fell (4.7" Ave.). August also experienced below average rainfall with accumulations of only 3.34" (4.2" Ave.). Total rainfall for the March 1st through September 1st growing season totaled 21.03" of rain, slightly below the seasonal average of 25.1".

For the third straight year, Hudson Valley **tree phenology** was considerably later during the early stages of development of the season. However, by petal-fall the season was only one-day later than the 25-year mean. By harvest of McIntosh, Retain applications for fruit drop management were applied 4-5 days earlier then the calendar dates. McIntosh green tip (13 April) occurred 8 days later than the 25-year historical mean (see McIntosh phenology), two days shy of the latest recorded day. King bloom on McIntosh began on the 6th of May with the bloom period lasting 6-7 days. 80% PF in McIntosh occurred on 12th May. Bloom lasted 2.5 days fewer then the mean, with ample sunlight yielding strong pollination and conditions for fruit set yet under conditions of severe water stress that concerned tree fruit growers. Degree-day accumulations were about 45.5 DD_{43} / 39.2 DD_{43} higher than the average by petal fall (12th May of 527.8 DD_{43} / 304.5 DD_{50}). By the 26th of May, McIntosh king fruit had sized to 18mm. From the onset of bloom to PF temperature ranged between 49 ^{o}F and 87^{o}F followed by 10 days of mean high temps of 59 to 83^{o}F after petal fall, generally cooler then normal.

Tarnished Plant Bug (TPB) presence required timely applications for management in orchards with historical fruit damage. Dry conditions during the pre-bloom period favor TPB activity requiring applications at both TC and P applications showed significant reduction in fruit injury. Lower levels of injury in higher valued fruit such as Sweetango, Honeycrisp, Gala will require TPB management if culls from this insect exceed economic threshold.

Plum Curculio (PC) required three applications beginning at 80% PF, followed by 1st and 2nd cover (for most varieties. PC damage began well after fruit set given the cool temperature we experienced. PC movement into orchards and oviposition was predicted to end on 3rd of June using predictive modeling of 308 DD_{50} from petal fall of McIntosh. Rains during the 1C period exceeded 3.0" up to the morning of June 2nd, with 305 DD_{50} accumulated toward the PC migration completion model.

European apple sawfly (EAS) activity occurred in very low numbers this season with early varieties showing 1.8% injury in Ginger Gold and McIntosh cluster fruit evaluations. PC injury was also moderate with 44.0.% and 22.8% injury with TPB injury at 4.8% and 3.8% injury observed in Ginger Gold and McIntosh respectively on 6 June in untreated plots with increasing damage noted in these plots at harvest.

Codling moth (CM) 1st generation sustained adult flight occurred on 11th May with larval emergence predicted for 27th May using 220 DD_{50} from CM biofix. The internal lepidopteran complex, lesser apple worm (LAW), oriental fruit moth (OFM) and CM showed moderate levels of damage to apple, with frass produced by the internal lep.complex appearing during mid-late June through early July. Moderate levels of damage from the internal Lepidopteran complex was observed with 7.5% and 7.0% damage from 1st generation evaluated on 28th June on Red Delicious. The 2nd generation adult sustained catch for the CM biofix occurred on 13th July with management for larval emergence prediction using 250 DD_{50} to occur on 20 July.

San Jose scale (SJS) crawler emergence was predicted to occur on 10 June using 1st adult capture on the 11th May 400 DD_{51} model. Nymphs were observed on fruit on the 18th of June, 8 days after the predicted emergence date. In general SJS scale levels were high in infested trees. The infestation means ranged from 27.3% to 86% injury observed in HVRL research plots on 26th August. In conventionally treated orchards, the SJS has become a major insect pest to manage in apple, requiring targeted applications for multiple generations.

Overwintering larvae of the spotted green fruit worm (SGFW), red banded leafroller (RBLR) and OBLR larva during the pre-bloom period through fruit set remain a concern of most Hudson Valley and Lake Champlain pome fruit growers. The tools for use against the Lepidoptera complex are diverse in mode of action, are very effective and have excellent residual activity.

Obliquebanded leafroller (OBLR) monitoring and management by tree fruit growers continues to be a high priority. Targeting up to three seasonal application windows while employing a single mode of action for each period, growers can achieve successful management of the OBLR larva. These include the pre-bloom through Petal Fall period for the overwintering generation, often using IGR's such as Proclaim and Intrepid, the Summer generation using either Altacor / Belt or Delegate, and later in August applying either Altacor / Belt or Delegate. Recommendations for applications were made using insect phenology predictions for early emergence, using 340 DD_{50} from 29th of May biofix to manage emergence of larvae, predicted to occur on 14th of June. In general, low-levels of leafroller feeding was observed on developing foliage and fruitlets this spring. Trap captures were moderate for 1st generation OBLR averaging 6.3 / day during the peak periods (15 June). The 2nd generation flight of OBLR biofix was low during August, averaging 0.6 / day during the peak periods (10 August). We are seeing a trend of increasingly high levels of RBLR with mixed populations of **tufted apple bud moth** (TABM) and **sparganothis fruitworm** (SFW) during the season, contributed to the overall leafroller damage each year.

Apple maggot (AM) emergence was late this season with first emergence on 13th July. Threshold of 5 flies per trap per block was observed on the 10th of August. AM density was low to moderate throughout the region with reduced emergence due to the lack of late season rainfall in July and early August. Low populations of adults were noted in the mid-Hudson Valley with seasonal accumulation totals near 40 flies per trap (mean n=4) by 31st August. Highest populations occurred late in the season as rainfall in August providing more ideal emergence conditions for the adult fly.

The **brown marmorated stink bug** (BMSB), *Halyomorpha halys,* has been observed throughout the southern Hudson Valley for the past 6 years with the first BMSB confirmation in December 2008. Since that time increasing populations have been documented in urban environments and present on many farms throughout the season in the lower to mid-Hudson Valley region. We have observed a second generation over the past two years, developing in mid-late August in HVRL voltinism studies. However, in 2015 we did not find adult egg laying after the development of 1st generation in our rearing chamber.

Although there appears to be stink bug feeding in apple this season, both BMSB and the **green stink bug**, *Acrosternum hilare* BMSB was found from mid-season through harvest on pome fruit in lower to mid-Hudson Valley with increasing northern observations and fruit injury occurring in Columbia County in 2013. It has been found reproducing in deciduous trees such as Sugar Maple, *Acer saccharum*, White Ash, *Fraxinus americana*, Tree of Heaven, *Ailanthus altissima*, and eastern black walnut *Juglans nigra* in high numbers with lower numbers observed in Staghorn Sumac, *Rhus typhina,* and wild grape, *V. vinifera.* Late season nymphs and adult trap captures of BMSB using Tedders traps (with a single site employing traditional black light traps), the

USDA #10 lure and the *Plaudi stali* aggregation pheromone lure, *methyl (E,E,Z)-2,4,6-decatrienoate,* was observed along the orchard edges in Orange, Ulster, Dutchess and Columbia Counties throughout the season. In 2015 we monitored the population throughout NYS in 44 tree fruit orchard sites, employing a trap threshold of 10 total BMSB adults per trap to recommend threshold based management timing for tree fruit production. We are presently recommending that growers access https://www.eddmaps.org/bmsbny/ for weekly updates on BMSB monitoring of adults and fruit injury requiring management.

Spotted wing drosophila (SWD), *Drosophila suzukii*, (Matsumura) (Diptera: Drosophilidae) were first observed in NY by late August, 2011. We monitored SWD in four counties throughout the lower to mid-Hudson Valley this season using baited traps across small fruit, grape and tree fruit. The first SWD trap captures were found in Ulster County on the week of the 11th of June. A single female SWD was discovered in Warwick, Orange County using a baited Trécé trap, set during the week of June 15th -22nd . By 16th July, evaluations of unsprayed 'Summit' sweet cherry showed infestations of fruit above 10%. However, in managed 'Emperor Francis' sweet cherry, a blush, yellow / red mid-late season variety, SWD injury was not observed. By the 30th of July SWD was found infesting berry in a homeowner blueberry patch. During the week leading up to the 25th of August managed conventional patches of blackberry, red raspberry and blueberry in were found to have 10% to 100% infestation levels. Growers who harvested frequently and kept to a 3-7 day spray program were able to maintain low infestations levels (<15%) this season. We are presently recommending that growers access http://www.eddmaps.org/project/project.cfm?proj=9 for weekly updates on BMSB monitoring of adults and fruit injury for early season management.

APPLE: *Malus domestica*, cv. 'Ginger Gold', 'Red Delicious', 'McIntosh', 'Golden Delicious'

Apple Maggot (AM): *Rhagoletis pomonella* (Walsh)
Codling moth (CM): *Cydia pomonella* (Linnaeus)
European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Green fruitworm (GFW*): Lithophane antennata* (Walker)
Leafroller Complex (LR=OBLR, RBLR, VLR, TABM, SPAR)
Mullein and apple red bug; (MB): *Campylomma verbasci* (Meyer), (ARB) *Lygidea mendax* (Reuter)
Obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Oriental fruit moth (OFM): *Grapholitha molesta* (Busck)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Redbanded leafroller (RBLR): *Argyrotaenia velutinana* (Walker)
San Jose scale (SJS): *Quadraspidiotus perniciosus* (Comstock)
Stink Bug (SB): *Euschistus servus* (Say)*; Chinavia hilaris* (Say)*; Halyomorpha halys* Stål
Tarnished plant bug (TPB): *Lygus lineolaris* (Palisot de Beauvois).
Tufted apple bud moth Pl*atynota idaeusalis* (Walker, 1859)
Variegated leafroller (VLR): *Platynota flavedana* Clemens

Apple rust mite (ARM): *Aculus schlechtendali* (Nalepa)
European red mite (ERM): *Panonychus ulmi* (Koch)
Two spotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)
A predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman)

EVALUATION OF INSECTICIDES FOR CONTROLLING FRUIT FEEDING INSECT COMPLEX ON APPLE, 2015 –Hudson Valley Research Laboratory: Treatments were applied to four-tree plots of four varieties replicated four times in a randomized complete block design Treatments were applied concentrate using a Slim Line tower sprayer operated at 100 psi, delivering 0.69 to 0.75 gal/tree traveling at 2.5-2.86 mph. averaging 100 gal/acre. All insecticide calculations (presented as amt./A) are based on a standard dilution of 300 gal/acre trees. Maintenance applications for disease control and crop load reduction were also made using concentrate airblast, delivery using 100 GPA. Trees on the M.26 rootstock were 20 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Calculations used 16' tree row spacing as found in conventional production planting utilizing M.26. Alternate rows of unsprayed trees adjacent to treated plots are maintained for drift reduction, increased insect distribution and increased population pressure in yearly alternating plot placement.

Insect treatment programs in Table 1 were applied this season to manage the insect complex. Assessed during fruit development of cluster fruit damage (Tables 2a,b) was assessed before 'June drop' by randomly selecting 50 fruitlets from each tree and scoring for external damage. The 'E. LEP' category includes combined pre-bloom to 1C damage from the GFW, RBLR and OBLR, while the Leafroller complex (LR) comprised of OBLR, SPAR, TABM and VLR during the summer generations. Apple maggot assessed for both puncture and tunneling at harvest.

Evaluations of codling moth (CM) injury (Table 4) made on 29 May assessed 100 fruit in each of two varieties using calex end frass as evidence of CM activity. San Jose scale injury to fruit (Table 5) was assessed by scoring fruit as injured with 3 or more red hallo markings. Phytophagous and predacious mite populations were evaluated (Tables 6,7) by sampling 25 leaves from each plot on 20 May and 14 July. Leaves were removed to the laboratory, brushed onto glass plates using a mite-brushing machine, and examined using a binocular scope ($\geq$18X).

To stabilize variance, percent data were transformed using arcsine(Sqrt(x)) conducted prior to analysis. For numeric data such as foliar mite counts, $\log_{10}(x+1)$ transformation was used. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 1 Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

	Treatment / Formulation	Rate	Timing	Application Dates
1	Imidan 70WP	5.75 lbs./A	PF	14-May
	Delegate WG	5.2 oz/A	1-3,5-9C	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
	Closer	3 fl.oz./A	1-3,5-9C	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
2	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	7.82 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
3	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	7.82 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
	PureSpray oil	64.0 fl.oz./100	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
4	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	9.78 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
5	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	11.73 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
6	Imidan 70WP	5.75 lbs./A	1-3,5-9C	14-May
7	Asana XL 0.66EC	14.5 oz./A	TC, P	30-April, 5-May
	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	5.87 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
	Compound XB	3.43 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
8	Asana XL 0.66EC	14.5 oz./A	TC	30-April
	Imidan 70WP	5.75 lbs./A	PF	14-May
	Compound XA	4.89 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
	Compound XB	5.71 fl.oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
9	Asana XL 0.66EC	14.5 oz./A	P	5-May
	Imidan 70WP	5.75 lbs./A	PF	14-May
	Altacor 35WG	3.0 oz./A	CM 1st gen. @ 10d	24-May, 4, 11, 18, 27-June, 9, 22 July, 6, 17 August
10.	UNTREATED			

Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.3 to 1.9 gal/tree or 130 to 190 gal/acre with the range in gallonage representing the increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees.

Table 2a Evaluations Of Insecticides For Controlling Early Season Insect Complex On Apple [a]. Hudson Valley Research Lab. Highland N.Y. - 2015

Treatment / Formulation	Rate	Incidence (%) of insect damaged cluster fruit PC	TPB	MPB	LEP	EAS	Clean
6. Imidan 70WP	5.75 lbs./A	43.3 bc	1.8 a	0.0 a	0.0 a	0.0 a	49.3 b
7. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	9.5 ab	6.3 a	0.3 a	0.0 a	0.0 a	84.3 bc
8. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	12.6 ab	2.5 a	0.3 a	0.3 a	0.3 a	83.9 bc
9. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	11.2 a	3.0 a	0.0 a	0.0 a	0.0 a	85.8 c
10. UNTREATED	-	50.5 c	8.0 a	0.3 a	3.8 b	0.3 b	37.3 a
P value for transformed data		0.0024	0.2702	0.7362	0.01	0.5732	0.0001

[a] Evaluation made on May 29 on Ginger Gold cultivar. Data were transformed using arcsine(Sqrt(x)) using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 2b Evaluations Of Insecticides For Controlling Early Season Insect Complex On Apple [a]. Hudson Valley Research Lab. Highland N.Y. - 2015

Treatment / Formulation	Rate	Incidence (%) of insect damaged cluster fruit PC	TPB	MPB	LEP	EAS	Clean
6. Imidan 70WP	5.75 lbs./A	14.3 bc	5.3 a	0.3 a	0.0 a	0.0 a	80.3 b
7. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	4.9 ab	2.6 a	0.0 a	0.0 a	0.0 a	92.6 bc
8. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	9.4 ab	3.9 a	0.0 a	0.0 a	0.0 a	86.8 bc
9. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	2.5 a	3.0 a	0.0 a	0.0 a	0.0 a	94.5 c
10. UNTREATED	-	29.7 c	4.3 a	0.0 a	6.7 b	0.8 b	56.3 a
P value for transformed data		0.0331	0.5629	0.438	0.0457	0.0909	0.1888

[a] Evaluation made on May 29 on Red Delicious cultivar. Data were transformed using arcsine(Sqrt(x)) using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 3a Evaluations Of Insecticide Schedules For Managing the Mite Complex On Apple [A].
Hudson Valley Research Lab. Highland N.Y. - 2015.

Treatment / Formulation	Rate	Number of Adult Mite / Leaf ERM	TSM	ZM	AMB	ARM
6. Imidan 70WP	5.75 lbs./A	0.0 a	6.0 a	0.8 a	5.0 a	3.0 b
7. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	3.3 a	6.5 a	0.0 a	1.8 a	0.3 a
8. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	4.8 a	15.3 a	3.8 b	3.3 a	0.3 a
9. Asana XL 0.66EC Imidan 70WP	14.5 oz./A 5.75 lbs./A	0.3 a	7.5 a	0.3 a	1.8 a	0.3 a
10.	Untreated	0.0 a	2.3 a	0.5 a	1.8 a	0.0 a
P value for transformed data		0.4122	0.6783	0.0105	0.3108	0.0115

[a] Evaluation made on Red Delicious cultivar on May 20. Data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported

Table 3b Evaluations Of Insecticide Schedules For Managing the Mite Complex On Apple [A].
Hudson Valley Research Lab. Highland N.Y. - 2015.

Treatment / Formulation	Rate	Number of Adult Mite / Leaf ERM	TSSM	ZM	AMB	ARM
1 Imidan 70WP	5.75 lbs./A	3.3 ab	33.3 b	19.0 b	9.0 a	5.5 ab
Delegate WG	5.2 oz/A					
Closer	3 fl.oz./A					
2. Imidan 70WP	5.75 lbs./A	1.8 ab	1.0 a	6.5 ab	13.8 a	0.7 ab
Compound XA	7.82 fl.oz./A					
3. Imidan 70WP	5.75 lbs./A	0.8 a	4.5 a	0.8 a	4.3 a	0.0 a
Compound XA	7.82 fl.oz./A					
PureSpray oil	64.0 fl.oz./100					
4. Imidan 70WP	5.75 lbs./A	0.3 a	4.3 a	6.0 ab	18.8 a	9.8 ab
Compound XA	9.78 fl.oz./A					
5. Imidan 70WP	5.75 lbs./A	1.5 ab	3.3 a	9.5 ab	14.3 a	6.5 ab
Compound XA	11.73 fl.oz./A					
6. Imidan 70WP	5.75 lbs./A	0.8 a	0.8 a	13.0 ab	12.3 a	0.3 a
7. Asana XL 0.66EC	14.5 oz./A	7.3 b	4.5 a	2.8 ab	23.3 a	0.0 a
Imidan 70WP	5.75 lbs./A					
Compound XA	5.87 fl.oz./d					
Compound XB	3.43 fl.oz./d					
8. Asana XL 0.66EC	14.5 oz./A	1.0 a	1.5 a	14.8 ab	23.3 a	0.0 a
Imidan 70WP	5.75 lbs./A					
Compound XA	4.89 fl.oz./A					
Compound XB	5.71 fl.oz./A					
9. Asana XL 0.66EC	14.5 oz./A	0.0 a	11.5 a	4.5 ab	18.8 a	0.3 a
Imidan 70WP	5.75 lbs./A					
Altacor 35WG	3.0 oz./A					
10. Untreated		1.0 a	5.3 a	16.5 ab	9.8 a	15.0 b
P value for transformed data		0.4543	0.0256	0.3256	0.6047	0.3914

[a] Evaluation made on Red Delicious cultivar on July 14. Data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 4 Evaluations Of Insecticide Schedules For Controlling Leaf Hopper Complex on Apple [a]. Hudson Valley Research Lab. Highland N.Y. - 2015.

	Treatment / Formulation	Rate	Nymphs Complex	PLH foliar Damage
1	Imidan 70WP	5.75 lbs./A	0.8 a	26.3 ab
	Delegate WG	5.2 oz/A		
	Closer	3 fl.oz./A		
2	Imidan 70WP	5.75 lbs./A	2.0 ab	29.3 ab
	Compound XA	7.82 fl.oz./A		
3	Imidan 70WP	5.75 lbs./A	0.5 a	21.3 ab
	Compound XA	7.82 fl.oz./A		
	PureSpray oil	64.0 fl.oz./100		
4	Imidan 70WP	5.75 lbs./A	0.0 a	22.8 ab
	Compound XA	9.78 fl.oz./A		
5	Imidan 70WP	5.75 lbs./A	0.0 a	25.5 ab
	Compound XA	11.73 fl.oz./A		
6	Imidan 70WP	5.75 lbs./A	0.8 a	17.3 a
7	Asana XL 0.66EC	14.5 oz./A	0.0 a	17.8 a
	Imidan 70WP	5.75 lbs./A		
	Compound XA	5.87 fl.oz./A		
	Compound XB	3.43 fl.oz./A		
8	Asana XL 0.66EC	14.5 oz./A	0.0 a	21.0 ab
	Imidan 70WP	5.75 lbs./A		
	Compound XA	4.89 fl.oz./A		
	Compound XB	5.71 fl.oz./A		
9	Asana XL 0.66EC	14.5 oz./A	2.7 ab	37.7 ab
	Imidan 70WP	5.75 lbs./A		
	Altacor 35WG	3.0 oz./A		
10	Untreated Control		4.3 b	41.0 b

[a] Evaluation was made to McIntosh 15 July. Date transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. Leafhopper nymph complex comprised of potato leafhopper (PLH), rose and white apple leafhopper.

Table 5a Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

			Mean incidence (%) of insect damaged cluster fruit											
	Trmt./Formulation	Rate	PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM1	CM2	AmP	AmT	SJS	Clean
1	Imidan 70WP	5.75 lbs./A	16.0 bcd	0.0 a	11.0 a	0.3 a	1.8 a	0.8 a	0.3 ab	0.3 a	4.8 ab	3.3 ab	27.8 a	44.8 bc
	Delegate WG	5.2 oz/A												
	Closer	3 fl.oz./A												
2	Imidan 70WP	5.75 lbs./A	15.5 bcd	0.3 a	8.5 a	0.5 a	1.3 a	4.5 a	1.5 b	0.0 a	2.3 ab	2.0 ab	79.8 bc	13.3 ab
	Compound XA	7.82 fl.oz./A												
3	Imidan 70WP	5.75 lbs./A	24.3 cd	1.5 ab	12.6 a	0.5 a	1.8 a	1.8 a	1.8 b	1.0 a	1.5 a	1.0 a	37.1 ab	34.6 abc
	Compound XA	7.82 fl.oz./A												
	PureSpray oil	64.0 fl.oz./100												
4	Imidan 70WP	5.75 lbs./A	11.6 abc	0.5 ab	8.5 a	0.0 a	1.0 a	1.8 a	1.5 b	1.0 a	2.8 ab	2.3 ab	47.5 abc	29.5 abc
	Compound XA	9.78 fl.oz./A												
5	Imidan 70WP	5.75 lbs./A	13.2 abc	0.2 ab	7.0 a	0.0 a	0.7 a	2.2 a	0.2 ab	0.7 a	1.5 a	0.5 a	59.0 abc	52.0 c
	Compound XA	11.73 fl.oz./A												
6	Imidan 70WP	5.75 lbs./A	11.0 abc	1.0 ab	4.5 a	0.0 a	0.5 a	1.5 a	0.5 ab	0.3 a	0.5 a	0.5 a	27.3 a	54.3 c
7	Asana XL 0.66EC	14.5 oz./A	5.2 ab	0.0 a	3.3 a	0.0 a	0.0 a	0.8 a	0.3 ab	0.6 a	0.6 a	0.3 a	86.0 bc	11.6 ab
	Imidan 70WP	5.75 lbs./A												
	Compound XA	5.87 fl.oz.A												
	Compound XB	3.43 fl.oz./A												
8	Asana XL 0.66EC	14.5 oz./A	5.0 ab	0.3 ab	7.0 a	0.3 a	0.5 a	2.5 a	0.3 b	0.3 a	2.3 ab	1.5 a	88.3 c	6.5 a
	Imidan 70WP	5.75 lbs./A												
	Compound XA	4.89 fl.oz./A												
	Compound XB	5.71 fl.oz./A												
9	Asana XL 0.66EC	14.5 oz./A	4.3 a	0.0 a	4.8 a	0.5 a	1.8 a	0.5 a	0.0 a	0.3 ab	3.0 ab	2.0	76.3 abc	20.3 abc
	Imidan 70WP	5.75 lbs./A												
	Altacor 35WG	3.0 oz./A												
10.	UNTREATED		28.0 d	0.5 ab	7.8 a	0.3 a	8.3 b	11.8 a	7.5 c	7.0 b	8.0 b	7.3 b	64.5 abc	10.5 ab

Harvest evaluation of Red Delicious on 26th August. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.3 to 1.9 gal/tree or 130 to 190 gal/acre with the range in gallonage representing the increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees).

Table 5b Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

			Mean incidence (%) of insect damaged cluster fruit												
	Trmt./Formulation	Rate	PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM1	CM2	AmP	AmT	SJS	SB	Clean
1	Imidan 70WP	5.75 lbs./A	20.6 a	0.7 b	19.2 ab	4.0 a	2.2 bc	0.5 ab	0.5 a	0.3 a	2.5 ab	0.2 a	2.7 a	14.7 b	48.0 a
	Delegate WG	5.2 oz/A													
	Closer	3 fl.oz./A													
2	Imidan 70WP	5.75 lbs./A	7.8 a	0.0 a	16.5 ab	14.4 a	0.0 a	0.9 ab	0.0 a	0.5 a	0.8 a	0.0 a	35.7 a	3.7 a	45.5 a
	Compound XA	7.82 fl.oz./A													
3	Imidan 70WP	5.75 lbs./A	7.3 a	0.6 ab	15.7 ab	3.2 a	3.8 c	0.6 ab	1.8 a	0.0 a	1.2 ab	0.0 a	5.5 a	7.8 ab	59.5 a
	Compound XA	7.82 fl.oz./A													
	PureSpray oil	64.0 fl.oz./100													
4	Imidan 70WP	5.75 lbs./A	11.6 a	0.3 ab	21.9 ab	3.7 a	2.0 abc	0.8 ab	0.3 a	0.0 a	1.5 ab	0.3 a	23.4 a	5.6 ab	42.4 a
	Compound XA	9.78 fl.oz./A													
5	Imidan 70WP	5.75 lbs./A	8.8 a	0.3 ab	21.5 ab	1.6 a	0.5 ab	0.0 a	0.0 a	0.3 a	0.8 a	1.8 a	13.8 a	7.1 ab	54.8 a
	Compound XA	11.73 fl.oz./A													
6	Imidan 70WP	5.75 lbs./A	8.5 a	0.3 ab	24.6 b	4.1 a	2.5 bc	1.5 ab	0.0 a	0.0 a	2.3 ab	0.3 a	4.6 a	5.8 ab	53.0 a
7	Asana XL 0.66EC	14.5 oz./A	2.9 a	0.0 a	9.7 a	3.0 a	0.8 ab	0.7 ab	0.0 a	0.3 a	0.7 a	0.0 a	20.0 a	12.0 ab	52.9 a
	Imidan 70WP	5.75 lbs./A													
	Compound XA	5.87 fl.oz.A													
	Compound XB	3.43 fl.oz./A													
8	Asana XL 0.66EC	14.5 oz./A	3.5 a	0.0 a	11.7 ab	1.8 a	2.6 bc	2.7 bc	0.0 a	0.0 a	1.7 ab	0.0 a	23.8 a	6.3 ab	56.4 a
	Imidan 70WP	5.75 lbs./A													
	Compound XA	4.89 fl.oz./A													
	Compound XB	5.71 fl.oz./A													
9	Asana XL 0.66EC	14.5 oz./A	2.4 a	0.7 ab	11.7 ab	2.1 a	1.4 abc	0.3 a	0.0 a	0.0 a	1.8 ab	1.3 a	14.3 a	14.2 b	57.6 a
	Imidan 70WP	5.75 lbs./A													
	Altacor 35WG	3.0 oz./A													
10.	UNTREATED		19.2 a	0.3 ab	24.9 b	2.5 a	2.0 bc	4.3 c	1.8 a	0.0 a	8.4 b	1.5 a	23.5 a	5.0 ab	33.3 a
P VALUE			0.6007	0.2918	0.2742	0.796	0.0779	0. 0189	0.3573	0.7231	0.5475	0.2422	0.8118	0.3392	0.8444

Harvest evaluation of Ginger Gold on 5th August. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.3 to 1.9 gal/tree or 130 to 190 gal/acre with the range in gallonage representing the increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees).

Table 5c Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

			Mean incidence (%) of insect damaged cluster fruit												
	Trmt./Formulation	Rate	PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM_1	CM_2	AmP	AmT	SJS	SB	Clean
1	Imidan 70WP	5.75 lbs./A	11.5 ab	0.5 ab	16.4 bc	0.4 ab	0.0 a	0.8 a	0.0 a	0.0 a	2.4 ab	0.8 a	27.0 a	6.3 b	42.4 bc
	Delegate WG	5.2 oz/A													
	Closer	3 fl.oz./A													
2	Imidan 70WP	5.75 lbs./A	8.8 ab	0.0 a	15.5 bc	2.0 ab	2.4 b	0.3 a	0.0 a	0.3 a	2.4 ab	0.0 a	77.6 bc	2.1 ab	17.0 ab
	Compound XA	7.82 fl.oz./A													
3	Imidan 70WP	5.75 lbs./A	4.2 ab	0.6 ab	11.8 abc	0.0 a	0.0 ab	1.8 a	0.0 a	0.6 a	1.0 a	0.7 a	36.9 ab	3.5 ab	46.6 bc
	Compound XA	7.82 fl.oz./A													
	PureSpray oil	64.0 fl.oz./100													
4	Imidan 70WP	5.75 lbs./A	6.5 ab	0.8 ab	16.2 bc	0.5 ab	1.9 ab	1.3 a	0.8 a	0.0 a	1.9 ab	0.6 a	55.4 abc	3.5 ab	28.3 abc
	Compound XA	9.78 fl.oz./A													
5	Imidan 70WP	5.75 lbs./A	4.3 ab	0.0 a	10.6 abc	0.0 a	1.5 ab	1.7 a	0.0 a	0.0 a	1.2 a	0.6 a	55.1 abc	3.4 ab	28.4 abc
	Compound XA	11.73 fl.oz./A													
6	Imidan 70WP	5.75 lbs./A	8.1 ab	0.0 a	16.2 bc	0.0 a	0.8 ab	0.5 a	0.0 a	0.0 a	0.5 a	0.0 a	28.6 a	2.6 ab	51.6 c
7	Asana XL 0.66EC	14.5 oz./A	0.7 a	1.1 b	4.4 ab	0.6 ab	0.7 ab	2.1 a	0.6 a	0.0 a	1.8 ab	1.2 a	93.4 c	0.7 a	4.2 a
	Imidan 70WP	5.75 lbs./A													
	Compound XA	5.87 fl.oz.A													
	Compound XB	3.43 fl.oz./A													
8	Asana XL 0.66EC	14.5 oz./A	1.5 a	0.0 a	4.7 a	0.0 a	0.4 ab	0.3 a	0.4 a	0.0 a	2.1 ab	0.6 a	71.5 abc	3.6 ab	22.4 abc
	Imidan 70WP	5.75 lbs./A													
	Compound XA	4.89 fl.oz./A													
	Compound XB	5.71 fl.oz./A													
9	Asana XL 0.66EC	14.5 oz./A	2.9 ab	0.0 a	5.8 abc	0.5 ab	0.0 ab	0.5 a	0.0 a	0.5 a	0.7 a	0.0 a	67.6 abc	1.8 ab	27.5 abc
	Imidan 70WP	5.75 lbs./A													
	Altacor 35WG	3.0 oz./A													
10.	UNTREATED		20.5 b	0.0 a	19.0 c	2.7 b	0.6 ab	10.0 b	1.3 a	1.0 a	6.1 b	1.4 a	32.2 ab	7.3 ab	25.0 abc
P VALUE			0.5028	0.217	0.1346	0.228	0.4237	0.0077	0.443	0.4744	0.3265	0.693	0.0866	0.6297	0.1904

Harvest evaluation of MacIntosh on 25th September. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.3 to 1.9 gal/tree or 130 to 190 gal/acre with the range in gallonage representing the increasing amounts of foliage as the season progressed. Insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees).

APPLE: *Malus domestica*, cv. 'Ginger Gold', 'Red Delicious', 'McIntosh', 'Golden Delicious'

European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Green fruitworm (GFW*): Lithophane antennata* (Walker)
Mullein and apple red bug; (MB): *Campylomma verbasci* (Meyer), (ARB) *Lygidea mendax* (Reuter)
Obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Redbanded leafroller (RBLR): *Argyrotaenia velutinana* (Walker)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)
San Jose scale (SJS): *Quadraspidiotus perniciosus* (Comstock)
Oriental fruit moth (OFM): *Grapholitha molesta* (Busck)
Codling moth (CM): *Cydia pomonella* (Linnaeus)

Apple rust mite (ARM): *Aculus schlechtendali* (Nalepa)
European red mite (ERM): *Panonychus ulmi* (Koch)
Two spotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)
A predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman)

EVALUATION OF INSECTICIDES FOR CONTROLLING FRUIT FEEDING INSECT COMPLEX ON APPLE, 2015 –Hudson Valley Research Laboratory: Treatments were applied to four-tree plots of four varieties replicated four times in a randomized complete block design Treatments were applied concentrate using a Slim Line tower sprayer operated at 100 psi, delivering 0.69 to 0.75 gal/tree traveling at 2.5-2.86 mph. averaging 100 gal/acre. All insecticide calculations (presented as amt./A) are based on a standard dilution of 300 gal/acre trees. Maintenance applications for disease control and crop load reduction were also made using concentrate airblast, delivering 100 GPA. Trees on the M.26 rootstock were 20 year-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Calculations used 16' tree row spacing as found in conventional production planting utilizing M.26. Alternate rows of unsprayed trees adjacent to treated plots are maintained for drift reduction, increased insect distribution and increased population pressure in yearly alternating plot placement.

Insect treatment programs (Table 6) were applied this season to manage the insect complex. Directed treatment of San Jose scale (SJS) included Movento SC, Centaur 0.7 WDG and Esteem 35WP applied in a single application at petal fall against the overwintering adult. Fruit were assessed for 1st generation CM on 24 June and harvested on 3rd September and October 5th from Ginger Gold and Red Delicious respectively by randomly selecting 100 fruit, 75/25 from the perimeter and the interior respectively in each treatment for varieties assessed for insect damage. Injury to harvested fruit (Tables 8a-b) was assessed by scoring fruit as injured with 1 = 1-3, 2 = 4-10 or 3= >10 red hallo markings typical of SJS fruit infestation.

To stabilize variance, percent data were transformed using arcsine(Sqrt(x)) conducted prior to analysis. For numeric data such as foliar mite counts, $\log_{10}(x+1)$ transformation was used. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 6 Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

Treatment / Formulation	Rate	Timing	Application Dates
1 Sivanto	10.5 oz./A	PF	14-May
LI700	8.0 oz./100	PF	14-May
Imidan 70WP	5.75 lbs./A	PF	14-May
Belt	5.0 oz./A	CM (1C-2C)	24-May, 4 June
LI700	24.0 oz./100	1-2C	24-May, 4 June
2 Sivanto	14.0 oz./A	PF	14-May
LI700	8.0 oz./100	PF	14-May
Imidan 70WP	5.75 lbs./A	PF	14-May
Belt	5.0 oz./A	CM (1C-2C)	24-May, 4 June
LI700	24.0 oz./100	1-2C	24-May, 4 June
3 Sivanto	10.5 oz./A	PF	14-May
LI700	8.0 oz./100	PF	14-May
Imidan 70WP	5.75 lbs./A	PF	14-May
Movento SC	9.0 oz./A	1C	24-May
Belt	5.0 oz./A	CM (1C-2C)	24-May, 4 June
LI700	24.0 oz./100	1-2C	24-May, 4 June
4 Sivanto	14.0 oz./A	PF	14-May
LI700	8.0 oz./100	PF	14-May
Imidan 70WP	5.75 lbs./A	PF	14-May
Movento SC	9.0 oz./A	1C	24-May
Belt	5.0 oz./A	CM (1C-2C)	24-May, 4 June
LI700	24.0 oz./100	1-2C	24-May, 4 June
5 Imidan 70WP	5.75 lbs./A	PF-2C	14, 24-May, 4 June
6 Imidan 70WP	5.75 lbs./A	PF	14-May
Esteem 35WP	5.0 oz./A	1C	24-May
7 Imidan 70WP	5.75 lbs./A	PF	14-May
Centaur 0.7 WDG	46.0 oz./A	1C	24-May
8 UNTREATED			

Treatments were applied concentrate using a Slim Line tower sprayer operated at 100 psi, delivering 0.69 to 0.75 gal/tree traveling at 2.5-2.86 mph. averaging 100 gal/acre. representing the increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees.

Table 7 Evaluations Of Insecticide Schedules For Controlling San Jose Scale On Apple [a]. Hudson Valley Research Lab. Highland N.Y. - 2015.

Treatment / Formulation	Rate	% Fruit rated by Severity Scale (0-3) 1	2	3	% SJS	Clean
1 Sivanto	10.5 oz./A	3.0	4.0	0.0	7.0 a	93.0 b
LI700	8.0 oz./100					
Imidan 70WP	5.75 lbs./A					
Belt	5.0 oz./A					
LI700	24.0 oz./100					
2 Sivanto	14.0 oz./A	4.0	0.0	0.0	4.0 ab	96.0 ab
LI700	8.0 oz./100					
Imidan 70WP	5.75 lbs./A					
Belt	5.0 oz./A					
LI700	24.0 oz./100					
3 Sivanto	10.5 oz./A	3.0	0.0	0.0	3.0 ab	97.0 ab
LI700	8.0 oz./100					
Imidan 70WP	5.75 lbs./A					
Movento SC	9.0 oz./A					
Belt	5.0 oz./A					
LI700	24.0 oz./100					
4 Sivanto	14.0 oz./A	1.0	0.0	0.0	1.0 ab	99.0 ab
LI700	8.0 oz./100					
Imidan 70WP	5.75 lbs./A					
Movento SC	9.0 oz./A					
Belt	5.0 oz./A					
LI700	24.0 oz./100					
5 Imidan 70WP	5.75 lbs./A	0.0	0.0	0.0	0.0 b	100.0 a
6 Imidan 70WP	5.75 lbs./A	4.0	0.0	0.0	4.0 ab	96.0 ab
Esteem 35WP	5.0 oz./A					
7 Imidan 70WP	5.75 lbs./A	4.0	0.0	0.0	3.0 ab	97.0 ab
Centaur 0.7 WDG	46.0 oz./A					
8 Untreated		2.0	0.0	0.0	2.0 ab	98.0 ab

[a] Evaluation was made on 24 June assessing 100 red delicious fruit for 1st generation SJS. Percent data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. Assessment of fruit rated by severity scale (0-3) in which 0=clean, 1=1-3 SJS, 2=4-10 SJS, 3=>11 SJS

Table 8a Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

							Mean incidence (%) of insect damaged cluster fruit							
Trmt./Formulation	Rate	PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM1	CM2	AmP	AmT	SJS	SB	Clean
1 Sivanto + LI700*	10.5 oz./A	17.3 a	0.7 ab	18.7 a	2.0 ab	0.7 a	0.0 a	2.0 a	1.7 ab	17.7 a	4.4 ab	5.4 b	12.2 a	44.9 a
Imidan 70WP	5.75 lbs./A													
Belt + LI700*	5.0 oz./A													
2 Sivanto + LI700*	14.0 oz./A	17.0 a	1.0 bc	26.1 a	4.6 ab	4.6 ab	3.1 ab	3.6 a	2.0 bc	22.1 a	5.7 ab	0.5 ab	10.3 a	41.1 a
Imidan 70WP	5.75 lbs./A													
Belt + LI700*	5.0 oz./A													
3 Sivanto + LI700*	10.5 oz./A	17.0 a	0.0 a	17.9 a	0.0 a	0.5 a	0.0 a	1.1 a	0.0 a	33.5 a	9.7 b	0.0 a	8.1 a	42.0 a
Imidan 70WP	5.75 lbs./A													
Movento SC	9.0 oz./A													
Belt + LI700*	5.0 oz./A													
4 Sivanto + LI700*	14.0 oz./A	22.8 a	2.2 c	19.9 a	1.3 ab	6.1 b	6.3 b	2.5 a	3.2 bc	17.1 a	3.7 ab	0.0 a	12.4 a	33.1 a
Imidan 70WP	5.75 lbs./A													
Movento SC	9.0 oz./A													
Belt + LI700*	5.0 oz./A													
5 Imidan 70WP	5.75 lbs./A	8.1 a	1.1 bc	18.9 a	3.8 ab	7.2 b	2.5 ab	2.0 a	1.3 ab	8.0 a	0.9 a	6.6 b	8.5 a	47.4 a
6 Imidan 70WP	5.75 lbs./A	20.2 a	0.3 ab	12.8 a	3.0 ab	3.8 ab	5.1 b	4.9 a	6.0 c	13.4 a	1.7 ab	0.0 a	9.5 a	42.0 a
Esteem 35WP	5.0 oz./A													
7 Imidan 70WP	5.75 lbs./A	22.8 a	0.0 a	9.5 a	4.5 b	3.0 ab	2.0 ab	2.5 a	2.0 bc	12.2 a	2.0 ab	1.5 ab	3.0 a	54.5 a
Centaur 0.7 WDG	46.0 oz./A													
8 UNTREATED		31.3 a	0.0 a	16.1 a	1.7 ab	4.2 ab	4.5 b	3.2 a	3.2 bc	4.9 a	1.0 ab	2.3 ab	4.7 a	34.6 a
P Value		0.7939	0.0164	0.6893	0.4524	0.1122	0.1118	0.553	0.0238	0.8018	0.4238	0.0709	0.586	0.986

Harvest evaluation of Ginger Gold on 3rd September. Data were transformed using arcsine (Sqrt(x)) using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

* LI700 rates for Sivanto @ 8.0 oz./100; Belt @ 24.0 oz./100

Table 8b Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

			Mean incidence (%) of insect damaged cluster fruit												
Trmt.	Formulation	Rate	PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM1	CM2	AmP	AmT	SJS	SB	Clean
1	Sivanto	10.5 oz./A	5.3 a	0.0 a	7.3 a	1.3 ab	2.3 ab	1.8 ab	3.3 ab	0.8 ab	1.5 abc	0.3 ab	42.8 c	11.8 a	37.8 a
	LI700	8.0 oz./100													
	Imidan 70WP	5.75 lbs./A													
	*Belt	5.0 oz./A													
2	Sivanto	14.0 oz./A	4.3 a	0.0 a	7.8 a	0.5 a	1.0 a	1.5 a	2.5 ab	0.3 a	0.5 a	0.0 a	8.3 b	12.8 a	66.8 b
	LI700	8.0 oz./100													
	Imidan 70WP	5.75 lbs./A													
	*Belt	5.0 oz./A													
3	Sivanto	10.5 oz./A	5.0 a	0.0 a	9.0 a	1.0 ab	2.0 ab	4.8 bc	3.0 ab	0.5 ab	2.8 bc	1.5 b	4.3 ab	15.5 a	52.5 ab
	LI700	8.0 oz./100													
	Imidan 70WP	5.75 lbs./A													
	Movento SC	9.0 oz./A													
	*Belt	5.0 oz./A													
4	Sivanto	14.0 oz./A	1.5 a	0.3 ab	10.3 a	1.0 ab	0.8 a	1.3 a	0.8 a	0.8 ab	1.3 abc	0.5 ab	2.0 ab	10.3 a	73.3 b
	LI700	8.0 oz./100													
	Imidan 70WP	5.75 lbs./A													
	Movento SC	9.0 oz./A													
	*Belt	5.0 oz./A													
5	Imidan 70WP	5.75 lbs./A	6.0 a	0.5 b	11.3 a	1.0 a	3.3 ab	3.8 abc	2.5 ab	0.3 a	2.5 bc	1.3 ab	3.0 ab	8.0 a	64.2 b
6	Imidan 70WP	5.75 lbs./A	3.8 a	0.0 a	7.1 a	0.5 a	4.3 bc	5.5 cd	4.8 ab	1.5 ab	2.0 abc	1.0 ab	2.0 ab	7.8 a	66.4 b
	Esteem 35WP	5.0 oz./A													
7	Imidan 70WP	5.75 lbs./A	2.5 a	0.0 a	9.5 a	0.8 a	3.5 ab	3.3 abc	5.3 b	2.5 b	0.8 ab	0.3 ab	1.0 a	8.8 a	67.2 b
	Centaur 0.7 WDG	46.0 oz./A													
8	UNTREATED		22.3 b	0.3 ab	13.0 a	5.3 b	10.5 c	10.3 d	6.8 b	0.8 ab	4.0 c	1.5 ab	3.0 ab	15.5 a	34.4a
	P Value		0.0515	0.2612	0.8523	0.1944	0.0041	0.0009	0.2001	0.3792	0.1451	0.3003	0.0001	0.8412	0.0224

Harvest evaluation Red Delicious on 5th October Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.3 to 1.9 gal/tree or 130 to 190 gal/acre with the range in gallonage representing the increasing amounts of foliage as the season progressed. All insecticide dilutions.

* LI700 rates for Sivanto @ 8.0 oz./100; Belt @ 24.0 oz./100

APPLE: *Malus domestica*, cv. 'Red Delicious'

European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Green fruitworm (GFW*): Lithophane antennata* (Walker)
Mullein and apple red bug; (MB): *Campylomma verbasci* (Meyer), (ARB) *Lygidea mendax* (Reuter)
Obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Redbanded leafroller (RBLR): *Argyrotaenia velutinana* (Walker)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)
San Jose scale (SJS): *Quadraspidiotus perniciosus* (Comstock)
Oriental fruit moth (OFM): *Grapholitha molesta* (Busck)
Codling moth (CM): *Cydia pomonella* (Linnaeus)

Apple rust mite (ARM): *Aculus schlechtendali* (Nalepa)
European red mite (ERM): *Panonychus ulmi* (Koch)
Two spotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)
A predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman)

EVALUATION OF INSECTICIDES FOR CONTROLLING FRUIT FEEDING INSECT COMPLEX ON APPLE, 2015 –Hudson Valley Research Laboratory: Treatments were applied to large plots (of 25) 6 year-old red delicious on M.9, maintained at a 10' height, planted to a research spacing of 3' x 15' of 968 trees per acre replicated three times in a randomized complete block design. Treatments were applied concentrate using a Slim Line tower sprayer, operated at 100 psi, delivering 0.09 to 0.10 gal/tree, traveling at 2.5-2.86 mph. averaging 92.0 gal/acre. All insecticide calculations (presented as amt./A) are based on a standard dilution of 300 gal/acre trees. Maintenance applications for disease control and crop load reduction were also made using concentrate Green airblast, delivering 100 GPA. Untreated trees of four varieties on M.26 rootstock planted in parallel rows to inhibit drift and build insect populations. Calculations used 14' tree row spacing as found in conventional production planting utilizing M.9.

Insect programs (Table 9) were applied this season to manage the lepidopteran insect complex. Applications were timed for 1st generation codling moth continuing through the end of the 2nd generation, based on first sustained pheromone trap capture on 11th May and larval emergence predicted for 27th May using 220 DD_{50} from CM biofix. Assessments conducted on the tree of fruit for 1st generation infestation levels on 28th June on Red Delicious. The 2nd generation adult sustained catch for the CM biofix occurred on 13th July with management for larval emergence prediction using 250 DD_{50} to occur on 20 July. Assessments were made at harvest on 26th August.

To stabilize variance, percent data were transformed using arcsine(Sqrt(x)) conducted prior to analysis. For numeric data such as foliar mite counts, $\log_{10}(x+1)$ transformation was used. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Table 9 Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

Treatment / Formulation	Rate	Timing	Application Dates
1. Compound XA	9.78 oz./A	1st Gen CM @ 10d to EOS	8, 12, 27 June, 9, 22 July, 6, 17 August
Horticultural Oil	64.0 fl.oz./100	1st Gen CM @ 10d to EOS	8, 12, 27 June, 9, 22 July, 6, 17 August
Actatra	4.5 oz./A	PF	15 May
2. Altacor 35WG	3.0 oz./A	1st Gen CM @ 10d to EOS	12, 27 June, 9, July
Compound XA	9.78 oz./A	2nd Gen CM @ 10d to EOS	22 July, 6, 17 August
Horticultural Oil	64.0 fl.oz./100	1st & 2nd Gen CM @ 10d to EOS	12, 27 June, 9, 22 July, 6, 17 August
Actatra	4.5 oz./A	PF	15 May
3. Delegate	6.5 oz./A	1st Gen CM @ 10d to EOS	12, 27 June, 11, 25 July, 6, 19 August
Actatra	4.5 oz./A	PF	15 May
4. UNTREATED			

Treatments were applied concentrate using a Slim Line tower sprayer operated at 100 psi, delivering 0.09 to 0.10 gal/tree traveling at 2.5-2.86 mph. averaging 100 gal/acre.All insecticide dilutions (presented as amt./100 gal) are based on a standard of 300 gal/acre trees.

Table 10a Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab, Highland, N.Y. - 2015.

Trmt./Formulation	Rate	Mean incidence (%) of codling moth damaged CM 1st Gen.	Clean
1 Compound XA	9.78 oz./A	3.0 b	97.0 a
BioCover Oil	64.0 fl.oz./100		
2 ALTACOR 35WG	3.0 oz./A	0.0 a	100.0 b
Compound XA	9.78 oz./A		
BioCover Oil	64.0 fl.oz./100		
3 Delegate WG	6.5 oz/A	0.3 b	99.7 b
Actatra	4.5 oz./A		
4 White/ Untreated		4.0 b	96.0 a
P value for transformed data		0.0050	0.0050

Table 10b Treatment Schedule For Seasonal Apple Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

Trmt./Formulation	Rate	Mean incidence (%) of insect damaged cluster fruit PC	EAS	TPB	E.LEP	LR	Int.Lep.	CM1	CM2	AmP	AmT	SJS	Clean
1 Compound XA	9.78 oz./A	10.1 b	0.00 a	4.0 a	0.0 a	0.7 a	1.3 a	0.0 a	0.7 a	2.6 a	0.0 a	12.4 a	67.8 b
BioCover Oil	64.0 fl.oz./100												
2 ALTACOR 35WG	3.0 oz./A	7.0 ab	0.3 ab	3.0 a	1.0 a	0.7 a	0.7 a	0.3 a	0.0 a	3.4 a	1.0 a	14.7 a	65.6 b
Compound XA	9.78 oz./A												
BioCover Oil	64.0 fl.oz./100												
3 Delegate WG	6.5 oz/A	5.8 a	1.4 b	2.0 a	0.7 a	1.0 a	1.4 a	0.0 a	0.0 a	2.0 a	0.7 a	13.9 a	69.1 b
Actatra	4.5 oz./A												
4 White/ Untreated		8.1 ab	1.0 ab	3.7 a	12.4 b	4.4 b	13.8 b	6.4 b	10.1 b	11.7 b	3.4 a	7.4 a	34.6 a
P value for transformed data		0.1433	0.0779	0.8992	0.0003	0.4398	0.0022	0.0064	0.0005	0.0266	0.0153	0.5911	0.0111

Harvest evaluation of Red Delicious on 26th August. Percent data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. .

PEAR: *Pyrus communis* L. 'Bartlett', 'Bosc'

Pear psylla: *Cacopsylla pyricola* (Foerster)
Codling moth (CM): *Cydia pomonella* (Linnaeus)
Pear rust mite (PRM): *Epitrimerus pyri*
Fabraea Leaf Spot (FLS) *Fabraea maculata*

EFFICACY OF INSECTICIDES AGAINST PEAR PSYLLA ADULTS, EGGS AND NYMPHS, 2013: – Cornell University's Hudson Valley Lab: Treatments were applied to four-tree plots replicated four times in a RCB design. Each plot contained two trees each of 'Bartlett' and 'Bosc' cultivars, spaced 12 x 18 ft, 12 ft in height, and 33 years old. All dilutions are based on 400 gallons/acre with plot requirements ranging from 20 to 50 gallons increasing seasonally with developing canopy. Treatments were applied dilute to runoff using a three-point hitch tractor mounted high-pressure pecan handgun sprayer operated at 300 psi delivering $\geq$350 GPA.

Treatments were applied on various schedules as shown in Table 11. The onset of pear psylla 1st egg observation on 6th April with 1st observed nymph on 4th May and nymph threshold on 18th May; Application dates corresponding to tree phenology of 'Bartlett' began at delayed dormant (DD) on 14th April, bud burst (BB) on 20th April green cluster (GC) on 27th April, white bud (WB) on 4th May; bloom on 6th May, crop load reduction using NAA and 0.25% oil on 10 May, >5mm fruit set of Bartlett on 11th May, AgriMek on 12th May with the 21 day post application on 23rd June.

Scheduled applications were made against the pear insect complex with early applications targeting overwintering adult and first generation of pear psylla. Evaluations made to determine the treatment effects on pear psylla adult, egg and nymph populations in Table 12a-c. During the period from bud burst through 1st cover, evaluations to determine treatment effects on springform adult ovipositional deterrence, including subsequent 1st generation nymph emergence were conducted. Evaluations began on 17 & 29 June, in which 25 fruiting buds or leaves per treatment were evaluated. Subsequent application schedules were designed to evaluate treatments against the late 1st and early 2nd generation pear psylla adult, egg, nymph and pear rust mite populations, assessed initially with collections of 25 basal leaves of 5 shoots, with subsequent evaluations removing 1 distal, 1 proximal and 3 mid-shoot leaves of 5 shoots per treatment through remainder of the season, removed to the laboratory where target pests were counted using a binocular scope. The transformation using the Log_{10} (X + 1) was applied for foliar evaluations. To stabilize variance, percentage data were transformed by arcsine *(square root of x) prior to analysis. Fisher's Protected LSD (P=<0.05) was performed on all data to determine significance; untransformed data are presented in each table.

The greatest season long control of the psylla nymph was achieved by early pre-bloom and petal fall applications of Surround WP at 50 lbs./A on 14 April, 4 and 12 May, followed by post PF applications of 1% horticultural oil on 24 May, 22 June, 8 July. No rust mites were observed in the orchard this season.

Table 11 Treatment Schedule For Seasonal Pear Insecticide Screen.
Hudson Valley Research Lab., Highland, N.Y. - 2015.

Treatment / Formulation	Rate	Timing	Application Dates
1 BioCover Oil	128.0 fl.oz./100	DD, WB	14 April, 4 May
M-Pede 49L	256.0 fl.oz./100	PF- 3C	12, 24 May, 22 June, 8 July
2. BioCover Oil	128.0 fl.oz./100	DD, WB,PF	14 April, 4, 12 May
+ Surround	12.5 lbs./100	DD, WB PF	14 April, 4, 12 May
BioCover Oil	128.0 fl.oz./100	1-3C	24 May, 22 June, 8 July
3. Surround	12.5 lbs./100	DD, WB, PF	14 April, 4 May, 12 May
BioCover Oil	128.0 fl.oz./100	1 – 3C	24 May, 22 June, 8 July
4. BioCover Oil	128.0 fl.oz./100	DD	14 April
Asana XL	12.8 fl.oz./A	DD, PF	14 April, 12 May
AgriMek	20.0 fl.oz./A	10pPF + 21d	24 May, 22 June
Movento 240SC	9.0 oz./A	3C	8 July
BioCover Oil	32.0 fl.oz./100	3C	8 July
5. BioCover Oil	128 fl.oz./100	DD	14 April
Actara	5.5 oz./A	DD, PF	14 April, 12 May
AgriMek	20.0 fl.oz./A	10pPF + 21d	24 May, 23 June
Movento 240SC	9.0 oz./A	3C	8 July
BioCover Oil	128.0 fl.oz./100	3C	8 July
6. Oil	256.0 fl.oz./100	DD	14 April
Oil	32.0 fl.oz./100	WB, 3C	4 May, 8 July
Centaur 0.7WDG	46.0 oz./A	WB, 3C	4 May, 8 July
AgriMek	20.0 fl.oz./A	10pPF + 21d	24 May, 23 June
7. Oil	256.0 fl.oz./100	DD	14 April
Oil	32.0 fl.oz./100	WB, 3C	4 May, 8 July
Esteem 35WP	5.0 oz./A	WB, 3C	4 May, 8 July
AgriMek	20.0 fl.oz./A	10pPF + 21d	24 May, 23 June
8. UTC			

All applications made using a three-point hitch tractor mounted ‘Pack Tank’ sprayer and pecan handgun applied at 300 psi. dilute to runoff. All treatmens received a PF application of Imidan 70WP for plum curculio .

Table 12a Evaluations Of Insecticide Schedules For Controlling Insect Complex On Pear [A]. Hudson Valley Research Lab. Highland N.Y. -2014.

				Pear psylla Nymphs per 25 leaf or bud sample			
Treatment / Formulation	Rate	Timing	17 June	29 June	15 July	29 July
1 BioCover Oil	128.0 fl.oz./100	DD, WB	60.8 b	45.5 bcd	4.8 a	6.7 ab
M-Pede 49L	256.0 fl.oz./100	PF- 3C				
2. BioCover Oil	128.0 fl.oz./100	DD, WB,PF	26.3 a	5.0 a	2.0 a	10.7 ab
+ Surround	12.5 lbs./100	DD, WB PF				
BioCover Oil	128.0 fl.oz./100	1-3C				
3. Surround	12.5 lbs./100	DD, WB, PF	25.0 a	17.5 a	1.2 a	3.0 a
BioCover Oil	128.0 fl.oz./100	1 – 3C				
4. BioCover Oil	128.0 fl.oz./100	DD	56.0 ab	59.3 cd	2.7 a	10.7 ab
Asana XL	12.8 fl.oz./A	DD, PF				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
Movento 240SC	9.0 oz./A	3C				
BioCover Oil	32.0 fl.oz./100	3C				
5. BioCover Oil	128 fl.oz./100	DD	54.0 ab	36.0 abcd	3.2 a	26.0 b
Actara	5.5 oz./A	DD, PF				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
Movento 240SC	9.0 oz./A	3C				
BioCover Oil	128.0 fl.oz./100	3C				
6. Oil	256.0 fl.oz./100	DD	64.0 b	58.5 abc	5.0 a	10.0 ab
Oil	32.0 fl.oz./100	WB, 3C				
Centaur 0.7WDG	46.0 oz./A	WB, 3C				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
7. Oil	256.0 fl.oz./100	DD	65.8 b	65.5 d	5.7 a	7.7 ab
Oil	32.0 fl.oz./100	WB, 3C				
Esteem 35WP	5.0 oz./A	WB, 3C				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
8. UTC			101.3 c	21.8 ab	24.8 b	3.6 a
P value for transformed data			0.0009	0.0275	0.0001	0.4849

[a] Seasonal evaluations made on 'Bartlett'.

Percent data were transformed using $\log_{10}(x+1)$ conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. All applications made using a three-point hitch tractor mounted 'Pack Tank' sprayer and pecan handgun applied at 300 psi. dilute to runoff.

Table 12b Evaluations Of Insecticide Schedules For Controlling Insect Complex On Pear [A]. Hudson Valley Research Lab. Highland N.Y. -2014.

	Treatment / Formulation	Rate	Timing	Pear psylla Eggs per 25 leaf sample 17 June	29 June	15 July	29 July
1	BioCover Oil	128.0 fl.oz./100	DD, WB	115.5 a	7.3 a	0.0 a	4.0 a
	M-Pede 49L	256.0 fl.oz./100	PF- 3C				
2.	BioCover Oil	128.0 fl.oz./100	DD, WB,PF	76.0 a	6.5 a	0.0 a	2.7 a
	+ Surround	12.5 lbs./100	DD, WB PF				
	BioCover Oil	128.0 fl.oz./100	1-3C				
3.	Surround	12.5 lbs./100	DD, WB, PF	99.7 a	13.8 a	0.2 a	1.3 a
	BioCover Oil	128.0 fl.oz./100	1 – 3C				
4.	BioCover Oil	128.0 fl.oz./100	DD	109.8 a	8.25 a	0.0 a	2.7 a
	Asana XL	12.8 fl.oz./A	DD, PF				
	AgriMek	20.0 fl.oz./A	10pPF + 21d				
	Movento 240SC	9.0 oz./A	3C				
	BioCover Oil	32.0 fl.oz./100	3C				
5.	BioCover Oil	128 fl.oz./100	DD	83.5a	13.3 a	0.3 a	1.7 a
	Actara	5.5 oz./A	DD, PF				
	AgriMek	20.0 fl.oz./A	10pPF + 21d				
	Movento 240SC	9.0 oz./A	3C				
	BioCover Oil	128.0 fl.oz./100	3C				
6.	Oil	256.0 fl.oz./100	DD	108.0 a	11.8 a	0.3 a	1.7 a
	Oil	32.0 fl.oz./100	WB, 3C				
	Centaur 0.7WDG	46.0 oz./A	WB, 3C				
	AgriMek	20.0 fl.oz./A	10pPF + 21d				
7.	Oil	256.0 fl.oz./100	DD	87.5 a	7.5 a	1.0 a	2.7 a
	Oil	32.0 fl.oz./100	WB, 3C				
	Esteem 35WP	5.0 oz./A	WB, 3C				
	AgriMek	20.0 fl.oz./A	10pPF + 21d				
8.	UTC			94.3 a	9.5 a	11.2 b	2.0 a
P value for transformed data				0.8943	0.7151	0.0009	0.9346

[a] Seasonal evaluations made on 'Bartlett'.

Percent data were transformed using $\log_{10}(x+1)$ conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. All applications made using a three-point hitch tractor mounted 'Pack Tank' sprayer and pecan handgun applied at 300 psi. dilute to runoff.

Table 12c Evaluations Of Insecticide Schedules For Controlling Insect Complex On Pear [A]. Hudson Valley Research Lab. Highland N.Y. -2014.

				Pear Rust Mite per 25 leaf sample			
Treatment / Formulation	Rate	Timing	17 June	29 June	15 July	29 July
1 BioCover Oil	128.0 fl.oz./100	DD, WB	0.3 a	0.0 a	0.0 a	0.0 a
M-Pede 49L	256.0 fl.oz./100	PF- 3C				
2. BioCover Oil	128.0 fl.oz./100	DD, WB,PF	0.0 a	0.0 a	0.0 a	0.0 a
+ Surround	12.5 lbs./100	DD, WB PF				
BioCover Oil	128.0 fl.oz./100	1-3C				
3. Surround	12.5 lbs./100	DD, WB, PF	0.0 a	0.0 a	0.0 a	0.0 a
BioCover Oil	128.0 fl.oz./100	1 – 3C				
4. BioCover Oil	128.0 fl.oz./100	DD	0.0 a	0.0 a	0.0 a	0.0 a
Asana XL	12.8 fl.oz./A	DD, PF				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
Movento 240SC	9.0 oz./A	3C				
BioCover Oil	32.0 fl.oz./100	3C				
5. BioCover Oil	128 fl.oz./100	DD	0.0 a	0.0 a	0.0 a	0.0 a
Actara	5.5 oz./A	DD, PF				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
Movento 240SC	9.0 oz./A	3C				
BioCover Oil	128.0 fl.oz./100	3C				
6. Oil	256.0 fl.oz./100	DD	0.0 a	0.0 a	0.0 a	0.0 a
Oil	32.0 fl.oz./100	WB, 3C				
Centaur 0.7WDG	46.0 oz./A	WB, 3C				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
7. Oil	256.0 fl.oz./100	DD	0.0 a	0.0 a	0.0 a	0.0 a
Oil	32.0 fl.oz./100	WB, 3C				
Esteem 35WP	5.0 oz./A	WB, 3C				
AgriMek	20.0 fl.oz./A	10pPF + 21d				
8. UTC			0.0 a	0.0 a	0.0 a	0.0 a
P value for transformed data			NA	NA	NA	NA

[a] Seasonal evaluations made on 'Bartlett'.

Percent data were transformed using $\log_{10}(x+1)$ conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported. All applications made using a three-point hitch tractor mounted 'Pack Tank' sprayer and pecan handgun applied at 300 psi. dilute to runoff.

Evaluations Of Insecticide Schedules For Controlling Insect Damage on **Unpruned** Bartlett Pear [a].
N.Y.S.A.E.S. Hudson Valley Lab. Highland N.Y. - 2015.

	Treatment / Formulation	Rate	Timing	Lenticle L 0	Lenticle L 1	Lenticle L 2	Lenticle L 3	Calyx C 0	Calyx C 1	Calyx C 2	Calyx C 3	LR	PB	SJS	Clean
1	BioCover Oil M-Pede 49L	128.0 fl.oz./100 256.0 fl.oz./100	DD, GC WB- 8 July ab *@ 14d intervals	12.6 abc	64.7 ab	24.0 abc	0.0 a	11.4 ab	70.2 c	14.5 abc	5.1 a	6.2 ab	75.2 abc	0.8 a	18.6 ab
2	BioCover Oil + Surround	128.0 fl.oz./100 12.5 lbs./100	DD, WB,PF 8 July DD, WB PF	30.0 bcd	60.8 ab	7.5 ab	0.8 a	29.2 b	55.8 bc	11.7 ab	3.3 a	3.3 ab	82.5 bc	1.7 a	15.8 ab
3	Surround BioCover Oil	12.5 lbs./100 128.0 fl.oz./100	DD, WB, PF 1C – 8 July	34.9 d	56.5 ab	7.6 ab	0.0 a	17.7 ab	66.0 c	13.8 abc	2.6 a	10.9 a	65.1 abc	0.9 a	24.8 ab
4	BioCover Oil Asana XL AgriMek Movento 240SC BioCover Oil	128.0 fl.oz./100 12.8 fl.oz./A 20.0 fl.oz./A 9.0 oz./A 32.0 fl.oz./100	1C – 8 July DD, PF 10pPF + 21d 8 July 8 July	17.2 abcd	66.6 ab	15.4 abc	0.8 a	13.0 ab	69.0 c	12.3 abc	5.6 a	5.4 ab	74.4 abc	0.0 a	20.1 ab
5	BioCover Oil Actara AgriMek Movento 240SC BioCover Oil	128.0 fl.oz./100 12.8 fl.oz./A 20.0 fl.oz./A 9.0 oz./A8 July 128.0 fl.oz./100	1C – 8 July DD, PF 10pPF + 21d 8 July	7.5 ab	73.6 b	18.8 abc	0.0 a	9.2 ab	54.4 abc	27.2 c	8.4 a	4.8 ab	67.1 abc	0.0a	27.3 ab
6	Oil Oil Centaur 0.7WDG AgriMek	256.0 fl.oz./100 32.0 fl.oz./100 46.0 oz./A 20.0 fl.oz./A	DD GC GC, 8 July 10pPF + 21d	18.3 abcd	73.3 b	8.3 ab	0.8 a	21.7 ab	61.7 c	12.5 abc	5.0 a	2.5 ab	58.3 abc	0.8 a	38.3 b
7	Oil Oil Esteem 35WP AgriMek	256.0 fl.oz./100 32.0 fl.oz./100 5.0 oz./A 20.0 fl.oz./A	DD GC GC, 8 July 10pPF + 21d	39.2 bcd	45.8 ab	14.2 abc	0.0 a	24.2 ab	57.5 bc	15.0 abc	3.3 a	5.8 ab	65.8 abc	0.0 a	28.3 ab
8	Untreated Control			6.2 abc	53.4 ab	29.0 bc	12.4 b	10.6 ab	43.3 ab	21.4 bc	26.7 bc	5.6 ab	85.4 c	0.0 a	13.8 a

[a] Evaluation was made on September 8 assessing 30 fruit. Percent data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

Evaluations Of Insecticide Schedules For Controlling Insect Damage on **Pruned** Bartlett Pear [a].
N.Y.S.A.E.S. Hudson Valley Lab. Highland N.Y. - 2015.

Treatment / Formulation	Rate	Timing	Lenticle				Calyx							
			L 0	L 1	L 2	L 3	C 0	C 1	C 2	C 3	LR	PB	SJS	Clean
1. BioCover Oil	128.0 fl.oz./100	DD, GC	16.1 abcd	47.9 ab	22.6 abc	2.6 a	17.2 ab	52.4 abc	13.5 abc	6.0 a	6.8 ab	50.8 a	0.0 a	33.9 ab
M-Pede 49L	256.0 fl.oz./100	WB- 8 July												
		*@ 14d intervals												
2. BioCover Oil	128.0 fl.oz./100	DD, WB,PF, 8 July	39.1 d	54.4 ab	6.5 a	0.8 a	25.8 ab	61.1 bc	9.0 ab	3.3 a	9.7 ab	72.9 abc	0.8 a	23.1 ab
+ Surround	12.5 lbs./100	DD, WB PF												
3. Surround	12.5 lbs./100	DD, WB, PF	38.3 d	56.7 ab	4.2 a	0.8 a	29.2 ab	54.2 abc	11.7 abc	4.2 a	5.0 ab	74.2 abc	0.0 a	22.5 ab
BioCover Oil	128.0 fl.oz./100	1C – 8 July												
4. BioCover Oil	32.0 fl.oz./100	1C – 8 July	10.9 abcd	58.3 ab	20.8 abc	1.7 a	20.1 ab	60.7 bc	6.7 a	5.0 a	6.1 ab	61.8 ab	0.0 a	24.7 ab
Asana XL	12.8 fl.oz./A	DD, PF												
AgriMek	20.0 fl.oz./A	10pPF + 21d												
Movento 240SC	9.0 oz./A	8 July												
BioCover Oil	32.0 fl.oz./100	8 July												
5. BioCover Oil	32.0 fl.oz./100	10pPF + 21d, 8 July	27.7 abcd	48.8 a	19.3 abc	3.4 a	18.5 ab	53.5 abc	22.1 bc	7.6 a	6.7 ab	67.1 abc	0.0 a	29.5 ab
Actara	12.8 fl.oz./A	DD, PF												
AgriMek	20.0 fl.oz./A	10pPF + 21d												
Movento 240SC	9.0 oz./A	8 July												
6. Oil	256.0 fl.oz./100	DD	22.5 bcd	66.7 ab	10.8 ab	0.0 a	23.3 ab	51.7 abc	17.5 abc	7.5 a	3.3 ab	65.8 abc	0.8 a	28.3 ab
Oil	32.0 fl.oz./100	GC												
Centaur 0.7WDG	46.0 oz./A	GC, 8 July												
AgriMek	20.0 fl.oz./A	10pPF + 21d												
7. Oil	256.0 fl.oz./100	DD	19.2 abcd	64.2 ab	14.2 abc	2.5 a	20.0 ab	52.5 abc	15.0abc	13.3 b	2.5 a	77.5 abc	0.0 a	20.8 ab
Oil	32.0 fl.oz./100	GC												
Esteem 35WP	5.0 oz./A	GC, 8 July												
AgriMek	20.0 fl.oz./A	10pPF + 21d												
8 Untreated Control			1.7 a	43.3 a	35.8 c	13.3 b	7.5 a	34.2 a	25.8 c	32.5 c	9.2 ab	70.8 abc	0.0 a	22.5 ab

[a] Evaluation was made on September 8 assessing 30 fruit per treatment. Percent data were transformed using $\log_{10}(x+1)$ using Fishers Protected LSD ($P \leq 0.05$). Treatment means followed by the same letter are not significantly different. Arithmetic means reported.

APPLE (*Malus* x *domestica* 'Golden Delicious', 'McIntosh', 'Ginger Gold')
Apple scab; *Venturia inaequalis*
Cedar apple rust; *Gymnosporangium juniperi-virginianae*

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Evaluation of fungicide programs for control of apple scab and cedar apple rust, 2015.

A trial was conducted at the Hudson Valley Research Laboratory in Highland, NY to evaluate the effectiveness of fungicide programs for the management of apple scab and cedar apple rust. The orchard site is a mature planting of 17-yr-old trees on MM.111 rootstocks with M.9 interstems interplanted in discrete replicated plots. Each plot consisted of one 'Golden Delicious' tree and another tree where the lower scaffold limbs were 'McIntosh' and the upper scaffolds were 'Ginger Gold'. Between each tree 10 ft tall cedar trees were planted to reduce inter-plot drift and provide a high level of cedar apple rust disease pressure. Treatments were applied dilute (300 gal/A) to drip using a handgun (250 PSI) at intervals reflecting seasonal drought (14 Apr-green tip, 2 May -pink; 16 May-petal fall, 29 May-1st cover, 1 June-2nd cover). Summer cover maintenance sprays were applied to all programs with a Unigreen Turboteuton Mistblower sprayer (Uni–green Crop Protection, S.p.A., Reggio Emilia, Italy).

Table 14 Evaluation of fungicide programs for control of apple scab and cedar apple rust. Hudson Valley Research Lab. Highland N.Y. -2015.

(Amt./A)	14-Apr	2-May	16-May	29-May	14-Jun
Trmt. / Plot Color	GT	P	PF	1C	2C
1 White	Untreated	Untreated	Untreated	Untreated	Captan 5 lbs
2 Yellow	MasterCop 2.5 pt	Regalia 10.7 floz	Regalia 21.3 floz	Regalia 21.3 floz	Captan 5 lbs
3 Yellow Black Check	MasterCop 2.5 pt	Regalia 10.7 floz + Microthiol Sulfur 7.5 lb	Regalia 21.3 floz + Microthiol Sulfur 7.5 lb	Regalia 21.3 floz + Microthiol Sulfur 7.5 lb	Captan 5 lbs
4 Yellow/White	MasterCop 2.5 pt	Microthiol Sulfur 7.5 lb	Regalia 21.3 floz	Regalia 21.3 floz	Captan 5 lbs
5 Black	Captan 5 lbs	Microthiol Sulfur 7.5 lb	Microthiol Sulfur 7.5 lb	Microthiol Sulfur 7.5 lb	Captan 5 lbs
6 Red	Manzate 6lb	Luna Tran 12.0 floz+ Manzate 3 lb + LI-700 0.125%	Luna Tran 12.0 floz+ Manzate 3 lb + LI-700 0.125%	Luna Tran 12.0 floz+ Manzate 3 lb + LI-700 0.125%	Captan 5 lbs
7 Blue	Manzate 6lb	Luna Sen. 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Luna Sen. 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Luna Sen. 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Captan 5 lbs
8 Blue Dot / White	Manzate 6lb	Marivon 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Marivon 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Marivon 4.8 floz+ Manzate 3 lb + LI-700 0.125%	Captan 5 lbs
9 Red black check	Manzate 6lb	Fontelis 15.9 floz+ Manzate 3 lbs + LI-700 0.125%	Fontelis 15.9 floz+ Manzate 3 lbs + LI-700 0.125%	Fontelis 15.9 floz+ Manzate 3 lbs + LI-700 0.125%	Captan 5 lbs
10 Green	Manzate 6lb	Indar 8.12 floz+ Manzate 3 lb lbs + LI-700 0.125%	Indar 8.1 floz+ Manzate 3 lb lbs + LI-700 0.125%	Indar 8.1 floz+ Manzate 3 lb lbs + LI-700 0.125%	Captan 5 lbs
11 Orange	Manzate 6lb	Flint 2.63 oz+ Manzate 3 lbs + LI-700 0.125%	Flint 2.63 oz+ Manzate 3 lbs + LI-700 0.125%	Flint 2.63 oz+ Manzate 3 lbs + LI-700 0.125%	Captan 5 lbs
12 Red white Dot	Manzate 6lb	Manzate 1lb	Manzate 1lb	Manzate 1lb	Captan 5 lbs

*= GT on 14 April, ½" Green on April (7d), TC omitted, Pink on 6 May (11d), Bloom 15 May, PF on 25 May.

Handgun applications using three-point hitch pack-tank using a pecan gun @ 200 psi applied to drip. 300 GPA dilute [2.5 pts/A = 7.5 oz./100 (221.8mL); 6 lb./A = 2 lb./100; 5 lb./100 = 1.66 lbs (756.0 G)]

Table 15 Evaluation of fungicide programs for control of apple scab and cedar apple rust, 2015.[A]. Hudson Valley Research Lab. Highland N.Y. -2014.

	Treatment programs (amt./A)	Timing*	Incidence of apple scab on mature 'McIntosh' fruit (%)**	Incidence of apple scab on 'McIntosh' terminal leaves on 19 Aug (%)**	Incidence of cedar apple rust on 'Ginger Gold' terminal leaves (%)**
1.	Untreated	na.	41.0 ± 3.11 a	27.81 ± 3.87 a	84.06 ± 5.34 a
2.	MasterCop 2.5pt Regalia 10.7 fl.oz Regalia 21.3 fl.oz	1 2 3-4	7.0 ± 0.58 b	1.25 ± 0.51 cd	81.25 ± 2.45 a
3	MasterCop 2.5 pt Microthiol Sulfur 7.5 lb Regalia 10.7 fl.oz Regalia 21.3 fl.oz	1 2-4 2 3-4	1.0 ± 0.58 c	1.56 ± 0.60 bc	65.63 ± 2.82 b
4	MasterCop 1.5 pt Microthiol Sulfur 7.5 lb Regalia 21.3 fl.oz	1 2 3-4	3.0 ± 0.58 bc	1.88 ± 0.36 bcd	78.13 ± 3.73 ab
5	Captan 80WDG 5 lbs Microthiol Sulfur 7.5 lb	1 2-4	2.4 ± 0.40 b	4.00 ± 0.51 bcd	74.25 ± 4.25 ab
6	Manzate 6 lbs Luna Tranquility 11.2 fl oz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	0.0 ± 0.00 c	0.00 ± 0.00 d	39.69 ± 5.65 c
7	Manzate 6 lbs Luna Sensation 4.8 fl oz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	0.0 ± 0.00 c	0.00 ± 0.00 d	36.88 ± 3.70 c
8	Manzate 6 lbs Marivon 4.8 floz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	0.0 ± 0.00 c	0.94 ± 0.31 cd	20.94 ± 3.62 d
9	Manzate 6 lbs Fontelis 15.9 floz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	2.0 ± 0.82 bc	0.63 ± 0.36 cd	16.56 ± 1.87 d
10	Manzate 6 lbs Indar 8.12 floz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	0.5 ± 0.50 c	0.31 ± 0.31 cd	0.00 ± 0.00 e
11	Manzate 6 lbs Flint 50WG 2.63 oz + Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4 2-4	2.5 ± 0.96 bc	5.31 ± 0.60 bc	39.69 ± 3.36 c
12	Manzate 6 lbs Manzate 3 lbs + LI-700 0.125%	1 2-4 2-4	1.5 ± 0.96 c	6.88 ± 1.65 b	46.88 ±5.44 c

* Applications timing were: 1, 14 Apr-green tip (GT); 2, 2 May-pink (P); 3, 16 May-petal fall (PF); 4, 29 May-1st cover (1C); 8, 14 Jun-2nd cover. All plots received a single application of Captan 80WDG @ 5 lbs./A on 14 June (1C) to reduce the level of secondary inoculum.

** All values are disease incidence and the means and standard errors of at least 10 leaf or fruit collections across four replicate trees. Values within columns followed by the same letter are not significantly different from one another ($P \leq 0.05$) according to according to LSMEANS procedure in SAS 9.4 with an adjustment for Tukey's HSD to control for family-wise error.

APPLE (*Malus* x *domestica* 'Golden Delicious', 'McIntosh', 'Ginger Gold')
Apple scab; *Venturia inaequalis*
Cedar apple rust; *Gymnosporangium juniperi-virginianae*

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Evaluation of fungicide programs for control of apple scab and cedar apple rust, 2014.

A trial was conducted at the Hudson Valley Research Laboratory in Highland, NY to evaluate the effectiveness of fungicide programs for the management of apple scab and cedar apple rust. The orchard site is a mature planting of 16-yr-old trees on MM.111 rootstocks with M.9 interstems interplanted in discrete replicated plots. Each plot consisted of one 'Golden Delicious' tree and another tree where the lower scaffold limbs were 'McIntosh' and the upper scaffolds were 'Ginger Gold'. Between each tree 10 ft tall cedar trees were planted to reduce inter-plot drift and provide a high level of cedar apple rust disease pressure. Treatments were applied dilute (300 gal/A) to drip using a handgun (250 PSI) at 7-10 day intervals (18 Apr-green tip, 25 Apr-half-inch green, 2 May-tight cluster, 9 May-pink; 16 May-late bloom, 23 May-petal fall, 30 May-1st cover, 12 June-2nd cover). Summer cover sprays (3rd through 6th cover) were applied to all programs with a Unigreen Turboteuton Mistblower sprayer (Uni–green Crop Protection, S.p.A., Reggio Emilia, Italy).

Apple scab infection events based on Mills predictions using estimated leaf wetness occurred 15 Apr, 29 Apr, 8 May, 22 May, and 9 Jun. Five additional infection events occurred between 3rd and 6th cover. The incidence of apple scab symptoms on 'McIntosh' was assessed for immature fruit and terminal shoots on 9 Jun, and again on terminal shoots and mature fruit on 19 Aug. The incidence of cedar apple rust symptoms on 'Gingergold' was assessed for terminal shoots on 9 Jun. The incidence of apple scab symptoms on fruit was calculated from the number of fruit with apple scab lesions out of five randomly collected fruit. For each of four treatment replications, 10 such collections were assessed. The incidence of apple scab and cedar apple rust symptoms on terminal leaves was calculated from the number of terminal leaves with apple scab lesions or cedar apple rust lesions with pycnidia out of eight fully expanded leaves from the distal end of the shoot. For each of four treatment replications, the incidence of 10 shoots was assessed. Disease incidence data were subjected to analysis of variance (ANOVA) for a randomized block design using accepted statistical procedures and software (i.e. Generalized Linear Mixed Models (GLIMMIX)) procedure of SAS (version 9.4; SAS Institute Inc., Cary, NC). All percentage data were subjected to arcsine square root transformation prior to analysis.

On 'McIntosh', the incidence of apple scab symptoms on terminal leaves and mature fruit ranged from 0-49% and 2-43%, respectively. While the MasterCop program provided fairly good control of apple scab, substituting Captan 80 WDG at 5 lbs/A with MasterCop sometimes slightly diminished the level of control as evidenced in programs 4 and 5. Applications of MasterCop were no more effective than Captan 80 WDG against cedar apple rust. Both programs with Luna Tranquility (including the one with Phostrol) provided a high level of control of apple scab on both leaves and fruit. While, Luna Tranqulity programs provided some cedar apple rust control, the program in which Koverall was substituted for Phostrol (treatment 11) had one of the lowest incidences of cedar apple rust. While programs with Luna Sensation and Merivon provided excellent control of apple scab on both fruit and leaves, the identical Flint WG programs were substantially less effective than protectant programs. Such performance might suggest that the population may have practical resistance to Flint WG. On 'Gingergold', the incidence of cedar apple rust symptoms on terminal leaves ranged from 11-74%. The programs with QoI containing fungicides (Merivon, Flint WG, and Luna Sensation) provided some control of cedar apple rust. The lowest incidence of cedar apple rust was observed in programs that received Koverall during pink and bloom (applications 4 and 5).

Table 16 Evaluation of fungicide programs for control of apple scab and cedar apple rust, 2014.[A]. Hudson Valley Research Lab. Highland N.Y. -2014.

	Treatment programs (amt./A)	Timing*	Incidence of apple scab on 'McIntosh' terminal leaves on 19 Aug (%)**	Incidence of apple scab on mature 'McIntosh' fruit (%)**	Incidence of cedar apple rust on 'Ginger Gold' terminal leaves (%)**
1.	Untreated	na.	49.7 ± 8.5 a	42.9 ± 6.4 a	74.4 ± 3.0 a
2.	MasterCop 2.5pt Captan 80WDG 2.5 lbs	1 2-8	3.1 ± 0.8 de	6.4 ± 1.7 cd	65.6 ± 5.6 ab
3	MasterCop 2.5 pt MasterCop 1 pt Captan 80WDG 5 lbs	1 2 3-8	2.8 ± 0.9 e	2.0 ± 1.4 d	58.1 ± 3.2 b
4	MasterCop 1.5 pt Captan 80WDG 5 lbs	5-7 1-4,8	11.9 ± 4.9 cde	13.5 ± 5.6 bcd	73.4 ± 4.3 a
5	MasterCop 2.5 pt MasterCop 1 pt Captan 80WDG 5 lbs MasterCop 1.5 pt	1 2 3-4,8 5-7	15.3 ± 6.4 cd	2.2 ± 1.4 d	66.3 ± 5.3 ab
6	Koverall 6 lbs Captan 5 lbs Flint 50WG 2 oz Koverall 3 lbs + Captan 80WDG 2.5 lbs	1 2-3 4,5,7,8 6	23.8 ± 9.3 bc	17.5 ± 4.3 b	42.5 ± 8.5 c
7	Koverall 6 lbs Captan 5 lbs Merivon 5 floz Koverall 3 lbs + Captan 80WDG 2.5 lbs	1 2-3 4,5,7,8 6	0.3 ± 0.3 e	4.4 ± 2.0 d	36.9 ± 8.2 c
8	Koverall 6 lbs Captan 5 lbs Luna Sensation 5 fl oz Koverall 3 lbs + Captan 80WDG 2.5 lbs	1 2-3 4,5,7,8 6	2.2 ± 1.3 e	3.3 ± 2.7 d	42.2 ± 13.3 c
9	Koverall 6 lbs Captan 5 lbs Flint 50WG 2 oz Koverall 3 lbs + Captan 80WDG 2.5 lbs	1 2-3 4,5,7,8 6	27.8 ± 9.5 b	15.0 ± 5.3 bc	35.0 ± 6.7 c
10	Koverall 6 lbs Captan 5 lbs Koverall 3 lbs + Captan 80WDG 2.5 lbs	1,4-5 2-3,7-8 6	3.4 ± 1.1 de	7.0 ± 3.9 bcd	11.0 ± 3.5 d
11	Koverall 3 lbs + Captan 80WDG 2.5 lbs Luna Tranquility 11.2 fl oz+ Koverall 3 lbs + LI-700 0.125% Koverall 6 lbs Inspire Super 12 floz +Captan 2.5 lbs Captan 5lbs	1 2,3 4-5 6 7-8	3.8 ± 1.4 de	5.0 ± 1.3 cd	13.4 ± 5.7 d
12	Koverall 3 lbs + Captan 80WDG 2.5 lbs Luna Tranquility 11.2 fl oz+ Koverall 3 lbs + LI-700 0.125% Serenade Optimum 16 oz + Phostrol 64 fl oz Inspire Super 12 floz +Captan 2.5 lbs Captan 5lbs	1 2,3 4-5 6 7-8	5.0 ± 2.7 de	5.6 ± 2.7 cd	36.2 ± 9.3 c

* Applications timing were: 1, 18 Apr-green tip; 2, 25 Apr-half-inch green; 3, 2 May-tight cluster; 4, 9 May-pink; 5, 16 May-late bloom; 6, 23 May-petal fall; 7, 30 Jun-1st cover; 8, 12 Jun-2nd cover.

** All values are disease incidence and the means and standard errors of at least 10 leaf or fruit collections across four replicate trees. Values within columns followed by the same letter are not significantly different from one another ($P \leq 0.05$) according to according to LSMEANS procedure in SAS 9.4 with an adjustment for Tukey's HSD to control for family-wise error.

APPLE (*Malus* x *domestica* 'HoneyCrisp'),

Lambsquarters, *Chenopodium album*
Pennsylvania Smartweed, *Polygonum pensylvanicum*
Canada Thistle, *Cirsium arvense*
Red Clover, *Trifolium pretense*
Bermudagrass, *Cynodon dactylon*
Broadleaf Plantain, *Plantago major*
Common Chickweed, *Stellaria media*
Perrenial Ryegrass, *Lolium perenne*

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Evaluation Of Herbicide Programs For Control Of Weed Plants In Apple Tree Row, 2014.

A trial was conducted at the Hudson Valley Research Laboratory in Highland, NY to evaluate the effectiveness of herbicide programs for the management of the fall and spring weed complex. The orchard site is a 10-year old planting of Honeycrisp strains on M-9 rootstock on a single wire and post trellis planted at 3' by 12' row spacing. Herbicide plot lengths are 30' x 6' in four replications.

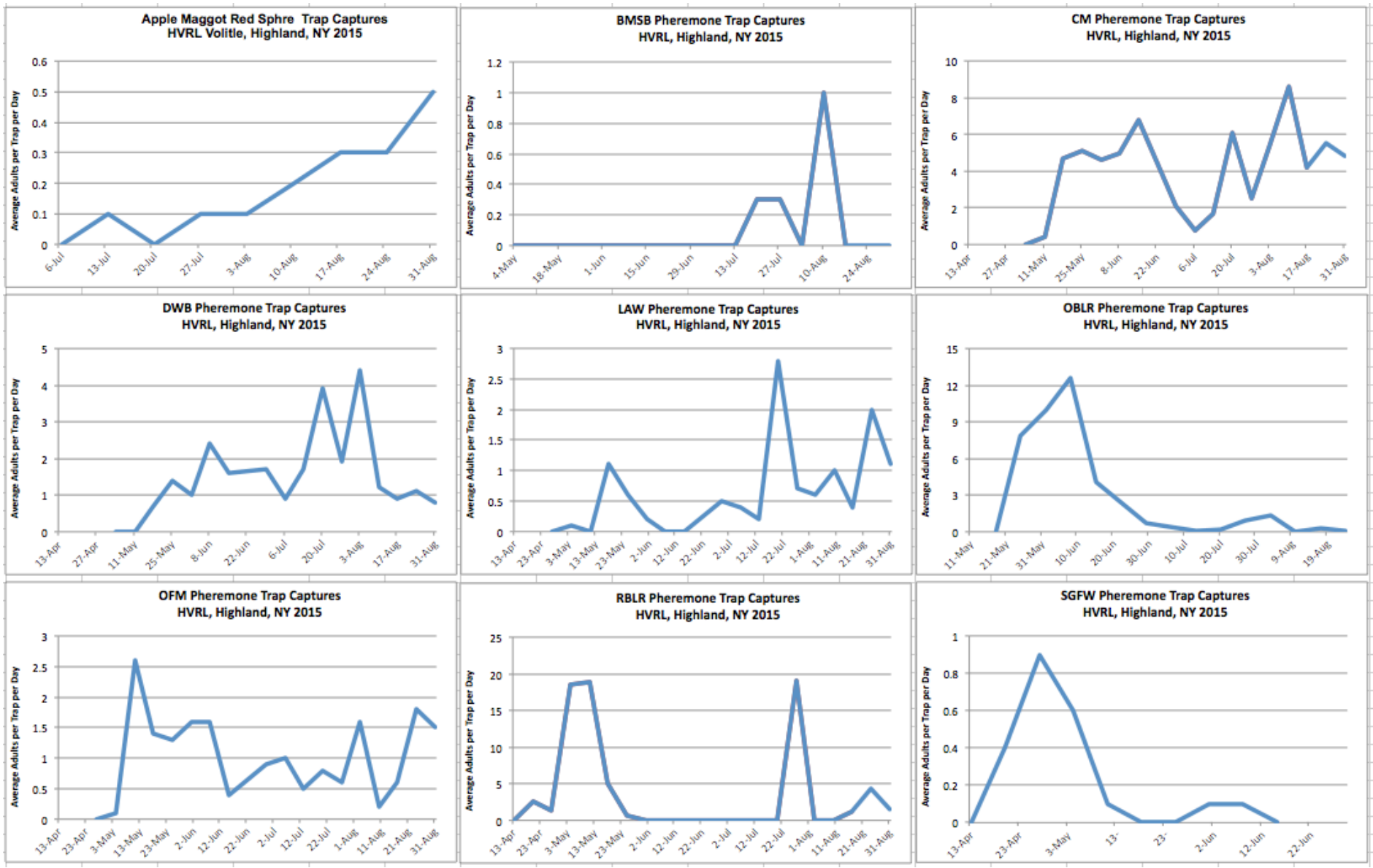
A single application was made on the 12th of November, using a pressurized backpack air sprayer and off set nozzle. All treatments received LI-700 at 0.125% added to the spray solution. Temperature during application ranged between 58.4 - 60.8 F, Wind speed and direction was South at 0-5 mph with trace rainfall beginning one hour after the last treatment, totaling 0.21" within 48 hours and 1.04" within 5 days post application. Four randomized replicates were applied, however, 'Rep D' was inadvertently sprayed over during a routine weed spray application this Spring.

Treatments were added in combination with Gramoxone at 3.5 pts./A to include 1. Gramoxone alone; 2. + Matrix 25DF at 4.0 oz./A; 3. + Alion 1.67 at 6.0 oz./A; 4. + Simazine at 1.1 lbs./A + Diuron 1.25 lbs./A; 5. + Chateau 51SW at 10.0 oz./A; 6. + GoalTender 3.0 pts./A; 7. + Sandea at 0.75 at 0.8 oz./A; 8. + Casoron 1.4 CS at 2.3 gal./A and 9. Mowed on 8th June. The herbicide strip understory was assessed on 25th May, 8th, 29th June and 5th October. The first observation showed all treatments with reduced weed growth in number and diversity with Alion, Chateau, and Casoron remaining 100% free of weed growth, followed by Matrix and GoalTender showing only slight growth. By 29th of June all plots had shown significant growth with Alion suppressing the greatest number and diversity of weed plants.

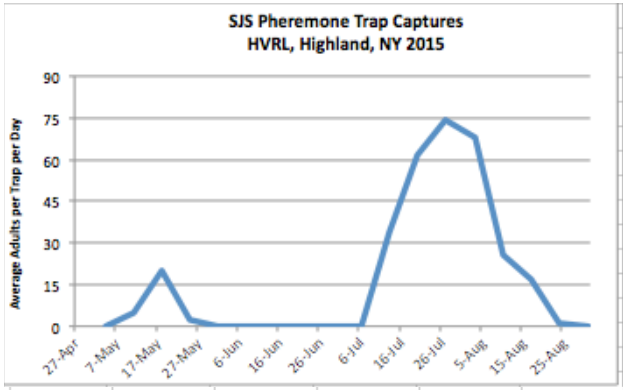
Table 17 Fall treatment for early season weed control.[A].
Hudson Valley Research Lab. Highland N.Y. -2015.

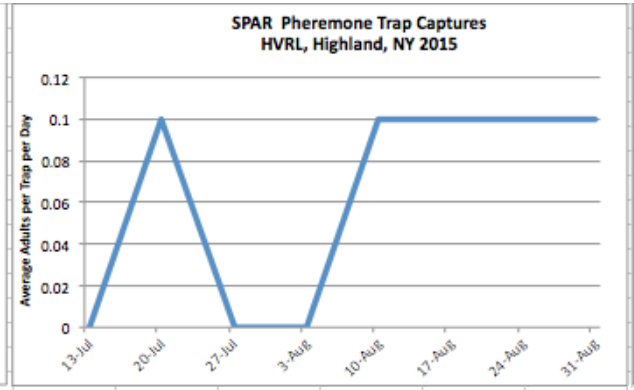
		Assessment of % Area Infested 25th May						Assessment of % Area Infested on 8 June					Assessment of % Area Infested on 29 June					
Trt.	Materials	**A**	**B**	**C**	**D***	**Ave**	**Weeds Plants:**	**A**	**B**	**C**	**D***	**Ave**	**A**	**B**	**C**	**D***	**Ave**	
1	Control	70	60	50	n/a	60.0	All listed	100	90	80	n/a	90.0	100	100	100	n/a	100.0	All listed
2	Gramoxone	20	40	20	n/a	26.7	Lambsquarters, Pennsylvania Smartweed, Canada Thistle	70	80	60	n/a	70.0	100	100	100	n/a	100.0	Lambsquarters, Pennsylvania Smartweed, Canada Thistle, Red Clover
3	Gramoxone + Matrix	10	0	0	n/a	3.3	Lambsquarters, Pennsylvania Smartweed, Canada Thistle	20	20	10	n/a	16.7	80	80	100	n/a	86.7	Lambsquarters, Pennsylvania Smartweed, Canada Thistle, Bermudagrass
4	Gramozone + Alion	0	0	0	n/a	0.0	clean	0	0	0	n/a	0.0	20	10	10	n/a	13.3	clean
5	Gramoxone + Simazine + Diuron (1/2 rate)	10	0	30	n/a	13.3	Lambsquarters, Pennsylvania Smartweed	20	10	60	n/a	30.0	90	80	100	n/a	90.0	Lambsquarters, Pennsylvania Smartweed, Broadleaf Plantain
6	Gramoxone + Chateau	0	0	0	n/a	0.0	clean	0	10	0	n/a	3.3	10	40	10	n/a	20.0	Red Clover, Bermudagrass
7	Gramoxone + GoalTender	10	0	0	n/a	3.3	Common Chickweed, Perrenial Ryegrass, Lambsquarters	10	10	0	n/a	6.7	20	30	20	n/a	23.3	Common Chickweed, Perrenial Ryegrass, Lambsquarters, Pennsylvania Smartweed
8	Gramoxone + Sandea	10	10	20	n/a	13.3	Lambsquarters, Pennsylvania Smartweed	30	50	70	n/a	50.0	90	80	100	n/a	90.0	Lambsquarters, Pennsylvania Smartweed, Red Clover
9	Gramoxone + Casoron	0	0	0	n/a	0.0	clean	10	20	10	n/a	13.3	90	90	70	n/a	83.3	Perrenial Rye, Lambsquarters, Bermudagrass
10	Mowed 06/08/15	80	70	70	n/a	73.3	All listed	100	90	80	n/a	90.0	100	100	100	n/a	100.0	All listed

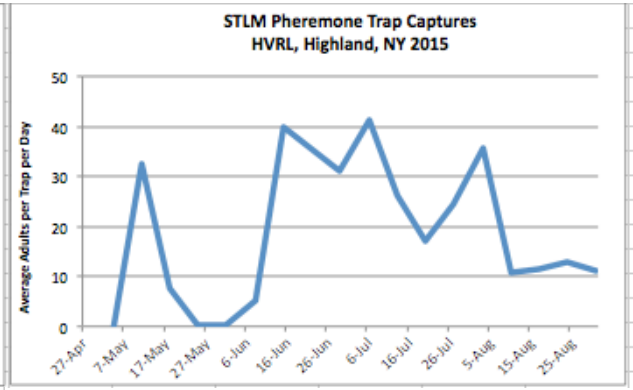
2015 HVRL Trapping Network (7d means employing 1 trap in each two orchards blocks).

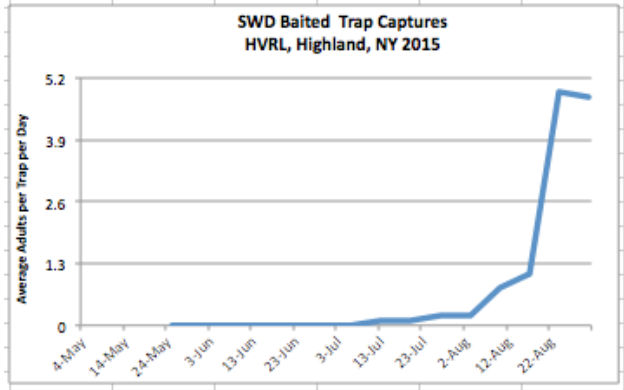


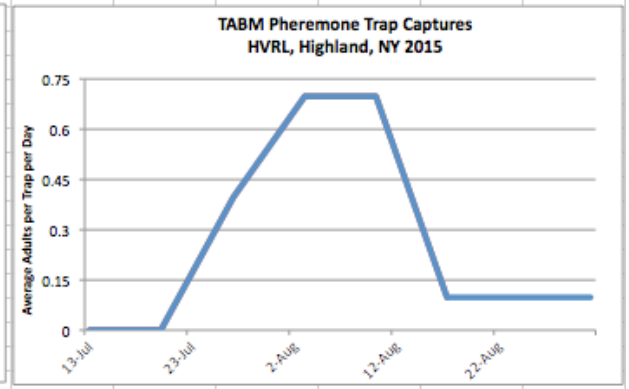
2015 HVRL Trapping Network Con't.

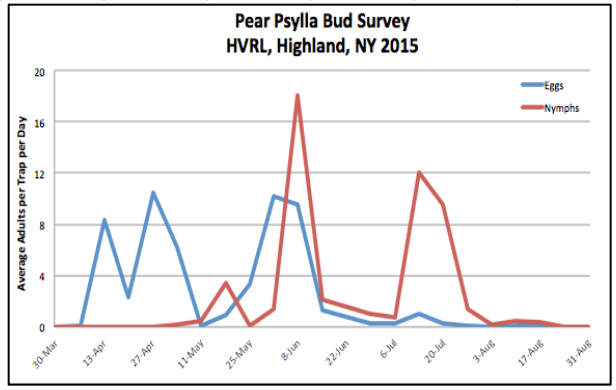




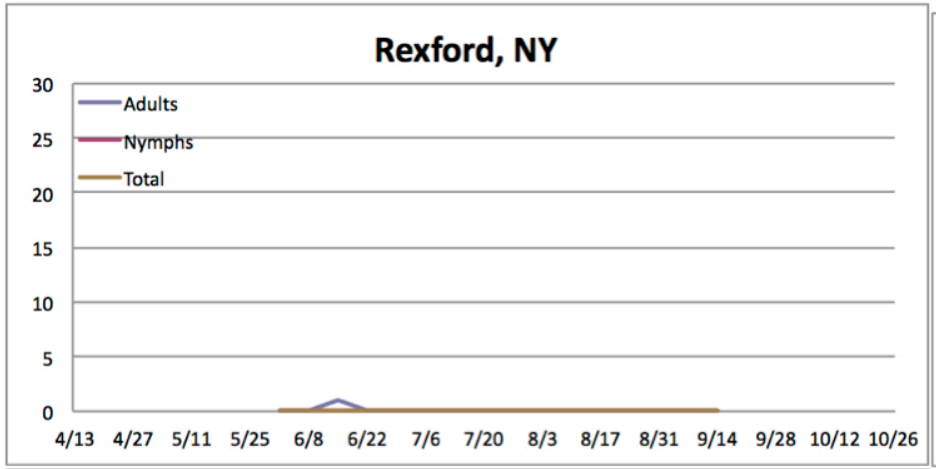


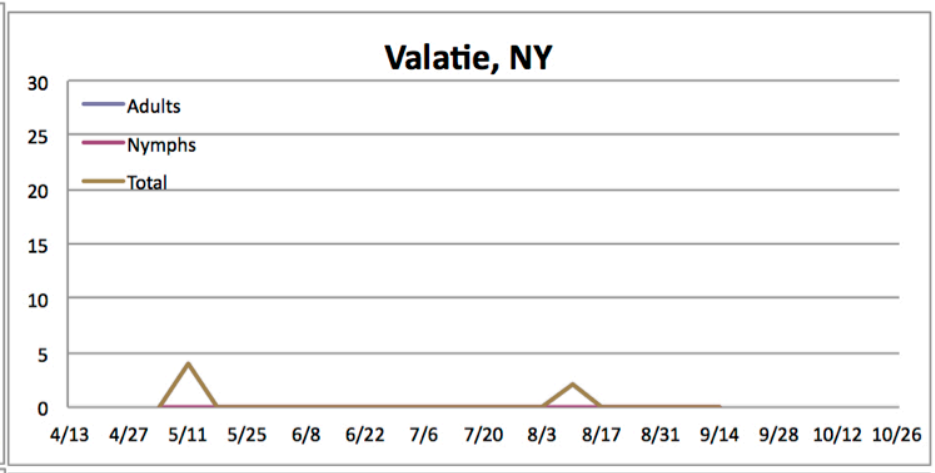


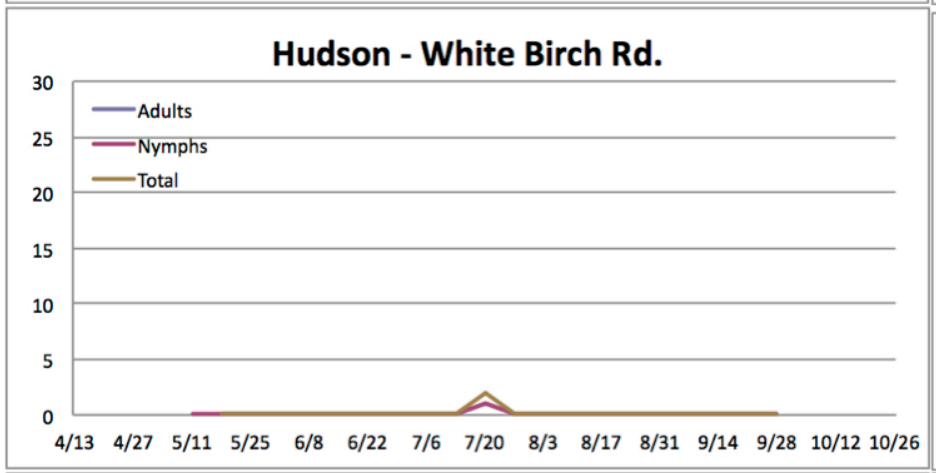


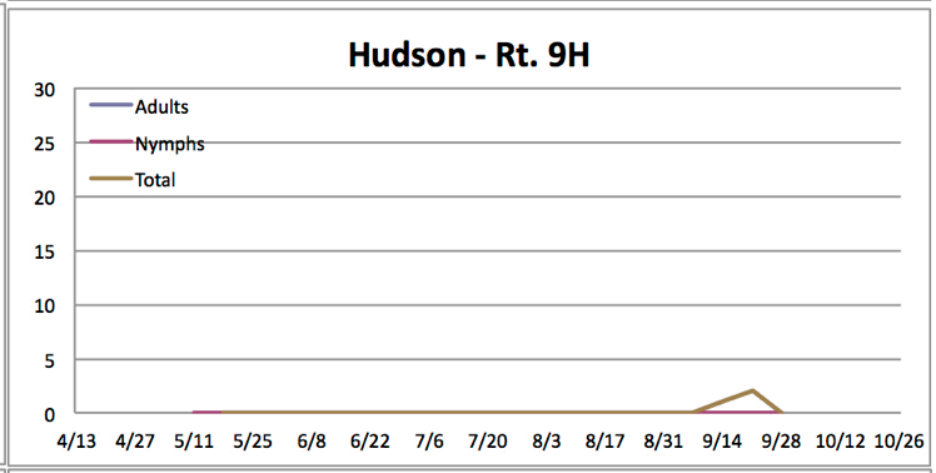


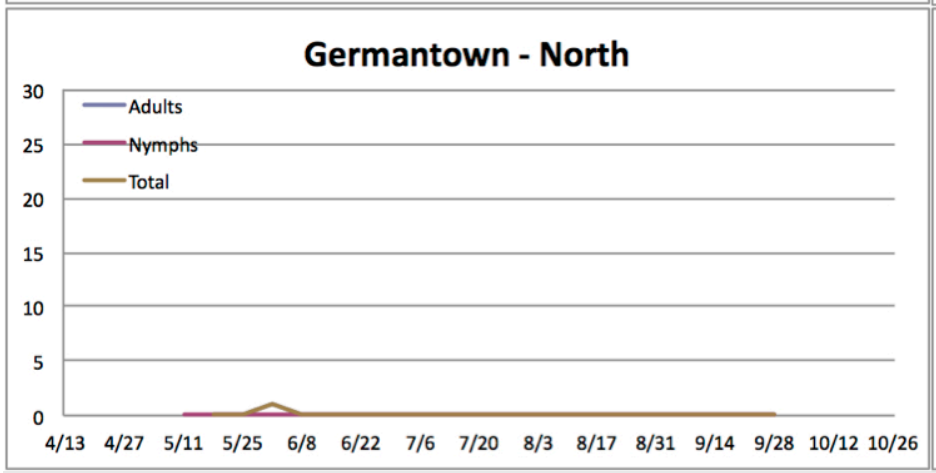
2015 Hudson Valley BMSB Trapping Network

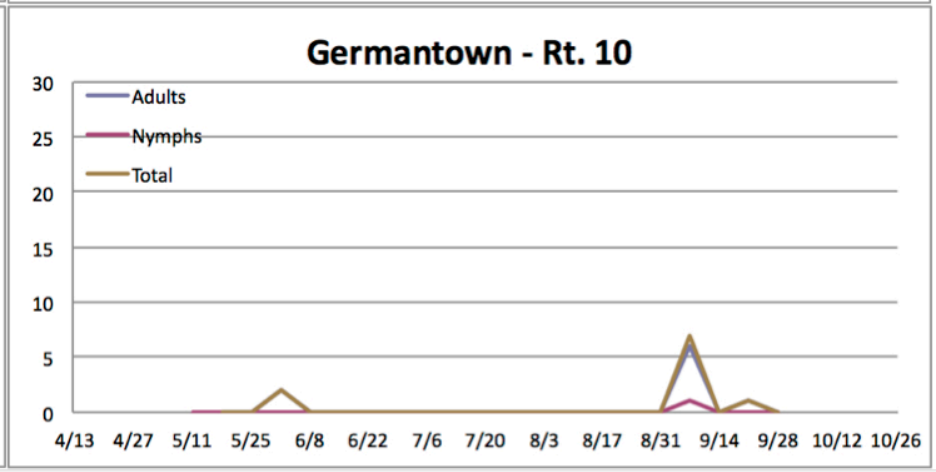




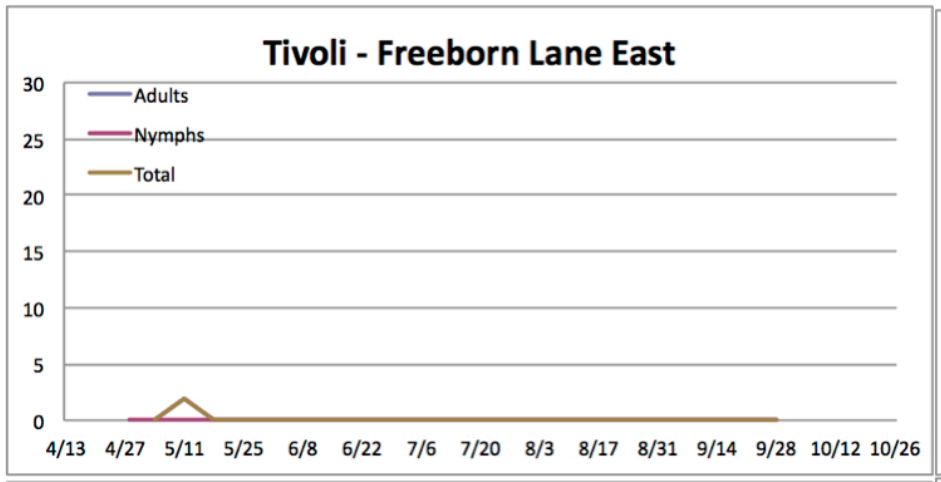


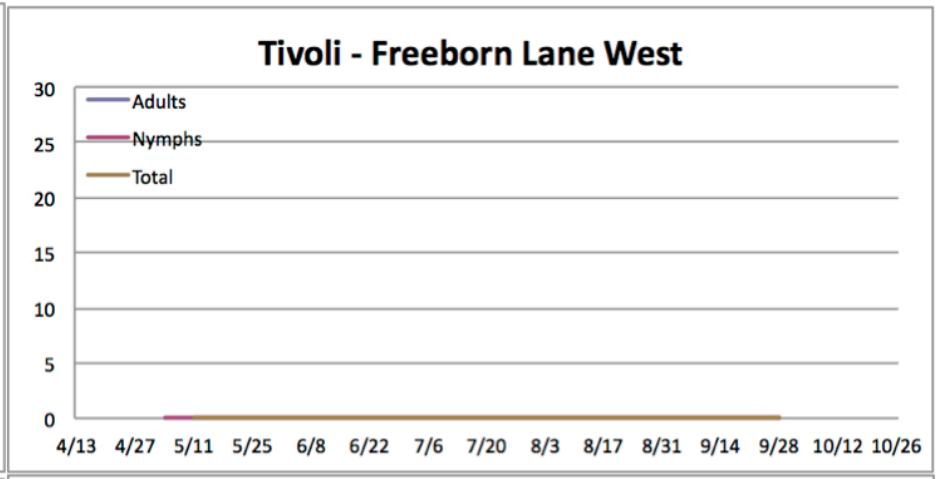


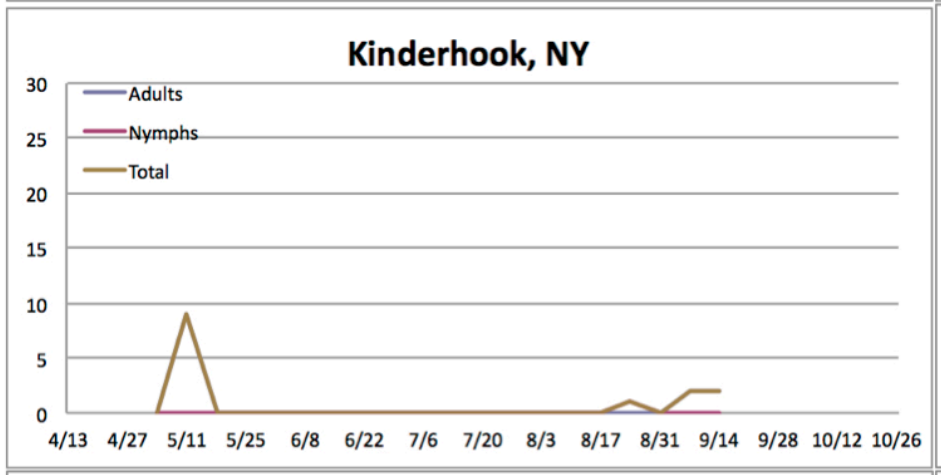


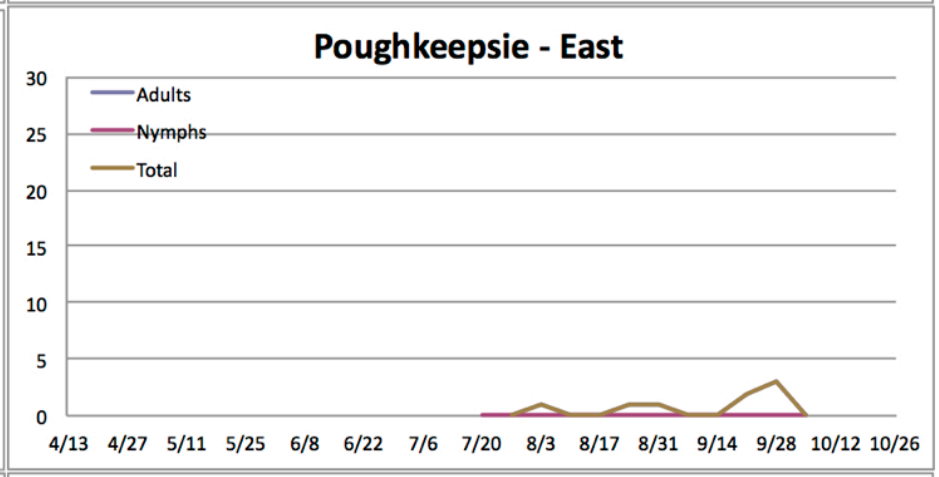


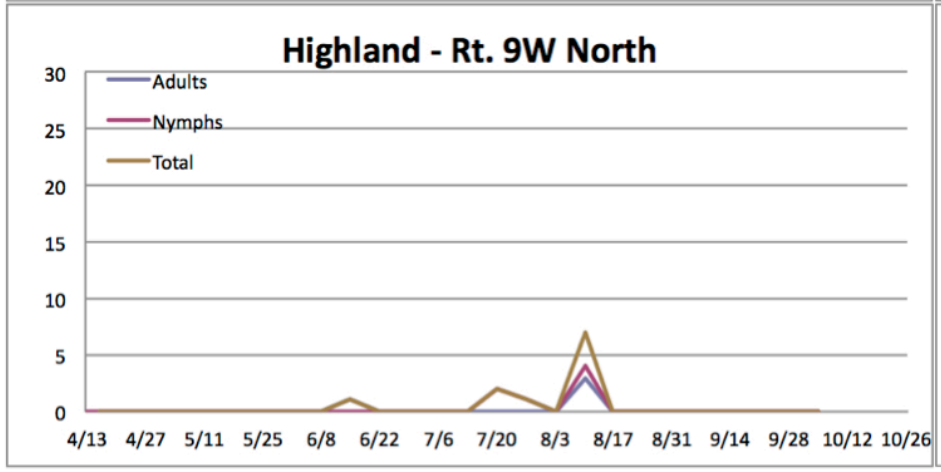
2015 Hudson Valley BMSB Trapping Network Con't.

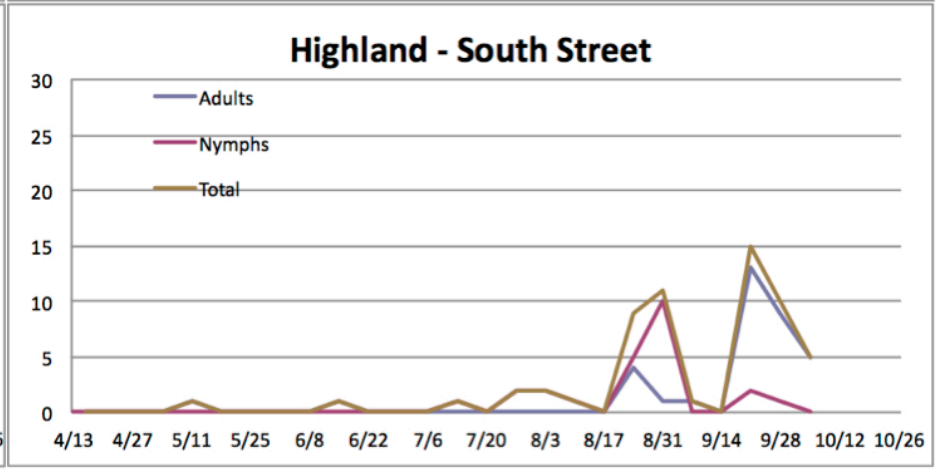




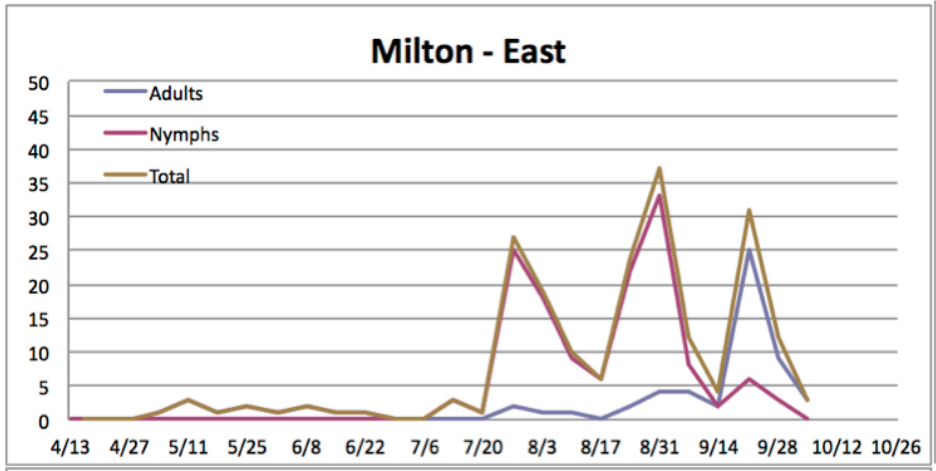


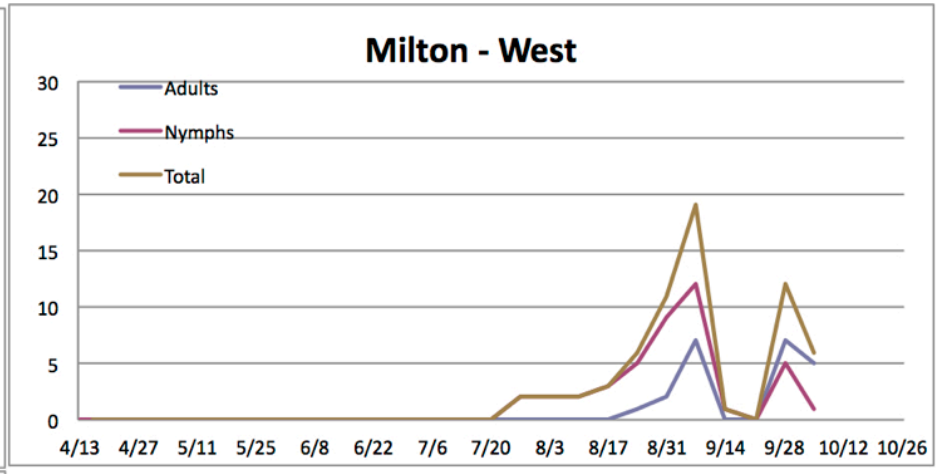


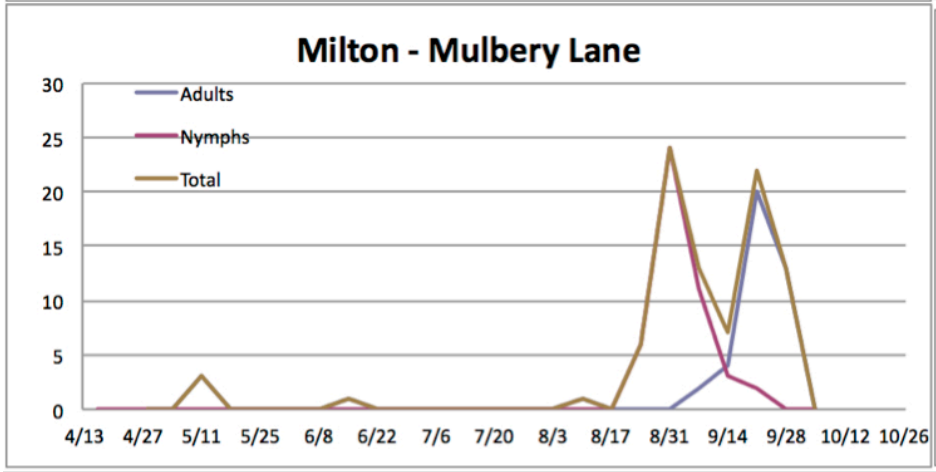


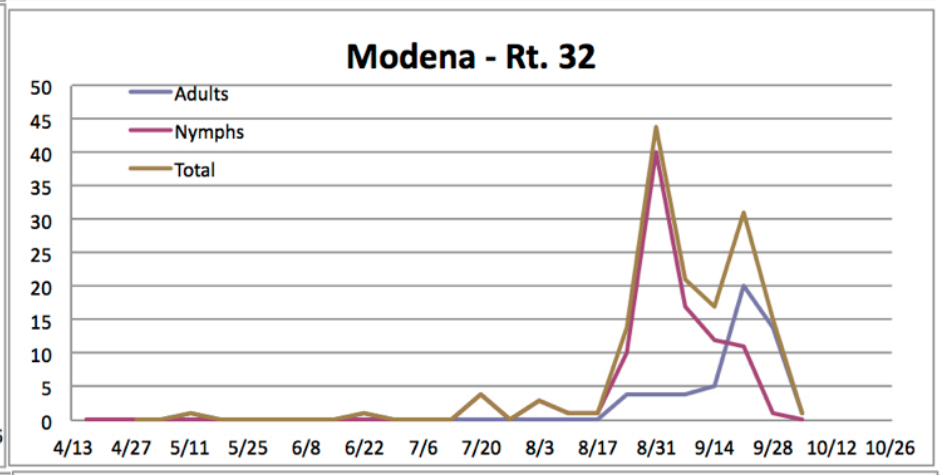


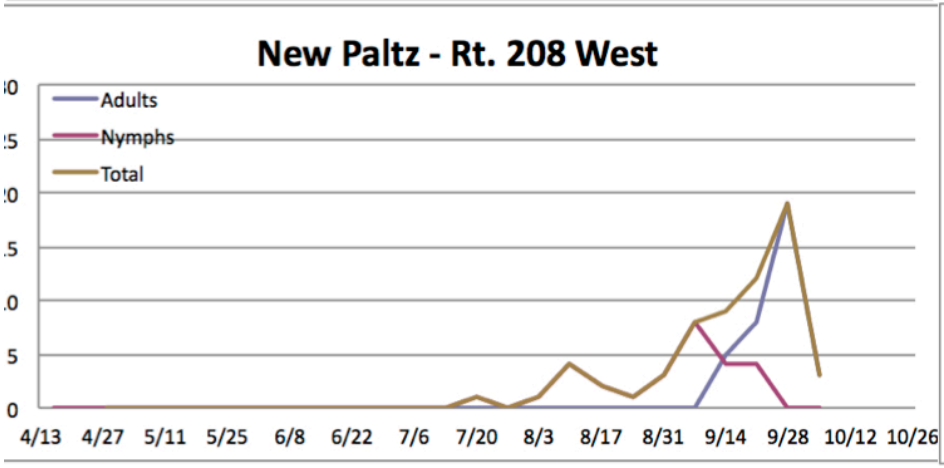
2015 Hudson Valley BMSB Trapping Network Con't.

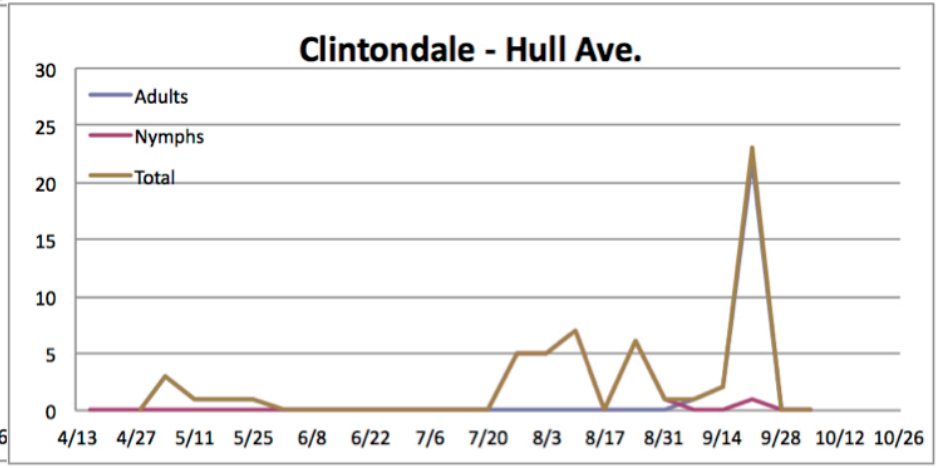




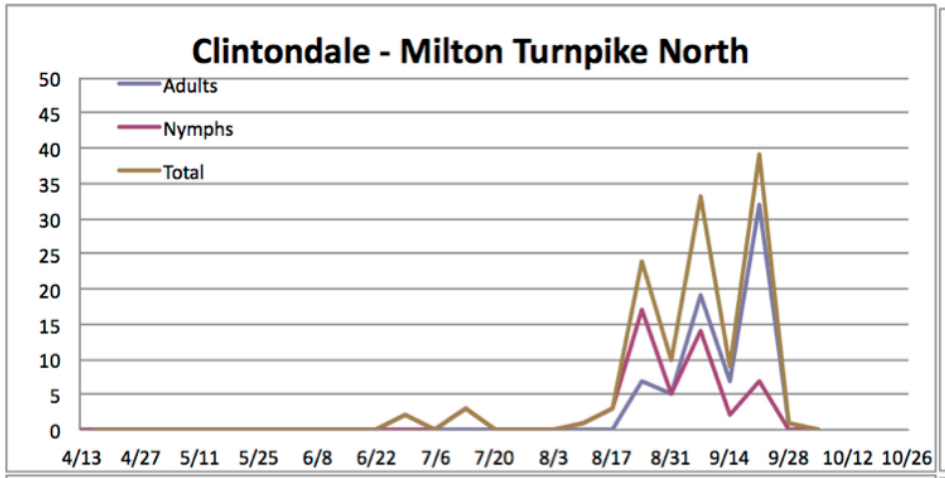


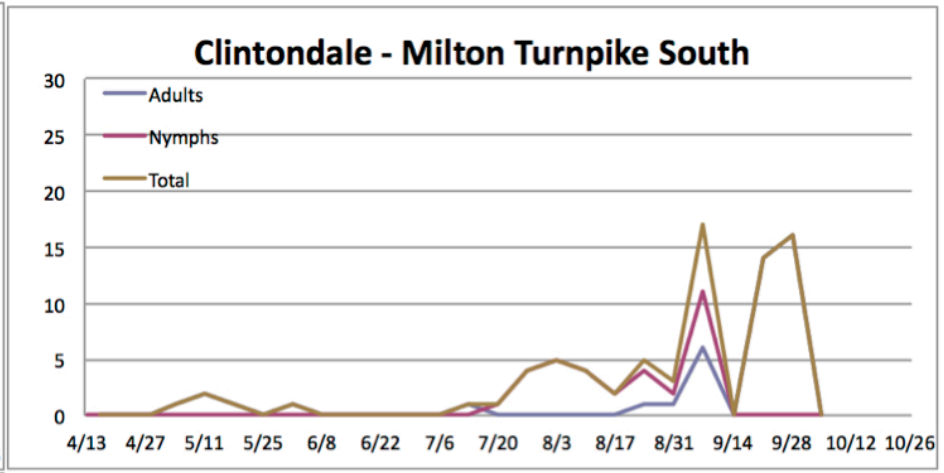


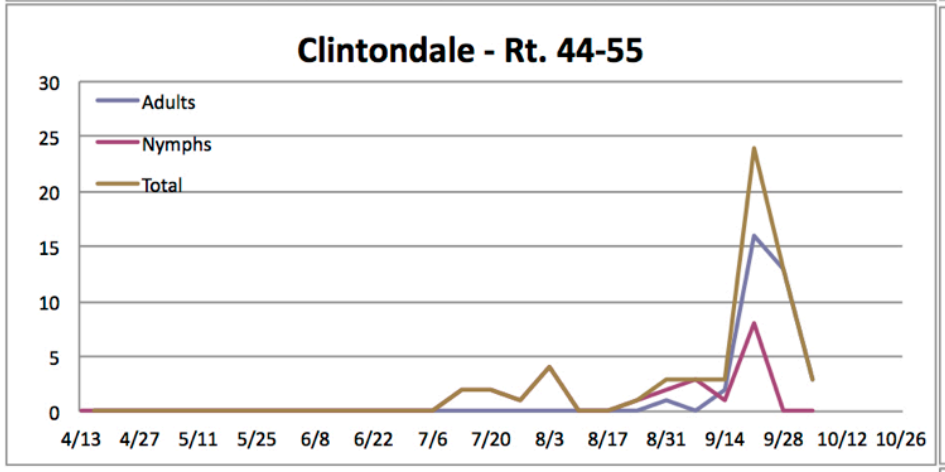


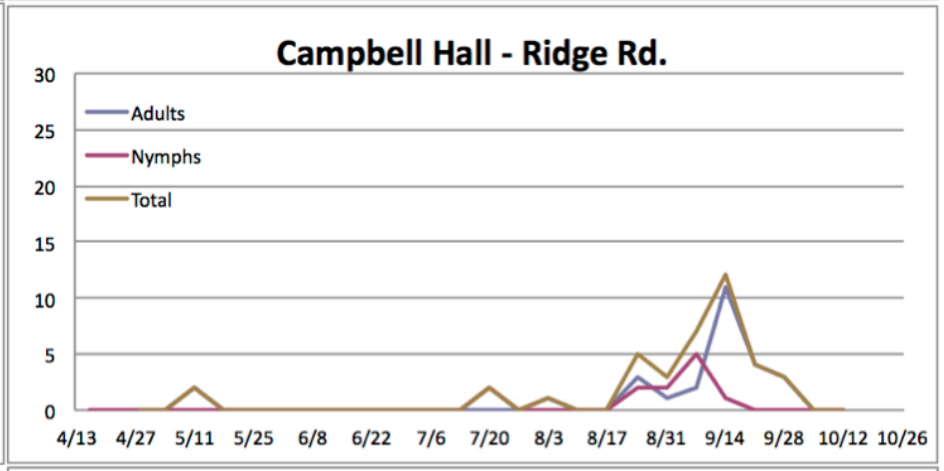


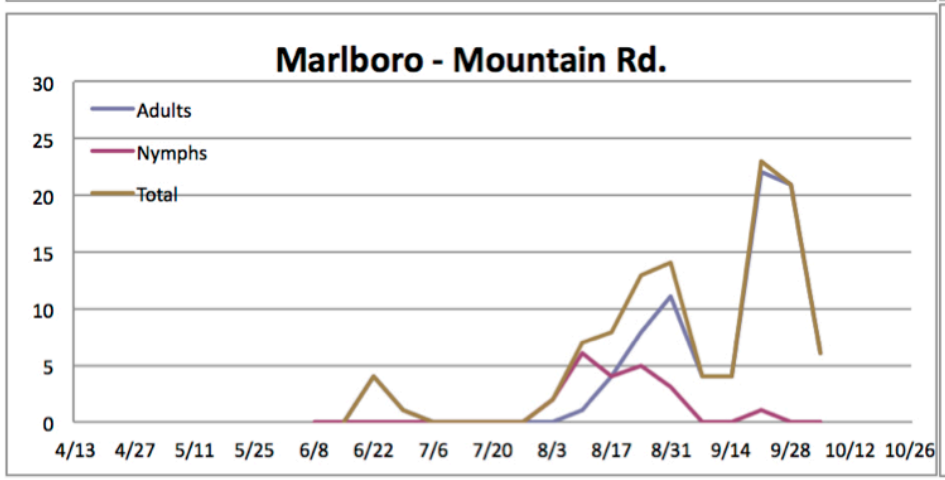
2015 Hudson Valley BMSB Trapping Network Con't.

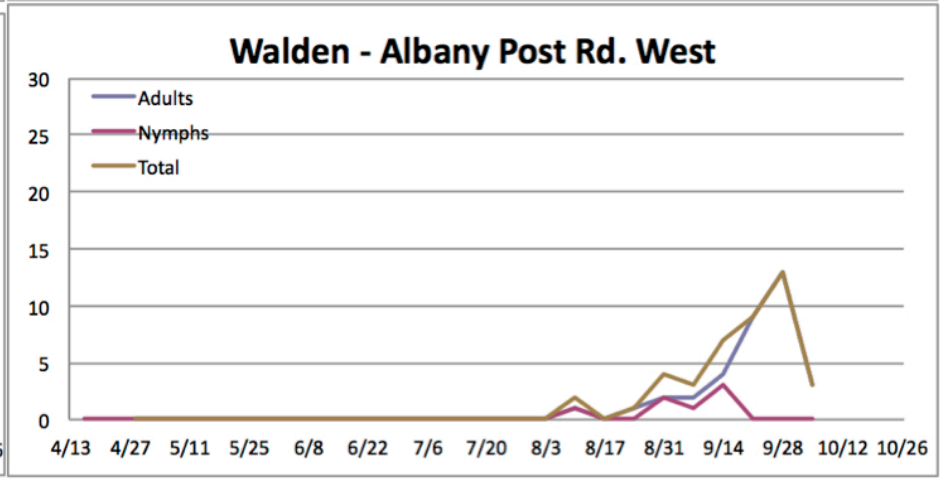




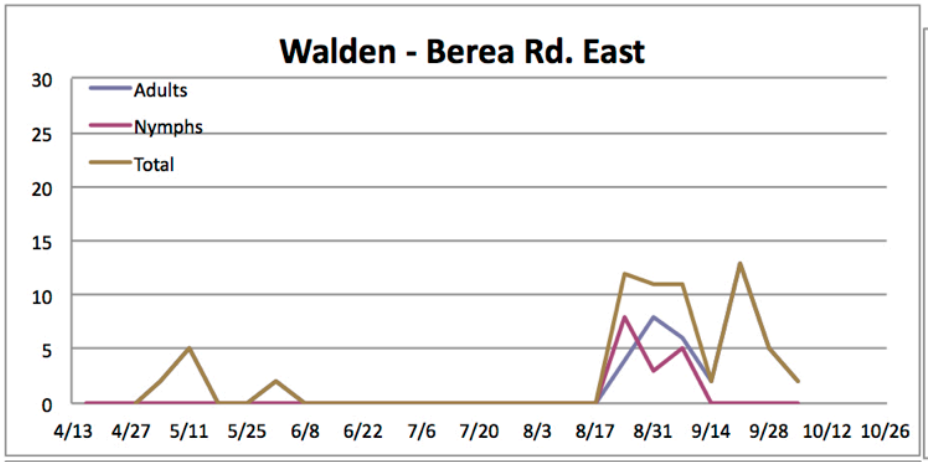


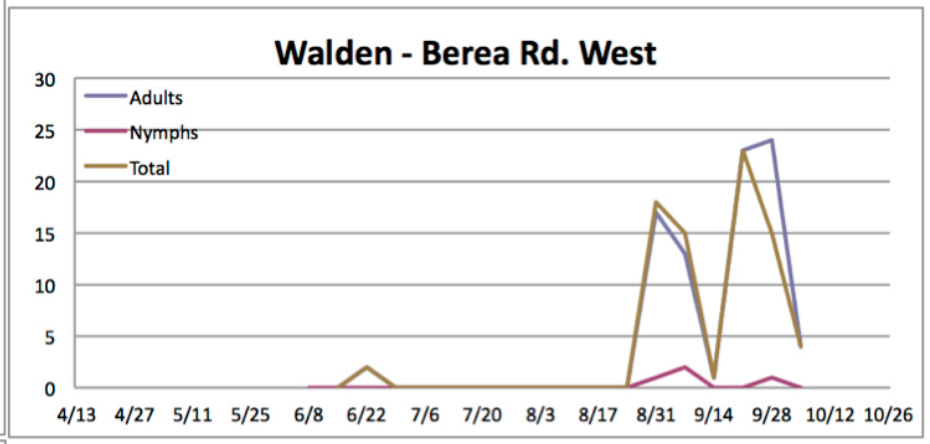


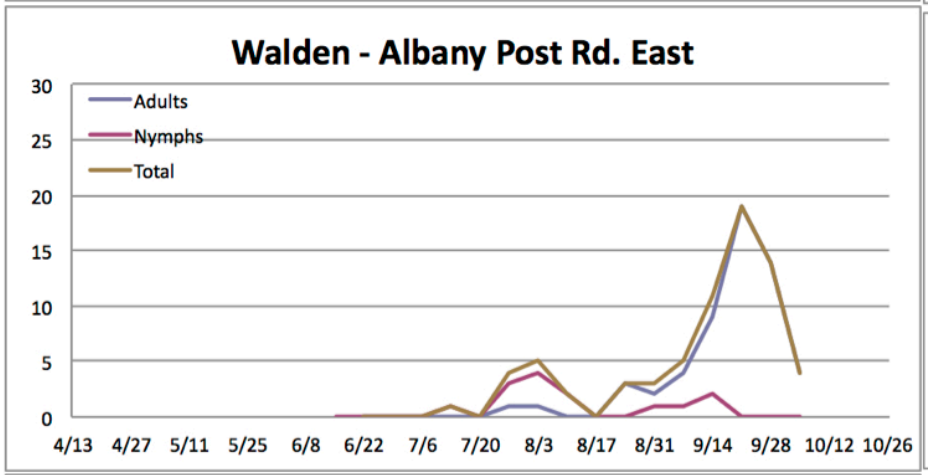


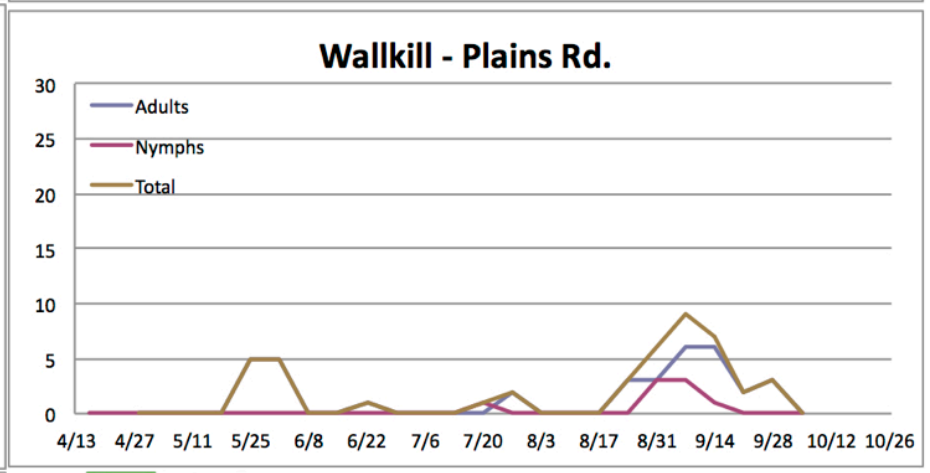


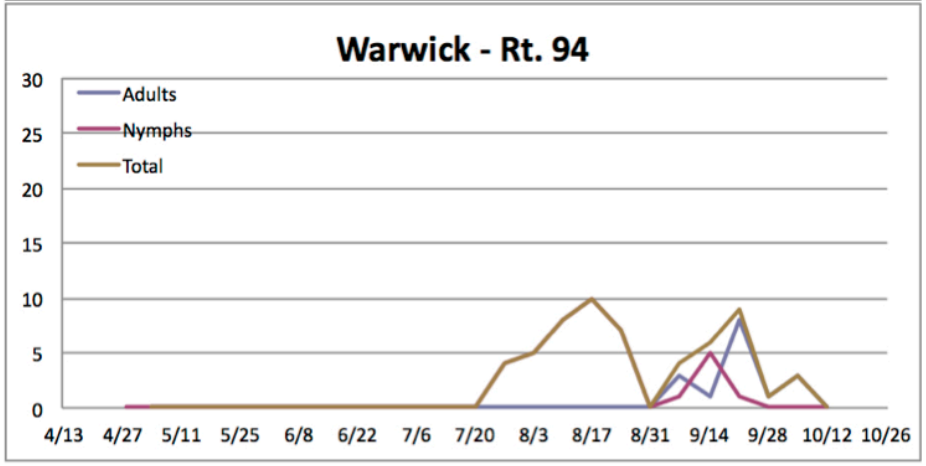
2015 Hudson Valley BMSB Trapping Network Con't.

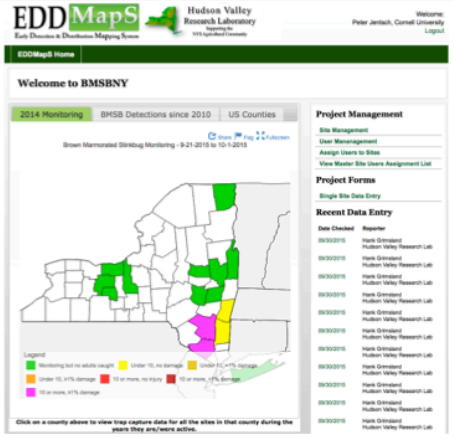












September 2015: Threshold in Ulster and Orange County for BMSB
https://www.eddmaps.org/bmsbny/

2015 MAXIMUM AND MINIMUM TEMPERATURES AND PRECIPITATION

Hudson Valley Research Lab, Highland, NY

All readings were taken from daily Max and Min on the dates indicated from NEWA-HVRL

	MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER		
Date	Max	Min	Rain	Max	Min	Rain	Max	Min	Rain	Max	Min	Rain	Max	Min	Rain	Max	Min	Rain	Max	Min	Rain
1	23.8	9.4	0.03	50.5	25.7	0.05	64.2	48.2	0.0	53.1	48.5	0.7	78.2	65.1	0.31	85.8	64.5	0.00	83.8	64.8	0.00
2	34.0	21.4	0.13	65.7	28.4	0.0	73.5	44.8	0.0	56.4	47.2	1.07	76.8	59.0	0.0	85.6	59.0	0.00	89.9	62.3	0.00
3	28.2	13.2	0.02	61.5	53.6	0.55	77.6	45.2	0.0	69.5	49.8	0.0	77.9	55.9	0.0	88.4	67.2	0.00	87.0	64.8	0.00
4	43.0	27.5	0.63	54.5	37.9	0.27	83.1	54.7	0.0	69.9	52.4	0.0	70.8	60.0	0.05	86.6	66.8	0.02	81.6	68.4	0.00
5	34.3	14.8	0.01	47.1	32.8	0.05	80.2	65.4	0.0	72.9	54.4	0.0	81.8	57.5	0.0	83.7	61.1	0.00	82.5	61.1	0.00
6	27.4	5.8	0.0	64.6	31.6	0.0	70.7	56.9	0.01	70.7	58.5	0.0	80.9	60.4	0.0	80.0	58.9	0.00	85.6	59.3	0.00
7	35.0	11.3	0.0	51.7	39.8	0.19	82.4	48.8	0.0	74.9	47.3	0.0	85.4	67.5	0.02	80.0	57.3	0.00	90.1	61.9	0.00
8	44.6	28.1	0.02	41.1	35.0	0.32	86.6	55.3	0.0	76.7	59.3	0.89	83.8	72.3	0.02	81.3	60.8	0.00	93.4	70.8	0.00
9	51.3	24.2	0.0	40.6	34.3	0.08	76.5	55.7	0.0	76.5	64.2	0.49	76.2	64.6	0.01	82.3	62.3	0.00	91.4	70.9	0.03
10	51.8	27.3	0.09	52.2	37.7	0.65	85.3	61.7	0.0	79.8	55.6	0.0	79.2	66.0	0.02	78.8	63.3	0.00	75.3	64.3	0.06
11	59.4	35.1	0.04	51.6	37.9	0.0	85.8	65.9	0.0	87.5	68.4	0.0	84.1	59.5	0.0	75.5	66.9	1.33	78.1	63.1	0.00
12	43.7	29.8	0.0	68.3	33.5	0.0	83.9	59.6	0.01	84.9	62.0	0.07	86.4	61.3	0.0	82.3	61.3	0.00	75.3	57.2	0.01
13	44.2	23.1	0.0	70.9	44.0	0.0	65.1	47.3	0.0	77.5	64.6	0.03	86.3	65.6	0.0	82.0	57.7	0.00	75.3	59	0.00
14	42.8	32.7	0.36	63.6	48.7	0.11	69.0	40.2	0.0	83.5	58.4	0.01	79.0	62.1	0.0	85.5	56.9	0.00	73.1	54.7	1.57
15	42.0	34.6	0.0	68.1	47.3	0.0	73.0	43.8	0.0	71.0	63.8	0.81	75.6	65.4	0.0	88.3	66.4	0.22	81	51.8	0.00
16	46.2	28.2	0.0	66.6	41.9	0.0	73.9	52.9	0.4	79.4	63.0	0.26	76.2	56.7	0.0	87.1	64.5	0.00	82.6	55	0.00
17	48.9	30.5	0.06	68.0	48.6	0.12	83.0	64.7	0.16	75.6	63.5	0.0	80.2	53.6	0.0	91.1	67.3	0.00	84.4	56	0.00
18	33.0	23.4	0.0	78.7	48.0	0.0	69.3	60.1	0.0	69.8	61.4	0.0	86.5	67.9	0.41	90.3	69.6	0.55	83.3	58.1	0.00
19	38.8	17.4	0.0	65.1	43.6	0.0	78.3	56.1	0.7	79.6	65.0	0.0	89.9	68.0	0.01	86.7	69.5	0.00	80.8	58.5	0.00
20	32.2	23.5	0.01	54.7	43.3	1.19	58.5	46.3	0.0	69.8	58.4	0.13	90.1	71.5	0.0	84.3	70.0	0.02	69.8	57.4	0.00
21	42.5	25.8	0.05	63.3	51.9	0.61	64.4	43.8	0.0	87.6	63.9	1.32	85.5	66.6	0.0	80.8	61.9	0.50	67.5	51.9	0.00
22	39.3	21.6	0.01	63.7	42.6	0.19	70.5	47.1	0.03	83.9	65.2	0.0	81.8	62.6	0.0	77.8	62.4	0.00	67	48	0.00
23	34.3	17.8	0.0	46.9	36.7	0.02	67.2	39.0	0.0	83.8	66.6	0.26	83.8	57.6	0.0	82.4	59.2	0.00	75.2	48.5	0.00
24	39.5	17.0	0.0	42.5	34.9	0.0	78.5	47.5	0.0	81.9	58.6	0.0	84.2	57.3	0.0	83.6	63.8	0.00	76.1	49	0.00
25	46.4	20.9	0.11	57.4	30.6	0.0	85.9	60.4	0.0	79.3	54.9	0.0	85.7	56.6	0.0	83.8	66.7	0.47	73.7	55.7	0.00
26	46.0	34.8	0.45	57.1	36.8	0.0	85.3	65.3	0.09	76.4	62.5	0.0	84.3	67.0	0.21	77.6	57.9	0.01	69	53	0.00
27	43.7	35.8	0.09	59.1	45.8	0.0	82.5	65.7	0.46	68.1	54.8	0.56	85.0	66.5	0.0	78.4	58.7	0.00	72.8	46	0.00
28	35.2	25.4	0.0	65.0	48.1	0.0	85	65.2	0.01	62.3	54.3	0.61	91.4	66.1	0.0	77.8	54.4	0.00	75.2	58.6	0.00
29	44.5	18.3	0.0	72.3	50.8	0.0	80.7	55.1	0.0	73.3	58.1	0.0	93.2	66.4	0.0	82.5	54.8	0.00	77.6	66.6	0.00
30	48.4	29.9	0.02	69.5	43.4	0.0	82.9	62.1	0.0	72.0	60.3	0.1	84.3	71.1	0.17	82.5	62.5	0.21	70.1	53	0.29
31	54.9	31.5	0.07	-	-	-	72.0	51.6	0.68	-	-	-	88.2	64.7	0.0	87.1	66.3	0.01	93.4	46	2.61
High / Low / Total																					
	59.4	5.8	2.20	78.7	25.7	4.40	86.6	39.0	2.55	87.6	47.2	7.31	93.2	53.6	1.23	91.1	54.4	3.34	93.4	46.0	4.57
Ave Temp.	32.5			49.7			65.4			66.4			72.8			72.6			68.2		

Departments of Entomology and Plant Pathology
Hudson Valley Research Laboratory

Cornell University
College of Agriculture and Life Sciences

McIntosh Phenology

Year	GT	HIG	T.C.	Pink	Bloom	P.F.	PF DD_{43}	PF DD_{50}	
2015	4/13	4/20	4/27	5/4	5/6	5/12	527.8	304.5	
2014	4/14	4/18	4/28	5/6	5/12	5/19	594.9	321.5	
2013	4/13	4/18	4/24	4/30	5/7	5/13	510.6	262.2	
2012	3/16	3/18	3/25	4/8	4/16	4/21	506.5	267.5	
2011	4/4	4/11	4/25	5/1	5/9	5/16	526.0	268.3	
2010	3/20	4/2	4/6	4/10	4/20	4/28	305.0	168.5	
2009	4/6	4/13	4/20	4/24	4/29	5/7	452.0	219.6	
2008	4/10	4/14	4/21	4/24	4/29	5/7	404.5	207.4	
2007	4/2	4/21	4/24	5/2	5/7	5/14	397.0	228.3	
2006	4/3	4/10	4/17	4/22	4/26	5/8	419.2	220.0	
2005	4/7	4/11	4/18	4/26	5/8	5/16	493.7	258.6	
2004	4/12	4/19	4/22	4/27	5/3	5/13	558.5	304.7	
2003	4/7	4/16	4/24	4/28	5/1	5/19	595.0	324.7	
2002	3/25	4/10	4/14	4/15	4/16	5/7	498.0	283.2	
2001	4/11	4/17	4/25	4/28	5/2	5/10	481.3	288.0	
2000	3/27	4/2	4/14	4/24	5/1	5/8	488.3	346.0	
1999	4/2	4/7	4/12	4/26	5/2	5/13	530.1	174.4	
1998	3/27	3/29	4/1	4/10	4/23	5/4	498.1	382.0	
1997	4/4	4/11	4/21	4/28	5/1	5/14	422.7	250.0	
1996	4/15	4/19	4/22	4/29	5/6	5/20			
1995	4/11	4/19	4/24	4/29	5/8	5/19			
1994	4/11	4/14	4/20	4/29	5/5	5/12			
1993	4/12	4/19	4/24	5/1	5/3	5/10			
1992	4/13	4/21	5/4	5/7	5/12	5/18			
1991	4/5	4/8	4/11	4/17	4/27	5/7			
1990	3/21	4/16	4/23	4/26	4/29	5/11			
1989	3/29	4/17	4/28	5/3	5/9	5/19			
1988	4/4	4/9	4/28	5/5	5/8	5/19			
1987	3/29	4/10	4/18	4/22	4/29	5/16			
1986	3/31	4/7	4/19	4/27	5/3	5/8			
1985	3/30	4/12	4/15	4/22	5/4	5/12			
1984	4/10	4/26	4/30	5/6	5/16	5/24			
1983	4/12	4/27	4/30	5/2	5/5	5/18			
1982	4/15	4/22	4/30	5/4	5/13	5/17			
1981		4/8	4/16	4/22	5/5	5/14			
1980	4/15		4/24	5/2	5/5	5/10			
Earliest day	**3/16**	**3/18**	**3/25**	**4/8**	**4/16**	**4/21**	305.0	168.5	**Low**
Latest day	**4/15**	**4/27**	**5/4**	**5/7**	**5/16**	**5/24**	595.0	382.0	**High**
Mean	**6 April**	**14 April**	**22 April**	**28 April**	**3 May**	**13 May**	**484.7**	**267.3**	

Midrange: **3/31** (+/-14D)
4/7 (+/-20.5D)
4/14 (+/-20D)
4/22 (+/-14D)
5/1 (+/-15D)
5/7 (+/-16.5D)

Mean days in bloom 9.4 days