

FURTHER DATA ON THE RELATION BETWEEN APHIDS AND FIRE BLIGHT (*BACILLUS AMYLOVORUS* BUR. TREV.)¹

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In the JOURNAL OF ECONOMIC ENTOMOLOGY, Vol. 8, No. 4, 1915, a report was given of field observations made on the relation of aphids to fire-blight in Doniphan County, Kansas, for the years 1913, 1914 and 1915. In 1915 and 1916, observations were carried on in Atchison as well as in Doniphan County, and in both counties a direct relation was found to exist between the severity of the aphid infestation and the amount of fire-blight infection.

It was planned to carry on experiments during the spring and summer of 1916 to determine two points—(1) how it was possible for the aphids to come in contact with the blight bacteria, and (2), whether or not the aphids could inoculate trees with fire-blight.

To determine the first point, a large number of hold-over cankers were examined and it was found that the aphids deposited their eggs in blight cankers (Pl. 2, Fig. 1) as readily as in any rough places on the bark. In the spring, the live cankers resume activity, giving forth gummy exudations filled with bacteria. The aphids, which hatch from eggs laid in the cankers, crawl through these exudations in passing to the terminal growth of the twigs and, in so doing, become contaminated with blight bacteria.

To determine the second point, it was planned to secure a large number of aphids, allow them to pass over pure cultures of blight bacteria, and then transfer them to the twigs of apple trees. Owing to the fact that aphids were very scarce in Kansas during the summer of 1916, none were obtained for this work until August.

During the month of August, the average maximum temperature at the field insectary at Manhattan, where these experiments were being conducted, was 96.5 degrees and the total rainfall for the month was .71 of an inch. Naturally, the trees put forth but very little new growth during this period.

Despite these adverse weather conditions, aphids, which had previously passed over pure cultures of blight bacteria, were placed on the twigs of four Yellow Transparent trees and these twigs covered with cheesecloth bags (Pl. 2, Fig. 2) to prevent other insects gaining access to

¹ Contribution from the Entomological Laboratory, Kansas State Agricultural College, No. 21. This paper embodies the results of the investigations undertaken by the author in the prosecution of project No. 13. Kansas Agricultural Experiment Station.

them. On the same date, transfers were made by a sterile needle from a pure culture of the organism to lesions in the succulent growth of several other twigs. Although observations were made on all of these trees until the 13th of October, no traces of blight were noticed. On the 25th of August, infected aphids were placed on four Yellow Transparent and four Jonathan trees, but the results were similar to the first experiment.

During the month of September, the average maximum temperature was 80.3° and the total rainfall was 8.12 inches. The apple trees now began to put forth new, tender growth, producing conditions more nearly approximating those of spring when blight is ordinarily more prevalent.

On the 25th of September, infected aphids were placed on nine Yellow Transparent, two Jonathan, one Delicious, one Winesap, and one Ben Davis apple trees. Although brown spots appeared on the leaves and terminal buds of some of the Yellow Transparent trees, no clear cases of blight were discovered. On the 7th of October, the Jonathans began to exhibit signs of blight, which became well developed cases by the 10th of October. The other varieties did not blight.

During the first thirteen days of October, while observations were being made on these trials, the average maximum temperature was 77 degrees and the total rainfall for that period was .9 of an inch. The apple trees developed considerable new growth during the early part of the month. On the 3d of October, infected aphids were placed on three Jonathan and four Yellow Transparent trees. The blight made its appearance on October 5 when the leaves began to turn brown, increasing daily until, on the 13th of October, all of the twigs showed well-developed cases of fire-blight (Pl. 2, Figs. 3 and 4).

SUMMARY

1. The blight developed only in the tender succulent growth on the twigs.
2. By hatching from eggs laid in blight cankers, the aphids come in contact with the fire-blight organism.
3. Aphids can and do inoculate trees with the bacteria of fire-blight.
4. The amount of fire-blight infection in an orchard may be materially decreased by destroying all of the aphids which may appear there.

VICE-PRESIDENT G. A. DEAN: This paper is now open for discussion.

MR. M. T. SMULYAN: I would like to ask what species of aphids were utilized in these experiments.

MR. J. H. MERRILL: Green.

MR. M. T. SMULYAN: I would like to ask if any other species were used.

MR. J. H. MERRILL: Those were the only ones I was able to get this year.

MR. M. T. SMULYAN: You cannot say then what species is most responsible for carrying the blight.

MR. J. H. MERRILL: In Kansas the blight cankers resume their activity just before the trees leave out in the spring, and at that time it is the green aphid which is present and enters the buds as they open and works its way into them. They may very easily inoculate the trees with the blossom blight by so doing.

VICE-PRESIDENT G. A. DEAN: If there is no further discussion, we will listen to the next paper by Mr. Quincy S. Lowry.

AN OUTBREAK OF THE EIGHT-SPOTTED FORESTER, *ALYPPIA OCTOMACULATA* FABR., IN NEW HAVEN, CONN.

By QUINCY S. LOWRY, *New Haven, Conn.*

On July 22, 1916, the writer, by request, visited the estate of Mr. E. A. Prince at 498 Howard Avenue, New Haven, to inspect his grape arbors which were being rapidly defoliated. Thousands of caterpillars, mostly full grown, were found feeding on nearly all kinds of foliage in the yard, but were especially abundant upon the grape and Virginia creeper. These proved to be larvæ of the Eight-Spotted Forester, *Alypia octomaculata* Fabr.

Due to the fact that this is a common insect, no detailed description is necessary here. It might be stated that it is a conspicuous naked caterpillar, the head being yellow, dotted with black, the segments rather brilliantly marked crosswise with orange, black, and white bands, each segment also having a row of black dots. There is near the tail a rather prominent hump on each side of which is a light yellow spot, rhomboidal in shape; smaller yellow irregular lateral markings are noticeable just above the spiracles and between the orange cross-bands. The full grown larvæ are about one and one-half inches in length.

The grape is the favorite food of this species, though it feeds readily on Virginia creeper, *Ampelopsis quinquefolia* Michx. The larvæ were also found feeding on the common barberry, *Berberis vulgaris* Linn., and different varieties of rose.

Nothing had been done up to this time (July 22) to prevent the ravages of the caterpillars and there was scarcely any food available, the arbors and also the Virginia creepers being completely defoliated.