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**FOOD HABITS OF *LEIS CONFORMIS* BOISD.
(CHINESE LADYBEETLE)**

By J. R. WATSON and W. L. THOMPSON*

In June, 1925, the senior author secured a colony of *Leis conformis* from the California Agricultural Experiment Station for the purpose of establishing them in Florida to combat *Aphis spiraecola* Patch (green citrus aphid).

FOOD HABITS IN THE INSECTARY

The adults and larvae thrived on a number of different species, but *Aphis spiraecola* and *Rhopalosiphum pseudobrassicae* were used to a large extent in rearing the beetles, for they appeared to do equally well on either of them. *Aphis gossypii*, *Brevicoryne brassicae*, and *Myzus persicae*, were used less, but the beetles devoured them seemingly as fast as they did the *Aphis spiraecola* or *R. pseudobrassicae*. The adults, as well as the larvae, have been observed eating the pupae and eggs of their own kind, and also those of other ladybeetles. The larvae especially are of a cannibalistic nature, as they attack the smaller larvae, and in many cases, larvae of their own size, even though a fair number of aphids may be available. Besides feeding on the previously named aphids, the larvae feed on several kinds of small, soft-bodied larvae, such as those of the syrphus fly, mealy-bugs, small cabbage loopers, and other species of ladybeetle larvae.

*Contribution from the Department of Entomology, Agricultural Experiment Station.

OBSERVATIONS OF FOOD HABITS IN THE FIELD

During the spring and summer of 1926, between forty and fifty colonies of these beetles were liberated in orange and tangerine groves in different sections of the citrus belt. Up to the beginning of the present year, there is only one general locality in which these beetles are known to have become established; namely, at Doctor Phillips Station, and the vicinity of Windermere, in Orange County. The above named places take in a radius of about five miles.

On April 22, 1932, the junior author visited some groves in the vicinity mentioned above, and along the edge of one grove, large numbers of *Leis* were observed apparently feeding on the extra floral nectaries at the base of the flowers of *Crotalaria striata*. Since the *Crotalaria* had not been killed during the winter, a number of blooms were present. On June 16, another visit was made to the same grove, and again the beetles were found on the *Crotalaria* blooms, but in much larger numbers than in April. Aphids were very scarce on the citrus trees. On February 2, 1933, a few beetles were observed on the *Crotalaria*, but very few blooms were present. In April, 1933 the writers visited this locality and the following interesting facts were observed: Aphids were hard to find on the orange and tangerine trees, but many young adult beetles that had recently emerged were present on the trees. A few beetles were on the *Crotalaria*, but blooms were not plentiful. In one grove, the crab grass was infested with *Aphis maidis* Fitch* and many adult beetles were feeding on them. In a wood adjacent to this grove, the saw palmettoes, *Serenoa serrulata*, were in full bloom and large numbers of young adult beetles were feeding on the pollen of these flowers. Beetles were on the palmettoes three to four hundred yards from the grove. The beetles were also found feeding on the very tender terminal buds of scrub oak. Gum was oozing from wounds of the terminal bud which apparently had been made by the beetles themselves. In May the groves were again visited by the authors. The beetles were found in abundance feeding on the sap from wounds resulting from a severe pruning of tangerine trees. As many as 30 beetles were found collected around one wound. During the previous year they had been observed feeding on gum exuding from wounds on the trunk of these citrus trees. At this time they

*Identified by Dr. A. N. Tissot.

were more abundant on the blossom of *Crotalaria* and were also found feeding on the blossoms of fire weed, *Erechtites hieracifolia* (L) Raf. They had eaten off the entire tops of the blossoms of these plants including pistils and stamens. On none of these plants, however, were any larvae, pupa or eggs observed.

In July, 1933 W. W. Yothers and R. L. Miller of the Orlando Laboratory of the Bureau of Entomology, U. S. D. A., observed them feeding on *Trialeurodes variabilis* on papaya. Not only adults but larvae were present on the leaves of the papaya. In August the senior author, together with Mr. Yothers and Dr. Miller again visited the papaya plantation at Orlando. In addition to numerous adults many larvae were seen and several clusters of eggs and several pupae, showing that the beetles are able to breed upon this whitefly and do not use it as a food for adults only.

In April, 1933, the authors took 117 pupa off of one small tangerine tree less than 10 ft. tall. No native lady beetles have ever been observed to become as abundant as were these, and it was very evident that they had been an important factor in controlling aphids in these groves. Although no other control measures had been taken the amount of damage by the aphids was slight. It would seem that with the knowledge that we now have of the possible summer foods for this ladybeetle at a time when aphids are scarce, we are in a position to make it possible for growers to establish this beetle permanently in many groves in Florida and that it will be a very great help in controlling the citrus aphids.

INSECT PARASITES OF CITRUS IN CENTRAL AMERICA

By MARSTON BATES

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The insect pests of Citrus anywhere on the American continent may be divided into three large groups: general feeders that number Citrus among their hosts; species that were originally parasites of *Xanthoxylum* or other indigenous Rutaceae, and that have adapted themselves to Citrus where it has been introduced; and Citrus feeding insects that have followed their host in its progress over the world. Many Citrus pests have become so widespread that it would be difficult now to determine their place of origin; others, mostly belonging to the second group, seem still to be of limited range. A thorough study of the Citrus