Not For Publication

FRUIT INSECT AND MITE CONTROL STUDIES - EASTERN NEW YORK - 1976

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Contents

Materials Tested

Ambush 2EC	ICI America, Inc.
BAAM 1.5EC	Upjohn Company
Bay Hox 1901 40W	Chemagro Corporation
Benlate 50W	DuPont Company
Captan 50W	Stauffer Chemical Co.
Cygon 2.67EC	American Cyanamid Co.
Cyprex 65W	American Cyanamid Co.
Exhault 800	Kay-Fries Chemicals, Inc.
Fundal 97SP	NOR-AM Agric. Prod., Inc.
Galecron 95SP	Ciba-Geigy Corporation
Guthion 50W	Chemagro Corporation
Glyodin 30%	Agway Inc.
Imidan 50W	Stauffer Chemical Co.
Lannate 1.8L	DuPont Company
M4170 50W	Dow Chemical Company
Mobil 9087 2EC	Mobil Chemical Company
Omite 6E	Uniroyal Chemical
Penncap M 2EC	Pennwalt Corporation
Petroleum Oil	Sun Oil Company
Phosphamidon 8EC	Chevron Chemical Company
Plictran 50W	Dow Chemical Company
PP199 4EC	ICI America, Inc.
SD43775 2.4EC	Shell Development Co.
Sumithion 8EC, 40W	Stauffer Chemical Co.
Systox 2EC	Chemagro Corporation
Thiodan 50W	FMC Corporation
Thiodan 2 Pyrenone .03-.3EC	FMC Corporation
Vydate 2L	DuPont Company
Zardex 40W	Zoecon Corporation
Zolone 3EC	Rhodia, Inc.

1976 WEATHER CONDITIONS - HUDSON VALLEY LABORATORY, HIGHLAND, N.Y. (Ulster Co.)

Date	Temp °F. Max	Min	Rain in.
Apr 19	94	63	
20	83	58	
21	78	53	
22	67	52	0.02
23	70	40	
24	52	35	
25	45	39	
26	44	38	1.29
27	50	34	0.09
28	58	38	0.01
29	63	42	
30	70	37	
avg	65	44	1.41*
May 1	59	40	1.46
2	72	52	
3	70	40	0.08
4	55	35	
5	73	34	
6	80	58	
7	71	56	0.09
8	61	35	
9	68	34	
10	76	39	
11	69	53	0.45
12	59	35	
13	69	32	
14	75	52	
15	80	60	
16	68	57	0.09
17	69	57	0.12
18	69	43	1.27
19	43	36	0.11
20	68	40	
21	68	41	
22	63	39	
23	67	36	
24	68	37	
25	58	49	0.03
26	62	47	
27	76	41	
28	79	43	
29	72	51	
30	68	57	
31	76	59	0.10
avg	68	45	4.21*
June 1	72	50	0.77
2	69	49	
3	72	43	
4	71	47	
5	77	44	
6	61	50	0.29
7	78	52	0.01
8	85	56	

Date	Temp °F. Max	Min	Rain in.
June 9	86	55	
10	88	61	
11	85	63	
12	72	47	
13	69	45	
14	80	58	
15	86	66	
16	86	70	0.48
17	78	64	
18	82	58	
19	79	67	
20	79	67	0.37
21	80	66	0.08
22	80	68	0.47
23	82	65	
24	85	64	
25	84	67	
26	85	63	
27	82	59	
28	85	55	0.53
29	83	62	
30	77	62	
avg	79	58	3.00*
July 1	79	64	1.16
2	78	57	
3	79	51	
4	77	58	0.19
5	86	54	
6	74	64	
7	77	61	0.23
8	81	60	
9	81	54	
10	85	62	
11	75	58	0.14
12	69	56	
13	76	60	0.05
14	80	55	
15	72	59	
16	78	54	0.48
17	78	50	
18	85	54	
19	82	62	
20	85	64	
21	76	64	0.02
22	81	61	0.03
23	70	54	1.14
24	83	65	
25	74	15	
26	80	45	
27	81	56	
28	85	60	
29	66	59	0.69
30	75	65	
31	80	65	

Date	Temp °F. Max	Min	Rain in.
July avg	78	58	4.13*
Aug 1	76	55	1.16
2	73	54	
3	72	50	
4	78	52	
5	81	57	
6	77	59	
7	61	57	1.08
8	69	59	
9	72	67	
10	69	60	2.80**
11	82	55	
12	82	60	
13	86	69	
14	84	66	
15	81	66	
16	72	55	0.66
17	80	61	
18	77	52	
19	78	51	
20	83	51	
21	87	60	
22	88	64	
23	83	59	
24	79	61	
25	83	53	
26	81	58	
27	74	66	1.91
28	82	66	
29	83	59	
30	65	41	
31	71	49	
avg	78	58	7.61*
Sept 1	77	66	
2	66	49	0.29
3	69	42	
4	68	53	
5	77	48	
6	70	45	
7	75	48	
8	81	58	
9	76	54	
10	71	55	1.65
11	66	47	
12	73	43	
13	81	52	
14	83	53	
15	76	59	
16	71	64	
17	73	66	1.73
18	73	64	
avg	74	54	3.67 *

* Sum, ** Sum of 8/9 & 8/10

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APPLE: Malus sylvestris
Apple aphid: Aphis pomi DeGeer
Aphid predator: Cecidomyiid larvae
Aphid predator: Syrphid larvae
Tarnished plant bug: Lygus lineolaris (P. de B.)
Plum curculio: Conotrachelus nenuphar (Herbst)
Codling moth: Laspeyresia pomonella (Walsh)
Oriental fruit moth: Grapholitha molesta (Busck)
Lesser appleworm: Grapholitha prunivora (Walsh)
Variegated leafroller: Platynota flavedana (Clemens)
Redbanded leafroller: Argyrotaenia velutinana (Walker)
Obliquebanded leafroller: Choristoneura rosaceana (Harris)
Apple maggot: Rhagoletis pomonella (Walsh)
San Jose scale: Quadraspidiotus perniciosus (Comstock)

APPLE, INSECT CONTROL, HUDSON VALLEY, 1976: Insecticide treatments were evaluated in a seasonal control program in a twelve-year-old planting on the EM 2 rootstock. Treatments were applied to runoff by high pressure handgun sprayer operating at 425 psi and using ca 3.2 gal/tree or 300 gal/acre. Eight-tree plots containing from 5 to 7 different apple cultivars were replicated 3 times in a randomized complete block design. Treatments were applied at pink (McIntosh) April 19; petal fall (Rome) May 7, 8; and in 7 cover sprays- May 21, 24; June 4; 18; July 2; 16; 30; and August 13. Additional sprays applied over the entire block by airblast sprayer for disease control included: Difolatan 4F, 5 qt/100 gal (April 6), Captan 50W 1 1/2 lb/100 gal (May 3), and Manzate 200 80W 1 1/2 lb/100 gal (May 13). The Golden Delicious, Rome Beauty, and Red Delicious cultivars were thinned May 22 with 10 ppm NAA. Above normal temperatures during early April caused an abnormally early bloom. This resulted in harvest dates which were 1-2 weeks earlier than normal. Temperatures were slightly below average for July,

August, and September, but rainfall was 3" and 1" above normal for months of August and September.

Bay Hox 1901 + Guthion, Cygon, Lannate + Guthion, M 4170, and SD 43775 were effective aphicides. Mobil 9087, while not effective as an aphicide, did allow aphid predators to survive. Under moderate tarnished plant bug pressure most materials provided moderate control. Under heavy plum curculio pressure Penncap M, Sumithion, treatments with Guthion at the recommended (8 oz) rate, and SD 43775, provided good to excellent control. All materials gave good control of codling moth, oriental fruit moth, lesser appleworm, and San Jose scale, under moderate pressure. Bay Hox 1901 + Guthion (low rate), Cygon, and Mobil 9087 were weak against early leafrollers (OBLR, RBLR, 1st brood), while Cygon was also weak against late leafrollers (VLR, RBLR, 2nd brood) and apple maggot. Red varieties (McIntosh, Cortland, and Red Delicious) had a "washed out" color in the Sumithion treated plots, while in Golden Delicious plots of same treatment severe russetting, along with the forementioned "washed out" appearance, were noted. A slight russetting was also found in Penncap M and Mobil 9087 treated Golden Delicious plots.

Table 1.

Treatment and rate per 100 gallons		Mean no. infested terminals/25[1]		
		Apple Aphid	Cecidomyiid larvae	Syrphid larvae
Bay Hox 1901 40W + Guthion 50W	20.0 oz 8.0 oz	0.3a	0.0	0.0a
Bay Hox 1901 40W + Guthion 50W	20.0 oz 4.0 oz	2.0a	0.0	0.0a
Cygon 2.67EC	24.0 oz	1.0a	0.0	0.0a
Lannate 1.8L + Guthion 50W	16.0 oz 4.0 oz	3.7ab	0.0	0.0a
M 4170 50W	16.0 oz	4.0ab	0.0	0.0a
Mobil 9087 2EC[2]	32.0 oz	15.3 c	1.0	3.0 b
Penncap M 2EC	32.0 oz	6.7 b	0.0	0.0a
SD 43775 2.4EC	2.7 oz	3.3ab	0.0	0.3a
SD 43775 2.4EC	5.4 oz	3.3ab	0.0	0.0a
Sumithion 40W[3]	32.0 oz	14.7 c	0.0	0.0a
Guthion 50W	8.0 oz	14.7 c	0.0	0.0a
Check		16.7 c	0.3	2.0 b

Means followed by the same letter are not significantly different according to DMRT, P= 0.05.

[1] Based on 25 McIntosh terminals/rep; evaluated June 23.

[2] Guthion 50W 8.0 oz substituted on May 7 application.

[3] Sumithion 8EC 12.8 oz substituted on April 19 and May 7 applications.

Table 2.

Treatment and rate per 100 gallons		% Fruit Injured[1] Tarnished plant bug	Plum Curculio	CM[2] OFM	LAW[2]	VLR[2] RBLR
Bay Hox 1901 40W + Guthion 50W	20.0 oz 8.0 oz	5.3ab	4.1a	0.2a	0.0a	0.1a
Bay Hox 1901 40W + Guthion 50W	20.0 oz 4.0 oz	9.1 bc	17.7 bcd	0.3a	0.3a	0.3a
Cygon 2.67EC	24.0 oz	11.3 c	20.8 d	1.5a	1.7a	6.4 b
Lannate 1.8L + Guthion 50W	16.0 oz 4.0 oz	7.4abc	11.9abcd	0.6a	0.2a	0.0a
M 4170 50W	16.0 oz	6.8ab	10.4abcd	0.0a	0.0a	0.0a
Mobil 9087 2EC[3]	32.0 oz	7.8abc	19.3 cd	0.4a	0.3a	0.4a
Penncap M 2EC	32.0 oz	7.3abc	4.8a	0.3a	0.1a	0.0a
SD 43775 2.4EC	2.7 oz	3.9a	0.9a	0.0a	0.0a	0.0a
SD 43775 2.4EC	5.4 oz	4.3a	1.3a	0.0a	0.0a	0.0a
Sumithion 40W[4]	32.0 oz	8.1abc	7.6abc	0.5a	0.1a	0.3a
Guthion 50W	8.0 oz	6.1ab	5.9ab	0.3a	0.1a	0.1a
Check		17.5 d	65.7 e	24.8 b	14.1 b	9.7 b

Means not followed by same letter are significantly different by the Waller and Duncan BSD test with an error weight ratio of 100 (ca. $P = .05$)

[1] Based on 100 fruits per tree from each of four cultivars per rep; cultivars and harvest dates included-McIntosh (Sep 7-9), Cortland (Sep 10), Red Delicious (Sep 14, 15), and Golden Delicious (Sep 23, 24).

[2] CM= Codling moth, OFM= oriental fruit moth, LAW= Lesser appleworm, and VLR= Variegated leafroller.

[3] Guthion 50W 8.0 oz substituted on May 7 application.

[4] Sumithion 8EC 12.8 oz substituted on April 19 and May 7 applications.

Table 3.

Treatment and rate per 100 gallons		% Fruit injured or infested[1]				
		OBLR[2] RBLR	Apple Maggot Punctures	Apple Maggot tunnels	San Jose scale	% Clean Fruit
Bay Hox 1901 40W + Guthion 50W	20.0 oz 8.0 oz	0.8ab	0.1a	0.0a	0.0a	89.8ab
Bay Hox 1901 40W + Guthion 50W	20.0 oz 4.0 oz	2.9 c	1.3a	0.3a	0.2a	70.7 cd
Cygon 2.67EC	24.0 oz	5.2 d	6.5 bc	0.7a	0.0a	57.9 d
Lannate 1.8L + Guthion 50W	16.0 oz 4.0 oz	1.1abc	2.1ab	0.1a	0.0a	79.3 bc
M 4170 50W	16.0 oz	1.6abc	0.2a	0.0a	0.0a	82.0abc
Mobil 9087 2EC[3]	32.0 oz	2.5 bc	0.3a	0.1a	1.3a	70.6 cd
Penncap M 2EC	32.0 oz	0.6ab	1.4ab	0.2a	0.0a	85.8ab
SD 43775 2.4EC	2.7 oz	0.0a	0.0a	0.0a	0.3a	94.9a
SD 43775 2.4EC	5.4 oz	0.0a	0.1a	0.1a	0.0a	94.4a
Sumithion 40W[4]	32.0 oz	0.9ab	2.2ab	0.1a	0.1a	81.2abc
Guthion 50W	8.0 oz	0.4a	0.1a	0.0a	0.0a	87.8ab
Check		16.9 c	8.3 c	5.1 b	19.1 b	11.8 e

Means not followed by same letter are significantly different by the Waller and Duncan BSD test with an error weight ratio of 100 (ca. P= .05)

1 Based on 100 fruits per tree from each of four cultivars per rep; cultivars and harvest dates included-McIntosh (Sep 7-9), Cortland (Sep 10), Red Delicious (Sep 14, 15), and Golden Delicious (Sep 23, 24)

2 OBLR= Obliquebanded leafroller, RBLR= Redbanded leafroller.

3 Guthion 50W 8.0 oz substituted on May 7 application.

4 Sumithion 8EC 12.8 oz substituted on April 19 and May 7 applications.

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PEAR: Pyrus communis, Bartlett
Pear psylla: Psylla pyricola Foerster

PEARS, PEAR PSYLLA CONTROL, HUDSON VALLEY, 1976: A six-year-old Bartlett pear block near New Paltz, New York was divided into three-tree plots replicated three times in a randomized complete block design. Eleven treatments were applied June 9 by high pressure handgun sprayer at 400 psi, spraying to runoff. Treatments were evaluated by sampling five spurs per plot and counting all pear psylla nymphs and eggs on each spur under a binocular scope in the laboratory. A pre-treatment count made June 4 indicated 2nd brood nymphs were starting to hatch and egg-laying was heavy. Counts were made 6 (June 15); 14 (June 23); and 28 (July 6) days after treatments were applied.

A six-day post-treatment count showed a good egg population present, with all materials having good activity against the nymphs. The 14 day post-spray count nymphal numbers were building-up in the Lannate and M4170 treatments. Mobil 9087, SD43775 and PP199 looked very good at the 28 day post-treatment count. BAAM, Galecron, Penncap + Galecron, and Ambush had nymphs building up, while Lannate and M4170 looked no better than the check at the 28 day count. No phytotoxicity was observed with any of the treatments.

Treatment and rate /100 gallons	Mean no. pear psylla nymphs and eggs per 5 spurs							
	6/4		6/15 (6[a])		6/23 (14[a])		7/6 (28[a])	
	nymphs	eggs	nymphs	eggs	nymphs	eggs	nymphs	eggs
BAAM 1.5EC 32 oz	3.0	17.3	0.0	46.3	0.0	28.7	4.3	9.7
Galecron 95SP 8 oz	2.0	22.7	0.3	62.7	0.7	44.0	6.7	4.3
Lannate 1.8L 32 oz	7.0	29.0	1.7	66.0	22.7	39.0	14.7	1.7
M 4170 50WP 16 oz	8.0	20.7	0.3	49.0	19.0	78.0	12.0	4.7
Mobil 9087 2EC 16 oz	6.3	27.7	0.3	38.7	0.3	4.3	0.7	1.3
Mobil 9087 2EC 32 oz	5.0	31.0	0.3	31.0	0.0	7.3	2.0	0.3
Penncap 2FM 32 oz + Galecron 95SP 8 oz	1.7	17.7	0.0	67.0	0.7	25.7	7.7	3.7
PP 199 4EC 6 oz	7.3	16.7	0.0	85.0	1.0	33.7	0.0	4.0
Ambush 2EC 6.4 oz	6.0	33.0	0.7	85.0	0.0	13.3	3.0	1.0
SD 43775 2.4EC 2.7 oz	5.0	19.0	0.0	56.0	0.0	22.0	0.3	3.7
SD 43775 2.4EC 5.4 oz	2.0	7.7	1.0	58.3	0.0	24.7	0.0	4.3
Check	6.3	24.0	10.3	75.0	43.3	89.7	14.7	13.7

a/ Days after treatment.

MITE CONTROL TRIAL

Studies were conducted in the Peru, N.Y. region of the Champlain Valley in cooperation with Mr. Frank McNicholas, Regional Coop. Extension Fruit Specialist. We were interested in assessing the effects of several insecticide, fungicide, and miticide regimes on the pest and predator mite species in that area. The more numerous mite species found in this study included the European red mite (ERM), apple rust mite (ARM), and the predatory phytoseiid, Amblysieus fallacis (AMB). Above normal temperatures were found for the months of April and June whereas temperatures were below the norm for May, July, August, and September. Rainfall was above normal from May through September (Fig. 1).

Figure 1. Growing Season Temperature and Rainfall, Champlain Valley, Peru, N.Y.

	Temperature (°F)		Rainfall (in.)	
Month	1976	Aug.	1976	Aug.
April	46.6	43.4	2.24	2.29
May	53.8	54.9	4.89	2.75
June	67.2	64.9	4.20	2.99
July	66.4	69.2	5.22	3.03
August	65.4	67.0	4.01	3.20
September	56.7	59.1	2.90	2.50

METHODS - A 14 acre block of large mature McIntosh trees spaced 40' x 40' was divided into 2 halves, one half (programs 1-6) receiving Benlate + Glyodin until mid-June, the other half receiving Cyrex early followed by Captan. Each half was further divided into miticide treatments-2% oil (programs 2, 4, 6, 8, 10, & 12), reduced rate of Plictran (programs 1, 5, 5 & 9), or checks (programs 3 & 11). Phosphamidon (programs 1, 2, 7 & 8) and Zolone (programs 5, 6, 9, & 10) were applied as aphicides July 1st. A new miticide, Zardex, was applied in an adjacent block (program 13) at the same time as the 2% oil application was made. Cyrex followed by Captan was the fungicide program in the Zardex block. Treatments were all applied by the grower with an airblast sprayer at 3x prebloom and 6x past bloom. All

treatments were applied as every row (full) sprays except where indicated as an alternate row (A) application in Table 1.

A spur sample (5 spurs/tree, 4 trees/program) was taken April 8th. Overwintered ERM eggs were counted on each spur using a binocular microscope. Leaves were sampled at ca 2 week intervals from May 20 to September 29. Four trees from the two middle rows of each program were sampled by collecting 20 leaves from the periphery and 5 leaves from the inside of each tree. Leaves were kept in a cooler, brought into the laboratory, brushed with a mite brushing machine, and the mites counted, usually on the same day samples were collected.

RESULTS - The Zardex program looked good until the beginning of July, but by July 27 ERM counts averaged 13.7 mites/leaf. The Zardex block was treated with 2 alternate row applications of Plictran at the 2 oz rate, which reduced the mites for the remainder of the season. The AMB numbers built up first in the Zardex plots as can be seen in the August 13 count.

The 2% oil and early Plictran programs looked good through the month of July, but by mid-August ERM build-up was found in phosphamidon treated programs (1, 2, 7, & 8) and the 2% oil programs (4 & 12). Plictran was applied to programs 1 and 2, but other programs were left to see if AMB would provide control. ERM mites increased to a peak of 15 mites/leaf (program 4) by September 7. Their numbers declined while AMB counts averaged over 1/leaf by September 29th in plots which had previously had high ERM counts.

The check programs (3 and 12) had almost identical mite counts on June 30, suggesting that the different fungicide programs had not affected the mite pests. Because Benlate was sprayed once in the Cyprex-Captan block, it was not possible to effectively compare the effect of the fungicide programs on AMB presence. The checks were treated with Plictran on July 15, which reduced their numbers for the remainder of the season.

Zolone was an excellent miticide in this test, the single application July 1 reducing ERM numbers throughout the season. It was encouraging to note the AMB re-establishment in all programs by the end of the season.

Table 1. Effects of Orchard Spray Programs on European Red Mite (ERM), Apple Rust Mite (ARM), and Amblysieus fallacis (AMB) predator mite in the Champlain Valley - 1976.

Program #	ERM Eggs/Spur 4/8	4/21	ERM 5/20	ERM Eggs	ARM	ERM 6/1	ERM Eggs	ARM	6/4
1	84.3		1.3[1]	.08	.7	1.0	21.5	1.5	Plic.[2] 2oz
2	42.4	2% oil	0.1	.01	.0	0.0	0.2	1.3	
3	31.1		0.8	.09	.0	0.5	5.6	3.4	
4	13.1	2% oil	0.1	.0	.1	0.0	0.2	1.0	
5	46.1		1.8	.61	3.2	0.6	22.3	7.6	Plic. 2oz
6	10.5	2% oil	0.0	.03	.1	0.0	0.0	0.1	
7	35.1		1.4	.09	.6	0.3	4.8	1.7	Plic. 2oz
8	13.5	2% oil	0.1	.01	.3	0.0	0.1	0.4	
9	46.5		1.0	.15	.3	0.6	6.3	2.9	Plic. 2oz
10	21.6	2% oil	0.0	.0	.6	0.0	0.1	0.1	
11	14.5		0.2	.0	.0	0.3	6.6	0.1	
12	41.4	2% oil	0.0	.0	.0	0.0	0.2	0.1	
13	13.3	Zardex 1.5 lb.	0.0	.0	.0	0.1	1.1	0.0	

Program #	ERM 6/16	ERM Eggs	ARM	AMB	ERM 6/30	ERM Eggs	ARM	AMB	7/1
1	0.8	0.6	2.4	.0	0.3	0.8	4.1	.0	Phos.[3] 1/5 pt
2	0.1	0.1	2.1	.0	1.2	3.6	30.9	.0	Phos. 1/5 pt
3	4.6	1.5	21.1	.01	15.7	23.1	107.5	.01	
4	0.2	0.1	2.4	.0	0.8	2.0	18.8	.0	
5	0.2	0.3	2.0	.0	0.2	0.5	5.6	.01	Zol.[4] 2 1/4 pt
6	0.1	0.0	7.4	.0	0.1	0.2	25.1	.0	Zol. 2 1/4 pt
7	0.3	0.4	1.3	.0	0.1	0.3	3.8	.01	Phos. 1/5 pt
8	0.1	0.0	3.5	.02	0.1	0.4	7.8	.01	Phos. 1/5 pt
9	0.1	0.2	0.3	.01	0.0	0.3	3.9	.0	Zol. 2 1/4 pt
10	0.4	0.1	0.6	.0	0.3	1.1	5.3	.01	Zol. 2 1/4 pt
11	8.8	2.0	5.5	.0	14.9	24.0	6.0	.0	
12	0.5	0.2	0.7	.0	0.8	1.9	1.7	.0	
13	0.5	0.7	0.7	.0	3.5	7.0	17.2	.0	

Program #	ERM 7/13	ERM Eggs	ARM	AMB	7/15	ERM 7/27	ERM Eggs	ARM	AMB
1	1.3	0.8	31.7	.01		4.6	4.7	70.8	.0
2	1.4	1.0	243.7	.0		3.2	5.4	107.7	.01
3	19.7	31.8	166.0	.06	Plic. 3oz	0.5	0.7	7.7	.06
4	1.2	1.4	158.2	.0		2.1	5.9	75.9	.0
5	0.1	0.3	13.3	.01		0.1	0.2	27.3	.03
6	0.0	0.0	32.5	.0		0.0	0.0	24.1	.0
7	0.1	0.5	6.3	.0		0.7	1.1	36.7	.02
8	0.2	0.2	36.7	.0		0.9	2.3	68.7	.0
9	0.0	0.1	3.4	.0		0.0	0.0	16.5	.0
10	0.2	0.1	5.2	.0		0.0	0.2	9.2	.0
11	21.3	32.0	62.4	.08	Plic. 3oz	0.5	0.7	3.5	.07
12	0.7	1.7	11.5	.01		2.2	6.9	52.6	.03
13	3.4	3.8	44.8	.0		13.7	23.6	90.9	.02

Table 1. Cont'd

Program #	8/3	ERM 8/11	ERM Eggs	ARM	AMB	8/12	8/18	ERM 8/25	ERM Eggs
1		12.7	4.3	105.6	.09	Plic. 1 1/4oz		1.6	3.0
2		5.5	5.5	121.7	.01	Plic. 1 1/4oz		1.8	1.6
3		.2	.9	6.7	.10			0.2	.7
4		6.4	4.0	100.9	.10			4.7	4.6
5		.03	.1	36.5	.03			0.5	.6
6		.1	.1	82.0	.00			0.1	.4
7		1.9	2.4	80.8	.06			2.5	3.2
8		2.2	3.4	104.9	.08			4.9	5.6
9		.2	.3	37.2	.02			0.6	.7
10		.01	.02	10.2	.01			0.1	.1
11		.1	.8	6.0	.12			0.04	.4
12		8.3	9.1	81.1	.08			3.5	3.3
13	Plic. 2oz (A)	6.2	7.4	63.0	.24	Plic. 2oz (A)		0.04	.7

Program #	ARM	AMB	ERM 9/7	ERM Eggs	ARM	AMB	ERM 9/29	ERM Eggs	ARM	AMB
1	74.1	.29					0.01	0.2	7.0	0.4
2	34.9	.08					0.1	0.4	24.9	0.3
3	19.5	.19					0.2	0.1	10.9	0.5
4	101.5	.18	15.8	4.9	103.5	.46	1.1	0.6	55.0	1.1
5	63.1	.13					0.2	0.04	60.1	1.4
6	69.4	.00					0.3	0.0	80.8	0.7
7	98.1	.34	4.5	7.4	93.2	.72	1.4	0.3	59.1	1.6
8	114.4	.04	7.9	5.2	96.3	.62	1.2	0.7	47.9	1.2
9	85.5	.09					0.7	0.1	77.7	0.9
10	40.2	.02					0.2	0.1	96.9	0.2
11	3.8	.06					0.1	0.1	14.6	0.3
12	109.6	.21	10.1	4.5	119.1	.61	0.8	0.3	21.7	1.0
13	6.6	.10					-	-	-	-

The following fungicides and insecticides were applied in full spray (F) or alternate row spray (A) at rates, dates, and conc. indicated, amounts expressed as mat./100 gal. based on 400 gal./acre dil. rate: Programs 1-6, Benlate 50W 2oz + Glyodin 1 pt, 3X, 4/22-A, 4/30-A, 5/5-A, 5/12-A, Cyprex 65W 3/8 lb 5/19-A, Benlate 50W 2oz + Captan 50W 1 lb + Imidan 50W 1 lb, 6X, 5/24-A, Benlate 2oz + Captan 1 1/4 lb + Imidan 1.0 lb + Solubor 6/10 lb, 6X 6/1-A, Benlate 2oz + Glyodin 1 pt + Solubor 6/10 lb, 6X, 6/10-A, Benlate 2oz + Glyodin 1 pt + Captan 1 lb + Imidan 1 lb + Solubor 6/10 lb, 6X, 6/21-A, Captan 1 1/4 lb, 6X, 7/1-F, Captan 1 4/10 lb + Imidan 1 4/10 lb, 6X, 7/13-A, Alar 85W 1 lb, 3X, 7/16-F, Captan 80W 1 lb + Imidan 1 8/10 lb, 6X 7/28-A, 8/11-A. Programs 7-13, Cyrex 3/8 lb, 3X, 4/22-A, 4/30-A, 5/5-A, 5/12-A, 5/19-A, Captan 50W 1 9/10 lb, 6X,5/22-F, Captan 1 4/10 lb + Imidan 1 lb + Solubor 6/10 lb, 6X, 6/1-A, 6/10-A, Benlate 2oz + Glyodin 1 pt + Captan 1 lb + Imidan 1 lb + Solubor 6/10 lb, 6X, 6/21-F, Captan 1 4/10 lb, 6X, 7/1-F, Captan 1 4/10 lb + Imidan 1 4/10 lb, 6X, 7/13-A, Alar 85W 1 lb, 3X, 7/16-F, Captan 80W 1 lb + Imidan 1 8/10 lb, 6X, 7/28-A, 8/11-A.

[1] Mean no. mites/leaf

[2] Plictran 50W

[3] Phosphamidon 8EC

[4] Zolone 3EC

SPOTTED TENTIFORM LEAFMINER TRIAL

Several insecticide trials were conducted for the control of the spotted tentiform Leafminer (STLM), Lithocolletis sp, in Columbia Co. apple orchards. The leafminer population was moderate in the first two trials but quite high in subsequent trials.

Trial 1, Methods.- A 4.5 ha apple block near Glencoe Mills, N.Y. was divided into 15 plots arranged in a randomized complete block design with 5 treatments replicated 3 times. Check plots were smaller (.1 ha) than sprayed plots, which ranged in size from .2-.5 ha. The block was ca 30 years old and consisted of Cortland (70%) and Lobo (30%) varieties spaced 12.2m x 12.2m.

Treatments were applied with a truck-mounted Friend model 393 Airmaster^{R} at 3.3x (120 gal/acre) with speed of 3 1/2 mph. Treatments were applied at the tight cluster stage of bud development when first STLM adult emergence was noted, April 14 and again at the pink stage, April 20. Because of questionable effectiveness of some treatments against total pest spectrum, these were combined with Guthion on April 20. Treatments, formulations, rates, and additional sprays applied by the grower are presented in Table 1.

Cortland leaves from 4 trees in the two middle rows of each plot were evaluated June 22. 100 leaves from each tree were examined and the number of leaves infested with STLM mines at the tissue feeding stage were counted and recorded.

Results - Although statistical differences could not be shown between treatments due to variations between replicates and the low number of mined leaves, some trends were evident. The low level of mined leaves, some trends were evident. The low level of mined leaves can be explained in part by the grower application of Lannate over all plots on June 8 prior to our leaf evaluation. The two applications of Lannate were more effective than the single application in reducing miners (Table 1). The Fundal applications reduced miner damage considerably. Whether this was due to Fundal acting alone or by synergistic action when combined with the Guthion could not be determined.

Table 1. Control of 1st brood spotted tentiform leafminer with several insecticide programs applied by airblast sprayer, Glencoe Mills, N.Y. - 1976.

Program[1]	Material & formulation	Rate form /100 gal.	Application dates	% Mined leaves
1	Lannate 1.8L Guthion 50W	2 pt 1/2 lb	4/14 4/20	4.0
2	Lannate 1.8L Guthion 50W	2 pt 1/4 lb	4/14, 4/20 4/20	2.6
3	Guthion 50W	1/2 lb	4/14, 4/20	3.3
4	Fundal 97SP Guthion 50W	1/2 lb 1/4 lb	4/14, 4/20 4/20	0.4
5	Check			3.8

[1] Additional sprays, rates/100 gal., and application dates include: Guthion 50W 1/4 lb-5/17, 5/23, 6/3, Guthion 50W 1/4 lb + Lannate 1.8L 1 pt-6/8, and Imidan 50W 1 lb-6/16, 7/1 and 7/22.

Trial 2, Methods - Two rows of Cortland trees adjoining the forementioned test block were arranged in a randomized complete block design with 7 treatments replicated 4 times in single tree plots. The treatments were selected to compare materials applied during adult flight with materials applied to control miners in the leaves. Treatments, rates, and application dates are presented in Table 2. Approximately 12 gal of spray per tree was applied with a handgun sprayer at 425 psi spraying dilute to run off.

Treatments were evaluated June 22nd, by examining 100 leaves per tree and recording the number of leaves mined by the tissue feeding stage.

Results - The Thiodan-pyrenone insecticide directed against adult spring brood STLM, and the Vydate application at petal-fall directed against larvae in the mines, were the most effective treatments in this trial (Table 2). Systox appeared slightly more effective when used for adult control rather than control of larvae in the mines.

Table 2. Control of 1st brood Spotted tentiform leafminer with several insecticide programs applied by handgun, Glencoe Mills, N.Y. - 1976.

Program	Material & formulation	Rate form. /100 gal.	Application dates	% Mined leaves
1	Vydate 2L	2 pt	5/10	0.3a
2	Thiodan 2 Pyrenone .3EC Guthion 50W	2 pt 1/2 lb	4/14, 4/20 5/10	0.8a
3	Systox 2EC Guthion 50W	2 pt 1/2 lb	4/14, 4/20 5/10	2.0ab
4	Cygon 2.67EC	1 1/2 pt	5/10	2.5ab
5	Imidan 50W Guthion 50W	1 1/2 lb 1/2 lb	4/14, 4/20 5/10	2.8ab
6	Systox 2EC	2 pt	5/10	3.3ab
7	Check			5.3 b

Means followed by the same letter are not significantly different at the 5% level, Duncan's multiple range test.

Trial 3, Methods - A Golden Delicious planting near Claverack, N.Y. was observed to have a high population of developing 1st brood larvae in the sap-feeding stage. Two outside rows were arranged in a randomized complete block design with 7 treatments, replicated 4 times using single tree plots. Small (3m high) Golden Delicious interplants formed buffer trees between the larger (5m high) treated trees. Treatments were all applied on May 28 at 425 psi by handgun sprayer using ca 12 gal of dilute spray per tree applied until run-off. The treatments, their formulations, and rates, as well as additional sprays applied by the grower, are listed in Table 3.

Treatments were evaluated June 3, by picking 50 mined leaves from each tree, carefully opening up one mine from each leaf with a fine jewelers tweezers, and recording whether the larva in each mine was alive or dead. Mines which were empty or which contained a parasitized larva were recorded separately, but regarded as dead larvae in the final summary.

Results - Evaluation of larval mortality in the mines indicated that the systemic organophosphates registered for use on apple, Systox, Cygon and phosphamidon, do not provide effective control at the recommended rates. (Table 3). Vydate, a carbamate systemic insecticide, and Lannate, a carbamate insecticide which apparently

has some systemic action, both provided excellent control. In examining the mines less than 1.8% of them were empty or parasitized.

Table 3., Control of Spotted tentiform leafminer larvae in their mines with several insecticides applied by handgun, Claverack, N.Y. - 1976[1].

Material & formulation	Rate form. /100 gal.	Mean no. dead larvae/50 mines	% mortality
Vydate 2L	2 pt	50.0a	100
Lannate 1.8L	2 pt	49.5a	99
Systox 2EC	2 pt	22.3 b	45
Cygon 2.67EC	1 1/2 pt	12.3 bc	25
Guthion 50W	1/2 lb	11.3bc	23
Check		9.0 c	18
Phosphamidon 8EC	1/4 pt	7.0 c	14

Means followed by same letter are not significantly different at the 5% level, Duncan's multiple range test.

[1] Additional insecticide sprays, rates/100 gal. and application dates include: Lannate 1.8L 1 1/2 pt-4/14, Zolone 3EC 1 pt-4/20, 5/13, Guthion 50W 4/10 1b-5/20, 5/29, 6/7

Trial 4, Methods - A Red Delicious block adjacent to the foremention Golden Delicious block was divided into 3 unreplicated, .8 ha, 4 tree by 20 tree plots. A treatment was assigned to each plot and the previously evaluated Golden Delicious check trees in the adjacent block were used as a check.

Treatments were applied with a Friend 393 Airmaster at 3.3 x (120 gal/acre) on June 4. Materials, formulations, and rates as well as additional sprays applied by the grower, are presented in Table 4. Treatments were evaluated June 10 by sampling 50 mined leaves/tree from 4 trees in the middle two rows of each plot. Because pupation had begun by the June 10 evaluation date we also distinguished live and dead pupae in addition to the larvae.

Results - Although ca 28% pupation had occurred by the time we evaluated our treatments in this test, we still found 86% mortality in the Vydate plots even though 1/2 the recommended rate of Vydate was used (Table 4). Apparently some pupation had occurred or the larvae were too old to be affected by the treatment, which resulted in the

12% live pupae found in the Vydate treatment. Some mortality among the larvae could be distinguished with both the Galecron and BAAM treatments.

Table 4. Control of Spotted tentiform leaf miner in the mines with several insecticides applied by airblast sprayer, Claverack, N.Y. - 1976[1].

Material & formulation	Rate form. /100 gal.	Larvae		Pupae		
		X̄ no. live	X̄ no. dead	X̄ no. live	X̄ no. dead	% mortality
Vydate 2L	1 pt	1.3	42.8a	6.0	0.0	86
Galecron 95SP	1/2 lb	19.0	18.8 b	10.8	1.5	41
BAAM 1.5EC	1 1/2 pt	23.0	9.5 c	17.0	0.5	20
Check		32.0	3.5 d	14.0	0.5	8

Means followed by same letter are not significantly different at the 5% level, Duncan's multiple range test.

[1] Additional insecticide sprays, rates/100 gal., and application dates include: Lannate 1.8L 1 1/2 pt-4/14, Zolone 3EC 1 pt-4/20, 5/13, Guthion 50W 4/10 1b-5/20, 5/29, 6/7.

Trial 5, Methods - A large 2nd brood STLM infestation was located in a block of large (5m high) Red Delicious trees located near Livingston, N.Y. The infestation was predominantly at the sap-feeding stage with the tissue-feeding stage mines just beginning to appear.

Nine different treatments were arranged in a randomized complete block design using single tree plots replicated 4 times. Treatments were applied July 9 by high-pressure handgun sprayer at 425 psi, spraying dilute to run-off, using ca 15 gal of spray per tree. Insecticides, formulations, rates, and additional sprays applied to the block by the grower are listed in Table 5.

Treatments were evaluated on July 15. The evaluation was conducted in the forementioned manner of assessing larval mortality from 50 mined leaves per tree, or 200 mines per treatment.

Results - Vydate was the most effective material, providing 89% mortality even at 1/2 pt rate (Table 5). Control with Lannate was considerably reduced when the rate was reduced from 2 pt to 1 pt. Zolone showed some activity against the larvae, while Thiodan had no effect on larval mortality.

Table 5. Spotted tentiform leafminer 2nd brood larval control, handgun application, Livingston, N.Y. - 1976.[1]

Material & formulation	Rate form. /100 gal.	$\bar{X}$ no. dead larvae/50 mines	% Mortality
Vydate 2L	1 pt	47.8a	96
Lannate 1.8L	2 pt	45.5a	91
Vydate 2L	1/2 pt	44.5a	89
Vydate 2L	1/4 pt	36.3 b	73
Lannate 1.8L	1 pt	30.8 b	62
Lannate 1.8L	1/2 pt	20.3 c	41
Zolone 3EC	1 1/2 pt	18.0 c	36
Check		7.5 d	15
Thiodan 50WP	1 lb	6.3 d	13

Means followed by same letter are not significantly different at the 5% level, Duncan's multiple range test.

[1] Additional insecticide sprays, rates/100 gal., and application dates include: Zolone 3E 1 3/5 pt-4/15; 4/21; 5/4; 5/13; Imidan 50W 1 lb-5/20; Zolone 3EC 1 3/5 pt-5/27; Imidan 50W 1 lb-6/7; 6/17; 7/2.

MITE CONTROL, HUDSON VALLEY

Methods. - A summer mite control trial was conducted in a commercial orchard near Milton, N.Y. Single-tree McIntosh plots arranged in a randomized block design with 4 replicates were sprayed by high pressure handgun at 420 psi on July 6. Ca 15 gal of spray was applied per tree, dilute to runoff. Counts of European Red Mite (ERM) motile forms and eggs, Apple Rust Mite (ARM) motile forms, and Amblysieus fallacis (AMB) motile predatory mites were made on June 24, July 12, and July 20. Twenty-five leaves/tree were sampled, brushed with a mite brushing machine, and the mites counted under a binocular scope.

Results. - All treatments had fewer mites than the check on the July 12 count but after 14 days post-spray most treatment had counts higher than the pre-spray (June 24) count (Table 1). Plictran and SD 14114 looked best against ERM while Fundal, Omite, Plictran, and SD 14114 looked good against ARM. All materials with the exception of Fundal and Vydate (32 oz rate) permitted re-establishment of the AMB predator mite after 14 days. Exhault 800 while having miticidal activity alone did not appear to enhance Plictran activity when combined. It should be noted that the rates tested with Plictran, Omite, and SD 14114 were below recommended commercial rates for these materials.

Table 1. Summer mite control trial, Milton, N.Y. 1976

Material, formulation, & rate form./100 gal	Mean No. Mites or Eggs/Leaf											
	6/24				7/12				7/20			
	ERM	ERM Eggs	ARM	AMB	ERM	ERM Eggs	ARM	AMB	ERM	ERM Eggs	ARM	AMB
Exhault 800 32 oz	1.2	1.5	51.2		1.3	1.8	10.9	.06	3.2	1.4	46.5	.06
Exhault 800 32 oz + Plictran 50WP 2 oz	.1	.1	30.8		.3	.5	2.2		.9	.4	48.9	.01
Fundal 97SP 8 oz	.4	.6	52.2		.5	1.1	.4		1.3	.8	8.3	
Lannate L 32 oz	.2	.4	41.9	.04	.7	.3	10.1		2.2	1.3	29.3	.01
Omite 6E 3 oz	1.9	2.0	54.3	.01	2.1	5.0	2.5	.13	4.1	1.1	8.9	.09
Plictran 50WP 2 oz	.5	1.1	57.7	.11	.2	.4	.8	.02	.4	.4	7.7	.01
SD 14114 50WP 4 oz	.1	.3	30.0		.2	.3	1.3		.3	.2	13.6	.02
Vydate L 8 oz	1.1	1.8	34.2	.01	1.8	1.6	16.1	.02	2.6	.9	33.0	.01
Vydate L 32 oz	.8	1.4	44.9	.06	1.0	.4	3.4		1.4	.3	33.0	
Check	.6	1.0	33.0		4.1	7.4	20.9	.03	12.1	3.8	100.1	.07