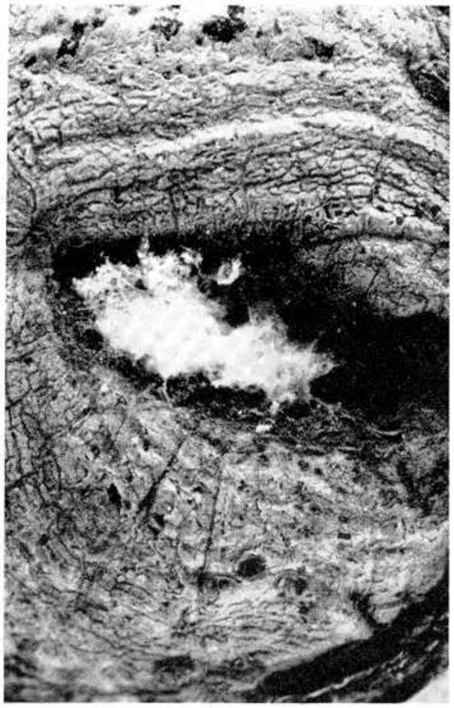

Overwintering colony of grape mealybug—on apricot tree.

Mealybug on Apricot

old pest of grapes and pears is causing new control problem for apricot growers

Harold F. Madsen and Lester B. McNelly

Damage to apricots by mealybugs is a relatively new problem as it was not reported prior to 1956. The species involved has been identified as the grape mealybug—*Pseudococcus maritimus* (Ehr.)—a common pest of grapes and pears.

The damage caused to apricots by the mealybugs is mainly due to the excretion of honeydew. Colonies are formed in the depression around the stem end of the fruits and the honeydew produced runs over the sides of the apricot. The black smut fungus which grows in the honeydew gives the fruit an unsightly appearance. In addition, the honeydew gives the fruit a reddish tint. As apricots are picked relatively ripe, it is not possible to remove the honeydew by the normal washing procedure. The fruit is not suitable for fresh shipment, and processors of unpeeled halves consider the contaminated fruit as culls.

The detailed biology of the grape mealybug on apricots has not been determined, but the general life history is known. The mealybugs overwinter as crawlers within a white cottony egg mass deposited by adult females. These egg masses are found on the trunk and main limbs of the tree, in protected places, such as cracks and depressions in the bark. In spring, shortly after the tree blooms, the crawlers become active, and leave their overwintering quarters. The crawlers usually congregate at the base of young shoots at this time, apparently feeding upon the tender tissue. The crawlers reach maturity by May, and the females deposit eggs in the cracks of the bark. The eggs hatch, and crawlers of the second generation move to both foliage and fruit during June and early July. It is at this time that the mealybugs colonize around the stem end of the fruit.

Apricots are usually harvested in July, and after the fruit has been picked the mature mealybugs crawl back to the main limbs and trunks to deposit eggs. The eggs hatch by September, but the crawlers remain within the old egg mass until the following spring.

1957–1958 Fall, Winter, and Spring Plots for the Control of Mealybugs

Material	Dosage /100 gallons	Reduction of crawlers Oct. 17, 1957 %	Reduction of crawlers Jan. 28, 1958 %	Infested fruit at harvest June 26, 1958 %
Fall Sprays[1]				
Light medium oil + Malathion	2 gal. + ½ pt. 50%	26.1	...	10.2
Light medium oil + Trithion-EK	2 gal. + ½ pt. 50%	80.0	...	7.0
Light medium oil + Phostex	2 gal. + 1 pt. 8.0 conc.	60.6	...	6.9
Light medium oil + Parathion	2 gal. + 1 lb. 25%	82.1	...	4.6
Check	No treatment	...	...	15.7
Winter Sprays[2]				
Dormant oil + Diazinon	2 gal. + 1 lb. 25%	...	85.8	1.3
Dormant oil + Trithion-EK	2 gal. + ½ pt. 50%	...	65.8	3.3
Dormant oil + Phostex	2 gal. + 1 pt. 8.0 conc.	...	50.5	5.6
Dormant oil + Parathion	2 gal. + 1 lb. 25%	...	81.1	1.6
Check	No treatment	...	...	13.0
Spring Sprays[3]				
Sevin	1½ lbs. 50% wettable	...	...	7.1
Trithion	½ pt. 50% flowable	...	...	4.3
Diazinon	1 lb. 25% wettable	...	...	2.0
Parathion	1 lb. 25% wettable	...	...	0.6
Check	No treatment	...	...	14.0

[1] Applied September 17, 1957. [2] Applied January 7, 1958. [3] Applied March 27, 1958.

Control Experiments

An apricot orchard with a history of damage from mealybugs was selected for spray trials. Plots were established in the orchard in the fall of 1957, and were continued through the 1958 season. The portion of the orchard used for the trials was divided into three sections, designated as *A*, *B*, and *C*. Each section was treated at a specific time of the year, and received no other insecticide treatments. Three different timings of sprays were used, the first during the fall, the second during the winter, and the third at the petal fall stage in early spring. The fall and winter sprays were directed against the overwintering crawlers, and the petal fall spray was applied when the crawlers emerged from their overwintering sites. Within each section, the individual treatments were applied to four trees with three replications in a randomized block design.

The fall treatments were applied to Section *A* on September 15, using four different phosphate compounds in combination with light medium oil. Materials were applied with a conventional high pressure spray rig with hand guns. An average of 550 gallons was applied per acre.

On January 7, the winter sprays were applied to Section *B*. Phosphate compounds were again used, and were com-

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MEALYBUG

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bined with dormant oil. The same spray equipment was used, and an average of 600 gallons was applied per acre.

With the fall and winter sprays, an attempt was made to determine the percentage kill of crawlers by removing the overwintering cottony egg sacs from the limbs and trunks of the trees. They were brought to the laboratory and examined under a binocular miscroscope in order to determine the number of living and dead crawlers. The plots were finally evaluated by counting the number of damaged fruits at the harvest period in late June.

In Section *C*, the petal fall treatments were applied on March 27. Continuous rains during late February and early March prevented spray applications and the timing of this treatment was late. The inclement weather also affected the mealybugs, as no activity was observed prior to mid-March. The materials used at the petal fall stage were applied without oil, and an average of 650 gallons was applied per acre.

All plots, fall, winter, and spring, were checked for the presence of mealybugs on the fruit at harvest. Six hundred fruits were examined per treatment, and fruit was picked at random from the trees. The fruits with mealybug present, or those showing honeydew and black fungus, were recorded as infested.

In general, the fall and winter treatments were less effective than the spring sprays. The mealybug crawlers are well protected, not only by their location, but by the waxy fibers in the old egg sac, and it is virtually impossible to wet all the colonies. The fall treatments were not as effective as the winter, probably because the presence of foliage made it difficult to obtain bark coverage. The fall and winter counts of crawler mortality did not correlate well with the final fruit counts. The technique of examining colonies was not too feasible, as the number of living mealybugs depended upon how well the colony was protected by the bark. It was not possible to select colonies with the same degree of protection. It was possible, however, to eliminate some materials that did not effectively control the crawlers. As an example, malathion gave a very poor kill in the fall spray, and therefore that material was not used during the winter or spring.

Of the compounds used, parathion and Diazinon gave the best control, regardless of the timing of treatments. Trithion, Phostex, and Sevin, although reducing fruit damage below that of the checks, did not compare with either parathion or Diazinon.

None of the sprays caused any serious phytotoxic effects to the trees, although the fall sprays in combination with oil caused a little foliage damage. These results are preliminary and additional plot work is planned for the 1959 season. It may be possible that treatments more closely timed to the first or second generation will give better control. With present knowledge, a petal fall spray of either parathion or Diazinon seems the most feasible method of control.

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PINE ROOTS

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were removed from the water baths and the seedlings carefully washed from the sand. The new roots, which had just started to harden—but could be recognized as new roots—were counted and those 0.5″ and longer were measured. The air temperature in the greenhouse did not fall below 68°F at night and with but few exceptions did not exceed 95°F during the day. Thus the seedling roots were exposed to a constant temperature, an abundant supply of moisture and nutrients, and the top was exposed to a varying air temperature and a changing photoperiod.

The 1956–57 series was handled in the same fashion except that sponge-rock was substituted for the sand.

Findings

Seedlings from Zone V seed grown at the Mt. Shasta Nursery behaved differently than seedlings from Zone III seed grown at Placerville, although both groups showed a pronounced seasonal periodicity in root elongation and root initiation when transferred at monthly intervals to the greenhouse. Root elongation on seedlings from both zones occurred from September through May and was absent, or of a limited nature, from June through August with the peak occurring on Zone V seedlings in May and on Zone III seedlings two months earlier in March. Some root initiation was evident from September to June but was prominent on Zone V seedlings only during April and May and on Zone III seedlings only from December to May.

The seasonal ability to initiate roots might on occasion be an important factor in determining the relative ability of fall and spring planted seedlings to survive. In the process of lifting, storing, shipping, and planting a number of the short laterals are destroyed. If it is a spring lifted seedling it will readily regenerate a number of new laterals some of which will then rapidly elongate; if lifted in the fall few if any new laterals will be formed.

Although Zones III and V stock showed significantly different behavior the difference must be interpreted with caution. Obviously, different lots of two year old ponderosa pine seedlings can be expected to perform differently when field planted. However, whether or not the difference in these two particular lots was due to the seed zone, the climate in which they were grown, the way they were lifted, the kind of temporary storage, the shipping conditions, or some unrecognized factor can not be determined from available data.

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RICE

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along with a conductance value of 4.8 millimhos—just over the saline threshold. Iron sulfate clearly increased yields but production was low regardless of iron treatment. Whether the poor performance was due to high sodium, to high salinity, or to both is not known at present.

Soils where rice fails are calcareous and characterized by a high pH, along with a relatively low salinity. Rice plants die of iron deficiency as seedlings because of low iron-supplying power of the soil, which seems to be associated with high pH under flooded conditions.

The use of ferric sulfate appears an effective means of raising rice production to economic levels on high pH, nonsaline soils which occur as localized spots in many fields in Glenn and Colusa counties. Where high salinity is encountered ferric sulfate treatments may not be expected to be effective until the soluble salt content of the soil is reduced by leaching.

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