ABSTRACTS OF PAPERS PRESENTED AT THE VIII ANNUAL MEETING OF OTAN IN CASTRIES, ST. LUCIA, AUGUST 4-8, 1975
RESUMENES DE TRABAJOS PRESENTADOS EN LA VIII REUNION ANUAL DE ONTA EN CASTRIES, ST. LUCIA, 4-8 DE AGOSTO, 1975

POTENTIAL OF HEURISTIC MODELS FOR DEVELOPMENT OF NEMATOLOGY RESEARCH PRIORITIES [POTENCIAL DE MODELOS DESCUBIERTOS PARA EL DESARROLLO DE INVESTIGACIONES EN NEMATOLOGIA]. G. W. Bird, C. Coley, M. Sarette and E. Meister, Department of Entomology, Michigan State University, East Lansing, Michigan, U.S.A. 48824 - - - The population dynamics of *Pratylenchus penetrans* was modeled in relation to the influence of soil temperature on nematode reproductive potential. Each nematode in the population is monitored daily in regard to its developmental status and reproductive contributions. A model for the growth and development of *Solanum tuberosum* was constructed with the assimilation rate as a function of light intensity and air temperature. Assimilates are partitioned into leaves, stems, roots and tubers on a daily basis. The models were integrated into a pest-crop ecosystem model designed to evaluate the influence of different initial population densities of *P. penetrans* on the growth, development and tuber yield of *S. tuberosum,* and the response of the nematode population to variation in the growth and development patterns and cultivars of the host. Because of the lack of quantitative biological data, many of the assumptions used in this model are tenuous. The most significant contribution of the initial model was to identify specific areas where detailed quantitative biological information is required before a more finely tuned simulation can be developed.

OCCURRENCE OF PLANT PARASITIC NEMATODES ON SUGARCANE IN BARBADOS [LA PRESENCIA DE NEMATODOS FITOPARASITICOS EN CAÑA DE AZUCAR EN BARBADOS]. C. W. D. Brathwaite, University of the West Indies, Trinidad - - - Twenty genera of plant parasitic nematodes were associated with root and soil samples from sugarcane in Barbados. The most abundant genera were *Aphelenchus, Helicotylenchus, Pratylenchus, Tylenchus, Rotylenchulus, Criconemoides* and *Meloidogyne.* Important nematode species identified were *Aphelenchus avenae* Bastian, 1865; *Helicotylenchus curvatus* Roman, 1965; *Helicotylenchus concavus,* Roman 1961; *Pratylenchus zeae* Graham, 1951; *Hemicriconemoides cocophilus* (Loos, 1949) Chitwood and Birchfield, 1957; *Rotylenchulus reniformis* Linford and Oliveira, 1940; *Boleodorus thylactus* Thorne, 1941; *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961 and *Paratrophurus loofi* Arias, 1970. The occurrence and population density of certain species which are known to be pathogens of sugarcane, suggest that nematodes may be a contributing factor to declining sugarcane yields.

NEMATODOS PARASITOS DE PLANTAS EN LA COSTA Y SIERRA DEL ECUADOR [PLANT PARASITIC NEMATODES FROM THE LOWLANDS AND HIGHLANDS OF ECUADOR]. J. Bridge, U. K. Ministry of Overseas Development Plant Pathologist, Imperial College, Ascot, Berks, England - - - Se colectaron y examinaron muestras de suelo y raices de 25 diferentes cultivos en numerosas localidades de la Costa Y Sierra del Ecuador. *Radopholus similis* fue el nemátodo mas abundante en el cultivo de banano, causando necrosis de la raíz, volcamiento y

reducción del crecimiento de las plantas, en todas las areas muestreadas. Altas poblaciones de *Pratylenchus coffeae* causaban daños similares en abacá *(Musa textilis). Meloidogyne* spp. *(M. incognita* y *M. hapla)* se observaron con frecuencia y eran responsables de la formación de agallas en las raíces de tomate, alfalfa, zanahoria, pepino, lechuga, tomate-de-arbol, tabaco y soya. *Heterodera pallida* y *Ditylenchus dipsaci* estuvierón presentes en gran número en papa y cebolla respectivamente en la Sierra. Otros nemátodos frecuentemente recobrados de raices de muchos cultivos fueron *P. neglectus* y *Helicotylenchus* spp; *Quinisulcius acti* fue comunmente extraído de suelos. Nemátodos encontrados con menor frecuencia fuerón *P. penetrans, Criconemoides* spp, *Merlinius* sp, *Tylenchorhynchus* sp., *Hemicriconemoides mangiferae* y *Xiphinema americanum.*

THE DEVELOPMENT OF PHENAMIPHOS FOR CONTROL OF NEMATODES IN AUSTRALIAN BANANA PLANTATIONS [DESARROLLO DEL PHENAMIPHOS COMO CONTROL DE NEMATODOS EN PLANTACIONES DE BANANOS EN AUSTRALIA]. W. M. Burnett, I. M. Inglis, and R. M. Burnett, Bayer Australia Ltd., Box 159 P. O., Botany, New South Wales 2019, Australia - - - Phenamiphos proved a highly effective material for the control of *Radopholus similis, Helicotylenchus multicinctus* and *Meloidogyne javanica,* the major parasitic nematodes of bananas in Australia. When applied to new plantings Phenamiphos effectively prevented a build-up of nematode populations, reduced the number of topples, reduced the length of the cropping cycle, significantly increased plant vigour and significantly increased mean bunch weight in ratoon (but not plant) crops. The minimum effective treatment was 1.2 g ai/m^2 applied every 4 mos to an area 1 m square.

VARIABILITY OF POTATO CYST NEMATODE (*HETERODERA* SPP.) IN THE ANDEAN REGION [VARIABILIDAD DEL NEMATODE ENQUISTADOR (*HETERODERA* SP.) EN LA REGION ANDINA]. M. Canto and Maria M. de Scurrah, The International Potato Center, Apartado 5969, Lima, Peru - - - Potato cyst nematode, *Heterodera* spp., collected from 29 locations in Peru, 2 from Ecuador and 1 from Colombia, were examined for female color and their reaction to differential clones. Occurrence and duration of the color phases from white to brown in the developing female varied within populations. *H. pallida* is the predominant species in Peru and it is the only species found north of latitude 12° S. *H. rostochiensis* was found only in the Southern Andean region of Peru, usually mixed with or nearby *H. pallida* populations. European differential clones as well as additional breeding lines from Germany and U.S.A. were used for race differentiation. Results showed a large variation, some races could not be fitted into the present classification. A new classification scheme is proposed. Under this scheme, 2 species and 5 races are identified of which 2 races were not previously recorded. Ten populations, which showed differences in female color and also in the host differential test, were selected to measure second stage larvae. Most characteristics measured showed a large variability, not only among populations but also within populations. This made it difficult to use most of the parameters for identification purposes. The length of the stylet and the length of the lip region were the 2 parameters that were most constant within populations and were significantly different to allow species differentiation but were not sufficiently diagnostic to separate races. The comparison of larvae measurements from Peruvian populations with those reported for the 2 species were generally different.

SCREENING COWPEA GERMPLASM FOR RESISTANCE TO ROOT-KNOT NEMATODES AT IITA [EVALUACION DEL GERMOPLASMA DE CAUPI PARA RESISTENCIA AL NEMATODO NODULADOR EN IITA]. F. E. Caveness, International Institute of Tropical Agriculture, PMB 5320, Ibadan Nigeria - - - Cowpea (*Vigna unguiculata* (L.) Walp.) lines are systematically screened for resistance or susceptibility to the root-knot nematodes, *Meloidogyne* spp., in a controlled temperature table in a screenhouse. Air temperature within the table is maintained at 26 + 1 C by thermostatically controlled air conditioners and an electric heater. Cowpea lines are planted in 8x11-cm plastic pots. About 5,000 juveniles are added to a previously saturated sterilized 1:3 soil/sand (v/v) mixture. The single seed per pot and the nematodes are covered with 2 cm of dry soil/sand mixture. The residual moisture is adequate for germination and emergence and the dry soil/sand mixture prevents crusting of the surface. Each line is replicated 5 times. Five weeks after planting plants are lifted, gently rinsed in water and indexed for root gall development in a well-illuminated aquarium. The root-knot nematode index used contains 5 categories with 1 = immune and no galls to 5 = highly susceptible and heavily galled. In each line the number of eggs per plant are determined by the dilution method after the roots are comminuted for 30 sec in a blender. Root segments are removed by pouring the comminution through a 0.5 mm sieve. Aliquots are counted at 30 X.

During 1974, 241 cowpea lines were screened for resistance to *M. incognita*. None was found to be immune. Four lines showed resistance with the remaining lines being more susceptible to nematode attack. Of the more susceptible plants 48 lines gave a mixed response suggesting heterogeneity within the cowpea line. Mean egg production per plant followed the index ratings although there was variation between lines in each category.

THE EFFECT OF DBCP ON THE NUTRIENT UPTAKE AND GROWTH OF BANANA PLANTS GROWN IN A VERMICULITE MEDIUM [EL EFECTO DE DBCP EN LA ABSORCION DE NUTRITIVOS Y EL CRECIMIENTO DE BANANOS CRECIDOS EN UN MEDIO DE VERMICULITE]. Alma P. Elliott, WINBAN Research and Development, Castries, St. Lucia - - - The application of different concentrations of DBCP to banana plants growing in vermiculite containing a nutrient solution, showed that low concentrations of DBCP increased plant weights, heights, leaf area and internode length, while high concentrations caused a reduction in these growth parameters. Compared with controls the uptake of the nutrients was generally higher in plants treated with low concentrations of DBCP and lower in plants with high treatments.

THE EFFECT OF DBCP VAPOUR ON THE NUTRIENT STATUS OF A SANDY CLAY LOAM SOIL [EFECTO DEL VAPOR DEL DBCP EN EL NIVEL DE NUTRIENTES DE UN SUELO ARCILLO-ARENOSO]. Alma P. Elliott and J. E. Edmunds, Research Fellow on Shell Grant to WINBAN and Director of Research & Development, WINBAN research, Castries, St. Lucia, respectively - - - DBCP vapours applied to a sandy clay loam soil increased the proportion of available phosphorus and exchangeable potassium by 75.9% and 70.3% respectively over that in untreated soil, and also produced increases of 25.3% and 8.7% in calcium and magnesium (exchangeable) respectively. Possible biological and chemical processes have been suggested to account for the observed increases.

NEMATICIDAL EFFECTS OF FOLIAR APPLICATIONS OF OXAMYL TO BANANA SEEDLINGS [EFECTOS NEMATICIDAS DE TRATAMIENTOS FOLIARES DE OXAMYL EN PLANTONES DE BANANOS]. S. R. Gowen, WINBAN Research Scheme, P. O. Box 115, Castries, St. Lucia - - - Foliar applications of oxamyl prevented nematodes from invading banana roots. Washing roots after oxamyl treatments destroyed nematicidal activity and made roots as susceptible to nematodes as the controls. Nematode invasion may be prevented for up to 8 wks after treatment. Oxamyl applied to nematode-infested plants gave incomplete control.

BANANA CORM COATING WITH NEMATICIDAL MUD: A PREPLANT TREATMENT [REVESTIMIENTO DEL RIZOMA DEL BANANOS CON LODO NEMATICIDA COMO TRATAMIENTO DE PRESIEMBRA]. R. Guerout, I F A C, Ivory Coast, Africa - - - This corm coating or "pralinage" has the same objective as dipping the corm in nematicidal solutions. Advantages of this technique are: (1) the active material is in contact longer with the infested part of the corms, and (2) the corm does not stay in the mud as is necessary with nematicidal dips. Coating is achieved by dipping corms in a mixture containing clay and water. With clay available in the plantations, preliminary trials have to be done in order to determine the clay-water ratio. Best results are obtained with commercial clays such as bentonite which have to be prepared a day before using to allow for swelling of the clay. After being dipped each pared corm measuring 25 cm diam retains about 300 ml of the mixture and nematicide is added in an adequate amount. Size of corms and paring have an important effect on the amount of mixture retained on each corm. The effect of this "pralinage" is very important on *Radopholus similis* development within roots in virgin soil. In such soils, with slightly pared corms, *R. similis* requires 6 to 8 mos before reaching a noticeable development in roots; when corms are coated with this nematicidal mud, this time can be 12 mos longer. After these 18 mos *R. similis* populations remain at a lower level in roots of treated corms than in untreated ones during the next year. This effect is obtained with Phenamiphos, Prophos or Carbofuran at 1 g ai per corm. Bunch weight is increased by 9% for the first harvest and 12% for the second harvest with Phenamiphos, and by 2 and 8% with Prophos. There is no effect on the third harvest. In soils previously planted with bananas, the "pralinage" reduces *R. similis* proliferation for only 2 or 5 mos during which population numbers are 75% less than for populations within uncoated corms. In such cases there is no effect on yield. The "pralinage" sometimes has a detrimental effect on germination and the first growth but in conditions not yet clear. In Ivory Coast conditions, "pralinage" must be used in every planting in virgin fields and soil treatments must begin after the second harvest.

THE SOIL AND ITS IMPORTANCE ON THE EFFECT OF NEMATICIDAL TREATMENTS ON BANANA YIELDS [EL SUELO Y SU IMPORTANCIA EN EL EFECTO DE TRATAMIENTOS NEMATICIDAS EN EL RENDIMIENTO DE BANANOS]. R. Guerout, I.F.A.C., Ivory Coast Africa - - - For several years new nematicides have been evaluated by the IFAC Team in banana fields in different regions of tropical Africa. Despite standardization of these trials, the effect of nematicidal treatments on yields were very different. With fertilizer, drainage and irrigation, 45 to 55 T of bananas per ha were harvested in treated plots. Three important aspects of soil composition were evaluated. **Granulometry**. - In soil with

more than 60% of the particles measuring less than 20 nm, there was a reduction in the number of primary lesions on roots. The infective population level in the soil when the trial is initiated, however, is much more important. **Cations.** - In untreated plots the yield reduction between the first and second crops was much less in high cation soils such as Cameroon volcanic soils than in poor sandy soils of the Ivory Coast. In these 2 soils, *Radopholus similis* populations in roots were very high and control by phenamiphos was very good. In Cameroon soil containing 24 meq cation for 100 g dry soil, 95% mortality of *R. similis* increased the yield by 5% for the first harvest and 10% for the first 2. In Ivory Coast sandy soils containing 2 meq cation for 100 g of dry soil, the same control resulted in yield increases of 90% and 170% for the first and the first 2 harvests, respectively. **Organic matter.** - The organic matter content of the soil influenced the efficacy of nematicides. In the Ivory Coast, when the organic matter content varied from 2% (sandy soils) to 13% (peaty clay soil) and 43%, the nematode mortalities obtained with prophos were 90%, 47% and 35%, respectively. With phenamiphos the mortalities were 95%, 69% and 48%, and with DBCP 66%, 45% and 36%, respectively for the same soils.

USE OF NEW NEMATICIDES IN IVORY COAST BANANA FIELDS [USO DE NUEVAS NEMATICIDAS EN PLATANALES DE LA COSTA DE MARFIL]. R. Guerout, I.F.A.C., Ivory Coast, Africa - - - Nematicide treatment in banana fields has been used in the Ivory Coast since 1958. For the first 12 yrs, DBCP was the only nematicide used, and good growers made 2 applications a yr (20 liters/ha/application). The first trials with granular nematicides were in 1968, and phenamiphos and prophos were used commercially in 1972. IFAC recommended phenamiphos and later carbofuran at 3 g ai applied 3 times a yr. For prophos, the rate was 4.5 g ai per application. Favorable application times are April, late July and October, times during which the rain is sufficient to drain the chemical into the soil without losses. Granules are applied on the soil all around the mat without any other cultural practice. Commercial dosages are often reduced to 2 g ai of phenamiphos and carbofuran, and 3 g ai of prophos. If recommended dosages are applied, the number of applications is often reduced from 3 to 2. During 1973, enough commercial formulation was sold to treat 1350 ha (20% of the planted area); however, the product was applied to 2250 ha (35%). Corm coating or "pralinage" was used in the replant program on 150 ha. During 1974 the same practice prevailed in commercial fields and about 3000 ha received granular nematicide and 250 ha were "corm coated." In 1975, approximately 3500 ha will be treated with granular nematicides and the IFAC recommendations will be followed more closely. Between 1972 and 1974 the production of ten plantations increased from 22000 to 30000 T. Half of this yield increase was due to favorable growth conditions without winds, and the other part to the use of granular nematicides. There was a slight increase in bunch weight and a consistent increase in the number of bunches, due to more rapid growth and reduction of blown-over trees. During the 1975 wind-storms, trees in treated plantations were broken, but rarely up-rooted. In the dry season, correctly treated plantations needed less water than others.

PINEAPPLE NEMATODES IN JAMAICA AND RELATIONSHIP BETWEEN THEIR POPULATIONS AND RAINFALL IN TWO AREAS [NEMATODOS DE PIÑAS EN JAMAICA Y LA RELACION ENTRE SUS POBLACIONES Y LA

LLUVIA EN DOS ZONAS]. D. G. Hutton, Plant Protection Division, Ministry of Agriculture, Hope, Jamaica - - - Of 11 genera of potentially parasitic nematodes found associated with pineapple plants in Jamaica, *Rotylenchulus reniformis, Helicotylenchus* spp. and *Pratylenchus* spp. were the most widespread occurring in 90%, 80% and 55%, respectively, of the areas sampled and in 66%, 67% and 39%, respectively, of the samples examined. *Scutellonema brachyurum,* although not widespread, appeared to be important where present. Nematode populations in pineapple roots and soils fluctuated regularly where rainfall tended to be seasonal. Where rainfall was well distributed throughout the yr, nematode populations decreased as the number of rainy days per mo increased; but with a time lag in either case.

INVESTIGATING THE ROLE OF *ROTYLENCHULUS RENIFORMIS* IN A DECLINE OF PIGEON PEA [INVESTIGANDO EL PAPEL DEL *ROTYLENCHULUS RENIFORMIS* EN UNA DECLINA DE GANDUL]. D. G. Hutton and J. L. Hammerton, Plant Protection Division, Ministry of Agriculture, Hope, Jamaica and Faculty of Agriculture, University of the West Indies, Mona, Jamaica - - No relationship was noted among numbers of *Rotylenchulus reniformis* in the soil about plants of three pigeon pea varieties at Lawrencefield, an agricultrual station in Jamaica, and the number of these plants exhibiting a decline.This decline starts with yellowing of new leaves after the first bearing, progressive dieback of twigs and mainstem and premature death of many plants. However, where populations of the nematode were suppressed, plants grew faster and flowered earlier than where populations were high and plants of one variety produced significantly greater yields of green pods.

PHYTOTOXICITY ASSOCIATED WITH BROMIDE UPTAKE IN PLANTS GROWN IN SOIL FUMIGATED WITH BROMINATED HYDROCARBONS [FITOTOXICIDAD DEBIDA A LA ASIMILACION DE BROMUROS POR PLANTAS EN SUELOS FUMIGADOS CON HIDROCARBUROS BROMINADOS]. B. Lear, Department of Plant Pathology, University of California, Davis, California 95616 - - - Development of techniques using a bromide specific ion electrode and meter permitted the measurement of inorganic bromide in soils and plants at intervals following treatment with methyl bromide and dibromochloropropane (DBCP). Gas chromatography with the hydrogen flame detector was used to measure the amounts of methyl bromide gas in the soil atmosphere. An electron capture detector was utilized to measure the amounts of DBCP present. Application of methyl bromide at a rate of 454 g/9.3 m^2 to the soil surface under a 4-mil polyethylene cover resulted in concentrations of methyl bromide of 7,000 ppm at the 15 cm depth after 2 hrs. After 30 days none was detectable. At double the above rate, 30 to 100 ppm was present after 30 days. Carnation plants set in treated soils after 30 days showed no phytotoxicity and produced a significantly larger number of blooms than the nontreated. In another test, carnations planted in soil 4 days after treatment had concentrations of inorganic bromide as high as 600 ppm in plant tissues. These plants were injured after 7 days and dead within 14 days. Applications of DBCP at rates of 200 to 4000 ppm to carnation plants showed that phytotoxicity was greatest in sandy soils. All concentrations caused injury within 7 days in soils containing 85% sand. Similar results were obtained with rose where phytotoxicity was most severe in soils containing 50% or more sand.

THE EFFECT OF NH_4^+ CONCENTRATIONS ON SELECTED NEMATODES IN VITRO [EL EFECTO DE CONCENTRACIONES DE NH_4^+ EN SELECCIONADOS NEMATODOS EN VITRO]. R. Mankau and Sarojam K. Mankau, Department of Nematology, University of California, Riverside, CA 92502 and California State College at San Bernardino, CA 92407, respectively - - - Under certain conditions the decomposition of organic matter in soil causes the production of free ammonia and ammonium ion and results in decreases in populations of plant-parasitic nematodes inhabiting such soil. Aqueous ammonia solutions used as fertilizers have also been noted to have some nematicidal properties. The effect of various concentrations of NH_4^+ derived from solutions of NH_4NO_3 on the survival of some plant-parasitic and other nematodes *in vitro* was tested in a series of experiments which indicated that some species were very sensitive to high concentrations of NH_4^+, particularly under alkaline conditions, while others were unaffected. *Tylenchulus semipenetrans* larvae were placed in a series of solutions containing 0 to 1000 ppm NH_4^+ at pH 7.0 buffered by Na_2HPO_4 and KH_2PO_4. The larvae exhibited a direct correlation of reduction in survival with increasing NH_4^+ concentration over a 96 hr period. The LD_{50} for larvae was approximately 500 ppm but for free-living males it was 200 ppm. An unbuffered series of NH_4^+ concentrations proved slightly more toxic at each concentration than those buffered at pH 7.0. Results did not change significantly with increased exposures of up to 25 days. At pH 8.0, the survival rate of citrus nematode in 200 ppm for five days was only 25% of controls. Higher doses were lethal. *Meloidogyne javanica* larvae behaved similarly but survival at 200 ppm was 34% of controls. Concentrations of up to 1000 ppm did not affect *Aphelenchus avenae* or *Pelodera* sp. when compared with *M. javanica* at pH 8.0. In a similar test the LD_{50} for *Pratylenchus scribneri* was approximately 600 to 700 ppm NH_4^+ and again *A. avenae* and *Pelodera* sp. were unaffected by the highest concentrations. In an unbuffered series, *P. scribneri* and *A. avenae* were not affected at any concentration up to 1000 ppm but *Pelodera* sp. survival appeared to be enhanced at high concentrations of NH_4^+.

HOST PLANTS OF *RADOPHOLUS SIMILIS* IN NATAL [PLANTAS HUESPEDES DE *RADOPHOLUS SIMILIS* EN NATAL]. D. L. Milne and D. P. Keetch, Citrus and Subtropical Fruit Research Institute, Nelspruit, Rep. S. Africa - - - Over 100 plant species have been tested for susceptibility to *Radopholus similis* from banana plants in Natal. Approximately 40 plant species, including certain vegetables, fruit trees, grasses and ornamentals, have been found to be non-hosts to *R. similis.*

NEMATODES OF CITRUS, BANANA, MANGO, PAPAYA, LITCHI, GRANADILLA AND PINEAPPLE IN SOUTH AFRICA AND THEIR CONTROL [NEMATODOS DE CITRICOS, BANANOS, MANGOS, PAPAYA, LICHI, GRANADILLA Y PIÑA EN SURAFRICA Y SUS CONTROLES]. D. L. Milne and E. A. de Villiers, Citrus and Subtropical Fruit Research Institute, Nelspruit 1200, Republic of South Africa - - - Although the major nematode pest on most subtropical fruit crops is *Meloidogyne javanica,* there are a number of other species of economic importance in South Africa. These include *Helicotylenchus multicinctus, H. dihystera, Radopholus similis, Tylenchulus semipenetrans, Hemicriconemoides mangiferae* and *Xiphinema brevicolle.* Experiments have been carried out to control these nematodes on various crops. In citrus, although ethoprop and phenamiphos have proved effective against *T. semipenetrans,* fumigation with DBCP has to date produced the best

yield increases. Numerous nematodes attack mango but fumigation has not produced yield increases. Litchi trees have responded well to fumigation with DBCP for control of *H. mangiferae* and *X. brevicolle. Meloidogyne* has also recently been recorded from litchi. Papaya and granadilla *Passiflora edulis* and *P. edulis* f. *flavicarpa)* seedbeds fumigated with methyl bromide and other conventional fumigants have produced excellent results. Preplant planting-site fumigation for granadillas in the field has led to marked yield increases, especially when using ethoprop. Banana research has been concentrated on determining the alternate hosts of *Radopholus similis* and procedures for eradication. Pineapple nematodes have been effectively controlled using dips and postplant systemic nematicides such as oxamyl and phenamiphos.

HOST RESPONSE TO FIVE BIOTYPES OF *TYLENCHULUS SEMIPENETRANS* [REACCION DEL HOSPEDERO A CINCO BIOTIPOS DEL *TYLENCHULUS SEMIPENETRANS]*. John H. O'Bannon and A. T. Tomerlin, Southern Region, Agricultural Research Service, U. S. Department of Agriculture, Orlando, Florida 32803, USA - - - Nine citrus rootstocks and *Severinia buxifolia* having resistance, tolerance, or susceptibility to 1 or more biotypes of *Tylenchulus semipenetrans* were separately infected with 5 biotypes; 2 from California (C_1, C_3), Arizona (A), Texas (T), and Florida (F), respectively, to study individual nematode response under comparable conditions. Six-month-old seedlings were transplanted into separate soil bins in a greenhouse, each heavily infested with a single biotype. Each soil bin contained a 1:1 mixture of Astatula fine sand and peat moss. Individual bins were large enough to accommodate 200 seedlings which were grown at ambient temperature for 1 yr. At harvest, roots were incubated to extract larvae and males, then comminuted in a blender to remove females. Numbers of larvae and males per g of root (in parentheses) and females per cm of root for rootstock and biotype were, respectively: Rough lemon *(Citrus limon)* C_1 (10,697) 2.5; C_3 (4,990) 1.3; A (10,892) 1.9; T (21,397) 1.6; F (4,307) 1.0; sour orange *(C. aurantium)* C_1 (4,884) 1.1, C_3 (3,024) 0.7, A (3,768) 1.1, T (6,985) 1.4, F (3,578) 1.0; Homosassa sweet orange *(C. sinensis)* C_1 (8,836) 2.6, C_3 (7,365) 1.4, A (7,271) 2.0, T (16,461) 2.2, F (6,505) 2.3; Carrizo citrange *(C. sinensis* X *Poncirus trifoliata)* C_1 (10,375) 2.1, C_3 (6,391) 1.8, A (732) 0.2, T (7,202) 1.1, F (1,336) 0.5; Troyer citrange CRC C_1 (6,234) 1.2, C_3 (4,441) 1.0, A (697) 0.1, T (7,643) 1.0, F (931) 0.2; Troyer citrange HF C_1 (7,657) 1.3, C_3 (5,481) 1.2, A (667) 0.1, T (5,036) 0.9, F (1,446) 0.3; Rubidoux *(P. trifoliata)* C_1 (1,307) 0.1, C_3 (9,369) 0.9, A (247) 0.04, T (2,576) 0.5, F (124) 0.0; Large Flower TO C_1 (1,647) 0.2, C_3 (2,772) 0.4, A (260) 0.02, T (942) 0.1, F (161) 0.0; Small Flower TO C_1 (2,846) 0.2, C_3 (8,528) 1.1, A (501) 0.05, T (4,713) 0.04, F (61) 0.0, *S. buxifolia* C_1 (760) 0.07, C_3 (881) 0.02, A (262) 0.02, T (307) 0.04, F (242) 0.01.. All selections were infested to some degree. Most resistant cultivars were Large Flower TO, Rubidoux, and Severinia. Greatest to least virulent biotype was: $C_3 > T > C_1 > A > F$. This study demonstrated that there is a marked variation in the degree of susceptibility of all cultivars and between nematode biotypes.

CARBOFURAN IN A SYSTEMS APPROACH TO PEST MANAGEMENT IN TOMATO [CARBOFURAN EN UN PROGRAMA PARA SANIDAD Y MANTEMIENTO DE TOMATE]. A. J. Overman and J. P. Jones, Agricultrual Research and Education Center, IFAS-University of Florida, Bradenton, Florida 33505, USA - - -

Components of a crop management system were chosen to minimize stress on tomato plants in a field of intensively cropped Myakka fine sand infested with root-knot nematodes *(Meloidogyne incognita)* and the tomato wilt fungus, *Fusarium oxysporum* race 2. The system consisted of seep irrigation from a constant water table, a single application of high analysis fertilizer to provide seasonal nutrition, full-bed mulch to control weeds, conserve fertilizer and water, moderate soil temperature, and protect plant roots from mechanical damage. The nematicide, Carbofuran 11.2 kg/ha and soil fumigants Telone 38.3 liter/ha, DD-MENCS 53.6 liter/ha, and Dowfume MC-33 392 kg/ha were evaluated as components in this system to determine the relative economic benefits to be derived from use of a non-phytotoxic, residual nematicide applied at time of planting compared to fumigants which require a 2-wk waiting period before planting. Carbofuran was broadcast as a 10% granule and incorporated to a 20 cm depth. Ground beds 20 cm high, 75 cm wide and 27.4 m long were constructed in the 4 plots treated with Carbofuran; corresponding beds in untreated plots were prepared to serve as controls. Similarly prepared beds were treated with the fumigants using 3 streams placed 20 cm apart to deliver the chemicals to a depth of 15 cm in the beds. The controls and plots treated with Carbofuran were planted on the day of treatment with 5-wk old transplants of tomato, cv 'Manapal.' The fumigated plots were also planted with 5-wk old Manapal transplants but 2 wks after treatment. In order to evaluate the relationship of the kind of seedling planted to the efficacy of the soil treatment, 3 types of transplants were used in all plots of the test: bareroot seedlings from a fumigated seedbed, seedlings grown in Jiffy-7® peat pots, and containerized Speedlings® having a cone-shaped rootball. The highest yields of marketable tomatoes were harvested from the Carbofuran-treated plots (49,056 kg/ha compared to 27,148 kg/ha from the untreated controls). Telone improved yield 7%, MC-33 35% and DD-MENCS 39%. In the untreated controls transplants in Jiffy-7® peat pots yielded better than the other plant types, but in all treated plots Speedlings® were most productive. A root-knot index taken after harvest indicated that galling of the tomato roots was reduced approximately 50% by Carbofuran and Telone, 60% by DD-MENCS and 92% by MC-33. There was no difference in severity of root-knot among the types of transplants in the control plots, but, with the exception of the DD-MENCS plots, Speedlings® sustained less galling in treated plots. At final harvest, 85% of the control plants showed symptoms of Fusarium wilt. The incidence of the disease was reduced in treated plots thusly: MC-33, 95%; DD-MENCS, 90%; Telone, 84%; and Carbofuran, 21%. For the first 11 weeks of the crop, however, wilt in Carbofuran-treated plots occurred in only 26% of the plants, increasing after the second harvest. Plants grown from Jiffy-7® seedlings exhibited the highest levels of disease. Disregarding the obvious difference in the equipment needs for broadcasting granules as opposed to a fumigation rig, based on a mean tomato value during the season of $45 US per 100 kg of marketable fruit, the "return per dollar invested" for the chemicals used in this test was: Carbofuran 75, Telone 7, DD-MENCS and MC-33 $15 US. These data suggest that soil treatment with Carbofuran may compete successfully with soil fumigants in crop management systems devised to maximize tomato production on land infested with root-knot nematodes and Fusarium wilt fungi.

EFFECT OF *INDIGOFERA HIRSUTA* L. ON POPULATIONS OF *BELONOLAIMUS LONGICAUDATUS, MELOIDOGYNE INCOGNITA* AND *M. JAVANICA*

AND SUBSEQUENT YIELDS OF CABBAGE, CUCUMBERS AND SNAP BEANS [EFECTO DEL *INDIGOFERA HIRSUTA* SOBRE POBLACIONES DE *BELONOLAIMUS LONGICAUDATUS, MELOIDOGYNE INCOGNITA, M. JAVANICA* Y LOS RENDIMIENTO SUBSECUENTES DE COLES, PEPINOS, Y HABICHUELAS]. H. L. Rhoades, University of Florida, Sanford, Florida 32771 - - - Greenhouse plantings of hairy indigo (*Indigofera hirsuta* L.) were inoculated with the sting nematode, *Belonolaimus longicaudatus,* and a mixed population of the root-knot nematodes, *Meloidogyne incognita* and *M. javanica.* The sting nematode population declined rapidly and essentially disappeared during a 3-mo period and the roots were only slightly galled in the root-knot infested pots. In field plantings, yields of cabbage, cucumber and snap bean were significantly higher following a 3-mo summer cover crop of hairy indigo than following *Sesbania macrocarpa* Muhl., or *Sorghum vulgare* Pers. which built up high populations of sting and root-knot nematodes. Soil fumigation with 25 gal/A of D-D following the growth of hairy indigo failed to increase the yield of cabbage or snap beans, but fumigation with 8.5 lb ai/A of DBCP (in-the-row) gave a moderate increase in yield of cucumbers.

THE EFFECT OF NEMATICIDE TREATMENT ON YIELD AND PRODUCTION OF RATOON CROPS IN PLANTAIN [EFECTO DE TRATAMIENTO CON NEMATICIDAS EN EL RENDIMIENTO Y PRODUCCION DE RENTOÑOS DEL PLATANO]. J. Román, Xiomara Rivas, J. Rodriguez y D. Oramas, Estación Experimental Agricola, Universidad de Puerto Rico, Rio Piedras, Puerto Rico - - - Research was conducted in Puerto Rico on chemical control of the nematodes that affect plantain (*Musa acuminata* x *M. balbisiana,* AAB), namely *Radopholus similis, Pratylenchus coffeae, Meloidogyne incognita, Rotylenchulus reniformis* and *Helicotylenchus* spp. Results, with the Dwarf and the Maricongo cultivars indicated that granular formulations of nematicides, increased yields significantly and extended the useful life of the plantations. Yield of the control plants were low in the plant crop and negligible or nil in the first ratoon. The use of nematicides has made possible the production of excellent yields in nematode-infested soils and, for the first time the harvest of three successive crops of plantains without the need of renovating the plantation.

PATHOGENICITY OF THE ROOT-KNOT NEMATODE, *MELOIDOGYNE INCOGNITA,* TO COCOA [PATOGENICIDAD DEL NEMATODE NODULADOR, *MELOIDOGYNE INCOGNITA,* EN CACAO]. R. D. Sharma and M. A. Z. Maia, Ceplac/Cepec, Caixa Postal 7, 45600, Itabuna (Bahia), Brazil - - - The pathogenicity of the root-knot nematode, *Meloidogyne incognita,* was studied in the glasshouse using inoculation experiments with 3 population levels; 2500, 5000, and 10,000 nematodes per plant and a control without nematodes, grown in 2.5 kg of steam sterilized soil in perforated black plastic bags. The nematode was pathogenic to cocoa cv "Catongo" and caused growth reduction, small internodes, thin stems, reduced number of leaves with reduced surface area, and reduced root systems with galls and fewer root hairs. Growth differences were evident 17 wks after inoculation. Histological observations revealed total disorganization of the stele, resulting in serious destruction of the xylem, phloem, pericycle and endodermis, making it difficult to identify these tissues.

INFLUENCE OF OXAMYL APPLICATION ON *MELOIDOGYNE INCOGNITA* AND *ROTYLENCHULUS RENIFORMIS* PENETRATION INTO ROOTS OF TOMATO, LETTUCE AND PIGEON PEAS [INFLUENCIA DE TRATAMIENTOS DE OXAMYL EN LA PENETRACION DE RAICES POR EL *MELOIDOGYNE INCOGNITA* Y EL *ROTYLENCHULUS RENIFORMIS* EN TOMATE, LECHUGA Y GANDUL]. N. D. Singh, University of the West Indies, St. Augustine, Trinidad - - - In greenhouse tests, a single foliar application of oxamyl at 600 ppm significantly inhibited penetration of roots of tomato and lettuce seedlings by *Meloidogyne incognita.* With pigeon pea seedlings, however, 2500 ppm inhibited penetration by *Rotylenchulus reniformis.* In a field test, 3 foliar applications of oxamyl at 1250 ppm significantly reduced the number of *M. incognita* and *Pratylenchulus zeae* recovered from tomato roots.

DETECTION OF TREE REVITALIZATION USING A PHOTO-RESISTOR SENSOR [DETERMINACION DE LA REVITALIZACION DE LOS ARBOLES CON UN FOTODETECTOR]. A. C. Tarjan, G. J. Edward, and J. J. Frederick, Institute of Food and Agricultural Sciences, University of Florida, Agricultural Research and Education Center, Lake Alfred, Florida 33850, U.S.A. - - - A means has been devised of detecting rejuvenation in declined trees following application of curative treatments. The method measures transmission of light through foliage and is based on the inevitability that recovery of trees from maladies or adverse conditions will be accompanied by a corresponding increase in foliage. The forward edge of a wooden crosspiece template is placed against the north, east, south, and west sides of the tree trunk and four readings are taken with a photo-resistor sensor at predesignated positions on the template, giving a total of 16 readings per tree. The sensor is made up of an external photo-resistor (Clairex cadmium sulfide photocell CL5M2341) connected to an on-off switch, a 5000 ohm variable resistor, a microampere meter calibrated from 0 to 100, and two 1.5 volt dry cells connected in parallel. A metal collar is fitted around the photocell housing forming a 50° angle at which the light strikes the photocell. Readings taken when the sun is 50° or more above the horizon are more accurate and reproduced more readily than readings taken earlier or later. Prior to use, the photo-resistor is calibrated without overhead cover at a reading of 100. Disadvantages of this method, thus far, have been the tendency of leaves being shaken by the wind, especially directly over the photocell, to cause a corresponding fluctuation of the indicator in the microammeter. Occasionally the photocell encounters a direct ray of light penetrating a relatively thick foliar canopy and a false high reading is obtained. Since 16 readings are procured per tree, however, mean values reflect the true foliar condition of the tree. At present, over 2500 readings, most of which have been statistically analyzed, have been obtained from 127 trees in several tests.