1983

Annual Report

California Tree Fruit Agreement

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University of California, Parlier/Davis

I. Optimum Spray Timing for In-Season Control of San Jose Scale, Peach Twig Borer, Oriental Fruit Moth, and Codling Moth

Sprays of diazinon 50 W at 2.0 lbs. a.i. per acre were applied by handgun at 400 gpa to mature plums and nectarines for determination of optimum timing to control crawlers of San Jose scale (SJS). These hosts are used for scale tests because of the relative ease of comparing treatments based on infested fruit. In addition, efficacy of the several treatments for control of 1^{st} generation crawlers was evaluated using sticky tape traps on tree limbs to measure post-treatment crawler activity. Timings of scale sprays were based on accumulated day-degrees (D°) after first male scales were trapped in pheromone traps.

Similar sprays of diazinon were applied to 3^{rd} leaf almonds for optimum timing tests for control of peach twig borer (PTB). Almonds are the preferred test crop for PTB due to greater accuracy in identifying twig strikes, and the usual absence of interference from similar-appearing twig strikes caused by oriental fruit moth. The treatment timings for PTB were determined by accumulated D° after first PTB moth collections in pheromone traps on April 16.

Sprays of diazinon at 2.0 lbs. a.i. in 400 gpa were also used to evaluate optimum treatment timings for oriental fruit moth (OFM) in 3^{rd} leaf peaches at Parlier, and for codling moth (CM) in mature oriental pears at Reedley and in plums at Parlier.

The results of these tests (Tables 1 & 2, Fig. 1) show that the optimum timing for sprays to control 1^{st} generation San Jose scale crawlers is 600-700 D° after 1^{st} males are trapped. The optimum timing for control of 1^{st} generation PTB larvae is 400-500 D° after 1^{st} male collections (Table 3, Fig. 2).

Table 1. Optimum timing for control of San Jose Scale on Fruit

Parlier, California

Day-Degrees > 1st Male	Mean No. SJS Crawlers Per Rep. 1982 1/	1983 2/
Check	5.74 a 3/	3.63 a
300°	--	2.55 b
400°	4.85 ab	2.01 bc
500°	3.92 b	1.65 c
600°	3.84 b	1.60 c
700°	3.87 b	1.64 c
800°	--	1.83 c

1/ 4 replicates, 100 fruit per replicate.

2/ 8 replicates, 100 fruit per replicate.

3/ Means in columns followed by the same letter are not significantly different at P = .05, DMRT. Data transformed to $\sqrt{x+.5}$.

Table 2. Numbers of San Jose Scale Crawlers Collected on Sticky Tapes During and After Chemical Sprays at Selected Intervals.

Parlier, California 1983

Treatment - D° > 1st Male	Mean No. Crawlers Per Treatment Timing 1st Gen. (Treated) 1/	2nd Gen. (1st Post-Trt.) 2/	3rd Gen. (2nd Post-Trt.) 3/
Check	15.4 ab 4/	22.8 a	79.0 a
300°	27.4 c	31.0 a	80.6 a
400°	19.1 abc	22.0 a	58.4 a
500°	17.8 abc	12.2 b	42.6 b
600°	11.3 b	3.1 c	31.3 b
700°	11.3 b	2.5 c	20.1 c
800°	24.4 ab	11.3 b	59.3 a

1/ Mar. 30-Jun. 15. 9 reps per treatment.

2/ Jun. 22-Aug. 17. 9 reps per treatment.

3/ Aug. 17-Oct. 5. 7 reps per treatment.

4/ Means in columns followed by the same letter are not significantly different, P = .05 ANOVA and DMRT.

Table 3. Optimum Spray Timing for Control of Peach Twig Borer

Day-Degrees $>1^{st}$ Moth	$\bar{X}$ No. PTB Strikes Per Timing 1981	1982	1983
300 D°	3.8 ab 1/	0.2 a	9.0 ab
400 D°	1.0 a	0.0 a	4.2 a
500 D°	0.8 a	0.1 a	7.8 ab
600 D°	5.4 b	3.6 b	9.1 ab
Check	15.6 c	8.1 c	16.8 b

1/ Means followed by the same letter are not significantly different at P = .05 DMRT.

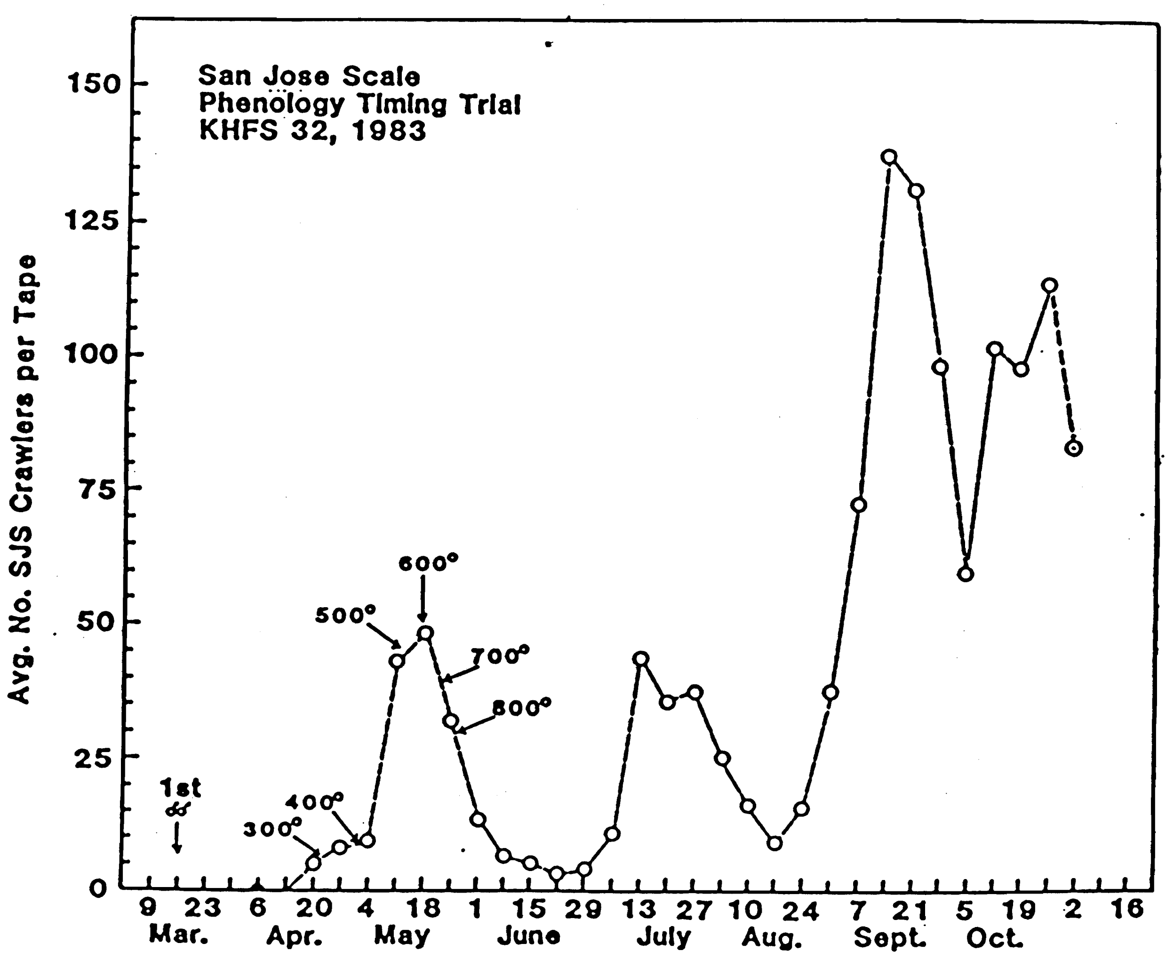

Fig. 1. Crawler activity for San Jose scale during the 1983 season at Parlier, Calif. Day-degree points on the 1st generation curve are calculated from 1st male scale collections in pheromone traps on March 16.

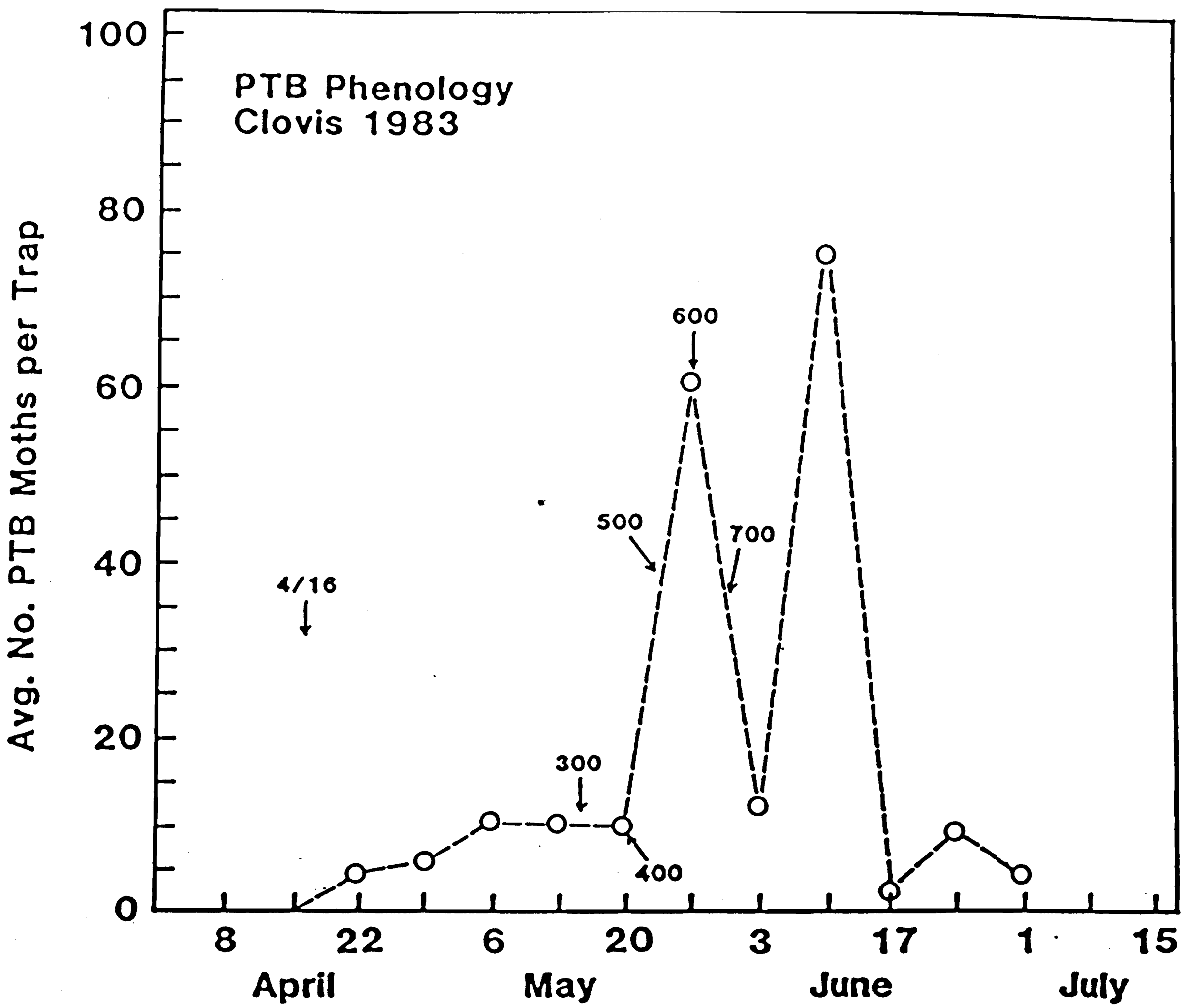

Fig. 2. First flight moth collections for peach twig borer showing D° points at which diazinon sprays were applied for control of 1st generation larvae.

Diazinon treatments for control of OFM in peaches were timed at intervals of 100± 10 day-degrees after beginning of the second flight (Fig. 3). Optimum timing with diazinon was determined to be at 500-600 D° into the flight; use of longer residual azinphosmethyl expanded the acceptable timing to 400-700 D° into the flight (Table 4). The experimental pyrethroid FMC 54800 also provided good control of OFM when applied at 600 D° at rates of .04, .06, and .08 lbs/a.i. per acre (Table 5). Continued validation of the OFM-PETE phenology model showed good correlation of model predictions, and observed biofixes for OFM during the 1983 season (Fig. 4).

Table 4. Number of Twig Strikes in Tests for Control of Oriental Fruit Moth in Central California Peach Orchards 1/

Day-Degrees	1982		1983		
> Biofix	Test 1	Test 2	Test 1	Test 2	Test 3
300 D°	22.2 b	27.2 c	30.0 d	24.0 d	9.2 b
400 D°	24.3 b	21.4 b	20.3 c	17.8 c	3.3 a
500 D°	15.1 ab	24.6 bc	8.1 b	7.0 ab	1.8 a
600 D°	10.2 a	14.6 a	1.6 a	4.8 a	1.8 a
700 D°	--	--	8.9 b	9.3 b	3.8 a
Check	39.6 c	35.0 d	35.6 d	28.5 e	19.2 c

ANOVA & DMRT, P = .05

1/ Tests 1 and 2 in both years with Diazinon 50 W @ 2.0 lbs. a.i./acre; Test 3 in 1983 with Guthion 50 W @ 2.0 lbs. a.i./acre. Test 1 at Parlier; Tests 2 and 3 at Yuba City. R.E. Rice, C.V. Weakley and R.A. Jones.

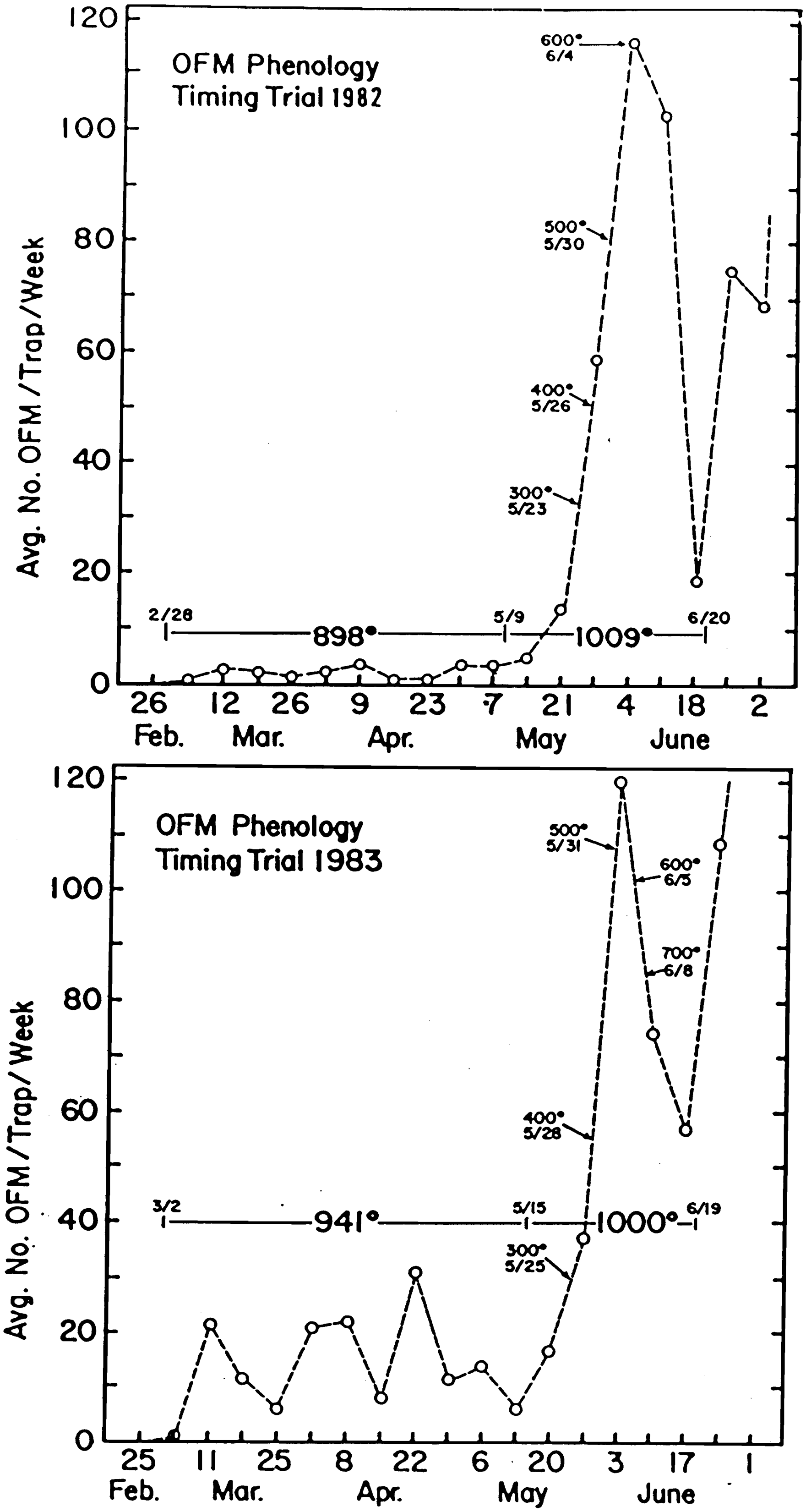

Fig. 3. Oriental Fruit Moth, flight curves for 1982 and 1983 showing relation of day-degree spray timing studies to 2nd flight activity.

Table 5 . OFM PHENOLOGY & EFFICACY TEST
PARLIER, CALIF. 1983

TREATMENT - D° > BIOFIX	RATE A.I./ACRE	$\overline{X}$ NO. TWIG STRIKES
300°	DIAZINON 2.0 LBS.	30.0 D[1/]
400°	DIAZINON 2.0 LBS.	20.3 C
500°	DIAZINON 2.0 LBS.	8.1 B
600°	DIAZINON 2.0 LBS.	1.6 A
700°	DIAZINON 2.0 LBS.	8.9 B
600°	FMC .04	2.3 A
600°	FMC .06	1.6 A
600°	FMC .08	1.8 A
CHECK	--	35.6 D

1/ 5% DMRT; TRANSFORMED TO $\sqrt{x+0.5}$

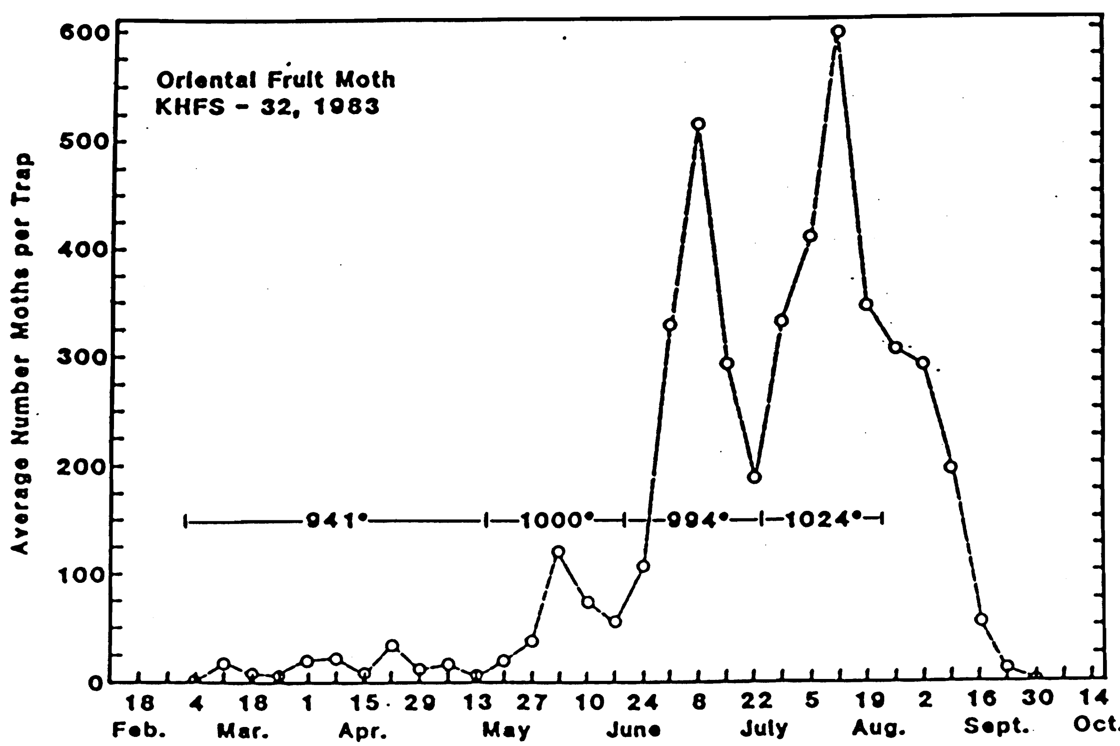

Fig. 4. Continuing validation of the PETE oriental fruit moth model, using thresholds of 45 - 90 °F, showed good correlation of model parameters and 1983 OFM flights at Parlier, Calif.

Optimum timing for treatment of codling moth and control of 1st generation larvae in 1983 was between ca. 200-400 D° after 1st moth flight (Table 6, Fig. 5). It is believed that the best timing should be toward the earlier part of this period.

Table 6. Optimum Timing for Control of Codling Moth 1/

Fresno County 1983

Asian Pears		Plums	
D° > 1st Moth	Total Strikes	D° > 1st Moth	Total Strikes
200°	0 a	212°	15 a
300°	3 a	324°	12 a
400°	4 a	431°	15 a
500°	9 a	531°	58 ab
600°	22 b	655°	75 bc
Check	32 c	Check	153 c

1/ Diazinon 50 W @ 2.0 lbs. a.i. in 400 gpa.

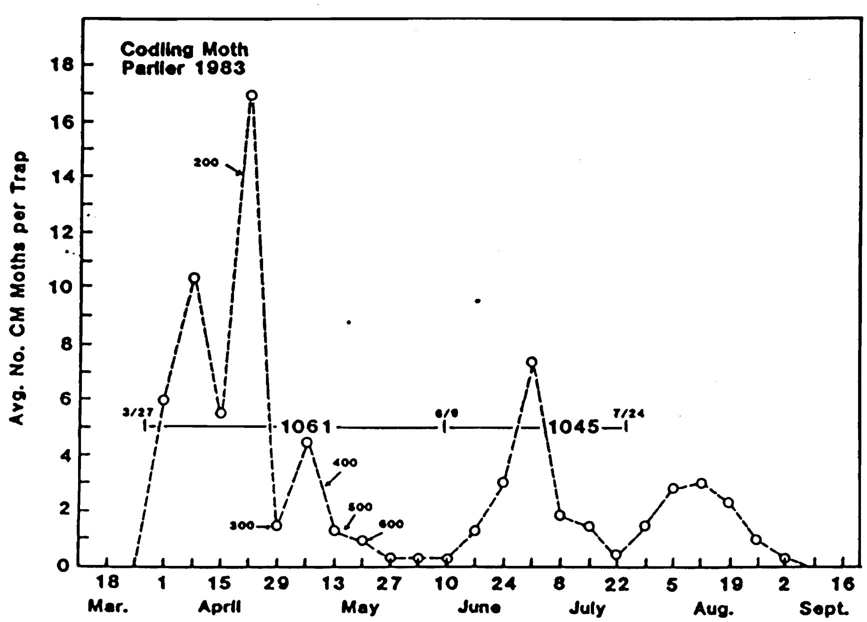

Fig. 5. Codling moth collections in pheromone traps at Parlier, Calif., showing D° timings at which chemical sprays were applied during the 1st flight and D° accumulations between biofix points for the 1st two flights.

randomized complete block array. The cap manufacture dates in both tests were: AA - 3 April 1981; A - 19 March 1982; B and C - 18 March 1983 (Table 8). Caps in treatments AA, A and B were not changed during either of the tests, while caps in treatment C were changed bi-weekly. All caps were placed in SJS tent traps; trapped male scales were counted weekly.

The results of the first test (Table 8) showed erratic performance of 1983 fresh (C) vs. unchanged (B) caps. The pattern of significant differences between these two treatments at 3, 5, and 7 wks. suggests some repellancy in fresh caps to responding male scale. There was a strong tendency for the unchanged 1983 caps to be more consistent in performance than the changed 1983 caps. With one exception (wk. 7), there were no significant differences between unchanged caps of any of the three dates of manufacture.

In Test II, there were no differences among treatments in male scale collections through the 4th wk. At wk. 5, the 1983 unchanged (B) caps were unaccountably better than fresh 1983 caps (C), while at wk. 6 and thereafter, the treatment C caps were better than treatment B. Again, with only 1 exception (wk. 6), there were no significant differences between unchanged caps of different dates of manufacture, which indicates a fairly good shelf life (± 2 yrs.) for these caps. Recommended cap change intervals for SJS caps will continue to be 4 weeks.

Table 8. Pheromone Dispenser Longevity Studies - 1983.

San Jose Scale, *Quadraspidiotus perniciosus* (Comstock)

Treatments: Date of Cap Manufacture	Mean No. SJS Males Collected 1/									
	Weeks Exposure									
	1	2	3	4	5	6	7	8	9	10
Test I: 6/2-7/28										
3 Apr. 81-AA	13.2a	26.2a	22.1ab	7.0a	6.3ab	6.3a	2.3 b	5.3a		
19 Mar. 82-A	19.7a	26.3a	20.0ab	15.0a	11.7ab	7.8a	2.0 b	4.3a		
18 Mar. 83-B	14.5a	27.8a	34.7a	17.5a	14.5a	11.7a	8.5a	11.0a		
18 Mar. 83-C	16.0a	23.0a	16.5 b	6.8a	5.0 b	6.2a	3.7 b	4.8a		
Test II: 8/18-10/27										
3 Apr. 81-AA	55.2a	30.8a	60.3a	24.5a	47.2ab	32.7ab	24.5a	25.3a	42.3a	99.5a
19 Mar. 82-A	54.0a	36.3a	31.7a	23.2a	57.7ab	37.8a	10.8a	41.7ab	60.7ab	68.0a
18 Mar. 83-B	61.5a	32.3a	36.7a	35.5a	65.5a	17.0 b	27.3a	51.2ab	37.3a	57.5a
18 Mar. 83-C	52.8a	29.7a	36.2a	27.5a	26.7 b	36.3a	60.0 b	96.8 b	87.7 b	194.8 b

1/ ANOVA & DMRT @ p = .05. Means in columns followed by the same letter are not significantly different.

C. Oriental Fruit Moth:

A weathering/dispenser longevity study was conducted from May 24-September 13, 1983 with old and new dispensers (caps) of commercial oriental fruit moth pheromone obtained from Zoëcon Corp., Palo Alto, Calif. The test was placed in a mature peach orchard at Parlier, Fresno Co., using Pherocon® I-C traps placed ca. 100 ft. apart. Pheromone caps made in October 1981 and stored at 43°F (treatment A) and March 1983 (B) were not changed throughout the 16-wk. test (Table 9); other caps made in March 1983 (C) were changed every 2 wks. Collected moths were counted, and traps re-randomized once each week. The test was designed as a randomized complete block with 6 replicates.

The results of this test (Table 9) showed no significant differences in moth collections between 1983 caps that were changed (C) or not changed (B) through the test. There was also no significant difference between the 1981 caps and 1983 caps, indicating that these caps have a refrigerated shelf life of several years. These data indicate that recommendations for OFM pheromone cap changes at 4-6 wk. intervals are still valid.

Table 9. Pheromone Dispenser Longevity Studies - 1983

Oriental Fruit Moth, *Grapholitha molesta* (Busck)

May 24 - Sept. 13, 1983

Treatments: Date of Manufacture	Mean No. OFM Moths Collected 1/ — Weeks of Exposure: 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total Moths
19 Oct. 81-A	24.3	23.2	21.8	27.2	28.5	48.5	28.7	18.2	21.8	58.7	63.8	25.2	23.3	50.5	66.8	34.0	3387
22 Mar. 83-B	30.0	53.8	35.5	30.7	37.3	70.2	38.3	23.5	33.0	88.5	80.8	33.3	33.8	62.5	65.5	29.2	4473
22 Mar. 83-C	18.3	32.8	24.5	32.0	52.2	75.7	24.2	21.3	39.7	76.2	83.7	44.5	31.2	55.7	71.0	36.7	4317

1/ ANOVA & DMRT @ p = .05 showed no significant differences between treatment means in any column.

D. Codling Moth:

Two tests comparing old and new pheromone dispensers (caps) for codling moth were conducted during April 8-May 5 and July 28-Sept. 2, 1983 in a mature asian pear orchard at Reedley, Fresno Co., Calif. Caps were placed in Pherocon® I-C traps 100-120 ft. apart. Caps made in October 1976 (AA), July 1982 (A), and March 1983 (B) were not changed during each test (Table 10); 1983 caps in treatment (C) were replaced every 2 wks. Both tests were designed as randomized complete block arrays; moths were counted and traps re-randomized once each week.

The results of the first test in the spring (Table 10) showed no differences in moth collections between 1982 and 1983 caps through the first two weeks of the test. After 2 wks., the data from this test are not considered reliable due to low codling moth populations. The second test in August-September also showed no differences between 1982 and 1983 caps for the first 2 wks., but the 1976 caps were considerably less attractive after only 1 week of exposure. Following the cap change in treatment C after 2 wks. exposure, all other treatments were significantly less attractive than the fresh caps. These results indicate that for maximum trapping efficiency, codling moth pheromone caps should be replaced at two-week intervals. The pheromone cap longevity shown by these data agrees with that reported by Culver and Barnes (JEE 70: 489-92 [1977]), but is contrary to results reported by McNally and Barnes (Env. Entomol. 9: 538-41 [1980]).

Table 10. Pheromone Dispenser Longevity Studies - 1983

Codling Moth, Laspeyresia pomonella (L.)

Treatments: Date of Cap Manufacture	Mean No. Codling Moths Collected[1/] Weeks Exposure 1	2	3	4	5
Test I: 4/8-5/5/83					
7 July 82-A	2.5a	2.2a	0.3a	0.3a	
25 Mar. 83-B	3.0a	2.3a	0.2a	0.5a	
25 Mar. 83-C	2.7a	2.7a	1.0a	0.8a	
Test II: 7/28-9/2/83					
28 Oct. 76-AA	12.8a	5.7a	4.2a	1.7a	1.0a
7 July 82-A	14.1a	18.7 b	4.8a	1.8a	0.3a
25 Mar. 83-B	15.5a	18.0 b	7.0a	1.7a	0.8a
25 Mar. 83-C	19.7a	9.2ab	18.5 b	5.0 b	5.8 b

1/ ANOVA & DMRT, p = .05.

E. Omnivorous Leafroller:

Two weathering tests were conducted in 1983 using old and new commercial pheromone caps for omnivorous leafroller (OLR), Platynota stultana. The pheromone caps were obtained from Zoëcon Corp., Palo Alto, Calif. The first test was conducted from April 8-June 9, 1983 in a 2.0 acre mature peach orchard at the Kearney Agricultural Center, Parlier. The test was designed as a randomized complete block with 4 treatments and 5 replicates. Treatments consisted of pheromone caps of different manufacture dates as follows: AA - 25 March 1980; A - 4 May 1981; B - 25 March 1983; C - 25 March 1983 (Table 11). Pheromone caps in treatments AA, A and B were not replaced during the test; treatment C caps were replaced with fresh caps every 2 wks. Caps were placed in Pherocon® I-C traps located ca. 50 ft. apart; the traps in this test were not re-randomized during the test. Moth counts were made weekly.

The second OLR pheromone longevity test was conducted from September 8 - Nov. 10, 1983 in a mature 10 ac. nectarine orchard near Sultana, Calif. This test was similar to Test I, except 6 replicates per treatment were used, with traps 100 ft. apart, and treatment AA was manufactured on 22 March 1976. Moth collections were made and traps were re-randomized weekly.

The results of Test I during the spring (Table 11) showed no significant differences (P = .05) between unchanged and fresh 1983 caps until the 8th week of the test. There were no differences between 1983 caps and 1980 or 1981 caps until the 6th week, when 1980 caps were significantly less attractive than fresh 1983 caps. An interestting result in this test was 1981 caps were as good as fresh 1983 1983 caps through most of the 9 wk. test, and particularly through the 7th wk.

The results of the 2nd test in late summer-early fall were quite different from the 1st test, and presented a confusing picture of cap performance. Surprisingly, the 1976 and 1981 caps were better than the 1983 caps for the 1st two weeks of the test. Also, the "fresh" 1983 caps (treatment C) were better than unchanged 1983 caps (treatment B) at both the 2nd and 3rd weeks, although they were of the same exposure age at 2 wks.

The most interesting result from this test, however, was that the oldest caps (treatment AA) caught significantly more OLR males over the entire 9-wk. test than any of the other three treatments. The reasons for this are not known at this time, although it could be speculated that either cap load rates and/or pheromone isomer content was different in 1976, compared to the other years. It was also noted that certain unchanged caps (reps), particularly from the 1981 treatment A, were always much less attractive than other caps in the same treatment, regardless of their location in the orchard. This suggests the possibility of some significant variations in load rates among caps of the same manufacture date.

Recommendations for cap change intervals will remain at 4 wks. for the 1984 season for OLR.

Table 11. Pheromone Dispenser Longevity Studies - 1983

Omnivorous Leafroller, *Platynota stultana* (Wals.)

Treatment: Date of Cap Manufacture	Mean No. OLR Males Collected[1/]									
	Weeks Exposure									
	1	2	3	4	5	6	7	8	9	Total
Test I: 4/8-6/9/83										
25 Mar. 80-AA	3.6 a	9.2 a	8.5 a	5.8 a	3.0 a	3.0 a	2.2 a	0.2 a	1.0 a	36.5 a
4 May 81-A	4.2 a	15.5 a	15.4 a	21.5 b	11.5 a	11.2 ab	6.0 a	1.0 a	1.0 a	87.3 b
25 Mar. 83-B	3.3 a	13.0 a	7.3 a	13.3 ab	6.2 a	4.7 ab	2.3 a	0.5 a	1.7 ab	52.3 a
25 Mar. 83-C	5.3 a	12.8 a	10.8 a	14.5 ab	8.7 a	11.5 b	5.2 a	3.5 b	3.5 b	75.8 b
Test II: 9/8-11/10/83										
22 Mar. 76-AA	19.2 a	15.5 a	52.0 ab	31.8 a	40.0 a	25.0 a	20.7 a	18.0 a	11.3 a	233.5 a
4 May 81-A	10.7 b	18.2 a	43.7 ab	12.3 a	20.3 ab	13.2 b	8.0 b	9.3 ab	5.8 ab	141.5 b
25 Mar. 83-B	0.8 c	3.5 c	10.7 b	43.7 a	13.5 ab	6.2 b	2.7 b	4.5 b	3.2 b	88.8 b
25 Mar. 83-C	3.0 c	6.7 b	84.2 a	37.0 a	8.2 b	13.7 ab	4.3 b	5.2 b	8.7 ab	171.0 b

1/ ANOVA & DMRT @ p =.05. Means in columns followed by the same letter are not significantly different.

III. Tortricid Moth Pheromones -- Mixed Hosts

Synthetic pheromones of eight tortricid species were placed into stonefruit orchards and uncultivated areas in four locations in Fresno and Tulare counties. The pheromones were for fruittree leafroller, filbert leafroller, fruittree tortrix, obliquebanded leafroller, orange tortrix, three-lined leafroller, tufted apple budmoth, and redbanded leafroller. Of these 8 target species, only the fruittree leafroller and obliquebanded leafroller were collected (Table 12).

The fruittree leafroller (FTLR) was attracted by several pheromones, including its own pheromone (171 total moths), filbert leafroller (105 FTLR), obliquebanded leafroller (85 FTLR) and redbanded leafroller pheromone (142 FTLR). Minor responses of FTLR were also shown to the pheromones of fruittree tortrix (4 FTLR) and three-lined leafroller (7 FTLR).

Obliquebanded leafroller (OBLR) moths were collected in traps containing pheromones of orange tortrix (273 OBLR), its own pheromone (157 moths), filbert leafroller (26 OBLR) and redbanded leafroller (3 OBLR).

Oriental fruit moth showed significant response to pheromones of orange tortrix (87 OFM) and three-lined leafroller (62 OFM). The garden tortrix, *Clepsis peritana*, responded in high numbers to pheromones of filbert leafroller (1053 GT) and OBLR (1362 GT). This species also responds to the pheromone of omnivorous leafroller, *Platynota stultana*.

Other non-target species responding to the pheromones were *Commophila umbrabsana* (Tortricidae) in tufted apple budmoth traps (231 moths) and *Macrotheca* sp. (Pyralidae) in FTLR traps (364 moths) and fruittree tortrix traps (638 moths).

These data indicate that among these 8 primary species of leafroller, only the fruittree leafroller and the obliquebanded leafroller are present in numbers great enough to be considered a potential pest in the four locations that were sampled. The three other moths noted in Table 12 (*Clepsis*, *Commophila*, and *Macrotheca*) are not known to be pest species wherever they have been reported.

Obliquebanded leafroller was collected in sufficient numbers at the Reedley location (Benner ranch) to construct a seasonal flight graph for the males (Fig. 6). This shows two distinct flight periods during the season, which agrees with information on OBLR in other states.

Table 12. Summary of Tortricid Moth Response to Selected Pheromone Types. Fresno & Tulare Counties, 1983 [1/]

Species Collected		Total Moths Collected in Pheromone Traps of — FTLR	FLR	FTT	OBLR	RBLR	OT	TLLR	TABM
Fruittree Leafroller *Archips argyrospilus*	FTLR	171	105	4	85	142	0	7	0
Filbert Leafroller *Archips rosanus*	FLR	0	0	0	0	0	0	0	0
Fruittree Tortrix *Archips podana*	FTT	0	0	0	0	0	0	0	0
Oblique banded Leafroller *Choristoneura rosaceana*	OBLR	0	26	0	157	3	273	0	0
Red banded Leafroller *Argyrotaenia velutinana*	RBLR	0	0	0	0	0	0	0	0
Orange Tortrix *Argyrotaenia citrana*	OT	0	0	0	0	0	0	0	0
Threelined Leafroller *Pandemis limitata*	TLLR	0	0	0	0	0	0	0	0
Tufted Apple Budmoth *Platynota idaeusalis*	TABM	0	0	0	0	0	0	0	0
Oriental Fruit Moth *Grapholitha molesta*		4	4	12	11	0	87	62	5
Garden Tortrix *Clepsis peritana*		14	1053	1	1362	85	32	5	2
Commophila umbrabsana		0	0	0	0	0	0	0	231
Macrotheca sp. (Pyralidae)		364	2	638	1	0	0	0	0

[1/] One trap of each pheromone type at the following locations: Kearney Agricultural Center, Parlier; 4 mi. N. Reedley; Visalia; and 6 mi. E. Visalia (Kaweah Oaks), Calif.

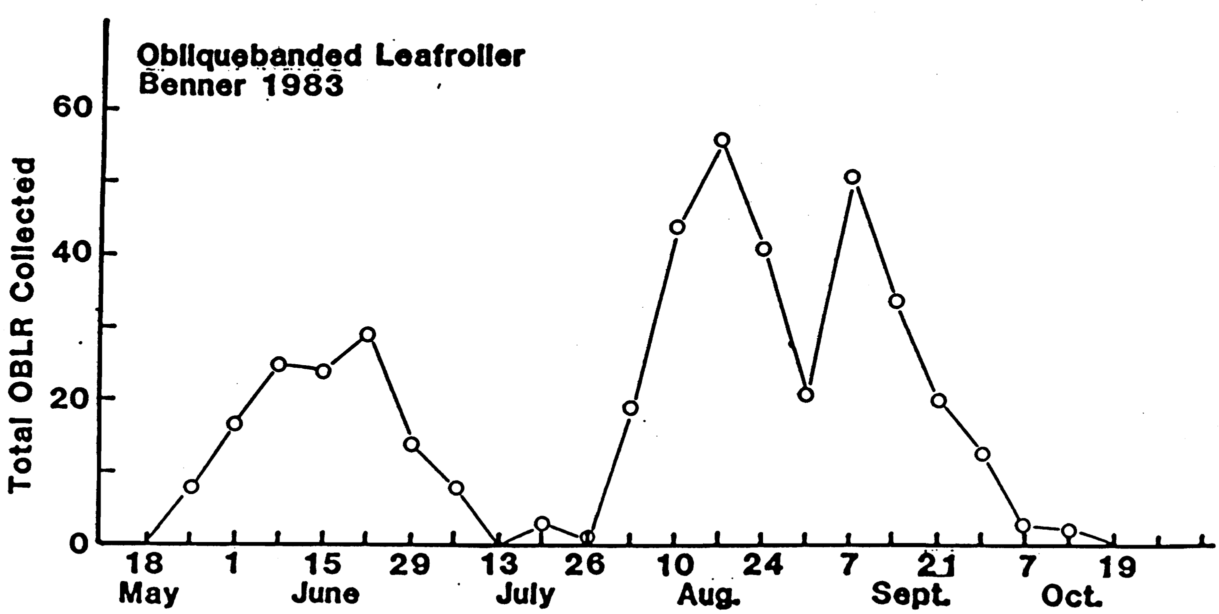

Fig. 6. Seasonal flight activity of the obliquebanded leafroller, *Choristoneura rosaceana*, in a plum orchard 4 mi. N. of Reedley, Fresno Co., Calif., 1983.

IV. Experimental Miticide Efficacy Trials

The experimental pyrethroid FMC 54800 was evaluated as a miticide and compared to Plictran and Pydrin on mature cling peaches at Parlier. Materials were applied by handgun at 400 gpa on 25 July 1983. Post-treatment counts (Table 13) showed rapid knock-down and good control of 2-spotted mites with Plictran through 90 days, with relatively good recovery and long-term survival of Phytoseiid (Metaseiulus occidentalis) predator mites. FMC 54800 also gave good initial knock-down and control of 2-spotted mites up to 7-14 days, but population resurgence was severe from 21 through 98 days. There was no recovery of Phytoseiids in 54800 treatments through 98 days post-treatment. Six-spotted thrips were able to re-invade FMC 54800 treatments at low levels, but apparently could not build strong populations even in the presence of high prey populations. This material showed very little impact on eriophyid mites.

Table 13. TETRANYCHUS URTICAE
MITICIDE EFFICACY TRIAL - PEACHES
PARLIER, CALIF. 1983 1/

MITICIDE	RATE - LBS. A.I./ACRE	PRE-TRTMT.	AVG. NO. MITES/LEAF — DAYS POST-TREATMENT 3	7	14	21	28	35	70	98
CHECK	--	7.8	16.7	26.9	45.5	21.5	1.7	0.8	.04	2.4
PLICTRAN 50 W	1.0	8.3	0.7	0.2	0.5	1.4	1.8	1.1	0.3	1.2
FMC 54800 2 E	.04	3.3	0.1	1.5	4.7	36.3	83.6	134.6	40.1	48.0
FMC 54800 2 E	.06	6.1	0	0.6	2.6	23.3	57.6	124.5	64.8	71.0
FMC 54800 2 E	.08	4.9	0.1	0.1	2.2	13.7	57.6	114.8	74.6	74.9
PYDRIN	.15	3.0	2.7	8.7	22.3	101	122	112.3	6.7	31.7

1/ HANDGUN APPLICATION @ 400 GPA; 25 JULY 1983.

PHYTOSEIIDAE
MITICIDE EFFICACY TRIAL
PARLIER, CALIF 1983

MITICIDE	RATE - LBS. A.I./ACRE	PRE-TRTMT.	AVG. NO. MITES/LEAF — DAYS POST-TREATMENT 3	7	14	21	28	35	70	98
CHECK	--	3.4	1.5	1.4	1.4	2.5	2.1	1.4	0.2	0.5
PLICTRAN 50 W	1.0	2.6	0.2	0	.03	0.1	0.2	0.3	0	0.2
FMC 54800 2 E	.04	2.3	.03	0	0	0	0	0	0	0
FMC 54800 2 E	.06	2.0	0	0	.03	0	0	0	0	0
FMC 54800 2 E	.08	2.2	.03	0	0	0	0	0	0	0
PYDRIN	.15	3.1	0.1	0	0	0	0	0	0	0

V. Phenology of San Jose Scale on Selected Hosts

Relative population densities of San Jose scale (SJS) were measured on 6 *Prunus* species in an unsprayed mixed block of stonefruits at Parlier during 1983. The host tree types were French prune, *Prunus domestica*; Tilton apricot, *P. armeniaca*; Bing cherry, *P. avium*; Nonpareil almond, *P. amygdalus*; Laroda plum, *P. salicina*; and Late Le Grand nectarine, *P. persica* var. *nectarina*. An SJS pheromone trap was placed in each of two trees of each host type, and two 3/4 in. wide sticky tape traps were placed in each of four trees of each type. Tapes and pheromone traps were serviced, and collected male scale and crawlers counted twice weekly from March 1 through December 16, 1983.

First male scales were collected in pheromone and tape traps on either March 8 or 9 in all six host types. Throughout the remainder of the season there were no significant differences or deviations among the 6 species in initial or peak male flight activity in any of the four distinct male flights. With the exception of the fourth flight collections in prunes and nectarines, male scale densities increased with each successive generation through the season (Table 14). There were variations between host types in numbers of flying males collected in pheromone traps, but these differences were not statistically significant.

In marked contrast to the numbers of males collected in the pheromone traps, there were highly significant differences in numbers of male scale collected on the sticky tape traps among the different host types (Table 15). These data showed the highest numbers of males on tapes in the nectarine, prune, and plum hosts, with significantly lower numbers in almonds, cherries, and apricots. Crawler counts on apricots were almost undetectable throughout most of the season.

These differences in male collections on tapes vs. pheromone traps suggest that high numbers of males are flying at random in the orchard and responding to the pheromone traps, but that all host tree types do not produce equivalent numbers of scale.

In general, collections of crawlers on sticky tapes (Table 16) tended to agree with the relative numbers of males collected on the sticky tapes. The highest numbers of crawlers were trapped in plums, prunes and nectarines, while apricot had the lowest numbers of crawlers. In comparison to almonds, cherries had a fairly high number of crawlers, reversing their relative ranking based on male scale collections on the tapes. The crawler data confirms the hypothesis that the pheromone traps do not accurately reflect relative host population densities when the different host types and pheromone traps are in close proximity (ca. 20-25 ft.) to one another.

Table 14. Collections of Male San Jose Scale on Pheromone Traps in Selected *Prunus* Host Trees. Parlier, Calif. 1983.[1/]

		No. Male Scale Per Flight					
Host Type	Variety	1st	2nd	3rd	4th	Total	$\bar{X}$
Prune	French	215	993	1057	969	3234	808.5
Apricot	Tilton	32	302	945	1168	2247	611.8
Almond	Nonpareil	72	439	853	926	2290	572.5
Cherry	Bing	29	388	686	1133	2136	534.0
Plum	Laroda	90	357	506	1056	2009	502.3
Nectarine	Late Le Grand	38	240	699	622	1599	399.8

1/ 2 pheromone traps per host type

Table 15. Collections of Male San Jose Scale on Sticky Tapes in Selected Host Types. Parlier, Calif. 1983.1/

Host Type	Variety	No. Male Scale per Flight 1st	2nd	3rd	4th	Total	$\bar{X}$
Prune	French	559	137	121	35	852	213.0
Apricot	Tilton	10	5	13	3	31	7.8
Almond	Nonpareil	317	39	59	16	431	107.8
Cherry	Bing	218	37	36	24	315	78.8
Plum	Laroda	425	98	196	56	775	193.8
Nectarine	Late Le Grand	824	52	95	76	1047	261.8

1/ 8 sticky tapes per host type

Table 16. Collections of San Jose Scale Crawlers on Sticky Tapes in Selected *Prunus* Hosts. Parlier, Calif. 1983.1/

Host Type	Variety	No. Crawler Per Generation 1st	2nd	3rd	4th	Total	$\bar{X}$
Prune	French	5300	2679	2143	1339	11,461	2865.3
Apricot	Tilton	8	1	1	1	11	2.8
Almond	Nonpareil	497	116	102	41	756	189.0
Cherry	Bing	1070	555	1025	141	2791	697.8
Plum	Laroda	11,670	10,135	5879	1604	29,288	7322.0
Nectarine	Late Le Grand	5290	1091	3241	782	10,404	2601.0

1/ 8 sticky tapes per host type

VI. Phenology of the Omnivorous Leafroller in Tree Fruits

Male populations of omnivorous leafroller (OLR) were monitored with pheromone traps in 4 orchards during 1983. Due to the volume of data, and computer down-time, these data have not been completely analyzed for D° comparisons between flights and/or locations. For comparative purposes, however, the flight curves for each location are attached (Figs. 7-10).

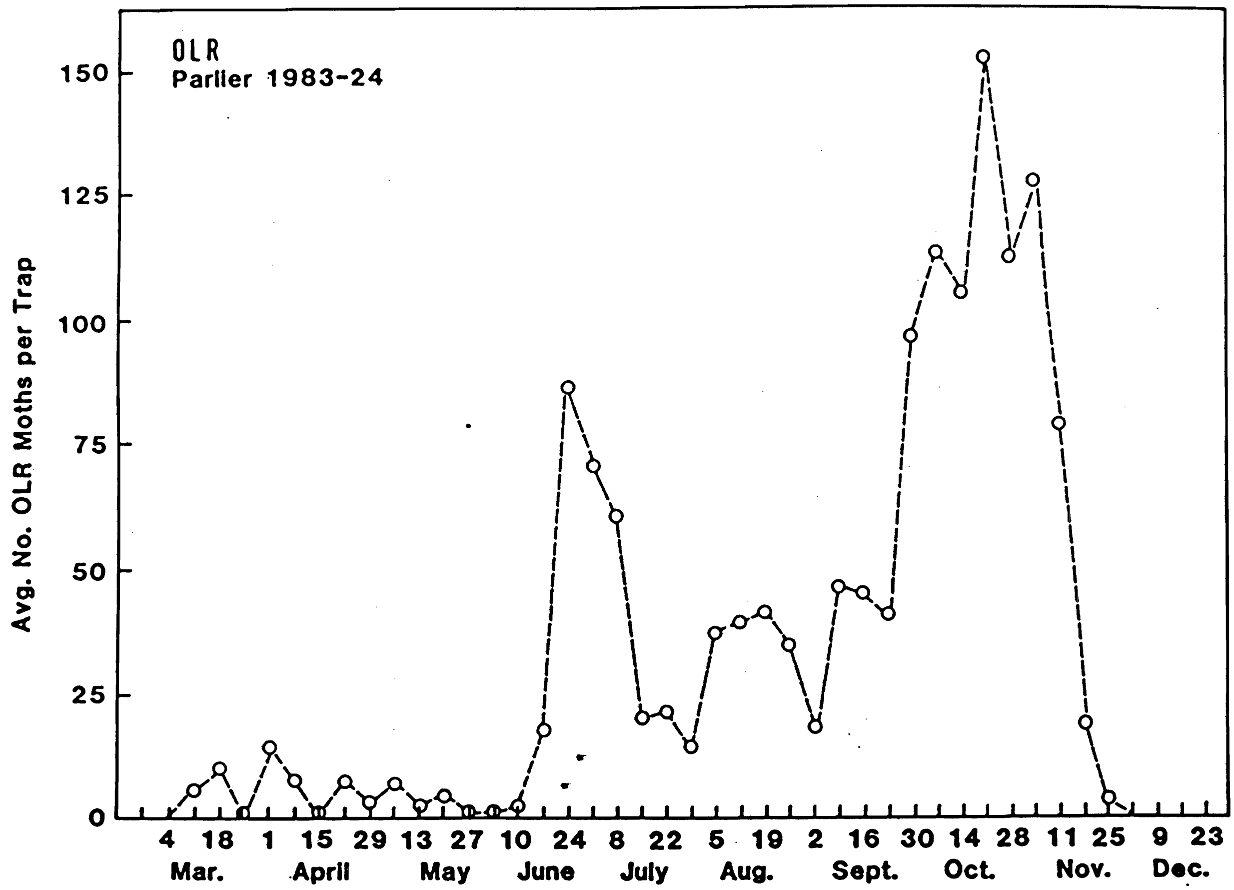
OLR
Parlier 1983-24
150
125
100
75
50
25
0
Avg. No. OLR Moths per Trap
4 18 1 15 29 13 27 10 24 8 22 5 19 2 16 30 14 28 11 25 9 23
Mar. April May June July Aug. Sept. Oct. Nov. Dec.

Fig. 7

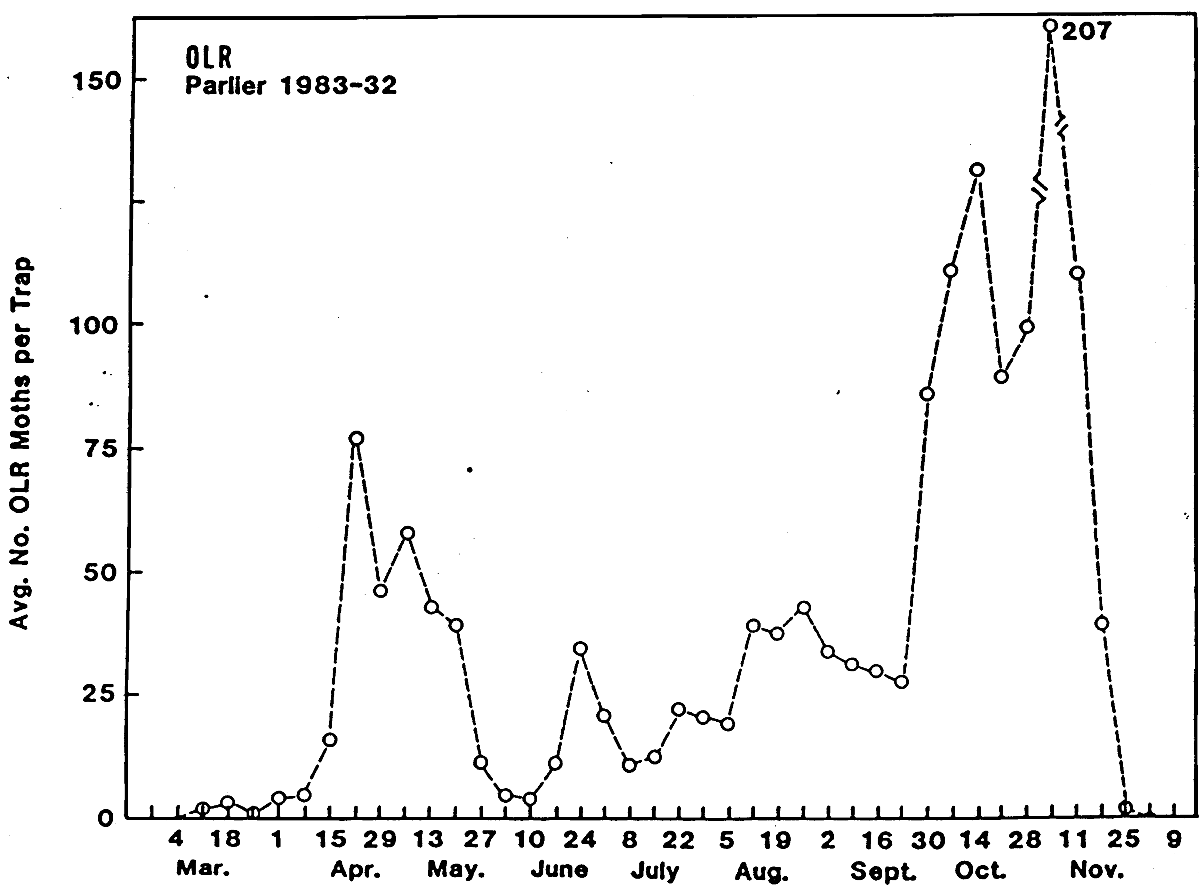
OLR
Parlier 1983-32
207
150
100
75
50
25
0
Avg. No. OLR Moths per Trap
4 18 1 15 29 13 27 10 24 8 22 5 19 2 16 30 14 28 11 25 9
Mar. Apr. May. June July Aug. Sept. Oct. Nov.

Fig. 8

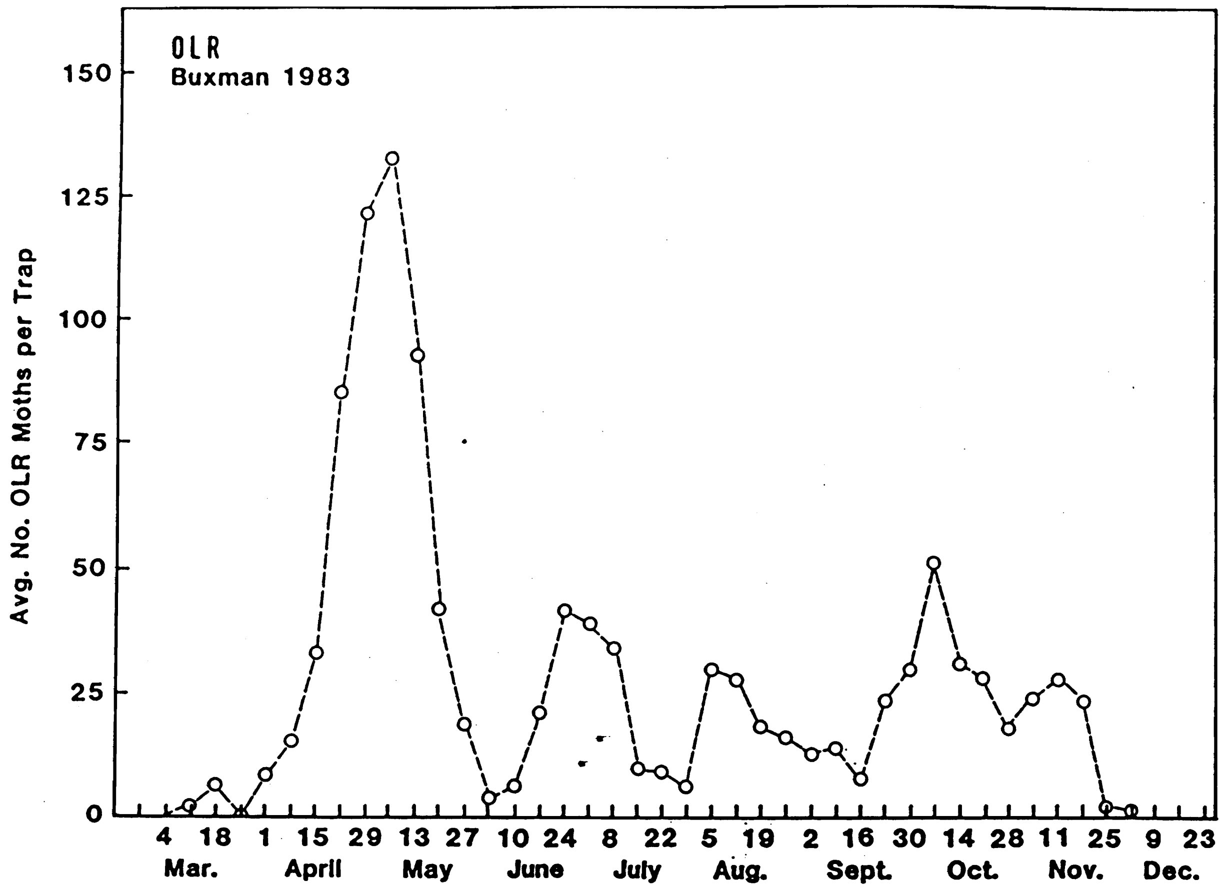
OLR
Buxman 1983
Avg. No. OLR Moths per Trap
150
125
100
75
50
25
0
4 18 1 15 29 13 27 10 24 8 22 5 19 2 16 30 14 28 11 25 9 23
Mar. April May June July Aug. Sept. Oct. Nov. Dec.

Fig. 9

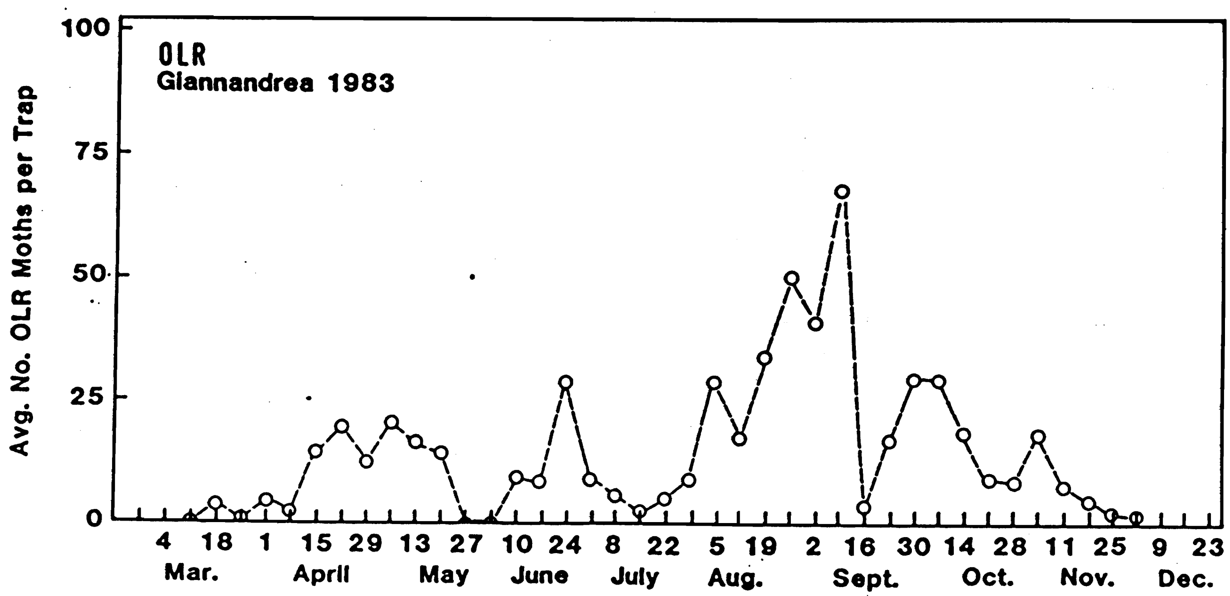
OLR
Giannandrea 1983
Avg. No. OLR Moths per Trap
100
75
50
25
0
4 18 1 15 29 13 27 10 24 8 22 5 19 2 16 30 14 28 11 25 9 23
Mar. April May June July Aug. Sept. Oct. Nov. Dec.

Fig. 10

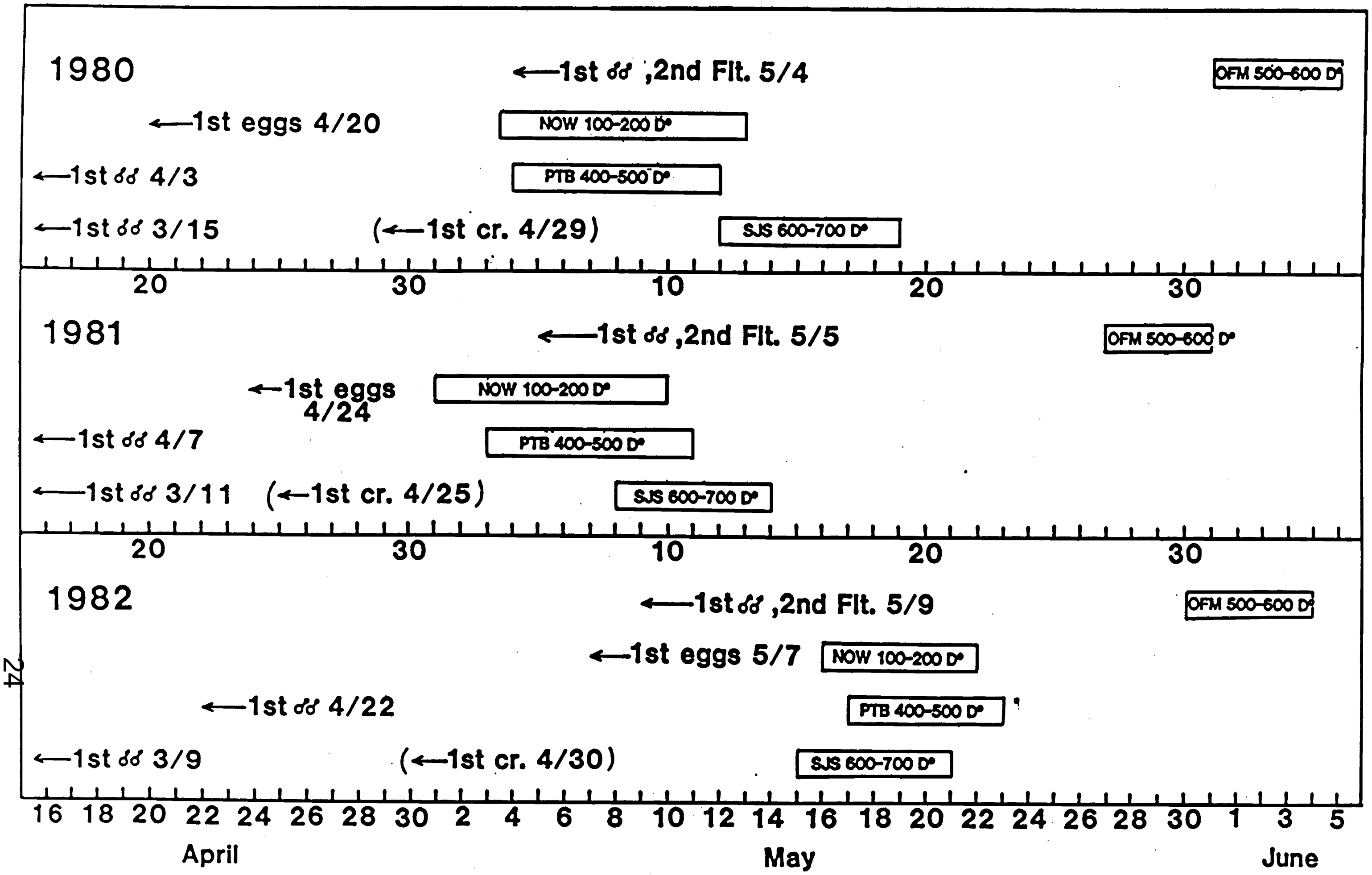

Fig. 11

SYNCHRONY OF OPTIMUM SPRAY TIMING FOR SEVERAL EARLY SEASON PESTS OF DECIDUOUS FRUITS AND NUTS

The graph above indicates the observed optimum spray timing for peach twig borer (PTB), San Jose scale (SJS), navel orangeworm (NOW) and oriental fruit moth (OFM) for the years 1980-82 at the Kearney Agricultural Center, Parlier. These timings were calculated from phenology model day-degree data for each species. For each year and species, the model biofix point is indicated (e.g. 1980, PTB 1st male flight April 3), followed by a bar representing the calendar period spanning the recommended timing at optimum day-degrees after the biofix (PTB 400-500 D° > biofix). Note that the OFM biofix is for the second OFM male flight each spring, not the first flight. Also, if sticky tapes are used to monitor and biofix SJS crawlers, the optimum day-degree accumulation for crawlers is 400 D° less than a biofix using male scale flight (e.g. crawler timing = 200-300 D°, not 600-700 D°).

These data show the synchrony of species to each other, and also the variation in timing from one season to the next. Note the shift in SJS timing in 1982 compared to PTB and NOW in 1980 and 1981.

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RER 11-28-83 1/2 M