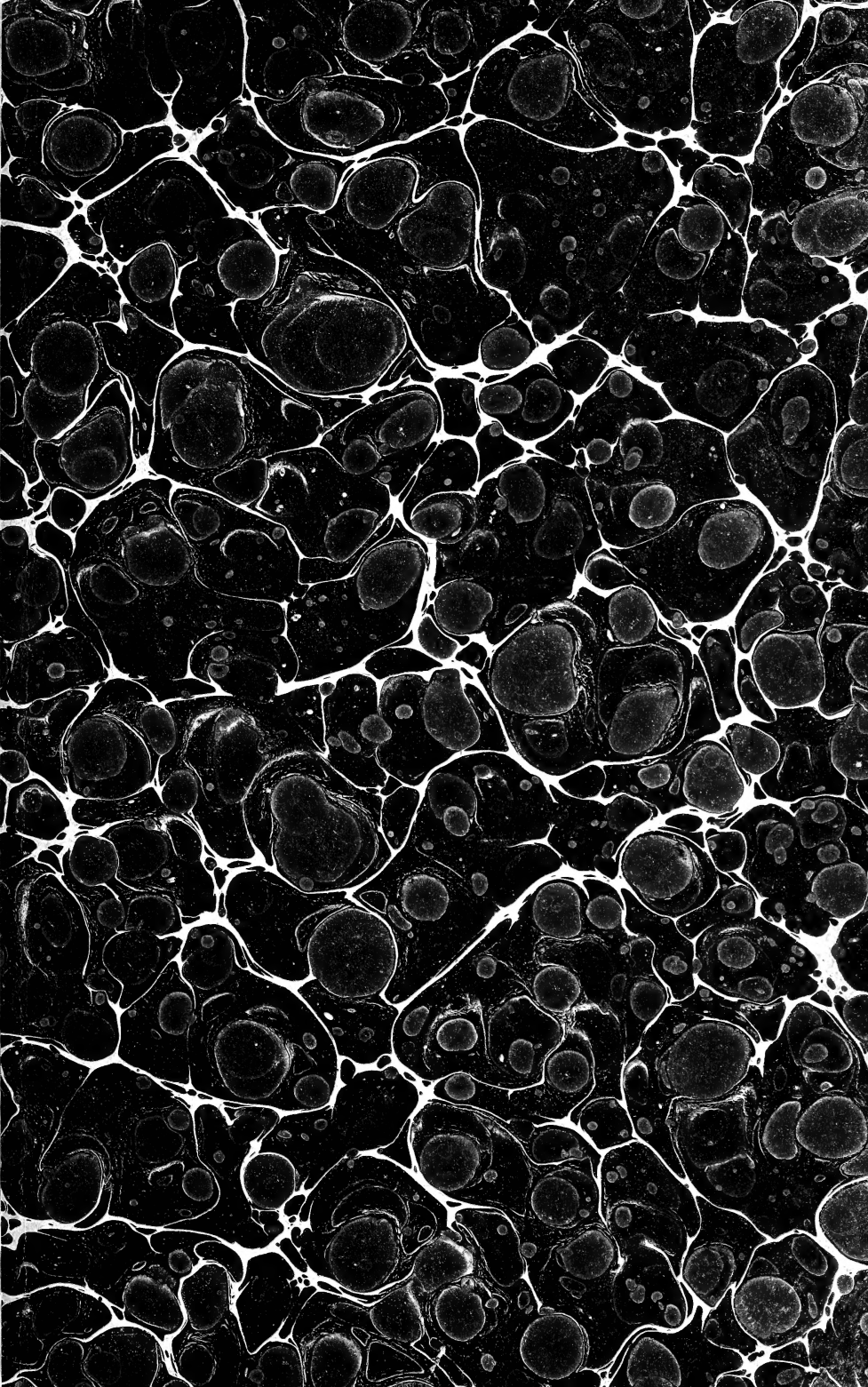

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United States Department of Agriculture,
BUREAU OF ENTOMOLOGY,
L. O. HOWARD, Entomologist.

THE TOBACCO THRIPS AND REMEDIES TO PREVENT "WHITE VEINS" IN WRAPPER TOBACCO.

(*Euthrips nicotianæ* Hinds.)[1]

By W. A. HOOKER, *Special Field Agent.*

In the tobacco thrips, an insect until recently unknown to science, we have a pest that has become of great economic importance. It is closely related to the minute yellowish wheat thrips (*Euthrips tritici* Fitch) that is common everywhere in blossoms of all kinds. It may be distinguished, however, by its brown color. The common onion thrips (*Thrips tabaci*) of this country was originally described by Lindeman as attacking tobacco in Russia, but since it has never been found to do so in the United States, this new pest may be termed "the tobacco thrips."

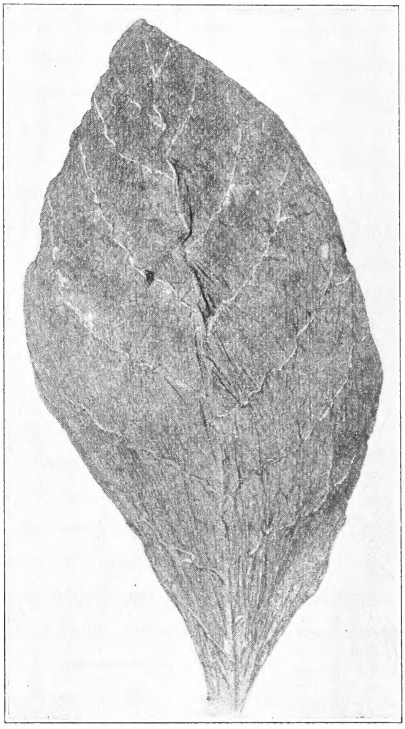

FIG. 1.—Leaf of tobacco, showing "white veins" caused by *Euthrips nicotianæ* (original).

This insect injures shade-grown cigar-wrapper tobacco in Florida, southern Georgia, and Texas, and thus appears to be widely distributed through the South. Its occurrence in Texas was discovered the past summer. The adult thrips in feeding on the upper surface of the leaves, as is their custom, remove the sap from the lateral veins and veinlets, which when fermented and ready for the trade become of a much lighter color than the other parts of the leaf. These light veins (fig. 1) are objectionable, since they appear in the manufactured cigars. As a result, tobacco thus affected is reduced in

[1] Described in the Proceedings of the Biological Society of Washington, Vol. XVIII, pp. 197–200, September, 1905.

value at least 50 per cent. The expense in grading is also largely increased. When we consider that the tobacco thus injured is the highest grade grown in this country, it will be seen that the loss thus occasioned is a large one.

The adult tobacco thrips (fig. 2) appear to pass the winter in the tobacco fields. They were found in the fields when first visited, the middle of April, feeding upon the young cocklebur, the principal weed. From the weeds they spread to the tobacco plants when the latter were transplanted. They first appear upon the lower leaves, from which they spread to the leaves above, the lower leaves thus being the worst affected.

The eggs are deposited in tissues of the stem and leaves. On hatching, the larvæ feed largely on the lower surface of the leaves, but as they reach the adult stage seem to prefer the upper surface, and this habit is taken advantage of in remedial treatment. The life cycle is passed in twelve or thirteen days. By this rapid reproduction from the comparatively few that pass the winter successfully, they soon reach vast numbers and become the source of extensive injury. After the tobacco is harvested the thrips live on the weeds in the field until cold weather drives them into hibernation.

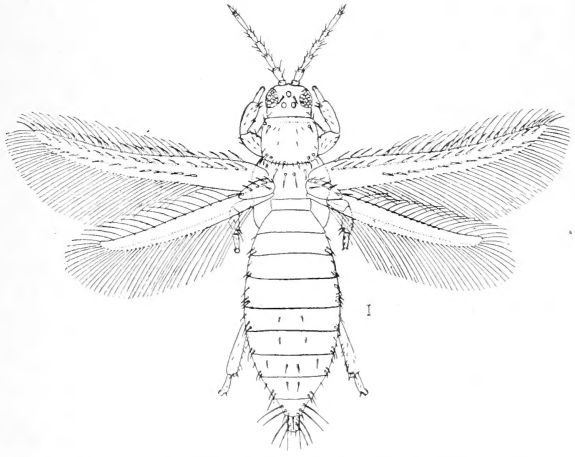

FIG. 2.—*Euthrips nicotianæ:* Adult insect, much enlarged (original).

REMEDIES.

Remedies may be considered under two heads, namely, cultural methods and insecticide applications.

CULTURAL METHODS.

The practice of locating the seed bed in the tobacco field is a bad one, as it furnishes a breeding place from which to spread into the field, not only for thrips, but for other pests, flea-beetles especially. When necessary so to locate the seed bed, frequent applications of kerosene emulsion, as herein described, and arsenicals, should be made.

At present it would seem advisable that clean culture be practiced between crops. It may be found, however, that kerosene emulsion will sufficiently control the pest, in which case catch crops may be grown.

As the pest is found to breed in countless numbers in oats, it seems advisable that these should not be grown in the immediate vicinity of the tobacco field.

INSECTICIDE APPLICATIONS.

From the habit possessed by the adult thrips of feeding on the upper surface of the leaf, we are able to combat it with a contact spray. In experiments carried on the past summer with insecticides, kerosene emulsion was found to be the most desirable and effective remedy.

Kerosene emulsion.—The following formula is recommended for the stock solution:

Kerosene	2 gallons.
Water	1 gallon.
Hard soap	½ pound.

The soap should be cut into fine shavings and dissolved by boiling in the gallon of water. The water should then be added to the kerosene while still hot and churned by means of a force pump, pumping it back into the same receptacle for ten minutes. When thoroughly emulsified, it has a creamy appearance and upon cooling becomes much thicker. By the use of a certain naphtha soap an emulsion can be readily made in the field with cold water. When so made, twice the amount of soap called for in the formula will be necessary. Care should be taken in making up the stock solution that it be completely emulsified, else, when diluted, free oil will appear and will burn the leaves.

Very particular attention was paid to the possible effect that the emulsion might have upon the aroma, but no trace whatever of such could be detected.

WHEN TO APPLY THE EMULSION.

The emulsion should be first applied when the plants are in the seed bed. A number of applications will be found necessary in order that the thrips be killed and not carried into the field when the plants are transplanted.

Spraying in the field should commence at once, as soon as the plants are transplanted. Two applications a week seem advisable.

While another season will be required to determine the matter fully, yet it seems probable that the pest can be almost entirely checked if the spraying is started while the plants are in the seed bed and continued regularly. Ten weeks is estimated as the maximum period in which spraying will be necessary.

Since, in combating the budworms of tobacco,[1] it is necessary to apply Paris green to the bud,[2] care must be taken not to spray the emulsion

[1] *Chloridea virescens* Fab. and *Heliothis obsoleta* Fab.

[2] For the budworms one tablespoonful of Paris green to a peck of corn meal is applied in the bud two or three times weekly.

into the bud more than is necessary, else burning is likely to follow. As the plants get larger this can easily be avoided. It will be found well to apply the Paris green and meal on the morning following the spraying, when possible.

HOW TO USE THE EMULSION.

One part of the stock emulsion to 10 parts of water has been found to be effective. The emulsion may be readily diluted to the required strength, in large quantities, in barrels or casks set near the rows to be sprayed. In the experiments at Quincy, Fla., the kerosene was found to separate from the soap to some extent when left standing; it will, therefore, be safer not to dilute it until ready to spray.

The tobacco may be sprayed during the day until 6 inches in height, for even if burning should take place the leaves injured will be those that would soon drop off. As the plants get larger, however, it has been found necessary to spray in the evening, shortly after 5 o'clock. On very bright, hot days it will be necessary to wait until a little later. On large plantations this gives insufficient time during daylight, and spraying after dark has been found necessary. In so spraying after dark, the use of two pumps to a row, one on each side, preceded by a boy with a lantern or torch, is a very satisfactory and economical method of application. Care should be taken that the spray be distributed over all the leaves, as it must come in contact with the thrips when sprayed in order to be effective.

COST OF SPRAYING.

The applications necessary to keep the pest in check will be found to vary considerably, depending upon the amount and period of rainfall. It seems improbable that two applications weekly will be found necessary for the maximum period of ten weeks. Even if found necessary, it is roughly estimated that the expense will not exceed $20 per acre.

Apparatus.—The use of a knapsack sprayer has been found to be the most practical method of applying the emulsion. These sprayers can be purchased at prices ranging from $5 to $15.

SUPPLEMENTARY NOTE.

During the work on this insect the writer was associated with Mr. W. W. Cobey, tobacco breeding expert of the Bureau of Plant Industry, from whom valuable advice and suggestions were received.

Mr. Cobey writes as follows regarding the effect of spraying on the character of the tobacco:

> It is the opinion of the writer, after a careful comparative study of the treated and untreated tobacco, that the use of kerosene emulsion on tobacco, when carefully prepared and applied at the proper time, under favorable conditions, is in every way practical and can be profitably employed by tobacco growers in pre-

venting almost wholly the ravages of this insect. There was considerable apprehension among the tobacco growers at first regarding the probable injurious effects of the kerosene emulsion on the character of the tobacco. However, a careful study of the cured and fermented tobacco from the sprayed plants showed that the spraying with kerosene emulsion had not injured the quality or reduced the value of the crop. It has been impossible to discover any difference in the color, elasticity, or flavor of the treated and untreated tobacco after curing and fermenting. On the other hand, the prevention of injury to the tobacco by the thrips, by means of the kerosene-emulsion spray, prevented a serious loss to the grower.

The injured tobacco may be fermented sufficiently to even up the color of the leaves and darken the white or discolored veins so that the injury will not be noticeable, but this severe sweating will darken the leaves to such an extent that they can only be classed as dark wrapper.

For the benefit of those who may apprehend injury to the quality of the tobacco it may be said that the experiments conducted last season indicate that when spraying is begun very early in the season it will not be necessary to continue it after the crop is about half grown.

SUMMARY.

It has been found that this pest can be successfully combated, and the following recommendations are therefore made:

(1) Clean cultivation of the field between crops.

(2) The planting of other than cereal crops in bordering fields.

(3) The application of kerosene emulsion (1 part to 10 parts of water) with the knapsack sprayer twice a week regularly, as herein described, commencing while the plants are in the seed bed.

Caution.—Care must be taken that the mixture be thoroughly emulsified, else burning will follow its application.

The emulsion should not be diluted until ready for spraying.

Spraying must be done in the evening (after 5 o'clock), else the sun's rays will cause a burning of the leaves following the spray.

Spraying should not closely follow an application of Paris green, and when preceding it the plants should be allowed to dry before the Paris green is applied.

Care should be taken not to spray into the bud, so far as it can be avoided.

Approved:

JAMES WILSON,
Secretary of Agriculture.

WASHINGTON, D. C., *February 26, 1906.*

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