

Enemies of Avocado Pests

parasites and predators if protected by sparing use of insecticides will keep avocado pests in check

Blair Bartlett and Paul DeBach

Southern California avocado growers enjoy a singularly fortunate position with respect to insect pests.

Localized outbreaks of some pests may present serious temporary problems to individual growers on occasions, but chronic pest problems such as beset the citrus industry have been largely avoided.

This favorable condition is mainly due to a remarkable array of natural enemies which prey upon the potential pests and destroy them. The latania scale, the long-tailed mealybug, soft-scales—4 spp.—, the omnivorous looper, the avocado brown mite, and the greenhouse thrips all have important natural enemies. Often the combat between natural enemies and avocado pests gets under way long before the pests become prominent and as a result the natural control may pass unsuspected unless something happens to upset the delicate equilibrium of the opposing forces in the early stages of their battle for domination.

Biological control work on avocados attempts first to favor the dominance of natural enemies over pests by introducing new parasites and predators left behind in foreign countries when the pests immigrated to California; and second to guard against catastrophes to the established array of natural enemies that are now present. This dual approach aims at swinging the pendulum even further in favor of biological control and away from the necessity of insecticidal treatment.

There is strong evidence that on avocados, insecticide treatment once initiated can upset the natural balance and develop into a condition of increased necessity for more chemical control applications. With very few exceptions the insecticides commonly used in experimental applications to avocados have shown greater toxicities to the natural enemies than to the pests themselves. This usually causes the pest to flare back unhindered by the retarding effect of natural enemies. Furthermore, some pests formerly of rare occurrence have increased to serious proportions due to the elimination of their natural enemies by insecticides.

These upsets resulting from the use of insecticides do not necessarily mean that insecticides should never be used on avocados. But a grower should weigh carefully the immediate emergency advantages of chemical control with the

possible long-range danger involved in upsetting the balance between natural enemies and the potential pests.

If a fruit crop is seriously endangered and the decision must be made in favor of chemical control, the grower should choose judiciously from those materials which are recognized as less detrimental to natural enemies and make applications at dosages just high enough to save the crop. This may at times even mean choosing materials of only moderate insecticidal effectiveness or of using dosages which will merely partially reduce the infestations without attempting their complete elimination.

If the grower risks elimination of natural enemies for extensive periods of time, he may soon find himself with insecticide control measures calling for increasingly greater insecticide expenditures.

Some of the most commonly used materials on avocados are listed below in order of decreasing hazard to certain natural enemies as determined from standard laboratory tests. The relative hazards indicated are for the dosages specified and high dosages increase and lower dosages decrease the danger. The same principle applies to frequency of application of materials. In general, the list will permit the avocado grower to restrict usage of materials most likely to upset a favorable natural balance.

1. DDT, 50% wettable powder	1½ lbs. per 100 gallons
2. DDD, 50% wettable powder	2 lbs. per 100 gallons
3. Dusting sulfur, 325 mesh	100 lbs. per acre
4. DN dust D-8	100 lbs. per acre
5. Cryolite	3 lbs. per 100 gallons
6. Nicotine sulphate solution 40%	¾ pt. per 100 gallons
7. Neotran, 40% wettable powder	1½ lbs. per 100 gallons
8. Ovotran, 50% wettable powder	1½ lbs. per 100 gallons
9. Aramite, 15% wettable powder	3 lbs. per 100 gallons
10. Zinc oxide	1 lb. per 100 gallons

In addition to the judicious use of insecticides the avocado grower should practice constant ant control. An abundance of ants can be as serious an upset to natural enemies as an insecticide. Ants may be attracted to only certain pests which secrete honeydew, but they are indiscriminate in their attacks on natural

enemies. Hence latania scale may increase in the presence of ants even though it is of no direct interest to the ants.

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NEMATODES

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Growers should exercise every reasonable precaution against introducing plant parasitic nematodes into uninfested land. These should include measures to minimize the possibility of carrying infested soil into a clean area on equipment that might have previously been used on infested soil and the use of planting stock grown in nematode-free soil. The use of resistant rootstocks and soil fumigation is recommended if plantings are being made on land known to be infested with root-knot or root-lesion nematode.

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SCALE

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tis may destroy many scales that would have served as food and home for its progeny. But it can build up rapidly on a high population of scale hosts.

Physcus, on the contrary, is at a disadvantage on high host populations when its per cent of parasitization is low. Under such conditions, the unmated female has to search many purple scales to find a parasitic larva in which to lay its male eggs.

The economic value of *Aphytis* and *Physcus* should be apparent to the citrus grower in coastal areas within three or four years.

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