Orange Tortrix on Apples

effective control obtained by spray treatment in fall and spring tests on experimental plot

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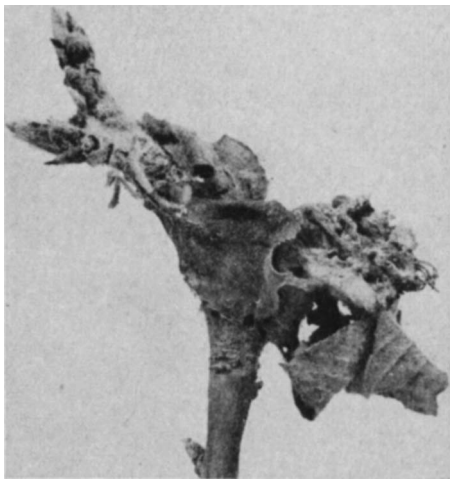
The orange tortrix—*Argyrotaenia citrana*—has been a major insect problem in the apple orchards of California's coastal counties for the past two or three seasons.

The damage to harvested fruit in the 1948 season was greater than that in the 1949 season because most growers attempted some means of control during the past season.

Field experiments in the control of this insect have been conducted during the past two seasons in a heavily infested apple orchard in the Sebastopol district. Studies of the insect's habits throughout the year have been of value in the timing of the control measures. Field observations have also been made on the populations of codling moth, woolly apple aphid, and rosy apple aphid occurring in the experimental plot.



Dried leaf clusters in which the orange tortrix larvae find protection while feeding on the foliage.

Postharvest sprays were applied early in October 1948 as a test of the toxicity of a number of insecticides to the larvae of the orange tortrix feeding on the foliage. The larvae at this time were in all stages of development and were quite securely protected in masses of dried leaves attached to green leaves and twigs. Adult moths and egg masses were present in great numbers which indicated a peak population of the pest.

The spray applications were made with a conventional type ground portable sprayer using short orchard guns and around 400 pounds of pressure at the pump. The gallonage applied per tree ranged from 25 to 30 gallons. The materials and dosages employed are shown below:

WARNING

The use of organic phosphates is not recommended.

The organic phosphates (parathion, hexaethyl tetraphosphate and tetraethyl pyrophosphate) are exceedingly dangerous to human beings in extremely minute amounts when ingested, inhaled or absorbed through the skin. Because of the present uncertainty concerning effective protective methods for applicators and orchard workers when these materials are used as insecticides, the inclusion of these materials in the reports of concluded field experimentation does not constitute a recommendation for their use.

Percentage of Living Larvae after the Postharvest Spray, October 1948

Materials	Dosage per 100 gallons	Percentage of living larvae after 1 wk.	3 wks.	9 wks.
50% wettable DDT	2 lbs.	65%	60%	48%
25% wettable parathion	1½ lbs.	15%	12%	14%
50% wettable DDD	2 lbs.	44%	15%	0%
wettable benzene hexachloride (10% gamma)	3 lbs.	67%	(*)	(*)
BHC wettable benzene hexachloride (25% gamma)	1 lb.	67%	(*)	(*)
25% emulsion tetraethyl-pyrophosphate	1 pt.	71%	(*)	(*)
Unsprayed trees		72%	83%	89%

(*) Control was so poor that no further counts were made.

Counts were made of the larvae within the tied up leaf clusters from each sprayed area at intervals of one week, three weeks, and nine weeks after spraying.

The comparatively high initial kill of parathion and the long residual action of DDD was noted. The benzene hexachloride—BHC—compounds and the tetraethyl pyrophosphate gave no appreciable kill and no residual action.

An experimental plot of replicated treatments on a heavily infested block of large Gravenstein apple trees was used during the 1949 season. Two spray applications were made—the first on May 2d at the petal fall period, and the second on June 6th, when the fruit was well developed.

The plot was divided into two sections, the first section receiving the customary codling moth spray of 1½ pounds of 50% wettable DDT in the first spray and a treatment for orange tortrix in the second spray. The second section received no DDT but had the same treatment for tortrix in both spray applications.

The materials and dosages per 100 gallons of water employed included the following: 50% wettable DDT, 1½ pounds; standard lead arsenate, four pounds; 50% wettable methyoxychlor, three pounds; natural cryolite, three pounds; 50% wettable DDD, two pounds; and 25% wettable parathion, 1½ pounds.

The applications were made with conventional ground portable equipment employing 400 pounds pressure at the pump and short orchard guns. Approximately 20 gallons of spray solution were applied per tree.

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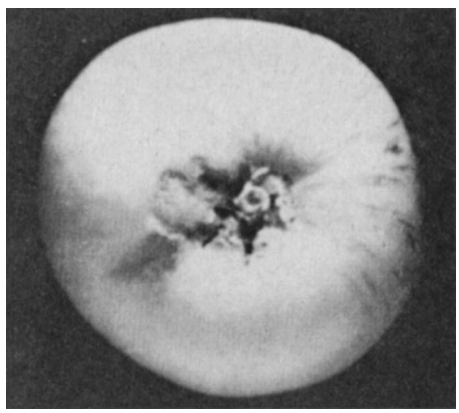

Orange tortrix larval attack at the stem end of an apple.

TORTRIX

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Two pickings of fruit were made—July 18th and August 9th—from the experimental plots, and a random sampling

Percentage of Tortrix Injured Fruit at Harvest Following Spray Treatments

First spray	Second spray	Fruit counted	Tortrix infested	Infested fruit
Plot Section 1				
DDT	Lead arsenate	3894	452	11.6%
DDT	Methoxychlor	3748	400	10.7
DDT	Cryolite	3514	182	5.2
DDT	DDD	3479	149	4.3
DDT	Parathion	3634	83	2.3
Plot Section 2				
Lead arsenate	Lead arsenate	3876	21	0.5%
Methoxychlor	Methoxychlor	3651	104	2.9
Cryolite	Cryolite	3033	51	1.7
DDD	DDD	3240	4	0.1
Parathion	Parathion	3450	10	0.3
Control Section				
Unsprayed trees		3446	719	21.0%

Significant difference at 1% level in the first plot is 5.7% and in the second plot, 1.3%.

of about 3,500 fruit was carefully inspected for tortrix and other insect injury from each of the treatments. The control obtained is shown above.

When DDT was used in the petal fall period and followed by one of the insecticides for the control of the orange tortrix, the results were not so good as when the same materials were used in both sprays. Considering that all of the materials used in the second plot are fairly effective in the control of codling moth as well as orange tortrix, any one of the materials should prove effective against either pest.

The codling moth population in this plot was too low to give significant differences in the control of this pest.

In orchards where spider mites are a problem, the use of a suitable acaracide in combination with these materials may be required.

Fewer woolly apple aphids were found on the fruit and trees sprayed with parathion, cryolite and lead arsenate. Aphids were noticeably heavier on unsprayed, DDD and methoxychlor sprayed trees.

Spray residue analysis of fruit from each of the treated plots at harvest gave the results shown in lower table.

There is apparently no danger from spray residues following these treatments when the last application is made six weeks before harvest.

Spray Residue Analysis

	ppm (parts per million)	
Plot Section 1		
DDT—lead arsenate	1.25	as arsenic trioxide
DDT—methoxychor	1.2	as methoxychlor
DDT—cryolite	2.1	as fluorine
DDT—DDD	1.6	as DDD
DDT—parathion	0.07	as parathion
	0.51	as DDT
Plot Section 2		
Lead arsenate-lead arsenate	3.5	as arsenic trioxide
methoxychlor-methoxychlor	1.6	as methoxychlor
cryolite-cyolite	3.6	as fluorine
DDD—DDD	1.8	as DDD
parathion-parathion	0.03	as parathion

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See "Orange Tortrix on Deciduous Fruits," page 13, CALIFORNIA AGRICULTURE, August, 1948.

CITRUS

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any given element is deficient, the direction of change of the other elements is fairly well known in many instances. Knowledge of the usual range of values for healthy leaves provides a somewhat broader base for evaluating the leaf analysis.

In another example case, the nitrogen might turn out to be around 2.75%, but phosphorus might be less than 0.08%. Under these conditions it might reasonably be suspected that phosphorus is lacking, and it would be worthwhile to try out phosphorus fertilizer in the orchard.

Data given here—while for orange leaves of a given age range—suggest that these values may be used on similarly aged lemon and grapefruit leaves even though the certainty be somewhat less.

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LIVESTOCK

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evidence is available, however, suggests that the deficit in sheep and lambs came during the World War II period. Although California has been a deficit area for dairy products as a group over the period under review, in recent years it has been a surplus state in the production of evaporated and dried whole milk. In the poultry products group a deficit position in chicken meat production has persisted throughout the period. In egg production a change from a surplus to a deficit state occurred around the middle 1930's. The state has been a surplus area in turkey production since the late 1930's. Commercial turkey production did not really get under way in this state until the early 1930's. Thus turkeys constitute the only product in the entire livestock group in which California has established a surplus position relatively early in its production history and maintained this surplus position continuously throughout the recent period of very rapid population growth.

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POULTRY

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ing of turkey poults is also practiced commercially. Schools teaching the cloacal sexing method have been developed, and associations of trained sexers formed for the promotion of commercial employment of sexers by hatcherymen. Certain problems still remain in the use of this method, since breeds and strains differ in the ease with which the sexes can be identified accurately. Future breeding work may prove that the accuracy of sexing of a strain can be improved by selecting for well-defined copulatory organs in males and their absence in females at hatching.

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CANKER

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as smut and molds, that may be carried by insects to the fruit and there result in spoilage and additional loss. For these reasons all prunings should be removed every year from the orchards and destroyed by burning.

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