RESULTS OF 2006 INSECTICIDE AND ACARICIDE STUDIES IN EASTERN NEW YORK

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- Materials Tested –

Formulation	Company
Apple	
Acramite 50W	Chemtura
AgriMek 0.15EC	Syngenta
Asana XL 0.66EC	E.I. DuPont De Nemours & Co.
Assail 30SG	Cerexagri
Baythroid 2E	Bayer
Calypso SC 480	Bayer
Choice	UAP Loveland Inc
Delegate WG	Dow AgroSciences
Danitol 2.4EC	Valent
Dipel DF	Valent
Entrust 80WP	Dow AgroSciences
Envidor 2SC	Bayer
Guthion 50WP	Bayer
Imidan 70WP	Gowan
Intrepid 2F	Dow AgroSciences
LI700 (NIS)	UAP Loveland Inc.
Lorsban 4EC	Gowan
Proclaim 5WG	Syngenta
PureSpray oil	Petro-Canada
Rimon 0.83 EC	Chemtura
Sevin XLR	Bayer
SpinTor 2SC	Dow AgroSciences
Surround WP	Engelhard
Thiodan 50WP	Makhteshim-Agan of N.America, Inc.
Warrior w/Zeon	Syngenta
Zeal 72WSP	Syngenta
Pear	
AgriMek 0.15EC	Syngenta
Assail 30SG	Cerexagri
Confidential agreements	xxxxxxx
Damoil	Drexel
Surround WP	Engelhard
Onion	
Confidential agreements	xxxxxxx
Entrust 80 (seed treatment)	Dow AgroSciences
Lorsban (Drench)	Gowan
Poncho 600 (seed treatment)	Bayer
Regent 500 (seed treatment)	BASF
Trigard (seed treatment)	Syngenta

APPLE: Malus domestica 'Ginger Gold', 'McIntosh'

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European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Green fruitworm (GFW): *Lithophane antennata* (Walker)
Obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Redbanded leafroller (RBLR): *Argyrotaenia velutinana* (Walker)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)
Codling moth (CM): *Cydia pomonella* (Linnaeus)
Mullen plant bug (MPB): *Campylomma verbasci* (Meyer)

EVALUATION OF INSECTICIDES AGAINST EARLY-SEASON INSECT PESTS OF APPLE, 2006 – 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 John Bean® Airblast sprayer at 300 psi. delivering 139 GPA, traveling at 2.9 mph. Trees on the M.26 rootstock were 11 yr-old, 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 drift reduction, increased insect pressure and distribution.

Treatments were applied on various schedules as shown in **Table 1-3.** Developmental phenology corresponding to application dates beginning at green tip (GT) on 3 April; 1/2" green on 10 April; tight-cluster (TC) on 14 April; pink (P) on 21 April; bloom on 26 April; petal fall (PF) on 9 May @ 80% PF of McIntosh, first cover (1C) on 18 May and second cover (2C) on 31 May. Evaluations were made on 6 June prior to 'June-drop' for 'Ginger Gold' and 'McIntosh' in **Tables 1 & 2** respectively. Evaluations were made on 14 June of 'dropped fruit' for 'Ginger Gold' in **Table 3.** Applications over the entire block for crop size management and disease control included: Dithane DF 3 lbs./A on 12 & 19 April, 3 May. Captan 80WDG 30.0 oz./A, Dithane DF 3.0 lbs./A, Nova 40WP 4.0 oz./A, NAA 2.1 oz./A, on 10 May, NAA 2.1 oz./A, Damoil 32.0 oz./A on 25 May, Dithane DF 3 lbs./A, Nova 40WP 4.0 oz./A, on 8 June, Captan 80WDG 3.0 lbs./A, Topsin-M 70WSP on 22 June.

Fruit damage prior to 'June drop' was assessed by randomly selecting 50 fruits from each tree and scoring for external damage. Damage to 'dropped fruit' was assessed by randomly selecting 50 fruits from under the tree canopy and scoring fruit for external damage. The 'E. LEP' category includes combined damage from green fruitworm, red-banded and oblique-banded leaf rollers. To stabilize variance, percentage data were transformed by arcsine *(square root of x) prior to analysis using Fisher's Protected LSD ($P = < 0.05$).

Temperatures and rainfall (8.05") was above normal during the treatment period from TC to the end of 2C. We experienced an extended bloom period of 12d; 2 d longer than the mean (10.2 days mean) and an extended plum curculio ovipositional period from PF (10 May) to the end of the PC ovipositional model using 304DD or 10 June. During this period we experienced 17 rain events totaling 5.20" of rain. Hail on 30 June at the HVL caused significant damage to early sizing varieties, making the rating of the stinkbug complex impractical.

From TC to Pink we experienced 4 days above 70°F yet very few TPB were observed. Infestation pressure from TPB injury was normal yet late presence and patchy distribution showed no significant difference between treatments. Infestation pressure from PC was moderate (21.5% damage in untreated), while EAS and LEP damage was relatively low during early season. Treatments ranged from >90% clean fruit to < 50% clean in the control, efficacy ranging in statistical difference from the standard (Guthion).

Calypso SC 480, Assail 30SG, Imidan 70WP, Guthion 50WP and Sevin XLR provided very good control of the European apple sawfly on both apple varieties. Calypso SC 480 gave the best overall early season insect fruit feeding pest management, most notably on plum curculio.

Table 1 Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit EAS	PC	TPB	E. LEP	% Clean
1. Delegate WG	6.0 oz. /A	P, PF – 2C	6.7 cdef	25.6 cd	7.3 a	4.0 a	58.0 abc
2. Delegate WG	7.0 oz. /A	P, PF – 2C	7.3 ef	14.7 abcd	9.8 a	1.0 a	70.7 bcd
3. Surround WP	50.0 lbs. /A	TC, P, PF – 2C	7.1 def	27.8 cd	3.0 a	0.4 a	62.3 abcd
4. Calypso SC 480	6.0 oz. /A	P, PF – 2C	1.0 abc	1.9 a	3.6 a	1.5 a	94.1 e
5. Assail 30SG	6.0 oz. /A	P, PF – 2C	3.6 bcde	42.0 d	3.6 a	2.2 a	53.5 ab
6. Assail 30SG Imidan 70WP	4.0 oz. /A 3.0 lbs / A	TC PF – 2C	0.5 ab	15.7 abcd	12.4 a	0.8 a	71.2 bcd
7. Rimon 0.83 EC	20.0 oz. /A	P, PF	4.4 f	40.4 d	10.9 a	5.5 a	41.5 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 2C	2.1 abcde	3.3 ab	10.0 a	1.3 a	79.7 cde
9. Calypso SC 480 Calypso SC 480 Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A	TC PF, 2C 1C	1.2abcd	10.0 abc	9.7 a	1.2 a	78.7 cde
10. Baythroid 2E Sevin XLR	2.0 oz. /A 96.0 oz. /A	TC PF – 2C	0.1ab	7.4 abc	7.0 a	1.1 a	83.7 de
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 2C	0.0 a	6.5 abc	8.9 a	1.1 a	79.8 cde
12. Untreated			12.7 f	21.5 bcd	7.5 a	8.8 a	49.9 ab

1 Data from ' Ginger Gold' evaluation on 6 June prior to "June drop".
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May.
2. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented.

Table Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit				% Clean
			EAS	PC	TPB	E. LEP	
1. Delegate WG	6.0 oz. /A	P, PF – 2C	9.6 cde	6.5 a	1.6 a	2.6 a	78.0 bcd
2. Delegate WG	7.0 oz. /A	P, PF – 2C	5.7 bcd	5.9 a	1.9 a	3.2 a	80.4 bcd
3. Surround WP	50.0 lbs. /A	TC, P, PF – 2C	12.2 de	7.2 a	0.7 a	3.7 a	70.1 abc
4. Calypso SC 480	6.0 oz. /A	P, PF – 2C	0.7 ab	1.0 a	1.6 a	1.0 a	95.1 d
5. Assail 30SG	6.0 oz. /A	P, PF – 2C	2.6 abc	23.1 a	1.0 a	1.3 a	71.9 abc
6. Assail 30SG Imidan 70WP	4.0 oz. /A 3.0 lbs / A	TC PF – 2C	5.2 bcd	12.0 a	1.3 a	1.3 a	77.8 bcd
7. Rimon 0.83 EC	20.0 oz. /A	P, PF	21.2 e	34.7 a	0.7 a	4.4 a	44.5 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 2C	5.0 bcd	5.8 a	1.1 a	0.3 a	85.6 cd
9. Calypso SC 480 Calypso SC 480 Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A	TC PF, 2C 1C	5.5 bcd	5.3 a	1.9 a	0.7 a	86.1 cd
10. Baythroid 2E Sevin XLR	2.0 oz. /A 96.0 oz. /A	TC PF – 2C	0.0 a	6.6 a	2.4 a	0.4 a	86.9 cd
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 2C	0.0 a	11.1 a	1.9 a	0.7 a	87.1 cd
12. Untreated			18.1 e	17.9 a	1.0 a	5.7 a	53.3 ab

1 Data from ' Mcintosh' evaluation on 6 June prior to "June drop".
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May.
2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented.

Table Evaluation of insecticides for controlling early season insect complex on apple drops [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit						
			EAS	PC	MPB	TPB	E. LEP	CM	% Clean
1. Delegate WG	6.0 oz. /A	P, PF – 2C	4.5 a	40.6 bcd	0.1 a	6.8 a	2.4 b	0.5 abc	45.0 b
2. Delegate WG	7.0 oz. /A	P, PF – 2C	2.6 a	33.1 abc	0.0 a	2.7 a	1.2 ab	0.1 a	59.3 bcd
3. Surround WP	50.0 lbs. /A	TC, P, PF – 2C	1.8 a	51.6 cd	0.0 a	1.3 a	0.1 ab	0.1 ab	44.1 b
4. Calypso SC 480	6.0 oz. /A	P, PF – 2C	0.3 a	18.8 a	0.2 a	4.5 a	0.0 a	0.0 a	75.2 d
5. Assail 30SG	6.0 oz. /A	P, PF – 2C	1.0 a	39.4 bc	0.0 a	4.5 a	0.9 ab	1.9 bc	54.7 bc
6. Assail 30SG Imidan 70WP	4.0 oz. /A 3.0 lbs / A	TC PF – 2C	2.9 a	21.5 ab	0.0 a	2.0 a	0.7 ab	0.0 a	71.8 cd
7. Rimon 0.83 EC	20.0 oz. /A	P, PF	5.3 a	32.2 abc	0.1 a	5.4 a	3.4 b	1.6 a	52.1 bc
8. Guthion 50WP	1.5 lbs./A	P, PF – 2C	2.0 a	16.9 a	0.0 a	3.0 a	0.6 ab	0.1 a	76.3 d
9. Calypso SC 480 Calypso SC 480 Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A	TC PF, 2C 1C	2.2 a	21.2 ab	0.0 a	8.0 a	1.4 ab	0.1 a	66.3 cd
10. Baythroid 2E Sevin XLR	2.0 oz. /A 96.0 oz. /A	TC PF – 2C	0.1 a	30.2 abc	0.1 a	1.5 a	0.6 ab	0.0 a	66.3 cd
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 2C	0.6 a	33.4 abc	0.1 a	3.6 a	0.4 ab	0.2 a	60.9 bcd
12. Untreated			3.9 a	61.4 d	0.0 a	0.9 a	15.8 c	0.1 a	22.0 a

1 Data from ' Ginger Gold' evaluation on 14 June after "June drop". Approximately 100 fruit collected per treatment from 'drops' and rated for insect damage. GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented.

APPLE: Malus domestica 'Ginger Gold', 'Red Delicious'

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Japanese beetle : *Popillia japonica* (Newman)
Oriental fruitworm (OFM): *Grapholitha molesta* (Busck)
Potato leafhopper (PLH): *Empoasca fabae* Harris
Rose leafhopper (RLH): *Edwardsina rosae* (L)
White apple leafhopper (WALH): *Typhlocyba pomaria* McAtee

EVALUATION OF INSECTICIDES AGAINST FOLIAR-FEEDING INSECT PESTS OF APPLE, 2006 – 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 John Bean® Airblast sprayer at 300 psi. delivering 139 GPA, traveling at 2.9 mph. Trees on the M.26 rootstock were 11 yr-old, 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 drift reduction, increased insect pressure and distribution.

Treatments were applied on various schedules as shown in **Table 4-5.** Developmental phenology corresponding to application dates beginning at green tip (GT) on 3 April; 1/2" green on 10 April; tight-cluster (TC) on 14 April; pink (P) on 21 April; bloom on 26 April; petal fall (PF) on 9 May @ 80% PF of McIntosh, first cover (1C) on 18 May and second cover (2C) on 31 May, third cover (3C) on 12 June, forth cover (4C) on 22 June, fifth cover (5C) on 8 July, sixth cover (6C) on 27 July, and seventh cover (7C) on 10 August. Applications over the entire block for crop size management and disease control included: Dithane DF 3 lbs./A on 12 & 19 April, 3 May. Captan 80WDG 30.0 oz./A, Dithane DF 3.0 lbs./A, Nova 40WP 4.0 oz./A, NAA 2.1 oz./A, on 10 May, NAA 2.1 oz./A, Damoil 32.0 oz./A on 25 May, Dithane DF 3 lbs./A, Nova 40WP 4.0 oz./A, on 8 June, Captan 80WDG 3.0 lbs./A, Topsin-M 70WSP on 22 June.

Foliar and terminal damage by Japanese beetle (JB) and the leafhopper complex was assessed on a single 'Red Delicious' tree across all replicates. Mean Japanese beetle leaf damage rating was scored using 5 individual mid-terminal leaves in each of 5 terminals / treatment in which 0 is clean and 3 is severe damage. Adult JB presence was assessed by examining 5 apical terminal leaves per terminal of 5 terminals and obtaining the mean number of beetles / tree. Both foliar and terminal damage evaluations were made on 11 July. Oriental fruit moth (OFM) 1 minute feeding evaluations were made on a single 'Ginger Gold' tree across all replicates on 21 June. Potato and rose leafhopper nymphs were evaluated 21 June and 7 July respectively by sampling PLH nymphs on 5 fully expanded apical terminal leaves and RLH on 5 mid-terminal leaves to represent mean nymphs per 5 terminals. To stabilize variance in these evaluations, transformation using the Log_{10} (X + 1) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

Treatments applied during the 3-5th cover period had greatest impact on the Japanese beetle presence and feeding damage. The neonicotinoids Calypso SC 480 and Assail 30SG, Sevin XLR and Surround WP / SpinTor 2SC combination provided superior control of the JB adults, RLH nymph and LH complex of adults while Calypso SC 480, Assail 30SG and Sevin XLR demonstrated lower JB feeding damage to foliage. Although their were no significant differences in the OFM damaged terminals it was apparent that the Rimon 0.83EC, Calypso SC 480 / Sevin XLR combination and Sevin XLR alone were very effective at reducing OFM damage to terminals.

Populations of wooly, rosy, green apple and spiria aphid were very low this season. Data for these insects showed population levels too low to be collected.

Table 4 Evaluation of insecticides for controlling mid-season foliar feeding insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	Foliar feeding [2]		
			Japanese beetle leaf rating 0-3	# OFM dam. terminals per 1 min. evaluation	No. of adult Japanese beetle per 5 terminal shoots
1. Delegate WG	6.0 oz. /A	P, PF – 7C	1.9 f	0.6 a	0.7 cd
2. Delegate WG	7.0 oz. /A	P, PF – 7C	1.8 f	0.6 a	0.6 bcd
3. Surround WP SpinTor 2SC	50.0 lbs. /A 6.0 oz. /A	TC, P, PF – 3, 6-7C 4-5C	1.7 ef	0.6 a	0.3 abc
4. Calypso SC 480	6.0 oz. /A	P, PF – 7C	1.4 bcd	0.2 a	0.2 abc
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	1.2 b	0.4 a	0.3 abc
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	1.6 def	0.6 a	0.5 bcd
7. Rimon 0.83 EC	20.0 oz. /A	P, PF, 4,5C	1.7 ef	0.0 a	1.5 e
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	1.7 def	0.3 a	0.1 ab
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A	TC PF, 3C 1, 6, 7C 4-5C	1.5 cde	0.0 a	1.0 de
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. /A 6.0 oz. /A	TC PF – 3C 4-5C 6-7C	0.9 a	0.2 a	0.3 abc
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	1.3 bc	0.0 a	0.0 a
12. Untreated	-	-	1.8 f	1.7 a	0.2 abc

1 Data from 'Red Delicious' and 'Ginger Gold'.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Examination were made using 5 terminals / tree / replicate of Japanese beetle adults. Japanese beetle leaf-rating uses a 0-3 scale represents the degree of feeding damage per leaf made on 11 July on 'Red Delicious'. Oriental fruit moth (OFM) 1 minute terminal tip feeding evaluation occurred on 21 June on 'Ginger Gold'.

Table 5 Evaluation of insecticides for controlling leafhopper complex on apple foliage[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# of leafhopper [2] nymphs per. 5 terminals 21 June PLH	7 July RLH	# of leafhopper adults [2] / 3 min. vacuum collection 21 June PLH	21 June RLH / WALH
1. Delegate WG	6.0 oz. /A	P, PF – 7C	2.5 a	2.3 bc	0.0 a	1.1 bc
2. Delegate WG	7.0 oz. /A	P, PF – 7C	2.5 a	2.8 c	0.2 a	2.2 c
3. Surround WP SpinTor 2SC	50.0 lbs. /A 6.0 oz. /A	TC, P, PF – 3, 6, 7C 4-5C	0.3 a	0.3 ab	0.0 a	0.0 a
4. Calypso SC 480	6.0 oz. /A	P, PF – 7C	0.0 a	0.0 a	0.0 a	0.4 a
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	0.0 a	1.3 abc	0.2 a	0.3 a
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	0.0 a	0.3 ab	0.0 a	0.6 a
7. Rimon 0.83 EC	20.0 oz. /A	P, PF, 4,5C	0.6 a	3.8 c	0.0 a	1.2 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	0.0 a	0.3 ab	0.0 a	0.4 a
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A	TC PF, 3C 1, 6, 7C 4-5C	0.0 a	0.3 ab	0.0 a	0.6 a
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. /A 6.0 oz. /A	TC PF – 3C 4-5C 6-7C	0.0 a	0.8 abc	0.0 a	0.0 a
11. Sevin XLR *Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	0.0 a	0.3 ab	0.0 a	0.0 a
12. Untreated	-	-	0.3 a	3.3 c	0.0 a	1.4 bc

1 Data from ' Red Delicious' evaluation on 20 June.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Log_{10} (x+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Vacuum collection of LH adult complex on 21 June made using 'Shark' handheld vacuum devices with screened nalgene bottles. Leafhopper complex composed of white apple leafhopper *Typhlocyba pomaria L.* (WALH) and rose leafhopper, *Edwardsinia rosa* McAtee (RLH). Adult complex contained 8.7% WALH male; 52.2% WALH female; 8.7% RLH male and 30.4% RLH female (N=47).

APPLE: Malus domestica 'Red Delicious'

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

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Treatments were applied on various schedules as shown in **Table 6-8.** Developmental phenology corresponding to application dates beginning at green tip (GT) on 3 April; 1/2" green on 10 April; tight-cluster (TC) on 14 April; pink (P) on 21 April; bloom on 26 April; petal fall (PF) on 9 May @ 80% PF of McIntosh, first cover (1C) on 18 May and second cover (2C) on 31 May, third cover (3C) on 19 June, forth cover (4C) on 22 June, fifth cover (5C) on 8 July, sixth cover (6C) on 27 July, and seventh cover (7C) on 10 August. Applications over the entire block for crop size management and disease control included: Dithane DF 3 lbs./A on 12 & 19 April, 3 May. Captan 80WDG 30.0 oz./A, Dithane DF 3.0 lbs./A, Nova 40WP 4.0 oz./A, NAA 2.1 oz./A, on 10 May, NAA 2.1 oz./A, Damoil 32.0 oz./A on 25 May, Dithane DF 3 lbs./A, Nova 40WP 4.0 oz./A, on 8 June, Captan 80WDG 3.0 lbs./A, Topsin-M 70WSP on 22 June.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 28 June, 12 July and 2 August. Leaves were removed to the laboratory where they were brushed with a mite-brushing machine and the mites and eggs examined using a binocular scope (≥18X). To stabilize variance in these evaluations, transformation using the Log_{10} (X + 1) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

Sustained rainfall throughout the season and relatively mild temperatures provided less opportunity for mite populations to reach action threshold in research plots. In all treatments, the stigmaeid, *Zetzellia mali* (ZM), was prevalent throughout the plots beginning early in the season, most likely providing effective biological control of the ERM. Higher sustained numbers of ZM were observed in the Deligate WG and neonicotinoid treatments, indicating low toxicity to this mite predator. There was little evidence of flaring of ERM, TSM or rust mite populations with the possible exception of the Baythroid 2E / Sevin XLR combination on TSM populations as demonstrated in the motile and egg counts in the 2 August evaluation. There were no detrimental effects on predatory mites observed in the plots again with the possible exception of the Baythroid 2E / Sevin XLR combination on ZM populations.

Table 6 Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2]								
			ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Delegate WG	6.0 oz. /A	P, PF – 7C	0.3 a	0.2 a	0.0 a	0.0 a	0.1 a	< 0.1 a	0.3 a	0.2 a	0.6 a
2. Delegate WG	7.0 oz. /A	P, PF – 7C	0.2 a	0.4 a	0.0 a	0.0 a	0.0 a	< 0.1 a	0.3 a	0.1 a	1.5 a
3. Surround WP SpinTor 2SC	50.0 lbs. /A 6.0 oz. /A	TC, P, PF, 3, 6, 7C 4-5C	< 0.1 a	0.2 a	0.0 a	0.0 a	0.1 a	< 0.1 a	0.2 a	< 0.1 a	0.2 a
4. Calypso SC 480	6.0 oz. /A	P, PF – 7C	< 0.1 a	0.1 a	0.0 a	0.0 a	0.2 a	0.1 a	0.3 a	0.3 a	0.0 a
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	0.2 a	0.2 a	0.0 a	0.0 a	< 0.1 a	< 0.1 a	0.6 a	0.2 a	1.4 a
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	0.1 a	0.2 a	0.0 a	0.0 a	0.1 a	0.2 a	0.4 a	0.2 a	0.2 a
7. Rimon 0.83 EC	20.0 oz. /A	P, PF, 4,5C	< 0.1 a	0.1 a	0.0 a	0.0 a	< 0.1 a	0.1 a	0.3 a	< 0.1 a	0.0 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	< 0.1 a	0.2 a	0.0 a	0.0 a	< 0.1 a	< 0.1 a	0.2 a	0.1 a	0.6 a
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A	TC PF, 3C 1, 6, 7C 4-5C	0.2 a	0.1 a	0.0 a	0.0 a	0.1 a	0.1 a	0.2 a	0.1 a	0.3 a
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. /A 6.0 oz. /A	TC PF – 3C 4-5C 6-7C	0.2 a	0.2 a	0.0 a	0.0 a	0.2 a	0.2 a	0.2 a	0.1 a	0.0 a
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	0.2 a	0.2 a	0.0 a	0.0 a	0.4 a	0.3 a	0.1 a	< 0.1 a	0.0 a
12. Untreated	-		0.3 a	0.4 a	0.0 a	0.0 a	< 0.1 a	0.1 a	0.2 a	< 0.1 a	0.2 a

1\ Data from ' Red Delicious' evaluation on 19 June.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May.

2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification.
ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

Table 7 Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2]								
			ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Delegate WG	6.0 oz. /A	P, PF – 7C	0.1 a	0.1 a	0.3 ab	0.3 a	0.0 a	0.1 a	0.1 a	0.1 a	0.2 a
2. Delegate WG	7.0 oz. /A	P, PF – 7C	0.1 a	0.1 a	0.2 ab	0.2 a	0.0 a	0.1 a	0.2 a	0.1 a	5.8 a
3. Surround WP SpinTor 2SC	50.0 lbs. /A 6.0 oz. /A	TC, P, PF, 3, 6, 7C 4-5C	0.0 a	0.1 a	1.4 ab	0.5 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
4. Calypso SC 480	6.0 oz. /A	P, PF – 7C	0.1 a	0.1 a	0.6 ab	0.2 a	0.0 a	0.1 a	0.3 a	0.1 a	0.5 a
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	0.0 a	0.1 a	0.4 ab	0.5 a	0.1 a	0.1 a	0.2 a	0.1 a	0.5 a
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	0.0 a	0.1 a	0.3 ab	0.2 a	0.0 a	0.0 a	0.1 a	0.0 a	0.0 a
7. Rimon 0.83 EC	20.0 oz. /A	P, PF, 4,5C	0.1 a	0.1 a	0.1 a	0.2 a	0.1 a	0.1 a	0.1 a	0.0 a	0.2 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	0.0 a	0.2 a	1.0 bc	0.2 a	0.0 a	0.0 a	0.1 a	0.1 a	0.2 a
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A	TC PF, 3C 1, 6, 7C 4-5C	0.1 a	0.2 a	0.3 ab	0.9 a	0.2 a	0.0 a	0.1 a	0.0 a	0.5 a
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. /A 6.0 oz. /A	TC PF – 3C 4-5C 6-7C	0.1 a	0.2 a	2.9 c	0.6 a	0.0 a	0.0 a	0.1 a	0.0 a	0.0 a
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	0.2 a	0.1 a	0.2 a	1.9 a	0.0 a	0.1 a	0.0 a	0.0 a	0.3 a
12. Untreated	-		0.1 a	0.3 a	0.2 a	0.2 a	0.1 a	0.1 a	0.1 a	0.1 a	0.3 a

1 Data from ' Red Delicious' evaluation on 12 July.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification.
ERM = European red mite *Panonychus ulm i*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

Table 8 Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2]								
			ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Delegate WG	6.0 oz. /A	P, PF – 7C	0.0 a	0.0 a	0.4 a	0.9 abc	0.0 a	0.0 a	0.2 c	0.1 a	0.0 a
2. Delegate WG	7.0 oz. /A	P, PF – 7C	0.0 a	0.0 a	0.2 a	0.3 ab	0.0 a	0.0 a	0.3 c	0.0 a	0.0 a
3. Surround WP	50.0 lbs. /A	TC, P, PF, 3, 6, 7C	0.0 a	0.1 a	0.2 a	1.6 bcd	0.0 a	0.0 a	0.0 ab	0.1 a	0.0 a
SpinTor 2SC	6.0 oz. /A	4-5C	0.0 a	0.0 a	0.1 a	0.2 a	0.1 a	0.0 a	0.3 c	0.2 a	0.0 a
4. Calypso SC 480	6.0 oz. /A	P, PF – 7C	0.0 a	0.0 a	0.2 a	1.0 abc	0.0 a	0.0 a	0.1 ab	0.1 a	0.0 a
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	0.0 a	0.0 a	0.6 a	2.7 bcd	0.1 a	0.1 a	0.2 c	0.1 a	0.0 a
6. Assail 30SG	4.0 oz. /A	TC									
Imidan 70WP	3.0 lbs / A	PF – 3C									
Assail 30SG	5.8 oz. /A	4-7C									
PureSpray oil	1% V/V	4-7C	0.0 a	0.0 a	0.3 a	0.4 ab	0.0 a	0.0 a	0.1 bc	0.0 a	0.0 a
7. Rimon 0.83 EC	20.0 oz. /A	P, PF, 4,5C	0.0 a	0.0 a	1.1 a	5.6 cd	0.1 a	0.0 a	0.2 c	0.2 a	0.0 a
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	0.1 a	0.2 a	0.2 a	3.0 bcd	0.1 a	0.0 a	0.2 c	0.1 a	0.0 a
9. Calypso SC 480	4.0 oz. /A	TC									
Calypso SC 480	6.0 oz. /A	PF, 3C									
Sevin XLR	64.0 oz. /A	1, 6, 7C	0.0 a	0.0 a	0.4 a	1.0 abc	0.1 a	0.0 a	0.1 abc	0.1 a	0.0 a
SpinTor 2SC	6.0 oz. /A	4-5C									
10. Baythroid 2E	2.0 oz. /A	TC									
Sevin XLR	96.0 oz. /A	PF – 3C	0.0 a	0.0 a	3.4 a	5.4 d	0.1 a	0.0 a	0.0 a	0.0 a	0.0 a
SpinTor 2SC	6.0 oz. /A	4-5C									
Calypso SC 480	6.0 oz. /A	6-7C	0.0 a	0.0 a	0.2 a	0.4 ab	0.0 a	0.1 a	0.3 c	0.1 a	1.0 b
11. Sevin XLR	64.0 oz. /A	TC, P									
Sevin XLR	96.0 oz. /A	PF – 7C									
12. Untreated	-										

1 Data from ' Red Delicious' evaluation on 2 August.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification.
ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

APPLE: Malus domestica 'Red Delicious' 'McIntosh', & 'Ginger Gold'

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Apple maggot (AM): *Rhagoletis pomonella* (Walsh)
Codling moth (CM): *Cydia pomonella* (Linnaeus)
European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Oblique banded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
San Jose scale (SJS): *Quadraspidiotus perniciosus* (Comstock)
Redbanded Leafroller (RBLR): *Argyrotaenia velutinana* (Walker)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)

HARVEST EVALUATIONS OF INSECTICIDES AGAINST AN INSECTS COMPLEX ON THREE APPLE CULLTIVARS, 2006 – 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 John Bean® Airblast sprayer at 300 psi. delivering 139 GPA, traveling at 2.9 mph. Trees on the M.26 rootstock were 11 yr-old, 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 drift reduction, increased insect pressure and distribution.

Treatments were applied on various schedules as shown in **Table 9-11.** Developmental phenology corresponding to application dates beginning at green tip (GT) on 3 April; 1/2" green on 10 April; tight-cluster (TC) on 14 April; pink (P) on 21 April; bloom on 26 April; petal fall (PF) on 9 May @ 80% PF of McIntosh, first cover (1C) on 18 May and second cover (2C) on 31 May, third cover (3C) on 12 June, forth cover (4C) on 22 June, fifth cover (5C) on 8 July, sixth cover (6C) on 27 July, and seventh cover (7C) on 10 August. Applications over the entire block for crop size management and disease control included: Dithane DF 3 lbs./A on 12 & 19 April, 3 May. Captan 80WDG 30.0 oz./A, Dithane DF 3.0 lbs./A, Nova 40WP 4.0 oz./A, NAA 2.1 oz./A, on 10 May, NAA 2.1 oz./A, Damoil 32.0 oz./A on 25 May, Dithane DF 3 lbs./A, Nova 40WP 4.0 oz./A, on 8 June, Captan 80WDG 3.0 lbs./A, Topsin-M 70WSP on 22 June.

Damage to fruit was assessed by randomly selecting 100 fruit at harvest maturity, removing to the laboratory, and scoring for external damage by each pest; subsequently, fruits were dissected to detect internal damage. Early PC damage is characterized by the typical crescent-shaped scar resulting from the flap of apple epidermis made by an ovipositing female. Late PC damage is characterized by a feeding or oviposition cavity that lacks the typical crescent-shaped scar. Damage caused by early Lepidoptera (E. LEP.) includes the GFW, OBLR and RBLR, while external Lepidoptera (EXT. LEP.) includes OBLR and/or RBLR. Damage caused by a complex of internal Lepidoptera (INT. LEP.) including the CM, OFM and LAW. Few larvae from fruit were recovered and the relative proportions of each species could not be determined. To stabilize variance in these evaluations, transformation using the arcsinee *(square root of x) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

Data from 'Ginger Gold', 'McIntosh' and 'Golden Delicious' is presented in **Table 8-10** respectively. The data set demonstrates the necessity for evaluating multiple cultivars. For example, 'Golden Delicious' was the only variety receiving infestations of SJS, while 'Ginger Gold', typically receiving high damage from plum curculio, received less overall PC damage. Moreover, the data reaffirm that 'Ginger Gold' is much more attractive to maggot than is 'McIntosh'.

Table 9 Evaluation of insecticides for controlling seasonal insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit							% Clean
			TPB	EAS	PC	INT. LEP. [3]	EXT. LEP. [3]	AM.P.	AM.T.	
1. Delegate WG	6.0 oz. /A	P, PF – 7C	22.5 a	4.5 a	24.0 a	4.5 b	14.0 a	2.5 a	5.5 bc	47.0 bc
2. Delegate WG	7.0 oz. /A	P, PF – 7C	22.5 a	5.0 a	18.0 a	2.0 b	15.0 a	6.0 a	3.0 bc	41.5 bc
3. Surround WP Entrust 80WP	50.0 lbs. /A 6.0 oz. / A	TC, P, PF- 3C, 6-7C 1st OBLR (4-5C)	7.0 a	6.0 a	21.5 a	2.0 b	14.0 a	1.0 a	2.0 bc	41.5 bc
4. Calypso SC 480 4F	6.0 oz. /A	P, PF – 7C	20.0 a	1.0 a	2.5 a	1.9 ab	20.5 a	5.5 a	0.0 a	58.0 bc
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	31.5 a	4.5 a	32.0 a	3.0 b	8.5 a	8.0 a	1.5 abc	40.0 b
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	18.7 a	0.0 a	10.0 a	0.7 ab	24.0 a	2.7 a	0.7 ab	51.3 bc
7. Rimon 0.83 EC	20.0 oz. /A	P, PF – 7C	26.0 a	6.7 a	20.0 a	1.9 ab	15.3 a	2.0 a	1.3 abc	38.0 bc
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	23.0 a	4.5 a	13.5 a	4.0 b	10.5 a	4.5 a	1.0 ab	56.5 bc
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A 96.0 oz. /A	TC PF, 2-3C 1C 1st OBLR egg (4-5C) 1st AM or 6-7C	31.5 a	5.0 a	18.5 a	0.0 a	18.0 a	3.0 a	0.0 a	47.0 bc
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. / A 6.0 oz. / A	TC PF – 3C 1st OBLR (4-5C) 1st AM (6-7C)	19.0 a	1.5 a	11.5 a	4.5 b	8.5 a	1.5 a	2.0 abc	58.0 c
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	22.5 a	0.5 a	10.5 a	0.5 ab	22.0 a	0.5 a	1.0 ab	47.0 bc
12. Untreated			29.0 a	5.5 a	27.0 a	21.0 c	25.5 a	10.0 a	7.5 c	13.5 a

1 Data from ' Ginger Gold' harvest evaluation on 15 August.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented. TPB = tarnished plant bug, *Lygus lineolaris (P. de B.)*, EAS = European apple sawfly, *Hoplocampa testudinea* (Klug). PC = plum curculio *Conotrachelus nenuphar* (Herbst), INT. LEP. = internal lepidopteran species including coding moth, *Cydia pomonella* (Linnaeus), lesser apple worm *Grapholitha prunivora* (Walsh), Oriental fruit moth *Grapholitha molesta* (Busck), EXT. LEP. = external lepidopteran species including obliquebanded leafroller *Choristoneura rosaceana* (Harris), redbanded leafroller *Argyrotaenia velutinana* (Walker), AM.P = ovipositional punctures made by apple maggot , *Rhagoletis pomonella* (Walsh), AM.T = tunneling made by apple maggot larvae, *Rhagoletis pomonella* (Walsh)

3 Internal lepidopteran species predominately lesser apple worm or codling moth (larvae with anal comb) N = 7. External lepidopteran species predominately obliquebanded determined from field observations of > 3rd instar leafroller larvae.

Table 10 Evaluation of insecticides for controlling seasonal insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit									
			TPB	E. Lep	EAS	E. PC	L.PC	INT. LEP. [3]	EXT. LEP. [3]	AM.P.	AM.T.	% Clean
1. Delegate WG	6.0 oz. /A	P, PF – 7C	2.7 a	0.5 a	4.2 c	39.5 bc	38.3 bc	4.2 cde	9.3 a	5.3 a	1.1 a	26.2 abcd
2. Delegate WG	7.0 oz. /A	P, PF – 7C	2.0 a	1.0 a	2.5 abc	35.5 bc	43.5 cd	4.5 cde	5.0 a	0.5 a	0.5 a	24.5 abc
3. Surround WP Entrust 80WP	50.0 lbs. /A 6.0 oz. / A	TC, P, PF- 3C, 6-7C 1st OBLR (4-5C)	2.0 a	0.0 a	3.5 bc	24.9 ab	54.7 d	6.0 e	5.5 a	3.0 a	4.0 a	18.9 a
4. Calypso SC 480 4F	6.0 oz. /A	P, PF – 7C	2.5 a	0.0 a	3.5 bc	8.5 a	30.5 bcd	0.5 ab	5.0 a	0.5 a	0.0 a	56.5 e
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	1.6 a	0.0 a	0.6 ab	56.0 c	0.6 a	1.6 abc	10.6 a	2.0 a	0.0 a	35.8 abcde
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	1.7 a	0.0 a	4.6 c	22.3 ab	8.5 ab	2.7 bcde	11.6 a	2.5 a	1.1 a	55.5 e
7. Rimon 0.83 EC	20.0 oz. /A	P, PF – 7C	0.5 a	3.0 a	4.5 c	57.0 c	24.0 bcd	3.5 bcde	9.0 a	1.0 a	2.5 a	20.0 ab
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	1.0 a	0.5 a	3.5 bc	12.5 a	31.4 bcd	1.5 abc	8.4 a	2.0 a	0.0 a	48.3 de
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A 96.0 oz. /A	TC PF, 2-3C 1C 1st OBLR egg (4-5C) 1st AM or 6-7C	3.5 a	0.0 a	4.5 c	23.0 ab	27.0 bcd	0.5 ab	6.5 a	1.0 a	0.5 a	52.5 de
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. / A 6.0 oz. / A	TC PF – 3C 1st OBLR (4-5C) 1st AM (6-7C)	1.4 a	1.1 a	0.0 a	38.4 bc	11.9 ab	1.5 abcd	5.7 a	1.0 a	0.0 a	46.2 bcde
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	6.8 a	2.9 a	0.0 a	37.0 bc	0.0 a	0.0 a	6.2 a	2.4 a	0.5 a	47.6 cde
12. Untreated			4.7 a	1.6 a	2.1 abc	55.7 c	13.7 abc	7.0 de	26.2 a	5.5 a	3.1 a	18.1 a

1 Data from ' McIntosh' harvest evaluation on 22 August.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented. TPB = tarnished plant bug, *Lygus lineolaris (P. de B.)*, EAS = European apple sawfly, *Hoplocampa testudinea* (Klug). PC = plum curculio *Conotrachelus nenuphar* (Herbst), INT. LEP. = internal lepidopteran species including coding moth, *Cydia pomonella* (Linnaeus), lesser apple worm *Grapholitha prunivora* (Walsh), Oriental fruit moth *Grapholitha molesta* (Busck), EXT. LEP. = external lepidopteran species including obliquebanded leafroller *Choristoneura rosaceana* (Harris), redbanded leafroller *Argyrotaenia velutinana* (Walker), AM.P = ovipositional punctures made by apple maggot , *Rhagoletis pomonella* (Walsh), AM.T = tunneling made by apple maggot larvae, *Rhagoletis pomonella* (Walsh)

3 Internal lepidopteran species predominately lesser apple worm or codling moth (larvae with anal comb) N = 7. External lepidopteran species predominately obliquebanded determined from field observations of > 3rd instar leafroller larvae.

Table 11 Evaluation of insecticides for controlling seasonal insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% Damaged [2] fruit									
			TPB	E.Lep.	EAS	PC	SJS	INT. LEP. [3]	EXT. LEP. [3]	AM.P.	AM.T.	% Clean
1. Delegate WG	6.0 oz. /A	P, PF – 7C	7.5 a	0.0 a	2.5 ab	47.0 a	5.0 a	0.5 a	1.0 abc	2.0 a	1.0 a	46.5 bc
2. Delegate WG	7.0 oz. /A	P, PF – 7C	26.0 a	0.0 a	3.3 abc	46.7 a	2.7 a	1.3 a	2.7 bcd	2.7 a	0.0 a	30.7 abc
3. Surround WP Entrust 80WP	50.0 lbs. /A 6.0 oz. / A	TC, P, PF- 3C, 6-7C 1st OBLR (4-5C)	12.7 a	0.0 a	2.5 ab	31.4 a	28.8 a	2.7 a	3.7 cd	4.0 a	2.0 a	32.2 abc
4. Calypso SC 480 4F	6.0 oz. /A	P, PF – 7C	18.6 a	0.0 a	0.0 a	23.2 a	0.7 a	0.0 a	0.7 abc	0.0 a	0.0 a	60.8 bc
5. Assail 30SG	6.0 oz. /A	P, PF – 7C	16.6 a	0.7 a	0.0 a	49.6 a	0.0 a	0.7 a	7.3 d	4.6 a	0.0 a	37.8 abc
6. Assail 30SG Imidan 70WP Assail 30SG PureSpray oil	4.0 oz. /A 3.0 lbs / A 5.8 oz. /A 1% V/V	TC PF – 3C 4-7C 4-7C	6.7 a	0.0 a	0.0 a	31.8 a	0.0 a	0.0 a	2.5 abc	0.5 a	0.0 a	63.5 c
7. Rimon 0.83 EC	20.0 oz. /A	P, PF – 7C	22.2 a	2.7 a	12.0 c	49.9 a	0.7 a	0.0 a	0.7 abc	2.0 a	0.7 a	26.5 abc
8. Guthion 50WP	1.5 lbs./A	P, PF – 7C	11.5 a	0.0 a	0.5 ab	25.6 a	0.0 a	0.0 a	0.0 a	1.5 a	0.0 a	62.9 bc
9. Calypso SC 480 Calypso SC 480 Sevin XLR SpinTor 2SC Sevin XLR	4.0 oz. /A 6.0 oz. /A 64.0 oz. /A 6.0 oz. /A 96.0 oz. /A	TC PF, 2-3C 1C 1st OBLR egg (4-5C) 1st AM or 6-7C	3.3 a	0.0 a	0.0 a	38.9 a	0.0 a	0.0 a	0.0 a	0.7 a	0.7 a	57.8 bc
10. Baythroid 2E Sevin XLR SpinTor 2SC Calypso SC 480	2.0 oz. /A 96.0 oz. /A 6.0 oz. / A 6.0 oz. / A	TC PF – 3C 1st OBLR (4-5C) 1st AM (6-7C)	16.0 a	0.0 a	0.0 a	63.8 a	0.0 a	0.0 a	1.0 a	1.0 a	0.0 a	25.7 ab
11. Sevin XLR Sevin XLR	64.0 oz. /A 96.0 oz. /A	TC, P PF – 7C	21.3 a	0.0 a	0.0 a	44.3 a	0.5 a	0.0 a	1.0 a	2.0 a	0.0 a	39.7 abc
12. Untreated			9.1 a	1.0 a	4.5 bc	56.5 a	6.8 a	3.5 a	8.0 d	6.8 a	7.2 a	15.6 a

1 Data from ' Golden Delicious' harvest evaluation on 1 September.
GT on 3 April, 1/2" GT on 10 April, TC on 14 April, Pink on 21 April, Bloom on 26 April, PF on 9 May @ 80% PF of McIntosh. 1C on 18 May, 2C on 31 May, 3C on 12 June, 4C on 22 June, 5C on 8 July, 6C on 27 July, 7C on 10 August.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Percent data were transformed using the arcsineee transformation. Untransformed data presented. TPB = tarnished plant bug, *Lygus lineolaris (P. de B.)*, EAS = European apple sawfly, *Hoplocampa testudinea* (Klug). PC = plum curculio *Conotrachelus nenuphar* (Herbst), INT. LEP. = internal lepidopteran species including coding moth, *Cydia pomonella* (Linnaeus), lesser apple worm *Grapholitha prunivora* (Walsh), Oriental fruit moth *Grapholitha molesta* (Busck), EXT. LEP. = external lepidopteran species including obliquebanded leafroller *Choristoneura rosaceana* (Harris), redbanded leafroller *Argyrotaenia velutinana* (Walker), AM.P = ovipositional punctures made by apple maggot , *Rhagoletis pomonella* (Walsh), AM.T = tunneling made by apple maggot larvae, *Rhagoletis pomonella* (Walsh)

3 Internal lepidopteran species predominately lesser apple worm or codling moth (larvae with anal comb) N = 7. External lepidopteran species predominately obliquebanded determined from field observations of > 3rd instar leafroller larvae.

Table 12 Evaluation of insecticides for controlling overwintering obliquebanded leafroller larvae on apple [1], Crist Brothers Orchard., Milton, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	OBLR feeding damage to foliage # terminals / 3 min. eval.	# OBLR larvae / 3 min. eval.	"June Drop" % damaged fruit TPB	"June Drop" % damaged fruit OBLR	% Clean
1. Lorsban 4EC	16.0 oz.	Pink	1.4 ab	0.0 a	0.0 a	0.2 a	99.5 c
2. Calypso 4SC	2.0 oz.	Pink	2.4 bc	0.2 a	0.2 a	0.9 a	98.6 bc
3. Asana XL 0.66EC	5.8 oz.	Pink	1.0 ab	0.7 a	0.2 a	0.7 a	98.6 bc
4. Baythroid 2E	1.7 oz.	Pink	0.0 a	0.0 a	0.2 a	0.0 a	99.5 c
5. Dipel DF	10.7 oz.	Pink	8.2 cd	0.7 a	1.4 a	2.6 a	96.3 a
6. Intrepid 2F	5.3 oz.	Pink	2.1 abc	0.0 a	0.0 a	2.2 a	99.5 c
7. Untreated			11.5 d	0.0 a	0.7 a	2.6 a	96.8 a

3 Data from ' Red Delicious evaluation on 8 June prior to "June drop".
4 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Pink application made on 25 April.

Table 13 Evaluation of insecticides for controlling summer obliquebanded leafroller larvae on apple [1], Crist Brothers Orchard., Milton, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	OBLR feeding damage to foliage # terminals / 3 min. eval.	# live OBLR larvae/ terminal 3 min. eval.	% OBLR damaged fruit mid-season fruit injury
1. Danitol 2.4EC	3.6 oz.	340 DD (5C), 6C	1.3 ab	0.5 a	0.0 a
2. Calypso 4SC	2.0 oz.	340 DD (5C), 6C	9.3 c	5.5 b	0.8 a
3. Asana XL 0.66EC	5.8 oz.	340 DD (5C), 6C	3.3 b	1.0 a	0.0 a
4. Baythroid 2E	2.0 oz.	340 DD (5C), 6C	0.3 a	0.0 a	0.0 a
5. Dipel DF	10.7 oz.	340 DD (5C), 6C	0.9 a	0.5 a	0.0 a
6. Intrepid 2F	5.3 oz.	340 DD (5C), 6C	1.0 ab	0.0 a	0.0 a
7. Untreated			15.0 c	8.5 b	1.0 a

1 Data from ' Red Delicious evaluation on 19 July. 340 DD application made on 30 June, 6C on 18 July..
Treatment means followed by the same letter are not significantly different. Mean separation by Fishers Protected LSD (P=<0.05; LSD). Data were transformed to log10(x+1) for analysis. Percent fruit damage data were transformed using the arcsineee transformation for analysis. Untransformed field means presented.

Table 14 Harvest evaluation of insecticides for controlling obliquebanded leafroller larvae on apple [1], Crist Brothers Orchard., Milton, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	% OBLR damaged fruit at harvest: early season fruit injury	% OBLR damaged fruit at harvest: late season fruit injury
1. Danitol 2.4EC	3.6 oz.	340 DD (5C), 6C	0.3 a	2.3 bc
2. Calypso 4SC	2.0 oz.	340 DD (5C), 6C	0.3 a	3.3 cd
3. Asana XL 0.66EC	5.8 oz.	340 DD (5C), 6C	0.0 a	1.0 abc
4. Baythroid 2E	2.0 oz.	340 DD (5C), 6C	0.3 a	0.3 a
5. Dipel DF	10.7 oz.	340 DD (5C), 6C	0.8 a	2.8 bc
6. Intrepid 2F	5.3 oz.	340 DD (5C), 6C	0.3 a	0.0 a
7. Untreated			0.5 a	9.3 d

1 Data from 100 ' Red Delicious' fruit. Evaluation on 21 September. 340 DD application made on 30 June, 6C on 18 July.
Treatment means followed by the same letter are not significantly different. Mean separation by Fishers Protected LSD (P=<0.05; LSD). Data were transformed to log10(x+1) for analysis. Percent fruit damage data were transformed using the arcsineee transformation for analysis. Untransformed field means presented.

Table 15 Evaluation of insecticides for controlling green aphid complex on apple [1], Crist Brothers Orchard., Milton, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	Green aphid complex* rating 0 – 3 on apical lvs.
1. Danitol 2.4EC	3.6 oz.	340 DD 1st hatch	2.7 c
2. Calypso 4SC	2.0 oz.	340 DD 1st hatch	0.9 a
3. Asana XL 0.66EC	5.8 oz.	340 DD 1st hatch	1.9 b
4. Baythroid 2E	1.7 oz.	340 DD 1st hatch	2.6 c
5. Dipel DF	10.7 oz.	340 DD 1st hatch	2.7 c
6. Intrepid 2F	5.3 oz.	340 DD 1st hatch	2.8 c
7. Untreated			2.8 c

Data from ' Red Delicious evaluation on 5 July.
Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Pink application made on 25 April, 340 DD on 30 June.
* GAA = Green apple aphid / Spirea aphid. Rating of 0-3 for green apple aphids / leaf (0=0 GAA / lf, 1 = 1-10 GAA / lf, 2 = 11-50 GAA / lf, 3 = >50 GAA / lf).

APPLE: Malus domestica 'Red Delicious'

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

EVALUATION OF INSECTICIDES AGAINST FOLIAR-FEEDING MITES OF APPLE, 2006 – CRIST BROTHERS ORCHARD, MILTON, NY: Treatments were applied to single-tree plots of 'Red Delicious' replicated four times in a randomized complete block design. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.5 gal/tree or 302 gal/acre. All insecticide dilutions (presented as amt/100 gal.) are based on a standard of 400 gal/acre trees. Trees on M.7 rootstock were 10 yr-old, approximately 10 ft high and planted to a commercial spacing of 12 x 18 ft.

Treatments were applied on schedule shown in **Table 16.** Developmental phenology corresponding to application dates beginning at pink (P) on 25 April; fifth cover (5C) on 30 June, sixth cover (6C) on 18 July. Applications over the entire block for disease and foliar feeding insect control included: Captan 80WDG 36.0 oz./A, Topsin-M 70WSP 9.0 oz./A and Provado 1.6F 3.0 oz./A on 21 June, Captan 80WDG 36.0 oz./A, Topsin-M 70WSP 9.0 oz./A, Intrepid 16.0 oz./A, Apollo 8.0 oz./A, Zeal 3.0 oz./A and Assail 70WP 3.4 oz./A on 27 July.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 19 July. Leaves were removed to the laboratory where they were brushed with a mite-brushing machine and the mites and eggs examined using a binocular scope (≥18X). To stabilize variance in these evaluations, transformation using the Log_{10} (X + 1) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

Sustained rainfall throughout the season and relatively mild temperatures provided less opportunity for mite populations to reach action threshold in commercial orchards. In all treatments, the phytoseiids were prevalent throughout the plots. Higher numbers of ERM were observed in the untreated treatment, with lowest numbers observed in the Lorsban 4EC / Danitol 2.4EC treatments. There was no evidence of flaring of ERM, TSM or rust mite populations. There were no detrimental effects on predatory mites observed in the plots.

The apple research and development program granted the funding to conduct this research. Its purpose was to study the efficacy of insecticides for use in a rotational management program to reduce the insecticide resistance potential of the OBLR. The study demonstrated the effectiveness of new chemistries for OBLR management for use in a rotational program in commercial orchards and IPM programs incorporating the use of *T. pyri* for biological control.

Table 16 Evaluation of insecticides for controlling phytophagous and predatory mite complex on apple [1], Crist Brothers Orchard., Milton, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2]								
			ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Lorsban 4EC Danitol 2.4EC	16.0 oz. 3.6 oz.	Pink 340 DD 1st hatch	0.1 a	0.4 a	0.0 a	0.1 a	0.1 a	0.1 a	0.0 a	0.0 a	0.0 a
2. Calypso 4SC	2.0 oz.	Pink 340 DD 1st hatch	1.4 bc	4.5 bc	0.1 a	1.0 a	0.4 a	0.1 a	0.0 a	0.0 a	0.0 a
3. Asana XL 0.66EC	5.8 oz.	Pink 340 DD 1st hatch	1.0 ab	2.2 ab	0.2 a	0.7 a	0.1 a	0.2 a	0.0 a	0.0 a	0.2 a
4. Baythroid 2E	1.7 oz.	Pink 340 DD 1st hatch	1.5 bc	3.5 bc	0.1 a	0.2 a	0.4 a	0.7 a	0.0 a	0.0 a	0.0 a
5. Dipel DF	10.7 oz.	Pink 340 DD 1st hatch	0.4 ab	1.2 ab	0.1 a	0.3 a	0.1 a	0.5 a	0.0 a	0.0 a	0.0 a
6. Intrepid 2F	5.3 oz.	Pink 340 DD 1st hatch	0.6 abc	1.5 ab	0.0 a	0.2 a	0.1 a	0.1 a	0.0 a	0.0 a	0.2 a
7. Untreated			2.0 c	7.2 c	0.1 a	0.9 a	0.4 a	0.2 a	0.0 a	0.0 a	0.0 a

Data from ' Red Delicious evaluation on 19 July. Pink application made on 25 April, 340 DD on 30 June.

Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Untransformed means presented. Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification. ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): Phytoseiid mite predators including *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

APPLE: Malus domestica 'Red Delicious'

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

EVALUATION OF INSECTICIDES AGAINST FOLIAR-FEEDING MITES OF APPLE, 2006 – ROSE HILL ORCHARD, RED HOOK, NY: Treatments were applied to single-tree plots of 'Red Delicious' replicated four times in a randomized complete block design. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 0.8 gal/tree or 161 gal/acre. All insecticide dilutions (presented as amt/100 gal.) are based on a standard of 400 gal/acre trees. Trees on M.7 rootstock were 10 yr-old, approximately 10 ft high and planted to a commercial spacing of 12 x 18 ft.

Treatments were applied on schedule shown in **Table 17.** Developmental phenology corresponding to application dates beginning at petal fall (PF) on 6 June; first cover (1C) on 13 June, and fifth cover (5C) on 10 July. Applications over the entire block for foliar feeding insect control included: Provado 1.6F 3.0 oz./A on 6 June.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 19 June, 10 July, 24 July. Leaves were removed to the laboratory where they were brushed with a mite-brushing machine and the mites and eggs examined using a binocular scope (≥18X). To stabilize variance in these evaluations, transformation using the Log_{10} (X + 1) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

Mite populations reached action threshold in this commercial orchard very early in the season with preliminary counts exceeding 10 mite/leaf during bloom. In all treatments, the phytoseiid, *Neoseiulus (=Amblyseius) fallacies* (AMB), was prevalent throughout the plots with slightly higher numbers observed in the untreated treatment post PF application. All treatments significantly reduced mite populations when compared to the untreated. Although not statistically different, the split application of Acramite 50W gave numerically better ERM control without significant reductions in phytoseiid numbers. There was no evidence of summer TSM or rust mite populations. There were no detrimental effects on predatory mite observed in the plots.

Table 17 Evaluation of insecticides for controlling early mite complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2] ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. AgriMek 0.15EC Damoil	10.0 /A 0.25 v/v	PF	6.4 a	8.8 a	0.0 a	0.0 a	0.1 ab	< 0.1 a	0.0 a	0.0 a	0.0 a
2. Zeal 75WP	2.0 oz. /A	PF	3.7 a	10.6 a	0.0 a	0.0 a	< 0.1 a	0.0 a	0.0 a	0.0 a	0.0 a
3. Acramite 50W LI700, Choice	16.0 oz. /A 32.0 oz./100	PF	4.0 a	8.9 a	0.0 a	0.0 a	< 0.1 a	< 0.1 a	0.0 a	0.0 a	0.0 a
4. Acramite 50W LI700, Choice	8.0 oz. /A 32.0 oz./100	PF, 1C	3.0 a	11.2 a	0.0 a	0.0 a	< 0.1 a	< 0.1 a	0.0 a	0.0 a	0.0 a
12. Untreated			13.8 b	16.0 a	0.0 a	0.0 a	0.1 b	0.0 a	0.0 a	0.0 a	0.0 a

1 Data taken on 4 year old Red Delicious on 19 June. 1st application on 6 June. 2nd application (1C - Trmt. #4 only) on 13 June, 5C application on 10 July.
2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification.
ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2] ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. AgriMek 0.15EC Damoil	10.0 /A 0.25 v/v	PF	0.8 a	8.7 a	0.0 a	0.0 a	0.4 a	0.5 a	< 0.1 a	0.0 a	0.0 a
2. Zeal 75WP	2.0 oz. /A	PF	0.3 a	27.5 a	0.0 a	0.0 a	< 0.1 a	0.5 a	0.0 a	< 0.1 a	0.0 a
3. Acramite 50W LI700, Choice	16.0 oz. /A 32.0 oz./100	PF	1.4 a	8.0 a	0.0 a	0.0 a	0.4 a	0.5 a	0.0 a	< 0.1 a	0.2 a
4. Acramite 50W LI700, Choice	8.0 oz. /A 32.0 oz./100	PF, 1C	0.5 a	9.9 a	0.0 a	0.0 a	0.2 a	0.8 a	0.0 a	< 0.1 a	0.2 a
12. Untreated			1.8 b	13.9 a	0.0 a	0.0 a	0.2 a	1.4 a	< 0.1 a	0.0 a	0.0 a

Data taken on 4 year old Red Delicious on 10 July.

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2] ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. AgriMek 0.15EC Damoil	10.0 /A 0.25 v/v	PF	0.0 a	0.5 a	0.0 a	0.2 a	0.1 a	0.2 a	0.0 a	0.0 a	0.0 a
2. Zeal 75WP	2.0 oz. /A	PF	0.0 a	1.1 a	0.0 a	0.5 a	< 0.1 a	0.7 a	0.0 a	0.0 a	0.0 a
3. Acramite 50W LI700, Choice	16.0 oz. /A 32.0 oz./100	PF	0.0 a	0.7 a	0.0 a	0.2 a	< 0.1 a	0.3 a	0.0 a	0.0 a	0.2 a
4. Acramite 50W LI700, Choice	8.0 oz. /A 32.0 oz./100	PF, 1C	0.0 a	0.9 a	0.0 a	0.2 a	< 0.1 a	0.2 a	0.0 a	0.0 a	0.0 a
12. Untreated			< 0.1 a	0.4 a	0.0 a	0.2 a	0.1 a	0.2 a	0.0 a	0.0 a	0.0 a

Data taken on 4 year old Red Delicious on 24 July..

APPLE: Malus domestica 'Red Delicious'

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Apple rust mite (ARM): Aculus schlechtendali (Nalepa)
European red mite (ERM): *Panonychus ulmi* (Koch)
Two spotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)
A predatory phytoseiid (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman)
Potato leafhopper (PLH): *Empoasca fabae* Harris
Rose leafhopper (RLH): *Edwardsina rosae* (L)
White apple leafhopper (WALH): *Typhlocyba pomaria* McAtee

EVALUATION OF INSECTICIDES AGAINST FOLIAR-FEEDING INSECTS AND MITES OF APPLE, 2006 – Cornell University's Hudson Valley Lab: Treatments were applied to single-tree plots of 'Red Delicious' replicated four times in a randomized complete block design. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 0.6 gal/tree or 130 gal/acre. All insecticide dilutions (presented as amt/100 gal.) are based on a standard of 400 gal/acre trees. Trees were in their third leaf, grafted onto 12 yr-old M.9 rootstock, approximately 10 ft high and planted to a research spacing of 10 x 20 ft.

Treatments were applied on schedule shown in **Table 18-19.** Developmental phenology corresponding to application dates beginning at second cover (2C) on 14 June; third cover (3C) on 29 June, forth cover on 21 July, and fifth cover (5C) on 7 August. Applications over the entire block for disease control included: Dithane DF 3 lbs./A on 12 & 19 April, 3 May. Captan 80WDG 30.0 oz./A, Dithane DF 3.0 lbs./A, Nova 40WP 4.0 oz./A on 10 May, Dithane DF 3 lbs./A, Nova 40WP 4.0 oz./A, on 8 June, Captan 80WDG 3.0 lbs./A, Topsin-M 70WSP on 22 June.

Vacuum collection of LH adult complex was made using a handheld vacuum devices to which was connected 500 mL screened nalgene bottles by 3-minute vacuum sweeps of foliage on 21 June. Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 21 June and 4 August. Leaves were removed to the laboratory where they were brushed with a mite-brushing machine and the mites and eggs examined using a binocular scope (≥18X). To stabilize variance in these evaluations, transformation using the Log_{10} (X + 1) was conducted prior to analysis using Fisher's Protected LSD (P=<0.05). Untransformed data are presented in each table.

The adult leafhopper complex contained 8.7% WALH male; 52.2% WALH female; 8.7% RLH male and 30.4% RLH female (N=47). The inclusion of Warrior w/Zeon in combination with Proclaim 5WG and Damoil gave superior numeric control of the adult LH complex than Proclaim 5WG and Damoil while AgriMek 0.15EC gave better numeric control of the WALH/RLH adult population. Sustained rainfall throughout the season and relatively mild temperatures provided less opportunity for mite populations to reach action threshold in research plots. In all treatments, the stigmaeid, *Zetzellia mali* (ZM), was prevalent throughout the plots beginning early in the season, most likely providing effective biological control of the ERM. Higher sustained numbers of ZM were observed in the untreated followed by AgriMek 0.15EC, indicating its low toxicity on this mite predator. Endivor 2SC however had statistically lower ZM numbers compared to the untreated, AgriMek 0.15EC and Zeal 72SP. In all treatments, the phytoseiid, *Neoseiulus (=Amblyseius) fallacies* (AMB), was prevalent throughout the plots with slightly higher numbers observed in the Zeal 72WSP treatment. None of the treatments significantly reduced ERM populations when compared to the untreated. Zeal 72SP negatively effected the rust mite populations exhibiting significantly higher numbers by 4 August while Endivor 2SC was observed to have the lowest rust mite populations.

Table 18 Evaluation of insecticides for controlling leafhopper complex on apple foliage[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# of leafhopper adults [2] / 3 min. vacuum collection PLH	WALH/RLH
1. Endivor 2SC	18.0 oz. /A	2C	5.0 a	1.3 a
2. Proclaim 5WG	4.8 oz. /A	2-5C	3.8 a	1.8 a
Damoil	32.0 oz. /100	2-5C		
3. Proclaim 5WG	3.2 oz. /A	2-5C	0.3 a	0.8 a
Warrior w/Zeon	5.0 oz. /A	2-5C		
Damoil	32.0 oz. /100	2-5C		
4. AgriMek 0.15EC	10.0 oz. /A	2C	2.8 a	0.3 a
Damoil	32.0 oz. /100	2C		
5. Zeal 72WSP	2.0 oz. /A	2C	9.0 a	2.3 a
6. Untreated	-	-	4.3 a	0.5 a

1 Data taken from ' Red Delicious on 21 June. 2C on 14 June, 3C on 29 June, 4C on 21 July, 5C on 7 August

2 Log_{10} (x+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.

Vacuum collection of LH adult complex on 21 June made using 'Shark' handheld vacuum devices with screened nalgene bottles. Leafhopper complex composed of white apple leafhopper *Typhlocyba pomaria L.* (WALH) and rose leafhopper, *Edwardsinia rosa* McAtee (RLH). Adult complex contained 8.7% WALH male; 52.2% WALH female; 8.7% RLH male and 30.4% RLH female (N=47).

Table 19 Evaluation of insecticides for controlling early season insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2] ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Endivor 2SC	18.0 oz. /A	2C	0.8 a	3.5 a	0.0 a	0.0 a	0.3 a	1.0 a	0.3 a	0.3 a	12.0 a
2. Proclaim 5WG	4.8 oz. /A	2-5C	1.0 a	3.3 a	0.0 a	0.0 a	1.3 a	1.5 a	1.8 abc	1.5 ab	84.0 ab
Damoil	32.0 oz. /100	2-5C									
3. Proclaim 5WG	3.2 oz. /A	2-5C	2.3 a	7.8 a	0.0 a	0.0 a	1.0 a	2.8 a	1.0 ab	1.0 ab	192.0 bc
Warrior w/Zeon	5.0 oz. /A	2-5C									
Damoil	32.0 oz. /100	2-5C									
4. AgriMek 0.15EC	10.0 oz. /A	2C	2.5 a	3.5 a	0.0 a	0.0 a	0.8 a	1.8 a	3.3 c	2.3 ab	160.0 bc
Damoil	32.0 oz. /100	2C									
5. Zeal 72WSP	2.0 oz. /A	2C	1.3 a	5.3 a	0.0 a	0.0 a	1.3 a	1.5 a	2.3 bc	3.0 b	588.0 c
6. Untreated	-	-	2.5 a	3.3 a	0.0 a	0.0 a	1.8 a	1.5 a	20.3 d	18.5 c	516.0 c

1 Data taken from ' Red Delicious on 21 June. 2C on 14 June, 3C on 29 June, 4C 21 July, 5C on 7 August

2 Log_{10} (X+1) transformation applied to data. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.

Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation under dissecting scope ≥ 18x magnification.

ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; (AMB): *Neoseiulus (=Amblyseius) fallacies* (Garman), ARM = apple rust mite *Aculus schlechtendali*

Treatment	Formulation amt./100 gal.	Timing	# mite or mite egg / leaf [2] ERM	ERME	TSM	TSME	AMB	AMBE	ZM	ZME	ARM
1. Endivor 2SC	18.0 oz. /A	2C	0.0 a	0.0 a	0.0 a	1.0 a	0.0 a	1.0 a	0.5 a	2.0 ab	8.0 a
2. Proclaim 5WG	4.8 oz. /A	2-5C	0.0 a	0.0 a	0.0 a	0.5 a	0.0 a	1.5 a	0.8 a	1.5 a	36.0 b
Damoil	32.0 oz. /100	2-5C									
3. Proclaim 5WG	3.2 oz. /A	2-5C	0.0 a	0.0 a	0.0 a	1.0 a	1.8 b	2.8 a	0.3 a	0.5 a	24.0 ab
Warrior w/Zeon	5.0 oz. /A	2-5C									
Damoil	32.0 oz. /100	2-5C									
4. AgriMek 0.15EC	10.0 oz. /A	2C	0.0 a	< 0.1 a	0.3 a	0.3 a	0.0 ab	1.8 a	4.8 b	5.0 b	16.0 ab
Damoil	32.0 oz. /100	2C									
5. Zeal 72WSP	2.0 oz. /A	2C	0.0 a	< 0.1 a	0.0 a	0.8 a	2.3 c	1.5 a	0.5 a	0.3 a	312.0 c
6. Untreated	-	-	0.0 a	0.2 a	0.0 a	1.5 a	0.3 ab	1.5 a	7.5 b	5.3 b	57.5 b

Data from ' Red Delicious' evaluation on 4 August.

PEAR: *Pyrus communis* L. 'Bartlett'

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Pear psylla: *Cacopsylla pyricola* (Foerster)
Codling moth (CM): *Cydia pomonella* (Linnaeus)

EFFICACY OF INSECTICIDES AGAINST PEAR PSYLLA ADULTS, EGGS AND NYMPHS, 2006: – Cornell University's Hudson Valley Lab: Treatments were applied to four-tree plots replicated three 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 26 years old. All dilutions are presented as amt/100 gal. – (based on 400 gallons/acre). Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi delivering ≥350 GPA.

Application phenology beginning at observation of 1st egg and swollen bud (SB) on 30 March; bud burst on 10 April, white bud (WB) on 20 April; 100% bloom on 29 April; PF application on 1 May @ 10-30% PF of Bartlett, 10dp PF application on 23 May, 2C on 6 June, 3C on 21 June, 4C on 30 June for a 'rescue' treatment. Applications over the entire block for disease control, plum curculio and crop size management included: Dithane DF 3 lbs./A on 19 April, 3, 10 May, 8, 22 June, NAA 2.1 oz./A on 3 May, Nova 40WP 4.0 oz./A, on 8 June, Ziram 3.0 lbs./A on 20 July, Imidan 70WP 3.0 lbs./A on 4 May.

Application schedules in **Tables 20** were made against three generations of pear psylla with evaluations being made to determine the treatment effects on adult, egg and nymph populations. During the period from swollen bud through petal fall, evaluations were used to determine treatment effects on springform adult ovipositional deterrence, including subsequent 1st generation nymph emergence. In pre-bloom evaluations beginning on 3 April, 25 fruiting buds / trmt. / replicate were evaluated. These were followed by evaluations made on 10 April through 1 May in which 25 fruiting cluster leaves / trmt. / replicate were evaluated. During evaluations to access 2nd and 3rd generation adults, numbers were assessed by 3-minute vacuum sweeps of foliage using a handheld vacuum to which was connected 500 mL screened nalgene bottles on 6, 19 June. Psylla nymph, egg and rust mite numbers were accessed by collecting leaf samples on shoots beginning with 25 basal leaves of 5 shoots in early summer and continuing with 1 distal, 1 proximal and 3 mid-shoot leaves of 5 shoots per treatment through the remainder of the season on 2, 12, 26 June, 5 July. Samples were removed to the laboratory, where adults, nymphs and eggs were counted using a binocular scope as needed. Leaf necrosis caused by accumulated honeydew was rated on 5 July, using a 0-5 scale where: 1 = 1-5 blemishes (<7mm diameter); 2=6-10 blemishes; 3=11-25 blemishes; 4=26-40 blemishes; and 5=>40 blemishes. Leaf drop rating was conducted on 28 September using 3 evaluators per tree in which the mean of 3 quadrants of the tree were assessed for remaining foliage. Fabraea leaf rating was conducted on 3 October and assessed by sampling 25 leaves from five terminals per treatment to determine the percent of leaves exhibiting leaf spot. Damage to fruit was assessed by randomly selecting 100 fruit to determine insect and disease damage, including sooty mold and fruit russet. Scoring fruit for external codling moth was conducted by accessing CM entry sites. Sooty mold was rated as % of fruit surface with sooty mold. Fruit russet was rated using a 0-4 scale in which 0 showed no dark lenticels, 1= dark lenticels in one quadrant of the fruit, 2 = dark lenticels throughout the fruit, 3 = russeting in the calyx end of the fruit, 4 = russeting throughout the fruit. To stabilize variance in fruit % damage evaluations, transformation using the arcsinee *(square root of x) was conducted prior to analysis while the transformation using the Log_{10} (X + 1) was used for adult and foliar evaluations. Fisher's Protected LSD (P=<0.05) was performed on all data and untransformed data are presented in each table.

Against the early-season adult population for ovipositional deterrence in **Table 20**, we observed the single application of Surround WP at swollen bud to exhibit numerically lower numbers of pear psylla eggs than the 2% Damoil application and significantly better control of nymph populations shortly after petal fall. Applications directed against 1st generation nymph and adult population on 23 May (**Table 21**) we observed effective control using the EXP compound at the 4X concentration comparable to the standard AgriMek 0.15EC treatment for adult and nymph population early in the season. All treatments with the exception of 1% Damoil exceeded post-bloom threshold of 1-2 nymphs / leaf by 26 June requiring a 'rescue' treatment on 30 June. Lowest sustained numbers of psylla nymphs were observed in the Damoil treatment receiving 1% applications every 2 weeks. AgriMek and Damoil treatments exhibited the least degree of leaf scorch (**Table 22**). The Damoil treatment had the least amount of both leaf drop and Fabraea leaf spot, which may indicate fungicidal suppression on the spread of this leaf spot disease. No rust mite or codling moth damage was observed in the research plots in 2006.

Table 20 Evaluation of insecticides for controlling pear psylla on Bartlett pear [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2006

Formulation Treatment	Application amt.	Application date	Eggs / bud or leaf				
			3 April[B]	10 April[L]	24 April[L]	1 May[L]	19 May[L]
Damoil	2.0 gal. / 100	SB	1.0 b	0.9 a	1.5 a	0.6 ab	0.3 a
Surround WP	12.5 lbs. / 100	SB	0.4 a	0.8 a	0.3 a	0.2 a	0.2 a
Untreated control			2.8 c	3.5 b	9.0 b	1.2 b	0.9 a

B = buds, L = leaves

Formulation Treatment	Application amt.	Application date	Nymphs / leaf		
			24 April	1 May	19 May
Damoil	2.0 gal. / 100	SB	0.13 a	0.42 a	0.60 b
Surround WP	12.5 lbs. / 100	SB	0.04 a	0.04 a	0.20 a
Untreated control			0.14 a	1.92 b	1.40 c

Swollen bud (SB) on 30 March, late swollen bud on 3 April, bud burst on 10 April, TC on 14 April, 30% bloom on 24 April, PF on 1 May @ 10-30% PF of Bartlett. 10dp PF on 23 May, 2C on 6 June, 3C on 21 June, 5C on 30 June.

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

Table 21 Evaluations of insecticide schedules against spring and summerform pear psylla adults and 2nd generation nymphs on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2006.

Treatment	Formulation amt./100 gal.	Application Dates	Springform Adults[1] # / 3 min.	2 June Nymph	2 June Eggs	Summerform Adults[1] # / 3 min.	12 June Nymph	12 June Eggs
1. Damoil	2.0 gal. / 100	SB	32.8 cd	0.8 ab	3.2 ab	14.5 a	3.8 bcd	6.2 ab
Damoil	0.5% V/V	10dp PF						
EXP	X	10dp PF						
2. Damoil	2.0 gal. / 100	SB	21.0 abc	1.3 b	5.8 bcd	15.5 a	2.8 cd	6.9 abc
Damoil	0.5% V/V	10dp PF						
EXP	2X	10dp PF						
3. Damoil	2.0 gal. / 100	SB	30.8 bcd	0.7 ab	7.2 cd	27.3 a	1.1 ab	6.2 ab
Damoil	0.5% V/V	10dp PF						
EXP	4X	10dp PF						
4. Damoil	2.0 gal. / 100	SB	18.8 ab	0.4 a	5.1 abcd	17.3 a	3.8 de	6.3 abc
EXP	4X	10dp PF						
5. Damoil	2.0 gal. / 100	SB	15.3 a	0.3 a	2.2 a	15.8 a	2.3 abcd	8.3 bc
Assail 30SG	2.0 oz./100	10dp PF						
+ Damoil	0.5% V/V	10dp PF						
6. Damoil	2.0 gal. / 100	SB	20.3 abc	0.3 a	3.6 ab	23.3 a	0.8 a	3.0 a
AgriMek 0.15EC	2.5 oz. / 100	10dp PF						
+ Damoil	0.5% V/V	10dp PF						
7. Surround	12.5 lbs. / 100	SB	10.8 a	0.5 a	4.2 abc	33.3 a	1.2 abc	2.4 a
Damoil	2.0 gal. / 100	10dp PF						
Damoil	1.0 gal. / 100	2, 3C						
8. Untreated control	-	-	56.3 d	1.3 b	13.5 d	26.5 a	7.8 e	14.3 c

1 Data taken of egg and nymph populations on 2 , 12 June; vacuum sweeps made on 6 and 19 June of spring and summerform adults respectively. Swollen bud (SB) on 30 March, late swollen bud on 3 April, bud burst on 10 April, TC on 14 April, 30% bloom on 24 April, PF on 1 May @ 10-30% PF of Bartlett. 10dp PF on 23 May, 2C on 6 June, 3C on 21 June, 5C on 30 June.

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

Table 21 con't Evaluations of insecticide schedules against spring and summerform pear psylla adults and 2nd generation nymphs on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2006.

Treatment	Formulation amt./100 gal.	Application Dates	Summerform Adults[1]- 19 June # / 3 min.	26 June Nymph	26 June Eggs	Summerform Adults[1] - 5 July # / 3 min.	% reduction	5 July Nymph	5 July Eggs
1. Damoil	2.0 gal. / 100	SB	14.5 a	2.6 ab	3.3 a	3.0 a	79.3	0.7 b	1.7 a
Damoil	0.5% V/V	10dp PF, 5C							
EXP	2X	10dp PF, 5C							
2. Damoil	2.0 gal. / 100	SB	15.5 a	6.2 c	5.8 a	6.3 bc	59.7	1.2 c	1.7 a
Damoil	0.5% V/V	10dp PF, 5C							
EXP	2X	10dp PF, 5C							
3. Damoil	2.0 gal. / 100	SB	27.3 a	6.2 c	7.1 a	8.0 cd	70.7	1.8 c	2.2 a
Damoil	0.5% V/V	10dp PF, 5C							
EXP	4X	10dp PF, 5C							
4. Damoil	2.0 gal. / 100	SB	17.3 a	4.4 bc	4.8 a	8.0 cd	53.8	1.6 c	1.7 a
EXP	4X	10dp PF, 5C							
5. Damoil	2.0 gal. / 100	SB	15.8 a	3.2 bc	3.6 a	6.0 c	62.0	1.3 bc	2.3 a
Assail 30SG	2.0 oz./100	10dp PF, 5C							
+ Damoil	0.5% V/V	10dp PF, 5C							
6. Damoil	2.0 gal. / 100	SB	23.3 a	2.4 ab	3.7 a	2.5 ab	89.3	0.2 a	0.6 a
AgriMek 0.15EC	2.5 oz. / 100	10dp PF, 5C							
+ Damoil	0.5% V/V	10dp PF, 5C							
7. Surround	12.5 lbs. / 100	SB	33.3 a	1.3 a	2.7 a	1.8 a	94.7	0.3 a	2.3 a
Damoil	2.0 gal. / 100	10dp PF							
Damoil	1.0 gal. / 100	2, 3, 5C							
8. Untreated control	-	-	26.5 a	6.1 c	2.8 a	15.3 d	42.5	1.5 c	1.1 a

1 Data taken of egg and nymph populations on 2, 12 June; vacuum sweeps made on 6 and 19 June of spring and summerform adults respectively. Swollen bud (SB) on 30 March, late swollen bud on 3 April, bud burst on 10 April, TC on 14 April, 30% bloom on 24 April, PF on 1 May @ 10-30% PF of Bartlett. 10dp PF on 23 May, 2C on 6 June, 3C on 21 June, 5C on 30 June.

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

Table 22 Evaluations of insecticide schedules on foliar phytotoxicity on Bartlett pear. Hudson Valley Lab., Highland, N.Y.-2006.

Treatment	Formulation amt./100 gal.	Application Dates	7/5 Leaf scorch rating 0-5 scale	% Leaf drop	% of lvs. With Fabraea L.S.
1. Damoil Damoil EXP	2.0 gal. / 100 0.5% V/V X	SB 10dp PF 10dp PF	0.7 bc	40.0 bc	91.9 bc
2. Damoil Damoil EXP	2.0 gal. / 100 0.5% V/V 2X	SB 10dp PF 10dp PF	1.0 c	63.6 cd	96.7 bc
3. Damoil Damoil EXP	2.0 gal. / 100 0.5% V/V 4X	SB 10dp PF 10dp PF	0.5ab	40.2 bc	88.1 bc
4. Damoil EXP	2.0 gal. / 100 4X	SB 10dp PF	0.6 ab	37.3 b	93.5 bc
5. Damoil Assail 30SG + Damoil	2.0 gal. / 100 2.0 oz./100 0.5% V/V	SB 10dp PF 10dp PF	0.7 bc	54.8 bcd	97.4 c
6. Damoil AgriMek 0.15EC + Damoil	2.0 gal. / 100 2.5 oz. / 100 0.5% V/V	SB 10dp PF 10dp PF	0.3 a	56.8 bcd	87.9 b
7. Surround Damoil Damoil	12.5 lbs. / 100 2.0 gal. / 100 1.0 gal. / 100	SB 10dp PF 2, 3C	0.3 a	6.7 a	56.8 a
8. Untreated control	-	-	1.5 d	70.6 d	96.6 bc

1 Data taken of egg and nymph populations on 2 , 12 June; vacuum sweeps made on 6 and 19 June of spring and summerform adults respectively. Swollen bud (SB) on 30 March, late swollen bud on 3 April, bud burst on 10 April, TC on 14 April, 30% bloom on 24 April, PF on 1 May @ 10-30% PF of Bartlett. 10dp PF on 23 May, 2C on 6 June, 3C on 21 June. Leaf rating for phytotoxicity caused by pear psylla honeydew from 0-5 on Bartlett leaves on 5 July. Percent leaf drop on 28 September, % Fabraea leaf spot on 3 October.

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

ONION: *Allium cepa* L. 'Millenium'

Onion maggot: *Delia antiqua* (Meigen)

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CONTROL OF ONION MAGGOT WITH INSECTICIDE DRENCH AND SEED TREATMENTS, PINE ISLAND, NY - 2006: Onion was seeded (ca. 13 seeds/row foot) into muck soil on 18 April using a cone seeder. Treatments were arranged in 1-row plots, 40 ft long, and replicated 5 times in a randomized block design. In furrow drench treatments were applied using the cone seeder equipped with a CO_2 pressurized (30 PSI) sprayer dispensing 40 GPA @ 2 MPH. With the exception of the confidentiality agreement treatments, insecticide treatment of onion seeds (ST) (film coating) was performed at Dept. of Hort. Sci. Seed Lab., NYSAES, Geneva, NY. At ten days post emergence, a stand count in each treatment was determined by counting the number of seedlings per 25 ft of row marked from the center of each 40 ft plot.

Efficacy evaluations, began 18 May and following at weekly intervals until 19 June at which time damage to onion had ceased. Evaluations were made by examination of all wilted or dead plants and recording the number damaged by onion maggot. Numbers of damaged plants at each evaluation were divided by initial stand count to compute percent damage. To stabilize variance, percentage data were transformed by arcsine *(square root of x) prior to analysis by Fisher's Protected LSD

All treatments received PRO-GRO fungicide for control of onion smut. Seed treatments, applied as grams ai/100 g of seed, were planted into two separate trials: Nebula onion seed (**Table 23 a,b**): were treated with Lorsban 4E in-furrow drench at 38.3 fl.oz./A; Trigard 75WG (cyromazine) applied at 5.0 grams; Trigard 75WG (cyromazine) applied at 5.0 grams + Lorsban 4E in-furrow drench (38.3 fl.oz./A); Regent 500 (fipronil) at 2.5 grams; Entrust (organic formulation of spinosad) applied at 5.0, and 7.5 grams; Poncho (clothianidin) at 5.0 grams; Baythroid XL (ß-cyfluthrin) at 0.65 grams; and two experimental compounds EXP. A at 1X and 1.5X;. Yellow Ebenezer onion seed (**Table 24 a,b**): were treated with Lorsban 4E in-furrow drench 5.8 ml./30.0 oz. water (38.3 fl.oz./A); Trigard 75WG (cyromazine); Regent 500 (fipronil) at 2.5 grams applied at 5.0 grams; and three experimental compounds under confidential agreements, EXP. B at 1X, 2X and 4X; Seed treatments were compared to an untreated (PRO-GRO fungicide only).

In both trials the stand count data suggests that seed treatments were not phytotoxic to plant development and emergence relative to untreated control and the Lorsban drench treatment was similar. Mechanical planting problems are attributed to a stand reduction of the Trigard 75WG treatment in Table 24a.

Lower degrees of onion maggot damage were experienced in 2006 compared to previous years. Good control was provided by all experimental seed treatments with the exception of the Baythroid XL treatment. Trigard 75WG in combination with the Lorsban 4E drench was numerically more effective at reducing onion maggot than either material alone. Poncho 600 provided overall excellent control in both varieties of onion trials. Both of the EXP. treatments showed a significant rate response between 1X and increased concentrations, giving longer and numerically greater control of OM than all other treatments.

Table 20a Pre-treatment counts of onion plant stand using Lorsban 4E in-furrow and treated seed, Pine Island., N.Y.-2006.

Treatment/form.[1]	Chemical name	Rate	Av. # plants/20 ft
Untreated		-	108.8 a
Lorsban 4E IF	chlorpyrifos	38.3 fl. oz/acre	155.0 cd
Trigard 75WG ST	cyromazine	5.0 g AI/kg	115.4 ab
Trigard 75WG ST + Lorsban 4E IF	cyromazine chlorpyrifos	5.0 g AI/kg	141.8 bcd
Regent 6.2TS	fipronil	2.5 g AI/kg	147.4 cd
Entrust ST	spinosad	5.0 g AI/kg	142.0 bcd
Entrust ST	spinosad	7.5 g AI/kg	112.2 ab
Poncho 600 ST	clothianidin	1.25 g AI/kg	156.8 d
Baythroid XL	ß-cyfluthrin	0.65 g AI/kg	125.6 abc
EXP. A		1X	138.4 bcd
EXP. A		1.5X	134.8 abcd

Variety – Nebula

Table 21a Pre-treatment counts of onion plant stand using Lorsban 4E in-furrow and treated seed, Pine Island., N.Y.-2006.

Treatment/form.[1]	Chemical name	Rate	Av. # plants/20 ft
Untreated		-	136.2 a
Lorsban 4E IF	chlorpyrifos	38.3 fl. oz/acre	144.2 a
Trigard 75WG ST	cyromazine	5.0 g AI/kg	70.2 b
Regent 6.2TS	fipronil	2.5 g AI/kg	134.4 a
EXP. B	-	1X	112.6 a
EXP. B	-	2X	123.4 a
EXP. B	-	4X	134.8 a

Variety – Yellow Ebenezer; IF – In-Furrow

Means followed by the same letter are not significantly different (P=0.05; Fisher's LSD). Percentage data were transformed by arcsine *(square root of x) prior to analysis.

Table 20b. Efficacy of insecticide treatments against damage by onion maggot, Pine Island – 2006

Treatment/form.[1]	Rate	Mean % seedling loss						
		5/18	5/24	5/31	6/6	6/12	6/19	Total
Untreated	-	0.0 a	0.6 a	2.6 b	6.5 c	2.9 c	0.5 a	13.1 c
Lorsban 4E IF	38.3 fl. oz/acre	0.0 a	0.0 a	0.0 a	1.8 ab	1.0 ab	0.6 a	3.4 ab
Trigard 75WG ST	5.0 g AI/kg	0.6 b	0.0 a	0.4 a	1.7 ab	0.5 ab	0.2 a	3.3 ab
Trigard 75WG ST + Lorsban 4E IF	5.0 g AI/kg 38.3 fl. oz/acre	0.0 a	0.0 a	0.2 a	0.6 ab	0.2 a	0.0 a	1.0 a
Regent 6.2TS	2.5 g AI/kg	0.0 a	0.0 a	0.5 a	0.2 ab	0.0 a	0.0 a	0.7 a
Entrust ST	5.0 g AI/kg	0.0 a	0.0 a	0.2 a	0.9 ab	0.0 a	0.3 a	1.4 a
Entrust ST	7.5 g AI/kg	0.0 a	0.0 a	0.0 a	1.2 ab	0.3 a	0.9 a	2.4 a
Poncho 600 ST	1.25 g AI/kg	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a
Baythroid	0.65 g AI/kg	0.0 a	0.0 a	1.0 a	4.0 bc	2.1 bc	1.5 a	8.7 bc
EXP A	1X	0.0 a	0.0 a	0.0 a	2.2 ab	0.1 a	0.0 a	2.3 a
EXP A	1.5X	0.0 a	0.0 a	0.0 a	0.3 ab	0.3 a	0.4 a	1.0 a

Variety – Nebula

Table 21b. Efficacy of insecticide treatments against damage by onion maggot, Pine Island – 2006

Treatment/form.[1]	Rate	Mean % seedling loss						
		5/18	5/24	5/31	6/6	6/12	6/19	Total
Untreated	-	0.2 a	1.6 a	3.3 b	2.0 b	1.0 a	0.3 a	7.9 bc
Lorsban 4E IF	38.3 fl. oz/acre	0.1 a	0.0 a	0.9 a	1.4 ab	0.2 a	0.6 a	3.1 a
Trigard 75WG ST	5.0 g AI/kg	0.0 a	0.0 a	1.0 a	0.7 ab	0.2 a	0.0 a	1.9 a
Regent 6.2TS	2.5 g AI/kg	0.0 a	0.0 a	0.0 a	1.5 ab	0.7 a	1.2 a	3.5 ab
EXP. B	1X	0.0 a	0.0 a	1.3 ab	4.1 c	1.7 a	1.1 a	8.2 c
EXP. B	2X	0.0 a	0.0 a	0.0 a	0.0 a	1.1 a	0.3 a	1.4 a
EXP. B	4X	0.0 a	0.0 a	0.0 a	0.3 a	0.8 a	0.7 a	1.8 a

1. Variety – Yellow Ebenezer Means followed by the same letter are not significantly different (P=0.05; Fisher's LSD). Percentage data were transformed by arcsine *(square root of x) prior to analysis. All treatments contained ProGro fungicide for onion smut. ST=seed treatment ; IF=in furrow drench

Cornell's Hudson Valley Lab
Departments of Entomology and Plant Pathology

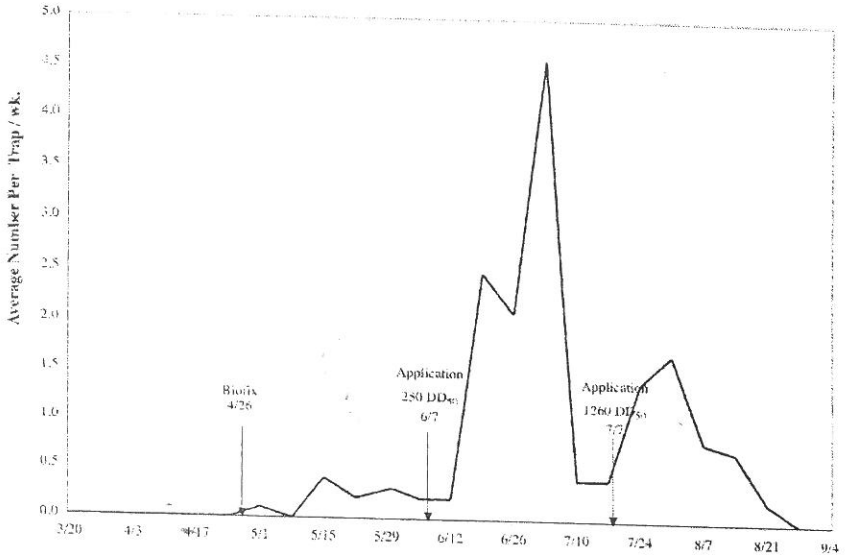
Cornell University
College of Agriculture and Life Sciences

Hudson Valley McIntosh Phenology

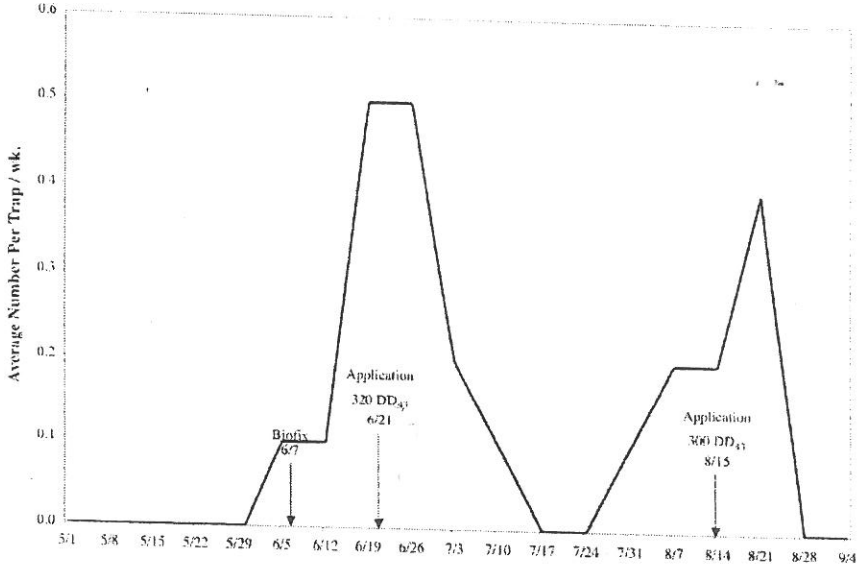
Year	GT	HIG	T.C.	Pink	Bloom	P.F.
2006	4/3	4/10	4/17	4/22	4/26	5/8
2005	4/7	4/11	4/18	4/26	5/8	5/16
2004	4/12	4/19	4/22	4/27	5/3	5/13
2003	4/7	4/16	4/24	4/28	5/1	5/19
2002	3/25	4/10	4/14	4/15	4/16	5/7
2001	4/11	4/17	4/25	4/28	5/2	5/10
2000	3/27	4/2	4/14	4/24	5/1	5/8
1999	4/2	4/7	4/12	4/26	5/2	5/13
1998	3/27	3/29	4/1	4/10	4/23	5/4
1997	4/4	4/11	4/21	4/28	5/1	5/14
1996	4/15	4/19	4/22	4/29	5/6	5/20
1995	4/11	4/19	4/24	4/29	5/8	5/19
1994	4/11	4/14	4/20	4/29	5/5	5/12
1993	4/12	4/19	4/24	5/1	5/3	5/10
1992	4/13	4/21	5/4	5/7	5/12	5/18
1991	4/5	4/8	4/11	4/17	4/27	5/7
1990	3/21	4/16	4/23	4/26	4/29	5/11
1989	3/29	4/17	4/28	5/3	5/9	5/19
1988	4/4	4/9	4/28	5/5	5/8	5/19
1987	3/29	4/10	4/18	4/22	4/29	5/16
1986	3/31	4/7	4/19	4/27	5/3	5/8
1985	3/30	4/12	4/15	4/22	5/4	5/12
1984	4/10	4/26	4/30	5/6	5/16	5/24
1983	4/12	4/27	4/30	5/2	5/5	5/18
1982	4/15	4/22	4/30	5/4	5/13	5/17
1981		4/8	4/16	4/22	5/5	5/14
1980	4/15		4/24	5/2	5/5	5/10
Earliest day	**3/21**	**3/29**	**4/1**	**4/10**	**4/16**	**5/4**
Latest day	**4/15**	**4/27**	**5/4**	**5/7**	**5/16**	**5/24**
Mean	**6 April**	**13 April**	**22 April**	**28 April**	**3 May**	**13 May**

Midrange **3 April (+/-12D)**
13 April (+/-14D)
17 April (+/-16D)
23 April (+/-13D)
1 May (+/-15D)
14 May (+/-10D)

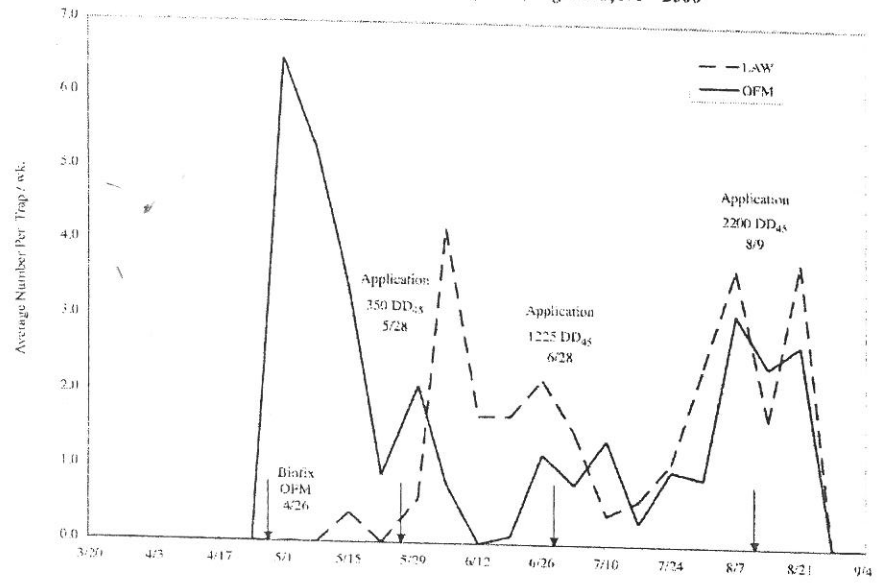
Codling Moth (CM) Pheromone Trap Catch Data
Cornell University's Hudson Valley Lab, Highland, NY - 2006



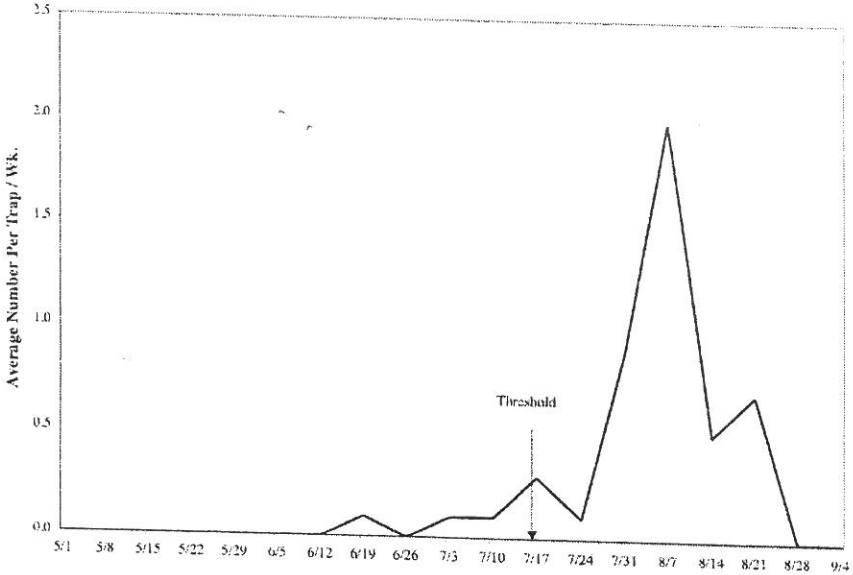
Oblique Banded Leafroller (OBLR) Phermone Trap Catch Data
Cornell University's Hudson Valley Lab, Highland, NY - 2006



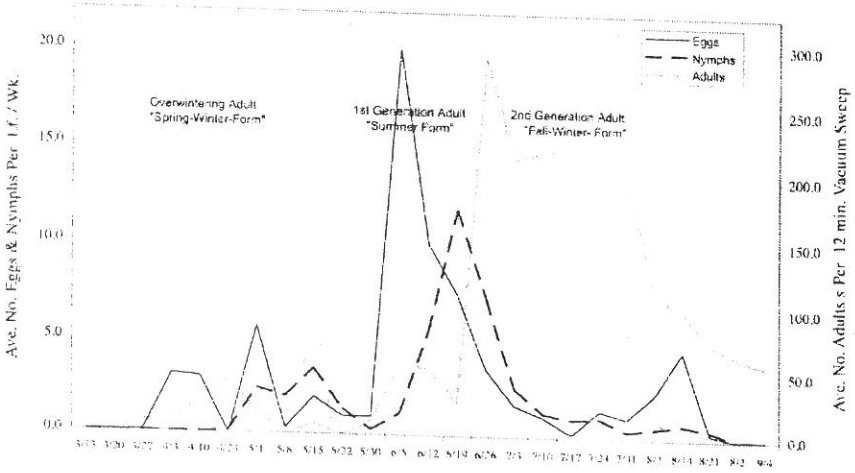
Lesser Apple Worm (LAW) and Oriental Fruit Moth (OFM) Phermone Trap Catch
Cornell University's Hudson Valley Lab, Highland, NY - 2006



Apple Maggot (AM) Trap Catch Data
Cornell University's Hudson Valley Lab in Highland, NY - 2006



Pear Psylla Counts in Untreated Bartlett Pear
Cornell University's Hudson Valley Lab in Highland, NY - 2006



2006 MAXIMUM AND MINIMUM TEMPERATURES AND PRECIPITATION
Hudson Valley Laboratory, Highland, NY

All readings were taken at 0800 EST on the dates indicated

	MARCH			APRIL			MAY			JUNE			JULY			AUGUST			SEPTEMBER		
Date	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip	Max	Min	Precip
1	29	15		71	49	0.01	70	38		79	62		79	54		86	70		66	52	
2	39	15		70	37	0.13	70	41		85	60	0.23	81	66		93	75		65	53	0.13
3	25	12		61	32		63	45		68	55	0.25	84	68		94	73		61	55	0.32
4	29	16	0.06*	49	37	0.92	64	48	0.03	59	52	0.38	83	64	0.70	92	69		68	53	
5	38	22	0.05*	45	28	0.02	79	55		63	53		79	67	0.10	82	57		70	53	
6	44	20		45	31		76	45		68	50		76	59		81	58		60	53	0.11
7	39	21		48	28		70	33		72	59	0.01	75	51		80	66	0.13	68	50	
8	39	19		51	39	0.24	65	39		59	54	1.06	78	56		84	64		72	52	
9	42	24		39	30		66	47		64	55	0.03	79	62		78	52		76	53	
10	48	36		52	28		64	50	Trace	68	50	0.12	82	61		79	55		79	52	0.18
11	70	36		59	32		68	52	Trace	64	45		79	66		82	57		64	43	
12	57	36		68	39		61	56	0.90	67	48		85	67		72	45		64	39	
13	50	45		68	51		59	53	0.10	72	53		75	68	1.23	75	45		64	45	
14	61	46	0.39	73	43		66	47	0.02	79	55		78	62		77	49		61	50	0.12
15	61	30		62	51	0.35	55	47		75	59	0.18	86	64		82	64	0.34	61	58	1.78
16	40	28		77	43		55	51	0.30	77	48	0.04	80	64	0.38	80	54		61	58	0.29
17	42	25		60	35		58	42	0.41	82	52		87	64		79	55		71	52	
18	41	21		55	44		65	49		79	61	0.01	93	69		81	59		72	54	
19	39	22		67	48		72	49	0.18	89	66		92	68		79	57		77	57	
20	36	24		70	46		56	41	0.36	86	61	0.12	83	61		77	66	0.83	69	48	0.05
21	36	16		75	43		63	42		80	52	0.30	83	66	0.06	82	60		66	40	
22	44	22		65	40	0.04	59	39	0.12	80	60	0.06	82	67		78	50		63	37	
23	40	29		40	36	1.38	59	37		83	64	0.10	79	60	1.40	81	55		65	48	0.02
24	48	36		50	40	0.91	62	38		82	64	0.18	73	55		79	55		68	56	
25	45	34	0.06	59	42	0.01	71	39		73	64		80	59		73	57	0.02	71	52	0.17
26	45	36	0.08	71	29	0.08	78	52		70	65	1.87	82	64		65	58	0.49	65	43	
27	48	29		61	35		71	61	0.42	75	68	0.15	83	66		61	57	0.03	67	38	
28	56	28		67	37		78	55		79	66	1.34	86	68	0.25	61	56	1.22	68	46	
29	53	26		57	37		81	57		82	66	0.2482	61	0.16		77	61	0.04	66	51	0.35
30	61	29		62	34		87	64		82	57		87	66		63	58	1.21	59	35	0.28
31	68	38					87	60	0.36				84	59		71	51				
Avg/ Total	45.6	27.0	0.64	60.0	38.1	4.09	67.7	47.5	3.20	74.7	57.5	6.67	81.1	61.0	4.12	78.4	58.6	4.31	66.9	49.2	3.80

* snow melt