Macrosiphum granaria Kirby

The eggs of this species are deposited upon rosebushes in the fall. Early in the summer the migrants go to oats and wheat, and probably to some other grains and grasses.

Macrosiphum dirhodum Walker

This species, like the preceding, has the rose as a winter host, and goes to the grains and grasses during the summer.

It seems a surprising thing that, after so much study of the life habits of the Aphididæ, there are still so many species having the habit of alternating their annual host plants, where only one of the winter hosts is known. There is still abundant opportunity for much good research work along this line.

PRESIDENT H. T. FERNALD: We will now take up a paper, the title of which failed to be printed on the program, by Mr. E. B. Blakeslee.

A MECHANICAL PROTECTOR FOR PREVENTING INJURY BY THE PEACH BORER

By E. B. BLAKESLEE, *Washington, D. C.*

(Abstract)

This paper briefly discussed the feeding habits and behavior of newly hatched peach borer larvæ. The point was emphasized that, in addition to the fact that large numbers of eggs are deposited about the crown of the tree, larvæ hatching from eggs deposited on trunk and branches instinctively migrate downward and begin their work below the surface of the soil. When an impenetrable barrier was placed at the crown of the tree, the larvæ made no attempt to enter above it. By the use of a cone-shaped tarred paper protector, extending out for eight inches to one foot from the base of the tree, and sealed with a viscous substance, it was found possible to entirely exclude the larvæ from the tree. The protectors were cut out in circular form with a hole in the center somewhat larger than the trunks to which they were to be applied. To serve as a support for the protector the earth was pulled up to the tree, slightly, making a small mound, the base of which was slightly below and the top slightly above the surface of the ground. The protectors were then brought tightly about the tree and fastened, the contact with the tree and the laps coated with a sticky sealing material and the earth pulled back over the edges. Field experiments showed that these protectors were able to maintain

their impenetrable character under field conditions. Photographs of the protector were exhibited.

MR. E. B. BLAKESLEE: Mr. Scott has secured very good results with a device which is essentially the same as the one described.

A MEMBER: I would like to inquire if in these experiments anything like cement was used which would harden in the soil?

MR. E. B. BLAKESLEE: We have not used cement or gas-tar mixtures for fear of injuring the trees. I do not think the cement would give good results.

A MEMBER: Some years ago we tried a series of experiments to test mechanical protectors of various sorts as a remedy for the peach borer. Those that we tried usually caused considerable injury to the trees.

MR. E. G. TITUS: In Utah, we find that peach borers attack the trunks and branches as well as the crown of the tree. This makes it difficult to use a mechanical protector.

MR. WILMON NEWELL: To me this is a very interesting paper. I think a glance at these photographs will convince any entomologist that the right principle is being correctly applied. We were working on this same insect in Texas a couple of years ago and tried to make application of the same principle. We even went so far as to make paper protectors but were not successful in sealing them to the trunks of the trees.

I am familiar with the work done along this line by Mr. Scott the past summer, and mentioned by Mr. Blakeslee. I happen to know that Mr. Scott's protectors, very similar to these but made in a different way, were placed on the trees early in the season. The results were such as to convince me that a method of control for one of our worst fruit tree pests has been developed. We should not let this matter pass without getting all the information we can and I would like to ask if Mr. Scott will give us the results of his work along this line.

MR. W. M. SCOTT: I was not aware that this subject would come up for discussion and therefore did not come prepared with notes on the results of my experiments, except such as I happen to have in this little pocket note-book.

I began experiments for the control of the peach tree borer while State Entomologist of Georgia, about 15 years ago, and have since continued to work on this problem as a peach grower. After trying numerous washes I concluded, as did Mr. Blakeslee, that this was not the right method of procedure. The habit of the newly hatched larvæ to crawl down the trunk of the tree and enter the moist tender bark below the surface of the soil furnished the clue to the solution of the

problem. In order to prevent injury from this insect, it is necessary to prevent the larvæ from reaching the underground portion of the tree. This is easily accomplished by encircling the trunk at the ground with a flexible soil-covering mat which must be impenetrable to borers and impenetrably sealed to the tree.

Last March I began to devise a protector that would fulfill the requirements and finally adopted a tarred felt mat, 16 inches in diameter, with a hole in the center to conform to the diameter of the tree and a slit from the hole to the outer edge. The soil is first mounded somewhat around the tree and the protector placed over this mound. The slit edges are lapped and glued together with a viscous material and the protector is sealed to the tree with the same material, completely filling all openings, so that it is impossible for the borers to reach the soil without crawling away from the tree beyond the outer edge of the protector. The viscous material for effecting an absolute sealing to the tree is an essential feature of the protector. I tried several substances and found the best to be a sticky preparation consisting, for the most part, of a residuum from the partial distillation of coal tar.

Beginning on June 9, 1914, I applied protectors to 250 peach trees in my orchard at Hancock, Md., and the results were perfect except where the mat was not properly sealed to the tree. An examination on October 2 showed that of 40 Belle trees provided with protectors, 28 were entirely free from borers, 7 had one each, 4 had two each and 1 had sixteen. The protectors had broken loose from the trees where a poor paste was used and this accounts for the successful entrance of the borers in these trees. It also emphasizes the necessity of maintaining an absolute seal between the protector and the tree. An average of 12 borers per tree was found in 15 unprotected trees nearby.

In a block of three-year-old Elbertas 20 treated trees were examined and 16 of them found free from larvæ. The protectors had partly cracked loose from the other four trees, admitting from 1 to 5 borers. Twenty untreated trees in an adjacent row were examined and found to be nearly ruined by borers. There was an average of 28 borers per tree and 5 trees averaged over 40 per tree. This gave the protectors about as severe a test as they could be subjected to.

Now in justice to myself and others I should admit that, on September 30, I applied for a patent on this method of protecting trees against borers.

MR. T. J. HEADLEE: Mr. Blakeslee, what did you use for sealing the protector?

MR. E. B. BLAKESLEE: I used "tanglefoot," it was the best thing I could find. I find the tanglefoot seems to retain efficiency under ordinary conditions. It doesn't dry out.

MR. T. J. HEADLEE: We have used tanglefoot for two seasons and while there was no injury the first season, during the second season the bark has died beneath the tanglefoot and the trees have perished. Our applications were made on a very small surface of the tree.

MR. A. L. QUAINANCE: I want to congratulate both Mr. Scott and Mr. Blakeslee for this discovery—*independent discovery*, as I happen to know. It appears to be a true case of parallel development. I am inclined to believe that the development of this tree protector marks the finish of a first-class insect pest which, up until now, has never been satisfactorily controlled. Of the many species of pernicious insects with which the orchardist has to contend, none have been more troublesome for a longer time than the peach borer. It is noted that Mr. Scott has applied for a patent for this protector. Should this be granted to him, the bureau will naturally discontinue further work along this line. It may contribute to its more speedy adoption by peach growers that it should be pushed by private interests, and I feel perfectly sure that no claims will be made by Mr. Scott as to its merits which, in his judgment, are not fully warranted. I certainly hope that it will be used by peach growers everywhere who are troubled with the peach borer.

MR. W. E. RUMSEY: In our experiments at the West Virginia Agricultural Experiment Station against the peach tree borer we have been trying some penetrating substances which were sprayed on the base of the trees to determine if it is practical to destroy the young borers in this way. While the work has not been under way for a sufficient length of time to obtain definite results some interesting observations have been made. Two of the materials used for the purpose mentioned were *avenarius carbolineum* emulsion and "Orchard Brand" miscible oil (1-9). To apply the materials the soil was removed from the base of the tree, as is done in "worming," and the trunk sprayed from six or eight inches above the general surface of the ground to the bottom of the cavity made by the removal of the soil. After spraying the dirt was replaced. The materials were applied in October and the trees examined the following June. The check trees showed an average of about five borers to a tree; with the miscible oil treated trees the average was one borer per tree; and where carbolineum emulsion was used we found an average of less than one borer per tree.

When applying the carbolineum emulsion night came on before the work was completed and when we returned the next morning three dead borers were found on the bark of the last tree treated the previous evening. One had worked its way completely out of its burrow and the other two were half way out. This indicates that the emulsion

had penetrated the bark and the borers had tried to escape. In the use of the two substances mentioned there was no apparent injury to the trees.

SECRETARY A. F. BURGESS: I would like to ask Dr. Headlee if both old and young peach trees were injured by tanglefoot? We are using large quantities of this material each year and seldom notice any injury, although we very rarely apply this material to peach trees.

MR. T. J. HEADLEE: The tanglefoot was applied both to young trees with thin tender bark and to old trees with rough heavy bark in bands about eight inches wide, beginning two or three inches below the surface of the soil and extending five or six inches above. The young trees first exhibited injury, but sooner or later practically all succumbed.

PRESIDENT H. T. FERNALD: If there is no further discussion, we will take up a paper by George A. Dean and R. K. Nabours.

A NEW AIR CONDITIONING APPARATUS

By GEO. A. DEAN, *Entomologist*, and R. K. NABOURS, *Zoölogist*, *Kansas Agricultural College and Experiment Station*

Within the last ten years the influence of moisture and temperature on animal life has received considerable attention. It is not necessary to emphasize the value and the absolute necessity of accumulating data relative to this important phase of entomological and zoölogical work. The difficulty in this work has been to devise or to secure some sort of an air conditioning apparatus that would maintain a desired constant humidity and temperature within a reasonable degree of variation. Different individuals have devised various machines and incubators for this purpose, but to the knowledge of the writers they have all proved more or less unsatisfactory. For several years the departments of entomology and zoölogy of the Kansas Experiment Station have been building and experimenting with various moisture and temperature control apparatus. Last spring at the suggestion of Professor Potter, of the Engineering Division, it was decided to take the matter up with some air conditioning specialists. After conferring with several companies a contract was made with the Carrier Air Conditioning Company, of Buffalo, N. Y. The plan was to construct and install a machine that would automatically condition the air before it entered the breeding chamber, flow it into the breeding chamber continuously and at a rate that would make a complete displacement of the air at least every minute.

Just recently the air conditioning machine has been installed and