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Pests of the Avocado

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The avocado grower is indeed fortunate in comparison to the citrus grower in that he is not confronted with the control of a number of such damaging insect and mite pests as occur on citrus. While the avocado is a host for a number of species of insects, the greenhouse thrips and the avocado brown mite are the principal pests that require insecticidal treatment each year. For reason of brevity this discussion will be limited to these two pests.

Greenhouse thrips: The control of greenhouse thrips, **Heliothrips haemorrhoidalis** (Bouche') was formerly accomplished through the use of nicotine sprays. Two treatments applied at an interval of from three to four weeks were necessary. The control program was very expensive and in addition it was not entirely satisfactory. Later studies with pyrethrum extract showed this material to be superior to nicotine, and it was generally used until all supplies of pyrethrum were needed for war purposes. Likewise nicotine became very scarce during the war period and as soon as supplies of DDT became available for agricultural experimentation, studies were undertaken with this material for control of this thrips.

Extensive laboratory studies showed that DDT was very effective against the

greenhouse thrips. The larval stages and also the adults were readily killed with relatively small amounts of DDT applied in dust mixtures, in water suspension sprays of wettable DDT powder and in solution in light grades of petroleum oils or other solvents applied as emulsions in water. The latter preparations using DDT in solution in oil or other solvents killed the eggs that were embedded in the tissue of the peel at the time of treatment. The residue of DDT resulting from each of the above mentioned DDT preparations was effective in killing the thrips for several weeks after the application was made.

Through the splendid cooperation of Dean Palmer, Howard Oldham, and Tom Ballantyne of the San Diego County Agricultural Commissioner's Department, field studies have been conducted using DDT in various spray and dust formulations.

Under the conditions of the tests conducted during the fall season of 1945, one treatment with DDT applied either in solution in a light grade oil spray, as wettable DDT powder suspended in water as a spray, or as a dust containing 5 per cent DDT afforded good control. Kerosene used at 2 per cent and mineral seal grade oil used at 1 per cent each containing as little as one-third (1/3) pound of actual DDT per 100 gallons of spray mixture was effective. Likewise good control was obtained with one-half (1/2) pound of actual DDT in the form of a wettatale DDT powder in 100 gallons of water.

Further field studies with various DDT dust and spray mixtures used in different areas and under varying conditions are necessary before the most effective and economical DDT treatment can be determined.

It is of interest to note that in most instances where DDT has been used on avocados the brown mite population rapidly increased. Also this condition often results when DDT is used on apples, pears, and citrus. Since DDT is not effective against spider mites a possible explanation of the "build up" of the avocado brown mite following the use of DDT is that the natural insect enemies of this mite are killed by the DDT. Fortunately, sulfur is effective in control of the avocado brown mite, and it may be combined with either the wettable DDT spray mixture or the DDT dust mixture. Such combinations have given good control of both the greenhouse thrips and the brown mite.

Considerable study of DDT residue on avocados is being made. The present tentative tolerance set by the Federal Food and Drug Administration is 7 parts of DDT per one million parts of commodity. When DDT is applied as a dust or as a water spray of wettable DDT powder, the amount of actual DDT remaining on the skin of the avocado four to six weeks after application is much less than the 7 parts per million tolerance. With several varieties of avocados that were treated with DDT when the fruit was nearly mature, it was found that some of the DDT had actually penetrated inside. The amount that penetrated was greatest when the DDT was applied in solution in oil sprays. However, analysis several months later showed that most of the DDT inside the fruit had disappeared.

Our studies of the DDT residue are continuing, and we feel optimistic that information will be developed which may enable the safe use of DDT for control of this thrips on avocados. However, until more information is available it is not advisable to use DDT for thrips control except on an experimental basis.

Avocado brown mite: The control of the avocado brown mite, **Paratetranychus coiti** McG., is very simply accomplished through the use of sulfur dust. This mite is one of the most susceptible species of the spider mites to sulfur. It is indeed an interesting fact that highly effective results in control are obtained from sulfur dust even under cool, and often overcast conditions. However, there is an exception to this fortunate circumstance, i.e., in the Santa Barbara locality the control of this mite from the use of sulfur has not always been satisfactory. The reasons for this condition are as yet not fully understood. In this locality the results from the use of DN-111 as a spray or DN dust D-8 as a dust are promising.

Future studies on pests of avocados: With the current expansion of our research activities it is now possible to make thorough and continuous studies of the entomological problems affecting avocados. Dr. Walter Ebeling of the U.C.L.A. staff is directly responsible for this work and it is his principal interest. The excellent cooperation of the avocado industry and others concerned is very helpful and it is much appreciated.