

Report on the Manatee Snail and White Fly.

BY F. D. WAITE.

Mr. President, Ladies and Gentlemen:

Our President recently asked me to get up a paper on the white fly and Manatee snail, the latter having been brought to the notice of the fruit growers within the past six months, and several descriptive articles have been published and copied into the leading papers of the State. I have brought a few specimens with me, also another specie of snail which may play a part in the cleaning up of the sooty mould, as we have found it feeding on the lichens several feet high on the trunks of old seedlings.

Messrs Butler and Heathcote of St. Petersburg sent me several dozen snail found feeding on the Mangrove at Passa-a-Grille, these were put around a tree during early winter and protected with sacks, but all died, I hope this summer to make another trial with them.

I am sorry to say that parties have visited the grove where the Manatee snail was first discovered and stolen so many that we can hardly find any left, and our neighbors who afterwards discovered them in their groves, have been treated in like manner.

From observations already made I believe the snail is not active during cold or dry weather, neither do I think they increase until the rainy season, and during the foggy weather in early fall and winter, when they become most active in ridding the trees and fruit of the sooty

mould. Those wishing to become familiar with the white fly and its enemies should procure Press Bulletin No. 4. issued May 1st, 1901, Press Bulletin No. 59 of January 15th, 1906, Bulletin No. 67 of June, 1903, and Bulletin No. 13 issued by the U. S. Department of Agriculture June 17th, 1897. There is another report of the Entomologist Prof. H. A. Gossard from July 1st, 1900 to July 1st, 1901.

All of the above reports cover the ground completely. I have a copy of Press Bulletin No. 59 with me, and if it is the pleasure of this Society I will read the same.

THE MANATEE SNAIL, BULIMULUS

DORMANI.

(Press Bulletin No. 59, Florida Agricultural Experiment Station. Department of Entomology.)

The sooty mold of orange, *Meliola*, is one of the most serious results of white fly infestation of citrus groves, and is an element in the injury to various plants from aphids and from some of the scale insects especially the *Lecaniums*, mealy bugs, wax scales, and cottony cushion scale. The fungus is not itself a parasite on the plant, but a saprophyte, deriving its sustenance from the sweet honey dew secreted by these insects. The injury to the plant results from the smothering action of the fungus, the heavy coating of

fungus threads interfering with the healthful action of sunlight on the leaves. The appearance of the various ornamental and hedge plants is also disfigured by the dark fungus. The sooty mold is especially bad following the white fly attack owing to the large amount of honey dew secreted by these insects. As the white fly larvae attach themselves to the under side of the leaves the honey dew exuded by them falls to the top side of the leaves beneath, thus affording favorable opportunity for the growth of the fungus. So constant is the association of the fungus and the white fly that badly infested groves and hedges may be recognized at some distance by the heavily coated dark foliage. The fungus develops on the fruit as well as on the leaves and stem and washing becomes necessary, resulting not only in an added expense, but also in increased danger of decay in shipping. In this connection the habits of the tree snail, *Bulimulus Dormani*, are of the greatest interest. This snail has been found in the orange groves in Manatee county feeding upon the sooty mould. Just how long the snail has been present on orange trees in this county it is impossible to say. It was observed as long as two years ago by Mr. F. D. Waite, at Palmetto. It seems to have been present in small number in other groves at this time, but attracted no further attention until the present summer. The snail is now widely distributed in Manatee county, occurring in many groves on both sides of the Manatee river. The work of the snails is very characteristic. When well started they occur in great numbers on the tree spreading over it from base to top. Its favorite food seems to be the sooty mold. The fungus is cleaned from the leaves, stems, and fruit. The leaves

thus cleaned have a glossy, shiny appearance as though free from white fly. The fruit thus cleaned has a better color and probably ripens earlier. In addition to the fungus, the snail takes algae and some lichens from the stem and trunk, giving the trunk a much cleaner and fresher look. The trees that are cleaned stand out conspicuously from the surrounding trees by their bright foliage and clean trunks. The snails increase rapidly under favorable conditions. The eggs are probably deposited in protected places about the trunks of the trees, possibly also about the base of the tree under leaves and other rubbish. That the snails are capable of doing effective work when present in sufficient numbers has been shown in numerous groves in Manatee county during the present summer. Such trees in these groves as are well stocked with the snails have been thoroughly cleaned, the fruit not requiring washing.

The snails are of medium size, measuring, when full grown, three-fourths to one inch in length. The shells are smooth, white, or *corneous* white, and with about four bands of brown spots. Old shells have often a somewhat corroded surface, the bands becoming indistinct or absent. When the conditions are unfavorable, either cold or dry, the snails take refuge in the hollows of the trees or under leaves accumulated in the forks, or elsewhere, or under sacks at the base of the trees when these are provided. It thus becomes an easy matter to transfer them from tree to tree. A few snails placed by Mr. Wade Harrison in one of his trees in March, increased in such numbers as to free the tree of sooty mold by mid-summer of the same year. The snails are known to range with some variation from the mouth of the St. Johns river on the north, to the

Caloosahatchie river on the south. The species is probably native to Florida as specimens in small numbers were observed about the hammocks and elsewhere as long as fifty years ago. Its habit of feeding on the sooty mold of the orange, however, was not known until within the past two years.

In view of the fondness of the snails for the injurious sooty mold fungus, it becomes of first importance to observe their treatment of the beneficial fungi. Among the fungi parasitic on orange insects there are four species of inestimable value to orange growers. These are, the brown fungus well known as an effective parasite on the white fly larvae; the red-pink fungus also parasitic on the white fly; the red fungus, and the gray headed fungus, both parasitic on the common scales. The brown fungus so effective in control of the white fly, as is well-known, throws out spreading *hyphae* for some distance around the body of the dead leaves. It seems that the snails occasionally feed to a limited extent on these, spreading *hyphae* but evidently not enough to interfere with the spread of the fungus, since this fungus is doing particularly effective work in the groves in the Manatee region where the snails occur.

The red-pink fungus is also abundant in the groves where the snails occur and is untouched by them. The snails have not been observed to feed on either the red or the gray fungi parasitic on the common orange scales, and it is probable that they have no taste for these parasitic fungi. Colonies of the snails are being started in part of the State where the white fly injury is severe and where conditions seem favorable for the growth of the snail. It is desirable that close attention be given to the habits of the snail, as well as to means of protecting colonies against unfavorable conditions. A few sacks thrown around the tree seem to afford a needed protection against unusual cold. It is probable that sprays can not be used on trees stocked with the snails without injury to the colony, for, although protected by the shell from the immediate effect, sufficient spray probably clings to the sooty mold on which they feed to destroy them. The beneficial parasitic fungi and the snails may be allowed to work together on unsprayed trees. The snail is here spoken of as the Manatee snail since while recorded as occurring in other parts of the State it was found working on the orange groves first in the Manatee region.