

## **ARABLE CROPS**

### **1. CEREALS**

#### **i RICE (*Oryza sativa*)**

✓ Rice is the most important staple food in the tropics. It is however parasitised by plant-parasitic nematodes. Rice yield losses resulting from plant-parasitic nematode attack are estimated at 10%. Major nematode pest of economic importance in rice production in Nigeria include *Aphelenchoides besseyi*, *Criconemella*, *Meloidogyne incognita*, *Hoplolaimus* spp. *Hirschmanniella* spp. *Paralongidorus*, *Pratylenchus*, *Heterodera* and *Xiphinema ifacolum*.

✓ Root-knot nematodes (rkn), *Meloidogyne* spp. particularly *M. graminicola* and *M. incognita* are responsible for root-knot disease of rice characterized by terminal or sub-terminal galls. At inoculum level of 1000-5500 eggs/juveniles *Meloidogyne* per plant correlates with 40-89% rice grain yield loss. Significant reduction in growth and grain yield is more severe in upland rice than lowland rice

✓ *Pratylenchus* spp. Particularly *P. zae* and *P. indicus* are responsible for root lesion disease responsible for significant damage of upland rice. They are migratory endoparasites which through their feeding activities destroys root cortex which hampers root growth.

#### **ii MAIZE (*Zea mays*)**

✓ Nearly 120 species of phytonematodes associates with maize worldwide. However 13 species in 14 genera are found in Nigeria. Four species of *Pratylenchus* namely *Pratylenchus brachyurus*, *P. zae* *P. scribneri* and *P. sefaensis*; three of *Meloidogyne*; *M. incognita*, *M. javanica* and *M. arenaria*, three of *Hirschmanniella*; *Hirschmanniella spinicaudata*, *H. oryzae* and *H. imamuri*, and *Helicotylenchus* spp occur in maize fields in Nigeria.

✓ *M. incognita*, *M. javanica* and *M. arenaria* also presents important constraints to economic production of maize in the tropics especially Nigeria.

✓ A threshold population is 2,000 eggs/second-stage juvenile. Symptoms include marked stunting, chlorosis and patchy growth of maize in the field. Small or large terminal or sub-terminal root galls may develop as a result of root-knot nematode infection.

✓ However, it is not always all the time that typical galls are formed on the roots. The overall effect of root-knot nematodes of maize is reduction in growth and grain yield.

✓ The three species of *Hirschmanniella* earlier listed are pathogenic on maize. It should be noted that because of interactions between all listed nematodes crop loss assessment by any single nematode specie is usually difficult, except in controlled experimental situation.

### iii **SORGHUM** (*Sorghum bicolor*)

✓ This is the world's fifth most important crop. In Nigeria it is grown for food and fodder and it can be processed into alcoholic and non-alcoholic beverages and ethanol. To date, more than 115 species of plant-parasitic nematodes have been associated with sorghum throughout the world.

✓ However, species of *Meloidogyne*, *Pratylenchus* and *Tylenchorhynchus* are of major economic constraints to sorghum production.

### iv **SUGARCANE** (*Saccharum officinarum*)

✓ Up to 275 species of plant-parasitic nematodes associates with sugarcane worldwide. However, important nematodes of economic magnitude in Nigeria and elsewhere in the tropics include *Heterodera sacchari*, *Meloidogyne* spp., *P. zae* and *Hirschmanniella* spp. *H. sacchari* is the most damaging on sugarcane. This nematode specie was responsible for the desertion of 100 hectares of Bacita sugar Estate sugarcane plantation in 1966.

✓ In Nigeria, sugarcane infected by *H. sacchari* would have necrotic roots leading to reduced cane yield of up to 70%

✓ *M. incognita* and *M. javanica* are the two species of root-knot nematodes that causes economic loss of sugarcane in the Tropics. They can reduce cane yield for about 20%. Affected plants are restricted from normal tillering. *P. zae* is parasitic on sugarcane causing necrotic cortex and stunted growth of the crop. *P. brachyurus* damage both cortical cells and the vascular bundle.

## 2. LEGUMES

### i COWPEA (*Vigna unguiculata*)

✓ Over 24 species of plant-parasitic nematode do associate with cowpea. However, those with established economic consequences on cowpea production include the root-knot nematodes (*Meloidogyne spp.*), *Rotylenchulus reniformis* and *Hoplolaimus seinhorsti*. The root-knot nematodes are the most reported.

✓ *M. incognita* reduced cowpea grain yield by 25-69%. Although *M. incognita* is the most preponderant, *M. javanica* and *M. arenaria* are also damaging on cowpea. A yield loss of up to 15% of cowpea grains is attributable to *R. reniformis*.

### ii GROUNDNUT (*Arachis hypogaea*)

- Groundnut is grown for its oil and protein (25%). Up to early independence it constitute one of the major crops grown in Nigeria for export. A 12% yield loss results from attack by plant-parasitic nematodes world-wide.

- A Yield reduction of 2% results from attack by *P. brachyurus* in Nigeria. *Aphelenchoides arachidis* affect the root, weaken pegs, attack pods and testa of groundnut. *M. arenaria* is the most important nematodes of groundnut.

### ii SOYBEAN (*Glycine max*)

➤ Over 100 species of plant-parasitic nematode associates with soybean.

- *Meloidogyne* spp and *R. reniformis* are the most damaging on soybean, contributing to over 10% grain yield loss. *M. incognita* has received due attention by nematologists in Nigeria.
- A yield loss of 12.9% was observed from *M. incognita* infested field at the Federal University of Agriculture (FUNAAB) in 1992.

### 3. ROOT AND TUBER CROPS

#### i YAM (*Discorea* spp)

✓ Over 90% of world yam is grown in Africa. Globally, 18% yield loss has been estimated from nematode attack on yams. The most important nematode pests of yams are *Scutellonema bradys*, *Meloidogyne* spp, and *Pratylenchus* spp.

✓ *S. bradys* causes a dry rot disease of yam tuber. It is disheartening to note that secondary infections facilitated by the nematodes are more readily investigated than the primary infection.

✓ *M. incognita* and *M. javanica* are particularly damaging on yam. They infect both roots and tuber. Galls resulting from *Meloidogyne* infection render the tuber unsightly with the consequent reduction in economic/market value of the tubers. *P. coffeae* also attack the tuber reducing the edible portion of the yam.

#### ii CASSAVA (*Manihot* spp.)

✓ *Manihot esculenta* is grown in all tropical regions. Cassava is a host to a wide range of plant-parasitic nematodes.

✓ pathogenicity of most nematodes on cassava remained poorly reported in literature. *M. incognita* and *M. javanica* are the most damaging on cassava. Yield loss of undocumented magnitude is associated with nematode attack on cassava.

✓ Other nematodes of economic significance on cassava are *P. brachyurus*, *R. reniformis* and *S. bradys*.

**ii SWEET POTATO (*Ipomea batatas*)**

✓ Sweet potato is grown throughout the humid tropics and many sub-tropical regions.

*Meloidogyne* spp., *R. reniformis*, *Pratylenchus* spp. and *Ditylenchus* spp. are parasitic on sweet potato causing economic losses of high magnitude.

✓ *M. incognita* and *M. javanica* induce galls on sweet potato as the case with other susceptible crops.

✓ *R. Reniformis*, *D. destructor*, *D. dispaci*, *R. reniformis*, *P. coffeae*, *P. brachyurus*, *P. zaeae* and *P. penetrans* are species of plant-parasitic nematodes that are well established to be damaging on sweet potatoes.

**iv CARROT (*Daucus carota sativa*)**

✓ Carrot is an important root crop that plays major economic and nutritional roles in the lives and living of people throughout the world. It contains large amount of sugar, carotene and other important vitamins.

✓ Up to 38% yield loss results from attack by *M. incognita*. The nematode causes reduced top growth, retarded tap root growth, alterations in tuber shape, galling of tubers and outright death of the plant.

**3. PLANTATION/HORTICULTURAL/TREE CROPS.**

**i BANANA/PLANTAIN (*Musa spp*)**

✓ *Musa* spp. are grown in large quantities all over the world. A 20% yield loss estimate results from plant-parasitic nematode attack on banana and plantain around the world.

*Radopholus similis* (burrowing nematode) is the most important nematode pest of banana and

plantain in the tropics. Obvious problem of *R. similis* attack is the toppling disease of the growing crop. Currently *R. similis* is of great economic concern in Nigeria.

**ii CITRUS** (*Citrus* spp.)

✓ Major plant-parasitic nematodes responsible for severe damage and economic loss to citrus include *R. similis*, *Pratylenchus* spp., *Meloidogyne* spp., *Trichodorus* spp., *Paratrichodorus* spp., *Xiphinema* spp., *Hemicycliophora* spp., and *T. semipenetrans* (citrus nematodes)

**iii COCOA** (*Theobroma cacao*).

✓ Forty-seven species of various nematodes belonging to twenty-seven genera associates with cocoa roots worldwide. In Nigeria, 24 of these have been found on cocoa. Important plant-parasitic nematodes include *M. incognita*, *Pratylenchus* spp., *Helicotylenchus cavenessi*, *Xiphinema ifacolum*, and *X.nigeriense* *Meloidogyne* often produce conspicuous galls roots of cocoa.

✓ It poses a serious constraint to the establishment of new cocoa on old cocoa land. Slow growth rate of cocoa and failure of young seedling to get established in the field have been associated with soils heavily infested with *Meloidogyne javanica*.

✓ *Meloidogyne incognita* associates with the roots of cacao trees showing symptoms of 'Morte subita' disease in Bahia, Brazil.

✓ *Meloidogyne* has also been implicated to cause die-back disease of cocoa caused.

**iv TOMATO** (*Lycopersicon esculentum*)

✓ Tomato is an important fruit vegetable in tropical crop production and utilization. Several nematode pest associates with the crop. However, prominent economically important nematode parasites of tomato are *M. incognita* and *Pratylenchus* spp.

**v EGG PLANT** (*Solanum* spp.)

✓ *S. melongena* and *S. macrocarpon* are moderate to efficient host of *M. arenaria* *H. cavenessi*, *H. Pseudorobustus*, *M. javanica* and *Scutellonema* spp.

