

# RESULTS OF 2009 INSECTICIDE AND ACARICIDE STUDIES IN EASTERN NEW YORK

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Formulation	Materials Tested	Company
	<b>Apple</b>	
Actara	.....	Syngenta
AgriFlexi 0.70SC	.....	Syngenta
AgriFlexi 1.55SC	.....	Syngenta
AgriMek 0.15EC	.....	Syngenta
Altacor 35DG	.....	E.I. DuPont De Nemours & Co.
Asana XL 0.66EC	.....	E.I. DuPont De Nemours & Co.
Assail 30SG	.....	United Phosphorus Inc.
Avaunt 30DG	.....	E.I. DuPont De Nemours & Co.
Baythroid 2E	.....	Bayer
Belt SC	.....	Bayer
Calypso 4F	.....	Bayer
Centaur 70WDG	.....	Nichino America, Inc.
Damoil	.....	Drexel
Delegate WG	.....	Dow AgroSciences
Entrust 80WP	.....	Dow AgroSciences
Esteem 35WP	.....	Dow AgroSciences
Imidan 70WP	.....	Gowan Co.
Leverage 2.7SE	.....	Bayer
LI700 (NIS)	.....	UAP Loveland Inc.
Movento 240SC	.....	Bayer
Portal	.....	Nichino America, Inc.
Proclaim 5SG	.....	Syngenta
Sevin XLR	.....	Bayer
Surround WP	.....	BASF
Voliam Express	.....	Syngenta
Voliam Flexi	.....	Syngenta
Warrior 1CS w/Zeon	.....	Syngenta
	<b>Pear</b>	
Actara	.....	Syngenta
AgriFlex 1.55SC	.....	Syngenta
AgriMek 0.70 SC	.....	Syngenta
AgriMek 0.15EC	.....	Syngenta
Centaur 70WDG	.....	Nichino America, Inc.
Damoil	.....	Drexel
Delegate WG	.....	Dow AgroSciences
Esteem 35WP	.....	Dow AgroSciences
Movento 240SC	.....	Bayer
Portal	.....	Nichino America, Inc.
PureSpray 10E	.....	Petro-Canada
Surround WP	.....	Tessenderlo Kerley, Inc.

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**APPLE:** *Malus domestica*, cv. 'Ginger Gold', '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.)

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE EARLY FRUIT FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Fruit evaluations were made on 20 May and 3 June of 'Ginger Gold' cultivars (**Table 2a-b**). Fruit damage was assessed before and after 'June drop' by randomly selecting 50 fruits from each tree and scoring for external damage. The 'LEP' category includes combined damage from green fruitworm, redbanded and obliquebanded leafrollers. To stabilize variance, percentage data were transformed by arcsine \*(square root of x) prior to analysis using Fisher's Protected LSD ( $P = < 0.05$ ). Untransformed data are presented in each table.

Data represents the efficacy of tight cluster and petal fall treatments (Table 2a) and subsequent 1<sup>st</sup> cover treatment (Table 2b) on the early season insect pest complex. Infestation pressure from TPB was relatively low during the early pre-bloom season as observed on the 'Ginger Gold' variety. Cool temperatures preceding tight cluster on through to pink provided lower than normal plant bug activity in tree fruit with no live sticky trap field captures during that period. Cool temperatures during the latter part of bloom on through to 1C provided lower than normal PC injury as observed in late migrations and decreased PC ovipositional activity on fruit with 1.3% and 5.3% damage observed in untreated Ginger Gold from the 1<sup>st</sup> to the 2<sup>nd</sup> evaluation. Overall PC damage to fruit was lower than normal this season.

Pre-bloom pyrethroid applications of Warrior were not significantly better than petal fall applications at controlling PC, TPB and reducing the lepidoptera complex damage to fruit. Numerically, plots receiving pre-bloom Warrior ICS applications provided higher overall levels of clean fruit. The combination of Assail 30SG with 0.25% Damoil did not appear to have increased efficacy over its counterparts with the surfactant LI-700 or alone as no statistical differences were observed.



Table 1. Application timing of insecticide schedules used on apple. N.Y.S.A.E.S., Cornell University's Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment # & Formulation		Rate/acre % V/V	Timing	Application dates
1	Voliam Xpress <sup>a</sup>	9.0 fl oz	PF, 1C, 2C	13, 22 May, 8 June
	AgriMek 0.15EC <sup>a</sup>	2.25 fl oz	PF	13-May
	Voliam Flexi <sup>a</sup>	5.0 oz	2nd Gen. CM biofix + 1250 DD, 21d	11, 29 July, 15 Aug.
2	Imidan 70WP <sup>a</sup>	5.33 lb	PF, 1C, 2C	13, 22 May, 8 June
	Voliam Flexi <sup>a</sup>	5.0 oz	2nd Gen. CM biofix + 1250 DD, 21d	11, 29 July, 15 Aug.
	Voliam Flexi <sup>a</sup>	5.0 oz	3rd Gen. OFM biofix + 2450 DD <sub>50</sub>	26-Aug
3	AgriFlexi 1.55SC <sup>a</sup>	8.5 oz	PF, 1C, 2C	13-May
	Voliam Xpress <sup>a</sup>	9.0 fl oz	1C	22 May, 8 June
	Proclaim <sup>a</sup>	4.2 fl oz	PF	22 May, 8 June
	Warrior 1CS	5.12 fl oz	3C-8C	26 June, 4, 15, 29 July, 8, 26 Aug.
4	Warrior 1CS	5.12 fl oz	Tight Cluster	24-Apr
	Assail 30SG	6.0 oz	PF, 1C, 2C	13, 22 May, 8 June
	Damoil	0.25%	PF, 1C, 2C	13, 22 May, 8 June
	Delegate WG	5.0 oz	OBLR 340DD43 + 14d (3-4C)	26 June, 4 July
	Imidan 70WP	5.33 lb	AM/OFM (6-8C)	29 July, 8, 26 Aug.
5	Warrior 1CS	5.12 fl oz	Tight Cluster	24-Apr
	Assail 30SG	6.0 oz	PF, 1C, 2C	13, 22 May, 8 June
	Delegate WG	5.0 oz	OBLR 340DD43 + 14d (3-4C)	26 June, 4 July
	Imidan 70WP	5.33 lb	AM/OFM (6-8C)	29 July, 8, 26 Aug.
6	Warrior 1CS	5.12 fl oz	Tight Cluster	24-Apr
	Assail 30SG <sup>a</sup>	6.0 oz	PF, 1C, 2C	13, 22 May, 8 June
	Imidan 70WP	5.33 lb	3-8C	26 June, 4, 15, 29 July, 8, 26 Aug.
7	Imidan 70WP	5.33 lb	PF, 1C, 2C	13, 22 May, 8 June
	Delegate WG	5.0 oz	OBLR 340DD43 + 14d (3-4C)	26 June, 4 July
	Assail 30SG	6.0 oz	AM/OFM (5-8)	29 July, 8, 26 Aug.
8	Asana 0.66XL	14.5 fl oz	Tight Cluster	24-Apr
	Avaunt 30DG	6.0 oz	PF, 1-2C, AM (5-8C)	13, 22 May, 8 June, 29 July, 8, 26 Aug.
	Altacor 35DG	4.0 oz	Ovicide OBLR / CM (3 -4C)	26 June, 4 July
9	Avaunt 30DG <sup>a</sup>	6.0 oz	PF, 1-2C, AM (5-8C)	13, 22 May, 8 June, 29 July, 8, 26 Aug.
	Altacor 35DG	4.0 oz	OBLR 340DD <sub>43</sub> + 14d (3-4C)	26 June, 4 July
10	Warrior 1CS	5.12 fl oz	Tight Cluster	24-Apr
	Imidan 70WP	5.33 lb	PF	13 May, 29 July, 8, 26 Aug.
	Calypso 4F	8.0 fl oz	1-2C	22 May, 8 June
	Delegate WG	5.2 oz	OBLR 340DD43 + 14d (3-4C)	26 June, 4 July
	Assail 30SG	6.0 oz	AM (5-8)	29 July, 8, 26 Aug.
11	Imidan 70WP	5.33 lb	PF	13 May, 29 July, 8, 26 Aug.
	Calypso 4F	8.0 fl oz	1-2C	22 May, 8 June
	Altacor 35DG	5.2 oz	OBLR 340DD43 + 14d (3-4C)	26 June, 4 July
	Delegate WG	5.2 oz	AM (5-6C) / OFM 2450 DD <sub>50</sub> (7-8)	29 July, 8, 26 Aug.
12	Imidan 70WP	5.33 lb	PF, 1-8C	13, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
	Proclaim 5SG	4.2 oz	PF	13-May
	Damoil	0.25%	PF	13-May
13 Untreated				

a. Treatments receiving LI-700 at 0.25% V/V

Table 2a Evaluations of insecticide schedules for controlling early season insect complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment	Formulation	Application Dates	% damaged fruit (20 May)					
			TPB	MPB	PC	EAS	E. LEP	% Clean
1. Voliam Express	9.0 oz./A	PF	5.3 a	5.5 a	5.3 a	10.5 fg	0.0 a	73.5 abc
AgriMek 0.15EC	2.25 fl.oz./A	PF						
LI-700	0.25% v/v	all appl.						
2. Imidan 70WP	5.33 lbs./A	PF	3.5 a	4.3 a	0.8 a	3.8 abc	0.0 a	87.8 d-g
3. Proclaim 5SG	4.2 oz./A	PF	5.0 a	5.8 a	3.8 a	4.8 a-e	0.3 a	80.5 a-e
AgriFlexi 1.55SC	8.5 oz./A	PF						
LI-700	0.25% v/	PF						
4. Warrior 1CS	5.12 oz./A	TC	2.3 a	1.3 a	1.3 a	1.0 a	0.0 a	94.0 g
Assail 30SG	6.0oz./A	PF						
Damoil	0.25% v/	PF						
5. Warrior 1CS	5.12 oz./	TC	2.0 a	1.5 a	1.8 a	3.3 abc	0.0 a	91.5 fg
Assail 30SG	6.0oz./A	PF						
6. Warrior 1CS	5.12 oz./A	TC	3.0 a	1.3 a	3.3 a	2.7 ab	0.0 a	89.7 d-g
Assail 30SG	6.0oz./A	PF						
LI-700	0.25% v/v	PF						
8. Asana 0.66XL	14.5 oz./A	TC	4.0 a	4.8 a	1.3 a	4.5 a-d	0.0 a	85.5 c-g
Avaunt 30DG	6.0 oz./A	PF						
9. Avaunt 30DG	6.0 oz./A	PF	4.5 a	5.8 a	2.3 a	2.0 ab	0.3 a	85.1 c-g
LI-700	0.25% v/v	PF						
10. Warrior 1CS	5.12 oz./A	TC	1.7 a	2.7 a	1.7 a	2.7 abc	0.0 a	91.3 cfg
Imidan 70WP	5.33 lbs./A	PF						
12. Imidan 70WP	5.33 lbs./A	PF	3.3 a	8.8 a	2.5 a	4.5 a-e	0.0 a	81.0 a-e
Proclaim 5SG	4.2 oz./A	PF						
Damoil	0.25% v/	PF						
13. Untreated			2.5 a	1.8 a	1.3 a	13.5 g	0.0 a	81.0 a-e

Percent data were transformed using arcsine (Sqrt(x)) 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.

<sup>a</sup> Evaluation made 20 May on 'Ginger Gold' cultivar. GT on 6 April, 1/2" Green on 13 April, TC on 24 April, Pink on 25 April, King Bloom on 27 April, PF on 13 May, 1C on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 1<sup>st</sup> gen. CM 250DD<sub>43</sub> (egg hatch) on 29 May; 2<sup>nd</sup> gen. CM 1250 DD<sub>43</sub> (modeled egg hatch) on 11 July; All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

Table 2b Evaluations of insecticide schedules for controlling early season insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment	Formulation	Application Dates	% damaged fruit (3 June)					
			TPB	MPB	PC	EAS	E. LEP	% Clean
1. Voliam Express	9.0 oz./A	PF, 1C	3.0 a	2.0 a	8.8 a	6.3 bc	0.3 a	79.8 a
AgriMek 0.15EC	2.25 fl.oz./A	PF						
LI-700	0.25% v/v	all appl.						
2. Imidan 70WP	5.33 lbs./	PF, 1C	2.5 a	1.0 a	2.5 a	11.0 cd	0.3 a	82.8 b-g
LI-700	0.25% v/	all appl.						
3. Proclaim 5SG	4.2 oz./A	PF	1.8 a	0.5 a	3.5 a	3.3 ab	0.5 a	84.5 abc
AgriFlexi 1.55SC	8.5 oz./A	PF						
LI-700	0.25% v/	PF, 1C						
Voliam Express	9.0 oz./A	1C						
4. Warrior 1CS	5.12 oz./A	TC	1.3 a	0.3 a	1.0 a	4.3 abc	0.0 a	93.0 c-e
Assail 30SG	6.0 oz./A	PF, 1C						
Damoil	0.25% v/	PF, 1C						
5. Warrior 1CS	5.12 oz./	TC	1.3 a	0.3 a	0.8 a	2.8 ab	0.3 a	94.8 e
Assail 30SG	6.0 oz./A	PF, 1C						
6. Warrior 1CS	5.12 oz./A	TC	1.8 a	0.0 a	2.5 a	3.8 abc	0.3 a	91.8c-f
Assail 30SG	6.0 oz./A	PF, 1C						
LI-700	0.25% v/v	PF, 1C						
7. Imidan 70WP	5.33 lbs./A	PF, 1C	2.3 a	2.5 a	3.8 a	5.8 bc	0.8 a	85.0 b-g
Proclaim 5SG	4.2 oz./A	PF						
Damoil	0.25% v/	PF						
8. Asana 0.66XL	14.5 oz./A	TC	2.5 a	0.8 a	1.0 a	1.5 a	0.3 a	94.0 de
Avaunt 30DG	6.0 oz./A	PF, 1C						
9. Avaunt 30DG	6.0 oz./A	PF, 1C	1.3 a	0.3 a	0.0 a	4.0 ab	0.3 a	94.0 de
LI-700	0.25% v/v	PF, 1C						
10. Warrior 1CS	5.12 oz./A	TC	1.0 a	0.0 a	1.3 a	4.3 abc	0.0 a	93.3 c-e
Imidan 70WP	5.33 lbs./A	PF						
Calypso 4F	8.0 oz./A	1-2C						
11. Imidan 70WP	5.33 lbs./A	PF	2.8 a	2.3a	3.3 a	6.8 bc	0.5 a	84.5 abc
Calypso 4F	8.0 oz./A	1-2C						
12. Imidan 70WP	5.33 lbs./A	PF, 1C	3.3 a	1.3 a	1.8 a	3.5 ab	0.0 a	89.8 c-e
Proclaim 5SG	4.2 oz./A	PF						
Damoil	0.25% v/	PF						
13. UNTREATED			2.0 a	1.0 a	5.3 a	15.2 d	2.1 a	59.8 a

Percent data were transformed using arcsine (Sqrt(x)) 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.

<sup>a</sup> Evaluation made 3 June on 'Ginger Gold' cultivar. GT on 6 April, 1/2" Green on 13 April, TC on 24 April, Pink on 25 April, King Bloom on 27 April, PF on 13 May, 1C on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 1<sup>st</sup> gen. CM 250DD<sub>43</sub> (egg hatch) on 29 May; 2<sup>nd</sup> gen. CM 1250 DD<sub>43</sub> (modeled egg hatch) on 11 July; All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

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

**Cecidomyiidae:** predatory larvae

**Green apple aphid complex (GAA):** *Aphis pomi* De Geer

**Obliquebanded leafroller (OBLR):** *Choristoneura rosaceana* (Harris)

**Potato leafhopper (PLH):** *Empoasca fabae* (Harris)

**Redbanded Leafroller (RBLR):** *Argyrotaenia velutinana* (Walker)

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Rosy apple aphid (RAA):** *Dysaphis plantaginea* (Passerini)

**Spirea aphid (SA):** *Aphis spiraeicola* Patch

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricus).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE EARLY AND MID-SEASON FOLIAR FEEDING INSECT PESTS OF APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar evaluations were made on 'McIntosh', 'Golden Delicious' and Red delicious' cultivars on 20 May and on 9 July in Tables 3 & 4 respectively. All evaluations of foliar damage conducted on 20 May employed 3-minute perimeter observations. Damage to fruit clusters by rosy apple aphids were evaluated on 'Golden Delicious' for both discoloration and leaf curl. The complex of lepidoptera were evaluated on 'McIntosh' for terminal leaf feeding by counting the number of terminals per tree showing signs of leaf feeding in a 3-minute perimeter observation and subsequently opening curled foliage to reveal live larvae. The 'Red Delicious' cultivar was used for STLM evaluations of both presence and density.

Evaluations on 9 July of damage to fruit clusters by rosy apple aphids were evaluated using three-minute perimeter observations on 'Golden Delicious' for both discoloration and leaf curl. The 'Red Delicious' cultivar was used for all other foliar evaluations. The complex of lepidoptera were evaluated for terminal leaf feeding by counting the number of terminals per tree showing signs of leaf feeding in a 3-minute perimeter observation. The leafhopper complex was rated by counting the number of nymphs per 5 mid-terminal leaves on 25 randomly selected perimeter terminals (RLH) or by counting the number of nymphs per 5 apical terminal leaves on 25 randomly selected perimeter terminals.

Pre-bloom combination applications of pyrethroids and chloronicotinyl insecticides demonstrated effective control of the RAA, foliar feeding by lepidopteran larvae, and suppression of PLH and RLH nymphs. Imidan / Calypso combinations provided good GAA suppression while maintaining high levels of cecidomyiid larvae. Adjuvants used with Assail (oil, LI-700) may have a suppressive effect on cecidomyiid larvae leading to increased GAA populations. Low levels of STLM were present this season with no significant differences between treatments.

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

**Cecidomyiidae:** predatory larvae

**Green apple aphid complex (GAA):** *Aphis pomi* De Geer

**Obliquebanded leafroller (OBLR):** *Choristoneura rosaceana* (Harris)

**Potato leafhopper (PLH):** *Empoasca fabae* (Harris)

**Redbanded Leafroller (RBLR):** *Argyrotaenia velutinana* (Walker)

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Rosy apple aphid (RAA):** *Dysaphis plantaginea* (Passerini)

**Spirea aphid (SA):** *Aphis spiraeicola* Patch

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricius).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE EARLY AND MID-SEASON FOLIAR FEEDING INSECT PESTS OF APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May., 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar evaluations were made on 'McIntosh', 'Golden Delicious' and Red delicious' cultivars on 20 May and on 9 July in Tables 3 & 4 respectively. All evaluations of foliar damage conducted on 20 May employed 3-minute perimeter observations. Damage to fruit clusters by rosy apple aphids were evaluated on 'Golden Delicious' for both discoloration and leaf curl. The complex of lepidoptera were evaluated on 'McIntosh' for terminal leaf feeding by counting the number of terminals per tree showing signs of leaf feeding in a 3-minute perimeter observation and subsequently opening curled foliage to reveal live larvae. The 'Red Delicious' cultivar was used for STLM evaluations of both presence and density.

Evaluations on 9 July of damage to fruit clusters by rosy apple aphids were evaluated using three-minute perimeter observations on 'Golden Delicious' for both discoloration and leaf curl. The 'Red Delicious' cultivar was used for all other foliar evaluations. The complex of lepidoptera were evaluated for terminal leaf feeding by counting the number of terminals per tree showing signs of leaf feeding in a 3-minute perimeter observation. The leafhopper complex was rated by counting the number of nymphs per 5 mid-terminal leaves on 25 randomly selected perimeter terminals (RLH) or by counting the number of nymphs per 5 apical terminal leaves on 25 randomly selected perimeter terminals.

Pre-bloom combination applications of pyrethroids and chloronicotinyl insecticides demonstrated effective control of the RAA, foliar feeding by lepidopteran larvae, and suppression of PLH and RLH nymphs. Imidan / Calypso combinations provided good GAA suppression while maintaining high levels of cecidomyiid larvae. Adjuvants used with Assail (oil, LI-700) may have a suppressive effect on cecidomyiid larvae leading to increased GAA populations. Low levels of STLM were present this season with no significant differences between treatments.

Table 3. Evaluation of insecticides for controlling foliar feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Data taken from 3 min. Observation made 20 May				
		RAA / Cluster <sup>b</sup>	Lep. Dam. / Terminal <sup>c</sup>	Lep. Larvae / Terminal <sup>c</sup>	# Leaves with STLM <sup>d</sup>	Mean STLM Mines / Leaf <sup>d</sup>
1. Voliam Express AgriMek 0.15EC LI-700	9.0 oz./A 2.25 fl.oz./A 0.25% v/v	2.5 bc	14.8 de	0.0 a	0.3 a	4.0 a
2. Imidan 70WP LI-700	5.33 lbs./ 0.25% v/	1.8 abc	8.3 cde	0.3 a	0.5 a	1.5 a
3. Proclaim 5SG AgriFlexi 1.55SC LI-700 Voliam Express	4.2 oz./A 8.5 oz./A 0.25% v/ 9.0 oz./A	4.0 c	11.3 cde	0.3 a	0.0 a	0.0 a
4. Warrior 1CS Assail 30SG Damoil	5.12 oz./A 6.0 oz./A 0.25% v/	0.0 a	3.3 ab	0.3 a	0.3 a	0.8 a
5. Warrior 1CS Assail 30SG	5.12 oz./ 6.0 oz./A	0.0 a	2.8 ab	0.0 a	0.0 a	0.0 a
6. Warrior 1CS Assail 30SG LI-700	5.12 oz./A 6.0 oz./A 0.25% v/v	0.0 a	1.8 a	0.3 a	0.0 a	0.0 a
7. Imidan 70WP Proclaim 5SG Damoil	5.33 lbs./A 4.2 oz./A 0.25% v/	0.0 a	5.8 abc	0.0 a	0.0 a	0.0 a
8. Asana 0.66XL Avaunt 30DG	14.5 oz./A 6.0 oz./A	1.0 ab	2.5 ab	0.0 a	0.0 a	0.0 a
9. Avaunt 30DG LI-700	6.0 oz./A 0.25% v/v	2.5 bc	5.5 abcd	0.0 a	0.0 a	0.0 a
10. Warrior 1CS Imidan 70WP Calypso 4F	5.12 oz./A 5.33 lbs./A 8.0 oz./A	0.8 ab	3.5 ab	0.0 a	0.0 a	0.0 a
11. Imidan 70WP Calypso 4F	5.33 lbs./A 8.0 oz./A	2.8 bc	17.8 e	0.0 a	0.0 a	0.0 a
12. Imidan 70WP Proclaim 5SG Damoil	5.33 lbs./A 4.2 oz./A 0.25% v/	0.8 ab	13.0 cde	0.3 a	0.3 a	0.5 a
13. UNTREATED		2.5 abc	6.5 bcde	0.0 a	0.8 a	2.3 a

Foliar data were transformed using Log10 (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.

<sup>a</sup> Evaluation made 20 May. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> RAA = Rosy apple aphid, *Dysaphis plantaginea* (Passerini). Data taken from 'Golden Delicious'.

<sup>c</sup> Lep. = Lepidoptera complex including; Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee). Data taken from 'McIntosh'.

<sup>d</sup> STLM = Spotted tentiform leafminer, *Phyllonorycter blancardella* (Fabricius). Data taken from 'Red Delicious'.



Evaluation of insecticides for controlling foliar feeding insect complex on apple.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	# / 3 min. Observation		# / 10 Leaf Sample <sup>d</sup>							
		RAA / Clusters <sup>b</sup>	Lep Dam. Term. <sup>c</sup>	PLH Nym.	RLH Nym.	% Leaves with GAA Rating <sup>e</sup>				Cecid Larvae	Lvs/w STLM
						0	1	2	3		
1. Voliam Express AgriMek 0.15EC LI-700	9.0 oz./A 2.25 fl.oz./A 0.25% v/v	1.8 abc	4.3 a	1.8 ab	2.0 a	75.0 a	17.5 a	7.5 a	0.0 a	0.5 a	0.0 a
2. Imidan 70WP LI-700	5.33 lbs./ 0.25% v/	4.0 bc	3.0 a	0.5 ab	2.3 a	67.5 a	20.0 a	12.5 a	0.0 a	0.3 a	0.5 a
3. AgriFlexi 1.55SC LI-700	8.5 oz./A 0.25% v/ 5.12 oz./A	10.0 cd	2.5 a	0.3 a	0.5 a	62.5 a	7.5 a	5.0 a	0.0 a	0.0 a	0.0 a
4. Warrior ICS Assail 30SG Damoil	6.0 oz./A 0.25% v/	1.0 ab	1.0 a	0.3 a	0.0 a	50.0 a	15.0 a	12.5 a	22.5 a	0.8 a	0.0 a
5. Warrior ICS Assail 30SG	5.12 oz./ 6.0 oz./A	0.0 a	3.0 a	0.5 ab	0.5 a	75.0 a	5.0 a	12.5 a	7.5 a	3.0 a	0.0 a
6. Warrior ICS Assail 30SG LI-700	5.12 oz./A 6.0 oz./A 0.25% v/v	1.0 ab	1.5 a	0.0 a	0.3 a	57.5 a	2.5 a	12.5 a	27.5 a	0.3 a	0.0 a
7. Imidan 70WP Damoil	5.33 lbs./A 0.25% v/	1.5 abc	3.5 a	0.3 a	1.5 a	72.5 a	20.0 a	5.0 a	0.0 a	0.5 a	0.0 a
8. Asana 0.66XL Avaunt 30DG	14.5 oz./A 6.0 oz./A	1.8 abc	0.5 a	1.3 ab	1.8 a	50.0 a	17.5 a	30.0 a	2.5 a	0.5 a	0.0 a
9. Avaunt 30DG LI-700	6.0 oz./A 0.25% v/v	16.0 d	2.5 a	1.8 b	1.0 a	77.5 a	12.5 a	7.5 a	2.5 a	0.0 a	0.3 a
10. Warrior ICS Imidan 70WP	5.12 oz./A 5.33 lbs./A	0.0 a	0.0 a	0.0 a	0.0 a	60.0 a	10.0 a	26.7 a	3.3 a	1.3 a	0.0 a
11. Imidan 70WP	5.33 lbs./A	6.5 cd	3.5 a	0.0 a	0.5 a	85.0 a	7.5 a	5.0 a	2.5 a	5.5 a	0.0 a
12. Imidan 70WP Proclaim 5SG Damoil	5.33 lbs./A 4.2 oz./A 0.25% v/	6.0 bcd	3.5 a	0.5 ab	2.5 a	67.5 a	15.0 a	10.0 a	7.5 a	0.0 a	0.3 a
13. UNTREATED		4.8 bcd	2.0 a	7.3 c	1.3 a	85.0 a	7.5 a	5.0 a	2.5 a	0.0 a	0.0 a

Foliar data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> Evaluation made 9 Jul. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

<sup>b</sup> RAA = Rosy apple aphid, *Dysaphis plantaginea* (Passerini). Data taken from 'Golden Delicious'.

<sup>c</sup> Lep. = Lepidoptera complex including; Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee). Data taken from 'Red Delicious'.

<sup>d</sup> PLH = Potato leafhopper, *Empoasca fabae* (Harris), RLH = Rose leafhopper, *Edwardsiana rosae* (Linnaeus). GAA = Green apple aphid, *Aphis pomi* or *Spiria* (DeGeer), Cecid = Cecidomyiidae, STLM = Spotted tentiform leafminer, *Phyllonorycter blancardella* (Fabricus). Data taken from 'Red Delicious'.

<sup>e</sup> GAA Rating Scale: 0 = 0 aphids / single terminal leaf with highest GA population, 1 = 1-5 aphids, 2 = 6-10 aphids, 3 = ≥ 10 aphids

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

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricus).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE LEAFHOPPER & LEAF MINER COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar evaluations were made using the 'Red delicious' cultivar on 4 September (Tables 5 & 6). All evaluations of damage employed foliar observations in the field to determine degree of foliar stippling from the leafhopper complex and STLM degree of presence and density. Evaluations on 4 September of stippling damage to foliage from the leafhopper complex was rated using the rating scale of 0 = 0% damage; 1 = 1-10% of the surface with stippling damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50%. The STLM evaluations were conducted by counting the number of mines per leaf and calculating the 5 damage in each of 5 categories using the rating scale of 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage.

Table 5. Evaluations of insecticide schedules for controlling leafhopper complex on apple foliage.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

	Treatment & Formulation	Rate/acre % V/V	Percent leaves with RLH & WALH stippling damage using 0-4 rating <sup>b</sup>				
			% Clean	% Damaged			
			0	1	2	3	4
1	Voliam Xpress <sup>a</sup> AgriMek 0.15EC <sup>a</sup> Voliam Flexi <sup>a</sup>	9.0 fl oz 2.25 fl oz 5.0 oz	96.0 bcd	4.0 ab	0.0 a	0.0 a	0.0 a
2	Imidan 70WP <sup>a</sup> Voliam Flexi <sup>a</sup> Voliam Flexi <sup>a</sup>	5.33 lb 5.0 oz 5.0 oz	98.0 bcd	2.0 ab	0.0 a	0.0 a	0.0 a
3	AgriFlexi 1.55SC <sup>a</sup> Voliam Xpress <sup>a</sup> Proclaim <sup>a</sup> Warrior 1CS	8.5 oz 9.0 fl oz 4.2 fl oz 5.12 fl oz	97.0 bcd	3.0 ab	0.0 a	0.0 a	0.0 a
4	Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	99.0 cd	1.0 ab	0.0 a	0.0 a	0.0 a
5	Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	98.0 cd	2.0 ab	0.0 a	0.0 a	0.0 a
6	Warrior 1CS Assail 30SG <sup>a</sup> Imidan 70WP	5.12 fl oz 6.0 oz 5.33 lb	99.0 cd	1.0 ab	0.0 a	0.0 a	0.0 a
7	Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	79.0 b	12.0 b	9.0 b	0.0 a	0.0 a
8	Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	92.0 bcd	7.0 ab	0.0 a	0.0 a	1.0 a
9	Avaunt 30DG <sup>a</sup> Altacor 35DG	6.0 oz 4.0 oz	95.0 bcd	5.0 ab	0.0 a	0.0 a	0.0 a
10	Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	100.0 d	0.0 a	0.0 a	0.0 a	0.0 a
11	Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	100.0 d	0.0 a	0.0 a	0.0 a	0.0 a
12	Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	81.0 bc	16.0 b	2.0 a	1.0 ab	0.0 a
13	Untreated		47.0 a	31.0 c	20.0 c	2.0 b	0.0 a

Percent data were transformed using arcsine (Sqrt(x)) 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.

<sup>a</sup> Treatments receiving LI-700 at 0.25% V/V.

<sup>b</sup> Evaluation made 4 Sept. on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph. LH Rating Scale: 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage.

Table 6. Evaluations of insecticide schedules for controlling spotted tentiform leafminer on apple foliage. N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

		Percent Leaves with STLM damage using 0-4 rating scale <sup>b</sup>				
Treatment & Formulation	Rate/acre % V/V	<u>% Clean</u>	<u>% Damaged</u>			
		0	1	2	3	4
1 Voliam Xpress <sup>a</sup>	9.0 fl oz	99.0 bc	1.0 a	0.0 a	0.0 a	0.0 a
AgriMek 0.15EC <sup>a</sup>	2.25 fl oz					
Voliam Flexi <sup>a</sup>	5.0 oz					
2 Imidan 70WP <sup>a</sup>	5.33 lb	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Voliam Flexi <sup>a</sup>	5.0 oz					
Voliam Flexi <sup>a</sup>	5.0 oz					
3 AgriFlexi 1.55SC <sup>a</sup>	8.5 oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Voliam Xpress <sup>a</sup>	9.0 fl oz					
Proclaim <sup>a</sup>	4.2 fl oz					
Warrior 1CS	5.12 fl oz					
4 Warrior 1CS	5.12 fl oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Assail 30SG	6.0 oz					
Damoil	0.25%					
Delegate WG	5.0 oz					
Imidan 70WP	5.33 lb					
5 Warrior 1CS	5.12 fl oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Assail 30SG	6.0 oz					
Delegate WG	5.0 oz					
Imidan 70WP	5.33 lb					
6 Warrior 1CS	5.12 fl oz	98.0 bc	2.0 a	0.0 a	0.0 a	0.0 a
Assail 30SG <sup>a</sup>	6.0 oz					
Imidan 70WP	5.33 lb					
7 Imidan 70WP	5.33 lb	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Delegate WG	5.0 oz					
Assail 30SG	6.0 oz					
8 Asana 0.66XL	14.5 fl oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Avaunt 30DG	6.0 oz					
Altacor 35DG	4.0 oz					
9 Avaunt 30DG <sup>a</sup>	6.0 oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Altacor 35DG	4.0 oz					
10 Warrior 1CS	5.12 fl oz	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Imidan 70WP	5.33 lb					
Calypso 4F	8.0 fl oz					
Delegate WG	5.2 oz					
Assail 30SG	6.0 oz					
11 Imidan 70WP	5.33 lb	100.0 c	0.0 a	0.0 a	0.0 a	0.0 a
Calypso 4F	8.0 fl oz					
Altacor 35DG	5.2 oz					
Delegate WG	5.2 oz					
12 Imidan 70WP	5.33 lb	92.0 a	6.0 b	2.0 a	0.0 a	0.0 a
Proclaim 5SG	4.2 oz					
Damoil	0.25%					
13 Untreated		97.0 b	1.0 a	1.0 a	1.0 a	0.0 a

Percent data were transformed using arcsine (Sqrt(x)) 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.

<sup>a</sup>Treatments receiving LL-700 at 0.25% V/V

<sup>b</sup>Evaluation made 4 Sep on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 2.0 psi, traveling in an average of 2.86 mph. STLM Rating Scale: 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage.

**APPLE:** *Malus domestica* 'Red Delicious'

**Apple rust mite (ARM):** *Aculus schlechtendali* (Nalepa)

**European red mite (ERM):** *Panonychus ulmi* (Koch)

**Two spotted spider mite (TSM):** *Tetranychus urticae* Koch

**A predatory stigmatid (ZM):** *Zetzellia mali* (Ewing)

**A predatory phytoseiid (AMB):** *Neoseiulus (=Amblyseius) fallacies* (Garman)

**EVALUATION OF INSECTICIDES FOR MANAGING THE MITE COMPLEX OF APPLE, 2008 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from Red Delicious of each plot on 3 dates throughout the season beginning on 3 June, 14 July and 5 August. Leaves were removed to the laboratory where they were brushed using a mite-brushing machine onto glass plates and the mites and eggs examined using a binocular scope ( $\geq 18\times$ ). To stabilize variance in these evaluations, transformation using the  $\text{Log}_{10}(X + 1)$  was conducted prior to analysis using Fisher's Protected LSD ( $P < 0.05$ ). Untransformed data are presented in each table.

Rainfall beginning in the latter spring and continuing late into the season reduced the need for miticides in most commercial orchards throughout the Hudson Valley. In general, suppression of mite from frequent rains and moderating temperatures also held populations below action threshold in research plots. Evaluations of the mite populations in treated plots showed few significant differences between treatments related to phytophagous miticidal effects of treatments on field populations. Relatively high populations of phytoseiid and stigmatid mite predators were present throughout the season, maintaining biological control of the remnant phytophagous mite populations in our plots.

We often observe shifts in both phytophagous and predacious mite populations with the use of pyrethroid, carbamate and neonicotinoid chemistries. We observed ERM populations above the 5 mite per leaf economic threshold on the 15 July in the Volium Flexi treatments (Trmt. 2, Thiamethoxam, Chlorantraniliprole) this season. Delegate applications appear to have contributed to higher rust mite populations (Trmt. 4).

Table 7. Evaluation of insecticides for managing the mite complex on apple.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

N. F. S. A. L. S., Hudson Valley Lab., Highland, N. Y. 2009.											
Treatment / Formulation		Rate/acre % vol:vol	ERM	ERME	# mite or mite egg / 25 leaf sample <sup>b</sup>				AMB	AMBE	ARM
					TSM	TSME	ZM	ZME			
1	Voliam Express <sup>a</sup> AgriMek 0.15EC <sup>a</sup> Voliam Flexi <sup>a</sup>	9.0 fl oz 2.25 fl oz 5.0 oz	0.5 a	0.0 a	0.3 a	0.0 a	0.8 a	0.0 a	0.0 a	0.0 a	272.0 abc
2	Imidan 70WP <sup>a</sup> Voliam Flexi <sup>a</sup>	5.33 lb 5.0 oz	2.0 a	1.5 a	1.0 a	0.0 a	0.8 a	0.0 a	0.0 a	0.0 a	100.0 ab
3	Proclaim 5SG <sup>a</sup> AgriFlexi 1.55SC <sup>a</sup> Voliam Express <sup>a</sup> Warrior 1CS	4.2 oz 8.5 oz 9.0 fl oz 5.12 fl oz	0.8 a	0.3 a	0.3 a	0.0 a	1.0 ab	0.3 ab	0.0 a	0.0 a	28.0 a
4	Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	0.5 a	0.0 a	0.8 a	0.5 a	2.3 abc	0.5 abc	0.0 a	0.0 a	1080.3 bcde
5	Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	2.3 a	1.5 a	2.0 a	1.0 a	3.5 cde	0.8 abcd	1.5 a	0.3 a	772.5 cdef
6	Warrior 1CS Assail 30SG <sup>a</sup> Imidan 70WP	5.12 fl oz 6.0 oz 5.33 lb	1.3 a	2.3 a	0.5 a	0.0 a	2.5 bcde	0.0 a	0.3 a	0.0 a	2807.3 ef
7	Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	4.5 a	3.3 a	0.3 a	0.0 a	6.0 ef	3.5 ef	0.3 a	0.0 a	1808.0 def
8	Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	1.3 a	1.3 a	0.3 a	0.8 a	3.5 cde	1.8 bcde	0.0 a	0.0 a	2216.0 def
9	Avaunt 30DG <sup>a</sup> Altacor 35DG	6.0 oz 4.0 oz	1.5 a	0.3 a	0.0 a	0.0 a	5.5 def	1.0 abcd	0.3 a	0.3 a	720.0 cdef
10	Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	0.8 a	0.5 a	0.0 a	0.0 a	8.8 f	3.0 de	0.5 a	0.0 a	3652.0 f
11	Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	5.5 a	3.3 a	1.0 a	2.8 a	6.5 cdef	1.3 abcde	0.5 a	0.0 a	1545.0 def
12	Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	1.3 a	0.0 a	0.0 a	2.8 a	11.5 f	2.5 cde	0.0 a	0.0 a	668.0 bcd
13	UNTREATED		0.0 a	0.0 a	0.0 a	0.0 a	2.0 abcd	6.0 f	0.0 a	0.0 a	224.0 bcd

Foliar data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> Evaluation made 3 Jun on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> European red mite (ERM): *Panonychus ulmi* (Koch), two spotted spider mite (TSM): *Tetranychus urticae* (Koch), a predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacis* (Garman), a predatory stigmatid (ZM): *Zetzellia mali* (Ewing), apple rust mite (ARM): *Aculus schlechtendali* (Nalepa).



Table 8. Evaluation of insecticides for managing the mite complex on apple.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

	Treatment / Formulation	Rate/acre % vol:vol	# mite or mite egg / 25 leaf sample <sup>b</sup>								ARM
			ERM	ERME	TSM	TSME	ZM	ZME	AMB	AMBE	
1	Voliam Express AgriMek 0.15EC Voliam Flexi	9.0 fl oz 2.25 fl oz 5.0 oz	1.5 a	3.5 a	3.0 a	5.8 a	0.3 a	2.3 ab	0.0 a	2.8 a	6202.0 cde
2	Imidan 70WP Voliam Flexi	5.33 lb 5.0 oz	125.0 a	14.8 a	3.5 a	3.5 a	2.5 abc	3.5 ab	1.8 a	5.8 a	2224.0 bc
3	Proclaim 5SG AgriFlexi 1.55SC Voliam Express Warrior ICS	4.2 oz 8.5 oz 9.0 fl oz 5.12 fl oz	2.5 a	5.0 a	0.0 a	0.0 a	1.0 ab	1.0 a	0.0 a	0.8 a	1040.0 ab
4	Warrior ICS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	8.3 a	8.5 a	1.5 a	1.8 a	8.0 cd	12.0 cd	0.3 a	1.3 a	11112.0 e
5	Warrior ICS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	18.5 a	17.5 a	16.0 a	21.8 a	14.5 cd	18.0 cd	0.8 a	5.8 a	5016.0 cde
6	Warrior ICS Assail 30SG Imidan 70WP	5.12 fl oz 6.0 oz 5.33 lb	9.0 a	19.3 a	5.0 a	3.5 a	5.0 bcd	7.3 bc	2.8 a	12.3 a	5988.0 de
7	Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	21.5 a	7.3 a	2.5 a	4.3 a	20.0 def	12.3 abc	0.0 a	1.0 a	3752.0 cde
8	Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	38.3 a	15.5 a	4.5 a	7.8 a	15.8 def	20.5 cd	2.3 a	6.3 a	5180.0 cd
9	Avaunt 30DG Altacor 35DG	6.0 oz 4.0 oz	6.8 a	4.3 a	0.8 a	1.5 a	16.3 def	27.8 cd	1.5 a	4.8 a	3632.0 cde
10	Warrior ICS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	14.3 a	16.8 a	1.3 a	1.5 a	13.0 de	23.0 cd	0.0 a	0.0 a	4463.0 cde
11	Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	51.8 a	19.3 a	9.8 a	5.8 a	9.5 cd	10.8 bc	0.8 a	6.3 a	3968.0 cd
12	Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	2.5 a	4.5 a	5.0 a	9.3 a	31.8 ef	36.8 d	1.0 a	4.3 a	3364.0 cd
13	UNTREATED		2.0 a	0.0 a	0.0 a	0.0 a	41.0 f	29.0 d	0.0 a	0.0 a	528.0 a

Foliar data were transformed using Log<sub>10</sub> (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> Evaluation made 14 July on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> European red mite (ERM): *Panonychus ulmi* (Koch), two spotted spider mite (TSM): *Tetranychus urticae* (Koch), a predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacis* (Garman), a predatory stigmatid (ZM): *Zetzellia mali* (Ewing), apple rust mite (ARM): *Aculus schlechtendali* (Nalepa).

Table 9. Evaluation of insecticides for managing the mite complex on apple.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

	Treatment / Formulation	Rate/acre % vol:vol	# mite or mite egg / 25 leaf sample <sup>b</sup>								
			ERM	ERME	TSM	TSME	ZM	ZME	AMB	AMBE	ARM
1	Voliam Express AgriMek 0.15EC Voliam Flexi LI-700	9.0 fl oz 2.25 fl oz 5.0 oz 0.25%	37.8 a	6.0 a	0.0 a	0.0 a	0.3 a	0.8 a	0.8 abc	6.8 a	184.0 a
2	Imidan 70WP Voliam Flexi Voliam Flexi LI-700	5.33 lb 5.0 oz 5.0 oz 0.25%	7.3 a	2.5 a	0.0 a	0.0 a	0.3 a	0.8 a	0.0 a	6.0 a	100.0 a
3	Proclaim 5SG AgriFlexi 1.55SC Voliam Express LI-700 Warrior 1CS	4.2 oz 8.5 oz 9.0 fl oz 0.25% 5.12 fl oz	7.8 a	3.5 a	0.0 a	0.0 a	0.8 a	1.0 a	1.3 abcd	6.0 a	336.0 a
4	Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	74.3 a	21.5 a	99.3 bc	32.5 cd	11.0 b	15.5 b	6.3 e	9.8 a	368.0 a
5	Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	17.8 a	8.0 a	2.0 a	4.8 abc	12.8 b	21.5 b	3.8 de	10.0 a	328.0 a
6	Warrior 1CS Assail 30SG LI-700 Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.33 lb	63.5 a	46.5 a	1.8 a	1.3 ab	7.8 b	9.3 b	2.8 bcde	13.0 a	240.0 a
7	Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	84.5 a	50.3 a	92.0 bc	25.8 d	8.3 b	10.5 b	2.3 cde	5.0 a	832.0 a
8	Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	21.8 a	3.0 a	5.0 ab	3.0 abc	5.8 b	22.5 b	1.8 bcd	4.8 a	148.0 a
9	Avaunt 30DG LI-700 Altacor 35DG	6.0 oz 0.25% 4.0 oz	15.0 a	5.0 a	2.5 a	0.5 a	13.8 b	7.5 b	2.0 abcd	3.0 a	680.0 a
10	Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	57.8 a	47.8 a	131.3 c	30.0 d	13.8 b	18.0 b	2.3 bcde	3.5 a	148.0 a
11	Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	54.3 a	35.3 a	2.0 ab	1.0 ab	15.3 b	27.0 b	0.3 ab	6.3 a	380.0 a
12	Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	2.0 a	5.0 a	5.0 ab	4.5 abcd	21.5 b	44.8 b	0.3 ab	4.8 a	368.0 a
	UNTREATED		10.0 a	2.0 a	4.0 abc	6.0 bcd	12.0 b	22.0 b	0.0 a	4.0 a	832.0 a

Foliar data were transformed using Log10 (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.

<sup>a</sup> Evaluation made 5 August on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> European red mite (ERM): *Panonychus ulmi* (Koch), two spotted spider mite (TSM): *Tetranychus urticae* (Koch), a predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacis* (Garman), a predatory stigmæid (ZM): *Zetzellia mali* (Ewing), apple rust mite (ARM): *Aculus schlechtendali* (Nalepa).

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

**San Jose scale (SJS):** *Quadraspidiotus perniciosus* (Comstock)

**EVALUATION OF INSECTICIDES FOR CONTROLLING SAN JOSE SCALE ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 2<sup>nd</sup> post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Fruit evaluations were made on 23 June of 'Ginger Gold' and 'McIntosh' (Table 10) and 14 August of 'Ginger Gold', 4 September of 'McIntosh' and 6 October 'Red Delicious'. Fruit damage was assessed by randomly selecting 200 fruit from each tree and scoring for external damage. A rating scale of 0-3 was used in which 0 = no scale observed on fruit, 1 = 1 scale, 2 = 2 - 4 scale, 3 = ≥ 5 scale. To stabilize variance, percentage data were transformed by arcsine  $\sqrt{x}$  prior to analysis using Fisher's Protected LSD ( $P = < 0.05$ ). Untransformed data are presented in each table.

Data is intended to represent the efficacy of seasonal insecticide programs in reducing the incidence of SJS crawler establishment on fruit after the first of two emergence periods. Data representing the 1<sup>st</sup> generation is shown in Table 10, and data representing the combined 1<sup>st</sup> and 2<sup>nd</sup> generation infestation damage to fruit at harvest is shown in Table 11. Infestation pressure from SJS was sporadically distributed throughout the block, leading to inconclusive results in efficacy, as few trends in control are evident. As infestations are established during the previous year, low damage levels can be due to low overwintering levels in plot trees. As such low levels are not compelling predictors for high degrees of efficacy. However, plots with very high infestation levels are likely to be relatively ineffective against the SJS. Based on the SJS predictive model used to forecast 1<sup>st</sup> generation crawler emergence in 2009, using 500DD<sub>50</sub> from March 1<sup>st</sup>, occurred on 3 June. Field observations of emergence however was observed on 15 June, 7 days after the model prediction. Residual of the 2<sup>nd</sup> cover application until crawler emergence through to 3<sup>rd</sup> cover were subjected to 7.7 inches of rainfall.

Altacor and Delegate (Trmts 8,9 & 11; 4, 5, 7, & 10), applied during 3<sup>rd</sup> and 4<sup>th</sup> cover appear to have little efficacy against SJS crawlers as their mode of action is most effective against lepidopteran complex. Both Imidan (Trmt 12) and the pyrethroid Warrior (Trmt 3) applied at 3<sup>rd</sup> cover appear to have stronger efficacy against SJS crawlers. Needless to say, rain events during the period of scale emergence presented a very challenging pest management scenario.

Table 10. Evaluations of insecticide schedules for controlling San Jose scale populations on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Ginger Gold Evaluated 23 Jun <sup>b</sup>				McIntosh Evaluated 23 Jun <sup>b</sup>			
		Clean	1	2	3	Clean	1	2	3
1. Voliam Express <sup>a</sup> AgriMek 0.15EC <sup>a</sup> Voliam Flexi <sup>a</sup>	9.0 fl oz 2.25 fl oz 5.0 oz	96.0 a	2.8 a	1.3 a	0.0 a	96.3 a	3.0 a	0.8 a	0.0 a
2. Imidan 70WP <sup>a</sup> Voliam Flexi <sup>a</sup>	5.33 lb 5.0 oz	97.0 a	2.5 a	0.5 a	0.0 a	97.0 a	2.8 a	0.3 a	0.0 a
3. Proclaim 5SG <sup>a</sup> AgriFlexi 1.55SC <sup>a</sup> Voliam Express <sup>a</sup> Warrior 1CS	4.2 oz 8.5 oz 9.0 fl oz 5.12 fl oz	95.8 a	2.5 a	1.3 a	0.5 a	90.8 a	4.8 a	3.0 a	1.5 a
4. Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	94.7 a	4.0 a	0.7 a	0.7 a	95.3 a	3.0 a	1.8 a	0.0 a
5. Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	96.8 a	2.3 a	1.0 a	0.0 a	93.3 a	4.8 a	1.3 a	0.8 a
6. Warrior 1CS Assail 30SG <sup>a</sup> Imidan 70WP	5.12 fl oz 6.0 oz 5.33 lb	95.5 a	3.3 a	1.0 a	0.3 a	97.5 a	1.5 a	0.8 a	0.3 a
7. Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	84.3 a	6.8 a	6.5 a	2.5 a	85.5 a	5.0 a	3.3 a	6.3 a
8. Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	96.3 a	2.3 a	1.3 a	0.3 a	94.8 a	4.0 a	1.0 a	0.3 a
9. Avaunt 30DG <sup>a</sup> Altacor 35DG	6.0 oz 4.0 oz	89.3 a	4.2 a	8.8 a	10.6 a	72.8 a	3.1 a	8.1 a	15.9 a
10. Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	95.3 a	3.0 a	1.7 a	0.0 a	96.0 a	3.0 a	1.0 a	0.0 a
11. Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	92.0 a	5.0 a	3.0 a	0.0 a	90.0 a	4.0 a	4.0 a	1.0 a
12. Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	97.3 a	2.3 a	0.5 a	0.0 a	99.0 a	0.8 a	0.3 a	0.0 a
13. UNTREATED		90.0 a	4.8 a	2.5 a	2.8 a	96.3 a	2.0 a	1.5 a	0.3 a

Percent data were transformed using arcsin (sqrt(X) ) 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.

<sup>a</sup>All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup>Rating Scale; 0 = 0 scale, 1 = 1 scale, 2 = 2 - 4 scale, 3 =  $\geq 5$  scale.

Table 11. Evaluations of insecticide schedules for controlling San Jose scale populations on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % V:V	Ginger Gold Harvested 14 Aug <sup>b</sup>				McIntosh Harvested 4 Sep <sup>b</sup>				Red Delicious Harvested 6 Oct <sup>b</sup>			
		Clean	1	2	3	Clean	1	2	3	Clean	1	2	3
1. Voliam Express AgriMek 0.15EC Voliam Flexi LI-700	9.0 fl oz 2.25 fl oz 5.0 oz 0.25%	55.8 a	7.5 a	10.0 a	26.8 cd	4.7 a	5.3 a	10.7 a	79.3 a	34.0 a	4.5 a	7.5 a	54.0 a
2. Imidan 70WP Voliam Flexi Voliam Flexi LI-700	5.33 lb 5.0 oz 5.0 oz 0.25%	72.1 a	11.4 a	10.1 a	6.4 abcd	11.0 a	8.5 a	21.5 a	59.0 a	6.5 a	6.0 a	10.5 a	77.0 a
3. Proclaim 5SG AgriFlexi 1.55SC Voliam Express LI-700 Warrior 1CS	4.2 oz 8.5 oz 9.0 fl oz 0.25% 5.12 fl oz	92.5 a	3.5 a	2.2 a	1.7 ab	22.5 a	7.5 a	16.0 a	54.0 a	32.0 a	6.5 a	16.0 a	45.5 a
4. Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	97.0 a	1.3 a	1.3 a	0.3 ab	18.5 a	13.0 a	19.5 a	49.0 a	7.3 a	6.7 a	18.2 a	67.8 a
5. Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	93.0 a	3.3 a	2.3 a	1.3 abc	21.0 a	7.5 a	11.5 a	60.0 a	44.7 a	8.7 a	13.3 a	33.3 a
6. Warrior 1CS Assail 30SG LI-700 Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.33 lb	98.8 a	1.0 a	0.0 a	0.3 a	42.3 a	6.4 a	21.2 a	30.0 a	30.0 a	10.0 a	16.5 a	43.5 a
7. Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	58.8 a	1.8 a	5.5 a	34.0 cd	7.5 a	3.5 a	13.5 a	75.5 a	19.0 a	4.5 a	15.2 a	61.2 a
8. Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	45.3 a	7.3 a	16.0 a	31.5 d	4.0 a	2.5 a	10.0 a	83.5 a	5.1 a	0.0 a	4.6 a	90.3 a
9. Avaunt 30DG LI-700 Altacor 35DG	6.0 oz 0.25% 4.0 oz	40.3 a	12.7 a	8.7 a	38.3 cd	19.0 a	10.5 a	21.5 a	49.0 a	25.0 a	8.0 a	21.5 a	45.5 a
10. Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	76.7 a	7.0 a	10.3 a	6.0 abcd	29.0 a	15.0 a	18.5 a	37.5 a	34.0 a	13.0 a	26.0 a	27.0 a
11. Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 5.2 oz 5.2 oz	60.9 a	7.5 a	11.8 a	19.8 bcd	14.4 a	8.7 a	14.3 a	62.6 a	7.0 a	3.5 a	13.5 a	76.0 a
12. Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	59.5 a	11.6 a	15.8 a	13.1 a-d	25.0 a	14.5 a	17.5 a	43.0 a	23.5 a	8.5 a	12.0 a	56.0 a
13. UNTREATED		82.3 a	6.5 a	7.0 a	4.3 abc	14.0 a	11.2 a	17.2 a	57.6 a	10.5 a	7.0 a	14.5 a	68.0 a

Percent data were transformed using arcsin (sqrt(X)) 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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> Rating Scale: 0 = 0 scale, 1 = 1 scale, 2 = 2 - 4 scale, 3 =  $\geq 5$  scale.

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

**Lesser apple worm (LAW):** *Grapholita prunivora* Walsh

**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)

**Tarnished plant bug (TPB):** *Lygus lineolaris* (P. de B.)

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE FRUIT FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 1. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Fruit evaluations were made at harvest on three varieties on 14 August of 'Ginger Gold', 4 September of 'McIntosh', 6 October of 'Red Delicious' cultivars (**Tables 12-14**). Fruit damage was assessed by randomly selecting 100 fruit from each tree and scoring for external damage. The 'Ext. LEP' category includes combined damage from green fruitworm, redbanded and obliquebanded leafrollers. The 'Int. LEP' category includes combined damage from codling moth, lesser apple worm and oriental fruit moth. To stabilize variance, percentage data were transformed by arcsine  $\sqrt{x}$  prior to analysis using Fisher's Protected LSD ( $P = < 0.05$ ). Untransformed data are presented in each table.

In general, pre-bloom treatments made against the early pest insect complex demonstrated lower damage levels to fruit at harvest. One notable exception is the high levels of PC damage inflicted to the #5 Assail treatment in the late 'Red Delicious' variety. Treatments 4-6 received Assail for PC management with adjuvants Damoil and LI-700 added to treatment #4 and #6 respectively. The addition of these adjuvants appear to have improved PC management during the late emergence of PC this season.

Mid-season lepidoptera were relatively low compared to past years. However, the 3<sup>rd</sup> generation of OFM and late emerging CM of the internal lepidopteran complex were problematic this season. In general, treatments with late season efficacy against this group showed lower damage levels, with Delegate performing well in 3 successive applications from 6-8C (trmt 11). With regards to apple maggot on Red Delicious, Very high AM populations were observed on baited red spheres this season (p58) with threshold exceeded in early July. Delegate did not perform up to commercially acceptable levels and would require the use of additional insecticides with greater efficacy against AM in commercial orchards. Imidan 70WP applied at the full labeled rate of 5.33 lbs/A in a full seasonal program 3<sup>rd</sup> – 8<sup>th</sup> cover provided



Table 12. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent damage of Ginger Gold Harvested 14 Aug								% Clean
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	
1. Voliam Express	9.0 fl oz	19.8 a	9.8 a	6.5 a	11.8 a	1.3 a	14.8 a	36.8 d	36.8 c	28.8 a
AgriMek 0.15EC	2.25 fl oz									
Voliam Flexi	5.0 oz									
LI-700	0.25%									
2. Imidan 70WP	5.33 lb	19.3 a	14.3 a	3.7 a	0.7 a	0.7 a	6.7 a	14.3 bcd	12.0 b	51.3 a
Voliam Flexi	5.0 oz									
Voliam Flexi	5.0 oz									
LI-700	0.25%									
3. Proclaim 5SG	4.2 oz	22.0 a	5.8 a	9.3 a	8.3 a	1.0 a	16.0 a	17.5 cd	17.0 bc	43.0 a
AgriFlexi 1.55SC	8.5 oz									
Voliam Express	9.0 fl oz									
LI-700	0.25%									
Warrior 1CS	5.12 fl oz									
4. Warrior 1CS	5.12 fl oz	11.3 a	4.3 a	1.7 a	7.3 a	0.3 a	18.0 a	5.3 ab	2.3 a	58.7 a
Assail 30SG	6.0 oz									
Damoil	0.25%									
Delegate WG	5.0 oz									
Imidan 70WP	5.33 lb									
5. Warrior 1CS	5.12 fl oz	17.0 a	9.7 a	2.7 a	6.0 a	0.7 a	3.3 a	21.7 bcd	20.3 bc	55.0 a
Assail 30SG	6.0 oz									
Delegate WG	5.0 oz									
Imidan 70WP	5.33 lb									
6. Warrior 1CS	5.12 fl oz	15.3 a	5.0 a	5.8 a	7.3 a	0.5 a	7.0 a	3.8 a	2.8 a	63.0 a
Assail 30SG	6.0 oz									
LI-700	0.25%									
Imidan 70WP	5.33 lb									
7. Imidan 70WP	5.33 lb	13.3 a	5.8 a	4.0 a	3.3 a	0.3 a	11.3 a	14.8 cd	12.8 bc	58.5 a
Delegate WG	5.0 oz									
Assail 30SG	6.0 oz									
8. Asana 0.66XL	14.5 fl oz	13.0 a	3.3 a	7.0 a	2.3 a	1.3 a	14.5 a	30.3 cd	30.0 bc	45.5 a
Avaunt 30DG	6.0 oz									
Altacor 35DG	4.0 oz									
9. Avaunt 30DG	6.0 oz	14.3 a	5.3 a	4.0 a	0.3 a	1.7 a	3.0 a	26.0 cd	25.0 bc	57.7 a
LI-700	0.25%									
Altacor 35DG	4.0 oz									
10. Warrior 1CS	5.12 fl oz	8.3 a	8.3 a	5.0 a	3.0 a	2.7 a	9.0 a	9.3 bc	8.3 b	58.7 a
Imidan 70WP	5.33 lb									
Calypso 4F	8.0 fl oz									
Delegate WG	5.2 oz									
Assail 30SG	6.0 oz									
11. Imidan 70WP	5.33 lb	18.8 a	10.5 a	3.8 a	2.0 a	0.8 a	7.6 a	25.3 cd	23.3 bc	49.1 a
Calypso 4F	8.0 fl oz									
Altacor 35DG	4.0 oz									
Delegate WG	5.2 oz									
12. Imidan 70WP	5.33 lb	23.8 a	9.5 a	5.8 a	1.5 a	0.3 a	5.8 a	17.8 cd	14.8 bc	51.2 a
Proclaim 5SG	4.2 oz									
Damoil	0.25%									
13. UNTREATED		19.3 a	4.0 a	9.7 a	14.3 a	10.0 b	32.3 a	29.3 cd	28.7 bc	25.3 a

Percent data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

Table 13. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to McIntosh Harvested 4 Sep								Clean
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	
1. Voliam Express AgriMek 0.15EC Voliam Flexi LI-700	9.0 fl oz 2.25 fl oz 5.0 oz 0.25%	6.7 a	2.7 a	6.7 a	3.3 a	0.7 a	16.7 bcd	0.7 a	0.0 a	69.3 bc
2. Imidan 70WP Voliam Flexi Voliam Flexi LI-700	5.33 lb 5.0 oz 5.0 oz 0.25%	4.0 a	2.5 a	9.0 ab	2.0 a	1.5 a	8.5 bc	1.0 a	1.0 a	72.0 bc
3. Proclaim 5SG AgriFlexi 1.55SC Voliam Express LI-700 Warrior 1CS	4.2 oz 8.5 oz 9.0 fl oz 0.25% 5.12 fl oz	7.0 a	2.5 a	5.5 a	10.0 a	1.0 a	13.5 bcd	3.0 a	1.5 a	67.5 bc
4. Warrior 1CS Assail 30SG Damoil Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.0 oz 5.33 lb	1.0 a	0.0 a	3.0 a	6.5 a	0.5 a	16.0 bcd	0.5 a	0.5 a	76.5 bc
5. Warrior 1CS Assail 30SG Delegate WG Imidan 70WP	5.12 fl oz 6.0 oz 5.0 oz 5.33 lb	4.5 a	2.0 a	6.5 a	10.0 a	0.5 a	10.0 bcd	1.5 a	1.5 a	73.0 bc
6. Warrior 1CS Assail 30SG LI-700 Imidan 70WP	5.12 fl oz 6.0 oz 0.25% 5.33 lb	4.5 a	0.5 a	1.5 a	3.5 a	0.5 a	21.3 cd	2.0 a	1.5 a	69.2 bc
7. Imidan 70WP Delegate WG Assail 30SG	5.33 lb 5.0 oz 6.0 oz	8.0 a	2.0 a	1.5 a	1.5 a	1.5 a	8.5 bc	2.5 a	2.5 a	77.5 c
8. Asana 0.66XL Avaunt 30DG Altacor 35DG	14.5 fl oz 6.0 oz 4.0 oz	5.0 a	1.0 a	3.0 a	2.0 a	1.0 a	9.0 b	2.0 a	1.5 a	79.0 c
9. Avaunt 30DG LI-700 Altacor 35DG	6.0 oz 0.25% 4.0 oz	6.3 a	2.3 a	9.0 a	2.5 a	2.0 a	15.3 bcd	2.0 a	1.0 a	59.4 b
10. Warrior 1CS Imidan 70WP Calypso 4F Delegate WG Assail 30SG	5.12 fl oz 5.33 lb 8.0 fl oz 5.2 oz 6.0 oz	5.5 a	3.5 a	3.5 a	3.5 a	0.5 a	11.5 bcd	1.5 a	1.0 a	75.5 bc
11. Imidan 70WP Calypso 4F Altacor 35DG Delegate WG	5.33 lb 8.0 fl oz 4.0 oz 5.2 oz	6.4 a	3.0 a	2.1 a	1.5 a	0.0 a	3.0 a	3.0 a	2.0 a	84.0 c
12. Imidan 70WP Proclaim 5SG Damoil	5.33 lb 4.2 oz 0.25%	7.0 a	5.5 a	4.5 a	4.5 a	0.0 a	11.0 bcd	3.0 a	2.5 a	73.0 bc
13. UNTREATED		12.4 a	0.8 a	26.0 b	25.6 a	7.2 a	22.4 d	10.8 a	8.0 a	34.4 a

Percent data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to 'Red Delicious' Harvested 6 October								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
1. Voliam Express	9.0 fl oz	21.5 a	0.5 a	3.5 a	7.5 a	0.0 a	16.5 a	10.0 cd	10.0 cd	52.5. b
AgriMek 0,15EC	2.25 fl oz									
Voliam Flexi	5.0 oz									
LI-700	0.25%									
2. Imidan 70WP	5.33 lb	23.5 a	2.0 a	9.5 a	4.5 a	2.0 a	3.5 a	6.5 abc	6.0 abc	54.5 bc
Voliam Flexi	5.0 oz									
Voliam Flexi	5.0 oz									
LI-700	0.25%									
3. Proclaim 5SG	4.2 oz	23.5 a	1.5 a	2.0 a	6.0 a	1.5 a	6.0 a	1.0 ab	1.0 ab	65.0 bc
AgriFlexi 1.55SC	8.5 oz									
Voliam Express	9.0 fl oz									
LI-700	0.25%									
Warrior 1CS	5.12 fl oz									
4. Warrior 1CS	5.12 fl oz	24.5 a	0.0 a	6.0 a	0.7 a	0.0 a	7.3 a	0.0 a	0.0 a	62.8 bc
Assail 30SG	6.0 oz									
Damofil	0.25%									
Delegate WG	5.0 oz									
Imidan 70WP	5.33 lb									
5. Warrior 1CS	5.12 fl oz	17.3 a	1.3 a	3.3 a	21.3 a	0.7 a	7.3 a	0.0 a	0.0 a	54.0 ab
Assail 30SG	6.0 oz									
Delegate WG	5.0 oz									
Imidan 70WP	5.33 lb									
6. Warrior 1CS	5.12 fl oz	23.0 a	1.0 a	2.5 a	9.0 a	0.5 a	10.0 a	1.5 abc	1.5 abc	61.0 bc
Assail 30SG	6.0 oz									
LI-700	0.25%									
Imidan 70WP	5.33 lb									
7. Imidan 70WP	5.33 lb	17.7 a	2.1 a	0.0 a	3.0 a	1.0 a	1.5 a	5.6 abc	4.5 abc	72.2 bc
Delegate WG	5.0 oz									
Assail 30SG	6.0 oz									
8. Asana 0.66XL	14.5 fl oz	10.2 a	0.5 a	2.5 a	5.0 a	1.0 a	6.6 a	5.0 bcd	5.0 bcd	73.7 c
Avaunt 30DG	6.0 oz									
Altacor 35DG	4.0 oz									
9. Avaunt 30DG	6.0 oz	16.5 a	1.5 a	7.0 a	2.5 a	1.5 a	0.5 a	14.0 bc	14.0 bc	60.0 bc
LI-700	0.25%									
Altacor 35DG	4.0 oz									
10. Warrior 1CS	5.12 fl oz	11.0 a	1.0 a	7.5 a	6.0 a	0.5 a	7.0 a	15.0 a	4.0 a	70.5 bc
Imidan 70WP	5.33 lb									
Calypso 4F	8.0 fl oz									
Delegate WG	5.2 oz									
Assail 30SG	6.0 oz									
11. Imidan 70WP	5.33 lb	24.5 a	3.0 a	12.0 a	11.0 a	1.0 a	5.0 a	9.0 cd	9.0 cd	52.5 b
Calypso 4F	8.0 fl oz									
Altacor 35DG	4.0 oz									
Delegate WG	5.2 oz									
12. Imidan 70WP	5.33 lb	27.0 a	4.0 a	4.0 a	1.5 a	1.5 a	0.5 a	2.5 abc	2.5 abc	64.5 bc
Proclaim 5SG	4.2 oz									
Damofil	0.25%									
13. UNTREATED		16.5 a	1.5 a	10.0 b	14.5 a	13.0 b	9.5 a	22.5 d	22.0 d	35.5 a

Percent data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

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

**European apple sawfly (EAS):** *Hoplocampa testudinea* (Klug)

**Green fruitworm (GFW):** *Lithophane antennata* (Walker)

**Mullein and apple red bug; (MB):** *Campylomma verbasici* (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.)

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE EARLY FRUIT FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 15 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 15 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Table 15. Application timing of insecticide schedules used on apple.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

	Treatment / Formulation	Rate/acre % vol:vol	Timing	Application Dates
1	Movento 240SC	6.0 fl oz	PF, 2C	15 May, 8 June
	Damoil	0.25%	PF, 2C	15 May, 8 June
2	Movento 240SC	9.0 fl oz	PF	15 May
	Damoil	0.25%	PF	15 May
3	Centaur 70WDG	34.5 oz	DD	2 April
	Damoil	1.0%	DD	2 April
4	Centaur 70WDG	34.5 oz	Pink	25 April
	Damoil	0.25%	Pink	25 April
5	Centaur 70WDG	34.5 oz	PF	15 May
	Damoil	0.25%	PF	15 May
6	UNTREATED			
7	Lorsban 4E	64.0 fl oz	DD	2 April
	Damoil	1.0%	DD	2 April
8	Esteem 35W	5.0 oz	DD	2 April
	Damoil	1.0%	DD	2 April
9	Calypso 4F	7.0 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
	Belt SC	5.0 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
10	Calypso 4F	5.8 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
	Belt SC	4.2 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
11	Calypso 4F	4.6 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
	Belt SC	3.4 fl oz	PF-8C	15, 22 May, 8, 26 June, 4, 15, 29 July, 8, 26 Aug.
12	Leverage 2.7	5.1 fl oz	PF	15 May
	Movento 240SC	9.0 fl oz	1C	22 May
	Damoil	0.25%	1C	22 May
	Calypso 4F	7.0 fl oz	1C	22 May
	Belt SC	5.0 fl oz	2C, OBLR	8, 26 June, 4 July
	Sevin XLR	96.0 fl oz	AM, OFM	15, 29 July, 8 Aug, 26 Aug
13	UNTREATED			

Table 16. Evaluations of insecticide schedules for controlling early season insect complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation <sub>1</sub>	Rate/acre % vol:vol	Percent Damage to 'Ginger Gold'					Percent Damage to 'McIntosh'				
		TPB	MPB	EAS	E. Lep.	PC	TPB	MPB	EAS	E. Lep.	PC
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	0.3 a	0.3 a	2.6 a	0.3 a	4.3 a	0.6 a	0.0 a	0.6 a	0.0 a	2.5 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	0.5 ab	0.5 a	1.0 a	0.3 a	6.5 a	0.6 a	0.0 a	0.6 a	0.1 a	4.3 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	1.4 c	0.3 a	2.4 a	0.1 a	5.2 a	0.5 a	0.1 a	1.8 a	0.0 a	5.1 a
12. Leverage 2.7 Movento 240SC Damoil Calypso 4F Belt SC Sevin XLR	5.1 fl oz 9.0 fl oz 0.25% 7.0 fl oz 5.0 fl oz 96.0 fl oz	0.1 a	1.6 a	1.8 a	0.0 a	4.0 a	0.5 a	0.1 a	1.0 a	0.1 a	3.3 a
13. UNTREATED		1.2 bc	1.5 a	4.7 a	1.6 b	13.6 a	0.0 a	0.4 a	1.5 a	0.5 a	12.6 a

Percent data were transformed using Log10 (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.

<sup>a</sup> Evaluation made on the tree 3 Jun. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.



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

**Cecidomyiidae:** predatory larvae

**Green apple aphid complex (GAA):** *Aphis pomi* De Geer

**Obliquebanded leafroller (OBLR):** *Choristoneura rosaceana* (Harris)

**Potato leafhopper (PLH):** *Empoasca fabae* (Harris)

**Redbanded Leafroller (RBLR):** *Argyrotaenia velutinana* (Walker)

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Rosy apple aphid (RAA):** *Dysaphis plantaginea* (Passerini)

**Spirea aphid (SA):** *Aphis spiraeicola* Patch

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricius).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE FOLIAR FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 15 May, 1<sup>st</sup> cover on 22 May. , 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A , Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar evaluations were made on 'McIntosh', 'Golden Delicious' and Red delicious' cultivars on 20 May and on 9 July (Table 16-17). Data taken from 'Golden Delicious' for evaluations of rosy apple aphid; the lepidoptera complex including; obliquebanded leafroller, redbanded leafroller and green fruitworm were taken from 'McIntosh' employing 3-minute perimeter observations. Data taken of spotted tentiform leafminer, potato leafhopper, (PLH) and rose leafhopper, (RLH), the green aphid complex comprised of the green apple aphid and spirea aphid (SA), and predatory larvae of Cecidomyiidae were taken from 'Red Delicious'. The GAA rating scale uses values 0 for 0 aphids, 1 = 1-5 aphids, 2 = 6-10 aphids, 3 =  $\geq 10$  aphids. Foliar data were transformed using Log<sub>10</sub> (X + 1) conducted prior to analysis. Untransformed data are presented in each table and mean separation using Fishers Protected LSD ( $P \leq 0.05$ ). Treatment means followed by the same letter are not significantly different.

Table 17. Evaluation of insecticides for controlling foliar feeding insect complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Data taken from 3 min. observations made 20 May				
		RAA / Cluster <sup>b</sup>	Lep. Dam. / Terminal <sup>c</sup>	Lep. Larvae / Terminal <sup>c</sup>	# Leaves with STLM <sup>d</sup>	Mean STLM Mines / Leaf <sup>d</sup>
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	0.0 a	16.0 a	0.0 a	0.8 a	2.8 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	4.5 b	14.0 a	0.3 a	0.0 a	0.0 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	0.8 a	10.8 a	0.0 a	0.5 a	2.0 a
12. Leverage 2.7 Movento 240SC Damoil Calypso 4F Belt SC Sevin XLR	5.1 fl oz 9.0 fl oz 0.25% 7.0 fl oz 5.0 fl oz 96.0 fl oz	4.8 b	32.3 a	0.0 a	1.0 a	6.3 a
13. UNTREATED		5.5 b	44.8 a	0.3 a	1.8 a	6.5 a

Foliar data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

<sup>b</sup> RAA = Rosy apple aphid, *Dysaphis plantaginea* (Passerini). Data taken from 'Golden Delicious'.

<sup>c</sup> Lep. = Lepidoptera complex including; Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee). Data taken from 'McIntosh'.

<sup>d</sup> STLM = Spotted tentiform leafminer, *Phyllonorycter blancardella* (Fabricius). Data taken from 'Red Delicious'.

Table 18. Evaluation of insecticides for controlling foliar feeding insect complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre or vol:vol	# / 3 min. Observation		# / 10 Leaf Sample <sup>d</sup>							Cecid Larvae	Leaves With STLM
		RAA / Clusters <sup>b</sup>	Lep Dam. / Terminals <sup>c</sup>	PLH Nymphs	RLH Nymphs	% Leaves with GAA Rating <sup>e</sup>						
						0	1	2	3			
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	0.5 a	4.0 a	0.0 a	0.3 a	52.5 a	35.0 a	12.5 a	0.0 a	0.0 a	0.0 a	
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	3.5 a	1.8 a	0.3 a	0.0 a	87.5 a	12.5 a	0.0 a	0.0 a	2.5 a	0.0 a	
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	3.0 a	2.5 a	0.0 a	0.3 a	62.5 a	30.0 a	15.0 a	0.0 a	2.5 a	0.0 a	
12. Leverage 2.7 Movento 240SC Damoil Calypso 4F Belt SC Sevin XLR	5.1 fl oz 9.0 fl oz 0.25% 7.0 fl oz 5.0 fl oz 96.0 fl oz	9.3 a	4.5 a	0.8 a	0.0 a	62.5 a	20.0 a	17.5 a	0.0 a	2.5 a	0.0 a	
13. UNTREATED		2.8 a	2.5 a	0.8 a	0.5 a	72.5 a	12.5 a	15.0 a	0.0 a	0.0 a	0.0 a	

Foliar data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup>Evaluation made 9 Jul. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup>RAA = Rosy apple aphid, *Dysaphis plantaginea* (Passerini). Data taken from 'Golden Delicious'.

<sup>c</sup>Lep. = Lepidoptera complex including; Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee). Data taken from 'Red Delicious'.

<sup>d</sup>PLH = Potato leafhopper, *Empoasca fabae* (Harris), RLH = Rose leafhopper, *Edwardsiana rosae* (Linnaeus), GAA = Green apple aphid, *Aphis pomi* (DeGeer), Cecid = Cecidomyiidae, STLM = Spotted tentiform leafminer, *Phyllonorycter blancardella* (Fabricus). Data taken from 'Red Delicious'.

<sup>e</sup>GAA Rating Scale; 0 = 0 aphids, 1 = 1-5 aphids, 2 = 6-10 aphids, 3 = ≥ 10 aphids

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

**Potato leafhopper (PLH):** *Empoasca fabae* (Harris)

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricus).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE LEAFHOPPER & LEAF MINER COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 15 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar data were transformed using Log<sub>10</sub> (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. Data taken from 'Golden Delicious' of evaluations for Rosy apple aphid, (RAA) *Dysaphis plantaginea* (Passerini). The Lepidoptera complex including; Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee) were taken from 'McIntosh'. Data taken of Spotted tentiform leafminer, (STLM) *Phyllonorycter blancardella* (Fabricus) were taken from 'Red Delicious'.

Table 19. Evaluations of insecticide schedules for controlling leafhopper complex on apple foliage. N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment & Formulation	Rate/acre % V/V	% Clean		% Damaged Leafhopper Rating <sup>a</sup>		
		0	1	2	3	4
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	95.0 b	5.0 a	0.0 a	0.0 a	0.0 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	100.0 b	0.0 a	0.0 a	0.0 a	0.0 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	99.0 b	1.0 a	0.0 a	0.0 a	0.0 a
12. Leverage 2.7 Movento 240SC Damoil Calypso 4F Belt SC Sevin XLR	5.1 fl oz 9.0 fl oz 0.25% 7.0 fl oz 5.0 fl oz 96.0 fl oz	98.0 b	2.0 a	0.0 a	0.0 a	0.0 a
13. UNTREATED		47.0 a	31.0 b	20.0 b	2.0 b	0.0 a

Table 20. Evaluations of insecticide schedules for controlling spotted tentiform leafminer on apple foliage. N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment & Formulation	Rate/acre % V/V	% Clean		STLM Rating <sup>a</sup> % Damaged		
		0	1	2	3	4
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	100.0 b	0.0 a	0.0 a	0.0 a	0.0 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	100.0 b	0.0 a	0.0 a	0.0 a	0.0 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	100.0 b	0.0 a	0.0 a	0.0 a	0.0 a
12. Leverage 2.7 Movento 240SC Damoil Calypso 4F Belt SC Sevin XLR	5.1 fl oz 9.0 fl oz 0.25% 7.0 fl oz 5.0 fl oz 96.0 fl oz	100.0 b	0.0 a	0.0 a	0.0 a	0.0 a
13. UNTREATED		97.0 a	1.0 a	1.0 a	1.0 a	0.0 a

Percent data were transformed using arcsine (Sqrt(x)) 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.

<sup>a</sup> Evaluation made 4 Sep on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

STLM Rating Scale: 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage.

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

**EVALUATION OF FUNGICIDES AND MITICIDES FOR MANAGING THE MITE COMPLEX OF APPLE, 2008 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 15 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Table 21. Evaluation of insecticides for controlling foliar feeding mite complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	# mite or mite egg / 25 leaf sample <sup>b</sup>								
		ERM	ERME	TSM	TSME	ZM	ZME	AMB	AMBE	ARM
9. Calypso 4F	7.0 fl oz	0.5 a	0.3 a	0.0 a	0.3 a	2.0 a	1.5 ab	0.0 a	0.0 a	404.0 a
Belt SC	5.0 fl oz									
10. Calypso4F	5.8 fl oz	0.3 a	0.0 a	0.0 a	0.0 a	5.3 a	1.0 ab	0.0 a	0.0 a	82.0 a
Belt SC	4.2 fl oz									
11. Calypso 4F	4.6 fl oz	0.0 a	0.0 a	0.0 a	0.0 a	4.8 a	2.0 b	0.0 a	0.0 a	184.0 a
Belt SC	3.4 fl oz									
12. Leverage 2.7	5.1 fl oz	0.3 a	0.0 a	0.0 a	0.0 a	2.3 a	0.0 a	0.0 a	0.0 a	72.0 a
Movento 240SC	9.0 fl oz									
Damoil	0.25%									
Calypso 4F	7.0 fl oz									
Belt SC	5.0 fl oz									
Sevin XLR	96.0 fl oz									
13. UNTREATED		0.0 a	0.0 a	0.0 a	0.0 a	2.0 a	6.0 c	0.0 a	0.0 a	224.0 a

<sup>a</sup> Evaluation made 3 June on 'Red Delicious' foliage.

Table 22. Evaluation of insecticides for controlling foliar feeding mite complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	# mite or mite egg / 25 leaf sample <sup>b</sup>								
		ERM	ERME	TSM	TSME	ZM	ZME	AMB	AMBE	ARM
9. Calypso 4F	7.0 fl oz	0.8 a	4.3 a	0.8 a	0.3 a	12.8 b	22.3 c	0.3 a	0.0 a	3352.0 b
Belt SC	5.0 fl oz									
10. Calypso4F	5.8 fl oz	1.8 a	7.0 a	0.8 a	1.3 a	13.3 b	22.5 c	0.5 a	0.3 a	2796.0 b
Belt SC	4.2 fl oz									
11. Calypso 4F	4.6 fl oz	2.5 a	13.8 a	0.0 a	0.0 a	17.3 b	11.0 b	0.8 a	0.0 a	7591.0 c
Belt SC	3.4 fl oz									
12. Leverage 2.7	5.1 fl oz	0.5 a	1.5 a	0.3 a	0.0 a	0.3 a	1.3 a	0.0 a	0.0 a	600.0 a
Movento 240SC	9.0 fl oz									
Damoil	0.25%									
Calypso 4F	7.0 fl oz									
Belt SC	5.0 fl oz									
Sevin XLR	96.0 fl oz									
13. UNTREATED		0.0 a	2.0 a	0.0 a	0.0 a	29.0 c	41.0 d	0.0 a	0.0 a	528.0 a

<sup>a</sup> Evaluation made 14 July on 'Red Delicious' foliage.

Foliar data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

<sup>b</sup> European red mite (ERM): *Panonychus ulmi* (Koch), two spotted spider mite (TSM): *Tetranychus urticae* (Koch), a predatory phytoseiid (AMB): *Neoseiulus* (= *Amblyseius*) *fallacis* (Garman), a predatory stigmatid (ZM): *Zetzellia mali* (Ewing), apple rust mite (ARM): *Aculus schlechtendali* (Nalepa).



Table 23. Evaluation of insecticides for controlling foliar feeding mite complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation <sup>c</sup>	Rate/acre % vol:vol	# mite or mite egg / 25 leaf sample <sup>b</sup>								
		ERM	ERME	TSM	TSME	ZM	ZME	AMB	AMBE	ARM
9. Calypso 4F	7.0 fl oz	11.3 a	28.3 a	0.0 a	3.0 a	40.0 b	39.5 b	2.3 a	0.8 a	4320.0 b
Belt SC	5.0 fl oz									
10. Calypso4F	5.8 fl oz	26.8 a	63.3 a	0.8 a	2.3 a	38.5 b	26.3 b	4.8 a	0.8 a	3316.0 b
Belt SC	4.2 fl oz									
11. Calypso 4F	4.6 fl oz	17.5 a	30.3 a	0.8 a	3.3 a	39.5 b	28.5 b	3.5 a	3.3 a	4868.0 b
Belt SC	3.4 fl oz									
12. Leverage 2.7	5.1 fl oz	22.3 a	43.5 a	1.5 a	3.0 a	5.5 a	3.0 a	2.3 a	0.5 a	800.0 a
Movento 240SC	9.0 fl oz									
Damoil	0.25%									
Calypso 4F	7.0 fl oz									
Belt SC	5.0 fl oz									
Sevin XLR	96.0 fl oz									
13. UNTREATED		2.0 a	10.0 a	6.0 b	4.0 a	22.0 b	12.0 b	4.0 a	0.0 a	832.0 a

Foliar data were transformed using Log10 (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.

<sup>a</sup> Evaluation made 5 Aug. on 'Red Delicious' foliage. All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

<sup>b</sup> European red mite (ERM): *Panonychus ulmi* (Koch), two spotted spider mite (TSM): *Tetranychus urticae* (Koch), a predatory phytoseiid (AMB): *Neoseiulus* (= *Amblyseius*) *fallacies* (Garman), a predatory stigmatid (ZM): *Zetzellia mali* (Ewing), apple rust mite (ARM): *Aculus schlechtendali* (Nalepa).

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

**San Jose scale (SJS):** *Quadraspidiotus perniciosus* (Comstock)

**EVALUATION OF INSECTICIDES FOR CONTROLLING SAN JOSE SCALE ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 15 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Fruit evaluations were made on two varieties after 1<sup>st</sup> generation emergence on 23 June of 'Ginger Gold', 'McIntosh' (**Table 24**) and at harvest on 14 August, 4 September and 6 October of 'Ginger Gold', 'McIntosh', and 'Red Delicious' respectively. Fruit damage was assessed by randomly selecting 50 (1<sup>st</sup> generation) or 100 fruits (harvest) from each tree and scoring for external damage. A rating scale of 0-3 was used in which 0 = no scale observed on fruit, 1 = 1 scale, 2 = 2 - 4 scale, 3 =  $\geq 5$  scale. To stabilize variance, percentage data were transformed by arcsine \*(square root of x) prior to analysis using Fisher's Protected LSD ( $P = < 0.05$ ). Untransformed data are presented in each table.

Table 24. Evaluations of insecticide schedules for controlling 1<sup>st</sup> Gen. San Jose scale populations on apple<sup>a</sup>.

N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation <sup>s</sup>	Rate/acre % vol:vol	Ginger Gold Evaluated 23 Jun <sup>b</sup>				McIntosh Evaluated 23 Jun <sup>b</sup>			
		% Clean	% Damaged			% Clean	% Damaged		
		0	1	2	3	0	1	2	3
9. Calypso 4F	7.0 fl oz	98.8 a	1.0 a	0.3 a	0.0 a	98.8 b	1.0 ab	0.3 a	0.0 a
Belt SC	5.0 fl oz								
10. Calypso4F	5.8 fl oz	98.0 a	1.8 a	0.3 a	0.0 a	98.8 b	1.3 ab	0.0 a	0.0 a
Belt SC	4.2 fl oz								
11. Calypso 4F	4.6 fl oz	98.5 a	1.0 a	0.5 a	0.0 a	99.5 b	0.5 a	0.0 a	0.0 a
Belt SC	3.4 fl oz								
12. Leverage 2.7	5.1 fl oz	99.5 a	0.5 a	0.0 a	0.0 a	98.3 b	1.5 b	0.3 a	0.0 a
Movento 240SC	9.0 fl oz								
Damoil	0.25%								
Calypso 4F	7.0 fl oz								
Belt SC	5.0 fl oz								
Sevin XLR	96.0 fl oz								
13. UNTREATED		92.8 a	3.0 a	2.5 a	1.8 a	91.3 a	5.8 c	2.3 b	0.8 a

Percent data were transformed using  $\arcsin(\sqrt{X})$  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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> Rating Scale; 0 = 0 scales, 1 = 1 scale, 2 = 2 - 4 scales, 3 =  $\geq 5$  scales.

Table 25. Evaluations of insecticide schedules for controlling San Jose scale populations on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Ginger Gold Harvested 14 Aug <sup>b</sup>			McIntosh Harvested 4 Sep <sup>b</sup>			Red Delicious Harvested 6 Oct <sup>b</sup>		
		% Clean	% Damaged		% Clean	% Damaged		% Clean	% Damaged	
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	97.2 b	2.0 ab	0.8 a	0.0 a	69.4 ab	16.6 a	72.0 a	21.0 a	6.0 a
10. Calypso 4F Belt SC	5.8 fl oz 4.2 fl oz	98.8 b	0.8 a	0.5 a	0.0 a	74.0 ab	13.0 a	74.0 a	16.7 a	8.0 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	99.7 b	0.3 a	0.0 a	0.0 a	84.5 b	8.0 a	80.0 a	14.3 a	5.7 a
12. Leverage 2.7 Movento 240SC Damoil	5.1 fl oz 9.0 fl oz 0.25%	96.7 b	2.3 ab	1.0 a	0.0 a	87.5 b	6.5 a	55.5 a	37.4 a	6.4 a
Calypso 4F Belt SC Sevin XLR	7.0 fl oz 5.0 fl oz 96.0 fl oz									
13. UNTREATED		49.3 a	6.8 b	9.5 b	34.5 b	48.0 a	13.5 a	42.5 a	13.5 a	15.5 a
										28.5 b

Percent data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05).  
Treatment means followed by the same letter are not significantly different.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> Rating Scale: 0 = 0 scale, 1 = 1 scale, 2 = 2 - 4 scales, 3 = ≥ 5 scales.

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

**Lesser apple worm (LAW):** *Grapholita prunivora* Walsh

**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)

**Tarnished plant bug (TPB):** *Lygus lineolaris* (P. de B.)

**EVALUATION OF INSECTICIDES FOR CONTROLLING THE FRUIT FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 15 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 15 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Table 26a. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple".  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to 'Ginger Gold' Harvested 14 Aug								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	12.5 a	3.8 a	6.1 a	8.7 a	0.8 a	3.8 ab	17.5 a	18.7 a	54.5 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	16.0 a	6.6 a	14.2 a	19.3 a	0.3 a	3.3 ab	38.3 a	36.1 a	29.4 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	15.6 a	5.5 a	8.4 a	11.3 a	0.0 a	6.0 b	17.4 a	15.2 a	46.9 a
12. Leverage 2.7 Movento 240SC Damoil	5.1 fl oz 9.0 fl oz 0.25%	24.6 a	5.5 a	9.2 a	9.7 a	0.8 a	2.6 a	15.0 a	14.0 a	49.3 a
Calypso 4F Belt SC Sevin XLR	7.0 fl oz 5.0 fl oz 96.0 fl oz									
13. UNTREATED		20.5 a	2.3 a	24.3 a	41.0 a	16.5 b	16.8 c	27.0 a	27.0 a	21.0 a

Table 26b. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple".  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to 'McIntosh' Harvested 4 Sep								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	8.0 a	1.5 a	8.5 a	11.1 a	0.0 a	8.1 a	2.5 a	1.5 a	67.3 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	9.0 a	1.0 a	14.5 a	5.0 a	0.0 a	11.0 a	9.5 a	6.5 bc	62.5 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	10.0 a	4.5 a	5.5 a	8.0 a	0.0 a	6.0 a	11.0 a	5.0 abc	61.5 a
12. Leverage 2.7 Movento 240SC Damoil	5.1 fl oz 9.0 fl oz 0.25%	9.5 a	2.5 a	9.0 a	5.0 a	0.0 a	10.0 a	9.0 a	2.5 ab	65.0 a
Calypso 4F Belt SC Sevin XLR	7.0 fl oz 5.0 fl oz 96.0 fl oz									
13. UNTREATED		12.5 a	2.5 a	14.0 a	15.5 a	4.0 a	21.0 b	19.5 a	16.5 c	36.5 a

Percent data were transformed using Log10 (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.

\* All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

Table 26c. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation <sub>i</sub>	Rate/acre % vol:vol	Percent Damage to 'Red Delicious' Harvested 6 Oct								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
9. Calypso 4F Belt SC	7.0 fl oz 5.0 fl oz	12.0 a	0.0 a	2.0 a	2.0 a	1.0 a	4.0 a	2.0 a	1.0 a	79.0 a
10. Calypso4F Belt SC	5.8 fl oz 4.2 fl oz	12.7 a	0.7 a	8.0 a	4.7 a	1.3 a	2.0 a	14.0 a	12.0 a	60.7 a
11. Calypso 4F Belt SC	4.6 fl oz 3.4 fl oz	28.6 a	0.0 a	2.9 a	14.3 a	5.7 a	0.0 a	51.4 a	51.4 a	22.9 a
12. Leverage 2.7 Movento 240SC Damoil	5.1 fl oz 9.0 fl oz 0.25%	20.2 a	1.6 a	41.0 a	1.4 a	0.8 a	7.3 a	35.3 a	35.3 a	33.6 a
Calypso 4F Belt SC Sevin XLR	7.0 fl oz 5.0 fl oz 96.0 fl oz									
13. UNTREATED		26.0 a	3.0 a	9.5 a	28.0 a	8.0 a	18.5 a	16.0 a	15.5 a	39.5 a

Percent data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.



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

**Cecidomyiidae:** predatory larvae

**Green apple aphid complex (GAA):** *Aphis pomi* De Geer

**Obliquebanded leafroller (OBLR):** *Choristoneura rosaceana* (Harris)

**Potato leafhopper (PLH):** *Empoasca fabae* (Harris)

**Redbanded Leafroller (RBLR):** *Argyrotaenia velutinana* (Walker)

**Rose leafhopper (RLH):** *Edwardsiana rosae* (Linnaeus)

**Rosy apple aphid (RAA):** *Dysaphis plantaginea* (Passerini)

**Spirea aphid (SA):** *Aphis spiraeicola* Patch

**Spotted tentiform leafminer (STLM)** *Phyllonorycter blancardella* (Fabricius).

**White apple leafhopper (WALH):** *Typhlocyba pomaria* McAtee

**EVALUATION OF INSECTICIDES TARGETING SCALE FOR CONTROLLING THE FOLIAR FEEDING INSECT COMPLEX ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor-mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 15 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July. 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Foliar evaluations were made on 'McIntosh', 'Golden Delicious' and Red delicious' cultivars on 20 May and on 9 July (Table 16-17). Data taken from 'Golden Delicious' for evaluations of rosy apple aphid; the lepidoptera complex including; obliquebanded leafroller, redbanded leafroller and green fruitworm were taken from 'McIntosh' employing 3-minute perimeter observations. Data taken of spotted tentiform leafminer, potato leafhopper, (PLH) and rose leafhopper, (RLH), the green aphid complex comprised of the green apple aphid and spirea aphid (SA), and preditdory larvae of Cecidomyiidae were taken from 'Red Delicious'. The GAA rating scale uses values 0 for 0 aphids, 1 = 1-5 aphids, 2 = 6-10 aphids, 3 =  $\geq 10$  aphids. Foliar data were transformed using  $\text{Log}_{10}(X + 1)$  conducted prior to analysis. Untransformed data are presented in each table and mean separation using Fishers Protected LSD ( $P \leq 0.05$ ). Treatment means followed by the same letter are not significantly different.

Table 27. Evaluation of insecticides for controlling foliar feeding insect complex on apple <sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Data taken from 3 min. Observation made 20 May				
		RAA / Cluster <sup>b</sup>	Lep. Dam. / Terminal <sup>c</sup>	Lep. Larvae / Terminal <sup>c</sup>	# Leaves with STLM <sup>d</sup>	Mean STLM Mines / Leaf <sup>d</sup>
1. Movento 240SC Damoil	6.0 fl oz 0.25%	4.0 bcd	47.3 b	0.0 a	1.3 a	3.3 a
2. Movento 240SC Damoil	9.0 fl oz 0.25%	2.3 b	46.8 b	0.0 a	1.0 a	3.0 a
3. Centaur 70WDG Damoil	34.5 oz 1.00%	3.8 bcd	32.3 b	0.0 a	1.3 a	5.0 a
4. Centaur 70WDG Damoil	34.5 oz 0.25%	5.8 d	40.0 b	0.0 a	1.0 a	3.8 a
5. Centaur 70WDG Damoil	34.5 oz 0.25%	4.5 cd	55.8 b	0.0 a	2.3 a	6.5 a
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	0.0 a	6.0 a	0.0 a	0.3 a	0.3 a
8. Esteem 35W Damoil	5.0 oz 1.00%	2.3 bc	29.8 b	0.0 a	0.8 a	1.5 a
13. UNTREATED		5.5 cd	44.8 b	0.3 a	1.8 a	6.5 a

Foliar data were transformed using Log10 (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

<sup>b</sup> RAA = Rosy apple aphid, *Dysaphis plantaginea* (Passerini). Data taken from 'Golden Delicious'.

<sup>c</sup> Lep. = Lepidoptera complex including: Obliquebanded Leafroller, *Choristoneura rosaceana* (Harris), Redbanded Leafroller, *Argyrotaenia velutinana* (Walker), and Green Fruitworm, *Orthosia hibisci* (Guenee). Data taken from 'McIntosh'.

<sup>d</sup> STLM = Spotted tentiform leafminer, *Phyllonorycter blancardella* (Fabricius). Data taken from 'Red Delicious'.

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

**San Jose scale (SJS):** *Quadraspidiotus perniciosus* (Comstock)

**EVALUATION OF INSECTICIDES FOR CONTROLLING SAN JOSE SCALE ON APPLE, 2009 – Cornell University's Hudson Valley Lab:** Treatments were applied to four-tree plots, replicated four times in a randomized complete block design. All applications were applied concentrate using a tractor mounted John Bean® Airblast sprayer delivering 200 psi. and 108.9 GPA, traveling at 2.4 to 2.6 mph. Trees on the M.26 rootstock were 14 yr-old, maintained at approximately 10 ft high and planted to a research spacing of 10' x 30'. Alternate rows of unsprayed trees were adjacent to treated plots for reduction of drift, increased insect distribution and insect pressure.

Treatments were applied on various schedules as shown in Table 15 on page 24. Dates corresponding to tree phenology for McIntosh occurred for green tip (GT) on 6 April, 1/2" green on 13 April, tight cluster (TC) on 23 April, pink on 25 April, King Bloom on 27 April, 1<sup>st</sup> PC oviposition or PF on 13 May, 1<sup>st</sup> cover on 22 May, 2C on 8 June, 3C on 26 June, 4C on 4 July, 5C on 15 July, 6C on 29 July, 7C on 8 August, 21d post 6C on 26 August, 8C on 15 August. Treatments applied season long over the entire block for crop size management and disease control included: Dithane DF at 3 lbs./A and Vanguard at 4.0 oz./A on 10 April, Dithane DF 2 lbs./A and Captan 50WP at 3 lbs./A on 19 & 30 April, Nova 40WP 3.0 oz./A on 30 April, Captan 50WP at 6 lbs./A and Flint at 2.0 oz./A on 6 May, Dithane DF 2 lbs./A and Nova 40WP 3.0 oz./A on 15 May, Captan 50WP at 6 lbs./A, Nova 40WP 3.0 oz./A and Flint at 2.0 oz./A on 27 May, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 17 June, Dithane DF at 2 lbs./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 29 June, Flint at 2.0 oz./A, Topsin M 10.0 oz./A and Fruitone-N 4.0 oz./A on 10 July, Pristine 18.5 oz./A on 22 July.

Based on the SJS predictive model used to forecast 1<sup>st</sup> generation crawler emergence in 2009, using 500DD<sub>50</sub> from March 1<sup>st</sup>, occurred on 3 June. Field observations of emergence however was observed on 15 June, 7 days after the model prediction. Residual of the 2<sup>nd</sup> cover application until crawler emergence through to 3<sup>rd</sup> cover were subjected to 7.7 inches of rainfall. Data presented in tables are intended to represent the efficacy of seasonal insecticide programs in reducing the incidence of SJS crawler establishment on fruit after the first of two emergence periods. Infestation pressure from SJS was sporadically distributed throughout the block, leading to inconclusive results in efficacy, as few trends in control are evident. Low levels are not compelling predictors of high degrees of efficacy. Since infestation levels are established during the previous year, low damage levels may be due to low overwintering levels in plot trees. However, treatments made to plots uniformly containing very high infestation levels are more discernable with regards to efficacy.

Fruit evaluations were made on two varieties on 23 June, shown on table 28, representing the 1<sup>st</sup> generation scale establishment on fruit. Harvest infestation levels shown in table 29 represent the combined 1<sup>st</sup> and 2<sup>nd</sup> generation were evaluated on three varieties on 23 August of 'Ginger Gold', 'McIntosh' and 'Red Delicious'. Fruit damage assessment was conducted by randomly selecting 100 fruits from each tree and scoring for external damage. A rating scale of 0-3 was used in which 0 = clean fruit, 1 = 1 scale, 2 = 2 - 4 scale, 3 = ≥ 5 scale, displayed as % fruit with damage levels in each category. To stabilize variance, percentage data were transformed by arcsine \*(square root of x) prior to analysis using Fisher's Protected LSD (P = < 0.05). Untransformed data are presented in each table.

Table 28. Evaluations of insecticide schedules for controlling San Jose scale populations on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Ginger Gold Evaluated 23 Jun <sup>b</sup>				McIntosh Evaluated 23 Jun <sup>b</sup>			
		Clean	1	2	3	Clean	1	2	3
1. Movento 240SC Damoil	6.0 fl oz 0.25%	95.5 a	3.0 a	1.3 a	0.3 a	98.8 bc	1.3 abc	0.0 a	0.0 a
2. Movento 240SC Damoil	9.0 fl oz 0.25%	95.3 a	3.8 a	1.0 a	0.0 a	97.3 bc	2.5 bcd	0.3 a	0.0 a
3. Centaur 70WDG Damoil	34.5 oz 1.00%	95.5 a	3.0 a	0.8 a	0.8 a	97.8 bc	2.3 abcd	0.0 a	0.0 a
4. Centaur 70WDG Damoil	34.5 oz 0.25%	96.8 a	2.8 a	0.3 a	0.0 a	99.0 c	1.0 ab	0.0 a	0.0 a
5. Centaur 70WDG Damoil	34.5 oz 0.25%	96.3 a	3.2 a	0.5 a	0.0 a	99.3 c	0.7 a	0.0 a	0.0 a
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	96.5 a	3.3 a	0.3 a	0.0 a	96.8 b	3.0 cd	0.3 a	0.0 a
8. Esteem 35W Damoil	5.0 oz 1.00%	96.5 a	3.3 a	0.3 a	0.0 a	99.0 bc	1.0 abc	0.0 a	0.0 a
13. UNTREATED		92.8 a	3.0 a	2.5 a	1.8 a	91.3 a	5.8 d	2.3 b	0.8 a

Percent data were transformed using arcsin (Sqrt(X)) 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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi. traveling at an average of 2.86 mph.

<sup>b</sup> Rating Scale; 0 = 0 scales, 1 = 1 scale, 2 = 2 - 4 scales, 3 =  $\geq 5$  scales.

Table 29. Evaluations of insecticide schedules for controlling San Jose scale populations on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Ginger Gold Harvested 14 Aug <sup>b</sup>			McIntosh Harvested 4 Sep <sup>b</sup>			Red Delicious Harvested 6 Oct <sup>b</sup>		
		Clean	1	2	Clean	1	2	Clean	1	2
1. Movento 240SC Damoil	6.0 fl oz 0.25%	84.1 a	6.6 b	6.7 bcd	72.0 abc	10.0 a	15.5 bc	36.7 b	13.3 a	25.3 c
2. Movento 240SC Damoil	9.0 fl oz 0.25%	59.4 a	7.1 b	10.4 bcd	78.5 abc	14.0 ab	7.0 abc	11.0 a	10.0 a	27.1 c
3. Centaur 70WDG Damoil	34.5 oz 1.00%	74.8 a	0.8 a	3.8 ab	73.0 abc	5.5 a	5.5 abc	81.7 b	6.7 a	9.7 abc
4. Centaur 70WDG Damoil	34.5 oz 0.25%	85.2 a	5.6 b	7.8 abc	81.5 abc	9.5 a	7.5 abc	67.3 b	19.3 a	9.3 bc
5. Centaur 70WDG Damoil	34.5 oz 0.25%	59.9 a	8.4 b	20.3 cd	58.1 ab	20.9 b	12.4 abc	5.0 a	7.0 a	27.0 c
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	98.7 a	1.3 a	0.0 a	91.0 bc	3.5 a	3.5 ab	86.0 b	7.5 a	4.0 ab
8. Esteem 35W Damoil	5.0 oz 1.00%	100.0 a	0.0 a	0.0 a	96.0 c	3.5 a	0.5 a	93.6 b	4.9 a	1.5 a
13. UNTREATED		37.8 a	9.9 b	16.4 d	48.0 a	13.5 ab	17.5 c	33.5 b	14.5 a	20.5 c

Percent data were transformed using  $\arcsin(\sqrt{x})$  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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.  
<sup>b</sup> Rating Scale; 0 = 0 scales, 1 = 1 scale, 2 = 2 - 4 scales, 3 =  $\geq 5$  scales.

Table 30. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent damage to 'Ginger Gold' Harvested 14 Aug								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
1. Movento 240SC Damoil	6.0 fl oz 0.25%	15.7 a	6.8 a	7.3 a	4.5 a	4.0 ab	11.9 a	20.3 a	19.3 a	45.2 a
2. Movento 240SC Damoil	9.0 fl oz 0.25%	13.9 a	3.3 a	9.1 a	10.8 a	3.0 a	8.8 a	19.5 a	19.3 a	48.8 a
3. Centaur 70WDG Damoil	34.5 oz 1.00%	14.6 a	7.6 a	16.5 a	15.3 a	7.6 ab	13.4 a	26.8 a	25.2 a	28.1 a
4. Centaur 70WDG Damoil	34.5 oz 0.25%	13.6 a	7.8 a	13.0 a	14.1 a	4.0 ab	7.8 a	24.7 a	24.4 a	44.4 a
5. Centaur 70WDG Damoil	34.5 oz 0.25%	14.2 a	1.8 a	13.8 a	18.6 a	20.2 b	18.2 a	25.7 a	25.4 a	25.1 a
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	17.0 a	5.0 a	16.5 a	17.9 a	5.3 ab	8.6 a	28.0 a	25.6 a	33.5 a
8. Esteem 35W Damoil	5.0 oz 1.00%	15.3 a	4.3 a	9.3 a	7.0 a	7.0 a	11.3 a	21.8 a	21.3 a	45.1 a
13. UNTREATED		26.0 a	3.2 a	18.7 a	35.5 a	11.5 b	13.5 a	23.7 a	23.7 a	28.2 a

Percent data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

Table 31. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to 'McIntosh' Harvested 4 Sep								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
1. Movento 240SC Damoil	6.0 fl oz 0.25%	10.5 a	2.0 a	5.0 a	1.5 a	3.5 a	5.0 a	5.5 a	5.5 a	68.0 a
2. Movento 240SC Damoil	9.0 fl oz 0.25%	10.0 a	2.5 a	23.0 a	13.0 a	10.0 a	23.0 a	14.0 a	11.5 a	43.0 a
3. Centaur 70WDG Damoil	34.5 oz 1.00%	7.5 a	3.0 a	11.0 a	16.0 a	16.0 a	11.0 a	20.0 a	17.0 a	37.5 a
4. Centaur 70WDG Damoil	34.5 oz 0.25%	17.2 a	2.0 a	19.6 a	9.0 a	7.1 a	19.6 a	25.2 a	20.7 a	29.5 a
5. Centaur 70WDG Damoil	34.5 oz 0.25%	10.6 a	0.0 a	24.3 a	18.5 a	21.6 a	24.3 a	27.3 a	26.3 a	27.5 a
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	6.5 a	3.5 a	3.0 a	12.0 a	5.0 a	15.0 a	9.0 a	6.0 a	55.0 a
8. Esteem 35W Damoil	5.0 oz 1.00%	8.0 a	2.0 a	12.0 a	6.0 a	3.0 a	11.5 a	15.0 a	13.5 a	56.5 a
13. UNTREATED		12.5 a	2.5 a	14.0 a	15.5 a	4.0 a	21.0 a	19.5 a	16.5 a	36.5 a

Percent data were transformed using Log10 (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.

<sup>a</sup> All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.



Table 32. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on apple<sup>a</sup>.  
N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Percent Damage to 'Red Delicious' Harvested 6 Oct								
		TPB	EAS	E. Lep.	PC	Int. Lep.	Ext. Lep.	AMP	AMT	Clean
1. Movento 240SC Damoil	6.0 fl oz 0.25%	20.7 a	2.7 a	8.0 a	3.3 a	10.7 a	6.0 a	26.7 a	26.7 a	44.7 a
2. Movento 240SC Damoil	9.0 fl oz 0.25%	15.7 a	3.0 a	0.0 a	1.0 a	28.1 a	10.7 a	25.2 a	25.2 a	38.5 a
3. Centaur 70WDG Damoil	34.5 oz 1.00%	18.0 a	1.3 a	9.0 a	12.3 a	10.7 a	21.3 a	35.3 a	18.7 a	24.0 a
4. Centaur 70WDG Damoil	34.5 oz 0.25%	20.0 a	2.7 a	6.0 a	16.7 a	14.0 a	10.0 a	36.7 a	36.7 a	28.7 a
5. Centaur 70WDG Damoil	34.5 oz 0.25%	23.0 a	1.0 a	6.0 a	11.0 a	16.0 a	9.0 a	25.0 a	25.0 a	37.0 a
7. Lorsban 4E Damoil	64.0 fl oz 1.00%	20.0 a	4.5 a	11.0 a	14.5 a	18.0 a	11.0 a	35.0 a	33.5 a	29.5 a
8. Esteem 35W Damoil	5.0 oz 1.00%	20.1 a	1.5 a	6.5 a	13.5 a	7.4 a	11.7 a	22.7 a	22.7 a	39.7 a
13. UNTREATED		27.5 a	3.0 a	10.0 a	34.0 a	9.5 a	17.5 a	32.5 a	32.5 a	20.0 a

Percent data were transformed using Log10 (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.

<sup>a</sup>All applications made using John Bean Airblast delivering 108.9 GPA at 200 psi, traveling at an average of 2.86 mph.

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

**Pear psylla:** *Cacopsylla pyricola* (Foerster)

**Codling moth (CM):** *Cydia pomonella* (Linnaeus)

**Pear rust mite (PRM):** *Epirimerus pyri*

**Fabrea Leaf Spot (FLS)** *Fabreaa maculata*

## **EFFICACY OF INSECTICIDES AGAINST PEAR PSYLLA ADULTS, EGGS AND NYMPHS,**

**2009: – 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 29 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 tractor mounted high-pressure handgun sprayer operated at 300 psi delivering  $\geq 350$  GPA.

'Bartlett' phenology beginning at delayed dormant (DD) on 2 April, onset of 1<sup>st</sup> egg or bud burst (BB) on 20 April; green cluster (GC) on 24 April; white bud (WB) on 27 April; 100% bloom on 7 May; PF application on 8 May @ 80% PF of Bartlett; 1C application on 18 May; 2C on 31 May; 3C on 10 June; 4C on 24 June as a 'rescue' treatment; 5C on 4 July, 6C on 9 July, 7C on 15 July and 8C on 3 Aug. 'Bartlett' was harvested on 22 August in which we collected and evaluated 100 fruit per treatment across 4 replicates. Treatments typically applied over the block for crop size management to reduced crop load were omitted due to sparse fruit set. Imidan 70WP was applied to treatments 3-11 at 5.33 lbs./A at WB and PF to control leaf curl midge and plum curculio. Treatment applications to the end of the season (EOS) received initial application including all succeeding treatments as noted above.

Scheduled applications were made against the pear insect complex. Early applications targeted overwintering adult and first generation of pear psylla with evaluations made to determine the treatment effects on adult, egg and nymph populations. During the period from bud burst through 1<sup>st</sup> cover, evaluations to determine treatment effects on springform adult ovipositional deterrence, including subsequent 1<sup>st</sup> generation nymph emergence were conducted. Pre-bloom evaluations began on 20 April, in which 25 fruiting buds per treatment were evaluated. Subsequent application schedules were designed to evaluate treatments against the latter 1<sup>st</sup> and 2<sup>nd</sup> generation pear psylla adult, egg, nymph and pear rust mite populations. Adult numbers were assessed on 6, 18, 29 May, 16 June, 17 July using 3-minute vacuum sweeps of perimeter apical shoot foliage using a handheld vacuum to which was connected 500 mL screened nalgene bottles. Psylla nymph, egg and rust mite numbers were assessed by collecting leaf samples on shoots beginning with 25 basal leaves of 5 shoots on 27 April and 4 May and continuing for all subsequent evaluations by removing 1 distal, 1 proximal and 3 mid-shoot leaves of 5 shoots per treatment through the remainder of the season. Sampling dates for foliar presence of psylla nymphs were 27 April, 4, 11, 27, May; 9, 18 June and 6 July. Samples were removed to the laboratory where target pests were counted using a binocular scope. Fifty bartlett fruit were harvested per treatment on 18 August and scored for insect damage. The transformation using the  $\text{Log}_{10} (X + 1)$  was applied for adult and foliar evaluations. To stabilize variance,

percentage data were transformed by arcsine  $\sqrt{x}$  prior to analysis. Fisher's Protected LSD ( $P \leq 0.05$ ) was performed on all data; untransformed data are presented in each table.

Against early-season pear psylla, the 50 lb/A applications of Surround WP at DD, GC and PF performed well as an ovipositional deterrent. It was equivalent in reducing adult presence and in controlling nymph populations to the standard 3% oil application, which were better at managing nymph populations than WB applications of Movento 240SC, BB and WB applications of Esteem 35WP and Centaur (Tables 33-34). All products significantly reduced nymph populations compared to the UTC. Applications beginning at 1C, 18 May, directed against 1<sup>st</sup> generation pear psylla nymph and adult population resulted in varying degrees of control in all treatments. Surround, 1% oil alone, Movento and Delegate provided excellent pear psylla nymph management 9 days after 1C applications (Table 35). All treatments provided excellent suppression of PRM with elevated mite numbers observed in treatment 5; 1C & 3C applications of Delegate.

Oil alone throughout the season does not manage fruit feeding insects as observed in Table 38. This treatment exhibited approximately 30% fruit injury from the pest complex, principally plum curculio, lepidopteran internal and leafroller complexes. However, the combination of early season Surround up to the 1<sup>st</sup> Cover spray followed thereafter with by-weekly summer oil applications produced >94% clean fruit from insect injury. The combination of these two materials may prove to be an effective solution to both insect and disease for organic pear production in the Northeast. The use of oil alone beyond the 77 to day harvest interval for mancozeb use may provide acceptable late season commercial pear management of both psylla and *Fabraea* leaf spot. This use of HMO's provide less fruit residue at harvest compared to ziram or ferbam, with a low day to harvest requirement in mixed plantings of early and late season fruit.

Table 33 Evaluations of insecticide schedules on pear psylla and pear rust mite populations on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2009.

Treatment	Formulation	Application Dates	20 April		27 April	
			# / 25 buds		# / 25 lvs	
			nymph	egg	nymph	egg
Damoil	3% v/v	DD	0.3 a	47.5 b	0.8 a	49.8 a
Surround WP	50.0 lbs./A	DD	0.3 a	11.3 a	0.5 a	0.0 a
Esteem 35W	5.0 oz./A	BB	2.3 a	68.0 b	5.0 a	114.3 b
Centaur 70WDG	34.5 oz./A	BB	1.3 a	58.0 b	7.8 a	89.3 b
UNTREATED			1.0 a	88.5 b	4.5 a	93.5 b

Table 34 Evaluations of insecticide schedules on pear psylla and pear rust mite populations on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2009.

Treatment	Formulation	Application Dates	4 May		6 May	11 May		18 May
			# / 25 lvs		Adult Sweep	# / 25 lvs		Adult Sweep <sup>3</sup>
			nymph	egg		nymph	egg	
Damoil	3% v/v	DD	2.5 a	12.8 ab	0.8 a	1.0 a	4.8 a	1.0 a
Damoil	1% v/v	GC, PF - EOS						
Surround WP	50.0 lbs./A	DD, GC, PF	1.0 a	11.0 a	0.5 a	1.8 a	8.3 b	1.0 a
Movento 240SC	6.0 oz./A	WB	16.5 b	23.0 ab	1.8 a	12.3 b	39.0 c	3.3 ab
Movento 240SC	9.0 oz./A	WB	14.3 b	30.8 bc	1.3 a	10.0 b	34.0 c	1.3 a
Esteem 35W	5.0 oz./A	BB, WB	15.0 b	39.0 bc	1.5 a	9.0 b	55.8 c	2.7 ab
Centaur 70WDG	34.5 oz./A	BB, WB	22.3 b	78.0 c	1.5 a	13.5 b	43.5 c	5.3 b
UNTREATED			18.0 b	51.5 bc	2.8 a	38.8 c	62.0 c	7.3 b

<sup>1</sup> Data taken on foliage of Bartlett. DD on 2 Apr, BB on 20 Apr, GC on 24 Apr, WB on 27 Apr, PF on 8 May, 1C on 18 May, 2C on 31 May, 3C on 10 Jun, 4C on 24 Jun, 5C on 4 Jul, 6C on 9 Jul, 7C on 15 Jul, 8C on 3 Aug.

Treatments 3-11 received Imidan 70WP at 5.33 lbs./A @ WB & PF.

<sup>2</sup> Foliar data was transformed using Log<sub>10</sub> (X + 1) conducted prior to analysis. Untransformed data are presented in each table.

Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.

<sup>3</sup> Data taken from four replicates with the exception of 18 May adult sweep using three replications.

Table 35 Evaluations of insecticide schedules on pear psylla and pear rust mite populations on Bartlett pear. Hudson Valley Lab., Highland, N.Y., 2009.

Treatment	Formulation	Application Dates	11-May			18-May			27-May (9dp 1C)			9 June (9dp 2C)			16-June Adult sweep		
			nymph	egg	PRM	nymph	egg	PRM	nymph	egg	PRM	nymph	egg	PRM	nymph	egg	PRM
Damofil	3% v/v	DD	1.0 a	4.8 a	0.0 a	1.0 a	1.0 a	0.0 a	1.5 a	9.8 a	0.0 a	35.8 bc	88.3 ab	0.0 a	2.8 ab		
Damofil	1% v/v	GC, PF - EOS															
Surround WP	50.0 lbs./A	DD, GC, PF	1.8 a	8.3 b	0.0 a	1.0 a	1.0 a	0.0 a	1.8 ab	20.0 ab	9.0 a	45.5 bc	163.0 bcd	0.0 a	5.0 bcd		
Damofil	1% v/v	1C - EOS															
Movento 240SC	6.0 oz./A	WB, 1C	12.3 a	39.0 c	0.3 a	3.3 ab	3.3 ab	0.0 a	11.0 cd	30.8 bc	0.0 a	49.0 bc	245.8 de	0.5 a	14.3 e		
LI700	0.25% v/v	1C															
Movento 240SC	9.0 oz./A	WB, 1C	10.0 a	34.0 c	0.0 a	1.3 a	1.3 a	0.0 a	5.5 bc	23.5 ab	0.0 a	38.5 bc	279.8 de	0.3 a	9.3 cde		
LI700	0.25% v/v	1C															
Damofil	3% v/v	DD							1.8 ab	20.5 ab	10.5 a	14.3 a	101.8 ab	1.8 a	1.0 a		
Delegate WG	7.0 oz./A	1C, 3C															
Damofil	0.25% v/v	1C, 3C															
AgriMek 0.15EC	20.0 oz./A	1C, 3C							14.0 cde	27.0 bc	5.0 a	41.3 bc	108.8 abc	0.0 a	3.8 bc		
Damofil	0.25% v/v	1C, 3C															
Damofil	3% v/v	DD							6.8 abc	16.5 ab	0.0 a	15.3 a	64.8 a	0.0 a	2.8 ab		
AgriFlex 1.55SC	8.5 oz./A	1C, 3C															
Damofil	0.25% v/v	1C, 3C															
Damofil	3% v/v	DD							7.3 bc	21.3 ab	0.0 a	23.5 ab	160.3 bcd	0.0 a	2.5 ab		
AgriMek 0.70SC	4.3 oz./A	1C, 3C															
Damofil	0.25% v/v	1C, 3C															
Esteem 35W	5.0 oz./A	BB, WB, 1C	9.0 a	55.8 c	17.8 b	2.7 ab	2.7 ab	0.0 a	12.5 cde	84.3 d	118.5 b	38.5 bc	302.5 e	6.3 a	11.0 de		
Damofil	0.25% v/v	1C															
Centaur 70WDG	34.5 oz./A	BB, WB, 1C	13.5 a	43.5 c	0.0 a	5.3 b	5.3 b	0.0 a	22.8 de	112.3 d	0.0 a	65.0 c	182.8 cde	4.0 a	6.5 bcd		
Damofil	0.25% v/v	1C															
Damofil	3% v/v	DD							15.5 cde	29.5 bc	0.0 a	24.3 ab	123.8 abc	0.0 a	4.0 bc		
AgriMek 0.15EC	20.0 oz./A	1C, 3C															
Damofil	0.25% v/v	1C, 3C															
UNTREATED			38.8 a	62.0 c	81.8 c	7.3 b	7.3 b	0.0 a	32.3 e	81.3 cd	898.3 c	75.8 c	170.8 b-e	592.0 b	9.5 cde		

1 Data taken on foliage of Bartlett. DD on 2 Apr, BB on 20 Apr, GC on 24 Apr, WB on 27 Apr, PF on 8 May, 1C on 10 Jun, 4C on 24 Jun, 5C on 4 Jul, 6C on 9 Jul, 7C on 15 Jul, 8C on 3 Aug. Treatments 3-11 received Imidan 70WP at 5.33 lbs./A @ WB & PF.

2 Foliar data was transformed using Log10 (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.

3 Data taken from four replicates with the exception of 18 May adult sweep using three replications.

Table 36 Evaluations of insecticide schedules on pear psylla and pear rust mite populations on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2009.

Treatment	Formulation	Application Dates	18 June (8dp 3C)			6 July Adult sweep	6 July (2dp 5C)		
			# / 25 lvs nymph	egg	PRM		# / 25 lvs nymph	egg	PRM
Damoil	3% v/v	DD	54.5 abc	99.0 abc	0.0 a	2.5 a	6.5 a	17.0 abc	0.0 a
Damoil	1% v/v	GC, PF – EOS							
Surround WP	50.0 lbs./A	DD, GC, PF	74.8 bcd	154.5 bcd	0.0 a	4.3 a	12.8 abcd	36.5 bcd	0.0 a
Damoil	1% v/v	1C – EOS							
Movento 240SC	6.0 oz./A	WB, 1C	107.0 cd	253.3 de	1.3 a	4.5 a	23.8 cdef	32.3 bcd	2.3 ab
LI700	0.25% v/v	1C							
Movento 240SC	9.0 oz./A	WB, 1C	83.5 bcd	372.8 e	0.3 a	2.8 a	46.3 f	17.0 abcd	98.0 cd
LI700	0.25% v/v	1C							
Damoil	3% v/v	DD	27.8 a	52.3 a	13.0 bc	2.3 a	19.8 bcde	68.8 cd	67.3 d
Delegate WG	7.0 oz./A	1C, 3C							
Damoil	0.25% v/v	1C, 3C							
AgriMek 0.15EC	20.0 oz./A	1C, 3C	43.5 ab	78.0 ab	0.0 a	4.0 a	24.5 def	34.8 bcd	1.0 ab
Damoil	0.25% v/v	1C, 3C							
Damoil	3% v/v	DD	25.5 a	77.3 ab	0.0 a	3.3 a	26.8 def	59.8 d	0.0 a
AgriFlex 1.55SC	8.5 oz./A	1C, 3C							
Damoil	0.25% v/v	1C, 3C							
Damoil	3% v/v	DD	55.3 abc	104.3 abc	0.0 a	5.0 a	10.5 abc	41.5 cd	0.0 a
AgriMek 0.70 SC	4.3 oz./A	1C, 3C							
Damoil	0.25% v/v	1C, 3C							
Esteem 35W	5.0 oz./A	BB, WB, 1C	50.5 abc	192.5 cde	20.5 c	4.5 a	35.8 ef	59.3 d	13.3 bc
Damoil	0.25% v/v	1C							
Centaur 70WDG	34.5 oz./A	BB, WB, 1C	103.8 cd	180.8 cde	0.0 a	5.3 a	26.8 ef	23.0 bcd	2.3 abc
Damoil	0.25% v/v	1C							
Damoil	3% v/v	DD	50.8 ab	107.3 abc	1.3 ab	2.5 a	4.8 ab	6.8 a	0.0 a
AgriMek 0.15EC	20.0 oz./A	1C, 3C							
Damoil	0.25% v/v	1C, 3C							
Damoil	1% v/v	4C-EOS							
UNTREATED			130.8 d	87.8 ab	1154.3 d	5.0 a	16.8 abcde	10.3 ab	1351.8 e

1 Data taken on foliage of Bartlett. DD on 2 Apr, BB on 20 Apr, GC on 24 Apr, WB on 27 Apr, PF on 8 May, 1C on 18 May, 2C on 31 May, 3C on 10 Jun, 4C on 24 Jun, 5C on 4 Jul, 6C on 9 Jul, 7C on 15 Jul, 8C on 3 Aug. Treatments 3-11 received Imidan 70WP at 5.33 lbs./A @ WB & PF.

2 Foliar data was transformed using Log10 (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.

Table 37 Evaluations of insecticide schedules on pear psylla and pear rust mite populations on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2009.

Treatment	Formulation	Application Dates	6 July (2dp 5C)			17 July	20 July (5dp 7C)		
			# / 25 lvs			Adult sweep	# / 25 lvs		
			nymph	egg	PRM		nymph	egg	PRM
Damoid	3% v/v	DD	6.5 a	17.0 abc	0.0 a	3.3 abc	5.5 a	40.8 a-f	0.3 a
Damoid	1% v/v	GC, PF – EOS							
Surround WP	50.0 lbs./A	DD, GC, PF	12.8 abcd	36.5 bcd	0.0 a	4.8 bcd	14.5 abc	68.5 c-f	0.3 a
Damoid	1% v/v	1C – EOS							
Movento 240SC	6.0 oz./A	WB, 1C	23.8 cdef	32.3 bcd	2.3 ab	5.8 cd	8.0 ab	28.3 a-d	2.5 ab
LI700	0.25% v/v	1C							
Portal	24.0 oz./A	Thresh. (7C)							
Movento 240SC	9.0 oz./A	WB, 1C	46.3 f	17.0 abcd	98.0 cd	10.0 d	12.5 abcd	19.3 ab	2.3 ab
LI700	0.25% v/v	1C							
Portal	32.0 oz./A	Thresh. (7C)							
Damoid	3% v/v	DD	19.8 bcde	68.8 cd	67.3 d	2.3 ab	17.0 bcd	59.8 d-f	202.8 d
Delegate WG	7.0 oz./A	1C, 3C							
Actara	5.5 oz./A	7C							
Damoid	0.25% v/v	1C, 3C, 7C							
AgriMek 0.15EC	20.0 oz./A	1C, 3C	24.5 def	34.8 bcd	1.0 ab	2.0 a	11.8 abcd	19.0 a	6.8 ab
Delegate WG	7.0 oz./A	CM 2 <sup>nd</sup> Gen. (7C)							
Damoid	0.25% v/v	1C, 3C, 7C							
Damoid	3% v/v	DD	26.8 def	59.8 d	0.0 a	5.0 bcd	33.3 d	105.5 f	9.5 b
AgriFlex 1.55SC	8.5 oz./A	1C, 3C							
Damoid	0.25% v/v	1C, 3C							
Damoid	3% v/v	DD	10.5 abc	41.5 cd	0.0 a	5.0 bc	24.3 cd	73.0 ef	1.0 ab
AgriMek 0.70SC	4.3 oz./A	1C, 3C							
Damoid	0.25% v/v	1C, 3C							
Esteem 35W	5.0 oz./A	BB, WB, 1C	35.8 ef	59.3 d	13.3 bc	5.0 bcd	10.5 abc	62.3 b-f	38.0 c
Damoid	0.25% v/v	1C, 7C							
Assail 30SG	4.0 oz./A	Thresh. (7C)							
Centaur 70WDG	34.5 oz./A	BB, WB, 1C, 7C	26.8 ef	23.0 bcd	2.3 abc	5.0 bcd	18.8 cd	37.8 a-e	3.0 ab
Damoid	0.25% v/v	1C, 7C							
Damoid	3% v/v	DD	4.8 ab	6.8 a	0.0 a	3.5 abc	6.3 ab	20.8 a-c	0.3 a
AgriMek 0.15EC	20.0 oz./A	1C, 3C							
Damoid	1% v/v	1C, 3C-EOS							
UNTREATED			16.8 abcde	10.3 ab	1351.8 e	6.3 cd	9.0 ab	47.5 a-f	514.0 d

1 Data taken on foliage of Bartlett. DD on 2 Apr. BB on 20 Apr. GC on 24 Apr. WB on 27 Apr. PF on 8 May. 1C on 18 May. 2C on 31 May. 3C on 10 Jun. 4C on 24 Jun. 5C on 4 Jul. 6C on 9 Jul. 7C on 15 Jul. 8C on 3 Aug. Treatments 3-11 received Imidan 70WP at 5.33 lbs./A @ WB & PF.

2 Foliar data was transformed using Log<sub>10</sub> (X + 1) conducted prior to analysis. Untransformed data are presented in each table. Mean separation by Fishers Protected LSD (P ≤ 0.05). Treatment means followed by the same letter are not significantly different.



Table 38. Evaluations of insecticide schedules for controlling the fruit feeding insect complex on Bartlett pear ". N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 2009.

Treatment / Formulation	Rate/acre % vol:vol	Timing	% TPB	% PC	% Int. Lep.	% Ext. Lep.	% Clean
1. Damoil	3%	DD	27.7 bcde	25.1 a	6.6 c	22.4 bcd	37.1 ab
Damoil	1%	GC, PF – EOS					
2. Surround WP	50.0 lb	DD, GC, PF	16.1 abc	4.5 a	5.0 c	21.6 bcd	57.2 bc
Damoil	1%	1C – EOS					
3. Movento 240SC	6.0 fl oz	WB, 1C	18.5 abcd	7.5 a	2.0 ab	20.5 bcd	55.0 bc
LI700	0.25%	1C					
Portal	24.0 fl oz	Thresh. (7C), 8C					
4. Movento 240SC	9.0 fl oz	WB, 1C	22.0 bcde	7.5 a	4.0 bc	25.5 cd	49.5 bc
LI700	0.25%	1C					
Portal	32.0 fl oz	Thresh. (7C), 8C					
5. Damoil	3%	DD	16.1 ab	5.0 a	0.5 a	14.0 abc	68.4 c
Delegate WG	7.0 oz	1C, 3C					
Actara	5.5 oz	7C, 8C					
Damoil	0.25%	1C, 3C, 7C, 8C					
6. AgriMek 0.15EC	20.0 fl oz	1C, 3C	26.5 bcde	14.5 a	0.0 a	13.0 ab	49.5 bc
Delegate WG	7.0 oz	7C, 8C					
Damoil	0.25%	1C, 3C, 7-8C					
7. Damoil	3%	DD	30.2 cde	3.0 a	0.0 a	12.0 ab	55.8 bc
AgriFlex 1.55SC	8.5 oz	1C, 3C					
Damoil	0.25%	1C, 3C					
8. Damoil	3%	DD	28.5 de	5.5 a	0.0 a	13.5 ab	56.5 bc
AgriMek 0.70 SC	4.3 fl oz	1C, 3C					
Damoil	0.25%	1C, 3C					
9. Esteem 35W	5.0 oz	BB, WB, 1C	28.5 de	11.0 a	0.0 a	11.0 ab	54.0 bc
Damoil	0.25%	1C, 7C, 8C					
Assail 30SG	4.0 oz	Thresh. (7C), 8C					
10. Centaur 70WG	34.5 oz	BB, WB, 1C, 7C	19.5 bcd	11.5 a	0.5 a	20.5 bcd	51.0 bc
Damoil	0.25%	1C, 7C, 8C					
11. Damoil	3%	DD	10.5 a	6.0 a	0.5 a	7.5 a	76.5 c
AgriMek 0.15EC	20.0 fl oz	1C, 3C					
Damoil	0.25%	1C, 3C					
Damoil	1%	4C-EOS					
12. UNTREATED			39.5 e	23.0 a	4.0 bc	33.0 d	28.5 a

Percent data were transformed using Log10 (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.

" Bartlett fruit harvested Aug 25. DD on 2 Apr. BB on 20 Apr. GC on 24 Apr. WB on 27 Apr. PF on 8 May. 1C on 18 May. 2C on 31 May. 3C on 10 Jun. 4C on 24 Jun. 5C on 4 Jul. 6C on 9 Jul. 7C on 15 Jul. 8C on 3 Aug. Treatments 3-11 received Imidan 70WP at 5.33 lbs./A @ WB & PF. Internal (% Int. Lep) complex: codling moth (CM): *Cydia pomonella* (Linnaeus), oriental fruit moth (OFM):

*Grapholitha molesta* (Busck), lesser apple worm (LAW): *Grapholita prunivora* Walsh; External (% Ext. Lep) complex: obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris) green fruitworm (GFW): *Lithophane antennata* (Walker) redbanded leafroller (RBLR): *Argyrotaenia velutinana* (Walker)

## 2009 MAXIMUM AND MINIMUM TEMPERATURES AND PRECIPITATION

Hudson Valley Laboratory, Highland, NY

All readings were taken at 0800 EST on the dates indicated

Date	MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER		
	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip
1	33	20		55	39		65	53		79	38		82	60	0.67	75	58	0.35	72	47	
2	32	17		48	42	0.19	68	51	0.17	70	56		79	64	0.09	83	66		78	48	
3	22	9		64	43	0.08	66	42		75	53		77	60	0.02	75	66	0.33	79	52	
4	26	11	0.05	59	44	0.22	59	48	0.06	66	54	0.04	76	59	0.30	82	59		82	55	
5	36	12		48	39		60	52	0.09	72	55		77	54		86	61		80	63	
6	44	22		61	37		56	49	0.32	61	54	0.04	80	54		86	56		75	57	
7	55	35		46	38	0.33	64	52	0.90	79	55		80	59		79	55		70	58	
8	66	46		45	33	0.01	73	48		82	58		74	55	0.28	79	51		76	55	
9	59	41	0.77	45	27		76	59	0.37	75	58	0.67	75	57		75	52		77	58	
10	42	29	0.24	61	31		75	53	0.02	68	59	0.09	75	55		72	65	0.17	68	52	
11	43	33	0.30	60	39	0.20	63	41		72	61	0.07	79	58		92	68	0.2	59	52	0.51
12	52	28	0.02	49	30	0.01	64	39		68	61	1.22	78	63	0.14	88	67		69	59	0.03
13	38	20		43	28		66	39		79	64		80	50		83	68	0.89	78	61	
14	39	23		55	40		71	50		77	59	1.30	78	50		75	64	0.08	78	53	
15	50	28		55	41		64	55	0.76	76	56	0.78	77	52		85	64		78	55	
16	59	28		63	35		76	52		70	56	0.12	82	64		90	68		68	57	0.03
17	52	28		62	32		69	48	1.30	72	54		83	61	0.23	91	68		59	50	
18	57	32		72	47		59	42		71	57	0.88	84	64	0.50	90	69	0.06	75	48	
19	66	40	0.01	76	45		54	33		64	59	0.89	81	58		87	70		68	42	
20	47	30	0.15	63	42		69	45		77	59		80	61		88	74		73	39	
21	41	21		50	42	0.69	82	52		68	61	1.46	82	65	0.01	89	69		75	45	
22	48	27		57	45	0.15	87	52		76	65	0.08	67	63	1.03	80	69	0.83	73	53	
23	49	21		56	42	0.01	89	60		74	65		79	66		82	65	0.73	82	64	
24	38	25		54	38		72	54		82	69		78	63	0.02	83	65	0.13	79	58	
25	45	23		72	48		84	59	0.01	81	64	0.13	77	58	0.65	80	63	0.0	64	45	
26	54	34		91	59		77	47		83	66		82	65	0.22	83	62		64	40	
27	45	35	0.23	89	52		66	48	0.32	81	59	0.61	80	67	0.01	85	58		66	53	0.56
28	62	44		88	62		61	50		76	59	0.07	84	63	0.07	75	61				
29	64	47	0.22	92	48		67	54	0.14	82	64		86	67		64	59	0.67			
30	55	40	0.52	66	41		73	52	0.06	82	59		81	70	0.40	66	61	0.06			
31	48	29	0.02				76	45					85	65	0.07	79	55				
Avg/																					
Total	47.3	28.3	2.53	59.8	41.0	1.89	69.4	49.2	4.52	74.6	58.6	8.45	79.3	60.3	4.71	81.5	63.1	4.5	72.8	52.6	1.1

### Factors Contributing To The 2009 Hudson Valley Pest Management Anomalies.

The 2009 apple phenology for McIntosh in the Mid-Hudson Valley lagged behind the 29 yr average during the early part of the season from green-tip to pink, followed by a strong warming period from pink through early bloom. A small percentage of the seasonal rainfall occurred between green-tip (6 April) and bloom (29 April) totaling 1.4", with relatively dry period during early bloom followed by 1.93" of rain during the middle period of bloom to petal fall. Yet, by petal fall we had accumulated only 6.4" from 1 March (6.2" in 2008), making it a relatively 'dry' Spring with fewer infection periods and good residual for pre-bloom insecticides.

The period marked from tight cluster (20 April) to bloom (29 April) was shorter than the 11-day mean typically observed in the Hudson Valley, allowing ample time for a single pre-bloom insecticide application. Temperatures between 70 and 91F° over a 5-day period between tight cluster and pink did not prompt significant populations of TPB into the orchard. There were 15 days between bloom and petal fall, 5 days longer than the 10-day mean. The extended bloom period allowed for favorable pollination and excellent set in most varieties across the region, especially in the later varieties. In general, long bloom periods allow for reduced insecticide residual during plum curculio migration, often resulting in ovipositional damage from PC in earlier setting king fruitlets. We often observe this in our early variety 'Ginger Gold'. However, this season we had cool temperatures and near daily rainfall between early bloom and petal fall, delaying PC emergence and oviposition.

Rainfall, wind and equipment problems postponed PF applications until the 13<sup>th</sup> & 15<sup>th</sup> of May. Subsequent post PF application rainfall on day 2 and 4 exceeding 2" of rain prompted early 1C applications 8 days post PF. High temperatures beginning the 24<sup>th</sup> of May, during the 1<sup>st</sup> Cover period of fruitlet development (from 8-12 mm), brought the PB complex into our research orchard blocks to cause significant injury.

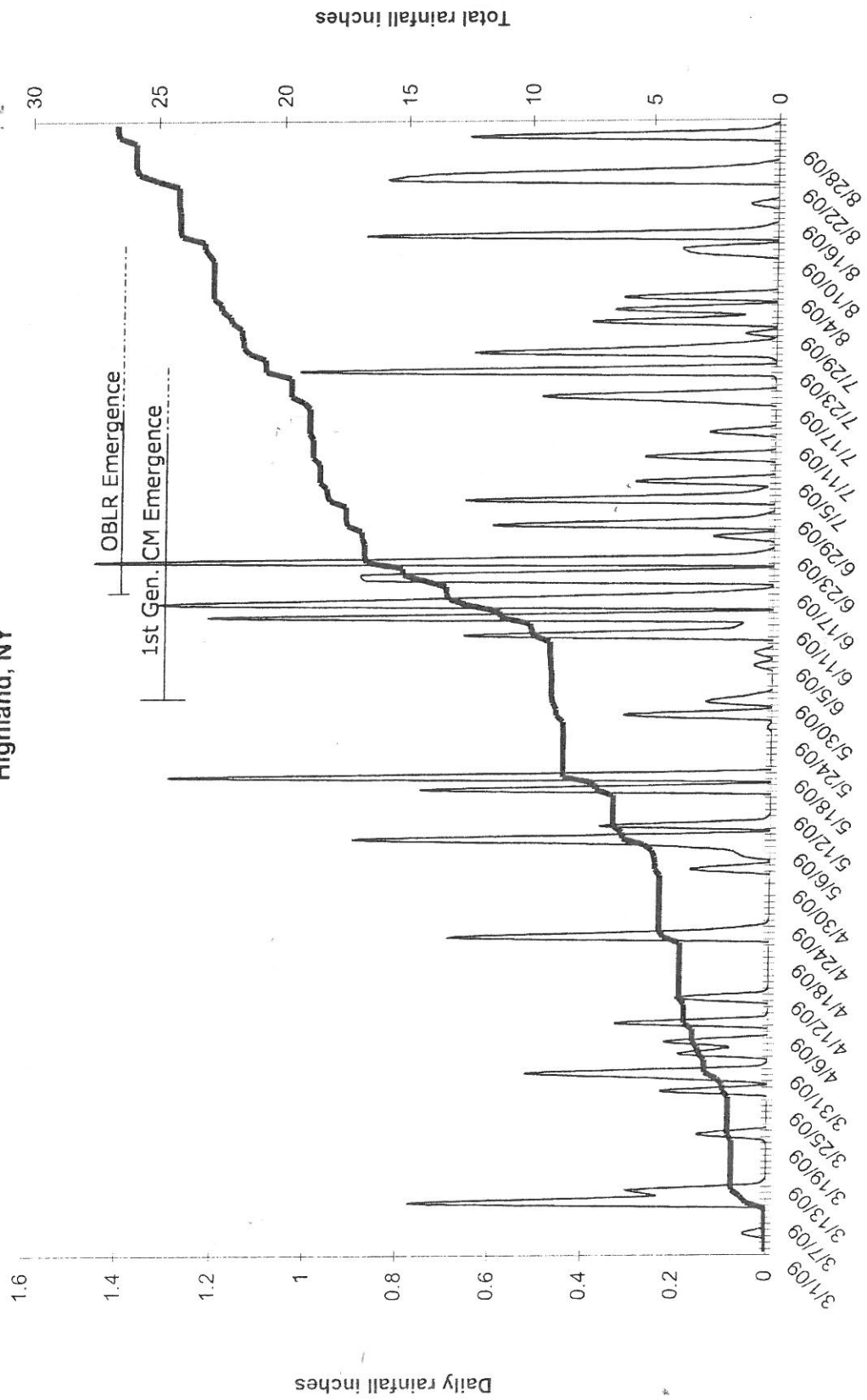
Migration of the plum curculio beginning at petal fall on 14 May and ending on 7 June (308DD<sub>50</sub> from PF) lasted 23 days. The majority of PC damage appeared to occur from the 21<sup>st</sup> of May to the 7<sup>th</sup> of June. Applications made on a 10-14 day schedule would have received 2.67" of rain during the time PC were ending their migration. Given the delay of PC migration and subsequent damage, a follow-up 2<sup>nd</sup> cover application was not needed.

1st gen. codling moth (CM) hatch occurred on 29 May (250 DD<sub>50</sub>) during the PC management period. OP's are often used to control PC, thereby controlling the 1<sup>st</sup> generation of CM adult and larvae. CM resistance to the OP's has not occurred in the Hudson Valley, allowing integrated management of the 1<sup>st</sup> generation CM using the OP's during PC migration from PF to 1-2 cover. The 2nd generation of CM hatch occurred much later than predicted this year, possibly due to heavy rains and relatively cool canopy temperatures than air temperatures, occurring on 8 July (1260 DD<sub>50</sub>). Scoring fruit during harvest evaluations of fruit with calyx end frass is associated with OFM, LAW and CM. Both this and last year we observed > 90% of live larvae from infested fruit were CM (determined by inspection of the last abdominal segment of larvae for comb (N=11)).

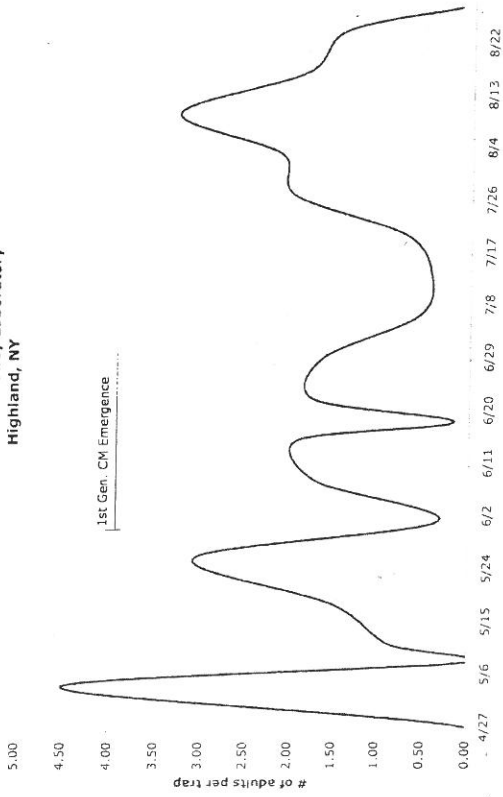
OBLR biofix began on 31 May with the 2<sup>nd</sup> generation 1<sup>st</sup> hatch on 19 June (340DD<sub>43</sub> from biofix). Hudson Valley growers began applications for 2<sup>nd</sup> generation OBLR shortly after the 19<sup>th</sup>, followed by a second application at 14-21 days. In general, scouts did not observe economic populations of OBLR larvae in commercial orchards. Heavy rainfall (8.8" inches over 44 days) during the period of OBLR hatch contributed to high levels of larval mortality.

Sufficient rainfall during mid-June through late July provided ample soil moisture for apple maggot emergence. The 1<sup>st</sup> observed emergence occurred on 22 June, while threshold on red baited spheres occurring on 20 July requiring three applications at 10 to 14 day intervals in mixed variety blocks. Damage was observed in commercial orchards that had not previously experienced injury from apple maggot.

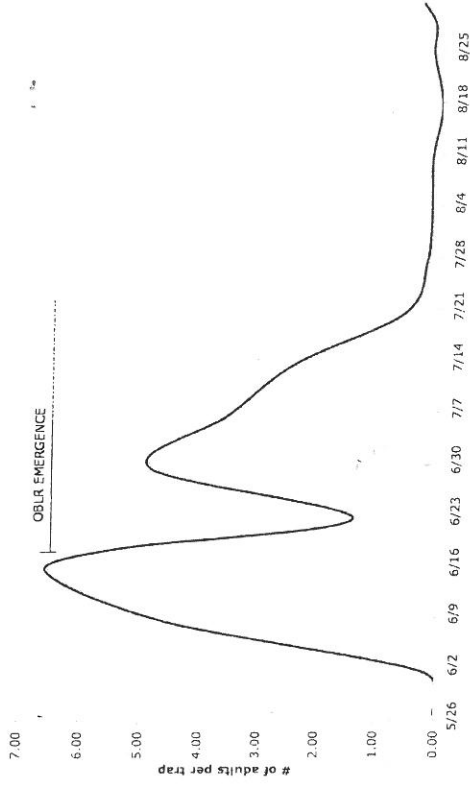
### 2009 Rain Events / Lep. Emergence Hudson Valley Lab, Highland, NY



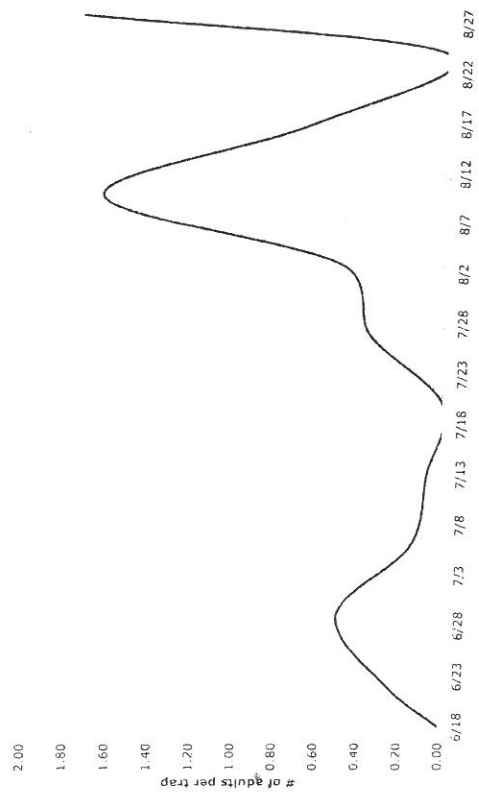
Codling Moth  
Cornell's Hudson Valley Laboratory  
Highland, NY



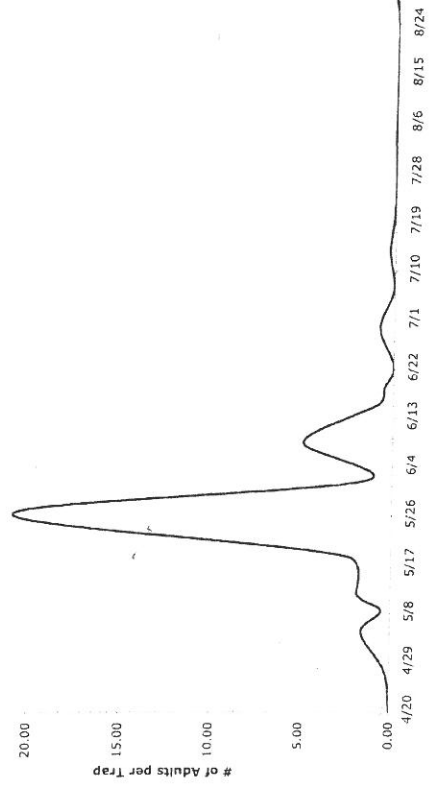
Oblique Banded Leaf Roller  
Cornell's Hudson Valley Laboratory  
Highland, NY



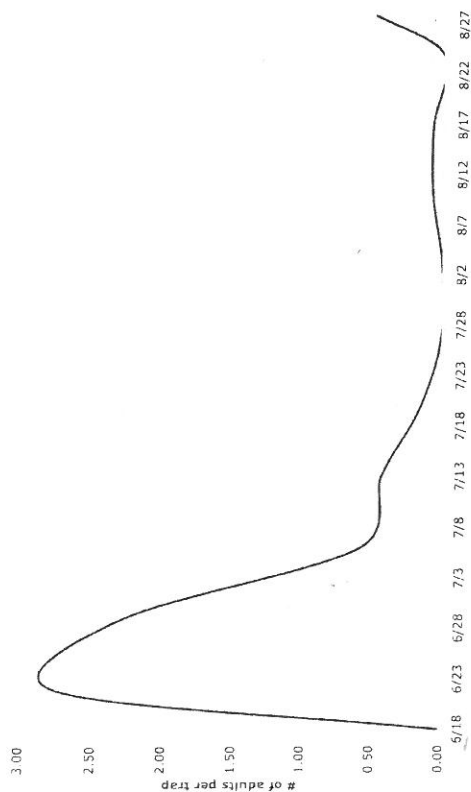
Variegated leafroller  
Cornell's Hudson Valley Laboratory  
Highland, NY, 2009



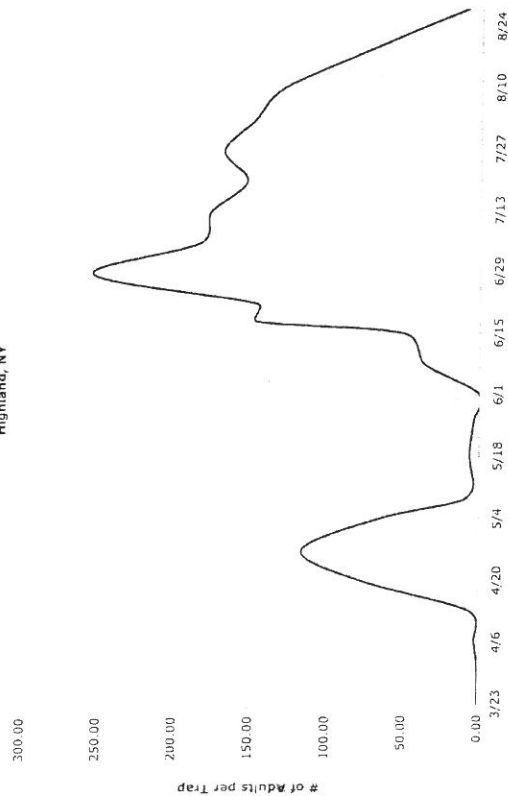
Grape Berry Moth  
Cornell's Hudson Valley Laboratory  
Highland, NY



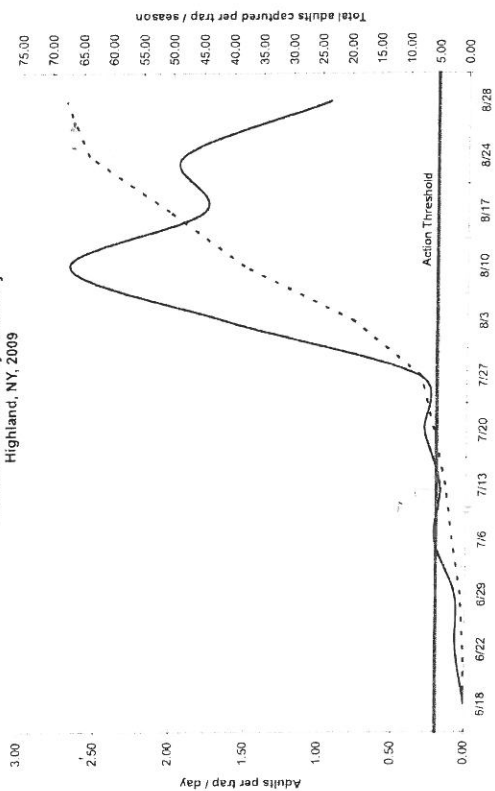
**Tufted Apple Bud Moth**  
Cornell's Hudson Valley Laboratory  
Highland, NY, 2009



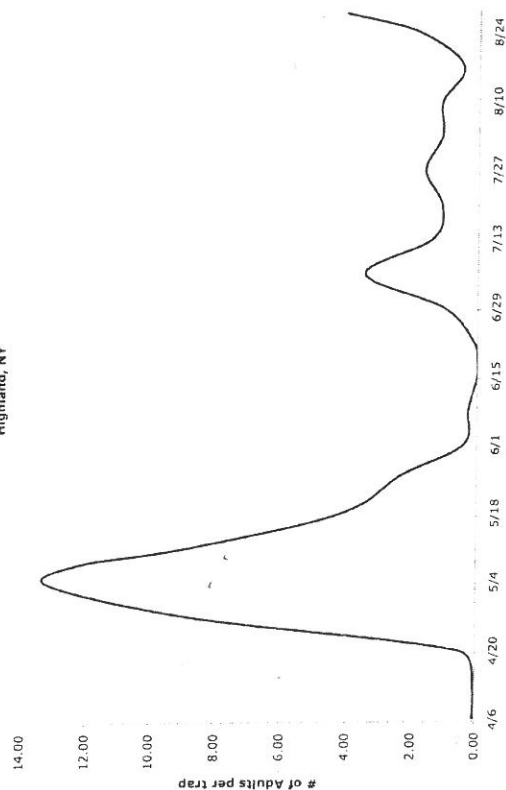
**Spotted Tentiform Leaf Miner**  
Cornell's Hudson Valley Laboratory  
Highland, NY



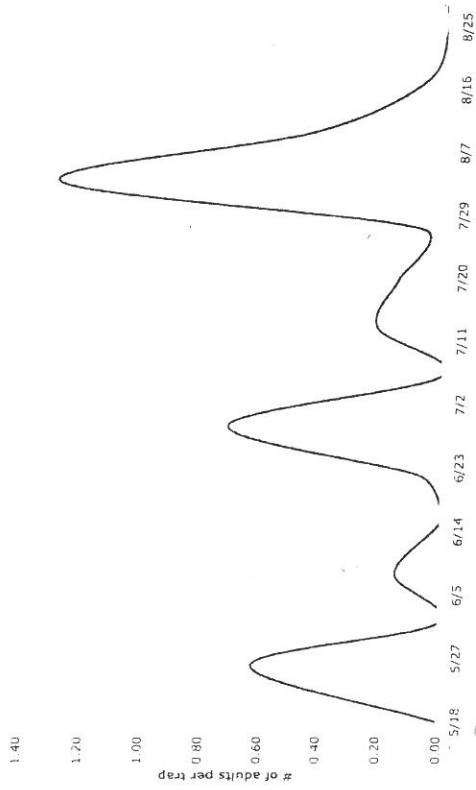
**Apple Maggot Trap Captures**  
Cornell's Hudson Valley Laboratory  
Highland, NY, 2009



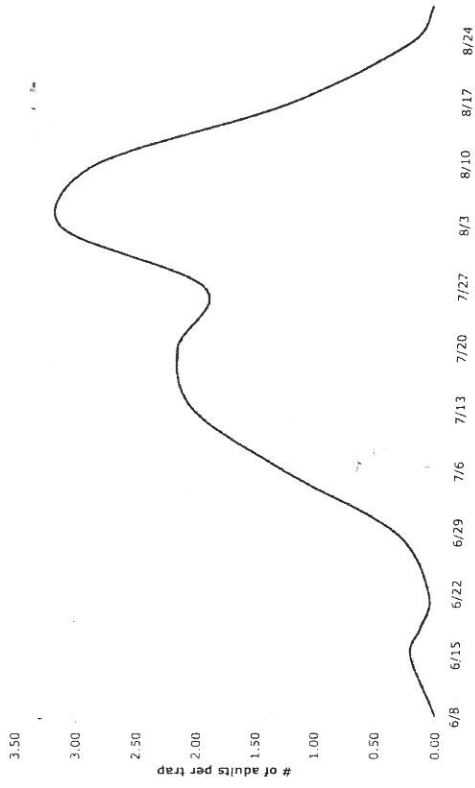
**Oriental Fruit Moth**  
Cornell's Hudson Valley Laboratory  
Highland, NY



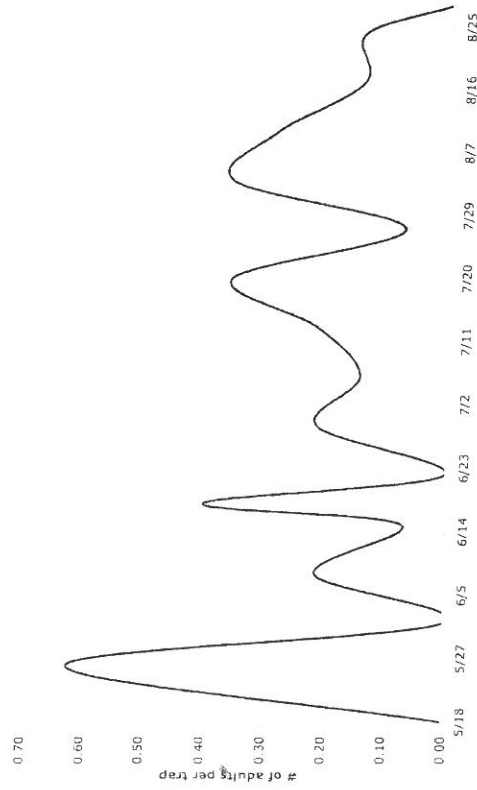
Dogwood Borer  
Cornell's Hudson Valley Laboratory  
Highland, NY



Greater Peach Tree Borer  
Cornell's Hudson Valley Laboratory  
Highland, NY 2009



Lesser Peach Tree Borer  
Cornell's Hudson Valley Laboratory  
Highland, NY



Lesser Appleworm  
Cornell's Hudson Valley Laboratory  
Highland, NY

