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ASSESSMENT OF FORMULATED RHIZOBACTERIA IN THE CONTROL OF PLANT-PARASITIC NEMATODES ASSOCIATED WITH GRAPEVINES [EVALUACIÓN DE FORMULADOS DE RIZOBACTERIAS EN EL CONTROL DE NEMÁTODOS FITOPARÁSITOS EN VIDES]

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Plant-parasitic nematodes (PPN) continue to be the most important problem affecting root systems of grapevines (*Vitis vinifera*) in Chile, with the chemical control as the main control alternative. In this study, the effect of a mixture of native rhizobacteria from genera *Bacillus* and *Pseudomonas*, formulated under liquid and solid conditions, was assessed in two studies with potted plants, 10-l pots filled with soil naturally infested with *Xiphinema index* and *Meloidogyne ethiopica*. In a first trial, both formulations were evaluated working with a concentration of $1x10^6$ cfu ml^{-1} and in a second trial, three concentrations were used, $1x10^6$, $1x10^8$ and $1x10^{10}$ cfu ml^{-1}. After 4-month growth, plants were uprooted and soil analyzed. Results showed that the three rhizobacteria concentrations were able to control nematodes at a same level as chemical control (cadusafos, 3 k a.i. ha^{-1}), being the formulation based on clay more effective than the liquid one, meaning finally that mixtures of these rhizobacteria may be an alternative to be used for the control of PPN in Chilean vineyards.

EFFECT OF BICHAR SOIL AMENDMENT ON FENAMIPHOS AND CADUSAFOS NEMATICDES BEHAVIOR IN SANDY SOIL [EFECTO DE LAS ENMIENDAS DE BIOCARBÓN SOBRE EL COMPORTAMIENTO DE LOS NEMATICIDAS FENAMIPHOS Y CADUSAFOS EN SUELOS ARENODOS]

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Effect of two types of biochar amendments, date palm (PBS), or eucalyptus leaves (EBS); on fate of fenamiphos and cadusafos, applications to sandy soil were examined in laboratory and greenhouse conditions. Measurements included uptake by tomato plants, dispersion, and absorption onto soil particles. In a second experiment, the effect of fenamiphos on *Meloidogyne incognita* juveniles (J2s) was tested in PBS. Addition of biochar decreased the degradation of both nematicides. Specifically, the half-life ($t½$) of cadusafos increased from 28.56 days in sandy soil to 163.86 and 151.47 days in (1% PBS) and (1% EBS) amended soil, respectively, under laboratory conditions. Fenamiphos $t½$ values increased about 200% by addition of biochar to soil in the laboratory, and 600% in greenhouse conditions. Sorption capacity as Kf was increased from 1.22; 0.39 ($\mu g^{1-1/Nf} g^{-1} ml^{1/Nf}$) in sandy soil to 4.49; 6.84 in 1% PBS and 3.49; 4.62 in 1% EBS in cadusafos and fenamiphos, respectively. Addition of both biochar types slowed the downward mobility of both nematicides in soil columns. Both compounds leached from soil columns but were not detected in the initial leachate. Uptake of both nematicides by tomato plants was reduced by 97% and 85% for cadusafos and fenamiphos, respectively. The percentage of mortality counts of J2s was less in PBS (18.31%) than in SS (43.14%) at 50% the recommended dose rate of fenamiphos. Mortality counts remained unchanged at the full dose rate of fenamiphos.

NEMATODOS EN PLÁTANO Y OPCIONES DE CONTROL [NEMATODES IN BANANA AND CONTROL OPTIONS]

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Factores bióticos y abióticos afectan el crecimiento y desarrollo del plátano. Dentro de los factores bióticos, los nematodos endoparásitos migratorios: *Radopholus similis* y *Pratylenchus coffeae*, el endoparásito sedentario *Meloidogyne incognita* y el ecto-endoparásito *Helicotylenchus* spp. dañan las raíces y cormo, alterando sus funciones normales. Los 4 géneros de nematodos se desarrollan y completan su ciclo de vida dentro de las raíces. Plantas infectadas carecen de buen anclaje y la habilidad de las raíces para absorber agua y nutrientes se reduce lo que resulta en mayor número de días para la emisión de hojas, hay pérdida de peso del racimo y se reduce la longevidad de la planta, y se alarga el ciclo de cosecha. Todos los estados fenológicos de la planta pueden ser infectados por cualquiera de los 4 géneros. En plantaciones infestadas las pérdidas en rendimiento alcanzan de un 20-50% en el primer ciclo y de un 50-90% en el segundo ciclo de cosecha. Para evitar o reducir el daño por nematodos, la aplicación regular de los nematicidas no fumigantes aprobados por la Agencia de Protección Ambiental de los Estados Unidos (EPA) y el Codex Alimentarius de la FAO, como el Mocap® 15GR es lo que el productor acepta como económicamente factible. Su aplicación se recomienda a la siembra y a los 3-4 meses después de la siembra, a razón de 20 g de producto comercial por planta. Su uso resulta en la reducción significativa de las poblaciones de nematodos y otras plagas de las raíces, lo que conlleva aumentos significativos del 12% (4,6) en el número de frutas por racimo, hasta un 41% en el número de frutas (P = 0,0039) por hectárea y hasta 68% en el peso del racimo. El costo promedio del uso de nematicida varía entre USA $260 y $300 ha^{-1} $ciclo^{-1}$ de cultivo que equivale de un 3-4% de los costos variables de producción.

IDENTIFICATION OF *MELOIDOGYNE* AND OTHER PLANT-PARASITIC NEMATODES FOUND IN PEACH ORCHARDS AND NURSERIES IN FLORIDA, USA [IDENTIFICACIÓN DE MELOIDOGYNE Y OTROS NEMATODOS FITOPARÁSITOS ENCONTRADOS EN HUERTOS DE MELOCOTÓN Y VIVEROS DE FLORIDA,USA]

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A total of 364 soil and root samples were collected from 22 orchards and five nurseries in Florida. Nematode identifications were performed using morphological and molecular analysis. DNA was extracted using the DNeasy Blood and Tissue Kit (Qiagen) or Proteinase K method. For the root-knot nematodes, the mtDNA region between *coxII* and 16S rRNA was amplified with C2F3/1108 primer set (Powers and Harris, 1993) and *nad5* was amplified with NADF2/NAD5R1 primers (Janssen *et al*., 2016). For all the other genera of plant-parasitic nematodes, the D2-D3 of 28S rRNA gene was amplified using D2A/D3B primers (Subbotin *et al*., 2006). PCR products of *coxII* and 16S rRNA region were digested with enzyme *Hinf* I following manufacturer's protocol. PCR products of the partial *nad5* and 28S rRNA genes were directly sequenced. *M. arenaria* (H3 phenotype), *M. floridensis*, and *M. javanica* were found at least in one of the orchards. The taxonomic status of *M. arenaria* (H3 phenotype) is still in progress. Results showed that this nematode does not reproduce on peanut. Only one nursery was found to be free of *Meloidogyne* spp. *Meloidogyne floridensis* was found in a nursery in Alachua Co. and *M. incognita* in another one in Jefferson Co. Both species were found in the other two nurseries. Three other nematode species known to reproduce on peach, *Mesocriconema xenoplax*, *M. ornatum*, and *Pratylenchus vulnus* were also found infecting peach trees in this study.

EVIDENCE OF INTRA-INDIVIDUAL VARIABILITY IN THE LARGE SUBUNIT (LSU) REGION OF RIBOSOMAL DNA IN A POPULATION OF *APHELENCHOIDES BESSEYI* (APHELENCHOIDIDAE) [EVIDENCIA DE LA VARIABILIDAD INTRA-INDIVIDUAL EN LA REGIÓN DE LA SUBUNIDAD GRANDE (LSU) DE ADN RIBOSOMAL DE LA POBLACIÓN DE *APHELENCHOIDES BESSEYI*]

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During investigation of the intraspecific variability present in the D2/D3 expansion of the large subunit of ribosomal DNA (LSU rDNA) in *Aphelenchoides besseyi* populations, variant sequences was found in the same single nematode. This atypical nematode was extracted from rice seeds origined from Spain. After we discarded the possibility of contamination, we hypothesized that could have intra-individual variation among copies of LSU rDNA in *A. besseyi*. To test this hypothesis, 10 individuals from two populations of *A. besseyi* were selected, being five specimens from that Spanish population and five from a population from Japan, both extracted from rice seeds. Nematodes were randomly selected, the DNA extracted from single nematode and LSU region amplified by PCR. LSU fragments obtained were cloned and sequenced. In total, 168 sequences of the LSU region were generated, with average of 17 sequences representative of the intra-individual variability present in each single nematode. Comparasion in database using BLAST indicated that the majority of the sequences from putative *A. besseyi* showed high identity to *A. besseyi* (99-100%); however in three specimens from Spanish population we also noted 14%, 20%, and 60% of variant sequences with identity to *A. fujianensis* (97-98%). This finding could be evidence of a recent hybridization event, or even that these two species recently diverged from a common parental lineage, as they are closely related phylogenetically. However, further research is needed to elucidate how often this occurs in ribosomal cistrons of *A. besseyi*.

APLICACIÓN DE NEMATODOS ENTOMOPATÓGENOS PARA EL CONTROL DE PLAGAS EN CULTIVOS DE EXPORTACIÓN EN LA LIBERTAD–PERÚ [APPLICATION OF ENTOMOPATHOGENIC NEMATODES IN THE CONTROL OF PESTS IN EXPORT CROPS IN LA LIBERTAD–PERU]

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Parte de la oferta exportable del Perú la constituye palto, espárrago y arándano. En espárrago verde, se ha incrementado *Proarna bergie* Distant, homóptero-Cicadidae conocido como "chicharra", cuyas ninfas se ubican entre 60 y 90 cm de profundidad chupando la savia de las raíces, originando menor desarrollo de las yemas, muerte de brotes y, consecuentemente, reducido número de tallos por metro lineal. Otro cultivo exportable es arándano cuya instalación requiere fuertes cantidades de materia orgánica, la que constituye una fuente de posturas y larvas de scarabeidos de la familia *Melonthidae* denominados comúnmente "gallinas ciegas o gusanos blancos" que profundizan hasta 40 cm y se alimentan inicialmente de la materia orgánica y posteriormente de las raíces causando debilitamiento, antocianescencia, clorosis y muerte de las plantas. Para el control de estas plagas se aplican insecticidas de diferentes ingredientes activos sin resultados satisfactorios. Ensayos preliminares con nemátodos entomopatógenos (NEPs) del genero *Heterorhabditis* (juveniles infectivos de tercer estadio) desarrollados en 3000 larvas de *G. mellonella* por hectárea, se efectuaron para evaluar la habilidad parasítica sobre las plagas antes mencionadas. Los NEPs fueron extraídos triturando las larvas hospederas en forma manual con la adición progresiva de agua para facilitar la extracción total, luego filtrada y llevada a un volumen de 200 litros e inyectada directamente a través del sistema de riego por goteo. El control alcanzado fluctuó entre 26 a 70%, lo que ha permitido considerar a los nemátodos entomopatógenos como alternativa de control biológico frecuente en el manejo de estas plagas.

FILTRADOS FÚNGICOS CON ACTIVIDAD NEMATICIDA CONTRA EL FITONEMATODO AGALLADOR [FUNGAL RATES WITH NEMATICIDAL ACTIVITY AGAINST ROOT-KNOT NEMATODE]

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El objetivo fue evaluar la capacidad *in vitro* de 41 filtrados de cepas nativas de *Trichoderma* en la inhibición de la eclosión de huevos y la mortalidad de Juveniles del segundo estadio (J2) del nematodo agallador *M. incognita*. Las cepas crecieron en PDA a 30°C durante ocho días, se colocaron discos de 5 mm en el medio de cultivo líquido; 200 g papa y 20 g dextrosa L^{-1} de agua destilada. Se realizó una serie de filtrados; con gasas estériles, inmediatamente se centrifugó durante 5 min a 3000 rpm, papel Whatman núm. 1 y através de un filtro miliporo de 0.45 µm. El ensayo in vitro, se condujo en dos etapas, la primera fue adicionar 1 mL de cada filtrado fúngico en siracusas con 50 huevos del fitonematodo y se evaluó a las 72, 96, y 120 h de exposición; la segunda consistió en agregar estos mismos filtrados con 25 J2 de *M. incognita* y su efecto antagónico se evaluó a las 24 y 48 h, y el efecto de reversibilidad. Los tratamientos lo conformaron los 41 filtrados fúngicos y un testigo con agua destilada estéril, cuatro repeticiones distribuidas en un diseño completamente al azar. Los resultados indican que los filtrados lograron hasta un 91.1% de inhibición de la eclosión de huevos del fitonematodo y hasta un 92.24% la mortalidad de J2 de *M. incognita* en los diferentes tiempos de exposición a los filtrados fúngicos.

CONTROL OF BANANA (*MUSA* AAA) ROOT NEMATODE WITH NEMACUR® 40EC, MOCAP® 72EC, AND VYDATE® 24 SL IN POT PLANTS. [CONTROL DE NEMATODOS EN RAÍCES DE BANANO (*MUSA* AAA) CON NEMACUR® 40EC, MOCAP® 72EC, Y VYDATE® 24 SL EN PLANTAS CULTIVADAS EN MACETAS]

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In two experiments in greenhouse conditions using a complete randomized design with six replicates, Nemacur®, Mocap®, and Vydate® were evaluated on banana (*Musa* AAA cv. Grande Naine) root nematode control in plants cultivated in 1.8 L pots. Un-sterilized soil from a commercial banana sowing, the *in vitro* plants were inoculated with 509 ± 47 *Radopholus similis*. The plantation infested with nematodes was the substratum. Twenty-five days after planting three nematicides were applied in drench with a 100 mg L^{-1} (ppm) concentration using 100 ml of solution per pot at 48 days after nematode inoculation. Eighty-six days after plant inoculation or 38 days after treatment application, plants were harvested and vegetative variables and nematode numbers recorded. No interaction in the population of any nematode ($P > 0.1534$) was observed between experiments, then data was gathered and analyzed together. With exception of *Meloidogyne* spp. ($P = 0.7257$), where its population was very low in all treatments, all three nematicides reduced *Pratylenchus* spp. between 86 to 87% ($P = 0.0258$), *Helicotylenchus* spp. from 76 to 85% ($P < 0.0001$), *R. similis* by 43 to 61% ($P < 0.0001$) and total nematodes between 58 to 66% ($P < 0.0001$). Consistent with the nematode control, Mocap® and Nemacur® increased ($P = 0.0027$) root weight by 44 and 54%, respectively, Mocap® increased ($P = 0.0003$) foliage weight by 26% and the three nematicides increased the number of leaves per plant ($P = 0.0026$) between 13 to 19% and pseudostem diameter ($P = 0.0004$) from 13 to 20%. For nematode control, the three nematicides were equally effective and could be applied irrespectively. Nevertheless, for product selection it is necessary to consider that all three are expose to the biodegradation phenomena. Therefore, to decide which product use, it is required to know which nematicides have been applied historically in the treating area to rotate the active ingredients to prevent their biodegradation.

MORPHOLOGICALLY DISTINCT CHARACTERS OF *CACTODERA* SPECIES (NEMATODA: HETERODERIDAE) FROM MEXICO [CARACTERES MORFOLÓGICOS CARACTERISTICOS DE ALGUNAS ESPECIES DE *CACTODERA* (NEMATODA: HETERODERIDAE) DE MÉXICO]

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Cyst nematodes of *Cactodera* spp. are present on different hosts in Mexico including both crops (barley, carnation), and native plants [*Amaranthus hybridus* and *Romerito Suaeda edulis* (Chenopodiaceae)]. *Cactodera rosae* cysts found parasitizing barley *Hordeum vulgare* L. are characterized by their lemon shape, dark brown to black color, 460-840 µm length, with a length/ width ratio of 1.2-2.1, strongly striated pattern on the cuticle, a prominent vulval cone with circumfenestrate vulva, and an anus located 25-60 µm from the fenestra in a depression in the cuticle. Egg surfaces bear conspicuous punctations. Second stage juveniles are characterized by the presence of 4-5 lip annulations on the head, a strong stylet 16-26 µm long with rounded stylet knobs, a tail 31-68 µm long and 6-14 µm wide with a hyaline portion of 11.2-28 µm in length, and lateral fields with four incisures and incomplete areolation. *C. galinsogae* females and males were isolated from *Galinsoga parviflora* (Asteraceae). Females are characterized by a small vulva cone, cysts are small (mean 523 µm length), spherical or sub-spherical. Eggs-shells show a pattern of punctuations. Males are less than 1 mm in length, with spicules curved and a bifid end. *C. evansi* parasiting carnation roots *Dianthus caryophyllus* have cysts that are almost spherical in shape, with a small vulval cone, the fenestra diameter 18-23 µm, and vulval slit 17-19 µm long. Egg surfaces contain conspicuous punctations. Males have a lateral field with four incisures and incomplete aereolation. Spicules are slightly curved with a slightly curved tip. *C. torreyanae* parasiting romerito plants *Suaeda torreyanae* (Chenopodiaceae) have cysts have a lemon shape with conspicuous vulval cone, light to dark brown color, cuticle surface has a zigzag pattern, and anus is located in a small depression. Males have a labial region with five irregular annuli, stylet knobs rounded, and a lateral field with four incisures with incomplete aereolation. *C. salina* isolated from roots of *Salicornia bigelovii* (Chenopodiaceae) included females and cysts that are very small or missing a terminal cone, have deep cuticular folds in a zigzag pattern, and smooth egg surfaces.

HISTOPATHOLOGY INDUCED BY SOME SPECIES OF THE HETERODERIDAE [HISTOPATOLOGÍA INDUCIDA POR ALGUNOS MIEMBROS DE LA FAMILIA HETERODERIDAE]

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We compared the histological changes induced in their hosts by different species of the Heteroderidae, including *Meloidodera mexicana*, *M. astonei*, *Globodera mexicana*, *Globodera* sp., *Punctodera chalcoensis, Cactodera rosae*, *Rhizonema sequoiae,* and *Meloidogyne* sp. In *Capsicum annuum* and *Solanum rostratum* roots, *Meloidodera mexicana* and *M. astonei* induced, in the secondary phloem, uninucleate giant cells with dense cytoplasm, hypertrophied nuclei and hyperplasia of the adjacent tissues in *Solanum rostratum*, *Globodera mexicana* induced syncytia with dense cytoplasm and hypertrophied nuclei and nucleoli in the pericycle cells and interfascicular cambial tissue, with hyperplasia of the surrounding cells. *Cactodera rosae* established a syncytium with dense cytoplasm and hypertrophied nuclei and nucleoli in the cortex, cambium. and pericycle of *Amaranthus hybridus*. Syncytia induced by *Globodera* sp. in the internal phloem of *Solanum demissum* had a dense, granular cytoplasm and disrupted both phloem and xylem. *Punctodera chalcoensis* in *Zea mays* induced syncytia in the pericycle with some cells of the endodermis and cortex containing dense, granular cytoplasm. *Rhizonema sequoia*, in the roots of Sequoia sempervirens, induced single giant cells with a large nucleus, a variable number of nucleoli, and dense cytoplasm, in the parenchyma of the xylem and phloem. *Meloidogyne* sp. altered root morphology of a tropical tree by forming multinucleate giant cells near the secondary phloem, pericycle and cortex, with hyperplasia of the adjacent cells.

THE SEARCH FOR EFFECTIVE NEMATODE CONTROL CHEMISTRY IN NIGERIA [BÚSQUEDA DE CONTROL QUÍMICO EFECTIVO CONTRA NEMATODOS EN NIGERIA]

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Nigeria is the most populated country in Africa with 70% of its population engaged in Agriculture directly and indirectly. In the past various nematicides had been successfully used to manage nematodes, however recently only one chemical categorised as a nematicide has been available for farmers. This study evaluated the use of locally available chemistry, categorised as insecticides or nematocides for the management of nematodes associated with five key crops. Nine chemicals were tested for their effect against *Scutellonema bradys* on yams, *Heteodera sacchari* on rice, *Meloidogyne incognita* on tomato and cowpea, and *Pratylenchus zea* on maize. The experiments were conducted in microplots with six replications per crop/nematode treatment. Plant height, leaf area, shoot and root weight, damage index, total number of nematodes, and reproductive factor were assessed per plant. The most effective chemistry was fluopyram which improved plant growth by 8.2, 10.9, and 13% compared to the plants treated with oxamyl, carbofuran, and inoculated control, respectively. Fluopyram treatment also reduced nematode populations by 74, 87 and 91% compared to treatment with oxamyl, carbofuran and inoculated plants with no treatment. This was accompanied by a corresponding increase in yield. The other chemicals tested fell into the same category as carbofuran. The judicious use of effective nematicides if registered in Nigeria can contribute to sustainable crop production in a integrated pest management system.

COVER CROPS IN ROTATION WITH YAMS FOR THE MANAGEMENT OF THE YAM NEMATODE [CULTIVOS DE COBERTURA EN ROTACIÓN CON ÑAME PARA EL MANEJO DEL NEMATODE DEL ÑAME]

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Management strategies for the yam nematode include the reduction soil populations in crop fields. Cover crops were evaluated in rotation with yams in studies in Nigeria at the International institute of Tropical Agriculture (IITA), Ibadan. Eleven cover crops were evaluated in the screenhouse with yam serving as control. Sterilized soil (3000 cm^3) was mixed with infected yam peels containing 2000 *Scutellonema bradys*. The cover crops were first planted and after four months, they were replaced with yams, then planted again after the yams were harvested. The field plots selected were naturally infested with *S. bradys*. In the first year, yams were planted in plots A1-A5 at IITA crop fields while 4 selected cover crops and yam (control) were planted in plots D1-D5, and in the following year, the planting sequence was reversed. In both experiments soil and root populations of yams and cover crops were assessed. Soil populations of *S. bradys* reduced to varying degrees with *Mucuna pruriens* (95.3%), *Aescynomene histrix* (87.8%), *Tagetes erecta* (85.1%), and *Pueraria phaseoloides* (82.5%) in screenhouse trials while high populations were maintained in *Crotalaria ochroleuca*, *C. juncea*, *Lablab purpureus*, *Vigna unguiculata*, and yams; and low populations in *Centrosema pubescens*, *Stylosanthes guianensis*, and *Cajanus cajan*. Soil and root populations of *Scutellonema*, *Pratylenchus*, *Meloidogyne*, *Hoplolaimus*, and *Helicotylenchus* reduced when *A. histrix*, *T. erecta*, *M. pruriense*, and P. *phaseoloides* followed yam in the cropping sequence on the field. Selected cover crops with the ability to reduce soil nematode populations can be included in yam cropping systems to manage *S. bradys*.

EMERGENCE OF *MELOIDOGYNE ENTEROLOBII* AS A PEST OF VEGETABLES IN NIGERIA [APARICIÓN DE MELOIDOGYNE ENTEROLOBII COMO UNA PLAGA DE HORTALIZAS EN NIGERIA]

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Ten tomato cultivars commonly grown in Nigeria in addition to new germplasm with resistance to *Meloidogyne incognita* were assessed for their reaction to local populations of *Meloidogyne* spp. The study evaluated populations of *Meloidogyne* collected from experimental field plots from University of Ibadan (UI), International Institute of Tropical Agriculture (IITA), Ijaye, Akobo, Federal University of Agriculture Abeokuta (FUNNAB), and Ilaro, (western Nigeria). Tomato plants were inoculated with galled roots obtained from each location in pot experiments laid out in a randomised complete block design with six replicates. Data on plant height, dry biomass, fruit weight, nematode population per plant, gall rating and reproductive factor were taken. Adult females and single egg masses were also collected from harvested galled roots and identified using perineal patterns and molecular techniques. The three local varieties, namely: Ibadan Local, Roma, and Beske showed a typical susceptible reaction to root-knot nematodes. Galling was observed in all the tomato varieties assessed, although Small Fry had significantly fewer galls and lower reproductive factor compared to the other cultivars. Yield was significantly reduced in inoculated plants compared to their control in all cultivars except for Small Fry. Perineal patterns identified adult females as *M. incognita* or *M. javanica*. However, molecular techniques further identified *M. enterolobii*. Some isolates could not be identified with the techniques used. The presence of *M enterolobii* presents new challenges for the use of resistant tomato and other vegetables in Nigeria.

THE POTENTIAL OF TWO BIOLOGICAL AGENTS IN SUPRESSION OF *PRATYLENCHUS BRACHYURUS* POPULATION FROM CENTRAL BRAZIL, IN SOYBEAN [POTENCIAL DE DOS AGENTES BIOLÓGICOS EN LA SUPRESIÓN DE LA POBLACIÓN DE *PRATYLENCHUS BRACHYURUS* EN LA REGIÓN CENTRAL DE BRASIL, EN SOYA]

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Pratylenchus brachyurus is a disseminated nematode in central Brazil, where soybean is extensively cultivated. In order to insert ecofriendly components to the nematode management, biological agents have been investigated. This study evaluated the potential of the isolates BRM32113 (*Burkholderia* sp.) and BRM32110 (*Pseudomona* sp.) to control *P. brachyurus in vitro* and *in vivo*. Treatments were composed of water (T1), BRM32110 (T2), BRM32113 (T3), Chemical, Avicta (T4), in a factorial scheme. *In vitro* assay: 500 J2 and eggs were added in all vials and mixed. After 24 and 48 hours, viable and unviable J2 were determinate by NaoH test, in 4 replications; in *in vivo* 13 days after soybean seedling, each plot received 350 J2 and eggs of *P. brachyurus* and 2 days latter, treatments were applied. After 15, 30, 45, and 60 days of inoculation, the nematodes were extracted and quantified and soybeans biomass determinate. The data were analyzed by ANOVA, and means compared by Tukey test ($p < 0.05$). In vitro, the presences of BRM32113 and BRM32110 have significantly increased unviable nematodes. *In vivo*, nematode population significantly reduced in all treatments at 15 days, in T4 at 30 days, in T3 and T4 at 45 and only in T4 at 60 days. The reproduction factor was significantly reduced in T2 at 15 day and T3 at 45 day and T4 in all evaluations. Although there were higher averages for growth promotion, there were no statistical differences among treatments.

A NEW METHOD FOR EXTRACTION OF *MELOIDOGYNE* SPP. FOR DIAGNOSIS ON GOLF GREENS [UN NUEVO MÉTODO DE EXTRACCIÓN DE *MELOIDOGYNE* SPP. PARA EL DIAGNÓSTICO EN CAMPOS DE GOLF]

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Root-knot nematodes are of increasing importance on ultradwarf bermudagrass (*Cynodon* hybrids) used on golf course greens. Conventional diagnosis of nematodes from turf utilizes sugar-flotation with centrifugation methods for extraction of nematodes from soil. However, experience at University of Florida (UF) has found this method to be unreliable for diagnosis of *Meloidogyne* spp. from ultradwarf bermudagrass because number of J2 in soil is often not a good predictor of infection in roots. Over the past 2 years UF staff have developed and implemented a Seinhorst mist system for method for extraction of *Meloidogyne* spp. from turf thatch and roots as an additional diagnostic service to supplement convention extraction from soil. This method requires different sampling protocols and equipment than those used for nematode sample collection for soil extraction. A description and comparison of sample collection and extraction methods will be presented. Extraction results for *Meloidogyne* spp. and other common turfgrass nematodes will be compared.

THE EFFICACY OF SALIBRO™ (FLUAZAINDOLIZINE) ON *MELOIDOGYNE INCOGNITA* IN CORN [EFICACIA DE SALIBROTM (FLUAZAINDOLIZINE) SOBRE *MELOIDOGYNE INCOGNITA* EM MILHO]

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Corn production has an important role as animal feed globally and this crop, together with soybean, represents 80% of grain production in Brazil. The roots of corn plants may be attacked by plant parasitic nematodes, which reduce potential yield. This is an increasing problem in Brazil. The present study evaluated the efficacy of a new nematicide product Salibro™ (containing the active ingredient fluazaindolizine, Vellozine™) on the root-knot nematode *Meloidogyne incognita* in corn. The experiment was conducted under greenhouse conditions from February to April 2017. Pots were first filled with substrate, planted with a susceptible cultivar of tomato (Rio Grande) and then inoculated with *M. incognita* (5000 eggs and J2's/pot). After 23 days the aboveground parts of the tomato plants were removed leaving the roots in the substrate and seeds of a corn cultivar were planted into the nematode infested substrate. The study had a completely randomized design with six treatments and five replications. Treatments consisted of five doses of Salibro™ (100, 200, 250, 350, and 500 g a.i./ha) and the untreated control. Salibro™ was applied as a band spray in furrow immediately after sowing. Thirty days after corn planting evaluations were performed to assess fresh root weight and nematode population density (eggs + J2's/10g of roots). Results showed Salibro™ provided good efficacy and root protection. Even at the lowest dose tested, corn treated with Salibro™ showed higher root mass and a lower nematode population.

IMPACT OF CRESCENT POPULATION DENSITIES OF *MELOIDOGYNE PARANAENSIS* IN COFFEE SUSCEPTIBLE GENOTYPE AND RESISTANT ROOTSTOCK [IMPACTO DE DENSIDADES POPULACIONAIS CRESCENTES DE *MELOIDOGYNE PARANAENSIS* EM GENÓTIPO SUSCETÍVEL E PORTA-ENXERTO RESISTENTE DE CAFÉ]

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Meloidogyne species are widely distributed in coffee growing areas, in which *M. paranaensis* is responsible for significant losses to the crop. The use of resistant genotypes, as Apoatã rootstock, is the main management tool in infested areas. However, the impact of crescent population densities of *M. paranaensis* in genotypes carrying resistance genes has been poorly understood. The objective of this study was to characterize the effect of crescent population densities of *M. paranaensis* in Mundo Novo, susceptible cultivar, and in the resistant rootstock, Apoatã, under greenhouse conditions, using 25 L-capacity pots. For this, both genotypes were inoculated with 0.0625, 0.125, 0.5, 1, 2, 4, 8, 16, 32, and 64 eggs per cm^3 of soil and, 540 days after inoculation, development of plants were evaluated, based on fresh top weight and fresh root weight. Results showed that in Mundo Novo, independent of the population density, there was a significant impact of nematode in the development of plants. On the contrary, in Apoatã damage was lower than in Mundo Novo, and it was not correlated with the population density, although higher population densities, from 2 eggs per cm^3, were capable of causing significant damages also in Apoatã. This suggested that *M. paranaensis* is a severe nematode species for coffee plants and that the damages caused are lower in resistant rootstock, independent of the nematode population density. The use of resistant genotypes, therefore, is imperative in infested areas.

PRESENCE OR ABSENCE OF ISOPRENOID SYNTHESIS IN NEMATODES [PRESENCIA O AUSENCIA DE SÍNTESIS DE ISOPRENOIDES EN NEMATODOS]

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Isoprenoids represent one of the largest classes of organic compounds, essential for living organism. All these oligomers are synthesized from the five-carbon precursor isopentyl-pyrophosphate (IPP) and its isomer dimethylallyl-pyrophosphate (DMAPP). Subsequent metabolic reactions and modifications generate an enormous complexity and diversity of natural products, with indispensable roles in various physiological processes. The isoprenoid precursors can be synthesized by two distinct metabolic pathways, the mevalonate (MVA) and the methylerythritol phosphate (MEP) pathways. The MVA pathway is considered the main rout of IPP/DMAPP synthesis in multicellular organisms. Plants have the capacity to synthesize IPP/DMAPP by both pathways, which display various distinct target sites for drug inhibition. In the nematode *Caenorhabditis elegans*, the MVA pathway inhibition by Statin resulted in embryonic lethality and larval arrest (Olsen *et al.*, 2009). Since plants possess the MVA and the MEP pathways leading to isoprenoids, MVA pathway inhibition against plant parasitic nematodes would be an ideal strategy without inhibition of the MEP pathway of the host plant. In silico investigation revealed that surprisingly numerous nematode species lack the ability to synthesize IPP/DMAPP. These variations observed in MVA synthesis in nematodes can potentially be exploited to devise group-specific processes for disease control and to further investigate how these essential compounds are taken up and their role in pathogenicity. Furthermore, these investigations show how bioinformatic tools can be used to pre-investigate potential drug targets.

EFFECT OF BRASSICA JUNCEA SEED MEAL EXTRACT ON THE POTATO CYST NEMATODE, *GLOBODERA PALLIDA [EFECTO DEL EXTRACTO DE SEMILLA DE BRASSICA JUNCEA EN EL NEMATODE QUISTE DE LA PAPA, GLOBODERA PALLIDA]*

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Globodera pallida, the pale cyst nematode (PCN), is a quarantine pest affecting potatoes that is present in 27 Idaho fields, and thus prompting eradication efforts. While methyl bromide fumigation has been effective for eradication, it has not been used since 2014. Isothiocyanate-generating *Brassica juncea* seed meal is known to be effective against nematodes, but the rate required for field application limits the utility of using mustards meals in nematode-control strategies. To overcome this obstacle, procedures to extract and formulate the active ingredients from mustard seed meal, into shelf-stable powdered products have been developed. *B. juncea* seed meal extract (SME) was tested for effectiveness as a biofumigant for control of *G. pallida* in micro-plot trials under field conditions. SME extract (4.48 t/ha, 382 µmol 2-propenyl glucosinolate/g extract) was amended to microplots infested with *G. pallida*. Each microplot contained 18.5 kg of sandy loam field soil and was infested with *G. pallida* cysts contained in small nylon mesh bags (2.5 encysted eggs/g soil). Population decline was determined 6 and 12 weeks after exposure to SME by conducting hatching assays with remaining encysted eggs. Viability of PCN after 12 weeks was further assessed by evaluating their ability to multiply in greenhouse potato bioassay. Application of SME in microplots was highly effective in killing encysted PCN; hatch of PCN after exposure to the biofumigant was negligible, and there was no multiplication of the nematode in a potato bioassay subsequent to exposure to the biofumigant extract.

EFFORTS TO CONTROL POTATO CYST NEMATODES IN THE USA [ESFUERZOS PARA CONTROLAR EL NEMATODO QUISTE DE LA PAPA EN ESTADOS UNIDOS]

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The economically important nematode parasites of potato, *Globodera pallida* and *Globodera rostochiensis* are some of the most specialized nematode pests in agriculture. Potato cyst nematodes (PCN) are limited in host range to potato and a few other solanaceous crops, and are well adapted to survive in soil for many years. In today's globalized world, intensified international trade has increased the risk of an introduction of such noxious pests. In the United States, *G. rostochiensis* was detected in New York in the 1940s and *G. pallida* was more recently detected in Idaho in 2006. In addition to these detections, a new species of *Globodera*, *G. ellingtonae*, was described from populations collected in Oregon and Idaho. Stringent adherence to phytosanitary programs have contained *Globodera rostochiensis* to eight counties in New York, fewer than 6,000 acres, despite its documented presence since 1941. The infestation of *Globodera pallida*, first found only in Idaho in 2006, continues to be contained to fewer than 3,000 acres which is less than 1% of the total acreage planted to potato in Idaho. Trade of potato from the US and from Idaho, originally interrupted by the detection of *G. pallida*, has resumed with Canada, Mexico, and South Korea, whereas negotiations to resume export of potato from Idaho to Japan are ongoing. The use of containment and quarantine methods, plant resistance, soil fumigation, and alternatives to fumigation in the United States, and elsewhere in the world against potato cyst nematodes will be discussed.

PHASMARHABDITIS HERMAPHRODITA AND ITS INFECTIVITY ON INVASIVE GASTROPODS AND NON-TARGETS IN THE US [*PHASMARHABDITIS HERMAPHRODITA* Y SU INFECTIVIDAD EN GASTRÓPODOS INVASIVOS Y NO-BLANCOS EN LOS EEUU]

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Following discovery of three *Phasmarhabditis* spp. including *P. hermaphrodita* in the US, tests were conducted to evaluate their lethal effects on invasive slugs, snails and non-targets. *Phasmahabditis hermaphrodita* caused significant to highly significant mortality on *Lehmannia valentiana* (Valencia slug), *Deroceras reticulatum* (grey field slug), *Cornu aspersum* (European brown garden snail), and *Lissachatina fulica* (giant African land snail) neonates at rates equivalent to or higher than Nemaslug®'s recommendation of 30 IJs/sq cm (1x). It also infects *Limacus flavus* (Tawny garden slug) but does not cause mortality and is safe to three earthworm species *Amynthas gracilis* (Alabama jumper), *Eisenia fetida* (Red wigglers), and *Eisenia hortensis* (European night crawler). In another test, gastropods showed different levels of susceptibility to the three *Phasmarhabditis* species. Results suggested that exposure to the three species at 1x or 5x recommended rate is safe to non-target species *Rumina decollata*.

EDUCATION IN NEMATOLOGY: INTERNATIONAL MSc IN AGRO- AND ENVIRONMENTAL NEMATOLOGY [EDUCACIÓN EN NEMATOLOGIA: MSc INTERNACIONAL EN AGRO Y NEMATOLOGÍA AMBIENTAL]

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Recently the International MSc programme in Nematology at Ghent University, Belgium, originally named "Postgraduate International Nematology Course (PINC)" has changed its name into "International Master of Science in Agro- and Environmental Nematology (IMAGEN)". The programme emphasizes more on the agricultural and environmental aspects, which are nowadays important parts of Nematology and should attract more students. It is an English taught 2-year programme, globally unique in its kind, offering a dynamic, interactive and multidisciplinary approach, attracting students from across the world and bridging with universities in the South. The first year offers a variety of basic compulsory Nematological courses and the second year offers a series of elective courses, tailor made to the needs and future perspectives of the students. Strong points are the teaching staff of national and international experts, international mobility, internships, networking courses with visits to European universities, institutes and companies involved into the current top priority research in Nematology. Key objectives of the programme include: (1) disseminate knowledge of nematode effects on crops and their role in disease complexes; (2) transfer of information to implement sustainable farming practices and improve agricultural productivity under rapidly changing environmental and climate conditions; (3) facilitate the use of nematodes as biological control agents; (4) advance the knowledge of nematodes in their role as ecosystem service providers. A new strategy is launched for international capacity building and sustainability in the South, through satellite programmes in Ethiopia (a Summer Course in Nematology) and Kenya (Basic Nematology Crash Course)

ARE INVASIVE NEMATODES PUTTING THE SQUEEZE ON FLORIDA STRAWBERRIES? [LOS NEMÁTODOS NO NATIVOS DAÑAN EL CULTIVO DE LA FRESA EN FLORIDA]

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Sting nematode (*Belonolaimus longicaudatus*) is generally considered to be the major plant-parasitic nematode affecting strawberry in Florida. However, several other damaging nematodes have been observed in Florida strawberry fields in recent years. All indications are that these "new" nematodes were introduced in Florida with strawberry transplants. Strawberry transplants are not produced in Florida, but are generally imported as either bare-root or plug plants from U.S. and Canadian production fields. Emergence of these nematodes in Florida is probably related to the changing soil fumigation practices in these strawberry nurseries from broad spectrum fumigants like methyl bromide to other less effective substitutes. In surveys of Florida strawberry fields during 2017 (and prior), the tropical foliar nematode species *Aphelenchoides besseyi* was found in several commercial farms on plants which probably originated from a high elevation North Carolina nursery. The more temperate nematodes, *Meloidogyne hapla* and *Pratylenchus penetrans,* are also increasingly found in Florida strawberry farms. Again, these nematodes are similarly strongly associated with specific US and Canadian transplant production fields with previous history of specific nematode problems. Damage and crop loss caused by these introduced nematodes in Florida can be significant, but only anecdotal evidence of their impacts is currently available. Also, there is no certainty whether or not any of these nematodes can survive in Florida strawberry fields during the summer off-season. The arrival of exotic nematode parasites of strawberry from outside Florida complicates nematode management within this crop when truly effective postplant crop rescue practices to mitigate nematode damage and crop loss are not currently available.

BLUEBERRY MULCHES MODULATE PEST MANAGEMENT AND COMPETITION BY MICROARTHROPODS, FUNGI, AND ENTOMOPATHOGENIC NEMATODES IN CADAVERS OF INSECT LARVAE [MANEJO DE PLAGAS MODULAR POR COMPETENCIA CON MICROARTROPODOS, HONGOS, Y ENEMPODOMINOS ENTOMOPATOGÉNICOS EN CADAVERES DE INSECTOS LARVAS CON COBERTURAS EN ARANDANOS]

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The application of entomopathogenic nematodes (EPNs) in blueberry in Florida is complicated by the near-universal use of pine-bark mulches or amendments to reduce soil pH. We compared the efficacy of *Steinernema riobrave* (30 infective juveniles/cm^2 soil surface) against caged, sentinel *Diaprepes abbreviatus* larvae buried either in bare soil or in beds of pine bark, pine bark mixed with composted chicken manure, or pine bark amended soil beds covered with woven, landscape fabric. Seven days after *S. riobrave* application, cages were recovered, mortality assessed, and cadavers placed on White traps. Sentinel mortality did not differ significantly between the bare soil (83%), fabric-covered soil (75%), mounded pine bark with manure (60%), or mounded pine bark (48%). However, 80% of sentinels from bare soil produced *S. riobrave* or bactivorous nematodes that compete with *S. riobrave*, in contrast (P = 0.05) to fabric-covered soil (35%), compost plus pine bark (25%) or pine bark (20%). Sentinels in compost plus pine bark produced cadavers (43%) infested by mites or *Fusarium* sp. at higher rates (P = 0.05) than those in fabric covered soil (25%) or pine bark (23%). Just 2% of sentinels in bare soil produced cadavers with mites or *Fusarium* sp. Ongoing research to maximize efficacy of EPN in blueberry is investigating irrigation rates and delivery methods, use of adjuvants to retain moisture, and EPN species that may perform better in bark mulches than in soil.

"SOJA LOUCA II" - GREEN STEM AND FOLIAR RETENTION - A NEW SOYBEAN DISEASE IN BRAZIL [SOJA LOUCA II - UMA NOVA DOENÇA DA SOJA NO BRASIL]

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"SojaLouca II" (SL-II) refers to soybean plants that remain green and foliated after the healthy leaves reach the harvest point. They have a darker coloration and reduced pilosity, blistering at the leaf limb and thickening at the veins and nodes, reduced number of pods with brown necrotic lesions, rotting. and reduction of the number of grains, high abortion rate of flowers and pods. Given the presence of impurities, losses of up to 60% are estimated. Incidence of SL-II increases during years of greater rainfall frequency. Greater reductions in the incidence of SL-II are achieved in cropping systems with strict control of invasive plants at pre- and post-sowing. *Aphelenchoides* sp. occurs in large numbers on reproductive nodes and symptomatic leaves. Koch's postulates were demonstrated by isolating *Aphelenchoides* sp. from plants with SL-II symptoms, reared in the laboratory and used to inoculate healthy soybean plants in the greenhouse that subsequently reproduced the same symptoms of original SL-II. Non-inoculated plants, maintained as control, did not present SL-II symptoms. The pathogenicity test was repeated three times, confirming the nematode *Aphelenchoides* sp. as the causative agent of SL-II. This new soybean disease in Brazil was reported to Ministério da Agricultura, Pecuária e Abastecimento – MAPA (a Government Departmentof Agriculture, Livestock and Food Supply) in July 2015.

"SOJA LOUCA II" – FIRST STUDY OF THE HOST-PATHOGEN RELATIONSHIP [SOJA LOUCA II –PRIMEIRO ESTUDO DA RELAÇÃO PATÓGENO-HOSPEDEIRO]

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The term "Soja Louca II" refers to a new soybean disease caused by *Aphelenchoides besseyi*. In order to understand the new host-pathogen relationship, a study was carried out under greenhouse conditions to elucidate the nematode movement in the plant. Soybean seeds were sowed in 48 pots containing a mixture of soil and sand (1:1) and, after 10 days, seedlings were thinned to one per pot followed by the inoculation. Inoculum was a suspension containing 500 specimens of *A. besseyi* poured into a 1.5 cm-deep hole near the base of the seedlings. Nematode quantifications were done weekly, started a week after inoculation and continued eight times. Soil, roots, nodes, and the respective leaves of each node were analyzed separately for nematode quantification. Nematodes were found in all plant parts evaluated. However, lower amounts were found in the soil (mean of 14 nematodes cm^{-3} soil), followed by roots (mean of 20 nematodes g^{-1}), and higher amounts were found in the nodes (mean of 120 nematodes g^{-1}) and leaves (mean of 217 nematodes g^{-1}). In the nodes, there were no significant differences in the number of nematodes found during the experimental period but, in the leaves, the number of nematodes recovered increased and was higher in the last weeks.

EFECTO FUMIGANTE DE BICARBONATO DE AMONIO SOBRE *MELOIDOGYNE JAVANICA* J2, COMO ALTERNATIVA SUSTENTABLE PARA CULTIVOS HORTÍCOLAS [FUMIGANT EFFECT OF AMMONIUM BICARBONATE AGAINST *MELOIDOGYNE JAVANICA* J2, AS A SUSTAINABLE ALTERNATIVE FOR VEGETABLE CROPS]

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Cultivos hortícolas como Tomate, zanahoria, lechuga, apio, Pimentón, y otros, en la zona tropical Colombiana del Valle de San Nicolás, Antioquia, se ven afectados por problemas fitosanitarios como el nematodo nodulador *Meloidogyne* spp., que ocasionan deformaciones, poco desarrollo, pérdida de competitividad y productividad entre 10 y 35%. La búsqueda de alternativas sustentables para el manejo de estos fitonemátodos surge como respuesta a un uso indiscriminado de plaguicidas de poca eficacia, toxicidad y contaminación ambiental; dentro de estas alternativas se encuentran varios productos fumigantes. En este estudio, por el método de fumigación *in vitro*, en el Laboratorio de Sanidad Vegetal de la UCO y en un diseño completamente aleatorizado con tres repeticiones, se evaluó la actividad nematicida del Bicarbonato de Amonio (BA) frente a estadios J_2 de *M. javanica*. Los resultados del BA bajo la metodología de biofumigación *in vitro*, fueron demostrados, al causar el 100% de inmovilidad de los juveniles J_2, veinticuatro horas después del tratamiento. De acuerdo a la eficacia de este producto, Se recomienda realizar experimentos bajo condiciones de campo para evaluar las potencialidades de este fumigante en el control de nematodos en áreas cultivables, incluso para cultivos establecidos; y de esta forma podría utilizarse como alternativa dentro de un programa integrado en la producción sostenible de hortalizas.

FLUORESCENCE MICROSCOPY AND POTENTIAL APPLICATIONS ON NEMATODE STUDIES [MICROSCOPIA DE FLUORESCENCIA Y APLICACIONES POTENCIALES EN ESTUDIOS DE NEMATODOS]

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To cause disease, plant pathogens undergo diverse morphological and physiological changes that live cell microscopy illuminated by the use of fluorescent proteins or fluorescent dyes can help us to reveal. My previous work has focused on studies of effector proteins that are delivered by invasive hyphae inside living rice cells to block host defenses and control host cell processes. So far, the only commonality found among all unique small-secreted blast effector proteins is their accumulation in a novel in planta structure called the biotrophic interfacial complex (BIC), which is associated with the hyphal cells undergoing a dimorphic switch. These novel findings were possible thanks to live cell microscopy of invasive hyphae expressing various fluorescent secretion machinery components and various fluorescent effectors. I used live cell imaging of invasive hyphae growing in rice cells to investigate protein secretion mechanisms by three different approaches. The first approach involves generation and analysis of fungal transformants that contain fluorescently-labeled components of the fungal secretory system. The second approach involves imaging of knock-out mutants lacking various secretory machinery components. And the third approach involves imaging effector secretion after treatment with chemicals that disrupt different secretory pathways. This work allows us to show for the first time localization of the fungus, *Magnaporthe oryzae* secretion components in invasive hyphae *in planta*. We propose that there is a spatially segregated mechanism for secretion of effectors into BICs by an unconventional secretory mechanism. I am currently working in Puerto Rico on crops as plantain, banana, and several root food crops for which a control of plant pathogenic nematodes (PPNS) is critical for sustainable crop productions. To provide an effective and durable control of PPNS is key to understand the closest interactions between them and their hosts. Fluorescent microscopy can help us to identify the key pathogenicity phase in their life cycle, comprehend their different strategies of invasion and their host specificities.

HOST STATUS OF SELECTED RICE CULTIVARS TO *APHELENCHOIDES BESSEYI* IN LOUISIANA [EVALUACIÓN DE LA REPRODUCCIÓN DE *APHELENCHOIDES BESSEYI* EN CULTIVARES DE ARROZ SELECCIONADOS EN LOUISIANA]

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Aphelenchoides besseyi, the causal agent of rice white-tip disease, has been recently found in quarantine samples in Louisiana. Previous studies suggested that short and medium grain cultivars are more susceptible to white tip nematode than long grain. The objective of this study was to evaluate the host resistance to *A. besseyi* among the most planted rice cultivars in Louisiana. A greenhouse study was conducted using 9 cultivars (3 medium, 3 long grain, and 3 long grain hybrids). Thirty-day-old rice seedlings were inoculated with 500 individuals of *A. besseyi* between the leaf sheath and culm. The experiment was established in a randomized split plot design with 90 plots, in which half was inoculated. At harvest time, plant measurements and nematode population were recorded. Among the inoculated cultivars, the most susceptible was Jupiter (medium grain) with 3,640 nematodes per 10 g of paddy seed. The hybrid XL 753 presented the lowest population with 512 nematodes. Inoculated hybrids, showed significantly lower height (6%), lighter fresh root (8%), and shoot weights (20%) compared to the control. The same trend was observed for long grain cultivars: lower height (8%) and lighter fresh root weight (35%). There was no difference in plant parameters between controls and inoculated for the medium grain group. This study indicates that a number of rice cultivars currently grown in Louisiana are still fairly susceptible to the white tip nematode but the nematode did not significantly impact yield.

PATOGÉNESIS DE *MELOIDOGYNE* SPP. SOBRE *CAPSICUM BACCATUM* VAR. *PENDULUM* Y SU RELACIÓN CON REPRESORES ORGÁNICOS EN CONDICIONES DE LABORATORIO Y VIVERO [*MELOIDOGYNE* SPP. PATHOGENESIS ON *CAPSICUM BACCATUM* VAR. PENDULUM AND ITS RELATIONSHIP WITH ORGANIC SUPPRESSOR UNDER LABORATORY AND NURSERY CONDITIONS]

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La investigación se realizó en el laboratorio de Fitopatología de la Universidad Privada Antenor Orrego y en el vivero del área de Suelos de la Universidad Nacional de Trujillo de la provincia de Trujillo, región La Libertad-Perú. El propósito del trabajo fue evaluar la patogénesis y tasa de reproducción de *Meloidogyne* spp. sobre *Capsicum baccatum* var. *pendulum* y determinar el efecto de los represores orgánicos sobre *Meloidogyne* spp en condiciones de laboratorio y vivero. Se empleó un diseño completamente al azar (DCA), para determinar la eficiencia de 4 nematóxicos (Nemaquill, Nemathor, Hunter, Vydate) en el control de *Meloidogyne* spp. Se hicieron pruebas in vitro con la dosis comercial, para establecer su efecto sobre la eclosión y mortalidad de huevos y J2. Además, se hizo una prueba de infectividad en invernadero en *Capsicum baccatum* var. *pendulum*. Se determinó la viabilidad de los huevos, encontrándose que el promedio de porcentaje natural de emergencia de juveniles fue de 23.32%. Los resultados obtenidos en laboratorio muestran que los productos Nemathor y Vydate causaron el 100% de mortalidad de los juveniles, Nemathor inhibió totalmente la emergencia de juveniles a partir de los huevos y Vydate logró valores de emergencia de juveniles de 1.03 y 1.05%. Nemaquill y Hunter alcanzaron porcentajes de emergencia de juveniles de 15.17%-15.39% y 34.40%-35.35% respectivamente. En mortalidad de juveniles, Nemaquill y Hunter lograron 0% y 5.57%-6.23% respectivamente. En condiciones de vivero, Vydate logró obtener la menor tasa de reproducción con 0.01, Nemathor, Testigo+Huevos, Nemaquill y Hunter alcanzaron una T.R de 2.33, 14.89,16.26 y 17.95 respectivamente.

REACTION OF *PHASEOLUS VULGARIS* L. GENOTYPES BAT-306 AND TRIUNFO-70. TO *MELOIDOGYNE INCOGNITA* [REACCIÓN DE *PHASEOLUS VULGARIS* L.GENOTIPOS BAT-306 Y TRIUNFO-70 A *MELOIDOGYNE INCOGNITA*]

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Common bean (*Phaseolus vulgaris* L.) has an important role in human nutrition. Common bean provides protein, complex carbohydrates, and valuable micronutrients for habitants in the tropics. Cuban people depend on common bean grain as a source of primary staple. Many pathogens and pests including plant-parasitic nematodes parasitize common bean. Our previous studies indicated that *Meloidogyne* is important pest in common beans in Cuba. Additionally, farmers use common beans in crop rotations with tobacco, potatoes, and other crops, that are good hosts for *Meloidogyne*. Although damage has been observed, no investigation has been undertaken to relate reaction of widely used Cuban genotypes in presence of *Meloidogyne incognita* (Kofoid and White) Chitwood. In order to provide adequate management for increase yields, provide benefits to farmers and evade the dependence of chemicals nematicides. The objective of our study was to determine the performance on susceptibility and/or resistance of common bean genotypes BAT-306 and Triunfo-70 using different concentrations of *M. incognita*. Under semi-controlled conditions common bean genotypes were planted in containers with 1 kg of substrate, plants were inoculated with a six initial population (Pi). The *M. incognita* inoculum was previous reproduced in beans at CENSA's nematode bank. Geometric series (Pi) of nematodes were used (0.125; 0. 25; 1; 4; 16 and 64 eggs/second stage juveniles per gram of substrate). The final population (Pf) was determined after 60 days, following by calculations of the Reproduction Factor (RF) = Pf/Pi. Our studies showed that the cultivar Triunfo-70 was resistant when Pi was less than 64 individuals of *M. incognita*. Calculation of the RF resulted between 0.23 and 0.9. While the cultivar BAT-306 increased the nematode population showing a, RF between 6.1 and 8. In relation to *M. incognita* our results showed that common bean genotypes BAT-306 (susceptible) and Triunfo-70 (resistant). For that reason, both genotypes could be used as standards in breeding programs that are examining resistance.

ENTOMOPATHOGENIC NEMATODE SPECIES RICHNESS IS INVERSELY RELATED TO CARIBBEAN FRUIT FLY INTEGRATED BIOLOGICAL CONTROL IN SOUTH FLORIDA [LA RIQUEZA DE ESPECIES DE NEMATODOS ENTOMOPATOGÉNICOS ESTÁ INVERSAMENTE RELACIONADO CON EL CONTROL BIOLÓGICO INTEGRADO DE LA MOSCA DE LA FRUTA EN EL SUR DE FLORIDA]

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Interspecific interactions between entomopathogenic nematodes (EPN), a braconid wasp (*Diachasmimorpha longicauda*) and Caribbean fruit fly (Caribfly or *Anastrepha suspensa*) were studied from June 2016 to May 2017 in south Florida. Caribfly-infested guava fruits were periodically obtained from a guava orchard and arranged in pyramidal ground cages (with sticky traps) beneath nearby avocado trees that are non-hosts for this insect. In zero, one-, two-, and three-EPN species treatments, the fruits and soil were treated with a total of 350 infective juvenile EPNs cm^{-2} soil surface. The numbers of adult Caribflies recovered on sticky traps were directly related ($P < 0.01$) to EPN species richness, suggesting that single EPN species will be more useful to manage Caribfly. Compared to untreated controls, treatment with *Heterorhabditis bacteriophora* (an exotic EPN) resulted in a lower ($P = 0.05$) proportion of emerging adult Caribfly (0.23 ± 0.06), than did treatment with the exotic *Steinernema feltiae* (0.45 ± 0.17) or the endemic *Heterorhabditis indica* (0.47 ± 0.13). None of the EPN species affected the emergence of the braconid (or parasitoid). Moreover, single EPN species treatments achieved the lowest ratios of emerging adult Caribfly per emerging parasitoid, indicating that both EPN species and the braconid are compatible for effective integrated pest management.

SPECIES OF *SCUTELLONEMA ANDRÁSSY*, 1958 FROM FLORIDA [ESPECIES DE *SCUTELLONEMA ANDRÁSSY* DE FLORIDA]

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According to Lehman (2002), six *Scutellonema* species have been identified morphologically in Florida: *S. africanum* Smit, 1971; *S. brachyurus* (Steiner, 1938) Andrássy 1958; *S. bradys* (Steiner & LeHew, 1933) Andrássy, 1958; *S. clathricaudatum* Whitehead, 1959; *S. conicephalum* Sivakumar & Selvasekaran, 1982 and *S. grande* Sher, 1964. The results of cooperative molecular and morphological studies conducted recently by taxonomists in the USA and South Africa have identified and characterized morphologically and molecularly two of these species: *S. brachyurus* and *S. bradys*. In addition, another species not previously reported in Florida, *S. cavenessi* Sher, 1964 was also detected in the state and characterized. The identification of the remaining four reported species is still unverified because they have not been found in recent nematode surveys conducted in Florida. *Scutellonema brachyurus* is the most common species, found on many plants including African violet (*Saintpaulia ionantha* (H.) Wendl.), daylilies (*Hemerocallis* spp.), and bowstring hemp (*Sansevieria* spp.). Unverified hosts of *S. bradys* in Florida include azalea (*Rhododendron* spp.), castor bean (*Ricinus communis* L.), oak (*Quercus viginiana* Mill.), and cabbage (*Brassica oleracea* L.), but not yam (*Dioscorea* sp.), a common host in other countries. Florida populations of *S. bradys* differ morphologically and genetically from other populations of *S. bradys*. They were found on the surface of Bermuda grass (*Cynodon dactylon* (L.) Pers.) roots. Florida *S. cavenessi* parasitizes *Sansevieria* spp. and is genetically similar to an unidentified population from Burkina Faso (West Africa), where some *Scutellonema* species and *Sansevieria* spp. are indigenous.

EFICACIA DEL NIMITZ® (FLUENSULFONE) CONTRA NEMÁTODOS AGALLADORES (*M. INCOGNITA*) EN EL CULTIVO DE PAPA (*SOLANUM TUBEROSUM* L.) [EFFECTIVENESS OF NIMITZ® (FLUENSULFONE) AGAINST ROOT-KNOT NEMATODES (*M. INCOGNITA*) IN POTATO CROPS (*SOLANUM TUBEROSUM* L.)

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Actualmente, el combate de fitonemátodos agalladores se ha convertido en un verdadero reto en los sistemas agrícolas, ya que la mayoría de los productos no fumigantes no tienen registro vigente para hortalizas. En el último lustro, resultados muy promisorios se han obtenido con la aplicación de un producto del grupo de los fluoroalkenilos, como una alternativa de reemplazo a nematicidas tradicionales de alto impacto ambiental y sobre la salud humana. En México y otros países, se ha documentado su efecto para controlar fitonemátodos (*Nacobbus* y *Meloidogyne*) en diversos cultivos de importancia agrícola. La siguiente contribución es para mostrar la efectividad del fluensulfone (FSF) en el cultivo de papa de gran importancia en el centro y norte de México. Se evaluaron cinco dosis de FSF (1.0-3.5 L/ha); de las cuales, las dosis de 3 y 3.5 L se aplicaron en dos subdosis: al momento de la siembra y al momento del aporque (30-35 DDS). El resto de los tratamientos se aplicaron en drench a la semilla. Oxamil (4.0 L/ha) y plantas sin tratar fueron incluidos como controles. Todos los tratamientos se establecieron bajo un diseño de bloques completos al azar con tres repeticiones. Las poblaciones de *M. incognita* fueron significativamente afectadas ($\alpha = 0.05$) con las aplicaciones de FSF (2.00-3.5 $L \cdot ha^{-1}$), encontrándose la mejor respuesta con las dosis de 3.0-3.5 $L \cdot ha^{-1}$, reduciendo las poblaciones de juveniles en más del 85% a los 90 DDS. El FSF (2-3.5 $L \cdot ha^{-1}$) proporcionó la mayor protección a las raíces de las plantas tratadas, con reducciones de daño superiores al 80%, en comparación a las plantas control. Bajo las condiciones de este ensayo, las plantas tratadas con FSF y oxamil, no mostraron diferencias significativas en las variables de rendimiento evaluadas a los 100 DDS ($\alpha = 0.05$). Las principales ventajas del FSF es que actúa como un verdadero nematicida, su efecto de control puede durar hasta los 60 días con poblaciones bajas, se aplica en drench en las semillas o a través del sistema de riego antes de la siembra, y no es fitotóxico al cultivo si se aplica siguiendo las instrucciones de la etiqueta.

EFFICACY OF INCORPORATED ORGANIC AMENDMENTS ON TURFGRASS NEMATODES AND TURF HEALTH [EFICACIA DE LA INCORPORACIÓN DE ENMIENDAS ORGÁNICAS SOBRE LOS NEMATODOS Y LA SALUD DEL CÉSPED]

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Various chemistries are available for nematode control; however, applications can be extremely expensive rendering them inaccessible for many golf courses and athletic fields. In many instances employment of cultural methods for management may be the only option. The incorporation of organic amendments within soils has been confirmed repeatedly to reduce population density of target plant-parasitic nematodes within turfgrass and agronomic crops. This reduction may be a result of increased levels of microorganisms which display antagonistic qualities. Comand® compost is a commercially available product which is marketed for turfgrass and agronomic crops. The manufacturing of Comand® involves a series of microbial inoculations with a patented microbial community. Canadian sphagnum peat moss (CSPM) is commonly used organic amendment incorporated with soil on golf courses and athletic fields. A microplot experiment conducted at the University of Florida comparing the efficacy of Comand® versus CSPM found a 95% reduction of *Belonolaimus longicaudatus* in soils containing a 20% Comand® mixture compared with 15% CSPM. A 2 year field experiment using a randomized block design with 3 replications was initiated in May 2016 with the objective of comparing the results of soils incorporated with Comand®, or CSPM with an unamended control. Treatments were applied to a depth of 2.54 cm and rototilled to the depth of 12.7 cm, creating a 20% amendment:soil mixture. Plots were then sprigged with 'T-11' bermudagrass. A significant reduction in *B. longicaudatus* and a significant increase in percent green coverage was shown by both treatments compared to the unamended control.

BIOGEOGRAPHY OF ENTOMOPHILIC NEMATODES: THE RELATIONSHIP BETWEEN LIFE HISTORY AND DISTRIBUTION RANGE [BIOGEOGRAFÍA DE NEMATODOS ENTOMOFÍLICOS: LA RELACIÓN ENTRE LA HISTORIA DE VIDA Y EL ÁMBITO DE DISTRIBUCIÓN]

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The distribution pattern of nematodes is determined by many factors, e.g., host/carrier insects, host plants, geographical history, and reproductive mode. The distribution patterns of three groups of entomophilic nematodes are introduced as the potential model system of nematode phylogeography. *Bursaphelenchus conicaudatus* is phoretic associate of a longhorn beetle, *Psacothea hilaris*. The beetle is separated into 12 subspecies derived from the geographical viariance. Phylogeographic analyses revealed that the relationship among beetle subspecies was similar to that among associated nematodes obtained from each subspecies. But there were two intraspecific vector replacements which were supposed to have occurred by the introduction of insect and nematode from different origins. The relationship between fig (*Ficus*) and fig wasp is known as a model system of mutualism and co-evolution, and further, many groups of nematodes are involved with the system, e.g., *Parasitodiplogaster* (insect parasite) and *Ficophagus* (plant parasite). Those nematode groups show various distribution patterns, i.e., some are almost cosmopolitan and the others have very limited distribution corresponding to the distribution of host fig species. This suggests the presence of multiple times of nematode colonization in figs followed by co-speciation among figs, wasps, and nematodes. A cosmopolitan genus, *Pristionchus,* is recently becoming an important research material, because of a satellite model, *P. pacificus*. The phylogeographic analysis of the genus revealed that the genus is separated into geographic (American, Asian, and Western and Eastern European) clades, but hermaphrodites show much wider distribution than the gonochorists. This suggests that hermaphrodites have higher ability for colonization than gonocholistic species.

ACTIVIDAD NEMATICIDA DE NEMIX C® (*BACILLUS SUBTILIS* Y *BACILLUS LICHENIFORMIS*) DURANTE DOS TEMPORADAS, EN VIDES CV. CABERNET SAUVIGNON PARASITADAS POR *MELOIDOGYNE ETHIOPICA*, EN VIÑEDOS DE COLCHAGUA, APALTA, SANTA CRUZ, VII REGIÓN DE CHILE [NEMATICIDE ACTIVITY OF NEMIX® (*BACILLUS SUBTILIS* AND *BACILLUS LICHENIFORMIS*) FOR TWO SEASONS, IN VIDES CV. CABERNET SAUVIGNON PARASITES BY *MELOIDOGYNE ETHIOPICA*, IN VINEYARDS OF COLCHAGUA, APALTA, SANTA CRUZ, VII REGION OF CHILE]

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Durante 2 temporadas agrícolas se evaluó la acción nematicida de NEMIX C®, (*Bacillus subtilis* y *Bacillus licheniformis*) afectada por *Meloidogyne ethiopica*, en vides variedad Cabernet Sauvignon, monitoreando raíces, rendimiento de fruta y poda de plantas. Cabernet Sauvignon es la variedad franca mas resistente a *M. ethiopica*, considerando un éxito haber podido limitar el incremento de población. Las aplicaciones imitaron una aplicación comercial. Se hicieron 8 muestreos de nemátodos en 2 años. En la primera temporada no hubo reducción de las poblaciones de nemátodos. En la segunda temporada, las dosis de 2 Kg/ha 1500 ppm, tuvo 36% de reducción de las poblaciones de nemátodos, 3 Kg/ha 1000 ppm, tuvo 23% de reducción, y 3 Kg/ha 1500 ppm tuvo 14%. Entre los 9 tratamientos de Nemix C®, 8 mejoraron consistentemente la calidad radical. En fozas de observación profundas, de 2 metros de profundidad, las raíces tuvieron mejora de calidad aunque no hubo incremento de profundidad. De 4 tratamientos con mayor rendimiento de fruta, 3 correspondieron a dosis altas de 3 Kilos por hectárea. La interpretación más correcta de este resultado en que luego de las aplicaciones a dosis de 3 kilos, se tuvo un efecto sobre gran parte del sistema radical, que mejoró la funcionalidad del sistema radicar que pudo elevar la calidad y cantidad de fruta. El incremento de poda fue mínimo. Las poblaciones de nemátodos no fitoparásitos o nemátodos benéficos, fueron incrementadas por las aplicaciones de NEMIX C®, lo que es relevante considerando que es uno de los buenos indicadores de vida en los suelos.

ESTUDIO DE LA ACTIVIDAD NEMATICIDA DE NEMIX C® (*BACILLUS SUBTILIS* Y *BACILLUS LICHENIFORMIS*) EN VIDES CULTIVAR CHARDONNAY AFECTADAS POR *MELOIDOGYNE ETHIOPICA* DE CASABLANCA, V REGIÓN DE CHILE, DURANTE DOS TEMPORADAS [STUDY OF THE NEMATICIDE ACTIVITY OF NEMIX C® (*BACILLUS SUBTILIS* AND *BACILLUS LICHENIFORMIS*) IN GRAPES CULTIVAR CHARDONNAY AFFECTED BY *MELOIDOGYNE ETHIOPICA* IN CASABLANCA, V REGION OF CHILE, DURING TWO SEASONS]

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Se evaluó la acción nematicida de NEMIX C®, (*Bacillus subtilis* y *Bacillus licheniformis*) sobre *Meloidogyne ethiopica*, y los beneficios para las plantas de vid variedad Chardonnay durante dos años. Se utilizó un viñedo cultivar Chardonnay de 20 años de edad del Valle de Casablanca. Se trabajó con 10 repeticiones por cada tratamiento y 4 fechas de muestreo para el monitoreo de nemátodos y de las raíces. El producto se comportó como un buen nematicida, particularmente en aplicaciones repetidas de dosis de 2 y 3 kilos por hectárea a 1500 y 2000 ppm de producto comercial. Entre los buenos resultados de control de *M. ethiopica* estuvieron los tratamientos a dosis de 3 kilos por hectárea y concentraciones más altas de 1500 y 2000 ppm. Los tratamientos testigo sin tratamiento los nemátodos incrementaron las poblaciones de *M. ethiopica*. Los nemátodos no fitoparásitos elevaron sus niveles poblacionales, lo que se interpretó como incremento de la vida en el suelo y benéfico para raíces. Hubo mejora de calidad de raíces e incremento de la funcionalidad radical y esto tuvo beneficios de rendimiento, así como incremento del material vegetativo o poda. En evaluaciones de raíces en fozas de observación profundas, al fin de cada una de las dos temporadas, no hubo incremento de profundidad de raíces, pero si mejora de calidad en los 30 centímetros de la rizósfera donde siempre estuvieron las raíces. Las raíces tuvieron malas calificaciones en la primera temporada, pero mejoró en la segunda temporada, donde 7 de los 9 tratamientos obtuvieron buenas calificaciones.

EVALUATION OF ENDEMIC POPULATIONS OF *ROTYLENCHULUS RENIFORMIS* WITHIN LOUISIANA ON SOYBEAN AND COTTON GENOTYPES [EVALUACION DE POBLACIONES ENDEMICAS DE *ROTYLENCHULUS RENIFORMIS* IN GENOTIPOS DE SOYA Y ALGODON EN LOUISIANA]

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Variation among geographic isolates of the reniform nematode, *Rotylenchulus reniformis* (Rr), has been demonstrated both inter- and intrastate in the USA. Methods to identify virulence phenotypes are not available and applicable within the U.S. Greenhouse and laboratory based differential assays are being developed using PI90763, Cloud, and P4930LL, soybean, and ST 4946, M713 Ren 5, and MT2468 Ren 3, cotton, and isolates of Rr from Rapides, East Carroll, West Carroll, and Morehouse parishes. In greenhouse studies, non-gravid and gravid females and egg masses of Rr across isolates were differentiated by MT2468 Ren 3 and M713 Ren 5. MT2468 Ren 3 cotton showed greatest differences in total life stages per root system, 148 for the West Carroll isolate and 85 for the East Carroll isolate. For M713 Ren 5, root associated life stages averaged 134 for the West Carroll isolate compared with 20 for East Carroll. Fifty ml capacity polypropylene centrifuge tubes of soil were maintained under lab conditions to mimic greenhouse studies produced similar results. The cultivar MT2468 Ren 3 produced greatest differences in total life stages for the Morehouse and West Carroll isolates, 116 and 103 respectively compared with 51 for the East Carroll isolate. The cultivar M713 Ren 3 produced greatest differences in total life stages on the West Carroll isolate, 181, compared to 18 for the East Carroll isolate. The cultivar Cloud produced greatest differences in total life stages on the Rapides isolate, 188, compared to the Morehouse and East Carroll isolates, 90 and 63, respectively.

PLANT-PARASITIC NEMATODES ASSOCIATED WITH *PASSIFLORA LIGULARIS* AND *P. EDULIS* PLANTS IN ANTIOQUIA (COLOMBIA) [NEMATODOS FITOPARÁSITOS ASOCIADOS CON PLANTAS DE PASSIFLORA LIGULARIS AND *P. EDULIS* EN ANTIOQUIA (COLOMBIA)]

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Sweet passion fruit (*Passiflora ligularis* Juss.), purple passion fruit (*Passiflora edulis* f. *edulis*) and passion fruit (*Passiflora edulis* f. *flavicarpa*) were planted on 402; 120 and 1433 hectares, respectively in Antioquia State (Colombia). The first two crops were grown for exportation and the latter one for local consumption. Plant-parasitic nematodes are yield-limiting plant pathogens in passion fruits that alone or in association with fungi can reduce the yields of these fruit plants turning it into an itinerant crop. *Meloidogyne* spp. x *Fusarium solani* interaction on *P. liguris* was reported from this region, and for this reason 520 root and soil samples of passion fruit plants were analyzed for the presence of nematodes. For the extraction of nematodes, Cobb`s decanting and sieving method was used. Hoplolaimids were the most prevalent nematodes found in all samples, followed by *Meloidogyne* and *Pratylenchus*, except for *Pratylenchus,* which was predominant in the roots of *P. edulis* f. *flavicarpa*. *Rotylenchulus* spp. was found only in the rhizosphere of *P. edulis* f. *flavicarpa*. *Trichodorids*, *Hemicycliophora*, *Xiphinema,* and criconematids were found in the soil of sweet passion fruit and of purple passion fruit. In the soil of passion fruit only the last two taxons were found. Host status of *Passiflora* spp. plants for plant parasitic nematodes was determinated.

INFESTACIÓN DEL NEMATODO DEL NUDO DE LA RAÍZ (*MELOIDOGYNE INCOGNITA*) EN CINCO ESPECIES DE SOLANÁCEAS SILVESTRES [INFECTION OF THE ROOT-KNOT NEMATODE (*MELOIDOGYNE INCOGNITA*) IN FIVE SPECIES OF WILD SOLANACEA]

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Existe una alta incidencia del nematodo *Meloidogyne incognita* en varias especies de Solanáceas de importancia económica. Este patógeno ocasiona daños en la planta, llegando a producir hasta la muerte de la misma, ocasionando pérdidas monetarias para el agricultor. En la presente investigación, se evaluó la respuesta de infestación de cinco especies de Solanáceas silvestres (*Solanum auriculatum*, *S. hirtum*, *S. hispidum*, *S. arboreum*, y *Nicotiana glauca*) al parasitismo de *M. incognita*. Se utilizó un diseño de bloques completamente al azar con tres repeticiones. Se obtuvo el inóculo de raíces infectadas de tomate de árbol (*S. betaceum*), el cual fue propagado en plantas de tomate (*Lycopersicum esculentum*) variedad 'Sheila'. Las Solanáceas silvestres más dos testigos susceptibles (*S. betaceum* y *S. quitoense*), fueron inoculados con una dosis de 2500 larvas. Relacionando la población inicial con la población final de *M. incognita*, se determinó que *S. arboreum*, *S. hirtum*, y *N. glauca* presentaron una respuesta de no infestación al nematodo; mientras que el resto de especies se infestaron. Además, *S. hirtum* y *N. glauca* presentaron el menor número de agallas en raíces. En cuanto al rendimiento del follaje (peso seco), se observó una respuesta de no infestación (tolerancia) excepto en los testigos. Se concluyó que es adecuado utilizar las especies *S. hirtum* y *S. arboreum* (compatibles con *S. quitoense* – naranjilla) y *N. glauca* (compatible con *S. betaceum* – tomate de árbol) como portainjertos de frutales de importancia comercial en Ecuador. Además esta alternativa contribuye a la eliminación del uso de nematicidas que contaminan el suelo.

USE OF COLOR VEGETATION INDICES FROM UAS AERIAL MAPPING TO EVAUATE NIMITZ® EFFICACY CONTROLING *BELONOLAIMUS LONGICAUDATUS* IN FLORIDA STRAWBERRY [USO DE INDICES DE COLOR VEGETATIVO GENERADO POR SISTEMAS DE MAPEO AEREO NO TRIPULADO PARA EVALUAR LA EFICACIA DE NIMITZ CONTROLANDO *BELONOLAIMUS LONGICAUDATUS* EN FRUTILLAS DE FLORIDA]

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The use of color vegetation indices (CVI) derived from low-altitude aerial photograph orthomosaics obtained using an unmanned aerial vehicle (UAV) were evaluated for the ability to discriminate green leaf area, plant vigor, plant stress, stunting, and decay induced by *Belonolaimus longicaudatus* in Florida strawberry. The two CVIs used in this analysis were the Excess Greeness (ExG) and Excess Redness (ExR), ExG represents the green plant area and ExR indicates the stressed or dead plant area. The vegetation index maps were created at the field scale at different stages of the strawberry growing season. The field was selected for NIMITZ® evaluation based on a long history of high nematode pressure. Programmatically, treatments consisted of one drip irrigation system application of NIMITZ® at 2.9 L/ha, NIMITZ® at 4 L/ha, and Telone® EC at a 112 L/ha in the final stage of the previous year's strawberry crop as a crop termination treatment, including and compared with, an untreated check. In preparation of a fall planting, 7 days prior to strawberry transplanting in September 2016, NIMITZ® was applied at 2.9 L/ha and at 4L/ha, Telone® EC was applied 21 days before transplant at 68.2 L/ha, and again compared with the same untreated controls associated with spring treatments. All treatments were drip applied with 3-hour injection periods except fall Telone® EC applied in 1.5-hours. At transplanting on October 1, 2016. All fall treatments were followed by 14 days of daily overhead irrigation to establish the bareroot transplants. Aerial imaging survey of the experimental area was conducted on December 16, 2016; January 24 and March 22, 2017 using a DJI Inspire 1 Pro UAS with a DJI Zenmuse Z3 camera and a AerialMediaPros X3 NDVI camera. Image orthomosaics were created using DroneDeploy cloud software platform. Image resolution was high quality, generated at 0.4 inches per pixel. Processed RGB and NDVI maps were analyzed by Skymatics Ltd. Plant row based zonal summary statistic results of each CVI map show significant

differences of both NIMITZ® treatments expressing larger canopy size and with more green plant area (ExG) compared to the Telone® EC and Untreated treatments. Conversely, the Telone® EC treatment showed numerically more stressed, reduced canopy and dead areas (ExR) than within NIMITZ® treated areas, the untreated control showed significantly greater ExR areas compared to either NIMITZ® treatments. This work suggests that the use of CVIs from unmanned aerial imaging can be useful to rapidly assess nematode damage and nematicide treatment efficacy in a very practical, non-invasive, and quantitative way, with implications for use in related plant pathology studies.

USING A BIOGEOGRAPHY LENSE TO UNDERSTAND BIODIVERSITY AND ECOSYTEM FUNCTION [USO DE UNA LENTE BIOGEOGRÁFICA PARA ENTENDER LA BIODIVERSIDAD Y FUNCIÓN DEL ECOSISTEMA]

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Ecologists attempt to explain global distribution of plants and animals in theories of metabolism to body size, niche partitioning, and climatic gradients created by latitude or altitude. This knowledge has applications in conservation biology, colonization and establishment of invasive species, and environmental monitoring. Compared to aboveground, knowledge of soil biogeography is poorly understood, especially in the tropics and non-arable lands. The advent of molecular markers provides tools to quantify genetic structure in relationship to ecological function across global scales. Initial reports suggest that soil pH and stress are major explanatory variable of bacterial community assembly. For example, abiotic stress of soil moisture explains contrasts of prokaryote communities in deserts versus temperate biomes. Actinobacteria, Bacteroidetes, and Cyanobacteria are more abundant in desert than non-desert, whereas Verrucomicrobia and Acidobacteria are opposite. In contrast, archaeal communities associate more with ammonium concentration and soil depth. Protozoan communities reflect moisture gradients rather than geographic separation. These patterns are intuitive yet we lack a comprehensive understanding of linkages between structure and function in soil communities.

USING PRECISION AGRICULTURE TO MANAGE NEMATODE PROBLEMS IN SOYBEAN [USO DE LA AGRICULTURA DE PRECISIÓN PARA MANEJAR PROBLEMAS NEMATODOS EN SOJA]

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Although site-specific application of nematicides has been shown to be effective for nematode management in cotton (*Gossypium hirsutum*), there has been very little research in this area for management of nematodes in soybean (*Glycine max*). The objectives of this study were to determine if a field of soybeans with variable soil texture and both Southern root-knot (*Meloidogyne incognita*) and reniform (*Rotylenchulus reniformis*) nematodes could be divided into management zones and treated with site-specific application of nematicides. Treatments included 1,3-dichloropropene, Avicta Complete Bean, the combination of nematicides, and an untreated control. The field was divided into management zones based on apparent electrical conductivity (EC_a) values which ranged from 19.0-118.0 mS/m. The fumigant significantly reduced populations of both nematodes at-planting and after harvest. There were no significant differences in the populations of either nematode or yield by the Avicta Complete Bean. Soil zones had a significant impact on populations of both nematodes at planting and yield. In zones 1 and 2 with ECa values of 19.0-35.7 and 35.7-54.4 mS/m, respectively the fumigant provided an increase of 1378 and 740 kg/ha over the non-fumigated plots. Yield was not significant between fumigated versus non-fumigated plots in zones 3-5. This study indicates that soybean fields with variable soil texture may be successfully divided into management zones using fumigation.

MOLECULAR CHARACTERIZATION OF PSEUDOMONODELPHIC DAGGER NEMATODES OF THE GENUS *XIPHINEMA* COBB, 1913 (NEMATODA: LONGIDORIDAE) IN COSTA RICA, WITH NOTES ON *XIPHINEMA SETARIAE* TARJAN, 1964 [CARACTERIZACIÓN MOLECULAR DE NEMATODOS DAGA PSEUDOMONODÉLFICOS DEL GENERO *XIPHINEMA* COBB, 1913 (NEMATODA: LONGIDORIDAE) EN COSTA RICA, CON NOTAS SOBRE *XIPHINEMA SETARIAE* TARJAN, 1964]

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Pseudomonodelphic dagger nematodes of the genus *Xiphinema* are characterized by having one of the genital branches reduced and lacking an ovary. They are usually reported from tropical regions. Nematode surveys conducted during rainy seasons in Costa Rica resulted in detection of several *Xiphinema costaricense* populations, but also other pseudomonodelphic and didelphic species of *Xiphinema*. We undertook detailed integrative morphometric and molecular studies using D2-D3 expansion segments of 28S rDNA, and ITS1-rDNA. From those studies, we also identified several populations of *Xiphinema krugi* and two populations of *Xiphinema setariae* with characteristics in agreement with those of the original and later descriptions of these species. The phylogenetic analyses of these species with other representatives of *Xiphinema* spp. indicated that pseudomonodelphic species are phylogenetically related (*X. costaricense* and *X. krugi*). On the basis of ITS1 sequences of *X. costaricense* and *X. variegatum* from Brazil, as well as similar morphology and morphometrics of both species, the latter is proposed here as a junior synonym of the former. Also, our morphometric data showed some intraspecific variability within *X. setariae*, which in combination with the molecular evidence, suggests that *X. setariae* and *X. vulgare* need to be considered as a single taxon.

BIOGEOGRAPHIC PATTERNS OF NEMATODES EMERGE AS TAXONOMIC RESOLUTION IMPROVES [BIOGEOGRAFÍA PATRONES DE NEMATODOS ENTOMOFÍLICOS: LA RELACIÓN ENTRE LA HISTORIA DE VIDA Y EL ÁMBITO DE DISTRIBUCIÓN]

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Nematode biogeography has been hampered by a taxonomy that lacks the necessary resolution to reveal geographic patterns of terrestrial, soil-dwelling nematodes. Similarly, classifications that include numerous paraphyletic taxa obscure the historical geographic patterns that reflect millions of years of evolution. Using the COI mitochondrial gene to assess haplotype distribution at the population and species level, coupled with 18S rDNA for resolution of deeper nodes in the phylogenetic tree, we have been examining historical biogeography and phylogeography of plant feeding nematodes in the superfamily Criconematoidea. The geographic patterns revealed in these analyses span epochs of evolutionary time and are closely associated with geological events operating at the continental scale. Foremost are nematode distribution patterns influenced by two million years of glaciations, interglacial intervals, and recolonization during our current interglacial stage. Like other organisms in North America, nematodes exhibit a decrease in diversity with increasing latitude, show genetic breaks structured by geological barriers, and in some cases, have patterns that mirror their plant hosts. Surprisingly, long distance nematode dispersal does not appear to be a common event, outside of anthropogenic influences associated with modern agriculture.

NEMATODE MANAGEMENT ON BANANAS IN MARTINIQUE AND GUADELOUPE (FWI): IS THE PROBLEM SOLVED? [MANEJO DE NEMATODOS DEL BANANO EN MARTINICA Y GUADALUPE (FWI): ¿SE HA RESUELTO EL PROBLEMA?]

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Given the increasing societal demand for more eco-aware farming practices during the two last decades, considerable changes and innovations have already occurred in banana cropping systems, from the former concept of Integrated Pest Management (IPM) that relied heavily on the use of chemical control towards a more sustainable concept of Integrated Crop Management that favours non-chemical pest management. These innovative methodologies were particularly more rapidly adopted in countries where environment, health and safety conditions were politically prioritized. But there are also additional causes to this rapid transformation for designing more sustainable cropping systems, i.e., economical endowments, environmental policies, and retail chain requirements. In Martinique and Guadeloupe (French West Indies), the reduction of pesticide impact on air, soil and water quality was a major goal of agronomy researches. As a result, management approaches that combine different tools for pest management such as use of improved fallows, crop rotations, use of banana vitroplants, tolerant cultivars are illustrated in relation with nematode infestations and global nematicide reduction. From 1996 to 2016, the nematicide market on bananas in Martinique (and Guadeloupe) has decreased to 97.3 % in applied tonnage of active ingredients and the banana treated surface per year decreased from 100 to only 5.2 %. However, the adoption of these innovative practices strongly depends on the farming contexts and only incentive governmental measures succeeded in forcing banana growers to adopt these methods.

MULTIPLE INDEPENDENT LOCI FOR RESISTANCE TO ROOT-KNOT NEMATODE AND FUSARIUM WILT IN AN INTERSPECIFIC COTTON POPULATION [LOCI MÚLTIPLE INDEPENDIENTE PARA LA RESISTENCIA AL NEMATODO AGALLADOR Y A LA MARCHITEZ POR FUSARIUM EN UNA POBLACIÓN DE ALGODÓN INTERSPÉCIFICA]

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Fusarium wilt, caused by the soil-borne fungal pathogen *Fusarium oxysporum* f. sp. *vasinfectum* (FOV), is a vascular disease of cotton (*Gossypium* spp.). FOV race 1 (FOV1) causes major plant injury and yield loss in *G. hirsutum* cultivars with co-infection with root-knot nematode (*Meloidogyne incognita*; RKN), while FOV race 4 (FOV4) causes plant damage in most *G. barbadense* cultivars without nematode co-infection. QTL analysis of a recombinant inbred line population from the interspecific cross *G. barbadense* Pima S-7 × *G. hirsutum* Acala NemX using genomewide SSR markers revealed separate multiple loci determining resistance to RKN, FOV1, and FOV4 in each case. Both parents contributed resistance to RKN, FOV1 ,and FOV4. Significant contributions to RKN root-galling (52% phenotypic variance) and egg-production (57%) resistance phenotypes were associated with SSR marker CIR316 linked to resistance gene *rkn1* in NemX on Chr 11. Two other significant QTLs on Chr 3 and Chr 1 accounted for 7-10% phenotypic variance in galling and egg production resistance. Six major QTLs were identified on chromosomes 12, 21, 1, 2, 15 for FOV1 resistance and four major QTLs on chromosomes 8, 14, 16, and 17 for FOV4 resistance based on disease index from 10 days to 23 days after inoculation. These loci contributed from 11 to 36% of phenotypic variance for resistance and confirmed that race specificity occurs in *F. oxysporum* f. sp. *vasinfectum* differentiated by polygenic resistance. The new trait-linked markers provide a valuable resource for marker-assisted selection of RKN and FOV resistance. Some of the new inbred lines have resistance to both Fusarium wilt races and to root-knot nematode, providing multiple resistance sources for breeding.

IMPACT OF ENTOMOPATHOGENIC NEMATODE APPLICATIONS ON DIAMOND BACK MOTH POPULATION [IMPACTO DE APLICACIONES DE NEMATODOS ENTOMOPATÓGENOS SOBRE POBLACIONES DE LA POLILLA DORSO DE DIAMANTE]

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Diamond back moth (DBM) represents one of the most dangerous pest in cabbage (*Brassica oleracea* L.) in Cuba and the entomopathogenic nematode (EPN) is a promising biological control agent for this pest. Farmers apply several chemicals for DBM control and need to increase their confidence in EPN through field experiments in their farms. The aim of this work was to determine the impact of EPN applications on DBM populations and cabbage yields in field conditions. The experiment was carried out in «Doña Amalia» Farm in the Province of Mayabeque, Cuba. Two treatments were used: EPN (*Heterorhabditis amazonensis* strain HC1) and chemical control (Clorpirifos (0.48-0.72 kg ai.ha^{-1}), both applied weekly. Each week, the DBM larvae population was evaluated. At the end of season, ten plants were randomly harvested from each experimental plot and the head fresh weight determined. The final yields (in t.ha^{-1}) were calculated by the farmers. The data (of infestation levels and head fresh weights), were statistically processed by an analysis of variance (ANOVA) and the difference of media were determined by Duncan´s Test ($p < 0,05$). The infestation Index (referred as the mean numbers of DBM larvae for two different treatments: EPN and Chemical) over time showed statistic differences, with a low population in the biological treatment, from 0.4 larvae.plant^{-1} at the beginning of the experiment to 0.1 larvae.plant^{-1} at the end, meanwhile, in the chemical treatment, the population increased up to 0.88 larvae.plant^{-1}, with a very high damaged crop. The head fresh weight was statistically higher in the biological treatment (7.02t) than in the chemical (6.7t).

SALIBRO™: A NOVEL NEMATICIDE FOR THE CONTROL OF *MELOIDOGYNE* SPP. IN DIFFERENT CROPS IN BRAZIL [SALIBRO™ UN NOVEDOSO NEMATICIDA PARA EL CONTROL DE *MELOIDOGYNE* SPP. EN DIFERENTES CULTIVOS EN BRAZIL]

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Root-knot nematodes are listed as the most important plant-parasitic nematodes around the world, largely due to their wide geographic distribution and large range of crop hosts. In Brazil, they have been documented to cause up to 55%, 50%, and 15% yield reduction in soybeans, sugarcane and coffee, respectively, as well as large yield losses in a range of vegetable crops. Integrated nematode management, which may include resistant/tolerant varieties, cultural methods, as well as chemical and biological solutions, is required to maintain root-knot nematode populations at levels that do not significantly impact yields. Salibro™, which contains the novel active ingredient fluazaindolizine (Vellozine™), is a new nematicide that has high potency against a broad range of species of root-knot nematodes. In Brazil Salibro™ has been extensively tested against *Meloidogyne javanica*, *Meloidogyne incognita*, *Meloidogyne exigua*, and *Meloidogyne enterolobii* in efficacy studies in a range of crops over several seasons. Salibro™, applied by various application methods according to the crop type, has demonstrated consistent and significant reduction in root-galling and will offer a new effective tool for the management of root-knot nematodes.

SALIBRO™: A NOVEL NEMATICIDE FOR THE CONTROL OF *PRATYLENCHUS BRACHYURUS* IN SOYBEAN IN BRAZIL [SALIBRO™: UN NOVEDOSO NEMATICIDA PARA EL CONTROL DE *PRATYLENCHUS BRACHYURUS* EN EL CULTIVO DE SOYA EN BRAZIL]

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The lesion nematode (*Pratylenchus brachyurus*) is listed as one of the most frequently occurring plant-parasitic nematodes in soybean areas in Brazil. Approximately 95% of the soil samples in the main soybean growing areas have shown the presence of this pest. Depending on various biotic, abiotic and cultural factors the damage *Pratylenchus brachyurus* causes to roots can lead to as much as 80% yield reduction in parts of heavily infested fields. Integrated approaches to nematode management are necessary to keep this nematode at levels which do not significantly impact yield. Salibro™, which contains the novel active ingredient fluazaindolizine (Vellozine™), is a new nematicide that has been shown to affect *Pratylenchus brachyurus* and reduce root damage. Efficacy studies on this new nematicide have been conducted in Brazil over several seasons. The results have shown that Salibro™ provides root protection when applied in furrow at planting and can be a promising addition to nematode management programs in soybean in Brazil. Data from efficacy studies will be presented.

HISTOPATHOLOGICAL CHARACTERIZATION OF *COFFEA ARABICA* CULTIVAR IPR 106 RESISTANCE TO *MELOIDOGYNE PARANAENSIS* [CARACTERIZAÇÃO HISTOPATOLÓGICA DA RESISTÊNCIA DE COFFEA ARABICA CULTIVAR IPR 106 A *MELOIDOGYNE PARANAENSIS*]

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Meloidogyne species are widely distributed in coffee growing areas, in which *M. paranaensis* is responsible to significant losses to the crop. One of the main management strategies is the use of resistant cultivars, as Apoatã rootstock and the cultivars IPR 100 and IPR 106. However, the parasitic relationship between coffee and *M. paranaensis* in cultivars carrying resistance genes has been poorly understand. The objective of this study was to characterize the resistance response of *Coffea arabica* cv. IPR 106 to *M. paranaensis*. For this, penetration and histopathological studies were realized using root tissues parasitized by the nematode. 'IPR 106' and 'Mundo Novo' (susceptible cultivar) seedlings were inoculated with 4,000 eggs of *M. paranaensis* and, 15 days after inoculation (DAI), roots were stained with fuchsine to verify the penetration rates of the nematode. Histopathological studies were conducted at 15, 30, 45, and 60 DAI and, at 120 DAI, the reproduction of the nematode was calculated. Results showed that 'IPR 106' did not avoid the nematode penetration at 15 DAI, discarding the hypothesis of a pre-infectional mechanism of resistance. However, observations from fuchsine-stained roots of 'IPR 106' from 30 DAI showed degenerated giant cells associated to collapsed nematodes. This fact suggested that the resistance mechanism present in 'IPR 106' to *M. paranaensis* involves a post-infectional response and could be mediated by a hypersensitive reaction.

ANÁLISIS PCR-RFLP DE LAS REGIONES 18S Y 28S DEL DNAr DE POBLACIONES DE FITONEMÁTODOS AGALLADORES [PCR-RFLP ANALYSIS OF THE 18S AND 28S-rDNA REGIONS OF ROOT-KNOT PHYTONEMATODE POPULATIONS]

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Nacobbus aberrans es un fitonemátodo con alta heterogeneidad morfológica y amplio rango de hospedantes, esta ampliamente distribuido en áreas tropicales y templadas de América, parasitando a 84 especies cultivadas y no cultivadas pertenecientes a 18 familias botánicas. En este trabajo se evaluó la funcionalidad de la técnica PCR-RFLP para la identificación y separación de poblaciones de fitonemátodos agalladores usando las regiones 18S y 28S del DNA ribosomal, digerida con nueve enzimas de restricción. Se analizaron 18 poblaciones de fitonemátodos agalladores de seis regiones agrícolas (Guanajuato, Michoacán, México, Nayarit, Puebla, y Tlaxcala). Se amplificó y secuenció la region 18S y 28S del DNAr y se digirieron con nueve enzimas de restricción AvaII, HhaI, HaeIII, KpnI, HindIII, SmaI, HaeIII (BsRI), EcoRI, y MboI. La identidad de las especies se corroboró molecularmente encontrando que las poblaciones corresponden a *N. aberrans* y *M. incognita*. El análisis de polimorfismos con marcadores RFLPs mostró diferencias entre las poblaciones de N. aberrans. Solamente seis y siete enzimas (AvaII, HhaI, HaeIII, KpnI, BsuRI, MboI, y SmaI) digirieron exitosamente los amplicones de las regiones 18S y 28S, respectivamente. Comparando los perfiles de digestión obtenidos con estas endonucleasas, se logró agrupar y separar claramente las poblaciones de *N. aberrans*, de las poblaciones de *Meloidogyne*. Por lo que el uso de esta técnica en fitonematología es recomendable como una herramienta auxiliar en la identificación de estos organismos fitopatógenos.

CHARACTERIZATION OF *MELOIDOGYNE* SPP. *PHYTOPHTHORA NICOTIANAE* RACES AND EVALUATION OF ITS PHYTOPATHOGENIC INTERACTION ON QUALITY AND PRODUCTIVITY OF COMMERCIAL TOBACCO VARIETIES (*NICOTIANA TABACUM* L.) IN COLOMBIA [CARACTERIZACIÓN DE *MELOIDOGYNE* SPP. RAZAS DE *PHYTOPHTHORA NICOTIANAE* Y EVALUACIÓN DE SU INTERACCIÓN FITOPATOGÉNICA SOBRE LA CALIDAD Y PRODUCTIVIDAD DE VARIEDADES COMERCIALES DE TABACO (*NICOTIANA TABACUM* L.) EN COLOMBIA]

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En la industria tabacalera el cultivo del tabaco **(***Nicotiana tabacum* L.) es la actividad de mayor importancia, y su producción se ve afectada entre otros, por factores bióticos y abióticos que afectan el rendimiento y calidad, como el oomyceto *Phytophthora nicotianae* (Pn) con pérdidas hasta del 100% y los nemátodos del género *Meloidogyne* (Mel) con pérdidas entre un 20-30% del cultivo; además, de la interacción entre ambos fitopatógenos, que pueden tener efectos aditivos o sinergísticos hacia un impacto negativo en la producción de la planta de tabaco. En Colombia, muchos predios presentan altos daños de Pn con presencia concomitante de Mel, aun usando variedades resistentes a Pn; y el manejo fitosanitario está dirigido principalmente sólo al oomicete, sin conocerse las especies y razas predominantes de ambos patógenos en las zonas tabacaleras colombianas. Por lo anterior, y a partir de un muestreo sistemático de plantas afectadas por uno o ambos patógenos en las zonas de los Departamentos de Huila y Santander donde se cultiva el 64% del tabaco nacional, se identificó mediante técnicas morfológicas, fisiológicas y moleculares la presencia de las razas 0-1-3 de Pn, y las especies de Mel: *M. incognita*, *M. javanica*, *M. arenaria*, y *M. hapla*. Además, bajo condiciones de casa de malla, aunque no se encontró interacción fitopatogénica de los microorganismos sobre las variedades K 346 e Ica Servita, independientemente se presentó un efecto detrimental entre 17% a 100% (muerte) en la calidad y productividad en estas variedades.

IDENTIFICATION OF NEMATODES ASSOCIATED WITH DIFFERENT ROOTSTOCKS IN OXISOL SOIL ON CITRUS IN PUERTO RICO [IDENTIFICACIÓN DE LOS NEMATODOS ASOCIADOS CON DIFERENTES PATRONES DE CÍTRICOS EN OXISOLES EN PUERTO RICO]

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Parasitic nematodes are organisms that cause economical damage to several crops in Puerto Rico. In citrus orchards, parasitic nematodes are considered a major problem because they originate root damage causing chlorosis, lack of vigor, and subsequently, decreased production. This study was conducted in 2016 with the objective to quantify nematode population in two 7-yr-old orchards: Tahiti lemon [TL] (*Citrus latifolia* Tan) and Nova mandarin [NM] (*Citrus reticulata*). The orchards were established in 2009 in the Agricultural Experiment Station at Isabela in Coto series (Very-fine, kaolinitic, isohyperthermic Typic Eustrustox) and were arranged as a Randomized Complete Block Design with four replicates. The TL scions were grafted in five different citrus rootstocks: Carrizo citrange (CC), Cleopatra mandarin (CM), HRS 812, Rough lemon (RL), and Swingle citrumelo (SC). The NM scions were grafted in five different citrus rootstocks: CC, HRS 812, HRS 896, RL, and SC. Soil samples were collected at 15-30 cm depth using a borehole, in laboratory they were processed using the methodology of Bearmann adapted by Christie and Perry and for the identification was used a pictorial key. In NM orchard, the population of free-living nematodes showed statistical significance ($P < 0.05$) in comparison to the parasitic ones. In addition, the bacteriophages were the most abundant in the NM orchard. While, in the TL orchard did not show statistical significance ($P > 0.05$) for parasitic and free-living nematodes. In general, in both orchards, most free-living nematodes belonged to the Rhabditidae families (CC, HRS 896, and SC) and Dorylaimidae (HRS 812). In addition, the parasitic nematodes with the highest presence were from the Hoplolamidae families (CC, HRS 812, HRS 896, and RL). The presence of bacteriophages is indicative of high levels of organic matter.

FLUAZAINDOLIZINE (VELLOZINE™): A NEW ACTIVE INGREDIENT FOR THE CONTROL OF PLANT PARASITIC NEMATODES [FLUAZAINDOLIZINE (VELLOZINE™): UN NUEVO INGREDIENTE ACTIVO PARA EL CONTROL DE NEMATODOS PARÁSITOS DE PLANTAS]

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Plant-parasitic nematodes remain a significant threat and source of yield reduction in crop production around the world. Over the last two decades nematicidal products used for protection against these soil dwelling pests have come under significant regulatory pressure due to a range of toxicological and environmental issues. In response, the crop protection industry has initiated an intensive effort directed at the discovery and development of new biological and chemical nematode control products, as well as traits in plants. Fluazaindolizine (Vellozine™) is a new highly effective and selective active ingredient for the control of plant-parasitic nematodes. Specificity for nematodes coupled with absence of activity against the target sites of commercial nematicides suggests that Vellozine™ has a novel mode of action. It is the first member from the novel chemical class of sulfonamide nematicides. Commercial formulations (Salibro™) primarily include a suspension concentrate (500SC) liquid formulation, with granular formulations also under development for certain markets around the world. Salibro™ has been extensively tested in laboratory, greenhouse, micro-plot and field trials in North America, Latin America, Europe and Asia. In those trials Salibro™ was proven extremely effective against a range of important plant-parasitic nematode species. Salibro™ has a fit in nematode management programs in a range of crops, including fruiting and cucurbit vegetables, root vegetables (carrot, sweet potato, potato), soybean, sugarcane, coffee, corn, cotton, citrus, tree nuts, stone fruit and grapes. An introduction to the chemical and biological properties of this new nematicide will be presented.