RESULTS OF 2004 INSECTICIDE AND ACARICIDE TRIALS IN EASTERN NEW YORK

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EVALUATION OF INSECTICIDES AGAINST EARLY-SEASON INSECT PESTS OF APPLE, 2004 – Hudson Valley Lab: Treatments were applied to four-tree plots (one of which was 'Ginger Gold') 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 150 gal/acre – the necessary gallonage represents minimal amounts of foliage during the early season. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Trees on the M.26 rootstock were 9 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30.

Treatments were applied on various schedules as shown in Table 1. Developmental phenology was: tight cluster (TC) on 18 April; pink (P) on 27 April; petal fall (PF) on 11 May; and first cover (1C) on May 24. Evaluations were made on 24 May and 2 June.

Damage to fruit was assessed by randomly selecting 100 fruits prior to 'June drop' and scoring for external damage. The 'LEP' category includes combined damage from green fruitworm, red-banded and oblique-banded leafrollers. Damage data from all categories were converted to percent damage and transformed by arcsine prior to analysis by Fisher's Protected LSD.

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. - 2004**

			% Damaged [2] fruit				
Treatment	Formulation amt./100 gal.	Timing	% TPB	% PC	% EAS	% LEP	% Clean
Supracide	16.0 oz.	DD	2.0 a	0.8 a	0.5 a	0.0 a	96.8
2% oil	2.0 gal.	DD					
Lorsban 75WG	10.7 oz.	P					
Imidan 70WP	21.3 oz.	PF, 1C					
Mesa	6.7 oz.	PF					
Damoil	1.0 gal.	PF					
+ LI700	16.0 oz.	1C					
Imidan 70WP	16.0 oz.	2-6C					
Intrepid 2F	4.0 oz.	3-5C					
Calypso 4SC	1.3 oz.	P, PF	2.5 a	3.8 a	0.8 ab	0.0 a	92.9
Calypso 4SC	2.0 oz.	OFM model					
Imidan 70WP	16.0 oz.	1C-PC Model					
Calypso 4SC	1.3 oz.	P, PF, 5&6	3.8 a	1.5 a	0.8 ab	0.3 a	93.7
Imidan 70WP	16.0 oz.	1C-PC Model					
Assail 70WP	1.1oz.	P, PF, 5-6C	1.8 a	7.5 a	0.0 a	0.0 a	90.8
Imidan 70WP	16.0 oz.	1C-PC Model					
Assail 70WP	1.1oz	LateP, EarlyPF	1.5 a	10.3 a	6.0 abc	0.0 a	82.3
Imidan 70WP	16.0 oz.	1C-PC Model					
Rimon 0.83SC	6.4 oz.	CM 75DD	2.0 a	11.3 a	0.8 a	0.0 a	86.0
Imidan 70WP	16.0 oz.	4-6C					
Rimon 0.83SC	6.4 oz.	CM1075DD	3.0 a	7.5 a	6.0 abc	0.3 a	83.3
Imidan 70WP	16.0 oz.	PF, 1C, 2C					
Imidan 70WP	21.3 oz.	P, PF-3C	0.8 a	5.0 a	1.3 ab	0.0 a	93.0
Imidan 70WP	16.0 oz.	4(AM)-6C					
Untreated	-	-	3.3 a	66.5 b	13.5 d	2.8 a	14.0

Data from ' McIntosh' evaluation on 24 May. GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold'.

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

Table 1 (cont.) **Evaluation of insecticides for controlling foliar feeding insect complex on apple [1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2003**

Treatment	Formulation amt./100 gal.	Appl. Timing	1st gen. OBLR foliar damage	RAA damage	live RAA Colonies
Supracide	16.0 oz.	DD	5.8 ab	0.5 a	0.0 a
2% oil	2.0 gal.	DD			
Lorsban 75WG	10.7 oz.	P			
Imidan 70WP	21.3 oz.	PF, 1C			
Mesa	6.7 oz.	PF			
Damoil	1.0 gal.	PF			
+ LI700	16.0 oz.	1C			
Imidan 70WP	16.0 oz.	2-6C			
Intrepid 2F	4.0 oz.	3-5C			
Calypso 4SC	1.3 oz.	P, PF	9.3 abc	1.8 ab	0.0 a
Calypso 4SC	2.0 oz.	OFM model (7/1)			
Imidan 70WP	16.0 oz.	1C-PC Model			
Calypso 4SC	1.3 oz.	P, PF, 5&6	8.5 ab	2.0 ab	0.0 a
Imidan 70WP	16.0 oz.	1C-PC Model			
Assail 70WP	1.1oz.	P, PF, 5-6C	10.0 abc	2.0 ab	0.0 a
Imidan 70WP	16.0 oz.	1C-PC Model			
Assail 70WP	1.1oz	LateP, EarlyPF	8.5 ab	0.5 a	0.0 a
Imidan 70WP	16.0 oz.	1C-PC Model			
Rimon 0.83SC	6.4 oz.	CM 75DD + 10D	9.3 abc	7.5 c	3.8 c
Imidan 70WP	16.0 oz.	4-6C			
Rimon 0.83SC	6.4 oz.	CM 1075DD+2 @ 10D	10.7 ab	2.3 ab	0.0 a
Imidan 70WP	16.0 oz.	PF, 1C, 2C			
Imidan 70WP	21.3 oz.	P, PF-3C	8.3 ab	2.0 ab	0.0 a
Imidan 70WP	16.0 oz.	4(AM)-6C			
Untreated	-	-	15.8 c	8.8 c	1.8 abc

1 Data from ' Golden Delicious'. All evaluations made on 2 June. OBLR evaluation made by observing damaged terminal leaves / 2 minutes. RAA evaluation made by observing fruit cluster damage / 2 minutes / tree and assessing colony for presence.

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

GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold'. CM 75DD on 11 May, 1C and 10dpCM 75DD on 24 May, 2C 9 June, 3C on 19 June, OFM model on 6 July, 1075DD for CM on 7 July, 4C on 9 July, 5C and 1260DD for CM and 2nd appl. for CM 1075DD on 19 July, 2nd appl for 1260DD for CM and 3rd appl. for CM 1075DD on 29 July, 6C on 2 August, 7C on 16 August.

APPLE: *Malus domestica* 'McIntosh'

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)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
San Jose scale (SJS): *Quadraspidiotus perniciosus* (Comstock)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)

HARVEST EVALUATION OF INSECTICIDES AGAINST FRUIT-FEEDING INSECTS ON APPLE, 2004: Treatments were applied to four-tree plots (one of which was 'McIntosh') 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 from 1.3 to 1.9 gal/tree or 130 to 190 gal/acre – the range in gallonage represents increasing amounts of foliage as the season progressed. <u>All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees</u>. Trees on the M.26 rootstock were 8 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30.

Treatments were applied on various schedules as shown in <u>Table 1</u>. Application phenology: GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold', 1C on 24 May, 2C on 9 June, 3C on 19 June, 4C on 9 July, 5C on 19 July, 6C 2 August, 7C on 16 August. Applications applied according to degree-day models were: OFM on 6 July, 1st CM appn. [1075DD] on 7 July; 2nd CM appn [1260DD] on 19 July; and 3rd CM appn. on 19 July.

Damage to fruit was assessed by randomly selecting 100 fruit at harvest maturity(4 Sept), removing to the laboratory, and scoring for external damage by each pest; subsequently, fruits were dissected to detect internal damage. PC damage is characterized by the typical crescent-shaped scar resulting from the flap of apple epidermis made by an ovipositing female. Damage by early Lepidoptera includes GFW & OBLR; external Lepidoptera includes OBLR and/or red banded leafroller. Damage from internal Lepidoptera is caused by codling moth and lesser apple worm. Data were converted to % damaged fruit, and transformed by arcsine prior to analysis by Fisher's Protected LSD.

Table 1. **Harvest evaluation of insecticides for controlling insect complex on apple fruit [1], Hudson Valley Lab., Highland, N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	% TPB	% E Lep	% EAS	% PC	% ext. LEP	% int. LEP	% AM t	% SJS	% Clean
			% Damaged [2] fruit								
Supracide	16.0 oz.	DD	8.2 a	0.0 a	0.0 a	15.3 abc	0.0 a	1.0 a	0.0 a	0.0 a	77.6 bc
2% oil	2.0 gal.	DD									
Lorsban 75WG	10.7 oz.	P									
Imidan 70WP	21.3 oz.	PF, 1C									
Mesa	6.7 oz.	PF									
Damoil	1.0 gal.	PF									
+ LI700	16.0 oz.	1C									
Imidan 70WP	16.0 oz.	2-6C									
Intrepid 2F	4.0 oz.	3-5C									
Calypso 4SC	1.3 oz.	P, PF	7.4 a	0.0 a	0.0 a	8.8ab	4.1 a	0.0 a	2.6 a	1.2 a	78.4 bc
Calypso 4SC	2.0 oz.	OFM model									
Imidan 70WP	16.0 oz.	1C-PC Model									
Calypso 4SC	1.3 oz.	P, PF, 5&6	4.6 a	0.5 a	0.0 a	5.5 a	2.6 a	0.0 a	0.5 a	1.0 a	85.3 c
Imidan 70WP	16.0 oz.	1C-PC Model									
Assail 70WP	1.1oz.	P, PF, 5-6C	5.3 a	0.6 a	0.0 a	32.2 cd	1.5 a	0.5 a	0.6 a	0.0 a	62.2 b
Imidan 70WP	16.0 oz.	1C-PC Model									
Assail 70WP	1.1oz	LateP, EarlyPF	5.9 a	0.0 a	0.0 a	21.7 abc	3.2 a	0.5 a	2.5 a	0.0 a	69.3 bc
Imidan 70WP	16.0 oz.	1C-PC Model									
Rimon 0.83SC	6.4 oz.	CM 75DD + 10D	13.6 a	2.5 a	6.6 abc	61.2 e	1.3 a	0.5 a	0.5 a	6.6 bcd	29.0 a
Imidan 70WP	16.0 oz.	4-6C									
Rimon 0.83SC	6.4 oz.	CM1075DD + 2 @ 10D	6.1 a	0.0 a	2.1 ab	25.0 bc	1.1 a	0.6 a	1.0 a	0.5 a	65.2 bc
Imidan 70WP	16.0 oz.	PF, 1C, 2C									
Imidan 70WP	21.3 oz.	P, PF-3C	3.3 a	0.0 a	2.0 ab	24.7 abc	0.7 a	0.7 a	1.3 a	6.4 a-d	63.5 bc
Imidan 70WP	16.0 oz.	4(AM)-6C									
Untreated	-	-	21.7 a	3.5 c	14.6 d	52.1 de	5.5 a	2.5 a	11.0 a	7.1 cd	28.6 a

1 Data from ' McIntosh' harvested on 4 September.
GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold'. CM 75DD on 11 May, 1C and 10dpCM 75DD on 24 May, 2C 9 June, 3C on 19 June, OFM model on 6 July, 1075DD for CM on 7 July, 4C on 9 July, 5C and 1260DD for CM and 2nd appl. for CM 1075DD on 19 July, 2nd appl for 1260DD for CM and 3rd appl. for CM 1075DD on 29 July, 6C on 2 August, 7C on 16 August.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Data transformed by arcsine prior to analysis - untransformed means are presented. Internal Lep. = codling moth, lesser apple worm, oriental fruit moth. External Lep. = oblique-banded leaf roller, red-banded leaf roller, sparganothis fruitworm, variegated leafroller, etc. AM t = apple maggot tunneling.

APPLE: *Malus domestica* 'McIntosh'

A predatory phytoseiid(AMB): *Amblyseius fallacis* (Garman)
European red mite (ERM): *Panonychus ulmi* (Koch)
Two-spotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)

EVALUATION OF INSECTICIDES AGAINST MITES, 2004: Treatments were applied to four-tree plots (one of which was '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 from 1.3 to 1.9 gal/tree or 130 to 190 gal/acre – the range in gallonage represents increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Trees on the M.26 rootstock were 10 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30.

Treatments were applied on various schedules as shown in Table 1. Application phenology: GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold', 1C on 24 May, 2C on 9 June, 3C on 19 June, 4C on 9 July, 5C on 19 July, 6C 2 August, 7C on 16 August. Applications applied according to degree-day models were: OFM on 6 July, 1st CM appn. [1075DD] on 7 July; 2nd CM appn [1260DD] on 19 July; and 3rd CM appn. on 19 July.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 23 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. Data were subjected to '$\log_{10}(X+1)$' transformation prior to analysis by Fisher's Protected LSD.

Phytophagous mite populations were very low in the experimental plots. Neither was there evidence of flaring of ERM and TSM populations, nor evidence of detriment to predatory mites.

Table 1. **Effects of insecticides on the mite complex of apple [1,2], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	Average number per leaf [7/23] ERM	ERME	TSM	TSME	AMB	ZM
Supracide	16.0 oz.	DD	<0.1 a	0.1 a	0.5 a	2.1 a	0.2 a	0.1 a
2% oil	2.0 gal.	DD						
Lorsban 75WG	10.7 oz.	P						
Imidan 70WP	21.3 oz.	PF, 1C						
Mesa	6.7 oz.	PF						
Damoil	1.0 gal.	PF						
+ LI700	16.0 oz.	1C						
Imidan 70WP	16.0 oz.	2-6C						
Intrepid 2F	4.0 oz.	3-5C						
Calypso 4SC	1.3 oz.	P, PF	0.1 a	0.1 a	0.1 a	0.1 a	0.1 a	4.3 d
Calypso 4SC	2.0 oz.	OFM model (7/1)						
Imidan 70WP	16.0 oz.	1C-PC Model						
Calypso 4SC	1.3 oz.	P, PF, 5&6	0.1 a	0.0 a	1.0 a	3.6 a	0.2 a	2.1 bcd
Imidan 70WP	16.0 oz.	1C-PC Model						
Assail 70WP	1.1oz.	P, PF, 5-6C	0.1 a	0.3 a	0.4 a	0.6 a	0.1 a	3.7 cd
Imidan 70WP	16.0 oz.	1C-PC Model						
Assail 70WP	1.1oz	LateP, EarlyPF	0.0 a	0.1 a	0.2 a	0.4 a	0.2 a	2.0 bcd
Imidan 70WP	16.0 oz.	1C-PC Model						
Rimon 0.83SC	6.4 oz.	CM 75DD + 10D	0.1 a	0.3 a	0.1 a	0.6 a	0.1 a	1.2 b
Imidan 70WP	16.0 oz.	4-6C						
Rimon 0.83SC	6.4 oz.	CM1075DD + 2 @ 10D	0.1 a	0.1 a	0.7 a	1.5 a	0.1 a	2.0 bcd
Imidan 70WP	16.0 oz.	PF, 1C, 2C						
Imidan 70WP	21.3 oz.	P, PF-3C	0.0 a	0.1 a	0.2 a	0.9 a	0.1 a	1.4 bc
Imidan 70WP	16.0 oz.	4(AM)-6C						
Untreated	-	-	0.1 a	0.1 a	0.3 a	0.3 a		0.1 a
1.9 bcd								

[1]Data from ' Red Delicious' evaluation on 23 July.
GT on 5 April, 1/2" GT on 15 April, DD on 18 April, Pink on 27 April, Late P on 27 April, King Bloom on 30 April, Early PF on 10 May, PF on 11 May @ 80% PF of 'Ginger Gold', 1C on 24 May, 2C on 9 June, 3C on 19 June, 4C on 9 July, 5C on 19 July, 6C 2 August, 7C on 16 August. Applications applied according to degree-day models were: OFM on 6 July, 1st CM appn. [1075DD] on 7 July; 2nd CM appn [1260DD] on 19 July; and 3rd CM appn. on 19 July

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

*ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; AMB = *Amblyseius fallacis* (100% *A. fallacies* of sample on 8/02/04; n = 18); ARM = apple rust mite *Aculus schlechtendali*

** Mites 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.

APPLE: *Malus domestica* 'Delicious'

A predatory phytoseiid(AMB): *Amblyseius fallacis* (Garman)
European red mite (ERM): *Panonychus ulmi* (Koch)
Twospotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)

MITE CONTROL WITH MITICIDES, 2004: Treatments were applied to four-tree plots (of which 'Delicious' was included) replicated four times. Treatments were applied dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering from 1.9 gal/tree or 190 gal/acre. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Treatments were applied once on 1 July (4th cover). Trees on the M.26 rootstock were 9 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30.

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 12 July and 26 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. Data were subjected to $\log_{10}$ (X+1) transformation prior to analysis by Fisher's Protected LSD.

ERM and TSM populations were low during 2004, and meaningful separation of treatments was not possible. The reasons for low mite populations are not clear; however ZM populations were quite high within some treatments, and may have accomplished biological control in these blocks.

Table 1. **Evaluation of miticides for controlling foliar feeding mite complex on apple [1,2], N.Y.S.A.E.S., Hudson Valley Lab.,Highland,N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	Mean no. of mites or eggs* / leaf** 12 July						
			ERM	ERME	TSM	TSME	AMB	ZM	ARM
1. Acramite 50WS Silwet Choice	5.33 oz. 3.0 oz. 2 qt.	4C	0.1	17.4	0.0	0.1	0.0	1.1	8.5
2. AgriMek 0.15EC Sunspray UF Oil	5.0 oz. 32.0 oz.	4C	1.6	4.7	0.0	0.1	0.1	0.0	12.6
3. Apollo SC	1.7 oz.	4C	0.3	5.3	0.0	0.0	0.2	0.8	10.9
4. Apollo SC FujiMite 5%	1.3 oz. 10.7 oz.	4C	0.0	12.0	0.0	0.1	0.0	0.8	9.4
5. Envidor 240SC	6.0 oz.	4C	0.0	7.1	0.0	0.1	0.0	0.2	11.4
6. Acramite 50WS	5.33 oz.	4C	0.0	3.9	0.0	0.0	0.0	2.1	19.5
7. Colloidal soap	1.0 gal.	4C	0.2	7.5	0.0	0.1	0.1	1.2	14.6
19. Untreated		-	4.8	12.5	0.1	0.3	0.1	0.5	15.8

(cont. following page)

Table 1 (cont.).

Treatment	Formulation amt./100 gal.	Timing	Mean no. of mites or eggs* / leaf** 26 July ERM	ERME	TSM	TSME	AMB	ZM	ARM
1. Acramite 50WS Silwet Choice	5.33 oz. 3.0 oz. 2 qt.	4C	0.0 a	8.6 a	0.0 a	0.1 a	0.0 a	0.6 c	11.7 a
2. AgriMek 0.15EC Sunspray UF Oil	5.0 oz. 32.0 oz.	4C	0.2 a	1.6 a	0.0 a	0.0 a	0.1 a	0.1 ab	8.8 a
3. Apollo SC	1.7 oz.	4C	0.1 a	2.2 a	0.0 a	0.0 a	0.0 a	0.2 b	27.4 a
4. Apollo SC FujiMite 5%	1.3 oz. 10.7 oz.	4C	0.0 a	1.0 a	0.0 a	0.0 a	0.0 a	0.1 ab	18.6 a
5. Envidor 240SC	6.0 oz.	4C	0.0 a	0.7 a	0.0 a	0.1 a	0.0 a	0.0 a	16.8 a
6. Acramite 50WS	5.33 oz.	4C	0.0 a	0.1 a	0.0 a	0.0 a	0.0 a	1.3 c	13.0 a
7. Colloidal soap	1.0 gal.	4C	0.0 a	0.1 a	0.0 a	0.0 a	0.0 a	1.3 c	24.6 a
19. Untreated		-	0.1 a	3.4 a	0.2 a	0.9 a	0.1 a	0.7 c	18.1 a

1 Data from ' Red Delicious'. Applications at 4C [1 July].
2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Data were transformed to log10(x+1) prior to analysis. Untransformed means presented.
* ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; AMB = *Amblyseius fallacis* (100% *A. fallacies* of sample on 8/02/04; n = 18); ARM = apple rust mite *Aculus schlechtendali*
** Mites 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.

APPLE: *Malus domestica* 'Delicious'

Rose leafhopper (RLH): *Edwardsaina rosae* McAtee
White apple leafhopper (WALH): *Typhlocyba pomaria* McAtee

EVALUATION OF INSECTICIDES AGAINST LEAFHOPPER PESTS OF APPLE, 2004: Treatments were applied to four-tree (of which 'Delicious' was included) plots 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, delivering1.3 to 1.9 gal/tree or 130 to 190 gal/acre – the range in gallonage represents increasing amounts of foliage as the season progressed. <u>All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees</u>. Trees on the M.26 rootstock were 9 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30.

Adult numbers were determined by sweeping the interior and exterior foliage with a portable vacuum device for 5-minutes. Nymph numbers were assessed by sampling 5 terminals per tree, evaluating 5 proximal leaves for PLH and 5 distal leaves for RLH. Leaf damage (stippling) assessments were made by a rating system where: 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage. Data were subjected to the $\log_{10}(X+1)$ transformation prior to analysis by Fisher's Protected LSD.

<u>Adults, 1st application</u> – Fujimite and Provado provided very good initial and residual knockdown of adult leafhoppers, providing significantly reduced populations at 2d and 10d postapplication, respsectively (<u>Table 1</u>).

<u>Adults, 2nd application</u> – Under relatively high adult populations, all materials provided high degrees of adult reductions at 7d postapplication.

<u>Nymphs</u> – Applaud and Provado provided quick knockdown of leafhopper nymphs, while Fujimite appeared to act more slowly against this stage.

<u>Foliar damage, both applications</u> - Leaf damage ratings showed that single applications of Fujimite and Provado made during mid-June and early-July provided significantly lower damage than did Applaud.

Table 1. Evaluation of insecticides for control of adult rose leafhopper on apple, [1,2], Hudson Valley Lab., Highland, N.Y.-2004

—First Application —

Treatment	Formulation amt./100 gal.	Timing	Pre-application 7 June # LH adults	(2d post) 16 June[3] # LH adults	% LH reduction[3]
FujiMite 5%	10.7 oz.	14 June	6.8 a	1.5 a	77.9 %
Applaud 70DF	4.0 oz.	14 June	3.0 a	6.8 b	- 55.8 %
Provado 1.6F	2.0 oz.	14 June	4.3 a	0.8 a	81.4 %
Untreated	-	-	5.0 a	8.3 b	- 39.8 %

Treatment	Formulation amt./100 gal.	Timing	(10d post) 24 June # LH adults	% LH reduction[3]
FujiMite 5%	10.7 oz.	14 June	1.3 a	91.2
Applaud 70DF	4.0 oz.	14 June	6.5 b	- 53.8
Provado 1.6F	2.0 oz.	14 June	0.5 a	88.4
Untreated	-	-	8.3 b	- 39.8

—Second Application —

Treatment	Formulation amt./100 gal.	Timing	Pre-application 24June # LH adults	(7d post) 15 July # LH adults	% LH reduction[3]
FujiMite 5%	10.7 oz.	7 July	1.3 a	0.0 a	100.0
Applaud 70DF	4.0 oz.	7 July	6.5 a	0.3 a	90.9
Provado 1.6F	2.0 oz.	7 July	0.5 a	0.0 a	100.0
Untreated	-	-	8.3 a	16.5 b	- 78.8

[1]Data from 'Delicious'. Evaluation of LH nymphs by observing # nymphs / 5 mid-terminal leaves; LH adults by 5 minute vacuum sweeps of foliage. Species composition: 97% RLH, 3% WALH.
[2]Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
[3]Negative number indicates a population increase.

Table 1. (cont.) **Evaluation of insecticides for control of rose leafhopper nymphs on apple,[1,2] Hudson Valley Lab., Highland, N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	**6/10** (Pre-application) # LH nymps /25 lvs.	**6/16** (2d post) # LH Nymph /25 lvs.	% nymph[3] reduction
FujiMite 5%	10.7 oz.	14 June	2.5 a	2.6	-3.9 %
Applaud 70DF	4.0 oz.	14 June	6.3 a	1.1	83.2 %
Provado 1.6F	2.0 oz.	14 June	7.3 a	0.9	88.2 %
Untreated	-	-	5.3 a	7.3	-38.2 %

[1]Data from 'Delicious'. Evaluation of LH nymphs by observing # nymphs / 5 mid-terminal leaves; LH adults by 5 minute vacuum sweeps of foliage. Species composition: 97% RLH, 3% WALH.
[2]Mean separation by Fishers Protected LSD ($P=<0.05$). Treatment means followed by the same letter are not significantly different.
[3]Negative number indicates a population increase.

Table 2. **Evaluation of insecticides for control of rose leafhopper foliar damage on apple[1], Hudson Valley Lab., Highland, N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	**6 July** Leaf rating 0-5 stipling damage	**2 August** Leaf rating 0-5 stipling damage.
FujiMite 5%	10.7 oz.	7 July, 14 June	0.26 a	0.37 a
Applaud 70DF	4.0 oz.	7 July, 14 June	0.29 a	0.60 b
Provado 1.6F	2.0 oz.	7 July, 14 June	0.37 ab	0.45 a
Untreated	-	-	0.49 b	1.51 c

[1]Data from ' Red Delicious'. Evaluation of rose leafhopper nymph feeding (stippling) on 6 July. Rating system where: : 0 = 0% damage; 1 = 1-10% damage; 2 = 11-25% damage; 3 = 26-50% damage; and 4 = >50% damage

APPLE: *Malus domestica* 'Liberty'; 'Jersey Mac'

Codling moth (CM): *Cydia pomonella* (Linnaeus)
European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)

EFFICACY OF CARBARYL AGAINST PLUM CURCULIO WHEN USED AT PETAL FALL FOR APPLE THINNING, 2004: Carbaryl (Sevin XLR) is being increasingly recommenced at petal fall for crop load adjustment on hard to thin apple cultivars. Because the effects of such treatment on plum curculio are unknown, we compared XLR (1.0 pt/100) applied at PF and at PF/1C, XLR tank mixed with Guthion applied at PF and at PF/1C, a Guthion standard (8 & 10 oz/100) and a Warrior standard. Damage to fruit was assessed by randomly selecting 100 fruits on 28 May (8d post application) and scoring for external damage by PC adults. Damage data were converted to percent damage and transformed by arcsine prior to analysis by Fisher's Protected LSD.

Treatments were applied to two-tree plots, each representing a separate cultivar ('Liberty'&'Jersey Mac') replicated four times in a randomized complete block design. Treatments were applied (PF and/or 1C; all treatments received Asana at pink) dilute to runoff using a high-pressure handgun sprayer operated at 300 psi, delivering 1.5 gal/tree or 150 gal/acre. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Scions topworked on M.26 rootstock were 6 yr-old, approximately 10 ft high. See Table 1 for application dates.

The results suggest that XLR (1.0 pt/100) when applied in single or multiple application scenarios is efficacious against curculio and can substitute for Guthion in early sprays. Moreover, tank mixing with Guthion for management of curculio is unnecessary.

Table 1. Insecticidal effects of Sevin XLR when applied as an apple thinning agent[1]
Hudson Valley Lab., Highland, N.Y. - 2004

			% Damaged[2] fruit ['Liberty']				
Treatment	Formulation amt./100 gal.	Timing	% TPB	% PC	% EAS	% LEP	% Clean
Sevin XLR Guthion 50WP	1.0 pt. 8.0 oz.	PF -1C 2C-6C	2.5 a	0.0 a	0.3 a	0.3 a	97.0
Sevin XLR Guthion 50WP	1.0 pt../100 8.0 oz./100	1C PF, 2C-6C	1.0 a	0.3 a	0.3 a	0.0 a	98.5
Sevin XLR uthion 50WP	1.0 pt../100 8.0 oz./100	PF -1C PF, 1C-6C	0.0 a	0.8 a	1.3 a	0.3 a	98.3
Guthion 50WP Sevin XLR Guthion 50WP	8.0 oz./100 1.0 pt../100 8.0 oz./100	PF, 1C 1C 2C-6C	0.8 a	0.3 a	1.0 a	0.0 a	98.0
Guthion 50WP	8.0 oz./100	PF-6C	0.3 a	0.0 a	1.3 a	0.0 a	97.5
Guthion 50WP	10.0 oz./100	PF-6C	0.5 a	0.0 a	0.0 a	0.0 a	99.5
Warrior	1.7 oz./100	PF-6C	2.5 a	1.5 a	1.8 a	0.0 a	94.3
Untreated	-	-	1.5 a	19.5 a	23.9 a	1.8 a	53.3

[1]Data from ' Liberty' evaluation on 21 May. All treatments received Asana XL @ 5.0 oz / 100 at 'pink'.
[2]Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.

PF on 12 May @ 80% PF of JM; 1C on 24 May; 2C on 8 June; 3C on 18 June; 4C on 6 July; 5C on 20 July; and 6C on 3 August.

Table 1 (con't).

Treatment	Formulation amt./100 gal.	Timing	% TPB	% PC	% EAS	% LEP	% Clean
			% Damaged [2] fruit ['Jersey Mac']				
Sevin XLR Guthion 50WP	1.0 pt. 8.0 oz.	PF -1C 2C-6C	0.0a	0.0a	0.0a	0.0a	100.0
Sevin XLR Guthion 50WP	1.0 pt../100 8.0 oz./100	1C PF, 2C-6C	0.0a	1.3a	0.0a	0.0a	98.8
Sevin XLR uthion 50WP	1.0 pt../100 8.0 oz./100	PF -1C PF, 1C-6C	1.5a	0.0a	0.3a	0.3a	98.0
Guthion 50WP Sevin XLR Guthion 50WP	8.0 oz./100 1.0 pt../100 8.0 oz./100	PF, 1C 1C 2C-6C	0.5a	0.0a	0.0a	0.0a	99.5
Guthion 50WP	8.0 oz./100	PF-6C	0.3a	0.3a	0.0a	0.0a	99.5
Guthion 50WP	10.0 oz./100	PF-6C	0.5a	0.5a	0.0a	0.0a	99.0
Warrior	1.7 oz./100	PF-6C	0.3a	0.5a	0.3a	0.0a	99.0
Untreated	-	-	2.5a	29.3a	5.5b	1.0b	61.8

[1.] Data from ' Jersey Mac' evaluation on 21 May. All treatments received Asana XL @ 5.0 oz / 100 at 'pink'.

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

PF on 12 May @ 80% PF of JM; 1C on 24 May; 2C on 8 June; 3C on 18 June; 4C on 6 July; 5C on 20 July; and 6C on 3 August.

APPLE: *Malus domestica* 'Honey Crisp'; 'Cortland'; 'Rome Beauty'

Apple maggot (AM): *Rhagoletis pomonella* (Walsh)
Codling moth (CM): *Cydia pomonella* (Linnaeus)
European apple sawfly (EAS): *Hoplocampa testudinea* (Klug)
Obliquebanded leafroller (OBLR): *Choristoneura rosaceana* (Harris)
Plum curculio (PC): *Conotrachelus nenuphar* (Herbst)
Rosy Apple Aphid (RAA): *Dysaphis plantaginea* (Passerini)
Tarnished plant bug (TPB): *Lygus lineolaris* (P. de B.)

A predatory phytoseiid(AMB): *Amblyseius fallacis* (Garman)
European red mite(ERM): *Panonychus ulmi* (Koch)
Twospotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)

EFFECTIVE AND ECONOMIC ALTERNATIVES TO AZINPHOSMETHYL: FIELD EVALUATION OF PHOSMENT AND PYRETHROID SCHEDULES, 2004: The current FQPA-IRED (Interim Reregistration Eligibility Document) for azinphos-methyl usage on apple will eventually reduce the permissible annual maximum amount from 9.0 lbs/acre to 8.0 lbs/acre. Additional limitations including a 14 day pre harvest interval (PHI), and a restricted-entry interval (REI) of 14 days for all activities, has further restricted the use of this insecticide, and thus alternative materials to fill the pest management void are required. We evaluated a maximum-use-rate azinphos-methyl schedule relative to multiple rates and schedules of phosmet and three pyrethroid insecticides (e.g., Asana™, Danitol™ and Warrior™).

Treatments were applied to single- tree plots 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 ca. 300 gal/acre. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Trees on M.26 rootstock were 20 yr-old, and approximately 10 ft high. Specific treatments and application schedules are shown in Table 1a. Because of space restraints, mite trials were performed in a commercial orchard and had an abbreviated number of treatments.

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. In a separate commercial orchard, phytophagous and predacious mite populations were evaluated by sampling 25 leaves from each plot on 28 May, 11 Jun, 29 Jun, 8 July, 22 July, and 3 Aug. Leaves were removed to the laboratory, brushed with a mite-brushing machine, and the mites and eggs examined using a binocular scope. All leaves from the 3 Aug samples were assessed for color differences by use of a Minolta CR-300 Chroma Meter (L*C*h color space). On 18 Aug and 15 Oct, 25 each 3-inch cuttings from 2-3 yr-old shoots from each treatment were examined for eggs of European red mite and phytoseiids (only *Amblyseius fallacis* found). Data were analyzed by Fisher's Protected LSD.

Infestation pressure from insects in the Hudson Valley Lab research orchard was generally high and damage at harvest was moderate to severe, depending upon the insect species. Severe damage was due in part, to tree age and size, *e.g.*, few fruit resulting in frequent and multiple visitations per individual fruit. In the trial performed at the HVL research site, Guthion was evaluated as a reduced schedule – one that utilizes only the maximum number of lbs/acre/season as dictated by recent FQPA IRED's .

Based on percent clean fruit (Table 1a), Imidan at the high rate, and the pyrethroids performed better than the Guthion schedule. Treatment effects on mite p[opulations were evaluated in a commercial orchard (Table 1b). Based on cumulative mite days, pyrethroid schedules allowed significantly fewer CMD's than did the organophosphate Imidan schedule, *i.e.*, pyrethroids did not flair mites Pyrethroid schedules however, were vry detrimental to predacious mites (Table 1c). Based on European red mite ovewintering egg counts (Table 1d), Danitol and Warrior treatments (that included oil) had very low egg numbers. In general, pyrethroid schedules had fewer predacious mites than the Imidan schedule.

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Table 1a. Effective and economic alternatives to azinphnosmethyl: field evaluation of phosmet and pyrethriod schedules[1], Hudson Valley Lab., Highland, N.Y.-2004

			% Damaged [2] fruit						
Treatment	Formulation amt./100 gal.	Timing	% TPB	% PC	% EAS	% ext. LEP	% int. LEP	% AM t	% Clean
1. Guthion 50WP Guthion 50WP	10.0 oz./100 4.0 oz./100	PF -1C 2C, 4-6C	27.0 a	34.0 bc	2.0 a	3.0 ab	0.0 a	0.0 a	47.0 bc
2. Imidan 70WP	12.0 oz./100	PF -6C	32.0 a	44.8 c	<0.1 a	3.0 ab	2.0 a	1.9 ab	35.9 b
3. Imidan 70WP	16.0 oz./100	PF -6C	29.6 a	25.8 abc	2.0 a	5.0 ab	0.0 a	0.0 a	56.5 cd
4. Imidan 70WP	20.0 oz./100	PF -6C	12.9 a	16.0 ab	2.0 a	3.0 ab	2.0 a	0.0 a	70.4 d
5. Danitol	3.6 oz./100	PF -6C	24.8 a	24.3 ab	<0.1 a	2.0 ab	0.0 a	1.0 ab	53.1 bcd
6. Asana XL	4.8 oz./100	PF -6C	17.3 a	13.3 a	<0.1 a	9.3 b	0.0 a	2.7 ab	69.3 d
7. Warrior	0.87 oz./100	PF -6C	35.0 a	20.3 ab	2.1 a	3.1 ab	0.0 a	0.0 a	57.0 cd
8. Warrior	1.71 oz./100	PF -6C	22.0 a	14.0 a	3.0 a	2.0 ab	0.0 a	0.0 a	68.0 d
9. Untreated	-	-	24.3 a	94.0 d	2.0 a	40.6 c	25.3 b	16.2 c	3.0 a

1 Data from 'Cortland' evaluation on 23 August.
PF sprays applied on 13 May (@ 80% PF of Cortland), 1C on 27 May, 2C on 10 June, 3C on 18 June, 4C on 7 July, 5C on 26 July, 6C on 9 August.

2 Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Untransformed means presented. Internal Lep. = codling moth, lesser appleworm, oriental fruit moth. External Lep. = oblique-banded leaf roller, red-banded leaf roller, sparganothis fruitworm, variegated leafroller, etc. AM t = apple maggot tunneling.
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Table 1b. **Effective and economic alternatives to azinphosmethyl: field evaluation of phosmet and pyrethriod schedules – Stone Ridge Orchards, Stone Ridge NY – 2004.**

	Treatment	Formulation amt./100 gal.	Timing	— MITES — Cumulative mite days / sample period ERM 28 May	ERM 11 June	ERM 29 June	ERM 8 July	ERM 22 July	ERM 3 Aug.	Total[1] cumulative mite days	Colorimeter values[2] L	H°
1	Imidan 70WP	20.0 oz.	PF – 6C	1.4	11.2	30.1	57.4	78.4	36.8	215.3 b	41.2 e	121.4 a
2	Danitol	3.6 oz.	PF – 6C	0.7	2.1	2.1	2.8	2.8	4.6	15.1 a	36.1 bc	130.8 de
3	Asana XL	4.8 oz.	PF – 6C	0.7	6.3	9.1	15.4	51.8	44.1	127.4 a	38.2 d	126.6 c
4	Warrior	1.71 oz.	PF – 6C	1.4	4.2	4.2	11.9	30.8	21.4	73.9 a	37.4 d	129.3 d
5	Warrior + Damoil	1.71 oz. 0.5 gal.	PF – 6C PF – 6C	1.4	4.9	4.9	3.5	7.0	10.2	31.9 a	35.2 a	131.2 e
6	Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.6 oz.	PF – 6C 1, 3, 5C 1, 3, 5C	1.4	4.2 s	4.2	4.2	11.9	10.5	36.4 a	36.4 c	130.3 de
7	Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.71 oz.	PF, 2, 4, 6C 1, 3, 5C 1, 3, 5C	1.4	4.9	4.9	5.6	11.2	7.0	35.0 a	35.5 ab	130.9 e
8	Untreated	-	-	2.1	15.4	32.9	56.7	58.1	29.4	194.6 a	40.7 e	123.5 ab

Mean separation by Fishers Protected LSD (P=<0.05) after transformation by 'square root of X'. Treatment means followed by the same letter are not significantly different. Untransformed means are presented.

[1]Cumulative mite days = $[0.5(mpl_1 + mpl_2]*d_{1-2}$, where mpl_1 is the number of mites per leaf at time 1, mpl_2 is the number of mites per leaf at time 2, and d_{1-2} is the number of days elapsed between the 2 counts.

[2]L = light absorption (high value being lighter); H° = Hue angle (angle of hue on color wheel. Higher value being greener [toward 180°] versus lower value [toward 90°] being more yellow).

Table 1c. **Effective and economic alternatives to azinphosmethyl: field evaluation of phosmet and pyrethriod schedules – Stone Ridge Orchards, Stone Ridge NY – 2004.**

Treatment	Formulation amt./100 gal.	Timing	ERM	ERME	TSM	— MITES — 10 August TSME	ZM	AMB	ARM
1 Imidan 70WP	20.0 oz.	PF – 6C	4.7 bc	58.7 d	0.0 a	0.8 a	0.7 a	0.6 c	1.3 a
2 Danitol	3.6 oz.	PF – 6C	0.9 a	12.9 abc	0.0 a	0.1 a	0.0 a	0.0 a	4.3 a
3 Asana XL	4.8 oz.	PF – 6C	10.9 c	81.0 d	0.2 a	0.5 a	0.0 a	0.0 a	7.0 a
4 Warrior	1.71 oz.	PF – 6C	4.5 bc	40.9 cd	0.2 a	0.3 a	0.0 a	0.0 a	4.1 a
5 Warrior + Damoil	1.71 oz. 0.5 gal.	PF – 6C PF – 6C	2.5 ab	23.7 ab	0.0 a	0.1 a	0.0 a	0.0 a	1.3 a
6 Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.6 oz.	PF – 6C 1, 3, 5C 1, 3, 5C	2.5 ab	24.9 bcd	0.0 a	0.2 a	0.0 a	<0.1 a	3.4 a
7 Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.71 oz.	PF, 2, 4, 6C 1, 3, 5C 1, 3, 5C	1.5 a	9.2 a	0.0 a	0.1 a	0.0 a	<0.1 a	1.0 a
8 Untreated	-	-	2.9 ab	33.3 bcd	0.0 a	0.5 a	0.4 a	0.4 b	3.6 a

1. Data from ' Rome'. Mite sampled by examining 25 terminals leaves per tree using mite brushing machine to remove mite onto soaped glass plates for evaluation.
2. Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Untransformed means presented.

Table 1d. **Effective and economic alternatives to azinphosmethyl: field evaluation of phosmet and pyrethriod schedules – Stone Ridge Orchards, Stone Ridge NY – 2004.**

Treatment	Formulation amt./100 gal.	Timing	— MITES — # eggs / 3 inch shoot section [1,2] 18 Aug. ERME	AMB
1 Imidan 70WP	20.0 oz.	PF – 6C	54.0 c	0.2 bc
2 Danitol	3.6 oz.	PF – 6C	1.0 a	0.1 ab
3 Asana XL	4.8 oz.	PF – 6C	52.8 c	0.1 ab
4 Warrior	1.71 oz.	PF – 6C	43.4 c	0.1 ab
5 Warrior + Damoil	1.71 oz. 0.5 gal.	PF – 6C PF – 6C	15.8 bc	0.0 a
6 Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.6 oz.	PF – 6C 1, 3, 5C 1, 3, 5C	3.1 ab	0.0 a
7 Warrior + Damoil + Proclaim	1.71 oz. 0.5 gal. 1.71 oz.	PF, 2, 4, 6C 1, 3, 5C 1, 3, 5C	4.0 ab	0.1 ab
8 Untreated	-	-	36.5 c	0.3 c

[1]Data from ' Rome'. Mite sampled by examining 3" cuttings, taken from 2-3 year old shoots, under ≥ 18X magnification for evaluation .
* ERME = European red mite *Panonychus ulmi*; AMB = *Amblyseius fallacis* (95.9% *A. fallacies*, 4.1% *T. pyri*., of sample on 8/02/04; n = 24); ARM = apple rust mite *Aculus schlechtendali*
[2]Mean separation by Fishers Protected LSD (P=<0.05).after transformation by 'square root X'. Treatment means followed by the same letter are not significantly different. Untransformed means presented.

APPLE: *Malus domestica* 'Ginger Gold' / 'Delicious'

Apple maggot (AM): *Rhagoletis pomonella* (Walsh)
Stink bug (SB): *Acrosternum hilare* (Say)

A predatory phytoseiid(AMB): *Amblyseius fallacis* (Garman)
European red mite (ERM): *Panonychus ulmi* (Koch)
Twospotted spider mite (TSM): *Tetranychus urticae* Koch
A predatory stigmaeid (ZM): *Zetzellia mali* (Ewing)

EVALUATION OF REDUCED-RISK INSECTICIDES AGAINST APPLE MAGGOT AND EFFECTS ON MITES, 2004: Treatments were applied to single-tree plots 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 from 1.3 to 1.9 gal/tree or 130 to 190 gal/acre – the range in gallonage represents increasing amounts of foliage as the season progressed. All insecticide dilutions (presented as amt/100 gal) are based on a standard of 300 gal/acre trees. Trees on the M.26 rootstock were 8 yr-old, approximately 10 ft high and planted to a research spacing of 10 x 30. Treatments were applied on various schedules as shown in Tables 1 & 2. Application phenology: tight cluster (TC) 4/25; pink (P)=4/29; petal fall (PF)=5/20; first cover (1C)=5 /30; 4C=7/1; 5C=7/20; and 6C=7/30

Insect damage to fruit ('Ginger Gold') 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. Phytophagous and predacious mite populations were evaluated by sampling 25 leaves ('Delicious) from each plot on 2 Aug. 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. Data were transformed by arcsine (% damaged fruit) and $\log_{10}(X+1)$ (mite counts) prior to analysis by Fisher's Protected LSD.

Damage to 'Ginger Gold' fruit was assessed on 13 Aug (Table 1). Only Assail, Imidan and Sevin XLR allowed damage levels below 95%. The performance of Avaunt and Spintor was poor. Because of excessive rainfall (Fig. 1) during the AM oviposition period, it is likely that poor efficacy was due in part, to lack of rainfastness. Although neonicotinoids have generally shown a propensity to flair mites, only Assail had apparent effect on ERM (Table 2). Warrior was significantly detrimental to predatory mites.

Table 1. Evaluation of conventional and reduced-risk insecticides for controlling late season pests on apple [1,2], Cornell's Hudson Valley Lab., Highland, N.Y.-2004

Treatment	Formulation amt./100 gal.	Timing	% fruit damage ['Ginger Gold']* AM tunnels	SB	% Clean
Assail 70WP	1.1 oz.	4-6C	0.7 a b	15.1 a	99.3 b c
Imidan 70WP	16.0 oz.	4-6C	1.1 a b	10.9 a	98.9 b c
Sevin XLR 4EC	16.0 oz.	4-6C	1.6 a b	13.0 a	98.4 b c
Provado 1.6F	2.0 oz.	4-6C	4 a b	13.0 a	96.0 b c
Warrior	1.7 oz	4-6C	9.3 a b	16.0 a	90.7 b c
Untreated		-	11.4 a b	12.2 a	89.1 b
Avaunt 30WDG	2.0 oz.	4-6C	13.4 b	17.9 a	86.6 b
SpinTor 2SC	2.5 oz.	4-6C	46.7 c	12.9 a	53.3 a

[1]Data from 'Ginger Gold' on 13 August. Applications at 5 fly / trap threshold on 4C @ 1 July, 5C @ 20 July, 6C @ 30 July.
[2]Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different. Data were transformed by 'arc sin' prior to analysis. Untransformed means presented.
* AM = apple maggot tunneling; SB = stink bug feeding sites (not contributing to % damage value)

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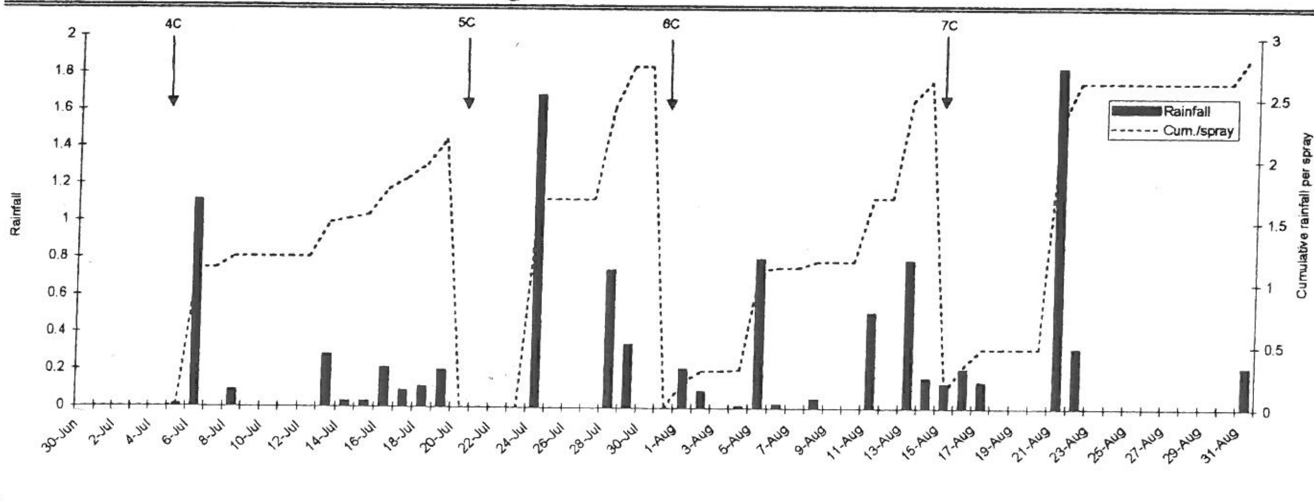
Figure 1. Rainfall events[1] between cover sprays for apple maggot, Hudson Valley Lab., Highland,NY – July and August, 2004.



[1]Columns represent rainfall events, lines indicate cumulative rainfall post application (arrows).
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Table 2. **Effect of conventional and reduced-risk insecticides on the mite complex of apple [1,2], Cornell's Hudson Valley Lab., Highland, N.Y.-2004**

Treatment	Formulation amt./100 gal.	Timing	Mean no. of mites or eggs* / leaf** 2 August						
			ERM	ERME	TSM	TSME	AMB	ZM	ARM
Provado 1.6F	2.0 oz./100	4-7C	0.1 a	1.0 a	2.5 a	4.9 a	0.2 a	0.8 bc	19.4 a
Assail 70WP	1.1 oz./100	4-7C	3.1 a	25.2 a	0.0 a	0.0 a	0.1 a	1.8 c	11.7 a
Imidan 70WP	16.0 oz./100	4-7C	0.2 a	3.8 a	0.3 a	0.6 a	0.1 a	1.1 bc	11.1 a
Warrior	1.71 oz./100	4-7C	0.0 a	2.5 a	0.0 a	0.1 a	0.0 a	0.1 a	16.2 a
SpinTor 2SC	2.5 oz. / 10	4-7C	0.4 a	4.5 a	1.6 a	6.7 a	0.2 a	0.9 bc	12.3 a
Avaunt 30WDG	2.0 oz. / 10	4-7C	0.5 a	8.6 a	0.0 a	0.9 a	0.1 a	2.2 c	16.8 a
Sevin XLR 4EC	16.0 oz./100	4-7C	1.0 a	6.7 a	0.0 a	0.1 a	0.0 a	0.5 b	16.8 a
Untreated		-	0.1 a	1.9 a	0.2 a	0.6 a	0.0 a	0.9 bc	16.5 a

[1]Data from ' Red Delicious' on 2 Aug. Applications began at 5 fly / trap threshold: 4C @ 1 July, 5C @ 20 July, 6C @ 30 July.
[2]Mean separation by Fishers Protected LSD (P=<0.05). Treatment means followed by the same letter are not significantly different.
Data were transformed by $\log_{10}(X+1)$ prior to analysis. Untransformed means presented.
*ERM = European red mite *Panonychus ulmi*; TSM = Two spotted spider mite *Tetranychus urticae* ; ZM = *Zetzellia mali*; AMB = *Amblyseius fallacis* (100% *A. fallacis* of sample on 8/02/04; n = 18); ARM = apple rust mite *Aculus schlechtendali*

PEAR: *Pyrus communis* L. 'Bartlett'

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

PEAR PSYLLA CONTROL WITH CONVENTIONAL INSECTICIDE PROGRAMS, 2003: 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 25 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 200 GPA.

A two-part experiment was used to evaluate insecticidal effects on psylla adults and the subsequent generation of nymphs. For PART A, insecticide emulsions were applied as split-applications on 11 May, and 12 days later on 23 May. The objective was to assess the impact of standard application timings on springform (overwintered) adults and oviposition. Effects on 1st generation nymphs were also assessed. For PART B, a single application (4 June) was used to evaluate insecticide effects on summerform adults and oviposition, and on subsequent 2nd generation nymphs. Adult numbers were assessed by 3-minute vacuum sweeps of foliage using a handheld vacuum to which was connected 500 mL screened nalgene bottles. Nymph numbers were assessed by sampling five terminals/treatment – from each one proximal, one distal, and three mid-terminal leaves (25 leaf samples) were examined. Samples were removed to the laboratory, where nymphs and eggs were counted using a binocular scope. Data were transformed by $\log_{10}(X+1)$ prior to analysis by Fisher's Protected LSD test.

Against springform adults (Table 1.), all treatments significantly reduced adult numbers @17d after the 1st application. At 9d after the 2nd application however, only AgriMek and Assail maintained that degree of control. Regarding subsequent 1st generation nymphs the 1st treatment of the split-application had no effect, while the 2nd application significantly reduced both nymphs and egg numbers.

Against summerform adults (Table 2), all treatments significantly reduced adults, but Actara was superior. At 4d postapplication, all treatments significantly reduced nymphs and eggs, but @ 24d postapplication, only AgriMek significantly reduced both life stages.

Results suggest that Actara, Assail and AgriMek have adulticide activity when applied according to the standard split-application method currently prescribed for early-season psylla control. It is also suggested that a specific application of AgriMek or Actara against summerform adults during early June significantly reduces adult numbers and significantly reduces egg numbers arising from that adult generation.

Table 1 (PART A). Evaluations of insecticide schedules against springform pear psylla adults and 1st generation nymphs on Hudson Valley Lab., Highland, N.Y.-2004.

Treatment		Formulation amt./100 gal.	Application Dates	Springform Adults[1] 5/28 # / 3 min.	6/2 # / 3 min.
1	Actara 25 WG	0.69 oz	5/11, 5/23	5.0 a	17.9 ab
	+ Damoil	32.0 oz.	5/11, 5/23		
2	AgriMek 0.15EC	2.5 oz.	5/11, 5/23	3.8 a	4.9 a
	+ Damoil	32.0 oz.	5/11, 5/23		
3	Assail	0.43 oz.	5/11, 5/23	4.8 a	7.2 a
	+ Damoil	32.0 oz.	5/11, 5/23		
4	Untreated	-	-	24.5 b	31.0 b

Table 1 (cont).

Treatment		Formulation amt./100 gal.	Application Dates	1st Generation Nymphs & Eggs[1] 5/20 # nymps / leaf*	5/20 # eggs / leaf*
1	Actara 25 WG	0.69 oz	5/11, 5/23	0.3 a	0.8 a
	+ Damoil	32.0 oz.	5/11, 5/23		
2	AgriMek 0.15EC	2.5 oz.	5/11, 5/23	0.3 a	0.7 a
	+ Damoil	32.0 oz.	5/11, 5/23		
3	Assail	0.43 oz.	5/11, 5/23	0.4 a	0.4 a
	+ Damoil	32.0 oz.	5/11, 5/23		
4	Untreated	-	-	0.7 a	1.0 a

Treatment		Formulation amt./100 gal.		1st Generation Nymphs & Eggs[1] 6/2 # nymphs / leaf*	6/2 # eggs / leaf*
1	Actara 25 WG	0.69 oz		1.1 b	5.0 b
	+ Damoil	32.0 oz.			
2	AgriMek 0.15EC	2.5 oz.		0.7 a	2.4 a
	+ Damoil	32.0 oz.			
3	Assail	0.43 oz.		1.0 ab	5.1 b
	+ Damoil	32.0 oz.			
4	Untreated	-	-	3.7 c	24.7 c

[1]Treatment means followed by the same letter are not significantly different ($P<0.5$; Fishers protected LSD). Springform treatments - Petal Fall (PF) on 11 May; 2nd split application 12dp application. on 23 May. Leaf samples taken from 2 apical, 2 basal, and 1 mid-terminal foliage. All treatments received Imidan70W @ 1C for pear midge & curculio.

Table 2 (PART B). Evaluation of insecticide schedules against summerform pear psylla adults and 2nd generation nymphs Hudson Valley Lab., Highland, N.Y.-2004

				Summerform Adults[1]		
Treatment	Formulation amt./100 gal.	Appln. Dates	Precount # / 3 min.	6/14 # / 3 min.	% Redn.	Adjust.[2]
1 Actara 25 WG	1.4 oz	6/4	17.9 a	1.2 a	93.2	92.5
+ Damoil	32.0 oz.	6/4				
2 AgriMek 0.15EC	5.0 oz.	6/4	4.9 a	1.2 a	75.2	72.5
+ Damoil	32.0 oz.	6/4				
3 Assail	0.8 oz.	6/4	7.2 a	3.1 a	56.7	52.0
+ Damoil	32.0 oz.	6/4				
4 Untreated	-	-	31.0 a	28.0 b	9.8	-

			2nd Generation Nymphs & Eggs[1]	
Treatment	Formulation amt./100 gal.	Application Dates	6/8 # nymphs/leaf*	6/8 # eggs / leaf*
1 Actara 25 WG	0.69 oz	6/4	0.5 a	3.0 a
+ Damoil	32.0 oz.	6/4		
2 AgriMek 0.15EC	2.5 oz.	6/4	0.4 a	3.2 a
+ Damoil	32.0 oz.	6/4		
3 Assail	0.43 oz.	6/4	0.4 a	4.1 a
+ Damoil	32.0 oz.	6/4		
4 Untreated	-	-	4.9 b	27.0 b

Treatment	Formulation amt./100 gal.		7/2 # nymphs / leaf*	7/2 # eggs / leaf*
1 Actara 25 WG	0.69 oz		1.4 b	2.0 b
+ Damoil	32.0 oz.			
2 AgriMek 0.15EC	2.5 oz.		0.4 a	0.3 a
+ Damoil	32.0 oz.			
3 Assail	0.43 oz.		2.7 c	2.5 b
+ Damoil	32.0 oz.			
4 Untreated	-	-	3.0 c	2.5 b

[1]Treatment means followed by the same letter are not significantly different (P<0.5; Fishers protected LSD). Summerform treatments applied on 4 June. Leaf samples taken from 2 apical, 2 basal, and 1 mid-terminal foliage.
[2]Corrected for untreated mortality by Abbott's formula.

SWEET CORN: 'Ambrosia'

Corn leaf aphid (CLA): *Rhopalosiphum maidis*

APHID CONTROL ON SWEET CORN WITH FOLIAR SPRAYS OF INSECTICIDES, 2004: Results of previous experiments suggested that a single whorl-spray of Warrior (lambda-cyhalothrin) provided suppression of sweet corn tassel and ear infestations by corn leaf aphid. This method of aphid management was studied further during 2004.

'Ambrosia' was planted 25 May and 28 June in Tioga silt-loam soil at New Paltz, NY. Treatments were arranged in 2-row plots 488 ft. long, replicated 4 times in a randomized block design. Insecticide emulsions were applied by high-clearance sprayer (3 MPH), through a single D3-25 cone nozzle, directed over the row, dispensing 51 GPA @ 100 PSI. For each planting date, experiments were configured in a split-plot design with main-plots being application date (40% TLR and EGT) and sub-plots being insecticide treatment. Tassel leaf ratio (TLR) is based on measurement of extended leaf height relative to maximum height of the embryonic tassel within the plant. Early green tassel (EGT) is the stage of plant growth at which the tassel is just emerging and unfolding from within leaf sheath. Sub-plot treatments were applied 15 July (40% TLR) and 22 July (EGT) and 4 Aug (40% TLR) and 11 Aug (EGT) for the mid-season and late-season experiments, respectively.

The following insecticide treatments were evaluated: Penncap M @3 pts/acre; Assail (neonicotinoid) @ 3.0 oz/acre; Actara (neonicotinoid) @ 3.0 oz/acre; Calypso (neonicotinoid) @ 3.0 oz/acre; Warrior @ 3.0 oz/acre; Lannate @ 1.5 pt/acre; MetaSystox R @ 2.0 pt/acre; Provado (neonicotinoid) @ 0.9, 1.8, and 3.5 oz/acre and an untreated.

Efficacy was assessed ~7d after the final application by examining 25 randomly selected ears per treatment/replicate. Data were transformed by 'square root of X' prior to analysis by Fisher's Protected LSD test.

There were no main plot effects, *i.e.*, no differences between applications at 40% TLR and applications at EGT. Plant maturity at the time of application does not appear to be critical to general insecticide efficacy. Within sub-plots however, for every sampling bout, Actara and MSR provided significantly superior control of aphids. Ratings below 2 indicate very good efficacy and within that criterion, Actara, MSR, Assail and the high rate (3.5 oz/acre) were superior to other treatments.

Table 1. Management of corn aphid with whorl applications of insecticide emulsions, New Paltz NY – 2004

Treatment & rate/acre	Mid-season (7/30) aphid[1] rating [1– 4]		Late-season (8/18) aphid[1] rating [1 – 4]	
	40% TLR[2]. (15 July)	EGT[2] (22 July)	40% EGT[2] (4 Aug)	EGT[2] (11 Aug)
Actara @ 3 oz	1.0 a	1.5 a	1.3 a	1.3 a
Assail 70WP @ 3 oz	1.3 b	2.0 b	2.1 b c	1.9 c d
Calypso 4SC @ 3 oz	1.6 c	1.9 b	2.7 e f	1.8 c
Lannate LV @ 1.5 pt	2.0 d	2.3 c	2.4 d e	2.1 e f
MSR 2E @ 2 pt	1.0 a	1.7 a	1.5 a	1.3 a
Penncap 2L @ 3 pt	1.9 c d	2.3 c d	2.2 c d	1.9 c d
Provado @ 0.9 oz	-	-	2.4 d e	1.9 c d
Provado @ 1.8 oz	-	-	2.5 d e	1.9 c d
Provado @ 3.5 oz	-	-	1.9 b	1.5 b
Warrior 1E @ 3 oz	2.0 d	2.5 d	2.7 e f	2.2 f
Mean rating	***1.54***	***2.03***	***2.17***	***1.78***
Untreated	2.1 d	2.3 c d	2.7 e f	2.1 e f

[1]Rating where: 1 = 0-10 aphids; 2 = 10-50 aphids; 3 = 50=100 aphids; and 4 = >100 aphids.
Mid-season trial planted 25 May; late-season trial planted 28 June.

[2]TLR = tassel leaf ratio (based on measurement of extended leaf height relative to maximum height of embryonic tassel within the plant); EGT = early green tassel stage of plant growth (tassel just emerging and unfolding from within leaf sheath).

ONION: *Allium cepa* L. 'Spartan Banner 80'

Onion thrips: *Thrips tabaci* Lindeman

CONTROL OF ONION THRIPS WITH INSECTICIDES, CHESTER, NY 2004:

Onion was seeded by grower-cooperator into muck soil on 26 April using conventional commercial equipment. Treatments were arranged in 1-row plots, 40 ft long, and replicated 4 times in a randomized block design. Insecticide emulsion treatments were applied over the plants with a CO_2 pressurized (100 PSI) backpack sprayer dispensing 38 GPA @ 2 MPH. Rates were based on 15" rows (34,848 linear ft./acre). After a precount on 7 July, foliar sprays were applied on 14 July, 21 July, 29 July, 4 Aug and 9 August. Efficacy evaluations were made 5 to 7 days post application by harvesting 10 randomly selected plants per treatment-replicate, and examining the 4 youngest leaves for number of nymphs and adults by means of a 10-power 'OptiVisor' scope. Seasonal data were converted to cumulative thrips days per plant (1 nymph/plant for one day) by the formula: $CTD = [0.5(tpl_1 + tpl_2]*d_{1-2}$, where tpl_1 is the number of thrips per leaf at time 1, tpl_2 is the number of thrips per leaf at time 2, and d_{1-2} is the number of days elapsed between the 2 counts. Data were subjected to a 'square root of X' transformation prior to analysis by Fisher's Protected LSD.

Weather for Southeastern NY during the '04 season was generally wet, typlified by numerous small rainfall events throughout the season (see Appendix). Because rainfall is generally detrimental to thrips survival, infestations were correspondingly low. Populations did not reach threshold (3 thrips/leaf) until 4 Aug, five days before the trial was concluded because of advancing plant maturity. At the final evaluation on 9 Aug, all treatments were below threshold. Regarding CTD's, the range among treatments was narrow (22.1 to 49.7) and did not result in economic damage — in general, CTD's greater than 200 are required to cause economic loss. Tank-mixes containing Lannate generally enhanced control of thrips.

Table 1. **Efficacy of foliar insecticides against nymphs of onion thrips. Chester, NY - 2004**

Treatment	Rate/acre	Av. no. nymphs per leaf by sampling date						
		7-Jul (Pre-ct.)	14-July	21-July	29-July	4-Aug.	9-Aug.	CTD[1]
Vydate + Lannate[2]	2.0 pt.+24.0 oz	0.3 a	0.2 a	0.3 a	0.7 ab	2.1 a	0.5 ab	22.1 a
Vydate	3.0 pt.	0.4 a	0.2 a	0.6 ab	0.6 a	2.0 a	0.6 abc	24.0 ab
Assail + Lannate[2]	2.0 oz.+24.0 oz	0.3 a	0.1 a	0.6 abc	0.9 abc	2.1 a	0.5 ab	25.3 abc
MSR + Lannate[2]	1.0 pt.+24.0 oz	0.3 a	0.3 ab	0.9 bcd	1.0 a-d	2.0 a	0.7 abc	29.7 a-d
Colloidal Cleanser	1% solution	0.4 a	0.3 ab	1.0 cd	1.1 a-d	2.3 a	0.4 a	31.8 bcd
Warrior + Lannate[2]	3.2 oz.+24.0 oz	0.4 a	0.2 a	0.5 ab	1.2 b-e	2.8 a	0.9 bc	33.1 cd
Warrior	3.2 oz.	0.3 a	0.3 abc	1.1 d	1.2 a-e	2.2 a	0.8 abc	33.9 cd
MSR	1.0 qt.	0.5 a	0.6 c	1.2 d	1.3 cde	1.8 a	0.5 ab	35.6 cd
Assail	2.3 oz.	0.3 a	0.3 ab	1.0 d	1.3 cde	2.8 a	0.9 bc	37.3 cd
Lannate	48.0 oz.	0.4 a	0.3 ab	1.8 e	1.6 de	1.3 a	1.1 cd	37.4 de
TD 2472	5.3 oz.	0.4 a	0.2 a	0.8 bcd	1.2 b-e	2.8 a	2.0 d	37.5 de
Untreated	-	0.3 a	0.5 bc	1.8 e	1.8 e	2.6 a	1.8 d	49.7 e

Means followed by the same letter are not significantly different ($P<0.5$; Fishers protected LSD). Data treated by 'square root of X' transformation prior to analysis.

[1]Cumulative thrips days = $[0.5(tpl_1 + tpl_2]*d_{1-2}$, where tpl_1 is the number of thrips per leaf at time 1, tpl_2 is the number of thrips per leaf at time 2, and d_{1-2} is the number of days elapsed between the 2 counts.

[2] Tank-mix solutions.

ONION: *Allium cepa* L. 'Millenium'

Onion maggot: *Delia antiqua* (Meigen)

CONTROL OF ONION MAGGOT WITH INSECTICIDE DRENCH AND SEED TREATMENTS, PINE ISLAND, NY - 2004: Onion was seeded (ca. 17 seeds/row foot) into muck soil on 8 April using a cone seeder mounted onto a PlanetJr frame. Treatments were arranged in 1-row plots, 40 ft long, and replicated 4 times in a randomized block design. In furrow drench treatments were applied using the cone seeder equipped with a CO_2 pressurized (100 PSI) sprayer dispensing 38 GPA @ 2 MPH. Insecticide treatment of onion seeds (ST) (film coating; fungicide also applied) was performed at Dept. of Hort. Sci. Seed Lab., NYSAES, Geneva. At ten days post emergence, a stand count in each treatment was determined by counting the number of seedlings per 20 ft of row marked from the center of each 40 ft plot.

Efficacy evaluations, began 19 May and following at weekly intervals until 27 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. Percentage data were subjected to analysis by Fisher's Protected LSD after transformation by arcsin.

All treatments received PRO-GRO fungicide for control of onion smut. Seed treatments, applied as grams ai/100 g of seed, consisted of: Trigard 75WG (cyromazine) applied at 5.0 grams; Entrust (organic formulation of spinosad) applied at 1.25, 2.5 and 5.0 grams; Regent (fipronil) at 2.5 grams; E2Y45 (from DuPont ; composition unknown) applied at 2.5 and 5.0 grams; and Trigard ST + Lorsban infurrow drench (applied at 38.3 fl. oz/acre). Seed treatments were compared to Lorsban drench and an untreated (PRO-GRO fungicide only).

Similar stand counts suggest that seed treatments provided emergence relative to drench treatments (Table 1a). Very good control was provided by all treatments, except Lorsban drench that was significantly different than all seed treatments (Table 1b). The high degree of control provided by all rates of Entrust verified the efficacy of spinosad that has been obtained during previous field trials. The high rate of E2Y45 provided very good control.

It is surmised that the poor performance of Lorsban drench was due to a lack of rainfastness. During the experimentation period, from planting until mid-June, insecticide performance was pressured by 4.98 inches of rainfall (see Appendix; not entirely representative of Orange County plot area). Given the generally water soaked soil conditions preceding and during the evaluations, all seed treatments fared much better than expected. Good performance by new chemistries as seed treatments is encouraging.

Table 1a. Pretreatment counts of onion plant stand, Pine Island NY - 2004

Treatment/rate[1]	Av. no. plants / row by treatment	Av. no/ plants / row by replicate.	
PRO-GRO fungicide only (check)	272.0 a	Rep 1	201.8 a
Trigard ST @ 5.0 gr	210.3 a	Rep 2	244.5 a
Entrust ST @ 1.25 gr[2]	235.3 a	Rep 3	223.8 a
Entrust ST @ 2.5 gr	222.8 a	Rep 4	223.7 a
Entrust ST @ 5.0 gr	216.5 a		
Regent 6.2S ST @ 2.5 gr	237.8 a		
Lorsban75WG IF drench @38.3 fl. oz./acre	257.5 a		
Trigard ST + Lorsban IF	182.8 a		
E2Y45 ST @ 2.5 gr	168.5 a		
EWY45 ST @ 5.0 gr	231.3 a		

Table 1b. Efficacy of insecticide seed treatments against damage by onion maggot, Orange County – 2004

Treatment[1]	% damaged plants by sampling date						
	19 May	27 May	2 June	9 June	16 June	27 June	% Reduction
Trigard ST + Lorsban IF	0.0 a	0.0 a	0.0 a	0.0 a	0.0 a	0.1 a	0.1 a
Regent ST	0.2 a	0.4 a	0.0 a	0.3 a	0.1 a	0.0 a	1.0 a
Entrust ST @ 2.5 gr[2]	0.2 a	0.1 a	0.6 a	0.2 a	0.1 a	0.1 a	1.3 a
Entrust ST @ 5.0 gr	0.1 a	0.5 a	0.4 a	0.5 a	0.0 a	0.1 a	1.5 a
Trigard ST	0.6 a	0.9 a	0.2 a	0.2 a	0.2 a	0.0 a	2.1 a
EWY45 ST @ 5.0gr	0.0 a	0.7 a	0.7 a	0.8 a	1.1 a	0.2 a b	3.5 a
Entrust ST @ 1.25 gr	0.2 a	0.2 a	1.6 a	0.7 a	0.5 a	0.7 a b	3.8 a
E2Y45 ST @ 2.5 gr	0.7 a	0.5 a	2.9 a	1.0 a	0.6 a	0.4 a b	6.0 a
Lorsban IF	0.3 a	5.2 b	6.5 b	5.0 b	4.5 c	0.9 b	22.3 b
PRO-GRO fungicide only (check)	2.6 b	8.5 c	9.6 c	7.7 c	2.8 b	0.5 a b	31.7 c

Means followed by the same letter are not significantly different ($P<0.5$; Fishers Protected LSD). Prior to analysis, counts and percentage data transformed by arcsine and 'square root of X', respectively.

[1]Seed treatment rates expressed as grams AI/kilogram of seed. All received PRO-GRO fungicide @ 20 g AI/kg. [IF=infurrow drench]

[2]Seed treatment of spinosad formulated for organic production.

- MATERIALS TESTED -

Acramite	Crompton Corp.
Actara	Syngenta
Apollo	Makhteshim-Agan
AgriMek	Syngenta
Applaud	Nichino America, Inc
Asana	Dupont
Assail	Cerexagri
Avaunt	Dupont
Calypso	Bayer CropScience
Colloidal soap	1st Enviro-Safety, Inc.
Confirm	Dow
Danitol	Valent
Guthion	Bayer CropScience
E2Y45 seed treatment	DuPont
Endivor	Bayer CropScience
Entrust seed treatment	Dow AgroSciences
FujiMite	Nichino America, Inc
Imidan	Gowan
Intrepid	Dow AgroSciences
Lannate LV	Dupont
Lorsban 75WG	Gowan
Mesa	Gowan
MetaSystox R	Gowen
Proclaim	Syngenta
Provado	Bayer CropScience
Regent	BASF
Rimon	Crompton Corp.
Sevin XLR	Bayer CropScience
SpinTor	Dow AgriSciences
Supracide	Gowan
TD 2472-01	Cerexagri
Trigard seed treatment	Syngenta
Vydate	DuPont
Warrior	Syngenta

2004 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	53	29		48	43	0.31	79	54		68	52	0.38	84	60		88	73	0.21	82	57	0.01
2	61	38		45	40		80	59		67	52	0.15	86	64		85	70	0.09	82	57	
3	64	34		44	38		70	51	0.08	78	56	0.02	88	56		86	68		80	58	
4	58	38	Showers	53	49		51	37	0.44	72	46	0.02	83	56		89	69	0.01	83	59	
5	54	36		50	26		59	36		73	51		85	67	0.01	84	63	0.80	86	62	
6	56	41		40	30		62	40	0.05	64	51	0.01	83	62	1.11	78	56	0.02	76	54	
7	58	35		52	37		71	56		60	56		80	58		72	56				
8	49	34	Rain/Snow	52	30		83	45		81	61		86	65	0.09	72	51	0.05			
9	38	34		52	33		62	45		87	64		87	63		78	57				
10	40	31	Sn shower	57	32		62	48	0.09	93	68		81	57		86	59				
11	45	29		58	32		76	61		68	54		84	60		85	66	0.51			
12	51	31		53	35		84	60		69	46		88	67		80	66				
13	41	23		57	38	0.66	88	62		75	51		73	64	0.28	79	70	0.79			
14	42	17		54	39	0.42	88	58		76	60	0.11	68	63	0.03	80	65	0.16			
15	45	30		54	43	0.05	75	58		78	66		78	65	0.03	79	66	0.13			
16	54	27		56	39		88	58	0.08	90	66		80	60	0.21	76	66	0.21			
17	34	22	Snow	60	38		75	52		86	69		79	64	0.09	74	58	0.14			
18	31	22	Sn shower	78	46		78	58		82	67	1.85	85	63	0.11	77	59				
19	36	28		76	44		79	60	0.62	84	69		74	66	0.20	80	65				
20	41	19		88	52		68	45		80	53		82	64		81	68				
21	48	28	Showers	54	45		73	52	0.09	73	48		85	61		89	70	1.83			
22	49	20		63	48		78	60		80	62		87	66		73	50	0.32			
23	32	15		78	49	0.55	80	58	0.06	75	63	0.07	88	72		75	54				
24	46	27		49	44	0.19	85	58	0.02	84	55		79	65	1.68	84	61				
25	61	41		63	38		72	56	0.24	84	60		75	62		76	58				
26	56	44		50	38	0.33	76	50	0.03	75	60	0.05	80	61		77	55				
27	70	53	Rain	54	46	0.25	62	50	0.47	74	52		82	66		76	61				
28	67	42		66	40		75	57	0.03	78	53		69	60	0.74	82	68				
29	61	28		56	42		74	46	0.13	74	57	0.09	75	62	0.34	90	70				
30	57	34		80	52		64	40		78	56		83	64		88	69				
31	46	34	0.43				74	45					84	68		86	70	0.22			
Avg/ Total	49.8	31.1		57.6	40.0	2.76	73.9	52.1	2.43	76.9	57.5	2.75	81.3	62.9	4.92	80.8	63.1	5.49			