





United States Department of Agriculture,

DIVISION OF ENTOMOLOGY.

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THE PEACH-TREE BORER.\*

(*Sannina exitiosa* Say.)

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GENERAL APPEARANCE AND METHOD OF WORK.

The brownish, gummy exudations, more or less soiled with earth and the larval excrement, about the bases of peach trees, and also, to a less extent, of the cherry and plum and other stone fruits, are familiar to

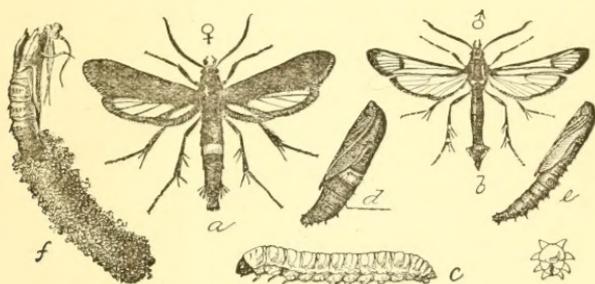


FIG. 1.—*Sannina exitiosa*: a, adult female; b, adult male; c, full-grown larva; d, female pupa; e, male pupa; f, pupa skin partially extruded from cocoon—all natural size (original).

all growers. These exudations indicate the presence of the peach-tree borer, which undergoes its development just within the bark, mining between the bark and the sapwood, often completely girdling and causing the death of trees, and always greatly injuring and weakening them. The parent of this larva is not often seen. It is a very slender, dark-blue moth, wasp-like in appearance, and presenting remarkable differences between the two sexes. The mimicking of the wasp is especially noticeable in the case of the male insect, the wings of which are transparent, bordered with steel-blue, which is the general color of the body in both sexes. The fore-wings of the female are blue and clothed with scales, while the hind-wings are transparent, resembling those of the male. The middle of the abdomen of the female is marked by a broad orange band covering the fourth, or fourth and fifth segments. The male expands about one inch and the female an inch and a half or more.

ORIGIN AND DISTRIBUTION.

The peach-tree borer is a native species, and was described by Thomas Say, of Philadelphia, early in the last century. It had then been

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known, however, as the peach-tree pest for nearly one hundred years. Its food plant prior to the introduction of the peach by Europeans was undoubtedly some of the wild cherries or plums of the Northeastern States. In other words, it is an Eastern species, and has followed the cultivated peach into the Middle and Western States. On the Pacific coast there is a closely allied species (*S. opalescens*) which takes its place as the important enemy of stone fruits. The Eastern species early attacked the cultivated peach and other stone fruits in New York and New Jersey. It is now widely distributed and is a common and perhaps the most important pest of these fruits in all the regions where they are grown east of the Rocky Mountains. Although it has been carried to the Pacific coast on nursery stock a good many times and obtained temporary foothold there, it does not seem to have ever permanently established itself in that region. The Pacific coast species named above is often confused with the Eastern species, but the two are quite distinct, although the habits and means of control are substantially the same for both species. This circular deals, however, with the more important Eastern species.

#### NATURAL HISTORY AND HABITS.

There is but one generation of larvæ annually. The moths appear as early as May in the latitude of Washington, D. C., and southward, over what approximates the lower austral region. In the upper austral region, roughly comprising the States above the cotton belt and below the northern tier, the moths do not appear until after the middle of June. In the transition region, which comprises the northern tier of States, together with most of New York and New England, the moths appear chiefly in July and later, emerging, however, as early as June, and belated individuals as late as October. June and July are therefore the months when the moths are the most numerous over the principal peach districts.

The egg is deposited on the bark, usually at or near the surface of the ground, although rarely it may be placed well up on the trunk or in the crotches of the larger branches. The egg is very minute, not exceeding 0.2 mm. in length, oval, yellowish brown in color, and irregularly ornamented with hexagonal sculpturing. The young larva on hatching is very active, and immediately burrows into the bark, usually entering at a crack. Having worked its way to the sapwood, usually near or below the surface of the ground, it feeds steadily during the balance of the summer and well into the fall, constantly enlarging its excavation, and causing the exudation of the gum intermixed with excrement and fragments of bark, which is so characteristic of its presence. It remains dormant in the larval state during winter and resumes feeding again the following spring, reach-

ing full growth in the central districts by the middle of June. It transforms to chrysalis within an elongate, cocoon-like cell constructed of its own frass and particles of bark attached with gum and threads of silk, and remains in this stage some three weeks. The males appear a few days earlier than the females.

The full-grown larva attains a length of about an inch, is rather robust, of a yellowish white color, with head and first segment brown.

#### PREVENTIVE MEASURES.

There is a great diversity of opinion as to the merits of the various preventive measures which have been suggested and practiced by different growers or economic entomologists and the results obtained by different individuals and from different regions are very much in conflict. This is doubtless to be explained by the differences in climate, care of application, or details of treatment which do not appear in the published accounts. One is not, therefore, obliged to discard a method as useless because some one experimenter has difficulty with it, but under such circumstances it is always advisable to make a careful preliminary test with a few trees before making a general application to an orchard.

Of the numerous mechanical and similar methods of preventing damage by the peach-tree borer the oldest and still one of the best is the process of mounding up earth about the trunks of the trees to a height of ten or more inches early in June and removing it again in the fall. This method is inexpensive and will protect the trees from a large percentage of the borers. It has been followed for nearly a hundred years, but perhaps it is not used now as much as formerly. As pointed out by Slingerland, it is especially of value in the case of nursery stock, where more artificial and possibly more efficient applications are impracticable.

Of the same order is the method recommended by Harris as early as 1826, which consists in removing a little of the earth from about the base of the tree and surrounding the trunk with a strip of sheathing paper 8 or 9 inches wide and extending 2 inches below the soil, secured with strings above and by replacing the soil about the trunk below. Any heavy paper or tarred roofing paper will answer the purpose. These wrappings may be removed in winter and renewed in June.

The idea of a more durable wrapping of this sort early suggested itself, and the late Dr. Lintner was perhaps the first to experiment with wire netting. Cylinders of window screen wire 15 inches in height were tied about the trees very much as the paper applications mentioned above. More careful experimentation in late years, especially by Mr. Slingerland, has demonstrated that wire netting is of no protection whatever, for, while the eggs can not be laid on the trunk

by the moths, young larvæ have no difficulty in crawling down from higher situations and gaining the usual position about the base of the tree.

To overcome the weak features of the wire screen netting, Prof. J. M. Stedman, of the Missouri experiment station, has employed a band of thin boards, which are securely wrapped and tied about the trees, the upper exposed end being stuffed with cotton about the trunk to prevent the larvæ from penetrating within the screened portion. This, in Professor Stedman's hands, has given excellent results, but in the hands of Mr. Slingerland the results were no better than with the wire screen.

Tying rye or other straw about the trunks has often been recommended and employed. It also has the objection of not affording very perfect protection on account of the possibility of the larva penetrating through straw and getting to the base of the trunk.

Another order of preventive applications are limy coatings to the bark, poisoned or otherwise, all of these applications extending from a few inches below the surface of the ground to a height of a foot or 18 inches, or, in the case of these lime coatings, even up to the lower branches. Some of these lime applications have had substances added to them to make them obnoxious to the moths, as, for instance, carbolic acid. Perhaps the best of these is the wash recommended by Mr. J. H. Hale. Two quarts of strong soap and a half a pint of crude carbolic acid, with 2 ounces of Paris green, are thoroughly incorporated in a bucketful of water and enough lime and clay added to make a thin paste. This application, in the hands of its originator and others, has given very good satisfaction, two applications, however, being sometimes necessary to get the best results. As will be noted, it contains a small amount of Paris green. The application of a reasonable amount of this poison to the trunk in combination with the lime is attended with no risk to healthy plants. Other mixtures containing arsenicals which have a glue or a paint base have proven injurious to the trees, and no strong arsenical application should be made to the trunk of the peach tree. The difficulty with the lime applications is that they are rather unstable in a climate where rainfalls are comparatively frequent and abundant; and, furthermore, if put on as a very thick wash, they are apt to crack and leave openings for the larvæ.

Gas tar was early recommended as a means of preventing damage by the peach-tree borer. The experience with it has been of a very contradictory nature, however. It has been very successfully employed for a number of years by Mr. Slingerland, who gives it his unqualified endorsement as perhaps the best method of preventing damage by this insect. On the other hand, as noted, gas tar has been used by other experimenters with disastrous results to the life

of the trees. There is no doubt, from Mr. Slingerland's work, that gas tar, lightly and properly applied to the trunk of the tree, will not endanger the health of the plant, at least under the conditions of temperature and moisture obtaining at Ithaca, N. Y. Its careless application, however, will probably result disastrously and it may be less safe in regions with moist and hot summers. In using this substance, therefore, one should first experiment with a few trees to be sure that a method is not adopted that will do material damage to the orchard. The ordinary gas tar is employed, heating it slightly so that it may be painted readily on the bark. Mr. Slingerland's experience showed that it freed the trees from four-fifths to all of the borers, but a small percentage of the trees becoming infested. All of these applications should be made early in June, or before the moths are out.

In addition to the above, a very large number of substances have been experimented with, including all which seemed to offer any likelihood of preventive value. Of these, those named above have yielded the best results.

#### REMEDIAL MEASURES.

The methods just outlined are preventive, and are designed to keep the peach-tree borer from ovipositing or to destroy the young larvæ before they have entered the bark. After a tree is once infested these external applications are of no avail, except to prevent additional attack. To kill the larvæ in the trees two or three methods may be followed. The old-time process of digging or cutting the larvæ out with a knife is undoubtedly the most effective and useful of all means of controlling the peach-tree borer, and is followed by some orchardists altogether, no effort being made to protect the trees from attack, reliance being placed solely in the removal of the larvæ in autumn or summer.

In California the related peach-tree borer referred to in the opening paragraph has been effectively controlled by the use of bisulphid of carbon. This substance has given very satisfactory results as reported by Prof. C. W. Woodworth; but, on the other hand, in the case of experiments made with it in New York by Mr. Slingerland, it proved a complete failure, and was condemned by him on account of its cost and its being dangerous to the health of the tree, and, at the same time ineffective as a means of destroying the borer. Its efficiency depends a great deal on the character and condition of the soil, and, taking the difficulty of determining and controlling this into account, and also the other objections to it, namely, cost and danger to the trees, it seems not a method to be generally recommended.

Douching the bases of the trees copiously with boiling hot water will also destroy the larvæ, but this entails the transporting of quan-

tities of water, kept at the boiling point, through the orchard, and on a large scale is rather impracticable.

The digging-out process, therefore, remains the simplest and most efficient. It entails very little expense, and after some experience can be done rapidly and with very little injury to the tree. The peach tree grows very rapidly, and any wound occasioned by cutting out some of the bark to get at the larvæ readily heals over and, at any rate, the damage is already done by the larvæ and is not very much increased by this treatment. Within certain limits one can take the most advantageous time for this work. The larvæ are small in the autumn and are located with greater difficulty than they are in early summer. During the winter they are hibernating, and the damage at this period is therefore at the lowest ebb. April or May is a good season for the work, as attended to then it prevents the early summer feeding. It will be advisable, however, to go over the trees again in June to pick up any of the larvæ which may have escaped the earlier examination. In June they are easily located by the larger size of their castings and pupal cases. To be effective this method should include not only the commercial orchard, but all old peach, cherry, and plum trees in yards or fields in the vicinity.

In conclusion it may be said that the peach-tree borer is one of the most difficult pests to control, and no one method probably will give complete freedom from it. Mounding, paper wrapping, or the deterrent washes should therefore be combined with the digging-out process, and if these are kept up as a regular yearly procedure this pest should be easily kept under, and the amount of labor entailed, especially in the digging-out work, should steadily diminish.

Approved:

JAMES WILSON,

*Secretary of Agriculture.*

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