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THYSANOPTERA OF THE GEENTON

(Continued from No. 1, Page 15)

J. R. WATSON

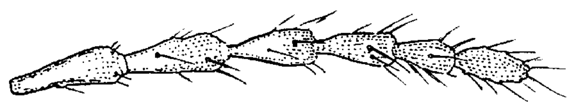
Hoplothrips (Trichothrips) wilsoni sp. nov.

Female (apterous): Length about 2.9 mm. (some over 3 mm.); color yellow brown, prothorax and apical abdominal segments somewhat darker; head brownish-yellow; legs somewhat lighter yellow; tube grayish yellow in apical third, shaded with brown in basal two-thirds; abdominal segments five to seven, bordered posteriorly with darker transverse bands; antennal segment two and basal half or more of three, concolorous with the head, segment one shaded darker especially at base, 4 to 8 blackish-brown, 4 a shade lighter than the others. Hypodermal pigment orange by reflected light, maroon by transmitted light.

Head a trifle longer than broad. Dorsum faintly striated at the sides. Cheeks slightly arched, quite strongly converging posteriorly, abruptly widened behind the eyes where they usually bear one or two small spinose tubercles. Postocular bristles pale, slightly curved, and long (152 microns), extending far beyond the eyes, pointed at tip, a small bristle between the base of each antenna and the eye. No other prominent bristles on the head. Eyes small, usually showing but 4 or 5 facets in lateral outline, dark. Mouth cone short and broadly rounded, reaching but little over half way across prosternum. Antennae about twice as long as head; segment one, oblong in outline, sides nearly straight and converging but slightly apically. Segment two, barrel-shaped apically, at about two-thirds the distance from the apex abruptly contracted (especially on the outer margin) to a broad pedicel, bent sharply outward; 3 to 5 clavate, broadest about one-fourth the distance from the apex and from there gradually converging to a broad base; 6 and 7 barrel-shaped, more abruptly contracted to narrower pedicels; 8 conical, abruptly contracted to a narrow, short pedicel. Sense cones colorless and stout; those on segments 6 and 7 are especially long and stout (about 26 microns long). Bristles also very pale.

Prothorax about as long as the head, and (including coxae) nearly twice as broad as long, smooth. A moderately long bristle on each anterior angle, and two pair of minute ones along the anterior margin. Dorsal and median to the latter is a pair of somewhat larger ones. A pair of long (152 microns) bristles on each posterior angle, the outer of these strongly curved. A somewhat shorter bristle on each coxa is bent sharply forward at about the middle and again backward near the end; a few short bristles scattered over the dorsal surface of the prothorax. All bristles pale yellow; pointed at tip.

Mesothorax somewhat narrower than the prothorax (including coxae); sides nearly parallel but diverging slightly posteriorly. Legs rather short. Fore femora much enlarged. Fore tibia with a pair of thick short anteriorly directed lobes at the apex on the inside. (These are appreciably smaller than those shown in the figure of the male.) Fore tarsus with a large, slightly curved tooth which is considerably longer than the width of the tarsus.



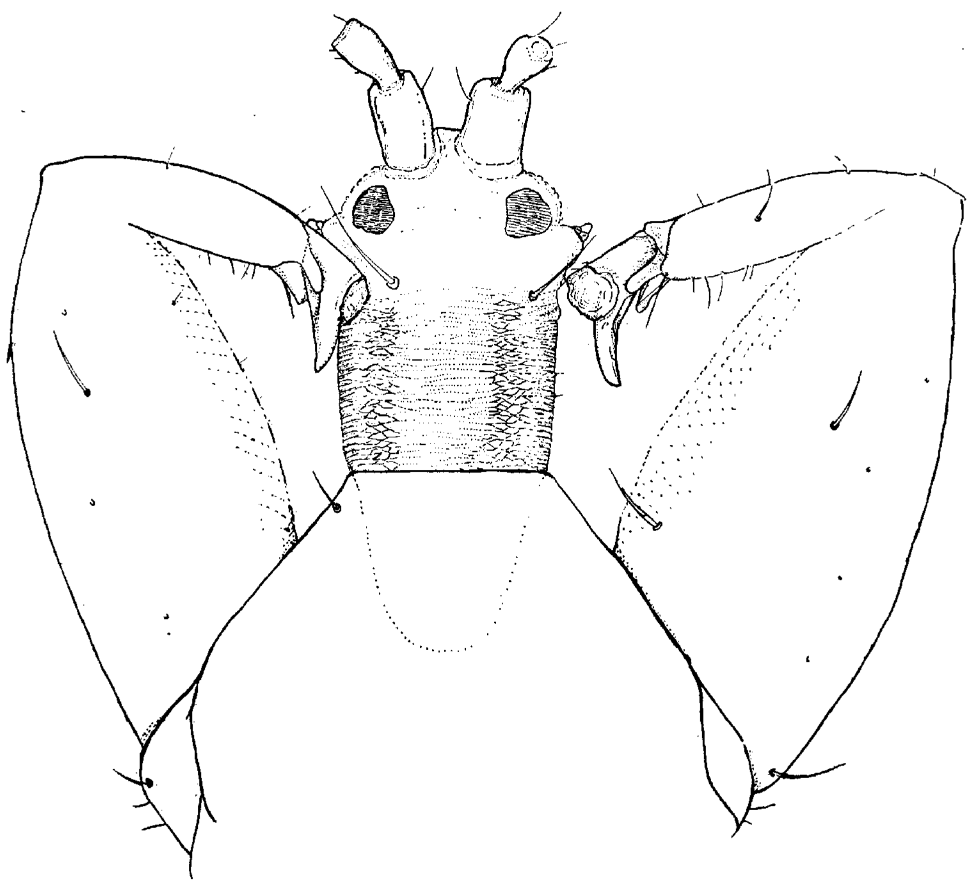


Fig. 1.—Male of *Hoplothrips (Trichothrips) wilsoni* n. sp.
(Drawing by L. S. Maxwell)

Abdomen thick and heavy, widest at about segment two from which it is gradually rounded to the base of the tube. Bristles near the posterior angle of segment nine 200 microns long. Tube nearly as long as the head.

Sides straight in apical two-thirds but somewhat swollen in basal third. Six pair of terminal bristles; the dorsal laterals 187 microns long. The dorsal mediads are only about a third as long and pale yellow. The ventral mediads still shorter and colorless.

Measurements of type: Total body length 2.9 mm.; head, length .30 mm., greatest width (immediately behind eyes) .27 mm.; prothorax, length .30 mm., width (including coxae) .56 mm.; mesothorax, greatest width .54 mm.; abdomen, greatest width .71 mm.; tube, length .26 mm., width at base .102 mm., at apex, .047 mm. Antennae, total length .59 mm.; segments, length (breadth): I, 59 (54); II, 70 (40); III, 102 (40); IV, 94 (41); V, 78 (35); VI, 70 (30); VII, 59 (29); VIII, 51 (23) microns.

Female (macropterous): Appreciably smaller than the apterous females. Color darker, especially the head which is concolorous with the prothorax, dark brown. Tube and especially the legs more heavily shaded with brown, only fore tibia and tarsi brownish yellow. Only basal half of antennal segment III brownish yellow; other segments dark brown, II a shade lighter.

Head fully as wide as long in the type, but some paratypes have the head shape more nearly approaching that of the apterous females. Much less abruptly swollen behind the eyes and usually without the spinose tubercles. Dorsum more conspicuously striated than in most of the apterous females. Eyes large, occupying about .4 of the lateral outline of the head, finely faceted. Ocelli large, light yellow, bordered by dark red irregular, blotch-like crescents. Posterior pair situated about opposite the middle of the eyes and contiguous with their margins.

Wings short, membrane reaching to about the seventh abdominal segment, shaded lightly with gray, closely fringed with rather short hairs, from 13 to 16 accessory ones on the fore wings.

Measurements of type: Total body length 2.6 mm.; head, length .23 mm., greatest width .24 mm., at base .21 mm.; prothorax, length .26 mm., width (including coxae) .44 mm.; mesothorax, width .45 mm.; abdomen, greatest width .61 mm.; tube, length .26 mm., width at base .096 mm., at apex .047 mm. Antennae, total length .62 mm.; segments, length (width): I, 58 (52); II, 70 (35); III, 105 (46); IV, 101 (44); V, 84 (35); VI, 74 (32); VII, 65 (26); VIII, 59 (20). Postocular bristles 128, outer ones at posterior angle of the prothorax 133; terminals of the tube 210 microns.

Male (apterous) (Figure 1): Body yellow brown, similar to that of the apterous female but head, fore legs, the second antennal segment and basal half of third usually much lighter yellow.

Head (excepting the tubercles) usually narrower, especially posteriorly, but in some males approaches in shape that of the female.

Tubercles very variable in size. In some (Fig. 1) very large, in others minute or entirely lacking. Posterior to this large tubercle there are often two or three smaller ones. The most posterior one about the middle of the cheek.

Reticulations on the dorsum more conspicuous than in the female, near the base forming a net-like structure. Frons clouded with brown as is antennal segment I, especially at the base.

Prothorax a third longer than in the female. Fore femora often greatly enlarged, much larger than the head. But this characteristic is very variable, in many males being scarcely at all enlarged. The spur at the apex of the lower surface of the tibia larger than in the female, concolorous with the tibia and with it an additional spur, larger, pointed, and much darker in color.

Measurements: Total body length 2.7 mm. Head, length .30 mm.; width across tubercles .27 mm., at base .19 mm.; prothorax, length .42 mm., width (including coxae) .56 mm.; mesothorax, width .54 mm.; abdomen, greatest width .66 mm.; tube, length .21 mm., width at base .09 mm., at apex .04 mm. Antennae, total length .65 mm.; segments, length (breadth): I, 84 (47); II, 75 (37); III, 112 (41); IV, 103 (37); V, 85 (35); VI, 73 (28); VII, 58 (28); VIII, 59 (20) microns. Postocular bristles 140; those at posterior angles of prothorax 136; terminal 170.

Nymph: The life history of the insect has not been worked out but four rather definite sizes were collected in addition to the pupae and prepupae. The first two differ markedly from the third and fourth in the shape of the antennal segments and probably represent different instars.

Length about .6-.7 mm. Color brownish gray with much orange hypodermal pigment. Last abdominal segments lighter. Eyes red by reflected light, black by transmitted. Antennae nearly half as long as the head; seven-segmented. Segments I-VI about as wide as long.

Length about 1.0-1.1 mm. Last two abdominal segments darker, light brown. Antennal segment I gray; II-V darker gray; VI and VII brown. Antennal segments about the shape of those in above; VII conical, more than three times as long as wide; IV the largest.

Length 1.3-1.8 mm. Color light grayish brown with much bright crimson hypodermal pigment, often arranged in transverse bands across the abdomen. Terminal segment of abdomen grayish yellow, the next deeply shaded with brown. Head with straight parallel sides. Segments I and II of antennae mostly concolorous with the head; II shaded with brown at the base; III-VII dark brown; III with a brownish yellow pedicel; III-VI elongated, club shaped; VII cylindrical (37 microns long), subequal to VI, rounded at end. Total length .35 mm. Eyes very small, black.

Length 1.7-2.2 mm. Color yellowish brown with red hypodermal pigment arranged as in the last. Last two segments of abdomen darker brown. Head small; .19 mm. and .15 mm. wide. Frons rounded with two slightly curved bristles projecting forward half as long as the head. Antennae as in the previous ones.

Prepupa 1.4-2.1 mm. long. Color light brown, head wider than long, (.25 : .21 mm.). Eyes black.

Pupa: Uniform yellowish brown with red hypodermal pigment.

Described from sixty apterous and eighteen winged females, thirty-two males, and numerous nymphs collected by Dr. J. W. Wilson and the author, between November 17, 1935 and March 31, 1936 from the trunk of a silk oak tree, *(Grevillea)*, infected with *Diplodia* rot and exuding much gum, at Leesburg, Florida. The insects were all associated with the gum from the rot.

J. D. Hood has called the author's attention to the close relationship of this species to his *calcaratus* described from Trinidad, (Psyche, 1925, p. 57). This species can be readily distinguished from *calcaratus* by its larger size and much darker color, the much longer and sharper spine on the fore tibia, (in *calcaratus* this is triangular in shape), and many other characters.

Adraneothrips pallidus (Watson)

In 1924 (Fla. Ent. VIII, p. 50) the author described this insect under the name of *Gastrothrips* ? *pallidus*. In the following year Hood (Psyche, XXXII, p. 54) established the genus *Adraneothrips*. To that genus this species evidently belongs since the wings are constricted in the middle as in *Haplothrips* but do not broaden again apically but remain narrow to the tip. This genus is evidently a large one in the American tropics. Many species have been described and the writer has several more taken mostly from banana refuse. This thrips is the most hydrophilous of those of the geenton, being the most abundant species in moulding leaves in low swampy hammocks just above the water level and in Spanish moss on trees. It has also been taken from *Tillandsia* on trees, *Polyporus gilvus* and *Chiodecton rubrocinctus* on the bark of trees. It has been taken from Lloyd (only a few miles from the Georgia state line) to Key West and on a lemon from Cuba.

Eurythrips batesi (Watson) and *E. reticulatus* (Watson)

Mr. Dudley Moulton has called the writer's attention to the characters which place these species described under *Glyptothrips* (Fla. Ent. XVIII, p. 45-46, 56-57) in the genus *Eurythrips*.

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ADDITIONAL NOTES ON NAUPACTUS LEUCOLOMA

J. R. WATSON

Since the article in the last number of the FLORIDA ENTOMOLOGIST (Vol. XX, No. 1) was published, some further observations have been made on this insect, which will be recorded here.

The adults, which began to emerge about the middle of June, apparently reached their maximum numbers about the 10th of July. During this month two trips were made to the infested region and observations made on the habits of the adults.

One of the most surprising discoveries at this time was made by Dr. A. N. Tissot of this department; namely, that no males are produced. This, however, is not unique in this group as a Russian entomologist, Silantjev, has recorded similar phenomena in a related genus. It does, however, immensely increase the danger of its being carried into uninfested sections, since but a single female or even a grub might start an infestation.

In mid-July the adults are distinctly shade lovers. During the middle of the day they are found in places protected from the sun. On the cotton plants most of them crawl to near the terminal bud where they are well shaded by the upper leaves. When infesting peanuts they crawl down to near the base of the plants, where they receive some shade from the stems. Late in the afternoon, earlier if it is cloudy, the adults leave the shade and begin to crawl actively over the ground, laying their eggs at the same time. Some were observed to crawl at the rate of about four feet per minute.

The eggs are laid in the ground, if it is not too hard. Otherwise many of them are laid on sticks and stones and other materials. They are surrounded by a gelatinous material to which numerous grains of sand adhere, so it is very difficult to distinguish the eggs in the soil. The eggs are oval in shape, about one-sixteenth of an inch long, and somewhat less in width. They are yellow in color.

The preferred foods of the adults are somewhat more restricted than are those of the larvae. Peanuts, beggarweeds, cocklebury and cotton seem to be favorites of the adults. A few were feeding on *Passiflora,* and still fewer on the so-called "Mexican clover" *(Richardia).* None were observed on corn, cane or other grasses. However, if the corn, which was approaching maturity, had been young and tender it might have been attractive.

In some fields the weevils were extremely numerous. Some workers in the U. S. Bureau of Entomology estimated that there were as many as 400,000 per acre in some fields. Although the adults do not seem to be hearty feeders, they nevertheless in many fields had entirely exhausted their food plants and migrated to other fields. The amount of damage that they can do and their migratory habits are illustrated by the history of two fields, adjacent to each other, on an infested farm.

One field was planted to peanuts in 1936 and, according to the County Agent, was a "complete loss". When this field was visited in May of this year it had again been planted to peanuts, and the grubs in this field were extremely scarce. On the contrary, in an adjoining field of corn they were extremely abundant—so much so that in one section of this field, about four acres in extent, not a single ear was produced, and only a few suckers were left standing. By the middle of July the ground in this field was peppered with the exit holes of the adults, but very few adults were found in this field. There had been a heavy migration back to the peanut field first mentioned, where the beetles were actively laying eggs. Doubtless if no control measures are taken the history of 1936 will be repeated in this field—the peanuts will be a total loss. The reason that there were so few larvae to be found in this field in May of this year is evidently because the larvae had destroyed all the host plants in this field and forced the adults to migrate to the field planted this year in corn where they laid their eggs, and this year they did likewise to the corn and migrated back to the peanut field.

They are clumsy creatures and are utterly unable to climb out of a furrow a few inches deep, providing the sides are dry and crumbly. County Agent Wilkins was the first to notice this characteristic and to suggest catching them in furrows plowed around the infested fields. This measure has been adopted by the Bureau of Entomology, since they have taken charge of control measures in the infested territory. If post holes are dug every few feet along the bottoms of the furrows they are even more certain to capture the beetles.

The insects evidently spend the winter in the grub stage, as farmers state that in plowing as early as December they turn up numerous grubs. This observation has been verified by Professor W. B. Gurney, New South Wales, Australia. In a letter to the writer he states that the "Winter is passed in the larval stage".

Professor Gurney also reports that this insect has been found in only one locality in New South Wales. "Up to the present the weevil has only been recorded at Willow Tree on the Northern table-lands 250 miles north from Sydney. It is not known how it was introduced, nor how it reached Willow Tree, which is so far inland from Sydney, without becoming established in other localities closer to Sydney. No detailed studies of the pest have been made, but the adult weevil lays its eggs by inserting the tip of the abdomen into the soil. The larvae feed upon the tap roots of lucerne, sometimes completely severing it, but more often making deep furrows along the roots."

It is thus seen that its history of introduction into New South Wales parallels that of Florida and Alabama, in that it appeared at an inland station many miles from any port through which it was probably introduced, though it has been recently found about Gulfport and Laurel, Mississippi.

It was observed that chickens and hogs are very fond of the beetles. Doubtless guineas and turkeys would be equally so, and because they roam farther afield, would be more effective in their control. However, as abundant as these beetles were in some of the fields it would take very large numbers of poultry to effect anything like a thorough clean up.

The observations made this summer on the insect indicate that we have here a very dangerous pest to the agriculture of the entire south, and probably southwest since in Australia it is a pest of Alfalfa. The insect in the larval stages feeds greedily on the majority of the common crops in this section, and it will certainly be difficult to raise a spring crop next season in fields where the beetles have been abundant this summer.

PROGRESS REPORT ON DUSTS CONTAINING ROTENONE FOR THE CONTROL OF FLEA BEETLES ATTACKING SHADE-GROWN CIGAR-WRAPPER TOBACCOS

By F. S. CHAMBERLIN and A. H. MADDEN
United States Department of Agriculture
Division of Truck Crop and Garden Insect Investigations
Bureau of Entomology and Plant Quarantine

From information obtained thus far it appears that dust mixtures containing rotenone have established their value in combating flea beetles upon shade-grown cigar-wrapper tobacco, especially the types of tobacco grown in northern Florida, southern Georgia, and the Connecticut Valley. In the Georgia and Florida producing region the crop is attacked by the tobacco flea beetle *(Epitrix parvula* F.), while in the Connecticut Valley the potato flea beetle *(E. cucumeris* Harr.) is the attacking species. While dust mixtures made from ground derris root will apparently exert a control quite similar to that of cube root powder, the latter material thus far has been used almost exclusively in investigational work and in commercial control operations, owing to its lower cost.

The advantages of rotenone dust mixtures.—The three main advantages of the rotenone-bearing dust mixtures made of cube powder over the insecticides used previously to control flea beetles on shade-grown cigar-wrapper tobacco are speed of action, safety to the crop, and absence of objectionable residue, combined with a relatively high toxicity to the insect. A quick kill of flea beetles is essential in the case of wrapper tobacco, where the leaves are the marketable part of the crop and where even a few small holes detract from the value of the cured product. The rotenone dust mixtures meet this requirement to a greater extent than any of the materials utilized previously for flea beetle control. Safety to foliage is a most exacting requirement for an insecticide to be used in the culture of wrapper tobacco. Any insecticide that has a tendency to burn, bleach, or discolor the leaves to a noticeable degree is automatically eliminated from further consideration. The question of residue on the crop, on the majority of the common crops in this section, and it will certainly be difficult to raise a spring crop next season in fields where the beetles have been abundant this summer.

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The disadvantages of rotenone dust mixtures.—The outstanding disadvantage of this material is that its efficiency is of short duration under the conditions imposed in tobacco shades. During the month of May 1936 a limited series of experiments designed to show the deteriorating effect of sunlight upon cube was carried out with three samples of dust mixtures containing 1.5, 1, and 0.5 percent of rotenone, respectively. Each dust mixture was applied carefully to the foliage of a different half-grown potted tobacco plant in such a manner that a very light film of the material was visible upon the leaf surface. The plants were kept beneath a cloth tobacco shade from 8 a. m. to 5 p. m. each day of the exposure period, with the exception of a few short rainy periods, at which times they were removed to a closed shed. They were also placed within the closed shed each night to protect them from the washing effect of dew or possible rains.

Immediately after the dust applications had been made, one half of a 12-inch leaf was removed from each of the three treated plants and from an untreated check plant. These leaf parts, each containing approximately 40 square inches of leaf surface, were placed within large lantern globes protected from direct sunlight. One hundred tobacco flea beetles *(Epitrix parvula* F.) were then introduced into each cage. Forty-eight hours later the beetle mortality was determined in each of the cages. Similar-sized leaf parts were removed from each of the plants after exposure to the sun for 24, 42, and 50 hours, respectively, and the toxicity of the dust-mixture residue was determined in the manner just described. The results of these tests indicated that the cube dust mixture containing 1 percent of rotenone exerted a 74 percent kill of the flea beetles after an exposure of 24 hours to sunlight, which was about the equivalent of 2 days of cloudless exposure. This work also indicated that the dust mixture containing 1.5 percent of rotenone maintained its toxicity much longer than the 0.5 percent material.

From the information now available it appears probable that the effectiveness of cube dust mixtures containing 1 percent of rotenone is limited to about 3 days under field conditions. The value of cigar-wrapper tobacco, however, is comparatively high, and frequent applications of the poison are justified in order that the flea beetles may be controlled.

Cube is not toxic to grasshoppers and it exerts only a very limited control of the tobacco hornworms *(Protoparce* spp.) and the tobacco budworm *(Heliothis virescens* F.). Applications of paris green, which are made occasionally to shade-grown tobacco for flea beetle control, aid materially in the control of the above-mentioned pests.[1] The outstanding disadvantage of paris green, however, is the burning hazard which attends its use even under the most favorable conditions. Barium fluosilicate, which is used frequently and is effective in controlling flea beetles upon newly set tobacco, is also very effective in controlling grasshoppers on the young plants.[2] The use of this insecticide upon large wrapper tobacco is hazardous, however, since it may cause burning of the leaves under certain weather conditions.

Dilution of cube root powder and dosage rates.—Preliminary field tests conducted during 1934 and 1935 indicated that a cube dust mixture with a rotenone content of approximately 1 percent is effective in controlling flea beetles on cigar tobacco. During 1936 additional data were obtained from an experiment performed in a 1⅓-acre shade of tobacco grown under contract by the North Florida Experiment Station, to determine the relative toxicity to the tobacco flea beetle of three cube dust mixtures containing 0.5, 1, and 1.5 percent of rotenone, respectively. The dust mixtures were applied by a hand duster to individual plots, 69 feet wide by 50 feet long, arranged as a Latin square. Each treatment was replicated three times and a series of four untreated check plots was included. Previous experience has shown that counts of living or dead flea beetles made within the dense growth of a tobacco shade are of questionable accuracy. For this reason the effectiveness of the three treatments was determined from the percentages of beetle-injured leaves. This work was facilitated greatly by spreading the cured sample leaves in a moist and pliable condition upon a large glass plate which was illuminated from below. Five applications of the dust mixtures were made during the season, at the rate of 7 pounds per acre per application. No attempt was made in this experiment to obtain a complete control of the beetles, since a sufficient degree of feeding was desired so that significant comparisons could be made. The applications of the insecticides

[1]CHAMBERLIN, F. S., and TENHET, J. N. 1923. The tobacco flea beetle in the southern cigar-wrapper district. U. S. Dept. Agr. Farmers' Bul. 1352. 9 pp., illus.

[2]CHAMBERLIN, F. S. 1933. Barium fluosilicate as a control for the tobacco flea beetle. Jour. Econ. Ent. 26 (1):233-6.

were delayed, therefore, until the progeny of the over-wintered beetles had emerged from the soil.

The results, which are given in Table 1, show that relatively light applications of a cube dust mixture exert a marked controlling effect against the tobacco flea beetle. They also indicate that dust mixtures containing 1 and 1.5 percent of rotenone, respectively, exert a greater controlling effect upon the insect than a dust mixture containing 0.5 percent of rotenone. The data should not be construed, however, as indicating the necessity of using dust mixtures containing 1.5 percent of rotenone, since it is possible that commercial control may be obtained with material of lower rotenone content applied at the proper intervals. Until additional data are obtained it seems desirable to continue the present recommendations of a 1 percent rotenone-bearing dust mixture for the control of flea beetles upon shade-grown cigar-wrapper tobacco.

TABLE 1.—THE PERCENTAGE OF TOBACCO LEAVES INJURED BY FLEA BEETLES WHEN TREATED WITH DUST MIXTURES CONTAINING VARIOUS PERCENTAGES OF ROTENONE.

Rotenone content of dust mixture	Injured leaves
Percent	*Mean percent*
1.5	20.5
1.0	31.9
0.5	44.1
Check	75.2

Rotenone dust mixtures appear to kill flea beetles principally because the irritating properties of this insecticide impel the beetles to "clean up" after coming in contact with it. Dosages of this insecticide should, therefore, be sufficient to give good coverage of the plants. For newly set tobacco plants a dosage of 4 or 5 pounds per acre should be sufficient, while in the mature crop a dosage of 8 to 10 pounds per acre is believed necessary.

Choice of diluent.—Finely ground Georgia clay, kaolin, or diatomaceous earth may be used as the diluent for cube root powder when the dust mixture is to be applied to newly set tobacco. The application of these white-colored materials to the maturing crop may, however, cause a discoloration of the cured product. Experiments have shown that finely ground tobacco dust is a satisfactory diluent for use on cigar-wrapper tobacco, and it leaves no discoloration. While the addition of a small proportion of clay to the tobacco dust may improve its physical qualities, the quantity of clay added should not be sufficient to change perceptibly the brown color of the tobacco dust. Tobacco dust used for this purpose should be certified by the manufacturer as being sterilized and free from pathogenic organisms which might spread tobacco diseases.

Time of day for applications.—While positive proof is not yet available, the writers are of the opinion that cube dust mixtures should be applied to cigar-wrapper tobacco early in the morning, late in the afternoon, or in the evening (Fig. 1). Weather conditions are usually most favorable for efficient dust applications during these hours of the day and the dust mixture appears to be more effective under moist than under dry conditions. Growers in the Florida area have found this true in practice and frequently apply the dust mixture to their tobacco crops immediately after a light rainfall. The safety of the material under these critical conditions is in marked contrast to the insecticides formerly used to combat flea beetles. Since maturing shade-grown tobacco is frequently damp for a large proportion of the day, the safety of rotenone-bearing dust mixtures under these conditions is a great advantage.

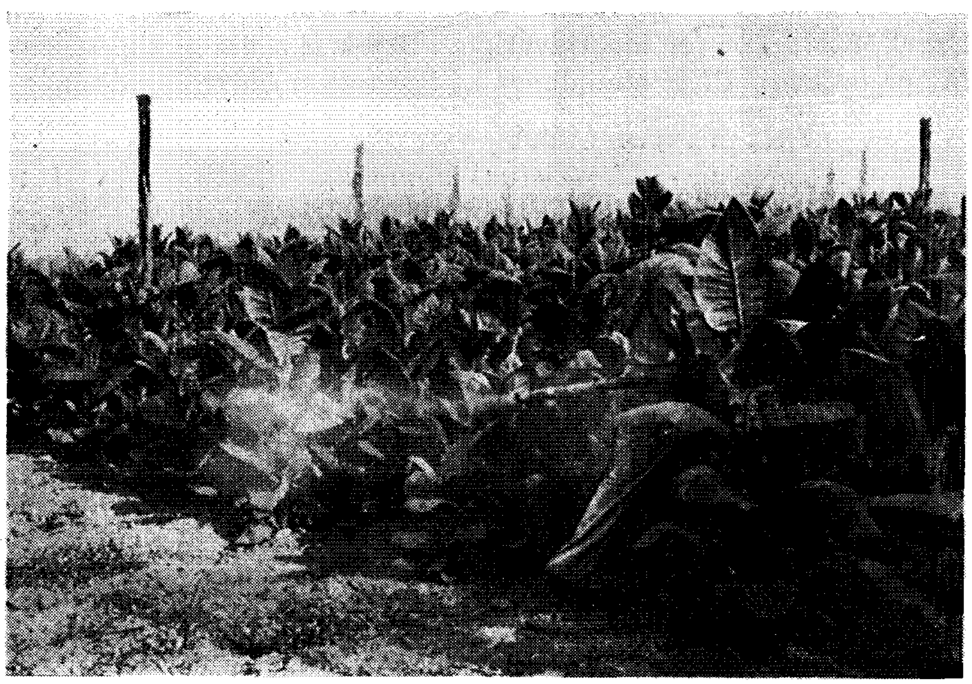

Fig. 1.—Applying cube dust mixture to maturing shade-grown cigar-wrapper tobacco for the control of the tobacco flea beetle.

IMPORTANCE OF BEES IN THE PRODUCTION OF WATERMELONS

Most varieties of watermelons are monoecious, the pistillate and staminate flowers being borne in separate axils of the leaves. In a few varieties, however, there may be hermoproditic and staminate flowers. As with many of our crops, these flowers are pollinated chiefly if not altogether by bees. They, therefore, are a very necessary factor in the production of a melon crop, and the number of them and their activity may directly determine the size of the yield of melons. This seems to have been well illustrated at Groveland, Florida, during the 1935 season. At that time a number of growers had planted their melons in adjacent areas so that an almost solid block was formed of around a thousand acres. Along the margins of this area there was a much better set of melons than in the central portion. Near the edges two or three acres produced a carload of melons while in the center of the area 4 or 5 acres were required. Dr. M. N. Walker visited this area, and after checking over the possible causes, concluded that the difference was probably due to the fewer number of bees reaching the central portion of the field.

In the Leesburg section during the 1937 season a collection was made of the bees visiting melon flowers, and sent to Dr. Grace Sandhouse for identification. Below is a list of the species in the order of their abundance in the melon fields.

Apis mellifica Linné
Halictus (Chloralictus) nymphalis Smith
Halictus (Chloralictus) lepidii Graen
Halictus ligatus Say
Halictus (Chloralictus) apopkensis Robt.
Augochlorella gratiosa (Sm.)
Agapostemon splendens (Lep.)
Augochloropsis caerulea (Ashm.)

The honey bee was by far the most abundant species. The next three species listed occurred fairly abundantly while the others were much less common. A visit to a field near Leesburg and one near Groveland on successive days showed that there was probably ten times as many bees in the first field. In this last area a rather poor set was obtained in some commercial fields and the lack of bees was probably the reason.

The honey bee is the first to make its appearance in the mornings. About the middle of May the first bees observed at the flowers were seen usually between 6:45 and 7:15 a. m. Bees of all types reach their greatest abundance in the field around 8:30 or 9:00 a. m.

From these observations it is quite evident that the size of the melon crop may be greatly influenced by the bees. Observations in Florida and elsewhere show that certain days are favorable for setting melons while a very poor set will occur on other days, due to weather conditions. If the favorable days are few and the supply of bees small, the yield may be small.

A factor which is of great importance in Florida is the need of producing an early crop. By far the greatest portion of the crop is shipped to the northern states, and the prices are usually the highest during the first week or two. When the melon crop is ready to ship from the other southern states, Florida is at a disadvantage due to the longer shipping distance. It is, therefore, important that a good set be obtained from the earlier flowers and to insure this an adequate supply of bees should be present. Thus, in certain areas at least, the earliness and size of yield may be increased by keeping honey bees near the field during the flowering season. In large fields best results should be obtained by having a hive near the center of the field.

C. C. GOFF

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