

Abstract

Inventory of Homoptera and Heteroptera in relation to the Amarelecimento Fatal disease. An inventory was made of *Homoptera* spp. and *Heteroptera* spp. which appear to be related to the Fatal Yellowing Disease of the African Oil Palm (*Elaeis guineensis*) in Brazil.

The insects were gathered from oil palm with vials and yellow traps and from the crown with an entomological net and emergence cages. This was done in both healthy areas and areas of foci.

Up to February 1988, 187 species of Homoptera had been found together with 55 species of Heteroptera of which 12 species of Homoptera are considered suspects.

Resumen

Inventários de Homopteros y Heteropteros con relación a la enfermedad amarillamiento fatal. Los insectos fueron colectados en palmas africanas con frascos y con trampas amarillas y en la cobertura frascos redes entomológicas y con jaulas de emergencia.

La colectas fueron hechas tanto en áreas sanas como en áreas de foio. Hasta el mes de febrero de 1988 fueron encontradas 187 especies de Homopteros y 55 de Heteropteros dentro de las cereales 12 especies de Homopteros son consideradas como sospechosas.

Resumo

Inventários de Homopteros e Heteropteros com relação a doença Amarelecimento Fatal. Os insetos foram coletados em dendê com frascos e armadilhas amarelas e na cobertura com rede entomológica e com gaiolas de emergência. As coletas foram feitas tanto em áreas saudáveis como em áreas do foco. Até o mês de fevereiro de 1988, foram encontradas 187 espécies de homópteros e 55 de heterópteros, dentro das quais 12 espécies de homópteros são consideradas suspeitas.

Discussion

Ruinard: Are collected insects checked on suspected organisms possibly responsible for spear rot?

Louise: No. Neither the vector nor the causal organism are known.

STUDIES OF POSSIBLE INSECT TRANSMISSION OF AMARELECIMENTO FATAL IN OIL PALM¹

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1. Introduction

The hypothesis that insects may be involved in the transmission of Amarelecimento fatal in the oil palm in Brazil would seem to be highly significant, particularly when one suspects the involvement of micro-organisms of the micoplasma, virus and viroid types.

This hypothesis can be further strengthened by the manner in which the disease spreads. It tends to follow the direction of predominant winds, while natural barriers, such as roads, rivers and clearings, are unable to hinder dissemination, thus demonstrating that the disease spreads through the air.

Insects, particularly *Homoptera*, as vectors of different types of micro-organisms, have been shown to participate in the spreading of other diseases in oil palm and coconut in Latin America and other parts of the world.

A good example is the lethal yellowing disease of the coconut palm in the southern part of the United States (Florida) and Central America (Caribbean Islands). In this case, the species *Myndus crudus* is the vector of a mycoplasma (McCoy et al, 1983). *My-*

ndus tafini is responsible for the transmission of a leaf disease that afflicts the coconut palm in the archipelago of Vanuatu (Julia, 1982; Julia et al. 1985).

In observations in plantations affected by the disease in the municipalities of Alvarães (AM) and Benevides (PA) and in inventories of insects in these and other localities of Brazil, the following species have been classified as suspicious: D1, D3a, D3b, D27, D50 (*Derbidae*); D31 (*Delphacidae*); D2, D46 (*Cixiidae*); D14 (*Flatidae*); D65, D93 and D105 (*Cicadellidae*).

Initially, the principal insects suspected of being responsible for transmission were the *Derbidae* D1 (Hsp1) and the *Cixiidae* D2 (Hsp2) due to the fact that they are commonly found in the oil palm. More specifically, part of the life cycle of these insects depends on the oil palm for nourishment. They were identified as *Persis* sp. and *Myndus crudus* respectively.

With the progress of inventory work, other insects came to be included in the transmission tests.

Among these were the D3a, D3b (identified as *Omolicna* sp.) D27 and D50.

The objective of the investigations described in this paper is to attempt to

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reproduce the symptoms of the disease in healthy oil palm plants through the utilization of insects that have supposedly been contaminated by the disease.

2. Release of insects in oil palm, utilizing different types of cages and introduction procedures

As described below, different types of cages are being utilized:

- Pre-nursery: small cages made of strips of wood and nylon screen, measuring 0.45 m x 0.30 m x 0.30 m, containing six pre-nursery seedlings;
- Nursery: medium size cages made of strips and nylon screen, measuring 1.2 m x 1.0 m x 1.0 m, containing four nursery seedlings;
- Leaves: cylindrical cages made of galvanized wire rings and tulle, measuring 1.80 m in length and 0.55 m in diameter;
- Large cages: made of wood and nylon screen, measuring 5.0 m x 0.5 m x 5.0 m, containing one young

plant and twelve nursery seedlings.

Insofar as the release of the insects into these cages is concerned, three procedures were utilized:

- a) insects with acquisition phase in diseased plants;
- b) insects introduced directly from the field, gathered in a supposedly healthy area;
- c) insects introduced directly from the field, gathered in an area in which the disease is present.

In the first case, the insects were confined in leaf cages above young diseased plants for a period that varied between 5 and 7 days. After the exposure period, the leaves with the cages were taken to the laboratory where the supposedly contaminated insects were gathered. These insects were transferred to other leaf cages on healthy plants. More specifically, there were 10 plants per species, with a total of 1,000 insects per cage, while a variable number of insects were placed in the pre-nursery and nursery cages.

In cases b and c, the insects were gathered from areas and introduced directly into the different types of

cages, without being submitted to the stage of supposed contamination.

The tests were begun in October 1986 at the Denpasar plantation, in the municipality of Benevides, Pará, Brazil.

Tables 1 and 2 above show the number of insects released up to the present into the different types of cages and the procedures that have been followed.

3. Results and conclusions

Up to the present time, a total of 256,712 homopterous insects belonging to the *Derbidae* and *Cixiidae* families have been released.

The *Persis* sp. (D1) represents 29.8% and the *Myndus crudus* (D2) represents 38.2% of the aforementioned total.

The release of these species began in the months of October and December 1986 respectively, and the leaf cage tests (Table 1) lasted between 2 and 4 months.

The tests with D3a, D3b, D27 and D50 began in April 1987, and releases of the species D3a and D3b have been concluded.

The pre-nursery, nursery and young plant tests have also been completed and are now in the stage of maintenance and observation.

Up till now in the palm trees utilized in the tests the appearance of symptoms typical of amarelecimento fatal has not been observed in any of the tests carried out.

However, this result cannot be consi-

dered conclusive, since reliable information is not yet available as to the period of incubation of the disease, despite the fact that an EMBRAPA report (1986) states that this period would seem to be between 6 and 10 months, and most probably between 8 and 9 months.

Consequently, observations of the tests in which releases have been concluded will continue for at least two years, while tests of new suspected species will be carried out.

4. References

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Table 1. Number of insects released on oil palm, in different types of cages (March/88).

Cages	<i>Derbidae</i> (D1)		<i>Cixiidae</i> (D2)	
	Prior contamination	Direct from field	Prior contamination	Direct from field.
Pre-nursery	1,600	1,820	2,809	2,445
Nursery	1,258	1,816	668	55
Leaves	12,039	11,819	12,856	14,735

Table 2. Number of insects gathered in area where the disease is present (focal area) and released on oil palm in different types of cages (March/88).

Cages	<i>Derbidae</i>						<i>Cixiidae</i>
	D1	D3a	D3b	D27	D50	D3a+D3b+D27	D2
Nursery	15,676	-	-	-	-	-	15,262
Leaves	-	12,929	13,053	1,582	9,090	-	28,734
Young plants	30,379	-	-	-	-	45,485	20,602

Abstract

Studies of possible insect transmission of Amarelecimento fatal in oil palm. The possibility that insects might be involved in the transmission of the fatal yellowing disease in oil palm, in Brazil is extremely significant when one suspects the involvement of "virus or viroid" mycoplasma-like organisms (MLD). The probable aerial spread of the disease reinforces this hypothesis.

Different species of the *Derbidae* and *Cixiidae* families, among them *Persis* sp. and *Myndus crudus*, are being tested as part of an effort to transmit the disease to healthy palms through suspected insects. Various types of cages are being used to isolate the plants. Until now a total of 256,712 insects from these two families have been released. No symptoms typical of fatal yellowing have been observed as yet in any of the tests that were developed.

Resumen

Estudios de la posible transmisión de la enfermedad amarillamiento fatal en la palmera, mediante insectos sospechosos. La posibilidad de que haya insectos involucrados en la transmisión de la enfermedad amarillamiento fatal, en la palma aceitera, en Brasil, tiene alta significación cuando se sospecha de la participación de micro-organismos del tipo micoplasma "virus o viróideo".

La probable forma aérea de diseminación de la enfermedad a plantas sanas de palma aceitera, a través de insectos sospechosos, se están probando diferentes especies de la familia *Derbidae* y *Cixiidae*, entre las cuales el *Persis* sp. y el *Myndus crudus* para eso se están utilizando diferentes tipos de jaulas para asistir a las plantas. Hasta ahora se liberaron 256.712 insectos, en total, de esas dos familias. En uno de los ensayos realizados se observó la aparición de los síntomas típicos del amarillamiento fatal.

Resumo

Estudos de possível transmissão da doença amarelecimento fatal em dendê, através de insetos suspeitos. A possibilidade de que insetos estejam envolvidos na transmissão da doença Amarelecimento Fatal em dendê no Brasil é de alta significância quando se suspeita do envolvimento de microorganismo do tipo micoplasma vírus ou viróide. A provável forma de disseminação aérea reforça esta hipótese.

Com o objetivo de transmitir a doença em plantas de dendê sadia, através de insetos suspeitos, estão sendo testadas diferentes espécies da família *Derbidae* e *Cixiidae*, entre as quais o *Persis* sp. e o *Myndus crudus*. Para isso estão sendo utilizados diferentes tipos de gaiolas para isolamento de plantas. Até o presente foi liberado o total de 256.712 insetos dessas duas famílias. Em um dos ensaios desenvolvidos, foi observado o aparecimento dos sintomas típicos do amarelecimento fatal.

INVESTIGATION ABOUT THE PUDRICION DEL COGOLLO DISEASE (P.C.) OF OIL PALM IN THE AMAZONIAN PART OF ECUADOR: SEARCH OF THE INSECT VECTOR

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A. Symptomatology and epidemiology of the P.C. disease in Ecuador

To begin, I would like to bring up a point about the terminology. It should be advisable to identify precisely the several 'spear rots'. It seems that we use the name spear rot (that is to say 'pudricion de la flecha' in Spanish) to describe several fatal conditions of the oil palm, all of them attacking the growing point of the plant. Then, spear rot is a generic name.

This is very practical for intercommunication, as well as confusing because it conceals differences between symptoms and epidemiology from the different areas in which these diseases occur.

Also I would like to stress that the name describes one symptom that is not specifically attached to these fatal diseases. We know that in both ring spot disease in Ecuador and marchitez sorpresiva in whole America, a spear rot is strongly noticeable and is the ultimate symptom of the death of the palm.

So, it is necessary to determine for each affected area the symptoms specifically linked with the lethal disease and to use the proper name of the

disease in relation to these symptoms.

From my own experience of the disease of oil palm in Ecuador, I am prone to name the spear rot in that country 'lethal bronze of young leaves'. In general the foliage symptom is a discoloration of the young leaves number 2 to 5 which turn from green to pale bronze mixed with yellow. After two months leaves 2 to 5 are almost totally colored pale bronze but some parts may stay yellow. At the same time the discoloration begins to be detectable, the young tissues of the spear and of the inner younger leaves are affected by a strong wet rot that very rapidly destroys the meristem (it can take from a few days to a few weeks). No other symptom is visible: the bunches and roots remain healthy. The progress of the wilt of the leaves is very slow, and it is obvious that the older fronds die by old-age rather than by the disease.

It is my opinion that the speed of the rot advance to the heart of the palm is slower in the western part of Ecuador, near the Pacific coast than it is in the eastern part. The climates, soils, and therefore the physiology of the palms are obviously very different between the two areas and that may be a factor inducing changes in symptomatology.

The investigators of IRHO, since

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