1976 Annual Report
California Almond Board

Project No. 76-H

Title: 1976 Annual Report on Navel Orangeworm Research

Prepared by: J. E. Dibble, University of California, San Joaquin Valley Agricultural Research & Extension Center, Parlier.

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Objectives:

To evaluate combinations of cultural and chemical controls. Test Guthion sprays during early moth flight in May as well as sprays during the second period of egg laying in June. Also evaluations of Sevin applied at different times along with other material comparisons were to be looked at. Application system comparisons were also to be part of the overall evaluation program. Effect of certain sprays and timings on the control of mites and other worms and their relationship in the pest management program of almonds was an additional part of this project.

Interpretive Summary:

A 70-80% reduction in NOW infested nuts can be obtained from a single May or July treatment of Guthion in a culturally clean orchard. Such is not possible in a non-culturally clean block and would be somewhat different in

an area having an August harvest in contrast to a September harvest date. Half rates of Guthion (1 lb. AIA) after a May treatment gave 52% control in a dirty orchard. Had such been culturally clean this control would no doubt be better. Also, if pinworm holes are not counted as rejected nuts then in the above case the 52% control becomes 74%.

In a seasonal spray program a dormant phosphate plus oil or oil alone can give excellent scale and mite egg suppression. This followed in May by Sevin or Guthion for NOW control should include a miticide such as Plictran for summer two-spotted mite control.

A hull split application in July in an August harvest area is not too effective (40% control) when the field NOW population is high. Under these conditions Sevin gave 40% control. Guthion was not effective nor presently allowable. Under these same high field populations (a result of no cultural sanitation) triple treatments can be quite effective as shown with Sevin applied in May, June and at start of hull split. High or low volume sprays gave equal results. Double hull split treatments (10% or 50%) were better than single (68% vs 49%) but less than the triple treatment (90%).

An airplane application in May gave poor results, however, different timing or perhaps double treatments should in fairness be evaluated. The non-conventional fans and nozzling of the Kinkelder and AgTec again gave somewhat better coverage and control than the conventional types.

Experimental Procedure:

Block treatments (non-replicated) have been found best where possible to use for NOW tests. Such are 5-20 acre square blocks with the 5 acre blocks buffered on all four sides. It is, however, necessary to cut the tests involving a number of different treatments and those involving non-registered compounds down to replications of a part of an acre or to single trees.

Twig and bark samples are taken for scale counts, leaf samples for mites and 250 nut random samples are taken from 1000 nut samples per replication for NOW infestation percentages. 30-100 twig or leaf samples per replication are used for scale and mites. Sub-sample replications are taken from the block treatments.

Results:

In an effort to test the efficacy of Guthion at 1/2 the recommended rate (1 lb. AIA) application were made on May 12 and June 4 (Tables 1 & 2). These trials applied in a non-cultural program orchard resulted in 52.3% control in the May block. If pinholes are not counted this value jumps to 74.1% control. The June treatments were either not satisfactory in dosage for control due to an aggressive NOW population or the timing of application was poor. Pinhole damage is obviously a vastly important consideration as to control rating. This damage can be over 50% of the total assessed infestation.

The overall pest management program must regard all pests in order to function properly against the primary target. Table 4 shows different May NOW treatments and their effect on mites. The inclusion of a miticide with Sevin is obviously essential. The same would apparently be true with Guthion. The May treatments of Supracide, Guthion and Sevin all effective on NOW control. These treatments were preceded with dormant applications each of which when combined with oil did a good job of controlling San Jose Scale and European Red Mites.

In contrast to early treatments a late treatment in July (August harvest) may not be too effective. Table 5 shows Sevin to be the only effective treatment (41% control) in an orchard having nearly 60% infestation in the untreated block. No difference existed between high volume (400 gpa) and low volume (100 gpa) applications.

Sevin 80S applied at 5 lbs/acre in 500 and 100 gpa by ground and 20 gpa by air showed that a May plus June plus 10% hull split can result in nearly 90% control (Table 6). Ten percent hull split alone can give almost 50% clean nuts. Ten percent plus a 50% hull split spray showed close to 70% control. Triple treatment is economically prohibitive. However, a May or June plus hull split spray program may provide a maximum clean not program even in a non-cultural programed orchard. A early (May) and single application by air was of little value.

Treatments two months prior to harvest by different sprayers showed that spray coverage ratings were consistently higher (13% average) than that control obtained for NOW. The linear air fan sprayers (Kinkelder and AgTec) performed better than the axial flow fan sprayers tested.

Discussion:

As a result of the work that Drs. Rice, Curtis, Barnes, et al and myself have done over the past 3 years an excellent handle on NOW control has been developed. This involves timing, materials, equipment and the pest management effect of cultural sanitation.

However, further development and investigation needs to be done on:

1. Timing of 1 vs 2 applications - as it differs in both the Central and Southern Valley areas.
2. Different requirements in high population, no sanitation orchards vs low population orchards practicing cultural sanitation.
3. Minimum chemical rate possibilities, alternate chemicals, equipment and seasonal spray programs for total pest management.

Table 1

ALMONDS - 1976

Navel Orangeworm Control
with Azinphosmethyl @ 1 lb. AIA (½ rate)

Treatment	Harvest Counts September 15 % Worm Infestation NOW	PTB	OTHERS	TOTAL
May 12	8.3 (62.4)*	0.0	0.8	8.4 (4.1)**
June 4	15.4 (41.2)	0.0	0.8	15.5 (9.6)
Check	12.8 (14.6)	0.2	4.6	17.6 (15.8)

Applied @ 100 gpa to 20 acre blocks. Counts are averaged from 250 nuts selected at random from approximately 1000 nuts taken from each replication. 6 replications/treatment. Fresno County.

*% of NOW infestation that was pinhole damage.
**Total net % of worm infestation minus pinhole infested nuts.

Table 2

ALMONDS - NOW - 1976

Damage Relationship With or Without Pinhole Counts

Treatment	Percent Control +Pinholes	-Pinholes
May 12	52.3	74.1
June 4	11.9	39.2

-Azinphosmethyl applied @ 1 lb. AIA/100 gpa to 20 acre blocks. Counts are averaged from 250 nuts selected at random from 1000 nuts/replication. 6 replications/treatment. Fresno County.

Table 3

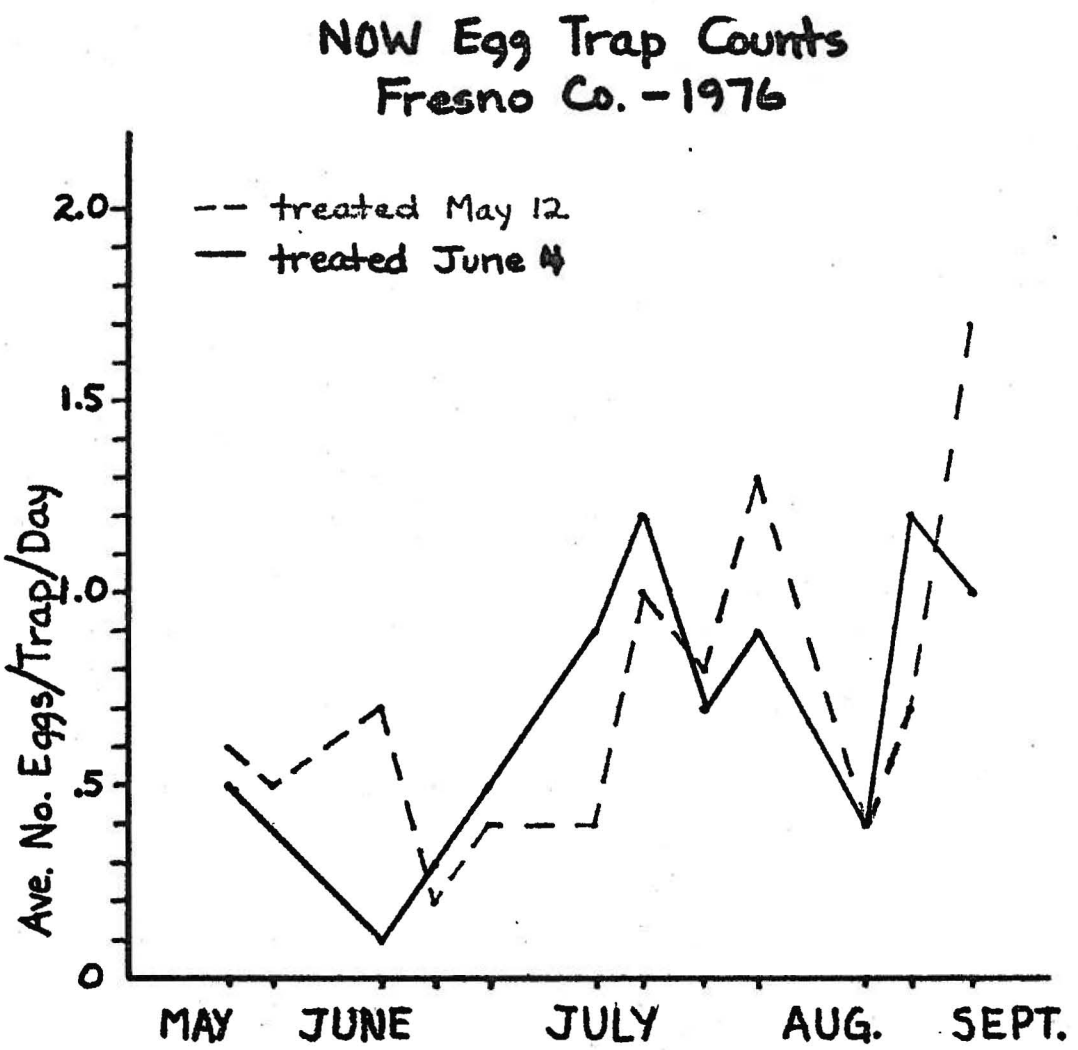
NOW Egg Trap Counts
Fresno Co. - 1976
-- treated May 12
— treated June 4
Ave. No. Eggs/Trap/Day
2.0
1.5
1.0
.5
0
MAY
JUNE
JULY
AUG.
SEPT.

Table 4

ALMONDS - 1976

Dormant Treatments for San Jose Scale and European Red Mite Control
and May Sprays for Two-Spotted Mite and NOW Suppression

Treatment		Average Number Pests			Average %
		scale crawlers/twig	ERM/leaf	2-spot/leaf	damaged nuts
February	May	May	May	June	August
Supracide	Supracide	8.1	5.2	5.5	3.6
Supracide + oil	Guthion	1.4	2.6	24.7	3.0
Diazinon + oil	Sevin	3.2	4.1	20.6	2.9
Diazinon + oil	Sevin + Plictran	4.0	3.4	1.8	4.2
Parathion + oil	--	4.8	4.0	14.5	10.4
Oil	Sevin	6.6	3.9	27.8	3.9
Check	--	39.0	14.9	15.4	11.1

Applications @ 400 gpa February 10 & May 18. Four 5-tree reps. per treatment. Fresno County. Sampling on May 18, June 16 and August 11.

Table 5

ALMONDS - NOW - 1976

Effect of Single Late Treatment

Material	Form.	Rate/AIA (lbs/gpa)	Harvest Counts August 11 % Worm Infestation NOW	PTB	OTHERS	TOTAL	% CONTROL
Sevin	80S	5/100	33.0	0	3.1	36.1	41.2
Sevin	80S	5/400	32.3	0	3.5	35.8	41.7
Guthion	50WP	2/100	67.1	0	0.3	67.4	0
Dylox	80S	4/100	64.3	0	0.9	65.2	0
Check	--	--	57.9	0	3.5	61.4	-

Applied by air carrier sprayer on July 8 to single large blocks of 5 acres each. Kern County.

Counts are average of 250 nuts from each of 6 replications. Kern County.

Table 6

ALMONDS - NOW - 1976

Low & High Volume Sprays as Compared to a Single
Early Airplane Application

Treatment	Application: Early May	Application: Early June	Application: Hull Split 10%	Application: Hull Split 50%	Harvest % Control
Ground @ 500 gpa	X	X	X		87.4
Ground @ 500 gpa			X		44.7
Ground @ 100 gpa	X	X	X		89.9
Ground @ 100 gpa			X		49.1
Ground @ 100 gpa			X	X	68.2
Airplane @ 20 gpa	X				35.7

Applications on 5/3, 6/2, 7/9 and 7/17. (Sevin 80S @ 5 lbs/acre)

Non-treated = 55% infestation.

Table 7

ALMONDS - 1976

Navel Orangeworm
Sprayer Application Trials

Sprayer		GPA	% Coverage	% NOW Control (clean nuts)
AgTec	Eng.	50	89.1	76.3
AgTec	Eng.	100	91.4	79.7
Berthoud	PTO	100	84.6	70.3
Bean 200TR	PTO	100	85.0	68.0
Kinkelder	PTO	50	87.3	77.0
Buffalo Tur.	Eng.	50	64.4	48.7

-July Applic. 3-3 X 15 tree reps.
-Guthion 50 WP @ 4 lbs/acre.
-Coverage evaluated from use of water soluble dyes and chrome surfaced cards placed in the trees. Fresno County.