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## Management of *Rotylenchus reniformis* on Tubers at Fuam Experimental Station

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**Abstract.** Very deep cracks (deeper than those caused by *Pratylenchus coffeae* and *Scutellonema bradys* on tubers) were observed on white yam (*Dioscorea rotundata*) and sweet potato (*Ipomoea batatas*) tubers in 2010 cropping season. Extraction and identification revealed *Rotylenchus reniformis* as the cause of the deformity observed on the tubers. Experiment was carried out in the field of the College of Agronomy, Federal University of Agriculture, Makurdi, to investigate the efficacy of neem (*Azadirachta indica*) in the management of *Rotylenchus reniformis*. Study on the effectiveness of neem leaves and fruits against the nematode showed significant difference ( $P \leq 0.05$ ) among the treatments. Direct incorporation of neem leaves and fruits into the soil, before planting were effective in the management of *Rotylenchus reniformis* and increased yield of yam. Variation in yield parameters (fresh weight of tubers, number of tubers per stand per plot) was significant at  $P \leq 0.05$ . Neem treated plots produced significantly ( $P \leq 0.05$ ) bigger tubers, which were free of nematode symptoms (deep cracks) with very smooth skin.

**Keywords:** Deep cracks, *Dioscorea rotundata*, *Ipomoea batatas*, management, *Rotylenchus reniformis*

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## EFFECTS OF *Heterodera sacchari* LUC AND MERNY (1963) ON LEAF CHLOROPHYLL CONTENT OF SOME UPLAND NERICA RICE CULTIVARS

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**Abstract.** The sugarcane cyst nematode, *Heterodera sacchari* (HS), is recognised as one of the most important soil-borne pathogens affecting rice in Nigeria. Pot and field experiments were conducted to evaluate effect of HS on the chlorophyll content of five upland NERICA rice (NR) cultivars: NR1, NR2, NR3, NR8 and NR14. Three-week old rice plants in pots were each inoculated at: 0, 2,500, 5,000 and 10,000 eggs and juveniles respectively in a 5x4 factorial design arranged in a complete randomised design (CRD) replicated 6 times. The field experiment was carried out on a *H. sacchari* naturally-infested field in a split-plot experimental design which was divided into two main-plots of nematode-infested and nematode-free plot which was denematized with carbofuran 3G at 3kg a.i/ha. Ten seeds each of the NERICA rice cultivars were planted in the sub-plots in a randomised complete block design (RCBD) replicated four times. Data were taken on leaf chlorophyll content using Minolta SPAD-502 meter. Final nematode population was determined from rice roots and soil. Root damage was assessed on a scale of 1-5. Where: 1= (0% no damage) and 5= (>75% severe root damage). Data were analyzed using analysis of variance (ANOVA) and means were separated using least significant difference (LSD) at  $P \leq 0.05$ . Leaf chlorophyll content of NERICA rice cultivars reduced significantly in nematode inoculated plants when compared with the control in both pot and field trials. There was rapid depletion of leaf chlorophyll with increasing *H. sacchari* inoculum densities. Similarly, in the field, there was a significant rapid reduction of leaf chlorophyll over time, increased root damage, wilting and eventual death of rice plants. These led to patchiness in the field, reduced plant population/ha and overall yield reduction.

**Keywords:** cyst nematodes, chlorophyll yield loss, juveniles, NERICA rice.

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## Nematotoxic Effects of Leaf Powders of Some Tropical Plants against *Meloidogyne Incognita* Race 2 in White Yam (*Dioscorea rotundata*) Poir under Storage Conditions.

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**Abstract.** Powdered leaf extracts of *Azadirachta indica* (Neem), *Cymbopogon citratus*, *Cnestis ferruginea*, *Tetrapleura tetraptera* and *Uvaria chamae* were evaluated in the control of root-knot nematode, *Meloidogyne incognita* (mi) Race 2 in white yam (*Dioscorea rotundata* cv Nwopoko). The study consisted of eighteen (18) treatments which included three rates (10g, 15g, and 20g) of leaf powders in comparison with a nematicide, carbofuran and a control. All treatments, especially those with *C. citratus* at 10g, *C. ferruginea* at 20g significantly ( $p < 0.05$ ) increased induction of tuber sprouting, reduced rate of weight loss of the stored tubers thereby increasing the growth components of yams. However significant ( $P < 0.05$ ) increases over the control were only observed among weight of tubers but not of number of tubers. Treatments also reduced the number of insect holes on stored tubers created by the yam tuber beetle, *Heteroligus* sp. The tested plant leaf powders have considerable control potential and their extracts can be exploited as source of pesticide of plant origin to control incidence of nematode disease in stored yam tubers incited by *Meloidogyne incognita* Race 2 *in vivo*.

**Keywords:** *Heteroligus* spp, *in vivo*, *Meloidogyne incognita*, Plant leaf powders, Yam

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### Potential of Poultry Litter Compost as Bio-Nematicides against Root-Knot Nematode on Cacao

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**Abstract.** Root-knot nematode, *Meloidogyne incognita*, is a primary nematode pest of cacao and contributes to retardation of seedling growth, sudden death, plant damage, and concomitant yield losses. Unfortunately, there is no nematicide currently approved for use on this pathogenic nematode. In this study, a series of laboratory bioassays and greenhouse experiments were designed to test the inhibitory and suppressive effects of sterile water extracts of poultry litter compost (PLC) and amendment on *M. incognita*. Extracts of PLC, in a microwell assay format, strongly inhibited egg hatch and second-stage juvenile (J<sub>2</sub>) motility of the root-knot nematode (RKN) even at the lowest concentration of 25% tested. The nematode egg populations on cacao seedlings were suppressed significantly by 34.9%, 50.6%, and 72.5% in the PLC soil amended at rates of 2.5%, 5.0% and 10.0% compost, respectively, in the greenhouse. The treatment with compost, particularly at 5.0% and 10.0%, significantly improved plant vigor compared to no compost treatment, whether or not nematodes were present. The study shows the high potential of naturally occurring chemicals present in PLC that should be further investigated as bio-nematicides for their use in sustainable integrated management of RKN.

**Keywords:** Amendment, poultry litter compost, root-knot nematode, *Theobroma cacao* *Meloidogyne*

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### *In vitro* Nematicidal Activity of Some Aloe Species on Eggs and Second-Stage Juveniles of *Meloidogyne incognita*

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**Abstract.** The nematicidal activity of acetone and water extracts of leaves and roots of *Aloe schweinfurthii* (ASF), *Aloe succrotina* (AST), *Aloe vera* (AVR), *Aloe chinensis* (ACS), *Aloe arborescens* (AAR), *Aloe keayi* (AKY), *Aloe macrocarpa* (AMC), and *Aloe schweinfurthii* x *Aloe vera* (ASV) on egg-hatch (EH) and mortality of second-stage juveniles (J<sub>2</sub>) of *Meloidogyne incognita* was investigated *in vitro*. Extracts were tested at concentrations of 50,000 mg/kg and 25,000 mg/kg in

an experiment laid out in a completely randomized design in the laboratory. Data were collected on inhibition of egg-hatch, mortality of juveniles, and analyzed using ANOVA ( $P \leq 0.05$ ). Both concentrations of *Aloe* species extracts inhibited egg-hatch and killed second-stage juveniles significantly. Acetone extract of AKY leaves at 50,000 mg/kg was the most effective in egg-hatch inhibition (93.6%), followed by AVR (91.9%) and AST (85.4%). Water extracts of leaves of AKY, AVR and AST inhibited egg-hatch by 83.2%, 74.9% and 78.7%, respectively. Acetone extracts of AKY, AVR, AST and water extract of AKY leaves at 50,000 mg/kg were the most effective in  $J_2$  mortality with 100% mortality recorded at 48 hr after exposure to treatments. Acetone root extracts of AKY, AVR, AST and water extracts of AKY and AVR at 50,000 mg/kg had 100%  $J_2$  mortality at 72 hr. This study reveals that *Aloe* species have nematicidal effects on *M. incognita* and can be used in the management of *M. incognita* after further field studies.

**Keywords:** Acetone, Aloes, eggs, *Meloidogyne incognita*, second-stage juveniles, water

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### Laboratory Assessment of Chemo-Therapeutic Potential of Some Composts on the Survival of Root Knot Nematode, *Meloidogyne Hapla*

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**Abstract.** Aqueous extract from some composts (Terra Ecosystem, wyvern waste, garden waste, farm yard manure and green waste) were assessed for their effects on juvenile survival of *Meloidogyne hapla* *in vitro*. It was found that graded extracts (5, 10, 15 and 20% w/v) of the composts effectively killed *M. hapla* juveniles. At the 8<sup>th</sup> day exposure time, *M. hapla* juveniles in Terra Ecosystem, wyvern waste, garden waste and green waste were dead, whereas few *M. hapla* were alive in the farm yard manure aqueous extract till day 10. The *in vitro* assessment shows that Terra Ecosystem, wyvern waste, garden waste and green waste were significantly toxic to *M. hapla*. Phyto-chemical analysis of the compost revealed that Terra Ecosystem contained sterols and flavonoids; wyvern waste contained sterols, glycosides and flavonoids; garden waste contained only flavonoids; farm yard manure contained saponins, sterols, glycosides and flavonoids; and green waste contained saponins, sterols and flavonoids.

**Keywords:** Chemotherapeutic, Compost, *Meloidogyne hapla*, nematode, nematotoxic

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### Nematode Pests of Pineapple (*Ananas Comosus* Meer) in Nigeria Fields.

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**Abstract.** A survey was conducted to determine the types, frequency of occurrence and population of plant-parasitic nematodes associated with pineapple in some pineapple-producing states in Nigeria. A total of 120 farms were sampled from Oyo, Ogun, Osun, Edo, Delta, Imo, and Cross-River States using the Agricultural Development Project in each state as a pilot to locate representative farmlands in the States. Eighteen species of plant-parasitic nematodes (PPN) were found with pineapple from the fields surveyed include; *Meloidogyne incognita*, *Rotylenchulus reniformis*, *Pratylenchus brachyurus*, *Tylenchus* spp., *Helicotylenchus dihystra*, *Scutellonema brachyurum*, *Hoplolaimus pararobustus*, *Criconemoides limitaneum*, *Paratylenchus minutus*, *Gracilacus* spp., *Hemicriconemoides* sp., *Hemicycliophora* sp., *Aphelenchus* sp., *Aphelenchoides* spp., *Tylenchorynchus* spp., *Paratrophurus* sp., *Dolichodorus* sp. and *Xiphinema nigeriense*. The most prominent plant-parasitic nematode species found in association with pineapple on all the fields were *P. brachyurus*, *H. dihystra*, *S. brachyurum*, *R. reniformis* and *M. incognita* occurring at frequency ratings of 88%, 80%, 71%, 56% and 44% respectively. The study indicated a widespread distribution of important plant-parasitic nematodes of pineapple in Southern Nigeria and could be a factor responsible for low yields recorded in many pineapple fields. Therefore, there is an obvious need for pineapple farmers to control plant-parasitic nematodes for improved crop yield.

**Keywords:** Pineapple, Plant-parasitic nematodes, *Meloidogyne incognita*, Yield

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## **Survey of Plant-Parasitic Nematodes Associated with Cassava in South-Western Nigeria.**

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**Abstract.** A survey was conducted to determine the frequency, population and relative abundance of plant-parasitic nematodes associated with cassava in Ekiti, Lagos, Ogun, Ondo, Osun and Oyo States of South Western Nigeria in the planting season of 2006 using systematic sampling for soil and root. Each of the six States was visited for collection of soil and feeder root samples of cassava plants. Eight (8) local government areas (LGAs) out of sixteen (16) LGAs in Ekiti State, five (5) LGAs out of twenty (20) LGAs of Lagos State (ten (10) out of twenty (20) LGAs in Ogun State, nine (9) LGAs out of eighteen (18) LGAs of Ondo State, sixteen (16) out of (30) LGAs in Osun State and seventeen (17) out of thirty – three (33) LGAs in Oyo State. Four farms were randomly selected in each Local government area for sampling, making a total of 32 farms in Ekiti state, 20 farms in Lagos state, 40 farms in Ogun state, 36 farms in Ondo state, 57 farms in Osun state and 68 farms in Oyo State. Nematodes from soil and root samples were extracted using pie-pan modification of Bearmann Funnel method. The plant-parasitic nematode genera recovered from both soil and roots in the six States include: *Meloidogyne*, *Pratylenchus*, *Helicotylenchus*, *Scutellonema*, *Rotylenhulus*, *Aphelenchoides*, *Tylenchus*, *Aphelechus*, *Radopholus*, *Xiphinema* and *Hoplolaimus*. The most widely distributed and abundant nematode was *Meloidogyne* sp, (55.5%) followed by *Pratylenchus* sp. *Meloidogyne* sp. was more abundant in Ondo (31.2%) > Oyo (27.0%), Ekiti (15.0%) >Lagos (10.9%) compared to other States.

**Keywords:** Cassava, frequency, *Helicotylenchus* spp., *Meloidogyne* spp., population of plant parasitic nematodes, *Pratylenchus* spp., survey

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## **Population Dynamics of Five Plant-Parasitic Nematodes on Plantain cv. Agbagba (AAB-Group) In South-West Nigeria**

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**Abstract.** A field study was initiated at the International Institutes of Tropical Agriculture, Ibadan, Nigeria, an area within the forest savanna transition zone in South–Western Nigeria (7°30'N; 3° 5'E). The population dynamics of *Radopholus similis*, *Pratylenchus coffeae*, *Helicotylenchus multicinctus*, *Meloidogyne incognita* and *Hoplolaimus pararobustus* were studied under two consecutive cropping cycles of plantain cv. Agbagba between 2003 to 2005. The population densities of *H. multicinctus* built up during all crop cycles throughout the two cropping cycles more than the rest of the nematode species studied. There was a sharp decline in the *M. incognita* population during November-January dry season. The dry season did not affect the population level of *H. multicinctus* across the treatments whereas the population levels of the other nematode species studied declined. The population of *R. similis*, *P. coffeae*, *M. incognita* and *H. pararobustus* declined greatly towards the maturity stage of the plants (November-January). Peak periods of nematode occurrence were observed during February-March and November-December in all the sequences with some variations. Fluctuations in the populations of these five nematodes were correlated with rainfall pattern.

**Keywords.** Africa, *Helicotylenchus multicinctus*, *Meloidogyne incognita*, *Musa*, *Pratylenchus coffeae*, *Radopholus similis*

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## **Comparative Analysis of Mitochondrial COI Sequences and Ribosomal 18S Gene in the Identification of Nematodes.**

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**Abstract.** Free-living nematodes are the most abundant metazoan organisms in marine sediments. They are important in many ecological processes and are used as bio-indicators. Yet, they remain the least described taxon, because morphological diagnostic features are difficult to observe due to their small body size. DNA barcoding may overcome the problems associated with morphology and may lead to a quicker identification of marine nematodes. The nuclear ribosomal 18S gene has been the preferred locus for barcoding nematodes because it is easily amplified throughout the phylum. This fragment lacks however resolution at the species level. In contrast, only few studies have addressed the applicability of the mitochondrial COI gene for nematode identification. In this study, the amplification and sequencing success of both gene fragments were compared in a wide range of marine nematodes. We used 73 species belonging to 56 genera that were sampled from Paulina Polder (the Netherlands). Our results demonstrate that 18S is more easily amplified in marine nematodes compared to COI (57% vs 43% amplification success). The production of aspecific bands was more common in 18S than in COI, but sequencing success remained higher for 18S than for COI (61% vs 39%). Neighbor joining analysis using the K2P-model showed that both genetic markers cluster into well-defined clades congruent with known taxonomic families and orders that have been delineated based on morphology. Pairwise genetic distance for the 18S sequences showed that  $\approx 74\%$  of intraspecific comparisons showed a genetic divergence  $\leq 3\%$  while about 77% of interspecific comparisons were above 3%. For COI sequences, 98% of intraspecific comparisons showed a genetic divergence of  $\leq 8\%$  and  $> 8\%$  was observed for about 94% of all interspecific comparisons. This study shows that COI sequences qualitatively outperforms the 18S gene in the delineation of marine nematode species.

**Keywords:** DNA barcoding, Mitochondrial gene, Nematode identification

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### **Pathogenicity of *Meloidogyne incognita* (Kofoid & White, Chitwood) on Four Cultivars of Cucumber (*Cucumis sativus* L)**

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**Abstract.** Root-knot nematodes (RKN) cause considerable losses in cucumber production. The pathogenic effect of these nematodes calls for effective study and proper management. Therefore, the pathogenicity of RKN on four cultivars of cucumber: Beit Alpha, Marketmore, Cucumber Ashley and Poinsett, were assessed in the screenhouse of National Horticultural Research Institute, Ibadan between August and November, 2008. Two seeds of each cultivar were planted in pots of 11-litres containing 10 litres of steam-sterilized top-soil. Two weeks after germination, the seedlings were thinned down to one plant per pot and were inoculated separately at four inoculum densities: 0, 10,000, 20,000 and 40,000 eggs of RKN using a 4 x 4 factorial experiment replicated four times in a randomized complete block design. Data were collected on the vine length, number of leaves over a period of six weeks after inoculation, also fresh shoot weight, fresh root weight, dry shoot weight, galling index, number of fruits and weight, eggs in root, nematode population in soil and nematode reproduction were collected at the end of the experiment. All data were analyzed using descriptive statistics and analysis of variance (ANOVA) using Statistical Analysis System version 8 ( $p = 0.05$ ). The RKN significantly reduced Vegetative growth by 34.2% and yield by 58.3% in cucumber. Gall index increased with increase in inoculum density. However, all the four cultivars of cucumber used were highly infected by RKN. It therefore follows that they should not be planted in RKN infested soils.

**Keywords:** Cucumber, Gall Index, inoculum density, vegetative growth, yield

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### **The Development and Life Cycle of *Meloidogyne incognita* in Sweet Potato (*Ipomoea batatas*) cv. TIS 4400-2**

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**Abstract.** The life cycle and development of root-knot nematode, *Meloidogyne incognita*, was studied in the roots of sweet potato (CV TIS4400-2) in a screenhouse. Three-week old sweet potato seedlings grown in 16-litre polyethylene pots containing 15-litre steam-sterilized sandy loam soil were each inoculated with 5,000 eggs of *M. incognita*. Twenty four hours later, and subsequently on a daily basis, two seedlings were randomly uprooted and the roots were cleaned and stained using lactoglycerol method and were examined for nematode penetration and stages of nematode development. The development of *M. incognita* spanned 30 days at a temperature range of 21.33±0.13°C to 28.36±0.26°C : egg to second stage juvenile (J2) (2 days); J2 to third stage juvenile (J3) (10 days); J3 to fourth stage juvenile (J4) (2 days); J4 to young adult (2 days) and young adult to adult females with 441±9.7 eggs (14 days).

**Keywords:** Development, Life cycle, *Meloidogyne incognita*, sweet potato

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### Pathogenicity of Root-Knot Nematode on Cassava

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**Abstract.** *Meloidogyne incognita* is the most important nematode species affecting cassava production in Nigeria. Two experiments were conducted to assess the pathogenicity of three separate populations of *M. incognita* on five cassava cultivars viz: TME1, 4(2)1425, TMS 326, TMS 30572 and Ofege This was done over two consecutive cassava growing seasons in the screen house of the International Institute of Tropical Agriculture (IITA) Ibadan, Nigeria. Two-week-old plants were each inoculated with 0, 1,000 and 10,000 eggs of *M. incognita* using a 5x3 factorial experimental design. The experiments were harvested 12 months after planting. Plants inoculated with 10,000 nematode eggs had significantly higher mean gall index (3.2) than those inoculated with 1,000 eggs (1.6) and control (0.0). The lowest significant mean fresh root weight (109.3g) came from plants that received the highest inoculum density (10,000 eggs). The un-inoculated plants had the highest mean number of tubers (5.7) and it was significantly higher than other treatments in both trials. The mean final nematode population differed significantly from each other. The highest value (29800.6) was obtained from plants inoculated with 10,000 eggs and this differed ( $P \leq 0.05$ ) from the value recorded from the plants infected with 1,000 eggs (1505.9) and the control (0.0) in the two trials. The mean nematode reproductive factor also differed significantly from each other. In both trials, the highest mean reproductive factor (3.0) came from plants inoculated with 10,000 eggs with the lowest value (0) from control plants. The results indicated that *M. incognita* led to poor performance in plant height, plant stem diameter, shoot weight, number of tubers and weight of tubers in the five cassava varieties

**Keywords:** Cassava, *Meloidogyne incognita*, root knot nematode

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### Pathogenicity of *Meloidogyne incognita* on *Moringa oleifera* Plant

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**Abstract.** A greenhouse experiment was conducted at the National Institute of Horticultural Research, Ibadan to examine the pathogenicity of the root-knot nematode (*Meloidogyne incognita*) on *Moringa oleifera* plant. *Moringa oleifera* seeds were sown in polythene pots at two seeds/pot arranged in completely randomized design in sterilized soil.

The plants were inoculated at 8 weeks after sowing with 1000 eggs, 1500eggs and 2000eggs and the control with no eggs introduced. Data collected on growth and development indices showed no significant effect of nematode infection on the *Moringa* plant compared with the control. It was equally observed throughout the four months (16weeks) period of the experiment that none of the nematode levels produce or develop galls on the roots of the *Moringa* plant.

**Keywords:** *Meloidogyne inconita*, *Moringa oleifera*, pathogenicity

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### **Effect of *Meloidogyne* Species and *Fusarium verticillioides* on Growth Performance of ITA 150 and N2 Rice Cultivars**

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**Abstract.** A pot experiment was conducted at the Department of Crop Protection and Environmental Biology, University of Ibadan, Ibadan to study the growth performance of rice cultivars after inoculation with 5000 *Meloidogyne* eggs and  $1 \times 10^6$  *Fusarium verticillioides* spores. The rice cultivars were grown on steam sterilized soil. 2 weeks after planting, plants were inoculated with either *Meloidogyne* eggs, T<sub>5</sub> or *Fusarium* spores, T<sub>6</sub> or both *Meloidogyne* eggs and *Fusarium* spores simultaneously, T<sub>4</sub>. A week later, half of the plants initially inoculated with either *Meloidogyne* eggs or *Fusarium* spores were inoculated the second time with either *Fusarium* spores, T<sub>3</sub> or *Meloidogyne* eggs, T<sub>2</sub> respectively. T<sub>1</sub> plants served as the control and were not inoculated with any pathogen. The treatments were replicated six times. Growth parameters data were taken weekly for 8 weeks after the second inoculation. The results were analyzed using Analysis of Variance at 5% probability level. There were significant differences in the number of leaves, stem heights and number of tillers amongst the inoculated plants and the control. However, plants inoculated with both *Meloidogyne* and *Fusarium* spores simultaneously were significantly different in stem height and number of tillers from plants that were inoculated with either *Meloidogyne* or *Fusarium* spores alone.

**Keywords:** *Fusarium verticillioides* spores, Growth parameters, Interaction, *Meloidogyne* eggs, Rice cultivars.

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### **Host Plant Resistance in The Management of *Pratylenchus zaeae* on Maize**

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**Abstract.** *Pratylenchus zaeae* causes serious root necrosis and predisposes the roots of maize to secondary infections by soil-borne pathogens leading to severe maize grain yield reduction. This study was embarked upon to obtain an environmentally-friendly and cheap alternative to toxic nematicides for the management of *P. zaeae*. Fifteen selected maize genotypes based on resistance to Downy mildew, maize streak virus and striga, were screened in a screenhouse experiment for susceptibility to *P. zaeae*. Out of these six genotypes were selected for field work based on resistance to *P. zaeae*. Five thousand juveniles and adults of *P. zaeae* were used for the inoculation of the maize genotypes; both in screenhouse and on the field. Parameters on *P. zaeae* density, reproductive factor (RF), grain yield and maize biomass were assessed at harvest. The RF ranged from 0.05 to 1.48 and mean *P. zaeae* density was between 263.4 and 7433.0 per plant. In this study, maize genotypes Western Yellow, 9450, Oba Super 2 and Oba Super 1 were rated moderately resistant. Others were tolerant, while Saint Mazoca larga and 5057 were moderately susceptible to *P. zaeae* infection. A positive regression coefficient ( $r^2 = 0.36$ ) was obtained when  $\log_{10}(x + 1)$  transformed density of *P. zaeae* was regressed on RF. This study established that the moderately resistant genotypes prevented a significant grain yield loss of 40.0% in the field studies. It was also observed that most of the genotypes that were resistant to Downy mildew, maize streak virus and striga were resistant to lesion nematode. Perhaps maize resistance to Downy mildew, maize streak virus and striga resistance could be an indicator to *P. zaeae* resistance in maize. This approach of using host plant resistance to manage maize nematode, without the use of nematicide, is cheap, readily accessible, eco-friendly and sustainable for peasant maize farmers in Africa.

**Keywords:** Grain yield loss, lesion nematode, maize, resistant genotypes,

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## Evaluation of Nematicidal Potentials of *Dieffenbachia bowmanii* and *Philodendron selleoum* on The Control of *Meloidogyne incognita*

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**Abstract.** The nematicidal potentials of two botanical plants (*Dieffenbachia bowmanii* and *Philodendron selleoum*) were examined against root-knot infecting *Celosia argentea* in a screen house experiment. The powdered leaves of the botanicals were incorporated into the soil at the rate of 5g/kg and 10g/kg soil. These were also compared with that of a synthetic nematicide; carbofuran at the rate of 5g/kg. Results obtained showed that soil nematode populations were significantly suppressed by the dried leaves of the two poisonous botanicals comparatively with carbofuran. Data collected on growth parameters and root galling of the *Celosia* plant among and between treatments showed that *Dieffenbachia bowmanii* and *Philodendron selleoum* are nemato-toxic or nemato-poisonous and as such could be explored further as alternatives to synthetic nematicides.

**Keywords:** Carbofuran, *Celosia argentea*, *Dieffenbachia bowmanii*, nemato-toxic, *Philodendron selleoum*

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## Effect of Botanical Extracts on Root-Knot Nematode (*Meloidogyne Incognita*) Infection and Growth of Cashew (*Anacardium Occidentale*) Seedlings

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**Abstract.** The effect of four rates (0, 10, 25, 50 and 100%) of leaf extracts was tested on root-knot nematode (*Meloidogyne incognita*). Water extract of all the test plants significantly inhibited egg hatching of nematode and caused 100% mortality of the second juveniles of *M. incognita* *in vitro* after 12h of exposure. Undiluted crude leaf extracts of *H. umbellata* and *M. oppositifolius* exhibited 100% inhibition of egg hatch and larva mortality, while undiluted leaf extracts of *B. micrantha* and *C. medica* exhibited 92 and 93.2% inhibition of egg hatch and 62.1 and 73% larval mortality respectively. Egg inhibition and larval mortality decreased with increase in dilution of all the extracts. Juvenile mortality increased corresponding to an increased time of exposure. The leaf extracts of individual plant significantly enhanced the growth of cashew seedlings in the presence of the nematode in the nursery when compared to the control ( $p < 0.05$ ). There was a significant increase in plant height (56.0, 68.0, 53.7 and 53.5 for *Bridelia micrantha*, *Mallotus oppositifolius*, *Hunteria umbellata* and *Citrus medica* respectively), shoot weight and root weight of the seedlings treated with all the leaf extracts even at the lowest concentration of 10% compared to the rest. This study showed that the test plants which are readily available to farmers at no cost have the ability to reduce nematode below economic threshold, thus this finding is important from the point of view of controlling root-knot nematodes affecting cashew seedling without the use of nematicides in view of the environmental pollution likely to cause. Farmers are therefore advised to apply the undiluted crude extract of the plants to cashew plants after planting in-situ or transplanting to field as plant-parasitic nematodes have been implicated for poor seedling establishment. There is need for further studies in identifying new classes of pesticides from natural plants to replace the synthetic dangerous and expensive chemicals used at present.

**Keywords:** Cashew seedlings, egg hatching, leaf extracts, larval mortality *Meloidogyne incognita*

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## Effects of Poultry Manure, Cow Dung and Carbofuran on Generation Time and Reproduction of *Meloidogyne Incognita* Race 2 on Okra (*Abelmoschus esculentus*)

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**Abstract.** The effects of poultry manure, cow dung as compared with carbofuran on the development and generation time of *Meloidogyne incognita* Race 2 infecting okra were investigated under

screenhouse conditions. Adult females were seen in the roots of okra plants at 18 days after egg inoculation for control plants, 22 days after egg inoculation for most treated plants and 30 days after egg inoculation for plants treated with carbofuran at 3.0 kg a.i / h. Generation time for *M. incognita* Race 2 in okra plants treated with poultry manure at the rate of 10 t / h, cow dung at the rate of 10 t / h and carbofuran at the rate of 3.0 kg a.i / h was 24 days for each treatment compared to 22 days in control plants at a temperature range of 35-38°C.

**Keywords:** Generation time, *Meloidogyne incognita*, Poultry manure

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### **Possible Use of Terpenes and Terpenoids to Control Plant Parasitic Nematodes**

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**Abstract.** An experiment to test the efficacy of synthetic terpene on plant parasitic nematode in soil was performed in pot experiment in the laboratory and in green house. Different concentrations (125, 250, 500 and 1000 parts per million) of terpene product were mixed with soil infected with plant parasitic nematode. Evaluation was done after 48, 96 and 144 hours by counting the number of surviving nematode. There was complete eradication of plant parasitic nematode at 1000 parts per million terpene concentrations after 96 and 144 hours. Nematode population density at harvest reduced with increase in terpene product concentrations. The efficacy of terpene at 125, 250, 500 and 1000 parts per million concentrations for management of *Meloidogyne incognita* was tested on tomato (*Lycopersicon esculentum*) in a green house experiment. The different terpene concentrations reduced the population of *Meloidogyne incognita* in soil. The number of galls per root reduced with increasing terpene concentrations but not significantly different from the untreated control. At 5 weeks of plant growth in the green house, plant growth significantly increased with an increasing terpene concentration. At 10 weeks there were no significant correlations between terpene product concentrations and tomato plant growth parameter in the green house. There were negative correlations between *Meloidogyne incognita* population density and some growth parameters (functional leaves, flowers and fruits) while positive for yellowing leaves after 5 weeks of plant growth. No significant correlation between growth parameters and *Meloidogyne incognita* population density at 10 weeks of plant growth. The results indicate that terpene could have practical application in the management of *Meloidogyne incognita* in tomato and plant parasitic nematodes in general.

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### **Evidence of Antihelminthic Activities of Selected Plant Materials on Nematodes**

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**Abstract.** The use of natural plant products is among the alternatives to synthetic pesticides in the current management of plant diseases. The thought that they have no indiscriminate effect on the environment compared to synthetic products makes them more appealing. This has led to increased sourcing of plant materials with nematicidal properties for incorporation into Integrated Pest Management (IMP). In the present study, aqueous extracts of five commonly available plant materials were evaluated for their antihelminthic effects on parasitic and free- living nematodes. Aqueous extract of *Pulmra alba*, *Thevitia neriifolia*, *Jatropha curcas*, *Viscum album* and *Azadirachta indica* were prepared at two concentrations of 20 and 10 per cent, with tap water as check. Fifty each, of *Helicotylenchus dihystra*, *Scutellonema bradys* and free living *Rhabditis* were exposed to the extracts 'in vivo'. Both concentrations of the extracts were lethal to both plant parasitic and free-living nematodes, except *Jathropha curcus* that had no effect at 10 % concentration.

**Keywords:** Antihelminthic, *in vivo*, *Jathropha curcus*

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### **Effect of *Trichoderma harzianum*, Organic Manure and Yeast on The Growth and Yield of Soybean Grown on Nematode Endemic Soil**

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**Abstract.** Pot experiments were carried out during 2010 and 2011 planting seasons in order to assess the effect of application of *Trichoderma hazianum*, organic manure and yeast on the growth and yield of soybean (*Glycine max* L.), variety TGx 536-02D grown in nematode naturally endemic soil. TGx 536-02D is a known nematode susceptible soybean variety. The treatments were control, *Trichoderma hazianum* T22 isolate, cured poultry manure, palm wine yeast, *T. hazianum* + cured poultry manure, *T. hazianum* + yeast, cured poultry manure + yeast and *T. hazianum* + cured poultry manure + yeast. Control experiment did not receive poultry manure, yeast or *T. hazianum*. In each trial, there were 8 treatments replicated 5 times fitted into complete randomized design. The results indicated that application of *T. hazianum*, cured poultry manure, palm wine yeast, *T. hazianum* + cured poultry manure, *T. hazianum* + yeast, cured poultry manure + yeast and *T. hazianum* + cured poultry manure + yeast significantly ( $p < 0.05$ ) increased the growth and yield of soybean, and also significantly ( $p < 0.05$ ) reduced the soil population dynamic of nematode pests of soybeans. Control plants that were not treated with yeast, *T. hazianum* and organic manure had significantly ( $p < 0.05$ ) reduced growth, reduced soybean yield and had increased soil nematode population. All Data collected on both trials were pooled together, analyzed using analysis of variance and significant differences among treatments were separated using Duncan's multiple range test (DMRT) at probability level of 5%.

**Keywords:** manure, nematode, poultry manure, soybeans, *Trichoderma harzianum*, yeast

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## **Effects of Organic Manures on Growth, Yield as Well as Root and Soil Populations of Root Knot Nematode *Meloidogyne Incognita* Affecting Tomato**

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**Abstract.** Studies of effects of some organic manures; cow dung, compost, poultry manure, and domestic waste on plant parasitic nematode (*Meloidogyne incognita*) affecting tomato (*Lycopersicon esculentum*) was conducted at Kabba College Of Agriculture, Ahmadu Bello University Kogi state Nigeria in the year 2008 and repeated in 2009. The organic manure (poultry manure, cow dung, compost and domestic waste) were applied as soil amendment and were incorporated into the soil at the rate of 5 tons per hectare and NPK 15:15:15 an inorganic manure was applied as one of the treatments at the rate of 200kg/ha while there was an untreated control treatment that acted as standard check. The experiment design was complete randomization comprising of 5 treatments and each treatment replicated 4 times. The result of the experiment shows that all the organic manures and inorganic manures were effective in reducing the population of root-knot nematode with resultant increase in growth and yield of tomato. Poultry manure is better than other organic manures and NPK fertilizer with respect to the tested parameters. There were significant differences between the various treatments and all the treatments were significantly different from the control with respect to the tested parameters. The result from this experiment confirmed organic manure as effective farm input for managing *M. incognita* in all endemic areas with a resultant increase in growth and yield of the plant growing in the medium.

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