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The Control of Insect Pests on the Avocado

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The Avocado is not attacked by as many enemies as cause damage to citrus fruits which have been longer established within our borders, nevertheless there are a number of destructive enemies which cause concern to the Avocado grower, and which must be reckoned with in order to successfully produce healthy trees so that they may produce a satisfactory crop of fruit. It is generally admitted that practically every fruit which is propagated commercially has one or more enemies bent on its destruction. At times growers fail to think about these enemies until their trees and fruit are attacked by them, and then it is generally too late to repair the damage done. It is very important for the grower who wishes to produce healthy trees in order that they may bear a satisfactory crop of fruit, to be ever on the lookout to detect insect infestation; to know something about the various destructive pests which may attack his trees and the measures which he may employ in order to effectively control them.

The purpose of this paper is to bring together briefly some information concerning some of the more destructive Avocado insects present in Florida, so that the grower may have some knowledge concerning them, and become better acquainted with some of the insect troubles he may at times be confronted with. For the most part the insect pests causing damage to the Avocado in Florida resemble greatly in habit and general appearance those which attack citrus fruits. Practically all of them are insects provided with mouth parts fitted for sucking the juices from the plant tissues. Such pests as scale insects, white flies and mealy bugs found on citrus trees are also to be found on the Avocado. It is quite possible that some of the insect pests at present found attacking the Avocado in Florida have been brought in. Others may be insects which have always existed here on some native vegetation and have adapted themselves to the Avocado. Hence as groves are being established in different widely separated sections, we may possibly find at times different insect pests appearing which gradually establish themselves on the Avocado. This condition is quite true of most newly introduced trees and plants. Then again, we may find sections in the State where the weather conditions prove more favorable for the multiplication of certain pests which do not thrive where the weather conditions are more adverse. This condition is evidenced by certain pests which thrive in groves situated on the keys with the close proximity of water which greatly regulates the temperatures. Many insect pests are sensitive to abrupt changes in temperature. Hence we may expect to find insect infestations severe in certain localities where others prove less favorable to insect activity.

During the dry winter months in Florida, the Avocado is generally considered in a dormant condition. At this time of year various enemies are to be found attacking the Avocado which thrives under conditions of little rainfall and low humidity.

THE AVOCADO RED SPIDER.

One of the enemies which attack the Avocado during the winter is the Avocado Red Spider, *Tetranychus yothersi* McG. In appearance it is not unlike most other red spiders which attack citrus trees. By examining the foliage carefully the red spiders will appear as mere red specks moving in every direction over the foliage when disturbed. It is very desirable for the grower to be provided with a suitable hand lens in order to be better able to detect and distinguish between the various pests he may come in contact with as many of the enemies are rather minute.

Trees heavily infested with red spiders appear in a comparatively short length of time under favorable conditions as if scorched by fire, the leaves turning brown and ultimately dropping. The over winter foliage should remain on the trees until there is sufficient new growth produced in the spring to take its place when normal shedding of the foliage will occur. Where the winter foliage is lost prematurely the result may be an abnormal development of the bloom, and a set back to the trees in their activity to sustain the proper set of fruit. The grower should watch his trees carefully and examine them frequently especially on the approach of dry weather in the fall, and when the red spiders are detected in numbers while the foliage is still green he should prepare to spray and not wait until the foliage has become browned and scorched.

Control.

The Avocado red spider may be controlled by spraying with the regular lime sulphur solution at the rate of one gallon to seventy-five gallons of water.

THE AVOCADO LEAF THRIPS.

Another enemy which may at times be seen infesting Avocado foliage is the so-called greenhouse thrips of the northern states, *Heliothrips hemorrhoidalis* Bouche, which attacks the Avocado in the open in Florida. This thrips resembles most other thrips in appearance, is black in color and about a millimeter in length.

The first indication of injury caused by this thrips is the production of pale colored areas to the foliage due to the extraction of the plant juices. These pale areas gradually run together as the work of the thrips becomes more in evidence over the leaf surface. Later the foliage assumes a brown color and appears scorched. Eventually the foliage drops prematurely as in the case of the red spider.

Control.

It may be controlled by using a spray of nicotine sulphate 40% at the rate of one gallon to nine hundred gallons of water. To this should be added four or five pounds of fish oil soap to each one hundred fifty gallons of the diluted spray mixture. The soap will cause the spray to spread more evenly over the foliage. If both the red spiders and thrips are present on the foliage, the two sprays of lime sulphur and nicotine sulphate may be combined, eliminating the soap. As both the red spiders and thrips carry on their

depredations on the upper surface of the foliage, the spray should be primarily directed to that part of the foliage.

THE AVOCADO BLOSSOM THRIPS.

With the approach of spring various other insect activities present themselves. Before the bearing Avocado tree produces new growth, the blossom clusters arise from the terminal twigs or from the base of the year's growth. The bloom as it appears is attacked by a blossom thrips, *Frankliniella cephalicus* Craw. This blossom thrips is not the same which attacks citrus in Florida; however, it does not differ materially in general appearance. It averages less than a millimeter in length and in general color is a pale yellow. It was first recorded as taken from the native acacia-like plants in the mountains of Mexico and it is quite probable that it has found its way into Florida from that country.

The injury by the thrips to the bloom is caused by the feeding of the young and adults on the individual flower parts destroying many of them in the course of their depredations. As succeeding generations appear the adults deposit their eggs in great numbers in the stems and pedicles which bear the floral panicles and which hold the fruits as they set to the terminal twigs. These punctures which later become emergence holes for the young reduce somewhat the strength of the stems which bear the fruit. This condition is evident in such varieties as the Trapp, which naturally bear weak stems. The thrips do not attack the fruit.

Control.

It may be controlled by spraying with nicotine sulphate 40% at the rate of one gallon to nine hundred gallons of water with the addition of four or five pounds of fish oil soap to the diluted spray, which serves as a spreader.

THE AVOCADO WHITE FLY.

With the maturing of the bloom and the setting of the fruit new growth commences to arise from the floral racemes. As the new growth appears it is attacked by the Avocado white fly, *Trialeurodes floridensis* Q. This white fly is not unlike the species of white flies which attack citrus; it bears white wings and possesses a yellow body. It is however, somewhat smaller than most citrus white flies, and may be distinguished on the foliage in the pupal stage by the characteristic fringe which this stage possesses.

This white fly is usually more abundant in groves situated on the keys and stretches of land between the ocean and bay inlets along the lower east coast of Florida. This probably is due to the fact that the temperature registers more evenly in these localities. It is found, however, in varying numbers on the mainland and especially in nurseries on young trees in lath houses, where its activities are more or less protected and not greatly interrupted by the weather conditions.

The adults which appear in the spring of year emerge from the over wintering pupal stage clustered in great numbers on the lower surface of the older foliage. The adults

deposit their eggs in great numbers on the new growth; the larvae which hatch from the eggs pass their existence on the lower surface of the leaves.

This species also produces an abundance of honey dew which accumulates upon the upper surface of the foliage and fruit. The common sooty mold fungus later develops in this honey dew deposit eventually giving the Avocado foliage and fruit a decided blackened appearance.

Control.

Where this pest is present in a bearing grove it may be controlled by spraying with the regular oil emulsion spray. Two sprayings will generally control the white fly, one during the spring after the fruit has set and the first general flush of new growth is sufficiently hardened, using strength of one gallon to eighty of water. Another application should be made in the fall when the adult flies are for the most part off the wing and the foliage is turning dormant using strength of one gallon to seventy of water.

THE DICTYOSPERMUM SCALE.

At times various scale insects give the Avocado grower considerable trouble. One in particular is the Dictyospermum Scale, *Chrysomphalus dictyospermi* Morgan. In appearance it does not differ materially from a great many scales and resembles quite closely our common Florida red scale in shape and is light amber in color.

Where this scale is present in a grove or nursery it attacks the twigs and branches, and where very numerous may often be found on the foliage. The branches attacked are gradually weakened and ultimately become of little use to the tree. The twigs and branches soon become roughened and crack considerably, thereby affording entrance places for various injurious plant diseases. As time goes on an infested tree shows a decided lack of lateral twigs and branches resulting in a badly formed tree.

Control.

The best time to control this pest on the Avocado is when the trees are dormant, usually from the middle of December until the first of February. The scale is readily killed by using an oil emulsion spray at a strength of one gallon to seventy gallons of water. Two applications of an oil emulsion spray at a three or four-week interval will control this pest.

PYRIFORM SCALE.

A scale which seriously attacks the Avocado in a number of localities is the Pyriform Scale, *Protopulmnia pyriformis* Ckll. In appearance this scale is somewhat convex, pyriform in shape and of a reddish brown color. In the adult stage it possesses a cottony matter which projects about the margins of the scale.

The scale attacks the foliage. The immature scales migrate in the spring to the new

growth as they hatch from the mature scales on the older growth of foliage. In the process of development on the foliage honey dew is produced in practically the same manner as when white flies are present and eventually sooty mold covers the foliage and fruit.

Control.

It is controlled by using an oil emulsion spray as recommended for the Dictyospermum scale. However, in this case the spray should be directed toward the lower surface of the foliage where the scales are found.

This in a general way gives briefly some information concerning some of the more important Avocado pests. There are, however, still others of importance about which little is as yet known, while there are still others of less importance. As our investigations along this line continue, information concerning these will be available.

Lastly, I wish to mention, that it behooves us in this early stage of the Avocado industry, to take full account of all Avocado pests and strive in every way to do our part toward controlling and eradicating such pests as we now have and to prevent the importation of those that exist in other places. Stop and consider what saving would have been accomplished in our various fruit industries, if the various destructive pests had not been introduced or had been eradicated when first introduced. In Hawaii the Avocados are badly infested with a fruit fly, and the commercial growing of Avocados, which otherwise would have become important, has been ruined. Such pests as the Mediterranean fruit fly, the West Indian fruit fly and others, as well as a number of very dangerous Avocado weevils, occur in a number of places where Avocados grow and we do not want in Florida. Every traveler coming from some foreign land is tempted at times to bring along some of the rare tropical fruits attacked by these various dangerous pests. Our laws are stringent on this point, but people are ignorant and we are constantly threatened with the possibility of the importation of dangerous pests. We should all be alert and watchful to aid so far as we can in preventing any such pests that threaten our various fruit industries from becoming established.