A PRELIMINARY REPORT ON A
GRASS-ROOT MEALYBUG (*RIPERSIA RADICICOLA
MORRISON*) AFFECTING SUGAR
CANE IN CUBA

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A PRELIMINARY REPORT ON A GRASS-ROOT MEALYBUG
(RIPERSIA RADICICOLA MORRISON) AFFECTING
SUGAR CANE IN CUBA

By C. F. Stahl, Chief Entomologist

ABSTRACT

A typical root-feeding mealybug (Ripersia radicicola Morrison) is found well distributed over the Island of Cuba on the roots of grasses and sugar cane. The mealybug is probably a native species which inhabits the roots of grasses and has adapted itself to sugar cane.

“Grass-root mealybug” is suggested as the common name for this insect in preference to “sugar cane root mealybug,” inasmuch as wild grasses are the primary host plants.

The area of injury does not coincide with the area of distribution. Serious injury occurs in soils subject to drought where the mealybug appears to be only one of several factors unfavorable to the growth of the plant.

The use of legume cover crops in areas where the grass-root mealybug is a serious pest, to improve the soil and suppress the grass hosts, is under consideration.

During the past two years considerable interest has been manifested in a mealybug found feeding upon the roots of sugar cane in several localities in Cuba. This interest has been intensified by the fact that the insect was reported as undescribed, which led some to believe that it was a pest recently introduced into Cuba. An effort has been made to obtain as much information concerning this insect as other work in progress would allow. The purpose of this paper is to summarize these observations and to discuss certain points that they raise.

“Mealybug” and “chinche harinosa” are terms familiar to all who have had experience in growing sugar cane. Besides the mealybug under discussion, which occurs on the roots of grasses and sugar cane, two species of stalk mealybugs have been encountered in Cuba. They are widely distributed. They are red or gray soft-bodied insects, covered with a white powdery or fluffy substance, occurring in clusters, usually at the nodes under the leaf-sheaths of the cane stalks. It is the white powdery covering that is responsible for the common names “mealybug” and “chinche harinosa.”

While the general appearance of mealybugs feeding on a plant is such that they may be easily recognized as a group, it is not so easy to distinguish between the different species. The common stalk forms may be found on the cane from the time it starts to germinate, and they are often seen beneath the surface of the ground, clustered around a germinating bud, or at the base of growing stalks. It would not, there-

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fore, be surprising if another species feeding on the roots was thought to be identical with the stalk species and if the fact that this other species constituted a potential pest had been entirely overlooked. Such seems to have been the case.

No reference to the occurrence of a root-feeding mealybug on sugar cane in Cuba has been found in the available published reports prior to 1924. However, mealybugs were observed on the roots of sugar cane growing at Central Stewart in 1916 by Mr. J. T. Crawley, who was at that time director of the Agricultural Experiment Station at Santiago de las Vegas. As this observation was never published, Mr. Crawley has kindly furnished his notes, which are quoted as follows:

“October 3, 1916. Fields are very uneven and there are many spots near the roads that are not thriving. Numbers of mealybugs, cornelons and beetle grubs were found at the roots of cane. Easy to pull up. Probably 5 to 10% of the old fields so affected. Mealybugs are most abundant, both on the cane and at the roots of cane examined.” Mr. Crawley stated that he could remember that the mealybugs in question were often noted on the smaller roots, but he did not attach any particular significance to the fact at that time. It is very probable, in the light of what is now known concerning the distribution of the grass-root mealybug, that Mr. Crawley observed this insect at that time. It can therefore be stated with reasonable certainty that the root-feeding mealybug was present on the roots of sugar cane in some districts of Cuba as early as 1916.

In October, 1924, attention was called to a mealybug designated as *Ripersia sp.* (2), which was found infesting the roots of sugar cane in Cuba. Ballou (1, p. 46), in his list of scale insects and mealybugs of Cuba, published in April, 1926, includes *Ripersia* sp. as having been collected at Camagüey by Bruner in 1923. Van Dine (6, p. 11-12) records *Ripersia* sp. in his list of sugar cane insects and mentions its occurrence on the roots of numerous grasses in the Provinces of Oriente and Camagüey. Myers (5, p. 99) also mentions *Ripersia* sp. as having been observed at Soledad in Santa Clara Province. Finally, in October, 1926, Morrison (4) published a description of the species under the name *Ripersia radicicola* n. sp., basing his description on material submitted from the Provinces of Oriente, Camagüey, and Santa Clara.

The tendency at first was to refer to this insect as “the sugar cane root mealybug,” a name which would indicate that sugar cane was of primary importance as its host plant. As will be shown later, this does

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2Numbers in parenthesis refer to references listed at the end of the paper.
not seem to be the case. The common name "grass-root mealybug" is suggested because of the importance of wild grasses as host plants.

If this root mealybug limited its feeding to the roots of sugar cane, or even showed a preference for them, it might appear to be a pest which had been introduced in some way as a result of the extension of cane planting. It has been repeatedly observed that many different species of grasses are infested, and in many cases it is evident that the infestation is in no way related to the planting of sugar cane. In fact, infestations have been noted on the roots of grasses growing adjacent to cane fields in which the roots of cane stools were found upon examination to be uninfested. In a few cases mealybugs have been found on grasses growing in areas far removed from cane fields.

On the basis of these observations it is reasonable to assume that the root mealybug is a typical grass-root feeding species, that it is probably native or at least that it has been present in Cuba for a long time, and that under changing cultural conditions, brought about by the rapid extension of cane plantings, it has spread to the roots of sugar cane.

The distribution of the grass-root mealybug over the Island has not been fully determined. It was first noted by the writer on the roots of grasses and sugar cane growing on the plantation of Ingenio Jobabo. The infestations there were limited to areas where the soil was comparatively light and well drained. Records were made of infestations on the roots of grasses growing on ditch banks, in guardarrayas, along the edges of cane fields, and, in some cases, well within the cane fields. When the infestations were found on the roots of sugar cane, their location often indicated that the source might have been the adjacent guardarrayas, in as much as the areas infested were usually small semicircular patches spreading from the edges of the fields. This was especially true where the guardarrayas had been planted to sweet potatoes (boniatos) and the natural grass hosts had in this way been suppressed. Later, more widespread infestations were found in the Province of Camagüey.

The following fragmentary records are given to indicate the localities in which the grass-root mealybug has been found. These records are taken from the survey reports made by Dr. Wm. H. Weston, Jr., Dr. R. V. Allison, and other members of the staff of the Tropical Plant Research Foundation. While these records indicate the presence of the mealybugs in the localities observed, they do not furnish information regarding the abundance or extent of the infestations, nor do they show the limits of distribution. The authority for the observations is given in parenthesis.
As has been mentioned before, the grass-root mealybug has been found on the roots of a large number of grasses. The following is a list of these plants as far as they have been determined.

*Cenchrus echinatus* .......... guizazo
*Valota insularis* .......... barba de indio
*Echinochloa colonum* .......... grama pintada
*Syntherisma sanguinalis* .......... pata de gallina
*Panicum reptans* .......... grama de Castilla
*Panicum fasciculatum* .......... súrbana
*Cynodon dactylon* .......... hierba fina
*Eleusine indica* .......... grama de caballo
*Sporobolus indicus* .......... espartillo
*Chloris ciliata* .......... 
*Chaetochloa geniculata* .......... rabo de gato
*Leptochloa filiformis* .......... pata de gallina
*Sorghum spp* .......... millo
*Zea mays* (corn) .......... maíz
*Saccharum officinarum* .......... caña de azúcar
*Cyperus sp* .......... cebollita

Most of the grasses were determined by Dr. M. N. Walker, formerly Pathologist at the Cuba Sugar Club Experiment Station, and the identifications were confirmed by Dr. A. S. Hitchcock of the United States Department of Agriculture, who also determined *Chloris ciliata*. The identification of *Sporobolus indicus* was made by Dr. J. A. Faris, Chief Pathologist of this Station. Dr. Weston reported *Cyperus rotundus* as infested with root mealybugs at Tuinucú, and Mr. B. T. Barreto
1, Mealybugs clinging to the roots of sugar cane. (Original).
Sugar Cane Stalk Mealybug, *Pseudococcus bonisus* Kuwana (Van Dine).
2, Mealybugs on node of sugar cane after leaf sheath has been removed.
3, Mealybugs clustered about the base of young cane stalks.
reports that he has collected the grass-root mealybug on the roots of Johnson grass (*Holcus halenensis*).

It will be noted that the majority of the grasses which have been found to be infested are annuals. This does not necessarily mean that the perennials are not host plants, but it indicates that the annual grasses are of primary importance as hosts. Roots of such grasses as *parana* (*Panicum barbinode*) and Guinea grass (*Panicum maximum*) growing in infested areas have been examined many times, but the root mealybug has never been found on them.

It is not possible with the literature available to discuss in detail the relation between the grass-root mealybug and other root-inhabiting mealybugs. A number of reports have, however, been noted in which the occurrence of mealybugs on the roots of sugar cane and grasses in other countries has been mentioned. Lefroy (3, p. 759) mentions *Ripersia sacchari* Cr. as living on cane as well as on rice and grasses in India but does not state that it is found on the roots. *Ripersia internodii* Hall, reported by Willcocks (7) from Egypt, appears to be a species that feeds on grasses and sugar cane, both above and below the ground. It is, however, said to feed on the nodes and internodes of sugar cane. In the same report *Pseudococcus variabilis* Hall is mentioned as a common grass-root feeding species which is found well up on the jointed canes and around the nodes of sugar cane. *Pseudococcus trispinosus* Hall is also reported as feeding on the roots of sugar cane and grasses. From these scattered reports it will be seen that it is not uncommon to find the roots of grasses infested with mealybugs, as well as sugar cane.

As a rule it is not difficult to recognize the grass-root mealybug in the field. Perhaps the one species most apt to be confused with it is the gray sugar cane mealybug (*Pseudococcus boninis* Kuwana), found commonly on the stalks of sugar cane in Cuba. This stalk mealybug may be distinguished from the root mealybug in several ways. It is somewhat larger, is covered with a more dense waxy-like secretion, and is flatter. The root species is distinctly globular in shape, and the conspicuous pink tinge can be seen through the sparse powdery secretion. Perhaps, however, the best way to distinguish between the two species is by means of their feeding position on the plant. The stalk mealybug is usually found on the stalk above the ground, but when it is found below the surface of the ground it has always been in the crown at the base of the stalks or around the germinating buds (Pl. 13, Fig. 2, 3). The root mealybug, on the other hand, has always been found on the roots and usually on the small rootlets, which spread out some distance from
the base of the plant. The stalk species has not been found on grass, but it may be present on some of them, especially the large cultivated types. When a plant is pulled up some of the root mealybugs usually cling to the roots by means of their mouth parts, which they insert in the tissue of the roots (Pl. 13, Fig. 1).

There are other underground mealybugs which are commonly found on weeds and grasses in Cuba. A common weed, romerillo (*Bidens* sp.) is frequently found to be infested with mealybugs below the surface of the ground, and it has been reported that romerillo is responsible for the presence of the grass-root mealybugs in the cane fields. The species feeding on romerillo is found on the underground portion of the stems rather than on the roots, and it has not been found on the roots of sugar cane. Several grasses have been found to be infested in the crown by the romerillo species, which Dr. Morrison has determined as *Pseudococcus virgatus* Ckll.

In common with other mealybugs, the grass-root mealybug is always attended by ants, which care for and protect them in return for a sweet substance known as honeydew secreted by the mealybugs. The most common attending ant is a small, inconspicuous, almost black species, which has been determined by Dr. W. N. Mann of the United States Department of Agriculture as *Tapinoma melanocephalum* Fabr. This ant, whose nests have been found at the base of the infested plants, is very assiduous in its attentions, and when the mealybugs are disturbed will pick them up and scurry about in search of a hiding place for them. It is very probable that these ants are largely responsible for the spread of the mealybugs. In fact, plants grown in pots for experimental purposes have become infested in such a way as to show conclusively that the mealybugs had been placed on the roots by the ants. Myers (5) reports a large ant (*Odontomachus haematoda insularis* Wheeler) in close association with the grass-root mealybug in the Soledad (Cienfuegos) area. Occasionally the fire ant, hormiga brava (*Solenopsis geminata* Fabr.), has been found associated with the grass-root mealybug, but the fire ant is more commonly found attending the stalk mealybugs.

There is some question in regard to the amount of injury that should be attributed to the grass-root mealybug. In areas of light soil, under drought conditions, this insect may cause severe injury to sugar cane. The damage is apparent where other factors, especially soil and drainage conditions are unfavorable to the growth of the plant. In many cases the plants are killed in small areas. Under these conditions it has been almost impossible to obtain a new stand of cane. An uneven stand of
cane has been observed in many Cuban fields, the vacant areas having grown up to grasses, which are often infested with root mealybugs. Grasses growing in these vacant areas perpetuate and augment the infestation, and consequently the areas become no longer suitable for growing cane. Unless the mealybugs are suppressed, or the grasses, or the conditions that favor their development are corrected, it is difficult to replant these areas. On the other hand, under favorable growing

Fig. 18.—Plots of Sword Beans (*Canavalia gladiata*) in the foreground, showing the vigorous growth and excellent cover made by this plant. (Original).

conditions, vigorous cane plants have been found to be heavily infested with root mealybugs. Often fields are found in which the plants are comparatively heavily infested but do not show any visible effect of the infestation. In other words, the area of injury from root mealybug does not coincide with the area of its distribution. It is probable, therefore, that the severe injury which follows a heavy infestation of the grass-root mealybug results from a number of unfavorable factors, of which the mealybug is only one.

The fact that so many grasses serve as hosts for the grass-root mealybug complicates the problem of control. Any expensive method of soil treatment would obviously be impractical if the importance of the presence of the grasses was overlooked. There is some evidence showing the relation of ants to the distribution of the mealybugs which would indicate that the reinfestation of treated areas will be a serious problem as long as there are grasses growing in the vicinity. In view of these considerations and until a more careful study has been made of all the
factors concerned, soil fumigation does not seem likely to be a practical method of control.

The possibility of utilizing certain legumes for cover crops, as a means of improving the condition of the soil and suppressing the grasses in badly infested areas, has been considered. Certain legumes, such as sword and jack beans, make a rapid, dense growth which seems to be very effective in keeping down weeds and grasses (Fig. 18). These beans are not host plants for the grass-root mealybug. Their value in farm practice as a means of soil improvement has long been recognized. A series of small plots has therefore been laid out in a heavily infested area where the injury is apparent. By means of these plots, observations may be made as to the efficiency of cover crops in suppressing the grass host plants of the mealybug and thus starving it out of the areas. The value of such crops as a means of correcting the poor soil condition can be determined, and also the growth habits of the beans under different seasonal conditions. It is hoped that observation of these plots may give suggestions which may later result in definite recommendations for the improvement of areas badly infested with mealybugs and lead to the discovery of practical control measures.

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