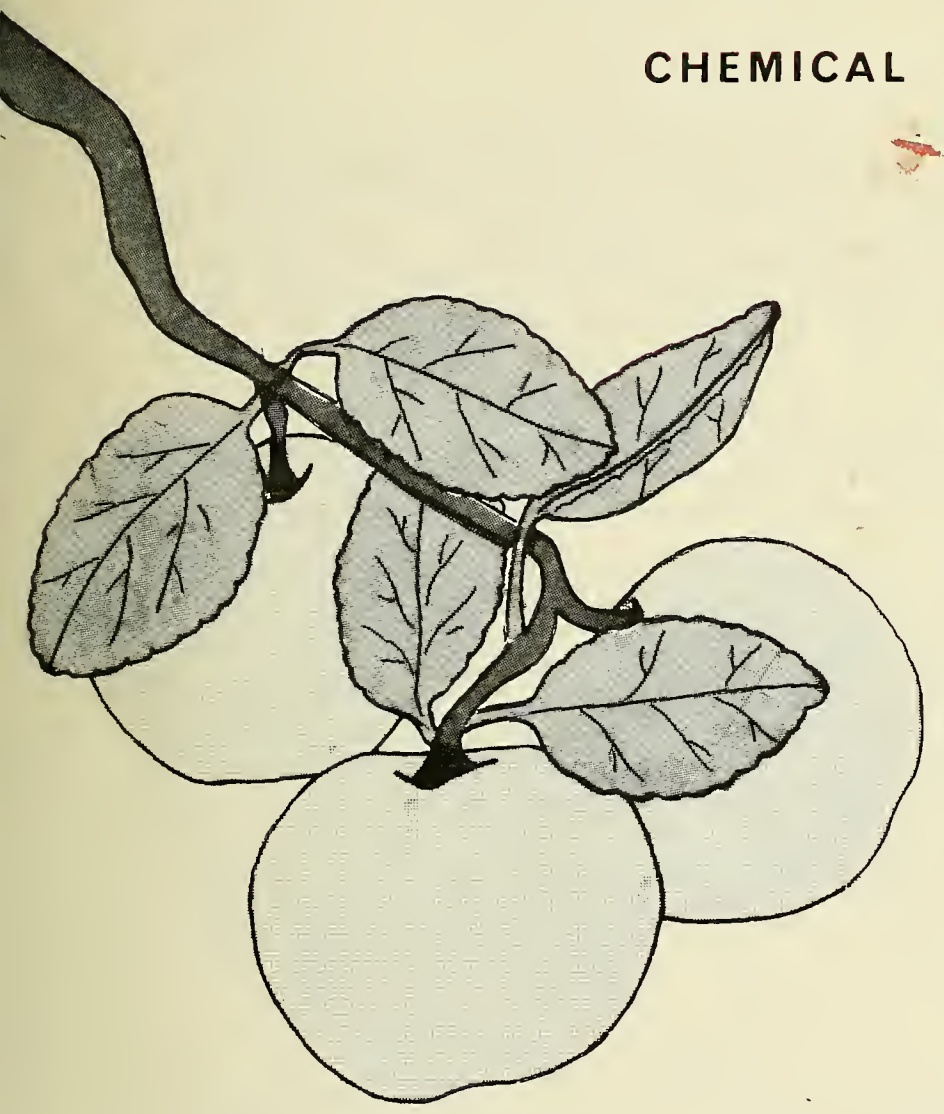
BULLETIN 751



CHEMICAL AND BIOLOGICAL

Control of Fruit Pests in Connecticut

Richard C. Moore

THE CONNECTICUT AGRICULTURAL EXPERIMENT STATION • NEW HAVEN

Published March 1975

CHEMICAL AND BIOLOGICAL CONTROL OF FRUIT PESTS IN CONNECTICUT (1974)

Richard C. Moore

In recent years emphasis has been placed on reducing the amounts of insecticides used to control fruit pests in the Northeastern fruit growing regions (Asquith 1972, Trammel 1972). In Connecticut, programs involving reduced spray schedules, reduced rates of pesticides, and better timing of spray applications have been evaluated (Moore 1973, 1974). Emphasis has also been placed on an integrated pest management program using natural enemies to control mites and aphids and chemicals to control other insect pests.

One of the major problems is allowing mite predators to survive while controlling early season pests such as plum curculio, European sawfly and tarnished plant bugs on apples. These three insects can damage fruit during a 10 week period from Pink to 3rd Cover.

Field trials were undertaken in 1974 to study the effectiveness of various pesticides and methods of applying pesticides for controlling orchard insects and mites. Two seasonal programs were evaluated for use in commercially sprayed apple orchards to reduce pesticide use and to encourage the build up of natural enemies of mites. The effectiveness of pre- and post-bloom applications of various insects were evaluated for control of plum curculio, European apple sawfly and plant bugs on apples and peaches. Candidate insecticides were tested in a seasonal program for control of insect pests on apples. Other tests included evaluation of (1) effectiveness of 3rd Cover application of aphicides for green apple aphid control, (2) two summer applications of miticides for European red mite control on apples, and (3) two seasonal programs for control of pear psylla.

PROCEDURES

Experiments were conducted at the Lockwood Farm, Mt. Carmel, Conn. Materials used in the reduced rate and reduced spray programs (Tables 1,3,4) and on standard peach trees (Table 6) were applied as 10X concentrates (Moore 1971) with a tractor-mounted mistblower. Full sprays (both sides of tree sprayed) were applied at 30 gal/acre and ½ sprays (one side of tree sprayed using alternate middle row technique) at 15 gal/acre with the exception of Difolitan 4F, used in the reduced spray plot (Table 1) which was applied dilute (1X) using 300 gal/acre. Acaricides applied to semi-dwarf trees (Table 9) were applied 10X using 20 gal/acre.

The remaining test sprays were applied dilute with a hydraulic sprayer at a pressure of 400 psi using a four nozzle hand gun. Early season application of insecticides for control of apple pests (Table 5) and seasonal application of candidate insecticides (Table 7) were applied to standard trees at 400 gal/acre. Aphicides (Table 8) and psylla sprays (Table 10) were applied at 300 gal/acre. In the concentrate tests (Table 2) where two 1.1 acre plots were sprayed, fruit was taken from 9 randomly selected trees of each variety (Cortland, Red Delicious, and Baldwin) per treatment. For the test on candidate materials (Table 7), fruit samples were taken from 4 single tree replicates consisting of one Gravenstein, one McIntosh, and two Red Delicious. In these tests, one bushel of picked and one bushel of dropped fruit were scored per tree.

Two McIntosh apple trees were used per treatment for control of plum curculio, sawfly and plant bugs (Table 5) and 100 apples were picked and scored per tree the first week in June. For control of plum curculio and plant bugs on peaches (Table 6) two replicates consisting of 3 trees of each variety (Harbelle, Red Haven, Glo Haven or Harmony) were sprayed. In mid June 50 peaches from one tree in each replicate were picked and scored; in mid August ½ bushel from each of six treated trees was scored.

Mites were sampled as described by Moore (1971). In the concentrate tests (Tables 3,4) 20 leaves were taken from 3 trees of each variety per treatment. Fifteen leaves per tree were taken from 3 McIntosh and 3 Spartan apple trees per treatment in the miticide test (Table 9).

Aphids were counted in the field (Table 8) in the distal 3 leaves of 5 tagged terminals on two McIntosh trees per treatment. Four Bosc pear trees were used per treatment in the pear psylla tests. Pear psylla were counted on 5 clusters of 5 leaves each per tree.

A list of spray materials used and their mammalian toxicities are found in Appendix I. Pests mentioned in this Bulletin that these materials are registered to control on apples, peaches or pears are found in Appendix II.

RESULTS

Concentrate (10X), ½ sprays combining Guthion 50WP and Imidan 70WP in the reduced rate program (Table 1) produced 83.7% fruit free from insect damage (Table 2). Most of the fruit damage was caused by plum curculio (8.9%) and European apple sawfly (5.7%). Apple maggot, codling moth, plant bugs and other insects were adequately controlled. Cygon 25WP was applied at 1.25 lb/acre at Tight Cluster and 9 oz/acre at 3rd Cover to control leafrollers and aphids (Table 1). Dikar 80WP applied at various rates during the season helped suppress mites as well as control apple scab and other diseases. Scab infection was 7.7% (Table 2).

In early July, ERM began to increase in the reduced rate plot (Table 3). In addition to the regular spray program, Plictran 50WP and Carzol 92SP were applied as ½ sprays on July 11 and 18 to rows 2 and 4, respectively, to suppress ERM. ERM decreased in rows 2 and 4 and also in row 6 where the regular spray program was continued. A predatory mite, Typhlodromus sp., also increased during this same period and in August outnumbered ERM in all treated rows. Stethorus punctum was found in low numbers throughout the season (Table 3).

In the reduced spray plot (Table 1), Imidan 70WP was applied concentrate (10X) as a full spray at Pink and Petal Fall and as ½ sprays for the remainder of the season. This program produced 85.7% fruit free from insect damage (Table 2). European apple sawfly caused the most fruit damage followed by plum curculio. Other insects were adequately controlled. Difolitan applied dilute (Table 1) at Green Tip using the single application technique followed by full sprays of Captan 80WP applied at Petal Fall and 1st Cover and ½ sprays from 2nd to 8th Cover adequately controlled apple scab (1.7%) and other diseases.

A delayed dormant oil spray was applied at Green Tip for control of overwintering eggs. However, ERM began to increase in early July (Table 4) in the reduced spray plot. In addition to Imidan 70WP, Plictran 50WP and Vendex 50WP were applied on July 11 and 18 to rows 2 and 4, respectively, to control ERM. As shown in Table 4, ERM decreased in rows 2 and 4, however, in row 6 where only Imidan was applied, ERM increased. The mite predators, Typhlodromus and Stethorus, were found in low numbers.

The results of Pink, Petal Fall, and 1st Cover dilute application of insecticides for control of plum curculio, European apple sawfly and plant bugs on apples are shown in Table 5. Torak 4EC, a candidate material, was most effective against these pests providing 97.5% control at 16 or 24 oz/100 gals. Guthion 50WP applied at P and PF was the least effective (86.0%). Other applications of Guthion 50WP or Imidan 70WP were as effective as Dieldrin 50WP for controlling these pests.

Table 6 presents results of concentrate (10X) application of materials for control of plum curculio and plant bugs on peaches. Harvest data taken on August 13 indicated that none of the test materials applied concentrate provided adequate control of these pests when used in a seasonal program on peaches. Zolone 3EC (40 oz/10 gal) or Imidan 70WP (20 oz/10 gal) applied at Petal Fall, Shuck Split and 1st Cover provided the most effective early season control of these pests, 90 and 87% respectively, when fruit was scored on June 11. Oriental fruit moth damage at harvest was 0 to 0.3% on the treated trees compared to 5.5% damage in unsprayed check trees, indicating that all materials tested adequately controlled this peach pest.

As shown in Table 7, San I-197 4.28EC was the most effective of the 6 candiate materials tested for seasonal control of apple pests. CGA-18809 50WP effectively controlled plum curculio. None of the materials tested adequately controlled sawfly, however, M-3016 25WP was the most effective. Zolone 25WP, San I-197 and MC-9087 2EC were the most effective materials against apple maggot. All materials effectively controlled codling moth and plant bugs. Only Zolone 25WP did not adequately control San Jose scale.

Table 8 presents the results of a single 3rd Cover application of 6 aphicides. All materials tested provided effective control of green apple aphids 5 days after application.

The effectiveness of two concentrate (10X) summer applications, 7 days apart, of miticides for control of ERM is shown in Table 9. All materials tested, except SD-14144 (Vendex) 50WP showed a 99-100% reduction of ERM 15 days after the initial application. S-15126 50WP and Plictran 50WP were the most effective 7 days after the first application.

As shown in Table 10, 70-sec oil applied (3 gal/100 gal) on 4/17, followed by five applications of Zolone 3EC or Guthion 50WP plus 70-sec oil (32 oz/100 gal) effectively controlled pear psylla eggs and nymphs.

DISCUSSION

This season 83.7% of the fruit was free from insect damage using Guthion plus Imidan in the reduced rate plot. These results compare favorably with those obtained in 1972 when 88.8% of the fruit was clean using Zolone in a full spray program (Moore 1973). European apple sawfly and plum curculio accounted for most of the damaged fruit in the reduced rate plot for the past three seasons while codling moth and apple maggot were adequately controlled. The incidence of apple scab was higher than in the previous year because lower rates of fungicides were used this season.

While two-spotted mites were a problem in this plot in 1972 and 1973, ERM were predominant in 1974. The seasonal use of Dikar alone or Dikar plus two low rate summer applications of either Plictran or Carzol suppressed ERM and allowed a predatory phytoseiid mite to build up and control the ERM. Although the mite predator, Stethorus punctum, was not as numerous as anticipated in this plot in 1974, its establishment from the previous season's introduction was encouraging.

This past season 85.7% of the fruit was clean using Imidan in a reduced spray program, while 93.8% of the fruit was free from insect damage in 1972 using Guthion in a full spray program in this plot. The decrease in control in 1974 was due to an increase in damage caused by plum curculio.

Both ERM and two-spotted were adequately controlled in this plot in 1972 using Zolone-Dikar in a full spray program. In 1974, however, ERM began to increase in early July and the use of two ½ sprays of Plictran or Vendex at this time reduced ERM in this plot when compared with a check row where these miticides were not used. Although higher rates of Imidan 70WP were used in this plot compared to the reduced rate plot, S. punctum was found in low numbers in late July and early August. Field observations indicated that adult S. punctum flew into this plot in late July from the adjacent reduced spray plot.

Because of the problems encountered in controlling plum curculio and European apple sawfly in these two plots in previous seasons using Guthion, Imidan or Zolone, a test was conducted this season comparing the use of these materials to Dieldrin, a chemical previously used by growers to control these insects, and Torak, a candidate material. Torak applied to apples at Pink, Petal Fall and 1st Cover appeared to be the most promising for achieving better control of these pests on apples, however, its effect on predators has yet to be determined. None of the materials applied concentrated provided adequate seasonal control of plum curculio or plant bugs on peaches. It should be noted that there were unsprayed barrier rows of peach trees in this plot which provided increased pests pressure.

Of the five candidate materials tested for use in a seasonal program for controlling apple pests, San I-197 looked most promising. MC-9087, a new insecticide which acts as a stomach poison, and a wettable powder formulation of Zolone effectively controlled apple maggot and codling moth. These materials may be useful in an integrated program to control these two pests from 4th Cover to harvest.

All miticides tested provided effective control of high populations of ERM, following the second application. Of the four candidate materials tested, S-15126, a broad spectrum miticide belonging to a new class of pesticides (benzylidene malononitriles) provided the most effective control 7 days after the initial application. Of the three miticides tested which were tin derivatives, R-28627 and Plictran were more effective than SD-14144 (Vendex). Swift (1974) reported that Vendex was more effective than Plictran against very low populations of ERM whereas the reverse was true at moderate to high densities.

Because of suspected resistance to Guthion, the use of Zolone for pear psylla control has increased in recent years in Connecticut. Applications of Guthion plus low rates of 70-sec oil provided control of pear psylla eggs and nymphs comparable to that obtained with Zolone.

REFERENCES CITED

Asquith, D. 1972. Initiating integrated pest management in apple orchards. Proc. Mass. Fruit Growers Assoc. 78: 24-35.

Moore, R. C. 1971. Experiments on the chemical control of fruit insects and mites in Connecticut (1971). Conn. Agric. Expt. Station Special Bull. IV: 20 p.

Moore, R. C. 1973. Experiments on the chemical control of fruit insects and mites in Connecticut (1972). Conn. Agric. Expt. Station Special Bull. VI: 18 p.

Moore, R. C. 1974. Experiments on the chemical control of fruit insects and mites in Connecticut (1973). Conn. Agric. Expt. Station Special Bull. VII: 19 p.

Swift, F. C. 1974. Acaricidal activity of Vendex and Plictran in New Jersey apple orchards. Paper presented at 46th Annual Meeting of Eastern Branch, Entomol. Soc. Amer., Hershey, Pa.

Thomson, W. T. 1972. Agricultural Chemicals. I. Insecticides. Thomson Publ., Fresno, Ca. 315 p.

Trammel, K. 1972. The integrated approach to apple pest management and what we are doing in New York. N.Y.S. Hort. Soc. Proc. 117: 37-49.

Vasvary, L. M. and F. C. Swift. 1966. How poisonous are pesticides? In Northeastern Pesticide Information Manual. 3 p.

ACKNOWLEDGMENTS

The technical assistance of Mr. Leo Herbette and Mr. Arturo Giron in conducting these field studies is gratefully acknowledged.

Table 1. Schedule, rates and methods of application of pesticide combinations. West Orchard, Lockwood Farm, Mt. Carmel, Conn. 1974.

Application[1]	Date	Pesticide per Acre: Reduced Rate Plot ½ Spray	Date	Reduced Spray Plot Full Spray
Green tip	4/11	2.25 lb Dikar 80 WP	4/6	3.75 gal Difolitan 4 F[2]
Half Inch Green	4/18	Repeat above		6.0 gal Oil - 70 sec[2]
Tight cluster	4/27	2.25 lb Dikar 80 WP 1.25 lb Cygon 25 WP		
Pre-pink	5/2	Repeat above		
Pink	5/8	2.25 lb Dikar 80 WP 4 oz Guthion 50 WP 6 oz Imidan 70 WP	5/8	3.0 lb Imidan 70 WP
Bloom	5/16	2.25 lb Dikar 80 WP		
Petal fall	5/21	Same as Pink	5/21	4.75 lb Captan 80 WP 3.0 Imidan 70 WP
1st Cover	5/30	Same as Pink	5/30	Repeat above
				½ Spray
2nd Cover	6/6	Same as Pink	6/6	2.0 lb Captan 80 WP
	6/13	Repeat above		1.5 lb Imidan 70 WP
3rd Cover	6/20	1.5 lb Dikar 80 WP 4 oz Guthion 50 WP 6 oz Imidan 70 WP	6/20	1.5 lb Captan 80 WP 1.5 lb Imidan 70 WP
	6/27	Repeat above		
4th Cover	7/3	Same as 3rd Cover + 9 oz Cygon 25 WP	7/3	Same as 3rd Cover + 12 oz Cygon 25 WP
	7/11	Same as 3rd Cover		
5th Cover	7/18	18 oz Dikar 80 WP 3 oz Guthion 50 WP 6 oz Imidan 70 WP	7/18	Same as 3rd Cover
	7/25	Repeat above		
6th Cover	8/1	Same as 5th Cover	8/1	Same as 3rd Cover
	8/9	Repeat above		
7th Cover	8/15	18 oz Captan 80 WP 3 oz Guthion 50 WP 6 oz Imidan 70 WP	8/15	Same as 3rd Cover
	8/22	Repeat above		
8th Cover	8/29	Same as 7th Cover	8/29	Same as 3rd Cover
	9/5	Repeat above		

[1]Concentrate mistblower application; 30 gal/acre for full spray[3], 15 gals/acre for ½ spray, 1.1 acre/plot.

[2]Dilute handgun application, 300 gals/acre.

Table 2. Effectiveness of concentrate applications of reduced rates or reduced sprays of insecticides and fungicides used in a seasonal schedule for controlling insect pests on apples. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]	% Uninjured fruit	% Fruit Injured By						
		Plum curculio	European sawfly	Plant bugs	Apple maggot	Codling moth	Other[2]	Scab
Reduced Rate Plot								
Guthion - Imidan Dikar - Captan	83.7	8.9	5.7	0.6	1.1	0.2	0.8	7.6
Reduced Spray Plot								
Imidan Difolitan - Captan	85.7	3.9	8.8	0.7	0.9	0.2	0.5	1.7
Check	9.5	41.6	14.2	3.1	69.1	15.2	2.7	30.7

[1] Schedule, rates and method of application given in Table 1.

[2] Damage to fruit by leafrollers, green fruit worm and cankerworms.

Table 3. Effect of two 1/2 spray applications of Plictran and Carzol on European Red Mites (ERM) and two predators, Thyphlodromus sp. (TYP) and Stethorus punctum (SP), in the reduced dose plot. West Orchard, Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials [1]	Rate/ Acre	Spray Dates	Rows	Mites and Predators	Ave. No./Leaf and Sampling Dates [2] 5/8	5/28	6/10	6/24	7/8	7/15	7/22	7/30	8/5	8/12	8/19
Dikar 80WP Guthion 50WP Imidan 70WP	See Table 1		2,4,6	ERM	7.5	0.3	2.5	3.1	7.8						
Plictran 50WP + materials in Row 6	3 oz	7/11, 7/18	2	ERM TYP SP					8.0 0.2 0.02	5.6 0.8 0.02	4.4 0.4 0.08	1.2 0.7 0.2	0.6 0.8 0.08	0.2 0.6 0.1	0.1 0.2 0.1
Carzol 92SP + materials in Row 6	3 oz	7/11, 7/18	4	ERM TYP SP					9.3 0.1 0.03	4.3 0.4 0.02	1.7 0.4 0.1	0.9 0.9 0.1	0.4 1.0 0.07	0.1 0.3 0.07	0.2 0.1 0.07
Dikar 80WP Guthion 50WP Imidan 70WP	See Table 1		6	ERM TYP SP					6.1 0.1 0.02	4.3 0.4 0.03	3.3 0.6 0.05	1.6 0.5 0.2	0.3 0.1 0.03	0.1 0.4 0.03	0.1 0.1 0.03

[1] Concentrate mistblower application; 15 gals/acre for 1/2 spray.

[2] One Cortland, Red Delicious and Baldwin sample in each row, 20 leaves/tree.

Table 4. Effect of two 1/2 spray applications of Plictran or Vendex on European Red Mites (ERM) and two predators, Typhlodromus sp. (TYP) and Stethorus punctum (SP), in the reduced spray plot. West Orchard, Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]	Rate/ Acre	Spray Dates	Rows	Mites and Predators	Ave. No./Leaf and Sampling Dates[2] 5/8	5/28	6/10	6/24	7/8	7/15	7/22	7/30	8/5	8/12	8/19
Oil - 70 sec Imidan 70WP		See Table 1	2,4,6	ERM	0.2	0.1	0.4	0.4	3.1						
Plictran 50WP Imidan 70WP	18 oz	7/11, 7/18	2	ERM					4.2	2.2	1.2	1.1	0.8	1.0	0.3
				TYP					0.1	0.2	0.1	0.03	0.02	0.3	0.1
				SP					0	0	0	0.02	0	0.07	0
Vendex 50WP Imidan 70WP	18 oz	7/11, 7/18	4	ERM					3.1	2.6	2.9	2.0	1.5	0.8	0.3
				TYP					0.1	0.2	0.4	0.1	0.5	0.2	0.1
				SP					0	0	0.02	0.05	0.1	0.05	0.02
Imidan 70WP		See Table 1	6	ERM					2.0	2.6	7.7	6.2	7.0	3.9	2.1
				TYP					0.1	0.1	0.3	0.2	0.7	0.5	0.9
				SP					0	0	0	0.05	0.05	0.2	0.1

[1] Concentrate mistblower applications; 15 gals/acre for 1/2 spray.

[2] One Cortland, Red Delicious and Baldwin sampled in each row, 20 leaves/tree.

Table 5. Effectiveness of pre and post bloom applications of insecticides for control of plum curculio, European sawfly and plant bugs on apples. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]		Rate/ 100 gals	Application Time	% Uninjured fruit	% Fruit Injured By[2]		
					Plum curculio	European sawfly	Plant bugs
Guthion	50 WP	8 oz	P,PF	86	6.5	8.5	1.0
Guthion	50 WP	8 oz	PF, IC	91	3.0	6.0	0
Guthion	50 WP	8 oz	P,PF,IC	91.5	3.0	5.5	0
Guthion	50 WP	10 oz	P,PF,IC	94.5	1.5	4.0	0
Imidan	70 WP	12 oz	P,PF,IC	92.5	1.0	7.0	0
Imidan	70 WP	20 oz	P,PF,IC	95.0	3.5	1.5	0
Torak	4 EC	16 oz	P,PF,IC	97.5	1.0	1.5	0
Torak	4 EC	24 oz	P,PF,IC	97.5	1.5	1.0	0
Dieldrin	50 WP	8 oz	P,PF	94.0	4.5	1.5	0
Dieldrin	50 WP	8 oz	P,PF,IC	96.0	3.5	0.5	0
Check				30.5	40.5	24.5	8.0

[1] Application dates: Pink (P), 5/1; Petal Fall (PF), 5/14; 1st Cover (IC), 5/22; handgun application, 400 gals/acre.

[2] Two McIntosh apple trees per treatment; 100 apples per tree scored on 6/4.

Table 6. Effectiveness of seasonal concentrate applications of insecticides for control of plum curculio and plant bugs on peaches. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]	Rate/ 10 gals	Application Time	% Injury on 6/11[2]			% Injury on 8/13[3]		
			Uninjured fruit	Plum curculio	Plant bugs	Uninjured fruit	Plum curculio	Plant bugs
Guthion 50 WP	8 oz	PF,SS,IC-6C	77.0	16.0	7.0	67.1	20.4	10.8
Guthion 50 WP	10 oz	PF,SS,IC-6C	79.0	11.0	9.0	74.4	20.6	8.3
Imidan 70 WP	12 oz	PF,SS,IC-6C	83.0	9.0	8.0	69.2	22.9	7.5
Imidan 70 WP	20 oz	PF,SS,IC-6C	87.0	7.0	6.0	71.9	16.7	9.4
Zolone 3 EC	20 oz	PF,SS,IC-6C	73.0	13.0	14.0	64.3	24.3	10.3
Zolone 3 EC	40 oz	PF,SS,IC-6C	90.0	3.0	7.0	77.9	15.0	9.4
Dieldrin 50 WP + Guthion 50 WP	8 oz 8 oz	PF SS,IC-6C	82.0	10.0	7.0	74.9	11.3	13.3
Dieldrin 50 WP + Guthion 50 WP	8 oz 8 oz	PF,SS IC-6C	81.0	11.0	5.0	72.6	18.0	7.5
Check			40.0	41.5	18.5	31.8	44.8	28.0

[1] Application dates: Petal Fall (PF), 5/7; Shuck split (SS), 5/22; 1st Cover (IC), 5/31; 2nd Cover, 6/12; 3rd Cover, 6/28; 4th Cover, 7/10; 5th Cover, 7/24; 6th Cover (6C), 8/6; mistblower application, 30 gals/acre.

[2] Two trees per treatment, 50 peaches per tree scored on 6/11.

[3] Six trees per treatment, 1/2 bushel of peaches per tree scored on 8/13.

Table 7. Effectiveness of candidate insecticides used in a seasonal program for control of insect pests on apples. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]		Rate/ 100 gals	% Uninjured fruit	% Fruit Injured By[2]						
				Plum curculio	European sawfly	Apple maggot	Codling moth	Plant bugs	San Jose scale	Other
San I-197	4.28 EC	16 oz	84.5	4.4	8.3	3.8	0.2	0	0.3	0.1
CGA-18809	50 WP	8 oz	80.4	2.6	9.2	8.8	0.8	0.1	0.1	0.2
M-3016	25 WP	32 oz	78.5	5.4	6.3	10.1	0.8	0.2	0	0.4
Zolone	25 WP	16 oz	77.5	5.6	9.2	2.1	0.5	0	2.8	1.9
MC-9089	2 EC	16 oz	76.6	11.0	7.2	4.8	0.6	0.1	0.8	0.5
Lannate	1.8 EC	32 oz	74.9	9.8	7.2	12.2	0.8	0.5	0.1	0.2
Check			9.6	41.4	13.8	69.4	15.0	3.5	9.3	4.0

[1] Application dates: 4/29, 5/14, 5/24, 6/5, 6/19, 7/2, 7/17, 7/31, 8/14, 8/28; dilute handgun application, 400 gals/acre

[2] One Gravenstein, two McIntosh and one Red Delicious tree per treatment; one bushel each of picks and drops scored per tree.

Table 8. Effectiveness of third cover (6/28) application of aphicides for control of green apple aphids on apples. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials	Rate/ 100 gals	Ave. No. Aphids per Distal End of Terminal[1]				
		Pre-spray	Post-spray		% Reduction	
		6/25	6/28	7/1	2 days	5 days
Thiodan 50 WP	8 oz	100.5	0.5	0.2	99.5	99.8
Cygon 25 WP	12 oz	108.4	1.5	0.6	98.6	99.4
Diazinon 50 WP	16 oz	127.2	4.1	0.2	96.8	99.8
Zolone 25 WP	16 oz	114.2	7.3	0.2	93.5	99.8
Phosphamidon 8 EC	4 oz	123.0	14.3	0.2	88.4	99.8
Lannate 1.8 EC	32 oz	126.4	19.8	0.5	84.3	99.6
Check		123.5	205.3	223.8	+66.2	+81.2

[1] Two McIntosh trees per treatment, 5 tagged terminals per tree; dilute handgun application, 300 gals/acre.

Table 9. Effectiveness of two concentrate summer applications (8/15 and 8/22) of miticides for control of European red mites on dwarf apple trees. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials		Rate/ 10 gals	Ave. No. Mites per Leaf[1] Pre-spray 8/14	Post-spray 8/21	Post-spray 8/29	% Reduction 7 days	% Reduction 15 days
U-36059	1.66 EC	14.4 oz	11.3	3.7	0.1	67.3	99.2
R-28627	25 WP	12 oz	14.9	3.0	0	79.9	100.0
S-15126	50 WP	4 oz	15.3	1.1	0.1	92.9	99.4
SD-14144	50 WP	4 oz	9.1	2.5	0.5	72.6	94.6
Plictran	50 WP	4 oz	10.9	1.6	0	85.4	100.0
Carzol	95 SP	4 oz	13.1	3.9	0.1	70.3	99.3
Kelthane	35 WP	16 oz	11.3	2.5	.03	77.9	99.9
Check			14.3	11.8	7.3	17.5	49.0

[1] Three McIntosh and three Spartan apple trees per treatment, 15 leaves per tree; mistblower application, 20 gals/acre.

Table 10. Effectiveness of seasonal programs for control of pear psylla eggs and nymphs. Lockwood Farm, Mt. Carmel, Conn. 1974.

Materials[1]	Rate/ 100 gals	Ave. No. Eggs and Nymphs per Leaf Cluster[2]									
		5/15		5/24		6/6		6/19		7/2	
		Eggs	Nymphs	Eggs	Nymphs	Eggs	Nymphs	Eggs	Nymphs	Eggs	Nymphs
Guthion 50 WP + Oil, 70-Sec	8 oz 32 oz	0	0	0	0	0	0	2.1	0	0.7	.05
Zolone 3 EC	32 oz	0.2	0	0.9	0	0.5	0	0.4	0	0.8	0
Check		8.3	3.0	1.6	2.8	1.4	2.9	38.4	9.7	18.1	19.2

[1] 70-Sec oil applied to sprayed plots at rate of 3 gals/100 gals on 4/17; other materials applied on 4/27, 5/15, 5/24, 6/6, 6/19; handgun application, 300 gals/acre.

[2] Two single Bosc pear trees per plot, 5 clusters of 5 leaves.

Spray Materials Evaluated in 1974 and Their Mammalian Toxicity[1]

MATERIAL AND FORMULATION		ORAL LD_{50} mg/kg	MAMMALIAN TOXICITY RATING[2]	MANUFACTURER
Captan	80WP	9,000	Non	Stauffer Chemical Co.
Carzol	92SP	20	Highly	Nor-Am Agr. Products, Inc.
CGA-18809	50WP	1,180*	Slightly	Ciba-Geigy Corporation
Cygon	25WP	215	Moderately	American Cyanamid Co.
Diazinon	50WP	150	Moderately	Ciba-Geigy Corporation
Dieldrin	50WP	46	Highly	Shell Chemical Co.
Difolitan	4F	6,200*	Non	Chevron Chemical Co.
Dikar	80WP	5,000*	Non	Rohm & Haas Company
Guthion	50WP	10	Highly	Chemagro Corporation
Imidan	70WP	300	Moderately	Stauffer Chemical Co.
Kelthane	35WP	684	Slightly	Rohm & Haas Company
Lannate	1.8EC	17	Highly	E. I. DuPont deNemours
M-3016	25WP	135	Moderately	Dow Chemical Company
MC-9087	2EC	102*	Moderately	Mobil Chemical Company
Phosphamidon	8EC	20	Highly	Chevron Chemical Co.
Plictran	50WP	540	Slightly	Dow Chemical Company
R-28627	25WP	860*	Slightly	Stauffer Chemical Co.
S-15126	50WP	350*	Moderately	Gulf Oil Company
SD-14414	50WP	857*	Slightly	Shell Chemical Company
San I-197	4.28EC	1,800	Slightly	Sandoz-Wander, Inc.
Sunspray Oil	70 sec	--	Non	Sun Oil Company
Thiodan	50WP	80	Moderately	FMC Corporation
Torak	4EC	50	Highly	Hercules Incorporated
U-36059	1.66EC	600*	Slightly	The Upjohn Company
Zolone	3EC, 25WP	100	Moderately	Rhodia Inc., Chipman Div.

[1] Acute oral toxicities as reported by Thomson (1972) or the manufacturer*

[2] According to Vasvary and Swift (1966)
EC = lbs/gal emulsifiable concentrate, F = lbs/gal flowable concentrate,
SP = % soluble powder, WP = % wettable powder

APPENDIX II

REGISTERED MATERIALS

The following materials were registered as of December 31, 1974 for control of the indicated insect or mite pests on apples, pears or peaches mentioned in this Bulletin.

Carzol:	mites
Cygon:	aphids, pear psylla, mites
Diazinon:	aphids, apple maggot, codling moth, leafrollers, pear psylla, San Jose scale
Dikar:	mites
Guthion:	aphids, apple maggot, codling moth, European sawfly, green fruit worm, leafrollers, Oriental fruit moth, pear psylla, plant bugs, plum curculio, mites, San Jose scale
Imidan:	aphids, apple maggot, codling moth, leafrollers, Oriental fruit moth, pear psylla, plant bugs, plum curculio, mites
Kelthane:	mites
Phosphamidon:	aphids, codling moth, leafrollers, mites, San Jose scale
Plictran:	mites
Sunspray Oil:	aphids, pear psylla, mites
Thiodan:	aphids
Zolone:	aphids, apple maggot, codling moth, leafrollers, Oriental fruit moth, pear psylla, plum curculio, mites

UNREGISTERED MATERIALS

CGA-18809, Dieldrin, Lannate, M-3016, MC-9087, R-28627, S-15126, SD-14414, San I-197, Torak and U-36059 were used as experimental materials and are not registered for use on apples, pears or peaches.

THE CONNECTICUT
AGRICULTURAL EXPERIMENT STATION
NEW HAVEN, CONNECTICUT 06504

Paul E. Waggoner
Director

AN EQUAL OPPORTUNITY EMPLOYER

POSTAGE AND FEES PAID
U.S. DEPARTMENT OF
AGRICULTURE

AGR 101

PUBLICATION