siderable toxicity, substantiating the results obtained in 1946. Emulsified IN4200 by itself showed some toxicity but not enough to yield a good commercial control in one application. When this material was used in conjunction with HETP and TEPP the efficiency was greater than when these phosphates were used alone (see also table 6). The addition of the wetting agent B1956 to the mixture of TEPP and IN4200 increased the efficiency considerably.

No plant injury occurred in any of these plots except the one sprayed with 899 at two quarts per 100 on vineyard No. 3. This vineyard was suffering from lack of water. This material at the same concentration did not injure the vines in vineyard No. 4 which had sufficient moisture. When two pounds of 15% wettable parathion powder were used with two quarts of 899 on vineyard No. 3, no damage to the vines occurred. The powder may have absorbed the 899 and prevented it from penetrating the leaves in toxic quantities.

It is known that ethyl phosphate sprays are relatively nontoxic to red spider eggs. Consequently, two applications are necessary to effect a satisfactory control. The second application must be timed to kill the young mites which hatch after the first spray and they must be killed before they become adults and in their turn produce eggs. Under normal summer weather conditions the egg stage lasts about three days and the immature (nymphal) stages last about nine days. Therefore the second application should be from four to nine days later than the first.

TEPP and HETP were tested in double applications on vineyard No. 4 and counts were made as described earlier. Leaves from check vines averaged 588.3 mites per leaf at the time of the count of the first application. The results are given in table 6.

The data in table 6 show that when

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TABLE 5

Phosphate Compounds on Pacific Mite on Grapes

Material	Amount per 100 gallons	Ave. no. of live mites per leaf	Per cent reduction
Parathion 899 Vatsol K	2 lb. of 15%... 2 quarts..... 2 oz.	0.0	100.0
Parathion	2 lb. of 15%	0.2	99.95
TEPP B 1956 IN4200	4 oz. 4 oz. 1 pint	4.8	99.06
TEPP IN4200 Duponol OS	2.6 oz. 1 pint .03 pint	7.4	98.56
899 Vatsol K	2 quarts 2 oz.	8.5	98.35
Parathion	1 lb. of 15%	14.7	97.14
HETP 100% IN4200 Duponol OS	½ pint 1 pint .03 pint	27.2	94.71
IN4200 Duponol OS	1 pint .03 pint	38.0	92.62
HETP 50%	1 pint	40.8	92.07
Check	none	514.6	.....

Aphids, Mites on Pears, Prunes

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Harold Madsen — *Research Assistant in Entomology*

POST HARVEST APPLICATIONS were applied October 14 in an experimental plot of large Smith Cider apple trees heavily infested with woolly apple aphid, using the following materials and dosages. Counts of living aphids on ten sucker growth shoots from each plot were made seven days after spraying.

Parathion gave the most remarkable control of woolly apple aphid yet observed and is most promising for the solution of this problem.

TABLE 1

Control of Woolly Apple Aphid

Materials	Dosage per 100 gals.	Number living aphids on 10 twigs
HETP 90% emulsion	¾ pint	278
Parathion 15% wettable	¼ pound	185
Parathion 15% wettable	½ pound	7
Parathion 15% wettable	¾ pound	0
Parathion 15% wettable	1½ pounds	0
Check unsprayed		5,840

In a randomized experimental plot of Bartlett pears on the Sacramento River in which nine of the most promising miticides were employed, HETP and parathion were included in the control of European red mite and the two-spotted mite. The complete program included spray applications on June 9, June 27, July 15, and August 15.

HETP (50%) at a dosage of one pint per 100 gallons was used in the June 9 application but the resulting injury to foliage and fruit precluded its further use in the program. Counts of adult mites on 100 leaves before and after the June 9 application on trees sprayed with HETP, are given in table 2.

The build up in the population of Eu-

TABLE 2—Control of Mites with HETP

	June 9 spray		
	June 5	June 12	June 26
European Red Mite	150	0	224
Two-spotted Mite	90	4	31

TABLE 3—Counts of Adult Mites on 100 Leaves from Trees Sprayed with One Pound of 15% Wettable Parathion per 100 Gallons

	July 15 spray	
	July 14	July 18
European Red Mite	172	18
Two-spotted Mite	62	0
	August 15 spray	
	Aug. 14	Aug. 22
European Red Mite	78	3
Two-spotted Mite	175	13

ropean red mite would indicate that this material does not sufficiently control this mite. The control of the two-spotted mite was somewhat better but would require frequent applications.

Parathion (15% wettable powder) was not received early enough to be included in the early mite sprays but was used over the more critical period of mite control (July 15 to August 22). It was applied at a dosage of one pound per 100 gallons in the last two sprays (July 15 and August 15) on a plot showing poor control from previous applications.

For a period of thirty days during the period of high temperatures and heavy mite attack it held the populations of both mites so as to prevent foliage injury. This material was the only one of the nine materials tested in 1947 that prevented a marked build up in mite populations during the late season.

TABLE 4

Control of the Pear Bud Mite

Materials	Dosage per 100 gals.	Per cent mortality
HETP—50%	1 pint	93
Lauryl thiocyanate	1½ pints	97
BHC 6% gamma	4 pounds	18
Parathion 15%	3 pounds	42

In a block of Bartlett and Hardy pears, sprays were applied September 11 and September 29 for the control of the pear bud mite which was under the first scales of the fruit buds. Counts were made under the binocular two weeks following the applications, and the results are given in table 4.

In the control of bud moth larvae of prunes a post harvest application of a number of insecticides were applied September 4. Subsequent counts showed the following mortality percentages.

Per 100 gallons:	Per cent mortality
4 pounds Basic Lead Arsenate	18
2 pounds 50% wettable DDT	54
2 pounds Genicide A	33
4 pounds BHC (6% gamma)	15
1½ pounds parathion (15%)	100

It was noted that all larvae within the hibernaculae at this time were killed by the parathion and further experimental tests were made (October 21) at dosages from one half to two pounds. Counts were made at one and four weeks after the application. The percentage mortality as given is after allowances were made for natural mortality. The results are given in table 5.

In a prune orchard heavily infested with brown apricot and black scale, applications of 15% parathion were applied (November 11) at several dosages, and counts were made under a binocular of the scale found on 10 twigs from each tree, at weekly intervals, following the

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Melon Insects and Mites

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HONEYDEW MELONS are subject to the attacks of several very important insects and mites. Until the advent of parathion, none of the recently developed insecticides offered too much promise in the control of all the harmful pests on melons. In fact, the use of DDT will frequently cause an increase of mites and aphids and as a result, must be used with a great deal of caution.

An opportunity to treat a small plot of Green Flesh Honeydew melons was presented during 1947 on a ranch at Woodland. The plot was a three-acre portion of a 65-acre melon field. Three pounds of a commercial 15% wettable parathion material in 100 gallons of water were used per acre. It was applied on August 27, 1947 by means of a homemade spray rig equipped with 38 nozzles on a 36 foot boom. The machine developed a maximum pressure of only 60 pounds per square inch.

The plot was not replicated. An adjacent untreated portion of the field was used as a check.

Comparative figures on the abundance of aphids, leafhoppers, and mites were obtained by examining at each survey from 10—65 leaves. It was arbitrarily decided to consider as infested all leaves with a visible population of mites, aphids, or leafhoppers.

Counts were made at weekly intervals in both the treated and untreated plots.

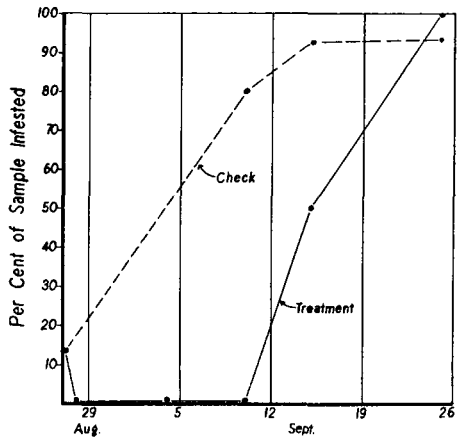
Population counts in the treated and untreated portions of the field are presented in figures 1, 2, and 3. At the end of 14 days the leaves in the sprayed plot were free of aphids—*Aphis gossypii*—while in the check, 80% of the leaves were infested. Two weeks later, however, the population in the treated portion surpassed that in the check plot.

Parathion held the leafhoppers—*Empoasca* sp.—under excellent control for seven days but after 19 days they increased to a 46% infestation as compared to 87% in the check. The first stages to appear were young nymphs, indicating either a lack of ovicidal action or else an incomplete coverage by the spray.

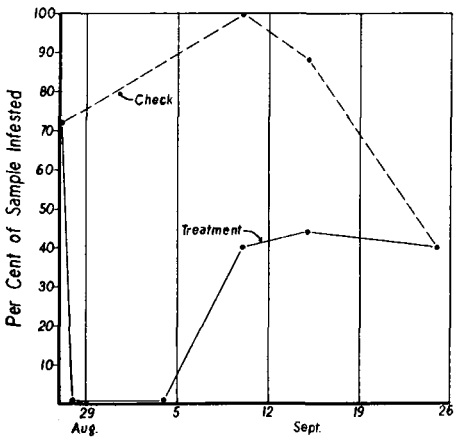
All moving forms of mites—*Tetranychus pacificus, Pacific mite and Tetranychus bimaculatus, Two-spotted mite*—were apparently killed as indicated in figure 3, but the population began to increase immediately after the first day and over 90% of the leaves were infested after 28 days. The first mites to appear after treatment were in the nymphal stage of development.

Predators and parasites were almost completely eliminated from the treated plot but maintained an increasing population in the check.

No harmful effect on the plants or fruit was noted. The grower thought he detected a more luxuriant growth at first in the treated plot two weeks after application, but later no difference could be noted.



Trend of the aphid population following spraying with parathion.



Trend of the leafhopper population following spraying with parathion.

It was apparent that the spray rig used was not adequate to give a coverage on the undersides of the leaves and it is felt that this in a large measure explains the rapid increase of mites and leafhoppers. As previously noted, the first stages of these to appear were the immature forms. A contributing factor also may have been the marked reduction of predators and parasites in the treated plot.

A second experiment using parathion at the same concentration and rate of application was performed at Patterson. Application was made from a power rig using two hand guns with double nozzles. Although the application was uneven, the

in a 10 ml. aliquot part of each. The average number of nematodes per treated bud was 148 as compared with 656 nematodes per bud in the untreated buds. These counts are comparable to the averages recorded in table 2.

The row that had received two applications of parathion was resampled December 31, 1947, 48 days after the last spray application. The results of these counts are recorded in table 3.

TABLE 3

Number of A. Fragariae per Leafbud 48 Days after Strawberries Were Sprayed with Parathion

Bud No.	Unsprayed		Sprayed
	Sample 1	Sample 2	
1	8	2320	0
2	6920	170	3
3	1800	300	680
4	240	141	0
5	0	1700	2
6	3270	2920	0
7	1450	3480	5
8	2800	0	855
9	60	1300	7920
10	20	280	17
Average per bud	1656	1261	948

The results obtained in these preliminary tests indicate that parathion is toxic to the strawberry spring dwarf nematode, *Aphelenchoides fragariae*, when applied as a spray in the field. Observations made during examination of the bud samples showed that parathion applied as a wettable powder in water kills the nematodes in partly opened buds. In nearly all instances in which large numbers of live nematodes were present in sprayed buds it appeared that the buds were tightly closed at the time the spray was applied. Further investigations with parathion in various spray formulations will be necessary before definite conclusions can be made regarding the actual effectiveness of this material as a control for *A. fragariae* on strawberries. The results obtained in the present experiments are not considered satisfactory, and parathion should only be applied experimentally for nematode control until sufficient data are available to permit accurate evaluation of its effect on nematodes and strawberry yields.

A study of the trend of salinity under the influence of irrigation, differential cropping and different climatic conditions, as well as an investigation of the trend of salinity in the ground waters of the South Coastal Basin is underway in the Division of Soils and Plant Nutrition, Riverside.

OLIVE SCALE

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AR60 were used a condition intermediate between the two previously described treatments had resulted.

Although the treatment of four pounds of 15% parathion showed 18% of the olives to be infested, the degree of infestation was very light so that few, if any, of the olives would have been culled out because of scale spots.

On August 8, 1947, two Mission olive trees near Fresno were sprayed with four pounds of 15% parathion per 100 gallons. A power sprayer was used. At the time of application there were many immature stages present though many of the scale had not yet completed oviposition. The fruit was already nearly 100% infested. Examinations were made on September 4, 1947, and again on January 7, 1948. In November, 1947, all the fruit showed purple spots due to scale infestation. The results are summarized in table 4.

From these experiments it would appear that HETP holds little promise for control of olive scale. On the other hand, parathion appears very toxic to olive scale eggs and young. While slow in action, it is also toxic to adult female scale. A great deal more work is needed to determine dosages, affect of high temperatures on the reaction of parathion on both scale and trees, persistence of residue, and penetration into olive fruit.

APHIDS

Continued from page 6

spray application. Many of the brown apricot scale were apparently affected by the spray but remained alive for two to three weeks before dropping off or drying up. The black scale (in a more advanced stage) were not so affected. Results are given in table 6.

TABLE 5

Control of Bud Moth Larvae in Hibernaculae

Dosage of 15% parathion per 100 gals.	Per cent mortality	
	Oct. 28	Nov. 25
½ pound	66	93
1 pound	82	100
2 pounds	96	100

TABLE 6

Control of Brown Apricot and Black Scales Per Cent Mortality

Dosage 15% parathion per 100 gallons	Brown Apricot Scale, weeks after spraying			
	1	2	3	4
½ pound	5	..	..	33
1 pound	6	..	76	92
2 pounds	4	13	88	100
3 pounds	8	23	94	100

Dosage 15% parathion per 100 gallons	Black Scale, weeks after spraying			
	1	2	3	4
½ pound	7	..	..	7
1 pound	6	..	10	12
2 pounds	7	8	17	..
3 pounds	5	10	27	30