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## ROOT KNOT PROBLEMS IN IVORY COAST

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A preliminary list of nematodes associated with plants in West Africa was published in 1960 by LUC and de GUIRAN. They identified Meloidogyne spp. associated with 115 plants belonging to 38 families from the Ivory Coast. Since then, only a few additional hosts have been added to this list.

The species of Meloidogyne existing in Ivory Coast are very polyphagous and their host range covers a large number of different plants which includes almost every kind of cultivated food and fiber crop.

### SPECIES OF PARASITES

From 1962 to 1970, NETSCHER studied the taxonomy of the Meloidogyne found in the Ivory Coast. He collected a large number of strains all over the country and studied their morphological characters, especially perineal patterns and size of the larvae. He recognized the presence of three species:

M. incognita  
M. javanica  
M. arenaria

Some of his observations of morphological characters appeared to be conflicting with those in other parts of the world.

In 1970, all the collections were removed to Dakar where the fundamental work on root-knot nematodes is now concentrated.

### HOSTS

Meloidogyne can be found parasitizing every kind of crop although their economic importance is not fully understood. There are many Meloidogyne spp. commonly associated with wild plants as seen in LUC and de GUIRAN's list but we will consider only those of cultivated crops.

COVER CROPS - Most of them belong to the leguminosae family and most of them are commonly very susceptible to Meloidogyne. In

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Collection de Références

no M-9322 Biol. Lab.

Ivory Coast, the following species have proved to be hosts.

Cajanus cajan, Calopogonium mucunoides, Canavalia ensiformis, C. gladiata, Centrosema plumieri, C. pubescens and Pueraria phaseoloides.

The use of cover crops can be a factor of maintaining high populations of Meloidogyne in a field for succeeding crops. The above species must be used with care in crop rotations.

#### FOOD CROPS

Meloidogyne has been observed in the roots of "bread tree" (Artocarpus incisa) near Abidjan but this big tree seems to be very tolerant and the importance of this crop in Africa appears relatively low.

Soybean (Glycine soja) is frequently and highly parasitized and Meloidogyne may be a problem if commercial production increases in the Ivory Coast.

Lowland rice is generally not attacked. However, root-knot nematodes are frequently found in upland rice fields. In one case, recently, high populations of parasites have been observed on rice roots, in one field, in the Central Region. It seemed restricted to a small area but an extensive survey will be started in 1977.

Maize is rarely attacked by Meloidogyne spp.

#### TUBER CROPS

The three main African tuber crops have been observed in Ivory Coast, to be hosts of Meloidogyne spp.

Sweet potato (Ipomoea batatas) is attacked in the south of the country, little is known about its economic importance.

Cassava (Manihot esculenta) is sometimes attacked but root-knot nematodes are minor parasites of this crop, for which the main parasite is Pratylenchus brachyurus

The same has been observed for yam (Dioscorea esculenta). It is known that Meloidogyne spp. attack yam tubers and may cause severe losses but this has almost never been observed in the Ivory Coast where

another parasite, Scutellonema bradys, is prevalent in yam tubers.

#### FRUIT CROPS

Pineapple (Ananas sativus) when grown in cleared land is severely attacked by Meloidogyne spp. but, as the season progresses, Pratylenchus brachyurus becomes the dominant species and is the most important parasite of pineapple in the Ivory Coast. Almost all the commercial production of pineapple is fumigated with DBCP at planting time and, again, about 4 months after planting.

Banana: Root-knot nematodes are very frequently observed in banana roots but their multiplication is limited by the development of Radopholus similis which is the dominant parasite of banana in the Ivory Coast. Almost all the banana plantations are treated with DBCP or phenamiphos.

Papaw (Carica papaya) is in general highly parasitized though it appears rather tolerant. The common practice of growing papaw trees among vegetable gardens is very bad because it provides a continuing source of high populations of root-knot nematodes to attack the vegetable crops.

#### FIBER CROPS

Although cotton (Gossypium spp.) is commonly attacked by root-knot nematodes in America and in some African countries, like Central African Republic, where the presence of Meloidogyne is related to the severity of Fusarium wilt, the occurrence of root-knot nematodes on cotton plants is occasional in the Ivory Coast.

On the other hand, roselle (Hibiscus sabdariffa) is heavily infected and this appears to be a limiting factor for the development of this crop in the north of the country.

#### COMMERCIAL CROPS

Although Meloidogyne spp. have been observed in the roots of tea, coffee (var. robusta) and cocoa, they are only minor problems in the production of these crops.

Tobacco is commonly infected and the yield losses, though not precisely known, are obviously important in many cases.

Sugarcane is known to be a host of Meloidogyne spp. all over the

world. Little is known about nematodes associated with sugarcane in Ivory Coast but, in Upper-Volta, about 200 kilometers to the north of the main sugarcane area of Ivory Coast and in similar ecological conditions, root-knot nematodes are commonly observed in sugarcane fields where they seem to cause yield losses.

The absence of root knot on groundnut (*Arachis hypogaea*), commonly infected in America, is worth being noted and is one of the inconsistencies with species identification.

#### VEGETABLE CROPS

Root-knot nematode is a major problem in all vegetable growing areas.

Tomato, lettuce, melon, carrot and bean (*Phaseolus vulgaris*) are the most severely damaged of the garden vegetables.

Two local vegetables, bitter tomato (*Solanum incanum*) and okra (*Hibiscus esculentus*) are often highly infested and the yield must be reduced by this infection.

Cabbage seems to be relatively resistant and, when infected, tolerant with no effect on yield.

In the Ivory Coast, infection of onion and leek is rare.

#### CONTROL

RESISTANT VARIETIES - Few resistant varieties have been developed in vegetable crops. One resistant variety of tomato, "Ronita", has been tested and proved to be effective against the strains of *Meloidogyne* present in two vegetable growing areas: North and Center. Unfortunately, this variety has not all the qualities required for the commercial market and its use will be limited. Continuous use of the resistant varieties without crop rotation soon leads to the development of pathotypes of the nematode which will overcome the plant resistance.

#### CROP ROTATION

In the areas where vegetables alone are grown, a crop rotation system, effective against root-knot nematodes is difficult to maintain since the only resistant plants are onion, leek and to a lesser extent, cabbage and

one can not avoid growing susceptible plants one after the other in the same soil.

In large areas where commercial tomato production for canning is planned, the recommended rotation will be one year tomato and two years rice. The Meloidogyne populations will be limited so that commercial production will be extended for a number of years.

#### CHEMICAL CONTROL

During the last two years trials have been made in vegetable crops, especially on tomato, melon and carrot which included a fumigant, DBCP, and two non-fumigant nematicides, Carbofuran and phenamiphos.

On tomato, a preplant treatment with DBCP (60 l/ha) has greatly reduced the infection of the roots. A scale between 0 (no root knot) and 5 (roots completely knotted and dead) was rated for each root system. The average was 1.3 for the treated plants as compared to 3.8 for the control. However, the difference in yield was not significant and, in fact, very low. A second trial with DBCP gave the same results. It was concluded that DBCP had a phytotoxic effect on tomato. A trial with DD will be done.

On melon, a trial was made, in 1975, using DBCP at the rate of 60 l/ha applied as a preplant treatment. The application of the product at three different times were compared:

- a - the day of sowing
- b - 5 days before sowing
- c - 10 days before sowing

The average quotations for Meloidogyne infection were:

a: 1.3    b: 1.7    c: 0.56

the difference between c and a and c and b being significant.

The yields, in tons/ha were:

a: 7        b: 10.5    c: 11.5

The difference between b and c is not significant.

Thus, between a and b, there is no difference in the infection but a difference in the yield. Between b and c there is a difference in the

infection but no difference in the yield.

It can be concluded that all three treatments were effective against Meloidogyne but treatments a and b were more or less phytotoxic.

Controls could not be included in the statistical analysis because the infestation was very high, almost all the plants died and no melon could be harvested.

Nonfumigant nematicides were tried on tomato without success but, in a trial in progress, carbofuran gives promising results on carrot.