



Damage caused by root-lesion nematodes

Musa Nematologists' Consortium: A Step Towards Global Collaboration

Dr Dirk de Waele, Nematologist, KUL, Belgium

Until recently, research efforts to obtain higher yielding *Musa* cultivars were lacking in two very important areas: nematological evaluation of *Musa* breeding material (parents, progeny) and identification of new nematode-resistance sources. A *Musa* Nematologists' Consortium has now been formed, thanks to funding from the Banana Improvement Project (BIP), which is sponsored by the Common Fund for Commodities (CFC), the Food and Agriculture Organization (FAO) and the World Bank; and to funding from the Flemish Association for Development Cooperation and Technical Assistance (VVOB), the Belgian Administration for Development Cooperation (BADC), the *Fundación Hondureña de*

Investigación Agrícola, Honduras (FHIA), IITA and INIBAP. The formation of this consortium could be the first step in global efforts to evaluate the susceptibility and sensitivity of *Musa* genotypes to nematodes under different agro-ecological conditions, in order to assist *Musa* breeding programmes and provide small-scale farmers with either nematode resistant or tolerant cultivars.

Musa Nematologists' Consortium

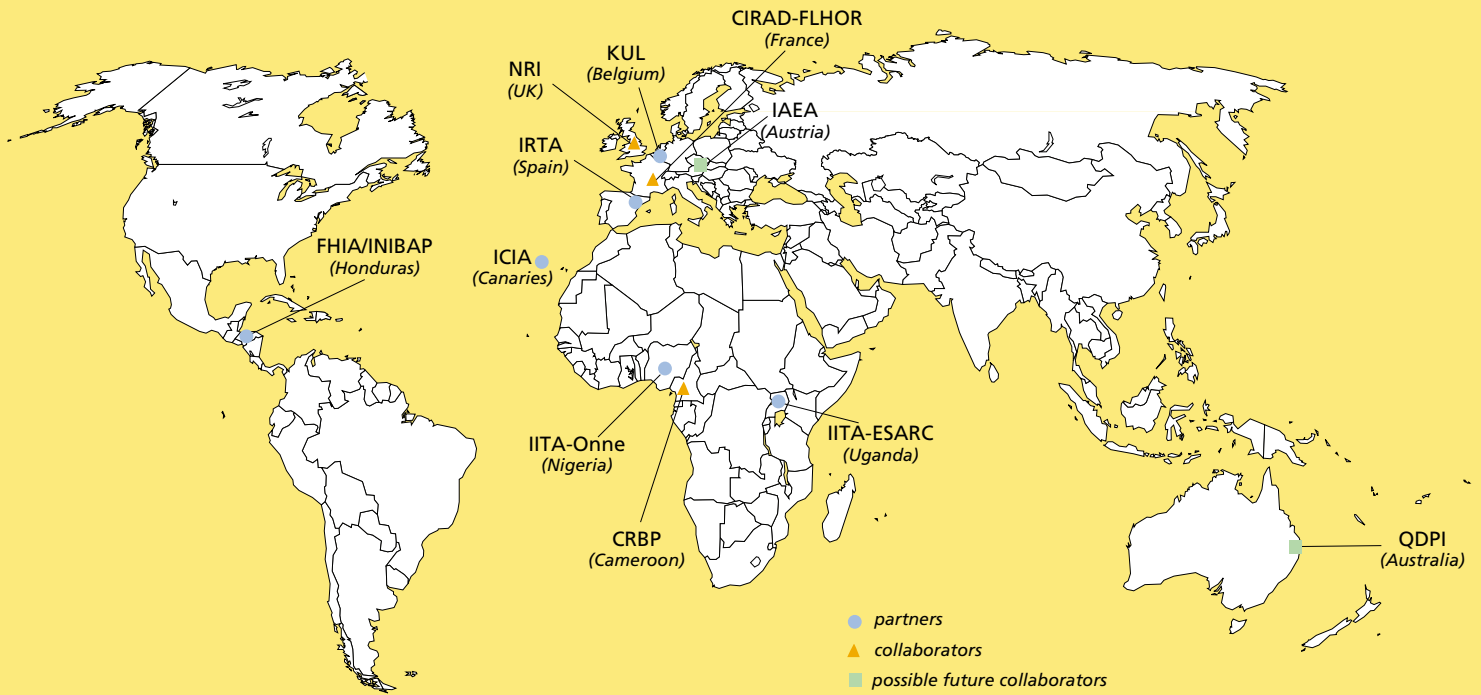
The *Musa* Nematologists' Consortium currently has six partners carrying out

activities in Europe, East and West Africa and Central America. Of these, the *Instituto de Recerca y Tecnología Agroalimentaria / Instituto Canario de Investigación Agrícola* (IRTA/ICIA), KUL and FHIA are sponsored by BIP. The remaining partners are IITA-Onne, the East and Southern Africa Regional Centre of IITA (ESARC) and INIBAP-Honduras.

VVOB provides funding for three Flemish research associates: one based with INIBAP at FHIA; and two with IITA, one in Nigeria and one in Uganda. BADC provides funding for the nematological research activities at IITA-Onne and IITA-Uganda. In order to extend activities to Asia, negotiations are underway with VVOB to obtain an additional Flemish research associate to carry out work in Viet Nam.

Through INIBAP, the *Musa* Nematologists' Consortium is able to establish links with all major *Musa* improvement programmes in the world. In particular, links have been established with the *Centre de recherches régionales sur bananiers et plantains* (CRBP), where another BIP project on the tolerance and resistance of *Musa* genotypes to nematodes is based. CRBP, in turn, is linked to CIRAD's *Département des productions fruitières et horticoles* (FLHOR) and the Natural Resources Institute (NRI), UK.

In future, it is also hoped to establish links with nematology research in Australia and



Partners/collaborators of the Musa Nematologists' Consortium

with the programme being run in Austria by FAO, the International Atomic Energy Agency (IAEA) and KUL, on identifying nematode-resistance sources in *Musa* using induced mutations.

Activities in the Consortium started in spring 1995 with nematode culturing and early screening activities. The screenhouse and field screening activities will commence in April, 1996 with the arrival of the INIBAP and IITA research associates at FHIA, IITA-Onne and IITA Uganda.

Objectives

In the initial phase, the three major objectives of the *Musa* Nematologists' Consortium are:

- to adapt or develop early, rapid and reliable methods for nematode resistance/tolerance screening,
- to provide the existing classical *Musa* breeding programmes at FHIA, IITA-Onne and IITA-Uganda with a nematological component, and
- to screen *Musa* genotypes for nematode resistance/tolerance.

Nematode Culturing

To support the screening activities, two types of nematode cultures are being

established and maintained: "dormant" stock cultures of all nematode populations used for screening (at IRTA) and active screening cultures which serve as sources of inoculum (at IRTA, KUL, FHIA and IITA).

As multiple resistance/tolerance to the major *Musa* nematodes is envisaged and in view of the reports of intraspecific differences in pathogenicity, especially between *Radopholus similis* populations, a representative number of populations of nematode species associated with *Musa* in the major banana-producing regions is being preserved at IRTA and used for screening.

A collection of nematode populations will be maintained at KUL as a source of inoculum for early screening; as bananas are not cultivated in Belgium, nematode populations from all over the world can be maintained. However, at FHIA, IITA-Onne and IITA-Uganda, only a small number of local nematode populations will be maintained as a source of inoculum.

Early Screening

The early screening undertaken at KUL and IRTA focuses mainly on the nematode reproductive potential and, therefore, only data on the resistance of *Musa* genotypes

are generated; *in vitro* propagated plants are used for this. The genotypes are screened against *Radopholus similis*, *Pratylenchus coffeae*, *Pratylenchus goodeyi* and *Meloidogyne* spp. In addition to genotypes selected from the *Musa* germplasm collection at ITC, material from the breeding centres will also be included in the early screening at KUL.

Screenhouse and Field Screening

Screenhouse and field screening will be undertaken in the Canary Islands at ICIA in collaboration with IRTA, at FHIA, IITA-Onne and IITA-Uganda. This type of screening, which will focus on nematode reproductive and damage potential, will generate data on resistance and tolerance of *Musa* genotypes.

In the Canary Islands, the genotypes will be screened under subtropical conditions against *P. goodeyi* and *Meloidogyne* spp.; at FHIA and IITA-Onne against *R. similis* and *P. coffeae*; and at IITA-Uganda against *R. similis* and *P. goodeyi*. Genotypes identified at KUL or IRTA as showing nematode resistance, other interesting material from the breeding centres as well as local breeding material, will also be

included in the screenhouse and field screening.

The eventual establishment of a nematological evaluation programme in Viet Nam will allow the screening of *Musa* genotypes against nematode populations which are more representative of *Musa* production in Southeast Asia, such as *Meloidogyne* spp. and *Pratylenchus* spp. other than *P. coffeae* and *P. goodeyi*.

Technical Guidelines for Nematode Resistance/Tolerance Screening

Several protocols, describing procedures to be used at various stages of nematode screening of *Musa* genotypes under laboratory, screenhouse or field conditions, have been published. However, none contain a complete set of guidelines for nematode-resistance screening under all conditions and the methods advocated by different nematologists sometimes vary.

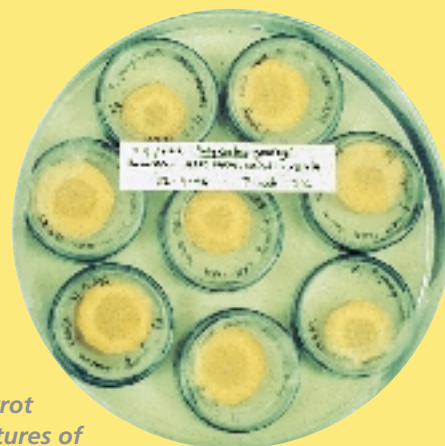
INIBAP, the Asia and Pacific Regional Network (ASPNET) and MARDI organized an international workshop on 'New Frontiers in Resistance Breeding for Nematode, Fusarium Wilt and Sigatoka' in October in Malaysia. This occasion was taken to arrange a meeting of nematologists in order to exchange experiences and agree on a basic outline for a complete set of technical guidelines for *Musa* nematode screening. Dr Jorge Pinochet from IRTA, Dr Jean-Louis Sarah from CIRAD-FLHOR, Dr Nigel Price from the International Institute of Parasitology, Dr Simon Gowen from the University of Reading, Dr Dirk De Waele from KUL, Dr Paul Speijer from IITA and Dr Roger Fogain from CRBP participated in the meeting.

As a result of the meeting, detailed technical guidelines, to be published by INIBAP, are now being prepared on all aspects of *Musa* nematode screening in the laboratory, screenhouse or field, including nematode culturing, preparation of *in vitro* propagated plants, evaluation of nematode reproductive and damage potential as well as extraction methods and effect on plant growth and yield. The meeting also agreed on a list of *Musa* genotypes to be used as a reference in experiments.

These guidelines will serve as a reference for all members of the *Musa* Nematologists' Consortium and will also be made available to all interested *Musa* researchers.



Carrot disc cultures of *Pratylenchus goodeyi* populations



Tomato hairy root cultures of a *Meloidogyne incognita* population

Conclusion

The *Musa* Nematologists' Consortium already brings together many nematologists engaged in *Musa* nematode resistance screening. It will contribute to the nematological characterization of the *Musa* genotypes preserved at ITC and the nematological evaluation of *Musa* genotypes under different pathogen

pressures and under the ecological conditions prevailing in the major banana producing regions of the world. The consortium represents an important step towards global collaboration in the nematological evaluation of *Musa* breeding material and the identification of nematode resistance sources. This initiative should be further broadened to include all important research efforts in this field.