SOME PRELIMINARY INVESTIGATIONS OF THE GREEN SCALE, *Coccus viridis* (GREEN), IN SOUTH FLORIDA

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INTRODUCTION

The green scale, *Coccus viridis* (Green), also known as the green coffee scale, soft green scale, and green bug, a pest of citrus and other woody and herbaceous plants, was discovered by grove inspectors of the State Plant Board of Florida near Davie, Florida, during May of 1942. Since then studies have been conducted on the life history, habits, and control of this scale. It is not known how long the green scale has been in South Florida; however, indications are that it has been there for several years.

DESCRIPTION

The name given this scale is very descriptive of its main character which is its color. It is bright pale green, being more or less transparent. The young stages are easily confused with the young of the green shield scale, *Pulvinaria psidii* Mask., but the adult does not have an egg sac outside the body as does the green shield scale and some other soft scales. The outline shape of the green scale is elongate oval and the actual body measurements on citrus are as follows:

Length, from 2.35 mm. to 3.3 mm.
Width, from 1.35 mm. to 1.65 mm.
On groundsel trees, the favorite host, they are only about three-fourths as large as on citrus.

The crawlers and adults have small black eyes and the legs and antennae are light green. On the dorsum of adult scales and those nearing maturity a black U-shaped or irregular internal marking, the closed end of which is at the anterior, is visible to the naked eye. At times this marking pulsates with regular beats varying from 27 per minute in some scales to 45 per minute in others. The movement of this internal marking seems to originate at the closed end of the U and working toward the rear. After the scales die they turn a light brown or buff color and the black markings are no longer apparent.

Green scales appear in a rather definite pattern on citrus leaves. The undersurface of the leaves toward the base is preferred, and the adults sometimes line up along both sides of the midrib, 2 or 3 abreast. On heavily infested citrus limbs as many as 250 to 325 scales per leaf have been found. Infestations were usually spotted on the individual trees; occasionally one-half of the tree was infested and the remainder had few or no scales. All stages of the scales were found infesting immature oranges and immature and mature limes. Although the foliage of grapefruit was often heavily infested, no scales were found on the fruit itself. On groundsels the scales were usually distributed over the entire plant.

KNOWN DISTRIBUTION IN FLORIDA

Indications are that the green scale has been limited to the present time to the extreme lower east coast of Florida. It is known to be established from 5 miles north of Ft. Lauderdale to a few miles south of Florida City.

HOST PLANTS

According to the records of the State Plant Board, this scale has been found on 72 different species of plants in Florida, so it is far from host specific and can reproduce itself on several species of plants in a grove should conditions become too adverse to permit further development on citrus. Apparently the preferred host of this scale is the groundsel tree, *Baccharis halimifolia*. Another common name of this plant is “silverling” and in South Florida it is best known as “glades myrtle.” Although several young citrus trees were found to be heavily infested, citrus did not appear to be an especially preferred host. The following plants have been observed by O. W. Calkins, a State Plant Board Inspector, to be more heavily infested than some others on the host list: Groundsel, tropical currant, wild coffee, citrus, saponaria, buttonbush, guava, ti-es, marlberry, seagrape, poisonwood, goldenrod, *Tetrazygia*, bostic, southern sumac, *Nectandra* sp., banana, *Ixora coccinea*, gardenia, wild primrose and ragweed.
Apparently, heavy infestations of green scales eventually will kill groundsels. This was demonstrated in Davie where several heavily infested groundsels were tagged at random for observations. The trees began to lose foliage and 3 months after the infestation had reached a dense population, the trees were bereft of foliage and some of them were dead to the base.

APPARENT ECONOMIC IMPORTANCE

The green scale in Florida has not been under observation sufficiently long to determine its economic importance. In two groves in Davie only a small percentage of the trees were infested. Since the groves were only 3 to 5 years old, it might be possible that the scales had not been on the trees sufficiently long to build up a heavy infestation. No extremely heavy infestations have been found on large mature citrus trees.

There is evidence indicating secondary damage which may be as severe and perhaps more so than the injury caused by green scales. In Florida and parts of the West Indies it has been observed that the populations of purple and long scales on citrus seem to increase considerably following heavy green scale infestations. According to W. L. Thompson,1 one of the probable reasons for this increase is the presence of sooty mold that grows on the honeydew which is exuded by green scales. Furthermore, green scales are parasitized by a white-fringed fungus, Cephalosporium lecanii Zimm., and after this fungus kills the scales, young purple and long scale crawlers hide under these dead mycelia-enveloped bodies. This was observed quite frequently while making counts. Green scales infected with C. lecanii will show the mycelium for 30 days, and observations indicate that these fruiting bodies cause the dead scales to stick to the leaves for a much longer period.

LIFE HISTORY AND HABITS

For experimental convenience the stages of green scales were divided into three classes:

1. First stage—all eggs and crawlers under the adults.
2. Intermediate stage—all not included in 1 and 3.
3. Egg depositing adults.

Green scales are parthenogenetic and oviparous. The eggs, whitish green in color and elongate oval in shape, are laid singly

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and remain under the adult until hatched. In hatching the egg case splits at the anterior, leaving the fore appendages free to struggle and work out of the remainder of the chorion which is sloughed off at the posterior. Eggs hatch from a few minutes to several hours after deposited. During September, October, and November 85 or more eggs were deposited per female. Due to C. lecanii and other parasitic fungi, considerable variation occurred. There was also a variation in the number of days in which adults deposited; some apparently completed deposition in 8 days, and a few under observation deposited over a 42-day period. In South Florida, the average length of time that passed from the egg to egg-depositing maturity was 59 to 62 days during the late summer months, and variations of from 50 to 70 days occurred.

The number of molts a green scale goes through was not determined; however, 3 different sizes of scales were observed dragging molt skins. According to Miller,2 “The larvac in any stage and the mature females as well are able to change their feeding position at any time, and the habit is very noticeable on branches which through any cause have begun to wither. The migration of the scales in search of fresh foliage takes place very soon after withering begins and very few individuals die in their old feeding positions upon such branches.”

Miller’s statement regarding the mobility of this scale was well substantiated in South Florida by observations made of the frequent migration of scales in search of fresh foliage.

A test was conducted to determine how long green scales would live without food. Some heavily infested groundsel twigs were cut and placed in a paper sack of double thickness. This was then placed in a can which had one inch of water in it. The sack was placed on a block to keep it out of water, and the can was sealed. Six examinations of the scales were made at various intervals and on the twenty-first day one living green scale crawler was observed. The scales that were living near the twenty-first day were not the scales that were living at the beginning but crawlers that had been deposited by adults up to the eighteenth day.

(To be continued)

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