RESULTS OF 1993 INSECTICIDE AND ACARICIDE TRIALS IN EASTERN NEW YORK

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Max/Min Temperatures (°F) and Rainfall (inches)
Summer 1993

All readings were taken at 0800 EST on the dates indicated for preceeding 24 hour period.

	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
1	64	36		76	47		65	50	0.40	84	64		85	60		89	69	
2	42	35		79	50		69	38		86	56		91	65		81	67	
3	38	34		78	43		72	45		66	62		95	65	0.35	83	69	0.05
4	44	34		72	48		75	52	0.02	80	65		93	63		92	69	1.07
5	42	25		71	56		72	46		91	60		94	55		75	68	0.08
6	60	13		70	56	0.92	58	53	0.20	91	61		83	49		82	56	
7	57	31		78	47	0.01	64	45		90	71		71	59	0.03	83	63	
8	65	28		69	43		74	46		98	71		74	60	0.13	70	58	
9	69	39	0.07	76	46		80	60	0.02	99	72		82	56		68	58	0.41
10	64	48	0.40	82	48		89	64	0.50	98	72		88	61		74	66	0.20
11	62	44		84	53		85	61		101	63		84	59		76	47	
12	58	40		92	56	0.05	79	55		95	64		77	65		68	44	
13	49	36		84	53	0.22	82	51		90	60	0.17	76	62	0.25	72	54	
14	53	31		66	39		84	54		91	59		85	63		82	60	
15	60	43	0.03	68	46		86	53		93	68	0.20	89	61	0.01	86	67	
16	60	49		76	56		82	57	0.17	87	53		90	64		87	53	0.36
17	68	55	0.87	74	46	0.01	78	52		86	54		80	68	1.50	62	53	0.75
18	63	39	0.04	69	44		82	58		85	53		77	73	0.25	65	61	0.01
19	57	35		62	50	0.30	92	72		88	63		79	63	0.10	68	54	
20	76	50		56	51	0.02	92	65	0.01	73	62	0.25	83	65		68	35	
21	75	52		56	44	0.37	76	65	0.17	89	59		78	65		59	45	0.25
22	69	39	0.60	68	39		83	63	0.43	87	54		77	50		61	56	0.50
23	44	38	0.63	68	38		85	54		83	56		77	55		64	58	
24	57	38	0.01	76	53		79	47		86	55		85	63		67	51	0.01
25	66	46	0.05	76	61		85	52		90	58		85	70	0.13	68	44	
26	78	55		84	53		87	58		91	60		93	63		72	54	0.55
27	57	35	0.77	70	46		89	62		75	65	0.15	92	62		73	63	0.01
28	56	32		70	43		85	62		84	64		94	71		69	51	0.78
29	68	38		76	52	0.01	87	63	0.20	91	71		96	58		63	42	
30	76	44		67	44		81	62		94	65		85	64		60	45	
31				74	40					84	60		84	66				
Avg/Tot	59.7	38.7	3.47	73.1	48.1	1.91	79.9	55.5	2.12	87.9	61.9	0.77	84.6	62.0	2.75	72.9	56.0	5.03

APPLE: Malus domestica 'Jersey Mac'

European apple sawfly (EAS): Hoplocampa testudinea (Klug)
Plum curculio (PC): Conotrachelus nenuphar (Herbst)
Tarnished plant bug (TPB): Lygus lineolaris (P. de B.)

EVALUATION OF INSECTICIDES AGAINST EARLY-SEASON PESTS, 1993: Treatments were applied to eight-tree (one of which was 'Jersey Mac') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7 gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied at 1/2" green (21 April), pink (29 April), petal fall (14 May), and as cover sprays on 26 May, 11 June, 24 June, 9 July, 23 July, 5 August and 19 August. Only Danspray and Orthene were applied at 1/2" green; only NTN33893 and Guthion 3F were applied at pink; all other treatments commenced at petal fall. Damage to fruit by EAS, PC and TPB was assessed prior to 'June drop' (7 June) and at harvest (31 July) by randomly selecting 100 fruit and scoring for damage by each pest. Data were converted to % undamaged fruit (**Table 1**).

The '93 season, particularly July, was characterized by below average rainfall and relatively high temperatures. All cultivars in our insecticide block were not irrigated, and thus were extremely stressed - stress was accentuated in treatments that provided poor control of leafhoppers, leafminers and mites (only dormant oil applied for mites).

It is important to note that PF treatments were applied simultaneously, when the majority of the eight cultivars in each block ('McIntosh', 'Cortland', 'Empire', 'Delicious' and 'Golden Delicious', specifically) had completed this event - therefore, the 'Jersey Mac' PF applications were applied ca. 3-5 days past optimum for control of TPB, PC and EAS in particular.

Damage by TPB is difficult to completely eliminate because much of it occurs at bloom, is temporally spaced and is probably affected by contact toxicants only. It should be noted that we only record damage that is considered to affect grade, i.e., minor damage at calyx end is discounted. As is usually the case, regardless of toxicant or timing, no treatment was exceptional against this pest. Oviposition by PC occurs between pink and 2nd cover. Under rather high infestation pressure, only Danspray10W/Orthene, Orthene @ 10 oz and Guthion 3F (P-7C) provided adequate protection. In general, treatments that included Guthion 35W during early season, performed poorly against PC. All treatments, save NTN33893 season-long, provided good protection against early and late Lepidoptera.

Table 1 Evaluation of insecticides against early season apple pests,[1] N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 1993.

Treatment	Formulation amt./100 gal.	Appl. Timing	% fruit damaged prior to "June drop" (and at harvest).[2] Tarnish Plant Bug	Plum Curculio	European Apple Sawfly
1. NTN 2F	1.6 oz.	PF-7C	3.9a (5.3a)	3.5a (17.5a)	0.1a (2.2a)
2. NTN 2F	1.6 oz.	3-4C	0.2a (15.5a)	0.4a (7.7a)	1.8a (0.8a)
Guthion 3F	10.7 oz.	P-3,5-6C			
3. Danspray 2.4E	9.7 oz.	D,2C	3.7a (7.9a)	0.1a (7.5a)	1.0a (0.0a)
Orthene 75S	10.0 oz.	PF,1C			
Guthion 35W	12.0 oz.	3-6C			
4. Danspray 10W	30.0 oz.	D,2C	2.4a (6.2a)	0.1a (1.0a)	0.9a (1.2a)
Orthene 75S	10.0 oz.	PF,1C			
Guthion 35W	12.0 oz.	3-6C			
5. Orthene 75S	10.0 oz.	D,PF,1C	1.3a (14.7a)	3.1a (3.1a)	7.2a (1.5a)
Thiodan 50W	16.0 oz.	2C			
Guthion 35W	12.0 oz.	2-6C			
6. Orthene 75S	13.3 oz.	D,PF,1C	0.1a (10.5a)	0.7a (9.4a)	1.3a (2.5a)
Thiodan 50W	16.0 oz.	2C			
Guthion 35W	12.0 oz.	2-6C			
7. TD 2321	12.0 oz.	2C	. (13.3a)	. (12.6a)	. (0.3a)
Guthion 35W	12.0 oz.	PF,1,4-7C			
8. Guthion 35W	12.0 oz.	PF-2,4-7C	. (8.8a)	. (15.9a)	. (3.9a)
Thiodan 50W	16.0 oz.	3C			
9. Imidan 70W	16.0 oz.	PF-2C	0.8a (6.6a)	2.9a (8.3a)	0.9a (1.5a)
Thiodan 50W	16.0 oz.	3C			
Imidan 70W	12.0 oz.	4-7C			
10. Guthion 3F	10.7 oz.	P,PF-7C	. (11.1a)	. (2.6a)	. (0.5a)
11. Carbaryl	24.0 oz.	1-2C	3.3a (9.4a)	3.9a (2.5a)	2.5a (0.1a)
+NAA	7.5 ppm.	1C			
Guthion 35W	12.0 oz.	PF,3-6C			
12. Untreated	-	-	9.6a (11.4a)	26.5b (28.8a)	7.0a (0.1a)

[1]Data from 'Jersey Mac' on 7 June prior to 'June Drop' and at harvest on 27 August.

[2]Mean separation by Fishers Protected LSD (P=<0.05). Arcsin transformation used for statistical analysis of data expressed as percentages.

APPLE: Malus domestica 'Empire'

Apple maggot (AM): Rhagoletis pomonella (Walsh
Codling moth (CM): Laspeyresia pomonella (L.)
European apple sawfly (EAS): Hoplocampa testudinea (Klug)
Green fruitworm (GFW): Lithophane antennata (Walker)
Lesser appleworm (LAW): Grapholita prunivora (Walsh)
Obliquebanded leafroller (OBLR); Choristoneura rosaceana (Harris)
Oriental fruit moth (OFM): Grapholita molesta (Busck)
Plum curculio (PC); Conotrachelus nenuphar (Herbst)
San Jose scale (SJS): Quadraspidiotus perniciosus (Comstock
Sparganothis fruitworm (SFW): Sparganothis sulfureana (Clemens)
Variegated leafroller (VLR): Platynota flavedana Clemens
Tarnished plant bug (TPB): Lygus lineolaris (P. de B.)

CONTROL OF FRUIT-FEEDING INSECTS ON 'EMPIRE',1993: Treatments were applied to eight-tree (one of which was 'Empire') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied at 1/2" green (21 April), pink (29 April), petal fall (14 May), and as cover sprays on 26 May, 11 June, 24 June, 9 July, 23 July, 5 August and 19 August. Only Danspray and Orthene were applied at 1/2" green; only NTN33893 and Guthion 3F were applied at pink; all other treatments commenced at petal fall. Damage to fruit was assessed at harvest (27 August) by randomly selecting 100 fruit and scoring for damage by each pest. Data were converted to % undamaged fruit. Damage by early-Lepidoptera includes OFM, OBLR and GFW . Damage from late-Lepidoptera includes OBLR, VLR and perhaps SFW and LAW.

The '93 season, particularly July, was characterized by below average rainfall and relatively high temperatures. These climatic factors probably contributed to the abnormally high populations of leafminer, and abnormally low populations of apple maggot. None of our insecticide block was irrigated, and thus varieties were notably stressed - stress was accentuated in treatments that provided poor control of leafhoppers, leafminers and mites (only dormant oil applied for mites).

Against TPB, both Danitol treatments provided superior control, and the Danitol WP and Guthion 3F treatments were excellent against PC (**Table 2**). In general, against all other pests satisfactory to excellent control was provided by all treatments, except where NTN was utilized in a season-long program. Against late-Leps. and AM, this material allowed unusually high degrees of damage. Since NTN is absorbed by leaves in a trans-lamellar fashion, it cannot be expected to protect against fruit-feeders, but apparently when used season-long, it affects the natural enemies of late-season pests. Admittedly though, natural ememies of these pests are thought to have little impact.

Table 2 Evaluation of insecticides in a seasonal program on 'Empire' apple[1] , N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-1993.

Treatment	Formulation amt./100 gal.	Application Timing[3]	% fruit damaged by insect species[2]: Tarnish Plant Bug	Plum Curculio	European Apple Sawfly	Early Lep. Species	Codling Moth	San Jose Scale	Late Lep. Species	Apple Maggot Punct.	Apple Maggot Tunnel	% Undamaged Fruit
1. NTN 2F	1.6 oz.	PF-7C	2.3a	7.4a	0.3a	0.4 b	0.0a	0.1a	6.1 b	2.3 b	2.7 b	76.0a
2. NTN 2F	1.6 oz.	3-4C	4.7a	1.6a	0.2a	0.0a	0.0a	0.0a	0.7a	0.0a	0.0a	91.9 b
Guthion 3F	10.7 oz.	P-3,5-7C										
3. Danspray 2.4E	9.7 oz.	1/2"G-2C	1.3a	1.1a	0.7a	0.0a	0.0a	0.0a	0.0a	0.0a	0.0a	96.8 bcd
Orthene 75S	10.0 oz.	PF-1C										
Guthion 35W	12.0 oz.	3-7C										
4. Danspray 10W	30.0 oz.	1/2"G,2C	0.4a	0.1a	1.0a	0.0a	0.0a	0.0a	0.0a	0.0a	0.2a	98.2 d
Orthene 75S	10.0 oz.	PF,1C										
Guthion 35W	12.0 oz.	3-7C										
5. Orthene 75S	10.0 oz.	1/2"G,PF-1C	1.5a	2.2a	3.0a	0.0a	0.0a	0.0a	0.2a	0.0a	0.0a	91.3 b
Thiodan 50W	16.0 oz.	2C										
Guthion 35W	12.0 oz.	2-7C										
6. Orthene 75S	13.3 oz.	1/2"G,PF-1C	1.3a	0.7a	1.1a	0.0a	0.0a	0.0a	0.0a	0.0a	0.0a	96.4 bcd
Thiodan 50W	16.0 oz.	2C										
Guthion 35W	12.0 oz.	2-7C										
7. TD 2321	12.0 oz.	2C	4.4a	2.4a	0.3a	0.0a	0.0a	0.0a	0.1a	0.0a	0.0a	93.2 bc
Guthion 35W	12.0 oz.	PF,1,3-7C										
8. Guthion 35W	12.0 oz.	PF-2,4-7C	3.3a	0.9a	3.0a	0.0a	0.0a	0.0a	0.1a	0.0a	0.0a	91.7 b
Thiodan 50W	16.0 oz.	3C										
9. Imidan 70W	16.0 oz.	PF-2C	3.6a	1.2a	0.2a	0.0a	0.0a	0.0a	0.0a	0.0a	0.0a	93.8 bcd
Thiodan 50W	16.0 oz.	3C										
Imidan 70W	12.0 oz.	4-7C										
10. Guthion 3F	10.7 oz.	P,PF-7C	0.8a	1.5a	0.0a	0.0a	0.0a	0.0a	0.0a	0.0a	0.0a	98.1 cd
11. Untreated	-	-	2.7a	10.3a	0.9a	0.9 b	0.9 b	1.3 b	5.7 b	0.1a	2.0 b	68.5a

[1]Harvested 29 September.

[2]Mean separation by Fishers Protected LSD (P=<0.05). Arcsin transformation used for statistical analysis of data expressed as percentages.

[3]1/2"G(4/21), P(4/29), PF(5/14), 1C(5/26), 2C(6/11), 3C(6/24), 4C(7/9), 5C(7/23), 6C(8/5), 7C(8/19)

APPLE: Malus domestica 'McIntosh', 'Cortland' and 'Empire'

Apple maggot (AM): Rhagoletis pomonella (Walsh
Codling moth (CM): Laspeyresia pomonella (L.)
European apple sawfly (EAS): Hoplocampa testudinea (Klug)
Green fruitworm (GFW): Lithophane antennata (Walker)
Lesser appleworm (LAW): Grapholita prunivora (Walsh)
Obliquebanded leafroller (OBLR); Choristoneura rosaceana (Harris)
Oriental fruit moth (OFM): Grapholita molesta (Busck)
Plum curculio (PC): Conotrachelus nenuphar (Herbst)
San Jose scale (SJS): Quadraspidiotus perniciosus (Comstock
Sparganothis fruitworm (SFW): Sparganothis sulfureana (Clemens)
Variegated leafroller (VLR): Platynota flavedana Clemens
Tarnished plant bug (TPB): Lygus lineolaris (P. de B.)

SUMMARY OF EFFICACY AGAINST FRUIT-FEEDING INSECTS ON 'McINTOSH, 'CORTLAND' AND 'EMPIRE', 1993: Treatments were applied to eight-tree (three of which were 'McIntosh', 'Cortland' and 'Empire') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7 gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied at 1/2" green (21 April), pink (29 April), petal fall (14 May), and as cover sprays on 26 May, 11 June, 24 June, 9 July, 23 July, 5 August and 19 August. Only Danspray and Orthene were applied at 1/2" green; only NTN33893 and Guthion 3F were applied at pink; all other treatments commenced at petal fall. Damage to fruit was assessed at harvest (27 August) by randomly selecting 100 fruit and scoring for damage by each pest. Data were converted to % undamaged fruit. Damage by early-Lepidoptera includes OFM, OBLR and GFW . Damage from late-Lepidoptera includes OBLR, VLR and perhaps SFW and LAW.

The '93 season, particularly July, was characterized by below average rainfall and relatively high temperatures. These climatic factors probably contributed to the abnormally high populations of leafminer, and abnormally low populations of apple maggot. None of our insecticide block was irrigated, and thus varieties were notably stressed - stress was accentuated in treatments that provided poor control of leafhoppers, leafminers and mites (only dormant oil applied for mites).

These data are presented (**Table 3**) in order to provide a broad picture of efficacies across a number of varieties.

APPLE: Malus domestica 'Delicious'and'McIntosh'

Apple aphid: Aphis pomi De Geer
Apple blotch leafminer: Phyllonorycter crataegella (Clemmens)
Spirea aphid: Aphis citricola Van der Goot
Spotted tentiform leafminer: Phyllonorycter blancardella (Fabr.)

CONTROL AND EFFECTS OF FOLIAR-FEEDING INSECTS, 1993: Treatments were applied to eight-tree (two of which were 'Delicious' and 'McIntosh') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7 gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied at 1/2" green (21 April), pink (29 April), petal fall (14 May), and as cover sprays on 26 May, 11 June, 24 June, 9 July, 23 July, 5 August and 19 August. Only Danspray and Orthene were applied at 1/2" green; only NTN33893 and Guthion 3F were applied at pink; Lorsban was applied only 2C and 3C, expressly for aphids; all other treatments commenced at petal fall.

Apple aphid and/or spirea aphids were evaluated once each in June and July by counting the number of live aphid colonies/2 minutes on 'Delicious' shoots. Combined 1st and 2nd brood leafminer was evaluated on 'Delicious' shoots by counting the number of mines in a 25 leaf sample. Combined 1st, 2nd and 3rd brood leafminer was evaluated on 3 September by counting the number of mines in a 25 leaf sample. Due to the combined effects of drought and leafminer damage, significant premature drop of 'McIntosh' occurred within some treatments. 'Mac' drop was assessed by visually estimating the cumulative percentage of total crop that had dropped from the tree on 25 August.

At the 1st evaluation on 7 June, NTN (tmt.#1), the Danspray/Orthene schedules and the Orthene schedules provided excellent kill of aphids (**Table 4**). Treatments that are known to have little aphicide activity were not evaluated; or some treatments had not yet been applied. At the second evaluation (made between 3C and 4C), the NTN, the Danspray/Orthene and Orthene schedules again provided acceptable kill of aphids. It was noted that some treatments, Lorsban in particular, provided good initial kill but allowed resurgence before the next cover.

Notable activity against leafminer was provided by both NTN schedules, and both Danspray/Orthene schedules. The data suggest that NTN, even when applied at just 3C and 4C, and the Danspray/Orthene schedule applied during early-season, provide control well into late-season There was an evident strong correlation between leafminer damage (plus drought) and premature drop of 'McIntosh' fruits, which would be expected at levels greater than 5 mines/leaf.

Table 4 Evaluation of seasonal insecticide program for control of leaf miner and aphid complexes on 'Delicious' apple[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 1993

Treatment		Formulation amt./100 gal.	Application[2], Timing	Aphid Sp. # col./ 2 min. 6/7	Aphid Sp. # col./ 2 min. 7/1	LM # mines / leaf 7/29	LM # mines / leaf 9/3	% "Mac" Drop 8/25
1.	NTN 2F	1.6 oz.	PF-7C	1.7	16.7	0.24ab	0.58*	2.0a
2.	NTN 2F	1.6 oz.	3-4C	25.3	7.0	0.05a	0.55*	3.3ab
	Guthion 3F	10.7 oz.	P-3,5-7C					
3.	Danspray 2.4E	9.7 oz.	1/2"G,2C	0.0	42.0	0.36abc	1.7**	2.0a
	Orthene 75S	10.0 oz.	PF-1C					
	Guthion 35W	12.0 oz.	3-7C					
4.	Danspray 10W	30.0 oz.	1/2"G,2C	0.0	28.3	0.57bc	2.9**	3.0ab
	Orthene 75S	10.0 oz.	PF-1C					
	Guthion 35W	12.0 oz.	3-7C					
5.	Orthene 75S	10.0 oz.	1/2"G,PF-1C	0.3	29.3	4.02ef	3.8	11.4ab
	Thiodan 50W	16.0 oz.	2C					
	Guthion 35W	12.0 oz.	2-7C					
6.	Orthene 75S	13.3 oz.	1/2"G,PF-1C	0.0	39.0	2.85de	3.3	15.5abc
	Thiodan 50W	16.0 oz.	2C					
	Guthion 35W	12.0 oz.	2-7C					
7.	TD 2321	12.0 oz.	2C	-	80.0	3.12de	5.4	25.0 bcd
	Guthion 35W	12.0 oz.	PF,1,3-7C					
8.	Guthion 35W	12.0 oz.	PF-2,4-7C	-	93.7	4.58ef	5.5	46.7 cde
	Thiodan 50W	16.0 oz.	3C					
9.	Imidan 70W	16.0 oz.	PF-2C	20.7	115.3	4.43ef	7.2	57.2 de
	Thiodan 50W	16.0 oz.	3C					
	Imidan 70W	12.0 oz.	4-7C					
10.	Guthion 3F	10.7 oz.	P,PF-7C	-	136.7	6.10f	7.9	65.8 e
11.	Lorsban 50WP	12.0 oz.	4C	-	75.3	-	-	-
	Guthion 3F	10.7 oz.	PF-3,5-7C					
12.	Untreated	-	-	28.7	155.6	3.25de	6.6	67.2 e

[1]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD)
* Partial mines, no survival. ** Predominately 3rd Brood. LM = Spotted Tentiform Leaf Miner & Apple Blotch Leaf Miner; Aphid Species = Green Apple Aphid, Spirea Aphid
[2]1/2"G(4/21), P(4/29), PF(5/14), 1C(5/26), 2C(6/11), 3C(6/24), 4C(7/9), 5C(7/23), 6C(8/5), 7C(8/19)

APPLE: Malus domestica 'Delicious'

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

EVALUATION OF OMITE MITICIDE FOR CONTROL OF LEAFHOPPERS, 1993: Treatments were applied to eight-tree (one of which was 'Delicious') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering 2.7 gal spray/tree or 260 gal/acre. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied on 20 August, at what would be 7th cover. Treatment efficacy was determined by sampling 25 spur leaves per treatment at 5 days and 12 days posttreatment and recording the number of LH nymphs/leaf.

Omite has shown some activity against LH in forage crops. The protocol for this trial called for possible multiple applications when leafhoppers were at threshold. Because LH populations were relatively low this season, presumably due to below average rainfall and above average temperatures, we did not reach threshold until late-season after the drought was broken (17 Aug). Under these rather low 2nd generation infestations, Omite generally reduced LH numbers significantly below the UNTREATED. There was no evident dosage-response, as the lower rates of both formulations provided equal or better control than the high rates. Results suggest that Omite has the potential of reducing LH populations, and it's use as a miticide during the season could provide some insecticidal benefit.

Table 5 Evaluation of a miticide for control of 2nd generation leafhopper complex on apple[1] , N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-1993

Treatment / form.		Amt./ acre	Appl. date	LH[2] # nymphs/ leaf 8/25	LH[2] # nymphs/ leaf 9/1
1.	Omite WP	5.0 lb. /A	8/20	<0.1ab	0.2ab
2.	Omite WP	7.0 lb. /A	8/20	0.5 bcd	0.6 cd
3.	Omite 6E	32.0 oz. /A	8/20	0.3abc	0.2abc
4.	Omite 6E	45.0 oz. /A	8/20	0.3abc	0.1ab
5.	Thiodan 50W	40.0 oz. /A	8/19	0.0a	0.0a
6.	Untreated[3]	-	-	0.9 d	1.0 d

[1]Data taken from 'McIntosh".
[2]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD)
LH = Rose Leaf Hopper, White Apple Leaf Hopper, Potato Leaf Hopper
[3]Untreated plot recieved Kelthane 50W @ 16.0 oz./100 on 6/9 & 6/23.

APPLE: Malus domestica 'Delicious'

Apple rust mite(ARM): Aculus schlechtendali (Nalepa)
A predatory phytoseid(AMB): Amblyseius fallacis (Garman)
European red mite(ERM): Panonychus ulmi (Koch)

MITE CONTROL WITH INSECTICIDES, 1993: Treatments were applied to eight-tree (one of which was 'Delicious') plots replicated three times in a randomized complete block design. Except for 2% dormant oil, no miticides were applied. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7 gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. Treatments were applied at 1/2" green (21 April), pink (29 April), petal fall (14 May), and as cover sprays on 26 May, 11 June, 24 June, 9 July, 23 July, 5 August and 19 August. Only Danspray and Orthene were applied at 1/2" green; only NTN33893 and Guthion 3F were applied at pink; all other treatments commenced at petal fall.

Phytophagous and predaceous mite populations were evaluated by sampling 25 leaves from one 'Delicious' tree per plot at regular intervals from 18 May through 15 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.

Development of ERM populations was slow until ca. 20 June, after which they peaked on 26 July, and dissipated thereafter (**Table 6**). On 12 July, only the UNTREATED and the two Orthene treatments were at threshold. By 26 July, ERM were over threshold, except for the two Danspray treatments (applied D & 2C) which lived up to its reputation for mite control. Generally, ERM counts fell off in all treatments by 10 August. ARM counts reached very high numbers in Danspray treatments, perhaps because of detrimental effects on *Ambylsieus.*

Table 6 Evaluation of insecticides for control of mite complex on apple[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 1993

Treatment	Formulation oz/100 gal.	Application Timing	Average # of mites / leaf [2] 6/29 ERM	6/29 AMB	6/29 ARM	7/12 ERM	7/12 AMB	7/12 ARM	7/26 ERM	7/26 AMB	7/26 ARM	8/10 ERM	8/10 AMB	8/10 ARM
1. NTN 2F	1.6 oz.	PF-7C	0.4a	<0.1a	2.0abc	3.0abc	0.0a	12.1a	18.4 bcd	0.0a	20.3a	4.8a	0.1a	75.2a
2. NTN 2F	1.6 oz.	3-4C	1.6a	0.0a	1.4abc	3.3 bc	<0.1 b	3.7a	29.9 cd	0.5a	20.0a	9.3a	0.2a	81.6a
Guthion 3F	10.7 oz.	P-3,5-7C												
3. Danspray 2.4E	9.7 oz.	1/2"G,2C	0.1a	0.0a	1.0ab	1.0a	0.0a	5.1a	0.4a	0.0a	27.4a	6.7a	<0.1a	258.42a
Orthene 75S	10.0 oz.	PF-1C												
Guthion 35W	12.0 oz.	3-7C												
4. Danspray 10W	30.0 oz.	1/2"G,2C	0.0a	0.0a	0.4a	1.1a	0.0a	3.3a	0.7a	0.0a	19.1a	7.6a	0.0a	216.9a
Orthene 75S	10.0 oz.	PF-1C												
Guthion 35W	12.0 oz.	3-7C												
5. Orthene 75S	10.0 oz.	1/2"G,PF-1C	0.9a	0.0a	1.0a	6.6 c	0.0a	11.2a	29.1 d	0.0a	17.5a	14.2a	0.1a	105.2a
Thiodan 50W	16.0 oz.	2C												
Guthion 35W	12.0 oz.	2-7C												
6. Orthene 75S	13.3 oz.	1/2"G,PF-1C	0.4a	0.0a	1.0a	4.9bc	0.0a	6.4a	20.1 bcd	0.0a	16.5a	9.1a	0.1a	110.9a
Thiodan 50W	16.0 oz.	2C												
Guthion 35W	12.0 oz.	2-7C												
7. TD 2321	12.0 oz.	2C	0.3a	0.0a	3.1 bcd	2.3abc	0.0a	15.0a	13.1 bcd	0.0a	16.1a	7.1a	0.2a	87.9a
Guthion 35W	12.0 oz.	PF-1,3-7C												
8. Guthion 35W	12.0 oz.	PF-2,4-7C	0.4a	0.0a	4.5 cd	3.8 bc	0.0a	24.2a	31.4 d	0.0a	21.0a	5.7a	0.2a	68.8a
Thiodan 50W	16.0 oz.	3C												
9. Imidan 70W	16.0 oz.	PF-2C	0.2a	0.0a	3.3 bcd	1.9ab	0.0a	8.8a	8.4 bc	0.2ab	16.1a	8.7a	0.1a	104.2a
Thiodan 50W	16.0 oz.	3C												
Imidan 70W	12.0 oz.	4-7C												
10. Guthion 3F	10.7 oz.	P-7C	0.6a	0.0a	1.5abc	1.6ab	0.0a	12.8a	6.1 b	0.0a	18.9a	9.9a	0.2a	144.2a
11. Untreated	-	-	2.3a	0.0a	7.7 d	5.2 bc	0.0a	16.1a	17.0 bcd	0.0a	8.8a	4.9a	<0.1a	77.0a

[1]Data from 'Red Delicious'.

[2]Mean separation by Fishers Protected LSD (P=<0.05). Arcsin transformation used for statistical analysis of data expressed as percentages.

[3]1/2"G(4/21), P(4/29), PF(5/14), 1C(5/26), 2C(6/11), 3C(6/24), 4C(7/9), 5C(7/23), 6C(8/5), 7C(8/19)

APPLE: Malus domectica 'Delicious'

Apple rust mite(ARM): Aculus schlechtendali (Nalepa)
A predatory phytoseid(AMB): Amblyseius fallacis (Garman)
European red mite(ERM): Panonychus ulmi (Koch)

EVALUATION OF MITICIDE PROGRAMS, 1993: Treatments were applied to eight-tree (one of which was 'Delicious') plots replicated three times in a randomized complete block design. All treatments were applied dilute to runoff using a high-pressure handgun sprayer at 300 psi delivering from 1.7 to 2.7 gal spray/tree or 160 to 260 gal/acre depending upon foliage density. Trees on the EMII rootstock were 30 years-old, 10 ft high, and 12 ft wide. All treatments received 2% dormant oil. Vendex 50W was applied per label at PF (13 May), 1C (26 May) and 2C (9 June). Omite 30W, Kelthane 50W and TD2336 50W were applied on calendar basis, i.e., 2C and 3C (23 June).

Phytophagous and predacious mite populations were evaluated by sampling 25 leaves from one 'Delicious' tree per plot. 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. The '93 season was characterized by below average rainfall and relatively high temperatures (particularly during July). Due to these or other factors, ERM development was slowed until ca. 28 June, after which populations peaked at the end of July and tapered off thereafter. Populations of two-spotted spider mite, Tetranychus urticae Kotch, were very low.

The 3-spray program with Vendex and the 2-spray programs with Omite, Kelthane and TD2336 held mites well below threshold through 19 July, at which time the UNTREATED was over threshold (**Table 7**). After the 1st of August, when ERM populations began building, Vendex and TD2336 were starting to show weakness, approaching threshold on 3 August. At that time, all treatments except Omite were controlling rustmite.

Table 7 Evaluation of miticides for control of mite complex on apple[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 1993

Average # of mites / leaf [2]

Treatment	Formulation oz/100 gal.	6/21 ERM	6/21 ERME	6/21 TSM	6/21 AMB	6/21 ZM	6/21 ZME	6/21 ARM	7/6 ERM	7/6 ERME	7/6 TSM	7/6 AMB	7/6 ZM	7/6 ZME	7/6 ARM
1. Kelthane 50W	16.0 oz.	<0.1a	0.2a	0.0a	0.0a	0.0a	0.0a	8.3b	<0.1a	1.6a	0.0a	0.0a	0.0a	0.0a	5.2a
2. Omite 30W	24.0 oz.	0.0a	<0.1a	<0.1a	0.0a	0.0a	0.0a	7.7b	0.0a	0.1a	0.0a	0.0a	0.0a	0.0a	21.8bc
3. Vendex 50W	8.0 oz.	<0.1a	0.1a	0.0a	0.0a	0.0a	0.0a	1.2a	<0.1a	0.2a	0.0a	0.0a	0.0a	0.0a	6.5ab
4. TD 2336 50W	8.0 oz.	0.4a	0.8a	<0.1a	0.0a	0.0a	0.0a	6.9ab	<0.1a	<0.1a	0.0a	0.0a	0.0a	0.0a	2.2a
5. Omite 6E	12.3 oz.	0.4a	0.3a	<0.1a	0.0a	0.0a	0.0a	24.5bcd	0.7a	1.3a	<0.0a	0.3a	0.0a	0.0a	161.2de
6. Untreated	-	0.3a	0.0a	0.0a	0.0a	0.0a	0.0a	0.8a	2.3a	1.7a	0.2b	0.0a	<0.1a	0.0a	7.7ab

Average # of mites / leaf [2]

Treatment	Formulation oz/100 gal.	7/19 ERM	7/19 ERME	7/19 TSM	7/19 AMB	7/19 ZM	7/19 ZME	7/19 ARM	8/3 ERM	8/3 ERME	8/3 TSM	8/3 AMB	8/3 ZM	8/3 ZME	8/3 ARM
1. Kelthane 50W	16.0 oz.	0.3a	1.0a	0.0a	0.0a	0.0a	0.0a	28.8ab	3.6bc	6.0c	<0.1a	0.1a	0.0a	0.0a	35.9abc
2. Omite 30W	24.0 oz.	0.4a	1.3a	0.0a	0.0a	0.0a	0.0a	28.4ab	5.2c	8.0cd	0.0a	<0.1a	0.0a	0.0a	90.2cde
3. Vendex 50W	8.0 oz.	1.0a	1.3a	0.0a	0.0a	0.0a	0.0a	20.3a	7.6cd	8.1cd	<0.1a	<0.1a	0.0a	0.0a	48.5bcd
4. TD 2336 50W	8.0 oz.	0.9a	1.1a	<0.1a	0.1a	0.0a	0.0a	63.4abc	7.2cd	8.5cde	0.0a	0.1a	<0.1a	0.0a	13.8a
5. Omite 6E	12.3 oz.	4.8a	9.5a	0.5b	0.0a	0.0a	0.0a	234.5d	4.8c	4.4bc	0.2a	0.1a	0.0a	0.0a	120.3def
6. Untreated	-	5.2a	5.2a	0.3ab	0.1a	<0.1a	0.0a	16.6a	17.0d	16.9def	0.1a	0.1a	<0.1a	0.0a	77.0bcd

[1]Data from 'Red Delicious'.

[2]Mean separation by Fishers Protected LSD (P=<0.05). Arcsin transformation used for statistical analysis of data expressed as percentages.

APPLE: Malus domestica 'Cortland' and 'Golden Delicious'

Apple blotch leafminer: Phyllonorycter crataegella (Clemmens)
European red mite(ERM): Panonychus ulmi (Koch)
Spotted tentiform leafminer: Phyllonorycter blancardella (Fabr.)
A predatory phytoseid(AMB): Amblyseius fallacis (Garman)

LEAFMINER AND MITE CONTROL WITH SYSTEMIC AND TRANSLAMELLAR MATERIALS, 1993: Trials were done at Wright Farms, a commercial orchard, and at the HVL research orchard. Treatments were applied to single-tree plots replicated either 4 times on 'Cortland'/MM.106 (Wrights) or 3 times on 'Golden Delicious'/EMII (HVL). Single applications of AgriMek (2.5 oz/100 gal) and Vydate (8.0 oz/100 gal) were timed to coincide with a) 50% oviposition (7 July), and b) 60% of the larvae in the tissue feeding stage of the 2nd leafminer generation (21 July). These stages were determined by both pheromone trap catches (oviposition) and by examination of mines for relative percentage of sap: tissue feeding larvae. Treatments were applied dilute to runoff, using a high-pressure handgun sprayer at 300 psi, delivering 2.7 gal/tree or 260 gal/acre.

Leafminer populations were evaluated by sampling 25 randomly selected leaves per treatment, and counting the total number of mines for each generation. Phytophagous and predaceous mite populations were evaluated by sampling 25 leaves from each treatment at regular intervals throughout the summer, removal to the laboratory, processing through a mite-brushing machine, and examination by microscope.

Leafminer (**Table 8**) - At 21 days posttreatment (28 July) at both locations, the '50% oviposition' treatments reduced infestations, with Vydate performing slightly better than AgriMek. At 85 days posttreatment (9/31), both treatments had significantly lower leafminer infestations than UNTREATED, with Vydate again showing better performance. It should be noted however, that absorption of AgriMek is enhanced with the addition of 1% oil; unfortunately, oil was omitted in the '50% oviposition' treatment. The 'tissue-feeding' treatments (applied 21 July) had little time for which to show activity by the 28 July evaluation date. At the 31 September evaluation, the infestation levels (combined 1st, 2nd and some 3rd brood) were quite high at the HVL site. At this time, both treatments were holding leafminer levels significantly lower than UNTREATED, with AgriMek + oil slightly better than Vydate.

In general ($\bar{x}$ both locations) these materials provided good long-term protection against leafminer. Although tissue-feeding larvae are generally more difficult to control than sap-feeders, the results show little difference in performance between application timings.

Phytophagous and predacious mites (**Table 9**) - Treatments timed for '50% oviposition' of leafminer (7 July) held phytophagous mites below threshold through August. The exception was a high level of infestation in the AgriMek treatment (HVL) on 28 July - this is likely due to a sampling error. AgriMek timed for '80% tissue feeding' provided very good mite control through August. Vydate at this timing however, allowed or 'caused' a buildup of ERM during August, although it appeared to allow for survival of AMB.

Table 8 Evaluation of seasonal insecticide program for control of leaf miner and mite complexes on apples[1,2], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y.-1993

Treatment		Formulation amt./100 gal.	Spray Timing	Leaf Miner[3] 7/28 HVL # tissue feed mines / lf	7/28 Wrights # tissue feed mines / lf	7/28 $\bar{x}$ both loc.	9/31 HVL # tissue feed mines / lf.	9/31 Wrights # tissue feed mines / lf.	9/31 $\bar{x}$ both loc.
1.	Untreated	-		2.6a	2.0a	2.3	7.6 b	1.6 b	4.6
2.	AgriMek	2.5 oz.	July 7*	1.9a	0.8a	1.4	4.6a	0.6a	2.6
3.	Vydate 2L	8.0 oz.	July 7*	1.4a	0.5a	1.0	3.6a	0.5a	2.1
4.	AgriMek + oil	2.5 oz.	July 21**	1.6a	0.9a	1.3	2.9a	1.4 b	2.2
5.	Vydate 2L	8.0 oz.	July 21**	2.4a	1.1a	1.8	3.6a	1.3 b	2.5

[1]Data taken from "Red Delicious"(HVL) & 'Cortland' (Wrights)

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

[3]LM = Spotted Tentiform Leaf Miner & Apple Blotch Leaf Miner.

* applied @ 50% oviposition of 2nd brood.

** applied @ 80% larvae in tissue feeding stage.

Table 9 Evaluation of seasonal insecticide program for control of leaf miner and mite complexes on apples[1,2], N.Y.S.A.E.S., Hudson Valley Lab., Highland, N.Y. - 1993

Wright's Farm

Treatment	Formulation amt./100 gal.	Spray Timing	7/21 ERM	7/21 AMB	7/21 ARM	7/28 ERM	7/28 AMB	7/28 ARM	8/23 ERM	8/23 AMB
1. Untreated	-		2.0 bc	0.2ab	48.0a	3.0 b	0.2a	90.6a	3.0 bc	0.4a
2. AgriMek	2.5 oz.	July 7*	0.7a	<0.1a	30.6a	2.1ab	0.1a	46.9a	2.8 b	0.4a
3. Vydate 2L	8.0 oz.	July 7*	1.7 b	<0.1a	62.1a	3.2 b	0.1a	47.4a	3.7 bc	0.7a
4. AgriMek + oil	2.5 oz.	July 21**	3.5 d	1.6 b	49.1a	1.1a	<0.1a	32.2a	0.3a	0.1a
5. Vydate 2L	8.0 oz.	July 21**	3.3 cd	0.2ab	81.2a	1.5a	<0.1a	58.6a	6.1 c	1.8 b

HV Lab

Treatment	Formulation amt./100 gal.	Spray Timing	7/21 ERM	7/21 AMB	7/21 ARM	7/28 ERM	7/28 AMB	7/28 ARM	8/23 ERM	8/23 AMB
1. Untreated	-		5.6a	0.0a	17.7a	5.9 c	<0.1a	9.2a	0.6a	0.2a
2. AgriMek	2.5 oz.	July 7*	2.8a	0.0a	5.7a	5.7 c	<0.1a	15.1a	1.7a	0.6a
3. Vydate 2L	8.0 oz.	July 7*	1.3a	0.0a	12.4a	0.9a	<0.1a	13.8a	3.0ab	0.5a
4. AgriMek + oil	2.5 oz.	July 21**	2.9a	0.0a	14.3a	2.3ab	0.0a	10.9a	1.1a	0.4a
5. Vydate 2L	8.0 oz.	July 21**	2.2a	0.0a	9.8a	3.7 bc	<0.1a	18.6a	7.9 b	0.6a

[1]Data taken from 'Red Delicious'(HVL) & 'Cortland' (Wrights).[2]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD)
* applied @ 50% oviposition of 2nd brood.
** applied @ 80% larvae in tissue feeding stage.

PEAR: Pyrus communis 'Bartlett'

Apple maggot (AM); Rhagoletis pomonella (Walsh
Codling moth (CM): Laspeyresia pomonella (L.)
Oriental fruit moth (OFM): Grapholita molesta (Busck)
Pear psylla: Psylla pyricola Forester
Pear rust mite: Epitrimerus pyri (Nalepa)
Plum curculio (PC): Conotrachelus nenuphar (Herbst)

PEAR INSECT AND MITE CONTROL, 1993: Treatments were applied to 8 tree plots, replicated 3 times in a randomized complete block design. Each plot contained 4 'Bartlett' and 4 'Bosc' cultivars, spaced 12 x 18 ft, 12 ft in height and 19 years old. Treatments were applied by high-pressure handgun sprayer, dilute to runoff, at 300 psi using from 1.7 to 2.6 gal/tree or 160 to 260 gal/acre, depending on foliage density. Two per cent dormant oil was applied prior to bloom for control of psylla eggs. NTN 33893 was applied at WB (30 April) and PF (10 May); another NTN treatment utilized applications at PF (10 May) and 17 days post-PF on 27 May. AgriMek + 1% oil was applied at 10 days post-PF (20 May). The AgriMek plot received Guthion @ PF for curculio. Imidan + 1% oil was applied on 11 May and again on 14 June, after precounts showed psylla to be above threshold. On 23 June, the Imidan plot was split - half being treated with Imidan + PBO, while half was treated with Imidan + oil alone. Mitac was applied 11 May and again on 14 June. On 23 June, the Mitac plot was split - half being treated with Mitac + PBO, while half was treated with Mitac alone.

Pear psylla was evaluated by sampling leaves from five spurs or five shoots from five trees in each plot, removing to the laboratory, and counting nymphs and eggs using a binocular scope. On 3 Sept., all 'Bartlett' trees in each plot were visually assessed and rated for both fruit russeting and phytotoxicity to foliage; where 0 = none, 1 = slight, 2 = moderate, and 3 = severe. On 15 Sept., 100 fruit from each plot were harvested and evaluated for damage by AM, PC, CM and OFM. Because AgriMek and NTN, applied for psylla, cannot be expected to protect pear fruit against secondary pests, it is likely that some growers would neglect covers for such protection.

The '93 season was one of below normal rainfall and above normal temperatures (particularly July). The psylla population reached peak nymph and egg numbers on 21 June, but had declined to very low numbers by 15 July (**Table 10**). Counts on 14 June showed that some plots were at threshold: AgriMek, the earliest treatments of NTN (#1) and Imidan. Imidan and Mitac plots were retreated, but on 21 June only the Mitac plots were under threshold. The addition of PBO to Imidan and Mitac had no appreciable effect on performance.

Leaf damage ratings (**Table 11**) show that Imidan plots had severe leaf necrosis, in part due to psylla honeydew, but primarily due to phytotoxicity from the tank mix with oil. Mitac plots generally had low levels of psylla throughout the season and therefore sustained very little phytotoxicity from honeydew. Russet ratings show that the NTN plots had rather severe russeting due to rust mite that came on in August. Against PC, only Imidan and Guthion (in AgriMek schedule) applied at PF provided protection. Against late-season Lepidoptera, AgriMek and Imidan protected against surface feeding by OFM, while Imidan and Mitac protected against the internal feeding by CM and OFM. Apple maggot damage was of no consequence.

Table 10 Evaluation of insecticides in a seasonal program on pear[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, New York. - 1993

Treatment Rate/100 gal.	Application Date	#'s / leaf[2] May 18 Nymphs	May 18 Eggs	May 18 PRM	May 24 Nymphs	May 24 Eggs	May 24 PRM	June 8 Nymphs	June 8 Eggs	June 8 PRM	June 14 Nymphs	June 14 Eggs	June 14 PRM
1. NTN 33893 4.0 oz.	April 30 May 10	0.01a	<0.1a	0.0a	0.0a	0.0a	0.0a	0.2ab	7.4ab	0.0a	1.9a	19.5a	0.0a
2. NTN 33893 4.0 oz.	May 10 May 27	0.04a	0.1a	0.0a	<0.1a	0.2ab	0.0a	<0.1a	4.5a	0.0a	0.8a	14.2a	0.0a
3. AgriMek + 1% Oil 20 oz./A Guthion 3F 8.0 oz.	May 20 May 11	0.5a	0.4a	0.0a	0.1a	1.2cd	0.0a	0.1ab	13.1abc	0.0a	2.1a	14.7a	0.0a
4A Imidan 70W+ 1% Oil 16.0 oz. PBO 8.0 oz.	May 11 June 14 June 23	<0.1a	0.3a	0.0a	<0.1a	0.5abc	0.0a	0.5bc	23.7bc	0.0a	2.4a	19.6a	0.0a
4B Imidan 70W+ 1% Oil 16.0 oz.	May 11 June 14 June 23	0.2a	0.2a	0.0a	0.0a	<0.1a	0.0a	0.1a	5.5a	0.0a	2.4a	19.0a	0.0a
5A Mitac 1.5 EC 32 oz. PBO 8.0 oz.	May 11 June 14 June 23 June 23	0.2a	0.4a	0.0a	<0.1a	0.3ab	0.0a	0.3ab	23.4bc	0.0a	1.2a	11.1a	0.0a
5B Mitac 1.5 EC 32 oz.	May 11 June 14 June 23	0.2a	<0.1a	0.0a	<0.1a	0.2ab	0.0a	0.2ab	7.9ab	0.0a	1.0a	7.7a	0.0a
6. Untreated		0.5a	0.6a	0.0a	0.2a	2.0d	0.0a	0.7c	15.1abc	0.0a	6.6b	25.2a	0.0a

[1]Data taken from "Bartlett". (Petal Fall, May 10)

[2]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD).
Leaf samples taken from early spurs and young terminals.

Table 10 (con't.) Evaluation of insecticides in a seasonal program on pear[1], N.Y.S.A.E.S., Hudson Valley Lab., Highland, New York. - 1993

Treatment Rate/100gal.	Application Date	#'s / leaf[2] June 21 Nymphs	June 21 Eggs	June 21 PRM	June 28 Nymphs	June 28 Eggs	June 28 PRM	July 6 Nymphs	July 6 Eggs	July 6 PRM
1. NTN 33893 4.0 oz.	April 30 May 10	4.6c	14.1a	0.0a	3.9c	8.1a	0.0a	1.5cd	1.0a	0.7a
2. NTN 33893 4.0 oz.	May 10 May 27	4.3bc	18.2a	0.0a	4.5c	8.8a	0.3a	0.4abc	1.5a	0.0a
3. AgriMek + 1% Oil 20 oz./A Guthion 3F 8.0 oz.	May 20 May 11	4.1bc	12.3a	0.0a	2.3bc	5.2a	0.0a	1.8d	2.2a	0.0a
4A Imidan 70W+ 1% Oil 16.0 oz. PBO 8.0 oz.	May 11 June 14 June 23	-	-	-	2.9c	4.6a	0.0a	0.7abcd	2.2a	0.0a
4B Imidan 70W+ 1% Oil 16.0 oz.	May 11 June 14 June 23	4.2bc	7.8a	0.0a	1.7abc	1.4a	0.0a	<0.1a	0.4a	0.0a
5A Mitac 1.5 EC 32 oz. PBO 8.0 oz.	May 11 June 14 June 23 June 23	1.6a	6.9a	0.0a	0.3a	1.3a	0.0a	0.3ab	1.3a	0.0a
5B Mitac 1.5 EC 32 oz.	May 11 June 14 June 23	1.8ab	4.8a	0.0a	0.6ab	2.5a	0.0a	0.1a	0.3a	0.0a
6. Untreated		8.1c	18.1a	0.0a	3.2c	6.0a	0.0a	1.3bcd	1.7a	0.0a

[1]Data taken from "Bartlet". (Petal Fall, May 10)

[2]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD). Leaf samples taken from early spurs and young terminals.

Table 11 Evaluation of insecticides in a seasonal program on pear fruit[1], N.Y.S.A.E.S., Hudson Valley Lab, Highland, New York. - 1993

Treatment Rate/100gal.	Application Date	Late season Lepidoptera damage[2]				Sept. 1[3]	
		Plum Curculio	Surface Lep. Feeding	Internal Lep. Feeding	Apple Maggot	Mean leaf rating	Mean fruit russet rating
1. NTN 33893 4.0 oz.	April 30 May 10	6.2ab	10.5 cd	18.3 b	0.7a	1.3	2.0
2. NTN 33893 4.0 oz.	May 10 May 27	8.5 bc	5.5 bcd	13.97ab	0.0a	1.3	1.7
3. AgriMek + 1% Oil 20 oz./A Guthion 3F 8.0 oz.	May 20 May 11	2.0a	0.8ab	9.6ab	0.1a	1.3	0.0
4 Imidan 70W+ 1% Oil 16.0 oz.	May 11 June 14 June 23	2.6a	0.2a	3.1a	0.0a	3.0	0.0
5 Mitac 1.5 EC 32 oz.	May 11 June 14 June 23	13.1 c	4.7abc	4.1a	0.0a	0.0	0.0
6. Untreated		15.5 c	14.9 d	15.4 b	0.3a	1.7	0.7

[1]Data taken from "Bartlett" (Petal Fall, Sept 10-13); 25% of fruit picked as "drops".

[2]Treatment means followed by the same letter are not significantly different (P<0.05; Fishers Protected LSD). Late-season Lepidoptera primarly of Codling Moth and Oriental Fruit Moth.

[3]Based on rating where 0 = none; 1 = slight; 2 = moderate; 3 = severe.

CORN (SWEET): *Zea mays* 'Flagship'
Corn earworm (CEW): *Helicoverpa zea* (Boddie)
European corn borer (ECB): *Ostrinia nubilalis* (Hubner)
Fall armyworm (FAW): *Spodoptera frugiperda* (J. E. Smith)

INSECT CONTROL ON LATE-SEASON SWEET CORN WITH FOLIAR SPRAYS OF ORGANIC INSECTICIDES, 1993: 'Flagship' sweet corn (chosen because of it's resistance to maize dwarf mosaic virus) was planted June 8 and July 2 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. Foliar spray treatments were applied with a high clearance sprayer through three D3-25 cone nozzles/row, dispensing 51 GPA @ 100 PSI @ 3 MPH. Insecticides were applied, starting at first silk, to Test 1 on 14 Aug and 19 Aug.; and to Test 2 on 30 Aug, 2 Sept and 7 Sept. Treatment efficacy was determined 6-days postapplication by randomly selecting 25 plants/replicate, recording the number of infested ears by insect species, and conversion to % infested ears.

Growing conditions during '93 were extremely dry with high temperatures, particularly during July (see page 1). Plots were irrigated once with ca. 2 inches of water in mid-July. Insect infestations were about normal in the first planting, but increased significantly in the second planting. The acceptance threshold for fresh market sweet corn is 5% infested ears.

Test 1 - With two applications Larvin (0.75 lb ai), Lannate (0.45 lb ai) and a tank-mix of Ambush and Penncap M (0.15 + 0.75 lb ai) provided excellent control of the insect complex (Table 12). Penncap M (1.0 lb ai) and Karate (0.02 lb ai) provided control that was acceptable, just under the 5% damage threshold. The performance of Asana at both rates was unacceptable. Confidor was applied primarily for control of corn leaf aphid, which were not in high numbers.

Test 2 - The performances of Penncap, Ambush, Asana and Karate in the previous test were at variance from what past history would lead one to expect - therefore these insecticides were re-evaluated on a later planting (Table 12). Under more intense pressure from CEW and FAW, only Ambush (0.2 lb ai) held total infestations below the 5% threshold. This improved performance was apparently due to the elevated dosage (from 0.15 to 0.2 lb ai), the additional application, or both. The performance of Karate was identical to the previous test, suggesting that the application rate was too low. Asana again allowed excessive damage. The poor performance of Penncap against FAW was characteristic.

Table 12. Evaluation of Insecticides for Control of Late-season Sweet Corn Insect Pests[1], New Paltz, NY, 1993

	****** *TEST 1* ******			
	% Infested ears by insect species[2,3]			
Treatment & Form.	ECB	CEW	FAW	Total % infest.
•Larvin 80WG 0.75 lb AI/acre	0.0 a	0.9 a	0.0 a	0.9 a
•Lannate 1.8L 0.45 lb AI/acre	0.0 a	2.0 a	0.9 ab	2.9 a
•Ambush + Penncap 0.15 + .75 lb AI/acre	0.9 ab	2.1 a	0.0 a	3.0 a
•Penncap M 2L 1.0 lb AI/acre	0.9 ab	4.9 ab	0.0 a	5.8 b
•Karate 1E 0.02 lb AI/acre	4.0 ab	0.9 a	0.9 ab	5.8 b
•Ambush 2E 0.15 lb AI/acre	5.9 abc	4.0 ab	4.0 ab	13.9 c
•Asana .66E 0.05 lb AI/acre	6.8 abcd	6.9 b	5.9 b	19.6 d
•Confidor 240FS 2.9 oz./acre	7.7 bcd	5.5 ab	11.0 cd	24.2 e
•Asana .66E 0.04 lb AI/acre	14.0 d	4.9 ab	5.4 b	24.3 e
UNTREATED	12.7 cd	7.9 b	11.9 cd	32.5 f

	****** *TEST 2* ******			
	% Infested ears by insect species [2,3]			
Treatment & Form.	ECB	CEW	FAW	Total % infest.
•Ambush 2E 0.20 lb AI/acre	2.0 a	0.0 a	2.0 a	4.0 a
•Karate 1E 0.02 lb AI/acre	3.0 a	0.0 a	2.8 a	5.8 a
•Ambush 2E 0.15 lb AI/acre	0.9 a	3.0 a	3.0 a	6.9 a
•Asana .66 E 0.05 lb AI/acre	3.0 a	2.0 a	5.9 ab	10.9 b
•Asana .66 E 0.04 lb AI/acre	8.9 a	0.9 a	7.9 ab	17.7 c
•Penncap M 2L 1.0 lb AI/acre	4.0 a	4.0 a	14.6 b	22.6 d
UNTREATED	5.9 a	19.7 b	27.6 c	53.2 e

[1]Application dates: Test 1 -14 Aug& 19 Aug; Test 2 - 30 Aug, 2 Sept & 7 Sept
Evaluation dates: Test 1 - 25 Aug; Test 2 - 13 Sept

[2]ECB = European corn borer; CEW = corn earworm; FAW = fall armyworm

[3]Means followed by the same letter are not significantly different ($P<0.05$; Fishers protected LSD). Data treated by arcsin transformation prior to analysis.

ONION: Allium cepa L. 'Golden Cascade'
Onion maggot (OM): *Delia antiqua* (Meigen)

CONTROL OF ONION MAGGOT WITH TRIGARD SEED TREATMENTS, 1993: Onions were seeded 30 May in muck soil near Florida, NY. Treatments were single rows, 40 ft long, replicated 4 times in a randomized complete block design. Germination and damage data were recorded from the center 20 ft of each row. All treated seeds were sown and seed-furrow treatments of insecticides were applied using a hand-pushed cone seeder that planted 9 seeds/ft and delivered 43 GPA through a CO_2 pressurized system. Trigard 75WP was applied, at Geneva NYSAES, to the seed either by pelleting (two methods) or by film coating (three methods). Pelleted treatments were applied by mixing Trigard with 140 mesh sand or diatomaceous earth and coating it using a copper pan treater and air brush. Progrow (Vitavax and Thiram) was included in the pellet for each specified seed treatment at the rate of 25 g of formulation/kg of seed, and Dithane (F45) applied in the furrow with the Lorsban drench treatment at 2.4 qts formulation/acre for control of onion smut, *Urocystis cepulae*. Film treatments were applied by suspending Trigard in a 15% solution of Opadry F, Opadry AG or Sepiret (commercially available film coating polymers) and then spraying the seeds. Progrow was applied during the film-coating procedure.

The number of maggot infested plants were assessed at regular intervals from 1 June to 21 June and the data are presented (Table 13) as accumulative stand loss. All treatments containg Trigard either as film coats or as pellets provided very good maggot control (average stand loss = 1.8 %) relative to the same seed treatments that did not include Trigard or any insecticide (average stand loss = 16.1 %). All Trigard treatments were superior to the Lorsban standard treatment and demonstrated no phytotoxicity. Although there were no significant differences in stand loss between the methods of seed treatment, the film coat (average 1.1%) appeared somewhat superior to the pellets (average 2.5%).

Use of the insect growth regulator Trigard as a seed treatment is a promising alternative method for control of onion maggot. Both pelleting and film coating of Trigard (with fungicide) could be used to control onion pests with a drastically reduced amount of active ingredient per acre. Other benefits would include reduced environmental contamination, reduced hazard to beneficial organisms, increased worker safety, convenience and faster planting time.

Table 13. Control of Onion Maggot using Trigard Seed-treatments[1], Orange County NY, 1993.

Seed treatment	Pesticide	% Stand loss[2]	No. plants before OM[2]
new film coat #2	Trigard + Progrow	0.5 a	113 cd
old film coat	Trigard + Progrow	0.8 a	92 bcd
new film coat #1	Trigard + Progrow	1.4 ab	116 cd
new film coat #3	Trigard + Progrow	1.7 ab	101 bcd
old pellet	thiram	2.1 ab	97 bcd
new pellet #1	Trigard + Progrow	2.6 ab	121 d
new pellet #2	Trigard + Progrow	2.7 ab	102 bcd
raw seed	Lorsban + Dithane	5.0 bc	97 bcd
1992 pellet	thiram	10.3 cd	37 a
new film #1	thiram	13.9 de	76 b
new pellet #3	thiram	14.4 de	72 ab
new pellet #2	thiram	14.6 de	82 bc
old film	thiram	17.0 de	84 bc
new pellet #1	thiram	17.1 de	81 bc
raw seed	Dithane	20.3 e	105 bcd
new film #2	thiram	20.5 e	94 bcd

[1]Planted 4/30; evaluated 6/1; 6/7; 6/14 & 6/21

[2]Means followed by the same letter are not significantly different ($P<0.05$; Fisher's protected LSD). Percentage data treated by arcsin transformation prior to analysis.

ONION: *Allium cepa* L. 'Spartan Banner 80'
Onion thrips: *Thrips tabaci* Lindeman

CONTROL OF ONION THRIPS WITH INSECTICIDES, 1993: Treatments were arranged in 1-row plots, 40 ft long, and replicated 4 times in a randomized block design. Insecticide emulsions were applied as single applications when thrips exceeded threshold on 9 Aug and repeated on 17 Aug. Treatments were applied over the plants with a CO_2 pressurized (100 PSI) back-pack sprayer dispensing 38 GPA @ 2 MPH. Efficacy evaluations were made at 2 days and 8 days postapplication by harvesting 10 randomly selected plants per treatment-replicate, and examining for number of larval thrips by means of a 10-power 'OptiVisor' scope. Reduction in numbers of thrips were determined by: [# thrips pretreatment - # thrips posttreatment] ÷ [# thrips pretreatment] x 100. Because thrips populations were declining rapidly in the untreated as plants matured and tops fell, data were corrected for untreated mortality by: [treated mortality - untreated mortality] ÷ [1 - untreated mortality]. Results of previous studies have shown that population levels above 3 nymphs/leaf are detrimental to yield, and therefore efficacy is judged on that threshold.

Thrips populations didn't build until very late in the season when the onion foliage was starting to dry and fall down. At 2 days postapplication (Table 14), treatment populations ranged from 0.8 to 6.5 thrips/leaf; all except Alliette reducing the initial population below threshold. By 8 days postapplication, all treatments except Alliette kept populations below threshold, even though the untreated population had risen slightly.

It is unusual that all treatments would perform so well against thrips. The 1993 season was remarkably dry and onion growth was poor. The average number of leaves/plant was 6.5; normally this cultivar would have 10 or more leaves/plant in late August. The foliage was in premature senescence and thrips were more exposed and accessible to sprays.

Table 14. Control of Onion Thrips using Foliar Sprays of Insecticides, Orange County NY, 1993

Treatment & rate/acre		Evaluated 19 Aug[1] *2 days postapplication* # nymph/leaf	% reduction[2]	Evaluated 25 Aug[1] *8 days postapplication* # nymph/leaf	% reduction[2]
Karate 1E	0.02 lb ai	1.6 b	67.4 b	2.3 bc	60.2 cd
Karate 1E	0.025 lb ai	1.3 ab	75.3 bc	1.5ab	75.0 ef
Karate 1E	0.03 lb ai	1.1 ab	77.4 cd	1.2 a	78.0 f
Alliette	1.6 lb ai	5.4 cd	-	3.9 ef	33.6 b
Alliette	2.8 lb ai	6.5 d	-	4.6 f	23.4 a
Alliette	4.8 lb ai	4.3 cd	-	4.5de	25.5 ab
Orthene 75W	1.0 lb ai	1.0 a	80.8 cd	2.1 bc	64.2 cde
Ambush 2E	0.3 lb ai	0.8 a	83.0 d	1.7 abc	71.3 def
Lannate 1.8E	0.45 lb ai	1.3 ab	75.3 bc	2.5 cd	55.0 c
Guthion 50W	0.75 lb ai	2.2 c	53.9 a	2.2 bc	62.5 cde
Ambush + Orthene	0.15 + 0.5 lb ai	1.2 ab	76.8 cd	1.9 abc	67.4 cdef
Lannate + Orthene	0.25 + 0.5 lb ai	1.0 ab	78.0 cd	1.9 abc	67.8 cdef
UNTREATED		6.6 d	-	7.8 g	-

[1]Means followed by the same letter are not significant. different (P<0.05; Fisher's PLSD).
[2]Reduction based on pretreatment counts of 8.3 thrips/plant. Data corrected for untreated mortality
by: [*treated mortality - untreated mortality*] ÷ [*1.0 - untreated mortality*].