ABSTRACTS OF THE XXXIX ANNUAL MEETING OF ONTA
RESÚMENES DE LA XXXIX REUNIÓN ANUAL DE ONTA
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EVALUACIÓN DEL COMPORTAMIENTO DE PORTAINJERTOS DE VID A NEMATODOS FITOPARÁSITOS EN PLANTACIONES DE MÁS DE 5 AÑOS EN CHILE [EVALUATION OF THE RESPONSE OF GRAPEVINE ROOTSTOCKS TO PLANT-PARASITIC NEMATODES IN 5-YEAR OLD PLANTATIONS IN CHILE]. **E. Aballay and M. Escobar. Facultad de Ciencias Agronómicas, Universidad de Chile, Casilla 1004, Santiago, Chile. eaballay@uchile.cl.—**El comportamiento de diferentes portainjertos de vid en suelos con altos niveles iniciales de varios géneros de nematodos fitoparásitos fue evaluado en plantaciones comerciales adultas, en producción, para determinar el comportamiento de las poblaciones, su incidencia en la sanidad del sistema radical y en el vigor de las plantas. Para ello, en la zona norte de Chile, se escogieron plantaciones de al menos 5 años de edad, que se iniciaron con niveles considerados altos de nematodos, algunos de ellos fueron replantes, en las cuales se realizaron excavaciones de 1 m de profundidad para muestrear suelo y raíces a dos profundidades, determinar densidad y tipo de nematodos presentes, daños y distribución de raíces en el perfil de suelo. También se determinó el peso de la madera de poda como expresión de vigor. Los datos obtenidos se compararon con plantaciones en las mismas condiciones de edad y suelo, pero sin portainjertos. Se evaluó principalmente los portainjertos Dogridge, Freedom, Harmony, Salt Creeck, C1613, 1103P. Los datos obtenidos en general indican que la mayor parte de estos portainjertos disminuyen la población de *Xiphinema index*, pero en algunos de ellos, como Harmony se incrementa en forma importante la población de *Mesocriconema xenoplax*, ambas especies muy frecuentes en el cultivo. Independiente del comportamiento frente a nematodos, todos los portainjertos evaluados vigorizan al cultivo, reflejado en mayores pesos de poda, dado probablemente por una mayor cantidad de raíces de menos de 2 mm, con mayor capacidad de absorción, que las plantas francas, como Thompson Seedless.

RENIFORM NEMATODE (*ROTYLENCHULUS RENIFORMIS*) RESEARCH IN THE UNITED STATES [INVESTIGACIÓN DEL NEMATODO RENIFORME (*ROTYLENCHULUS RENIFORMIS*) EN ESTADOS UNIDOS]. **P. Agudelo. Department of Entomology, Soils, and Plant Sciences, Clemson University, Clemson, SC 29634, USA. pagudel@clemson.edu.—**Reniform nematode (*Rotylenchulus reniformis*) can be a serious pest of economically important crops, including soybean, cotton, tobacco, and a wide range of vegetables and ornamentals, in tropical and subtropical regions of the world. The increase in distribution and prevalence of this nematode in the United States has caused a recent increased interest in the development of varieties resistant to *R. reniformis* and in finding effective management options. A review of current research efforts in the United States involving reniform nematode, with emphasis on soybean and cotton, is presented. Unique characteristics of the biology and ecology of this species provide excellent opportunities to answer important basic and applied research questions. In particular, the commonalities and differences between reniform nematode and the two main model organisms in plant nematology (i.e., root-knot nematodes and cyst nematodes) are of great interest. Our present knowledge of mechanisms of plant resistance to this nematode, the question of intraspecific variability, and the need for the development of standardized tests for identifying relevant variants in this species are discussed.

ISOLATION, IDENTIFICATION AND CHARACTERIZATION OF EGG-PARASITIZING FUNGI FROM GUAVA PLANTS INFESTED WITH *MELOIDOGYNE MAYAGUENSIS* IN BRAZIL [AISLAMIENTO, IDENTIFICACIÓN Y CARACTERIZACIÓN DE HONGOS PARÁSITOS DE HUEVOS PROVENIENTES DE PLANTAS DE GUAYABA INFECTADAS CON *MELOIDOGYNE MAYAGUENSIS* EN BRASIL]. **J. Arevalo[1], L. Hidalgo[1], I. Martins[2], J. F. Souza[2], J. M. C. Castro[3], R. M. D. G. Carneiro[2] and M. S. Tigano[2]. [1]Centro Nacional de Sanidad Agropecuaria, San José de las Lajas, Apartado 10, La Habana, Cuba, [2]Embrapa Recursos Genéticos e Biotecnologia, Brasília-DF, Brazil, [3]Embrapa Semi-Árido, Petrolina-PE, Brazil. lhidalgo@censa.edu.cu.—**Recently, *Meloidogyne mayaguensis* was detected causing serious economic damage in a commercial plantation of guava in Brazil. Considering the pos-

sibility to use biological control agents in combination with another biological tactic to keep the population of this pest below the economic level, infested root samples were taken in a commercial guava plantation in northeast Brazil with the objective to isolate egg parasitic fungi. Pure monospore cultures of different isolates were obtained and identified by cultural and morphological characteristics. Mycelia growth and sporulation in artificial media were evaluated at four different temperatures (20, 24, 28, 32°C), and mass production of chlamydospores/conidia was determined through a solid state fermentation in cereal grain bags. The fungi *Pochonia chlamydosporia* var. *chlamydosporia*, *P. chlamydosporia* var. *catenulata*, *Paecilomyces lilacinus* and *Lecanicillium psalliotae* were identified and deposited in the Entomopathogenic Fungi Culture Collection in Genetic Resources and Biotechnology, Embrapa. The *P. lilacinus* isolate was not considered in the characterization studies. The optimal growth and chlamydospore production for *Pochonia chlamydosporia* isolates were in the range of 24 and 28ºC, whereas *L. psalliotae* grew better at extreme temperatures than *P. chlamydosporia* isolates, but its conidia production was significatively affected when temperature increased. At 19 days of solid state fermentation, the *P. chlamydosporia* isolates produced between 3.5 and 5.2×10^6 chlamydospores per gram colonized substrate, and *L. psalliotae* produced 8.65×10^8 conidia per gram colonized substrate. The potential of these isolates as biological control agents of *M. mayaguensis* are discussed.

SOYBEAN NEMATODES IN BRAZIL: OLD AND NEW CHALLENGES [NEMATODOS EN SOYA EN BRASIL: VIEJOS Y NUEVOS DESAFÍOS]. **G.L. Asmus. Embrapa Western Agriculture. P.O. Box 661, 79804-970, Dourados (MS) Brazil. asmus@cpao.embrapa.br.—**Nematodes are important pathogens in Brazilian soybean plantations. The root-knot nematodes (*Meloidogyne javanica* and *M. incognita*) have been the ones most frequently found in Brazil since soybean started to be cultivated until the early 1990s. The occurrence of *Meloidogyne javanica* is more frequently noticed while *M. incognita* usually occurs in areas previously planted with coffee or cotton. The main strategies for controlling these two species are the use of resistant cultivars as well as the adoption of rotation system and non-host cover crops. Another important pathogen is the soybean cyst nematode (SCN, *Heterodera glycines*) that was first registered in the season of 2001/02 and turned out to be one of the main phytosanitary problems in soybean crops. The infested area with SCN rapidly increased in all soybean cropped regions of the country, reaching about 2.5 million hectares at the present time. The SCN management has been done through rotation system with non-host plants—mainly corn—and the use of resistant cultivars. Some other cultural methods for controlling SCN with success are the adequated management of soil fertility. Nowadays, the biggest problem concerning the management of SCN in Brazil is the great number of different races without resistant cultivars. Recently, as soybean is running into the "savanna" central part of the country, and due to the increase of the no-tillage cropping system, nematodes considered of secondary importance as reniform (*Rotylenchulus reniformis*) and root-lesion (*Pratylenchus brachyurus*) nematodes have been found in high population and damaging soybean crops. Some recommendations based on research results have already been adopted by farmers in the soybean production systems to decrease *R. reniformis* damages. Several resistant cultivars and rotation systems were chosen to diminish the impact of reniform nematode in soybean crops under infested areas. Unfortunately, there are only few available options for managing infested areas by lesion nematode.

EFECTO DE LA FERTILIZACIÓN NITROGENADA SOBRE LA COMUNIDAD DE NEMATODOS EN LA RIZÓSFERA DE MANZANOS EN LA PROVINCIA DE RÍO NEGRO [EFFECT OF NITROGEN FERTILIZATION ON THE NEMATODE COMMUNITY IN THE ROOT ZONE OF APPLE IN RÍO NEGRO PROVINCE]. **C. Azpilicueta[1], C. Aruani[2] and P. Reeb[2]. [1]Laboratorio de Servicios Agrarios y Forestales (LASAF), Ministerio de Producción y Turismo, Salta 624, C.P. 8300, Neuquén, Argentina, [2]Universidad Nacional del Comahue (UNCo), Facultad de Ciencias Agrarias, Argentina, [3]Estación Experimental INTA Alto Valle, Río Negro, Argentina. lasaf_suelos@neuquen.gov.ar.—**Se estudió el efecto de la fertilización nitrogenada sobre la abundancia de nematodos y estructura de la comunidad en un huerto con manzanos cv. *Royal Gala* en el Alto Valle de Río Negro, durante 2005-

2007. Los tratamientos fueron 2 dosis de nitrato de amonio 75 kg/ha (N75) y 150 kg/ha (N150), 50% a caída de pétalos y 50% 30 días después y un testigo (N0) sin fertilizar. Los muestreos de suelo fueron realizados antes de fertilizar (octubre), después de cada fertilización y en otoño. Los nematodos fitófagos constituyeron el 58 a 90% de la estructura de la comunidad de nematodos siendo *Hemicycliophora* el género dominante. La abundancia de nematodos no fue sensible a la fertilización nitrogenada. La aplicación de N150 aumentó la población de nematodos bacteriófagos y disminuyó la abundancia de fungívoros respecto a N0. Rhabditidae y Cephalobidae aumentaron con la mayor dosis de nitrógeno mientras que Tylencholaimellinae disminuyó. La población de fitófagos no fue sensible al nitrógeno, si bien se observó una tendencia hacia una disminución poblacional con la mayor dosis. La relación nematodos fungívoros - bacteriófagos (FB) fue significativamente menor en las parcelas tratadas, indicando mayor contribución de los nematodos bacteriófagos en los procesos de descomposición del suelo. El índice para nematodos fitófagos (PPI) no fue afectado por los tratamientos, mientras que el índice de madurez para nematodos de vida libre (IM) respondió a N150 y N75 respecto a N0, estando asociado a una mayor frecuencia de nematodos oportunistas.

COMPARISON OF *IN VIVO* PRODUCTION SYSTEMS OF ENTOMOPATHOGENIC NEMATODES IN *GALLERIA MELLONELLA* (L.) LEPIDOPTERA: PYRALIDAE [COMPARACIONES ENTRE SISTEMAS *IN VIVO* PARA LA PRODUCCIÓN DE NEMATODOS EN *GALLERIA MELLONELLA* (L.) LEPIDOPTERA: PYRALIDAE]. **C. R. C. Barbosa[1], A. S. Negrisoli Jr.[1] and A. Moino Jr.[2]. [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, RS, Brazil, [2]Entomology Department, Federal University of Lavras, 37200-000, Lavras, MG, Brazil. carlanema@hotmail.com.—**Successful utilization of entomopathogenic nematodes (EPN) in IPM programs is facilitated by large scale commercial production of various formulations. In Brazil, neither mass production nor EPN-based commercial products exist yet. *In vivo* production of EPNs can be achieved by various technical processes. The objectives of this study were to evaluate two different systems for producing *Heterorhabditis bacteriophora* Poinar, 1976 in *Galleria mellonella* hosts and analyze mass production costs. A completely randomized factorial experiment was conducted to estimate the maximum lethal inoculum concentration (LC_{99}) as a basis for optimizing inoculum rates in mass production. Nematodes were produced with the White trap method and the Baermann funnel method. Mortality data for caterpillars and JI production per unit caterpillar weight were submitted to variance analysis and polynomial regression. The estimated LC_{99} was 2.404 IJ/Petri dish of *G. mellonella* caterpillars after 72 hours of exposure to nematode inoculum. In the White trap and Baermann funnel systems (at a density of 200 caterpillars); production rates were 486.610 and 3.984.758 IJ/g of caterpillar, respectively. The cost of producing nematode IJs in the White trap and Baermann funnel production systems was of R$ 190,01 (US$ 63,33) and R$ 1,84 (US$ 0,61)/million IJ, respectively. So, the best production system for *in vivo* production of *H. bacteriophora* was the Baermann funnel method.

COMPATIBILITY OF *STEINERNEMA* SPP. (RHABDITIDA: STEINERNEMATIDAE) WITH INSECTICIDES RECOMMENDED FOR THE CONTROL OF *SPODOPTERA FRUGIPERDA* (J.E. SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE) [COMPATIBILIDAD DE *STEINERNEMA* SPP. (RHABDITIDA: STEINERNEMATIDAE) CON INSECTICIDAS RECOMENDADOS PARA CONTROLAR *SPODOPTERA FRUGIPERDA* (J.E. SMITH, 1797) (LEPIDOPTERA: NOCTUIDAE)]. **C. R. C. Barbosa, A. S. Negrisoli, Jr., D. Bernardi and M. S. Garcia. Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, RS, Brazil. carlanema@hotmail.com.—**The armyworm, *Spodoptera frugiperda* (J. E. Smith, 1797) (Lepidoptera: Noctuidae) is considered the most important pest attacking corn, and is difficult to control because the insects are protected within leaf folds of the apical meristem of the plant. Searching behavior of entomopathogenic nematodes (EPNs) applied to foliage allows them to reach such cryptic habitats, making them promising for control of this pest. A bioassay was conducted in plastic cups with sterilized sand, with simultaneous application of 100 IJs/cup of *S. carpocapsae* (Weiser, 1955) and *S. glaseri* Steiner, 1929 alone or in combina-

tion with the following insecticides: Lufenurom (Match EC®), Cipermetrina (Galgotrin®), Clorpirifós (Lorsban 480 BR®), Espinosade (Tracer®), Clorpirifós (Vexter®), Gama-ialotrina (Stallion 150 CS®), Lambda-cialotrina (Karate® 50 EC), Diflubenzuron (Dimilin®), Metoxifenozida (Intrepid 240 SC®), and maintained in and environmental chamber at 25 ± 1°C, 70 ± 10% RH for 4 days. The EPN products were applied at the highest dose recommended for the pest. *S. carpocapsae* caused equal or greater mortality of *S. frugiperda* when applied alone compared to treatments with *S. carpocapsae* plus insecticide. Those results indicate a possible incompatibility of the insecticides tested with *S. carpocapsae*, reducing its efficiency in the control of the pest. On the other hand, an additive effect on the pest mortality was obtained when *S. glaseri* was applied in combination with all products, indicating the possible simultaneous use of both methods of control.

EFFICACY OF ENTOMOPATHOGENIC NEMATODES (RHABDITIDAE: HETERORHABDITIDAE, STEINERNEMATIDAE) AGAINST STORED-GRAIN WEEVILS [EFICACIA DE NEMATODOS ENTOMOPATÓGENOS (RHABDITIDAE: HETERORHABDITIDAE, STEINERNEMATIDAE) CONTRA GORGOJOS DE GRANOS ALMACENADOS]. **C.R.C. Barbosa, A.S. Negrisoli Jr., D. Bernardi, A. Silva and M.S. Garcia. Plant Pathology Department, Federal University of Pelotas, RS, 96010-900, Pelotas, RS, Brazil. carlanema@hotmail.com.—***Sitophilus oryzae* (L.), *S. zeamais* (Motschulsky) (Coleoptera: Curculionidae) and *Acanthocelides obtectus* (Coleoptera: Bruchidae) are considered primary pests able to infest all types of stored grain. Insects of these genera are most destructive as pests of storage and temperate fruits in the south of Brazil, causing annual production losses of 10%. In order to develop a control for these insects, adult insect susceptibility to entomopathogenic nematodes (EPNs) (*Heterorhabditis* sp. RS 33, *Heterorhabditis* sp. RS 56, *Heterorhabditis* sp. RS 57, *Steinernema* sp. RS 59, *Heterorhabditis* sp. RS 72, *Heterorhabditis* sp. RS 88, and *Steinernema* sp. RS 106 and *Steinernema carpocapsae*) was evaluated. EPN suspension (50 µL/insect) at concentrations of 0, 10, 20, 50, 100 and 200 IJs/insect was applied as inoculum added to eppendorff microtubes (1.5 mL), containing a piece of paper (2.5 × 1.0 cm) and food, maintained in an environmentally controlled chamber (25 ± 1°C) for a period of five days. Ten days afterward, insect adults were observed for nematode infection symptoms. Generally, adults of both species of *Sitophilus* had low susceptibility to the nematodes, with *Heterorhabditis* sp. RS 33 (at 200 JIs/insect) and *Heterorhabditis* sp. RS 72 causing the greatest mortality (58%) of *S. oryzae* and *S. zeamays* adults. *A. obtectus* was highly susceptible to *Steinernema* sp. RS 59, *Heterorhabditis* sp. RS 57, *Heterorhabditis* sp. RS 33 and *S. carpocapsae*, with mortality rates, respectively, of 98% (at 200 IJs/insect), 98% (at 200 IJs/insect), 88% (at 100 IJs/insect) and 100% (at 10, 50 and 100 IJs/insect).

FIRST RECORD OF *HETERORHABDITIS* SP. (RHABDITIDA: HETERORHABDITIDAE) IN THE STATE OF PIAUÍ, BRAZIL [PRIMER REGISTRO DE *HETERORHABDITIS* SP. (RHABDITIDA: HETERORHABDITIDAE) EN EL ESTADO DE PIAUÍ, BRASIL]. **C. R. C. Barbosa[1], A. S. Negrisoli, Jr.[1], P. H. S. Silva[2] and A. Moino Jr.[3]. [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, RS, Brazil, [2]Embrapa Meio-Norte, 64006-220, Teresina, PI, Brazil, [3]Entomology Department, Federal University of Lavras, 37200-000, Lavras, MG, Brazil. carlanema@hotmail.com.—**Steinernematids and Heterorhabditids are widespread soil nematodes, abundant in many areas of the world, from tropical to paleartic regions. This study examined nematodes present in soil samples from Piauí State, Brazil. Six soil samples were collected representing three distinct areas in Embrapa Meio-Norte, with a "Poty" River margin soil, a Neossolo Eutrófico Aluvial soil, and a Latossolo vermelho-amarelo (red-yellow) soil, and three samples collected in coastal areas near "Coconut tree" Beach. Soil samples were removed a depth of 20 cm (900 g/sample), placed in plastic sacks and maintained in an insulated box at 8 to 15°C until taken to the laboratory. To detect entomopathogenic nematodes present, samples were put in plastic containers containing 10 larvae of *Galleria mellonella* (Linnaeus, 1758) (Lepidoptera: Pyralidae) per container as "insect-bait", covered and maintained at room temperature for a period of 7 days. An isolated *Heterorhabditis* sp. nematode re-

ferred to as *Heterorhabditis* sp. (PI strain) was obtained, from six samples from areas cultivated to rice (*Oryza* sp.) and pig bean (*Vigna unguiculata*), with Neossolo Eutrófico Aluvial soil, at 5°02'21,7"S, 42°47'30,1"W, and 78 m elevation.

OCURRENCE OF ENTOMOPATHOGENIC NEMATODES IN RIO GRANDE DO SUL STATE, BRAZIL [PRESENCIA DE NEMATODOS ENTOMOPATÓGENOS EN EL ESTADO DE RIO GRANDE DO SUL, BRASIL]**. C. R. C. Barbosa, A. S. Negrisoli, Jr., D. Bernardi and M. S. Garcia. Plant Pathology Department, Federal University of Pelotas, RS, 96010-900, Pelotas, RS, Brazil. carlanema@hotmail.com.—**Soil samples were collected from August 2005 to November 2006 in agroecological areas of Rio Grande do Sul State, Brazil, in different agroecosystems, including orchards, pastures, annual crops, vegetables, native fields and forest, to detect and identify native entomopathogenic nematodes (EPNs). Soil samples (1 kg) were collected to a depth of up to 20 cm, homogenized and taken to the laboratory. The samples were then transferred to plastic containers with lids, containing last instar *Galleria mellonella* (L.) (Lepidoptera: Pyralidae) larvae were employed as "insect-bait" and maintained at room temperature. From a total of 106 samples collected, 23.30% were positive for the presence of EPNs. Nematodes from 12 samples (11.32%) were shown to belong to the genus *Steinernema* Travassos, 1927 and from 7 samples (6.6%) to the genus *Heterorhabditis* Poinar, 1976, based on symptoms produced in infected *G. mellonella* larvae. In relation to soil texture, the following results were obtained: six isolates (two steinernematids and four heterorhabditids) from sandy-loam soil; three isolates (two steinernematids and one heterorhabditid) from medium-loam soil; two isolates (one steinernematid and one heterorhabditid) from clay-loam soil; 4 isolates (steinernematids) from clay soil; an isolate (steinernematid) from sand, sandy-clay-loam and silt-clay soil; and an heterorhabditid isolate from loamy-sand soil.

PRODUCTION OF ENTOMOPATHOGENIC NEMATODES (RHABDITIDA: STEINERNEMATIDAE, HETERORHABDITIDAE) IN LEPIDOPTERAN HOSTS [PRODUCCIÓN DE NEMATODOS ENTOMOPATÓGENOS (RHABDITIDA: STEINERNEMATIDAE, HETERORHABDITIDAE) EN HOSPEDANTES LEPIDÓPTEROS]**. C. R. C. Barbosa[1], A. S. Negrisoli Jr.[1] and A. Moino, Jr.[2] [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, Brazil, [2]Entomology Department, Federal University of Lavras, 37200-000, Lavras, MG, Brazil. carlanema@hotmail.com.—** Entomopathogenic nematodes (EPNs) are produced *in vitro* and *in vivo* to control economically important insect pests in agriculture. One of the factors that influence *in vivo* production is the potential of the particular insect host species that is employed, to provide a high nematode production rate at a low cost. This study aimed to compare and analyze economically the multiplication *in vivo* of *Heterorhabditis bacteriophora* Poinar, 1976 in *Anticarsia gemmatalis* Hüebner, 1818, *Agrotis ipsilon* (Hufnagel, 1767), and *Diatraea saccharalis* (Fabricius, 1794) larvae. A completely randomized factorial design was used to estimate the maximum lethal concentration (LC_{99}) as a basis for evaluating inoculum production. Nematodes were produced by the White trap method. The higher levels of production were 351,868, 227,848 and 24,928 IJs/g host for *D. saccharalis*, *A. gemmatalis* and *A. ipsilon* caterpillars, respectively. The most costly host was *A. ipsilon*, at R$ 49.86/g caterpillar (US$ 16.62) and R$ 200.04/million IJ (US$ 66.68) followed by *A. gemmatalis* and *D. saccharalis*. The best alternative host was *A. gemmatalis*, with the highest production of *H. bacteriophora* in the white trap system, at a low cost.

STEINERNEMA FELTIAE* (FILIPJEV, 1934) (RHABDITIDA: STEINERNEMATIDAE) PRODUCTION BY TWO INOCULATION METHODS OF USING ALTERNATIVE HOSTS** [PRODUCCIÓN DE *STEINERNEMA FELTIAE* (FILIPJEV, 1934) (RHABDITIDA: STEINERNEMATIDAE) POR DOS MÉTODOS DE INOCULACIÓN EMPLEANDO HOSPEDANTES ALTERNATIVOS]**. C. R. C. Barbosa[1], A. S. Negrisoli, Jr.[1], D. Bernardi[1], M. S. Garcia[1] and L. G. Leite[2]. [1]Plant Pathology Department, Federal University of Pelotas, RS, 96010-900, Pelotas, RS, Brazil, [2] Instituto Biológico, Campinas, 13001-970, SP, Brazil. carlanema@hotmail.com.—In vivo*** production of entomopathogenic

nematodes (EPNs) at low cost compared to agrochemicals, as well as the search for alternative insect hosts for rearing purposes has been developed for two EPNs species with the objective of implementing the use of EPNs as biocontrol agents. Therefore, the objective of this work was to evaluate the influence of two inoculation methods on the multiplication and infectivity of *Steinernema feltiae* (Filipjev, 1934) and *Steinernema glaseri* (Steiner, 1929) produced in last instar larvae of *Galleria mellonella*, *Agrotis ipsilon* (Hufnagel, 1767), *Diatraea saccharalis* (Fabricius, 1794) and *Spodoptera frugiperda* (J. E. Smith, 1797). The concentration of 250 IJ/larva was applied by two inoculation methods consisting of petri dishes with two sheets of filter paper and plastic cups with sterilized sand. The infective juveniles collected were used in infectivity assays with *G. mellonella* larvae. The mortality rate of *A. ipsilon* for *S. feltiae* inoculated in petri dishes and sand was lower compared to *G. mellonella* and *S. frugiperda*. Infective juveniles of *S. feltiae* produced on *D. saccharalis* and *G. mellonella* in sand were the most infectious against *G. mellonella*. *Spodoptera frugiperda* was the only insect host that produced *S. feltiae* in the petri dish inoculation method and was pathogenic against *G. mellonella*. Infective juveniles of *S. feltiae* were not affected in their infectivity when harvested six days after the beginning of emergence, independent of the insect host or the inoculation method used.

SUSCEPTIBILITY OF *CERATITIS CAPITATA* (DIPTERA: TEPHRITIDAE) TO TWO ISOLATES OF *STEINERNEMA RARUM* (DOUCET, 1986) MAMIYA, 1988 (NEMATODA: STEINERNEMATIDAE) FROM CÓRDOBA PROVINCE, ARGENTINA [SUSCEPTIBILIDAD DE *CERATITIS CAPITATA* (DIPTERA: TEPHRITIDAE) A DOS AISLAMIENTOS DE *STEINERNEMA RARUM* (DOUCET, 1986) MAMIYA, 1988 (NEMATODA: STEINERNEMATIDAE) DE LA PROVINCIA DE CÓRDOBA, ARGENTINA]. **M. A. Bertolotti[1], M. E. Doucet[2] and A. Kambic[1]. [1]Cátedra de Parasitología, [2]Laboratorio de Nematología, Centro de Zoología Aplicada, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, CC 122, 5000, Córdoba, Argentina. mbertolo@com.uncor.edu.—***Ceratitis capitata* (Mediterranean fruit fly) is an important fruit pest in the province of San Juan, Argentina. Susceptibility of third-stage juveniles of *C. capitata* to two isolates of *Steinernema rarum* from the localities of Arroyo Cabral (ACAB) (department of Tercero Arriba) and Noetinger (NOE) (department of Unión) was evaluated under laboratory conditions. Experiments were conducted in Eppendorf tubes. The inoculum dosage was one infective juvenile (IJ) per insect larva; 56 replications per isolate were performed. Percent mortality of insects was recorded every 24 h for 7 days after the start of the experiment. Regardless of the isolate, the highest mortality values were recorded between the first 24 and 48 h. Total mortality of *C. capitata* at the end of the observation period was 39.28% (ACAB) and 82.14% (NOE). Immature stages of this dipteran were susceptible to both of the two isolates considered, with infectivity of NOE being the more remarkable. These preliminary results show that *S. rarum* has potential in the control of *C. capitata*.

FRECUENCIA DE OCURRENCIA Y NIVELES POBLACIONALES DE *MELOIDOGYNE* SPP. EN CAFETALES DEL MUNICIPIO ANDRÉS ELOY BLANCO DEL ESTADO LARA, VENEZUELA [FREQUENCY OF OCCURRENCE AND POPULATION LEVELS OF *MELOIDOGYNE* SPP. IN COFFEE PLANTATIONS OF ANDRÉS ELOY BLANCO COUNTY, LARA STATE, VENEZUELA]. **M. Bonilla Montoya, N. Jiménez-Pérez and D. Ulacio Osorio. Universidad Centroccidental Lisandro Alvarado (UCLA), Postgrado de Fitopatología, Apartado 400, FAX 0251-2592571, Cabudare Edo Lara. nelabonilla@hotmail.com -** Con la finalidad de determinar la frecuencia de ocurrencia y niveles poblacionales del género *Meloidogyne* se colectaron 144 muestras de suelo y raíces en 16 localidades del Municipio Andrés Eloy Blanco. Cada muestra representó una superficie de dos hectáreas y estuvo compuesta por 25 submuestras. Los niveles poblacionales fueron estadísticamente diferentes ($p<0.05$) y se aglomeraron en tres grupos. El 43.09% de las muestras estudiadas (provenientes de las localidades de Miracuy, Sabana Redonda, Las Quebraditas, Los Palmares, Villorín-Londres y El Naranjal) conformó un grupo de poblaciones con baja densidad (0.013 a 0.196 J2/cm^3 de suelo y de 2.36 a 6.95 J2/g de raíz). El 45.96 % de las muestras analizadas (localidades: Guapa, La Mayela,

Caspito, Caspo, Lechalito, Las Virtudes y El Degredo) correspondió a otro grupo de poblaciones con niveles intermedios que fluctuaron de 0.257 a 0.510 J2/cm^3 de suelo y de 9.26 a 16.43 J2/g de raíz. Finalmente se observó un tercer grupo con los más elevados niveles poblacionales (0.492 a 0.580 J2/cm^3 de suelo y de 32.90 a 41.50 J2/g de raíz) que representó al 10.95 % de las muestras analizadas (La Travesía, Cerro Blanco y Valle Lindo). Estos niveles son relativamente bajos en comparación con otras localidades productoras de cafeto en Latinoamérica, en las que los valores son superiores a 2400 J2/g de raíz. No obstante, dependiendo de factores climáticos y debido a las características de cultivo perenne, estos niveles poblacionales podrían incrementarse significativamente en un corto lapso.

MESOCRICONEMA XENOPLAX* SUPPRESSION BY CASTOR OILCAKE AND VERMICOPMPOST IN PEACH TREE** [SUPRESIÓN DE *MESOCRICONEMA XENOPLAX* EN DURAZNERO POR EL USO DE TORTA DE TÁRTAGO Y COMPOST DE LOMBRIZ]. **V. K. Bosenbecker[1,2], C. B. Gomes[2], D. L. Lima[2], L. Somavilla[1], G. R. Krolow[2], A. D. Campos[2], S. A. A. Silva[2] and J. G. Casagrande, Jr.[2] [1]Universidade Federal de Pelotas/PPG Fitossanidade/FAEM, 96010-900, Pelotas-RS, [2]Embrapa Clima Temperado, BR 392, km 78, CP 403, 96001-970, Pelotas-RS. veri@cpact.embrapa.br.—Mesocriconema xenoplax* is widely disseminated in peach and plum orchards in the extreme South of Brazil, and it has been associated with Peach Tree Short Life (PTSL) syndrome. Therefore, a study was conducted to investigate incorporation of vermicompost and castor oilcake to suppress *M. xenoplax* in an organic peach cv. Ametista orchard naturally infested with the nematode. During the autumn and spring seasons, 20 kg of castor oilcake or vermicompost were incorporated into the soil in plots of 10 m^2 with two peach plants. Peach plant plots maintained without weeds were used as control. The experiment was conducted for four years (2003-2006) as a randomized design with six replications per treatment. Four months after the application of residues, soil samples were collected for evaluation of *M. xenoplax* populations to determine the reproduction factor (RF). A *M. xenoplax* RF reduction ranging from 55 to 65% was obtained in peach trees to which castor oilcake and vermicompost were added. The addition of castor oilcake had a stimulating effect on plants, increasing the number of branches, nitrogen levels in leaves and activity of resistance polyphenol oxidase enzyme. After the second and third year of incorporation of the castor oilcake into the soil, a small delay in the fruit maturation was observed. Based on these results, the use of both residues can provide suppression of M. *xenoplax,* and increase the tolerance of peach trees to PTSL.

NEMATODOS FITOPARÁSITOS ASOCIADOS CON MALEZAS DEL CULTIVO DEL CAFÉ EN LA CUENCA DEL RÍO YACAMBÚ, MUNICIPIO ANDRÉS ELOY BLANCO, ESTADO LARA, VENEZUELA [PHYTOPARASITIC NEMATODES ASSOCIATED WITH WEEDS IN COFFEE CROPS IN THE CUENCA DEL RIO YACAMBÚ REGION OF MUNICIPIO ANDRÉS ELOY BLANCO, LARA STATE, VENEZUELA]. **E. Briceño, M. Casanova and N. Jiménez-Pérez. Universidad Centroccidental Lisandro Alvarado, Decanato de Agronomía, Posgrado de Fitopatología, Apdo. 400, Barquisimeto, Venezuela. nixonj@ucla.edu.ve.—**En el cultivo del café (*Coffea arabica* L.) las malezas causan serios problemas, tanto en los viveros como en plantaciones establecidas. Con la intención de conocer los nematodos fitoparásitos presentes en las malezas asociadas con el cultivo del café se realizó un muestreo nematológico en fincas de café ubicadas en la cuenca del río Yacambú en el municipio Andrés Eloy Blanco, estado Lara. Se colectaron 187 muestras de suelo y raíces de malezas. Estas se procesaron en el Laboratorio de Nematología del Postgrado de Fitopatología de la Universidad Centroccidental Lisandro Alvarado. Se tomaron 100 g de suelo por muestra y se procesaron con el levigador de Oostenbrink y los nematodos presentes en las raíces se extrajeron por el método de maceración con licuadora. La limpieza se realizó con el método de Baermann. Se identificaron 7 especies de nematodos: *Monotrichodorus monohystera*, *Helicotylenchus dihystera*, *Tylenchorhynchus annulatus*, *Pratylenchus penetrans*, *Meloidogyne incognita*, *Paratylenchus nawadus*, *Xiphinema americanum, Tylenchus* sp., *Criconemoides* sp. y el género no fitoparasítico *Mononchus*. Se destacó la maleza *Impatiens balsamina* donde se encontraron elevadas poblaciones de *M. incognita* y numerosas agallas en las raíces. Del mismo

modo resaltaron las malezas *Emilia sonchifolia*, *Browalia americana* y *Lantana camara* donde se detectaron dos especies de nematodos de importancia fitopatológica: *M. incognita* y *P. penetrans*. Estos resultados ratifican la importancia de incluir un oportuno y adecuado control de malezas en el manejo integrado de nematodos fitoparásitos.

OCCURRENCE OF ENTOMOPATHOGENIC NEMATODES IN PRIVATE PROPERTIES IN CÓRDOBA CITY, ARGENTINA [PRESENCIA DE NEMATODOS ENTOMOPATÓGENOS EN DOMICILIOS PARTICULARES DE LA CIUDAD DE CÓRDOBA, ARGENTINA]**. S. R. Cagnolo and F. Carranza. Cátedra de Parasitología. F.C.E.F. y Naturales, Universidad Nacional de Córdoba, Avda. Vélez Sársfield 299. 5000, Córdoba, Argentina. scagnolo@efn.uncor.edu.—**Entomopathogenic nematodes of the families Steinernematidae and Heterorhabditidae (Order: Rhabditida) are used as alternatives for chemical control of pest insects. The growing interest in the use of these organisms as biological control agents has led to an exhaustive search of new species. Up to the present they have been found in many regions of the world. This study evaluated the presence of entomopathogenic nematodes in soils of private properties in Cordoba capital city. Nematode presence was analyzed in relation to the edaphic characteristics of the sites sampled. A total of 152 samples were collected between August 2005 and March 2006. The insect bait method was used to isolate entomopathogenic nematodes from soil samples. Soil texture, moisture, and pH were determined for soil samples. The recovery frequency of entomopathogenic nematodes was 10.53%; of the isolates detected, 12 belonged to the genus *Heterorhabditis* Poinar, 1976 and 3 to the genus *Steinernema* Travassos, 1927. No significant differences were found among sites with regard to presence or absence of entomopathogenic nematodes when edaphic characteristics of sites were compared. Based on the knowledge that entomopathogenic nematodes are naturally found in soils in urban tracts, and that these soils allow survival of these organisms, further studies are needed to implement biological control programs against insect pests in those environments.

SUSCEPTIBILIDAD DE LARVAS DE *AEDES AEGYPTI* (DIPTERA: CULICIDAE) AL PARASITISMO POR *STEINERNEMA RARUM* (OLI) (NEMATODA: STEINERNEMATIDAE) EN CONDICIONES DE LABORATORIO [SUSCEPTIBILITY OF *AEDES AEGYPTI* LARVAE (DIPTERA: CULICIDAE) TO PARASITISM BY *STEINERNEMA RARUM* (OLI STRAIN) (NEMATODA: STEINERNEMATIDAE) UNDER LABORATORY CONDITIONS]. **S. R. Cagnolo, M. E. Rivero and W. R. Almirón. Cátedra de Parasitología, Centro de Investigaciones Entomológicas de Córdoba, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, Av. Vélez Sársfield 299, (5000) Córdoba, Argentina. scagnolo@efn.uncor.edu.—**Los nematodos entomopatógenos tienen características que los hacen efectivos agentes de control. Poseen capacidad de adaptación a nuevos ambientes, se movilizan en busca de su hospedador y presentan alta especificidad para insectos, resultando inocuos para mamíferos, inclusive el hombre. Con objeto de evaluar bajo condiciones de laboratorio el parasitismo del nematodo *Steinernema rarum* (OLI) en larvas de *Aedes aegypti*, se analizaron diferentes dosis de aplicación. Para cada unidad experimental se utilizaron 25 larvas de mosquito de segundo estadio y se infectaron con nematodos en proporciones de 1:1, 5:1, 15:1, 100:1, 500:1, 750:1 y 1500:1 juveniles infectivos/larva de mosquito. Se realizaron tres réplicas y grupos control. Las unidades experimentales se mantuvieron en bandejas con agua declorada y las larvas se alimentaron con hígado en polvo (25 mg/larva/día). Se registró un incremento en el porcentaje de mortalidad larval al aumentar la dosis, observándose en las dosis 500:1, 750:1 y 1500:1 los máximos valores: 60%, 65.33% y 73.33%, respectivamente. Las larvas de segundo estadio resultaron más susceptibles al parasitismo por este nematodo con las dos dosis inferiores y el tercer estadio con dosis mayores. Se conoce que la reducción de mosquitos adultos mediante adulticidas se ve compensada por una mayor supervivencia de larvas que permanecen viables en los criaderos. Futuros estudios son necesarios para implementar estrategias de control y manejo integrado de mosquitos, considerando la utilización de estos nematodos como larvicidas biológicos de mosquitos de importancia sanitaria.

DEVELOPMENT OF YOUNG PLANTS INOCULATED WITH *PRATYLENCHUS JAEHNI* IN MICROPLOTS. [DESARROLLO DE PLANTAS JÓVENES INOCULADAS CON *PRATYLENCHUS JAEHNI* EN MICROPARCELAS]. **S. A. Calzavara[1], J. M. dos Santos[1], L. Favoreto[1], E. R. Borelli[2], A. C. Generoso[2] and L. S. C. Silva[1]. [1]UNESP/FCAV, Jaboticabal-SP, [2]ITES, Taquaritinga-SP, CEP14884-900, Brasil. seradca@bol.com.br.—***Pratylenchus jaehni* is the most aggressive nematode in citrus in São Paulo State, Brazil. The species was described in 2001 based on a subpopulation collected in an orchard from Itápolis County - SP. A microplot experiment under field conditions was conducted to study the influence of nematode inoculations in a logarithmic scale (0, 10, 100, 1,000, 10,000 and 100,000 specimens/microplot), on the development of young 'Valencia' orange tree plants grafted onto 'Rangpur' lime. The experiment had a randomized complete block design with 10 replicates. The following variables were considered: height of the plant, stem diameter, diameter of the second branch and the canopy volume. Evaluations were started 90 days after inoculation at intervals of 30 days. Eleven months after inoculation a 43.7% reduction in canopy volume was observed. Measurements at 12 months showed reductions of 22% in the height of the plants, 22.5% in the diameter of the stem, 20.4% in the diameter of the second branch, and 52.5% in the canopy volume, confirming the aggressiveness of the nematode.

HOST RANGE OF *PRATYLENCHUS JAEHNI* IN CULTIVATED PLANTS AND WEEDS [RANGO DE HOSPEDANTES DE *PRATYLENCHUS JAEHNI* EN PLANTAS CULTIVADAS Y MALEZAS]. **S. A. Calzavara[1], J. M. dos Santos[1], E. J. Almeida[1], L. Favoreto[1], E. R. Borelli[2], A. C. Generoso[2] and L. S. C. Silva[1]. [1]UNESP/FCAV, Jaboticabal-SP, [2]ITES, Taquaritinga-SP, CEP14884-900. seradca@bol.com.br.—***Pratylenchus jaehni* is the most dangerous species of nematodes to citrus in Brazil. The objective of this research was to study the host suitability of cultivated plants to the nematode in order to choose a non-host to plant in the areas of old and infested orchards and to know the weeds that are hosts of the nematode to aid in the management of the pest. The study was carried out in a greenhouse at the Universidade Estadual Paulista (UNESP/FCAV), Jaboticabal Campus. Ten individual plants of each species were maintained in clay pots of 2.5 L containing a mixture 1:1 sand/soil, previously autoclaved and each was inoculated with a variable number of specimens of the nematode. The plants were inoculated with 10 ml/plant of a *P. jaehni* suspension obtained from multiplication of the nematode in carrot cylinders in vitro, corresponding to the levels of 1,000, 2,000 or 3,000 nematodes per plant (initial population = IP), based on the size of the root system of the plant species. Ninety days after the inoculation, nematodes were extracted from roots and soil of each plant and the final population (FP) was estimated with the aid of the Peters chamber and a light microscope. The reproduction factor (RF = FP/IP) was calculated. Species with values of RF>1 were considered susceptible and those with RF<1 were considered resistant. Among 20 plant species studied, only millet, soybean, maize and *Crotalaria juncea* were susceptible to the nematode.

BIODIVERSIDAD Y PREVALENCIA DE NEMATODOS PARÁSITOS Y PATÓGENOS DE INSECTOS DE INTERÉS AGRÍCOLA SANITARIO [BIODIVERSITY AND PREVALENCE OF NEMATODE PARASITES AND PATHOGENS OF INSECTS OF IMPORTANCE AS AGRICULTURAL PESTS]. **N. B. Camino. Investigador CIC. Centro de Estudios Parasitológicos y de Vectores, CEPAVE, CONICET-UNLP, Calle 2 No. 584, 1900 La Plata, Argentina. nemainst@cepave.edu.ar.—**El estudio de nematodos parásitos de insectos plaga de la agricultura y de interés sanitario realizada hace más de veinte años, reveló una gran diversidad específica en gusanos blancos (Coleoptera, Scarabaeidae), acrídidos, grillos y grillotopos (Orthoptera, Acridiidae, Gryllidae y Gryllotalpidae respectivamente), y unas 30 especies para insectos vectores como simúlidos, culícidos y quironómidos (Diptera, Simuliidae, Culicidae y Chironomidae respectivamente). Los insectos fueron colectados con pala, con soluciones tensoactivas, en diferentes campos con cultivos de trigo, alfalfa, pasturas, de horticultura intensiva, parques y zonas de recreación, luego colocados individualmente en recipientes para aislar los nematodos. En cuanto a las larvas acuáticas, fueron colectadas con cucharón y red,

colocadas en peceras. Este estudio, nos condujo a la identificación taxonómica de las especies halladas, elaborando una lista de nematodos parásitos de insectos, a determinar en cada especie el porcentaje e incidencia de parasitismo, y el momento del año que esas especies están presentes en los insectos. Utilizamos el índice de biodiversidad de Shannon y Weaver, análisis de la varianza one-way ANOVA a fin de obtener diferencias significativas entre los porcentajes de parasitismo de los diferentes lugares y en distintas épocas del año; los factores de significancia en ANOVA fueron evaluados con el test de separación de los promedios de LSD (P = 0.05). Las larvas de gusanos blancos presentaron alto índice de biodiversidad y prevalencia con especies de la familia Thelastomatidae, las tucuras con Mermithidae, los grillos con Oxyuridae, los grillotopos con Rhabditidae y Mermithidae, y los dípteros acuáticos con Mermithidae. Las especies de las familias Steinernematidae y Heterorhabditidae el índice de biodiversidad fue muy bajo.

TAXONOMÍA DE ENTOMONEMATODOS EN LA ARGENTINA—SITUACIÓN ACTUAL [TAXONOMY OF ENTOMOPATHOGENIC NEMATODES IN ARGENTINA—CURRENT STATUS]. **N. B. Camino. Investigador CIC. Centro de Estudios Parasitológicos y de Vectores, CEPAVE, CONICET-UNLP. Calle 2 No. 584, 1900 La Plata, Argentina. nemainst@cepave.edu.ar.—**El papel de una de las pioneras para desarrollar el tema en Argentina me fue designado, y nos obligó a especializarnos en la identificación taxonomía de nematodos parásitos y patógenos de insectos, desconocidos hasta entonces. Este estudio conduce a un análisis morfológico y morfométrico de los nematodos adultos, bajo microscopia óptica y electrónica de barrido, con la obtención de microfotografías digitales, y en un segundo plano dilucidar los ciclos biológicos, establecer el grado de patogenicidad, llevar a cabo estudios de biocontrol en el laboratorio y su evaluación en pruebas a campo, y a comparar el accionar de nematodos nativos con especies importadas para tal fin. En Argentina en la década del 80 Camino en Buenos Aires con plagas acuáticas como los simúlidos, culícidos y quironómidos, y terrestres como las tucuras, especializándose en la familia Mermithidae, luego plagas de la agricultura, incrementando el conocimiento de las especies del resto de las familias entomonematodos, sumando más de 100 especies nuevas descriptas; y la Dra. Magdalena Doucet en Córdoba con simúlidos y especialmente abarcando el grupo de los Steinernematidae y Heterorhabditidae, comenzaron a descubrir las especies de entomonematodos hasta el momento desconocidas para nuestro país. Hoy en día, en Argentina, en cuanto al estudio taxonómico de los entomonematodos, existe solamente el grupo que pertenece al CEPAVE, y que comenzará con las técnicas moleculares como herramienta que corroborará la presencia legítima de las especies y la afinidad intraespecífica evolutiva.

ADDITIONAL INFORMATION ON *MELOIDOGYNE INORNATA* LORDELLO, 1956 (TYLENCHIDA: MELOIDOGINIDAE) AND ITS CHARACTERIZATION AS A VALID SPECIES [INFORMACIÓN ADICIONAL SOBRE *MELOIDOGYNE INORNATA* LORDELLO, 1956 (TYLENCHIDA: MELOIDOGINIDAE) Y SU CARACTERIZACIÓN COMO ESPECIE VÁLIDA]. **R. M. D. G. Carneiro[1], M. L. Mendes[2], M. R. A. Almeida[1], M. F. A. Santos[1], A. C. M. M. Gomes[1] and G. Karssen[3]. [1]EMBRAPA-Recursos Genéticos e Biotecnologia, C.P. 02372, 70849-979 Brasília, DF, Brazil, [2]University of Florida, P.O. Box 110620 Gainesville, FL 32611-0620 USA, [3]Plant Protection Service, P.O. Box 9102, 6700 HC Wageningen, The Netherlands. recar@cenargen.embrapa.br.—**A root-knot nematode parasitizing yakon (*Polymia sonchifolia* Poep Endl) in São Paulo State, Brazil, is identified as *Meloidogyne inornata*, 1956. The species is redescribed from this material and compared with the original description of *M. inornata*. The female perineal patterns have a distinct high dorsal arch composed of smooth to wavy striae, similar to *M. incognita*. The female stylet is 15.0-17.0 µm long with the cone generally slightly curved dorsally with well developed knobs. DGO is 3.5-4.5 µm. Males have a high, round head cap which is continuous with the body contour and has a large and round labial disc, centrally concave, and rose above the medial lips. The head region is never marked by incomplete annulations. Stylet robust, 20.0-25.0 mm long, cone straight, shaft cylindrical with several small projections, knobs, pear-shaped and backwardly sloping. The stylet length of second-stage juveniles is 10.0-13.0 µm, DGO

is 2.5-3.5 mm and the tail length is 35.0-58.0 µm, "c" measurement is 6.7-13.9. Biochemically, the esterase phenotype I3 (= Y3) is species-specific and is the most useful character for differentiating *M. inornata* from other *Meloidogyne* species.

DIVERSITY OF *MELOIDOGYNE ARENARIA* ISOLATES USING MORPHOLOGICAL, BIOCHEMICAL, CYTOLOGICAL AND HOST RACES APPROACHES [DIVERSIDAD DE AISLAMIENTOS DE *MELOIDOGYNE ARENARIA* RELACIONADA CON SU MORFOLOGÍA, BIOQUÍMICA, CITOLOGÍA Y RAZAS]. **R. M. D. G. Carneiro, M. F. A. Santos, M. R. A. Almeida, F. C. Mota, A. C. M. M. Gomes and M. S. Tigano. EMBRAPA, Recursos Genéticos e Biotecnologia, C.P. 02372, 70849-979 Brasília, DF, Brazil, recar@cenargen.embrapa.br.—**Twelve *Meloidogyne arenaria* isolates representing two cytological types (3n = 51-56, 2n = 42-48) and four enzymatic phenotypes (esterase and malate deshydrogenase: A1N3, A2N1, A1N1 and A2N3) were studied. Considering morphometrical and morphological features it was possible to conclude that the isolate with enzymatic phenotype A2N3 (race 1, 3n = 50-56) was the same species as *M. arenaria* from peanut, Florida, USA, described by Chitwood, 1949. The seven isolates with phenotypes A2N1 (3n = 50-56) from different localities and the isolate A1N1 (2n = 42-46 chromosomes) can be considered morphometrically typical *M. arenaria* race 2. Morphologically, they were different from isolate race 1: stylet of female, head region of males and second-stage juveniles. The two isolates A3N1 (2n = 42-48, race 2 of *M. incognita*) were identified as *M. morociensis* considering all morphological characters described for this species, enzymatic phenotypes, the number of chromosomes and the host race. The isolates A2N3 (2n = 42-48, race 2) can be identified as an atypical *M. arenaria* race 2 or an unidentified species, presenting atypical perineal patterns and males with a very small distance of the DEGO to the base of the stylet (2.0-2.5 µm). Consistent morphological differences were found between the two host races and four enzymatic phenotypes of *M. arenaria*.

***MELOIDOGYNE ETHIOPICA*, A MAJOR ROOT-KNOT NEMATODE PARASITISING *VITIS VINIFERA* AND OTHER CROPS IN CHILE** [*MELOIDOGYNE ETHIOPICA*, UN NEMATODO MUY IMPORTANTE QUE PARASITA *VITIS VINIFERA* Y OTROS CULTIVOS EN CHILE]. **R. M. D. G. Carneiro[1], M. R. A. Almeida[1], E. T. Cofcewicz[1], J. C. Magunacelaya[2] and E. Aballay[3]. [1]EMBRAPA -Recursos Genéticos e Biotecnologia, C.P. 02372, 70849-979 Brasilia, DF, Brazil, [2]Universidad Catolica de Valparaíso, Casilla 4059, Valparaíso, Chile, [3]Universidad de Chile, Dpto. Sanidad Vegetal, Casilla 1004, Santiago, Chile. recar@cenargen.embrapa.br.—**Enzyme phenotypes, specifically esterases (EST) and malate dehydrogenase (MDH) were used to characterise different species of *Meloidogyne* from Chile. Esterase activity was highly polymorphic and was the most useful in the identification of the different species. Using this enzyme it is possible to characterize and identify *M. ethiopica* in about 80% of samples on grapevine, kiwi and tomatoes. Another three species: *M. javanica*, *M. hapla* and *M.arenaria* were identified on tomatoes, kiwi and pomegranate with only one or a few populations. It was possible to detect minor atypical (unidentified) phenotypes, generally in mixed populations with *M. ethiopica*. Only the profiles N1 and H1 of MDH were detected. N1 was not specific and H1 allowed identification of *M. hapla*. Contaminated nursery stock has probably resulted in serious infestation by *M. ethiopica* in vineyards in various localities in Chile.

CARACTERIZACIÓN DE UNA POBLACIÓN VENEZOLANA DE *GRACILACUS* ASOCIADA CON PASTO GUINEA (*PANICUM MAXIMUM*) [CHARACTERIZATION OF A VENEZUELAN POPULATION OF *GRACILACUS* ASSOCIATED WITH THE GRASS *PANICUM MAXIMUM*]. **M. Casanova, N. Jiménez-Pérez and E. Briceño. Universidad Centroccidental Lisandro Alvarado, Decanato de Agronomía, Posgrado de Fitopatología, Apdo. 400, Barquisimeto, Venezuela. casanovamery@yahoo.es.—**Una población del género *Gracilacus* proveniente del Estado Lara, Venezuela, fue identificada como *G. latescens* en base a caracteres morfológicos entre los que se incluyen: juveniles de segundo estadio con estilete corto, hembras vermiformes con estilete largo. Hembras obesas se en-

contraron dentro del tejido de la raíz de la planta hospedante, parte anterior del cuerpo angosta y una porción del cuerpo angosta y alargada inmediatamente posterior a la vulva; dos líneas laterales, estilete pequeño, faringe criconematoidea, monodélfica. Machos vermiformes sin estilete desarrollado. Además, se determinaron las siguientes medidas: hembras vermiformes (n=10): longitud del cuerpo = 282.5 ± 11 µm, longitud del estilete = 70.0 ± 3.8 µm, longitud de la faringe = 115 ± 3.3 µm, distancia del ano a la vulva = 53 ± 3.0 µm, longitud de la cola = 23.5 ± 2.5 µm. Hembras obesas (n = 10): longitud del cuerpo = 370 ± 35.1 µm, longitud de la faringe = 99 ± 5.5 µm. Machos (n = 5): longitud del cuerpo = 291 ± 23.5 µm, longitud de la cola = 24.5 ± 3.2 µm, longitud de las espículas = 18.5 ± 0.5 µm, longitud del gubernáculo = 4.3 ± 0,3 µm. Juveniles de segundo estadio (n = 10): longitud del cuerpo = 270 ± 9.3 µm, longitud del estilete = 10 ± 0.7 µm, longitud del cono = 6 ± 0.5 µm, longitud de la faringe = 74 ± 2.5 µm. Por primera vez se reporta esta especie en Venezuela.

NEMATODOS FITOPARÁSITOS ASOCIADOS A FRUTALES MENORES, EN EL MUNICIPIO MARA, ESTADO ZULIA, VENEZUELA [PLANT PARASITIC NEMATODES ASSOCIATED WITH MINOR FRUIT TREE CROPS IN THE STATE OF ZULIA, VENEZUELA]. **G. Castellano[1] and Z. Lugo[2]. [1]Instituto Nacional de Investigaciones Agrícolas INIA-Zulia, Km 7 vía Perijá, [2]INIA-Falcón, Av. Roosevelt, Punto Fijo, Estado Falcón, Centro Frutícola del Zulia-CORPOZULIA, Municipio Mara, Estado Zulia, Venezuela. gcastellano@inia.gov.ve.—**Los frutales menores en Venezuela son cultivos que ocupan una superficie relativamente reducida. Si bien su mercado de consumo es limitado, constituyen una alternativa de importancia económica para los pequeños productores; éstos los utilizan en la elaboración de conservas, dulces, jaleas y fabricación de bebidas refrescantes. Con el fin de identificar los nematodos fitoparásitos asociados a la ciruela de huesito (*Spondias purpurea* L.), icaco (*Chrysobalanus icaco* L.), tamarindo (*Tamarindus indica* L.) y granada (*Punica granatum*) se tomaron un total de 68 muestras de suelo y raíces, provenientes del Centro Frutícola del Zulia-CORPOZULIA y otras unidades de producción del estado Zulia. Las muestras fueron procesadas por el método de Cobb y embudo de Baermann. Las especies de nematodos fitoparásitos identificadas fueron: *Radopholus similis, Hemicriconemoides mangiferae, Rotylenchulus reniformis* y representantes de *Meloidogyne* spp. *R. reniformis* se encontró asociado a todos los cultivos estudiados; *Meloidogyne* spp. se identificó en el 13 y 50% de las muestras de tamarindo y granada respectivamente; *H. mangiferae* en el 60% de las muestras de tamarindo, en el 12% de icaco y en el 25% de las muestras de granada. *R. similis* solo se detectó en el cultivo de icaco, en el 15% de las muestras. Es importante continuar los muestreos en otras zonas productoras y realizar pruebas de patogenicidad con la finalidad de evaluar y determinar el daño que pudieran causar los nematodos identificados en estas especies frutales.

ASSESSING THE SPECIATION BOUNDARIES IN *PASTEURIA* SPP. [DETERMINACIÓN DE LOS LÍMITES DE ESPECIACIÓN EN *PASTEURIA* SPP.]. **A. Ciancio[1], L. C. Rosso[1], M. T. Maresca di Serracapriola[1], R. Favre[2] and M. Cermola[2]. [1]Istituto per la Protezione delle Piante, C.N.R., Via Amendola 122/D, I-70126 Bari, [2]Istituto di Genetica e Biofisica "Adriano Buzzati Traverso", C.N.R., Via Pietro Castellino 111, I-80131 Napoli, Italy. a.ciancio@ba.ipp.cnr.it.—**The increasing number of *Pasteuria* spp. described thus far underlines the need for the identification of species definition criteria suitable for this group of rhizosphere bacteria. 16S rDNA sequence data, ultrastructural diversity of endospores, host nematode groups and parasitism specificity are the main criteria used to define *Pasteuria* spp. Analysis of 16S rDNA data obtained by PCR amplification of a 420 bp fragment from two *Pasteuria* spp. from *Helicotylenchus* sp. and *Tylenchulus semipenetrans*, respectively, compared with GenBank-available sequences, showed the occurrence of two new putative species. Molecular clock analysis applied to the 16S divergence of these fragments revealed that *Pasteuria* ancestors gave rise to a wide phylogenetic radiation, whose extent and diversity are still largely unexplored. A review of endospore ultrastructural diversity shows a concomitant range of morphological and functional adaptations. Endospores from other *Pasteuria* spp., including two distinct forms from *Xiphinema diversicaudatum* and *X. pachtaicum*, showed varying patterns of cortex organization, wall layers and/or

central core rings, as well as of parasporal fiber organization and type. Although host nematode appears as a practical criterion for species identification, the occurrence of more than one *Pasteuria* spp. in hosts from the same genera, i.e. *Xiphinema*, *Heterodera* and *Meloidogyne* spp., casts doubts about its value. The combination of 16S rDNA nucleotide polymorphism analysis with ultrastructural data provides more reliable criteria for species definition. Finally, the lack of type material for *P. thornei* prompts the need for research efforts to identify available phenotypes through nucleotide and ultrastructural data, as well as with host specificity tests.

NEMATODOS FITOPARÁSITOS DEL CULTIVO DE SOYA EN EL NOROESTE ARGENTINO [PLANT PARASITIC NEMATODES OF SOYBEAN IN NORTHWESTERN ARGENTINA]**. N. B. Coronel. Sección Zoología Agrícola, Estación Experimental Agroindustrial Obispo Colombres, Avda Williams Cross 3150, CP4101, Las Talitas, Tucumán, Argentina. nbcoronel@eeaoc.org.ar.—**En el noroeste argentino la soja es afectada por diversos géneros y especies de nematodos fitoparásitos que provocan severos daños en casos puntuales. Entre ellos se destacan por su importancia *Heterodera glycines* (el nematodo del quiste de la soja) y *Meloidogyne* spp. (el nematodo de la agalla). *H. glycines* fue localizado en las provincias de Tucumán, Salta y Santiago del Estero, en general sin manifestar síntomas aéreos. Los niveles poblacionales encontrados oscilaron entre 0,5 y 498 quistes/cm^3 de suelo. Pudieron clasificarse las razas 3,5 y 6 y los HG tipo 2,5,7 y HG tipo 5,7. Varias poblaciones de este nematodo aún no han sido caracterizadas. El nematodo de la agalla fue localizado afectando soja en las provincias de Tucumán, Salta, Santiago del Estero y Catamarca en niveles poblacionales entre 1 y 857 juveniles/cm^3 de suelo. En lotes con altas infestaciones de este nematodo se observaron manchones de superficie variable con plantas de tamaño reducido y a veces muertas. Se evaluó el comportamiento de cultivares de soja frente a estos nematodos; la mayoría se comportó como susceptibles a estos, y pocos exhibieron moderada resistencia. Otros nematodos asociados al cultivo de soja que aparecieron con mayor frecuencia en las muestras fueron *Pratylechus* spp. y *Helicotylenchus* spp.; ambos han sido encontrados en plantas afectadas por otros patógenos. Son necesarios estudios adicionales sobre los nematodos fitoparásitos que afectan este cultivo; la información será de sumo interés para poder implementar tácticas destinadas a controlarlos y hacer más rentable la producción de soja en la región.

REACTION OF SOYBEAN CULTIVARS TO *HETERODERA GLYCINES* ICHINOHE, 1952 (TYLENCHIDA: HETERODERIDAE) IN NORTHWESTERN ARGENTINA [REACCIÓN DE VARIEDADES DE SOYA A *HETERODERA GLYCINES* ICHINOHE, 1952 (TYLENCHIDA: HETERODERIDAE) EN EL NOROESTE ARGENTINO]. **N. B. Coronel[1] and M. R. Devani[2]. [1]Sección Zoología Agrícola, [2]Sección Granos, Estación Experimental Agroindustrial Obispo Colombres, Avda Williams Cross 3150, CP4101, Las Talitas, Tucumán, Argentina. nbcoronel@eeaoc.org.ar.—**Soybean cyst nematode, *Heterodera glycines* Ichinohe, is one of the most destructive pests of soybean in all major soybean-producing countries. This nematode is widely distributed in soybean-producing areas of Argentina. The response of soybean varieties to attack by *H. glycines* has not been extensively studied in our country. The objective of this study was to evaluate the reaction of commercial cultivars of soybean used in Northwestern Argentina to a population of *H. glycines*. Fifty-five cultivars of soybean were evaluated for their reaction to *H. glycines* race 6 (HG Type 5.7). The experiment was conducted in greenhouse conditions and arranged in a completely randomized design with one plant per plot and 7 replicates. The cultivar Lee 74 was used as the susceptible control. Plants of each cultivar were inoculated with about 4,000 eggs. Evaluations were done 28 days after inoculation by counting the number of white females and cysts that had developed on each plant. Reaction of cultivars was determined based on Female Index. Only one (2%) cultivar was resistant to *H. glycines*, one (2%) moderately resistant, 15 (27%) moderately susceptible, and 38 (69%) susceptible.

ACTIVIDAD NEMATOSTÁTICA DE EXTRACTOS ACUOSOS CONTRA *MELOIDOGYNE INCOGNITA* [NEMATOSTATIC ACTIVITY OF AQUEOUS EXTRACTS FOR THE CONTROL OF *MELOID-*

OGYNE INCOGNITA]. **J. Cristóbal, E. Herrera, M. N. Marbán, J. Tún, P. Simá, F. Pat, L. Medina and M. Gamboa. Instituto Tecnológico de Conkal, Yucatán, 97345-México. jairoca54@hotmail.com.—**Se evaluó la actividad nematostática en condiciones protegidas de extractos acuosos de hoja y raíz de *Calea urticifolia* Mill., en concentraciones de 0, 50 y 100% (0, 13 y 26 g/L), se realizó la aplicación de los extractos al momento del trasplante y 24, 48 y 72 h consecutivas posteriores al mismo, lo que generó un factorial de 2x3x4 con cuatro repeticiones. El experimento se realizó durante 45 días en macetas con 2 kg de suelo previamente esterilizado e inoculando 1000 huevos larvados y 130 J_2 cerca de la raíz de plántulas de tomate *cv.* Río Grande. El tratamiento con el menor número de agallas por planta correspondió al proveniente de hoja, sin embargo, la menor cantidad de huevos por g de raíz licuada se obtuvo con el extracto de raíz, lo que implicó mejor control del nematodo al final del experimento. En relación al testigo, se obtuvo una disminución de agallas del 50 y 56% al aplicar los extractos al 50 y 100%, respectivamente y una disminución de huevos por g de raíz licuada del 59 y 72% con dichas concentraciones. Con la primera aplicación de los extractos se tuvo el mejor control del nematodo.

CHARACTERIZATION OF A VENEZUELAN POPULATION OF THE FOLIAR NEMATODE, *APHELENCHOIDES RITZEMABOSI*, ON CHRYSANTHEMUM (*DENDRANTHEMA GRANDIFLORUM*) [CARACTERIZACIÓN DE UNA POBLACIÓN VENEZOLANA DEL NEMATODO FOLIAR, *APHELENCHOIDES RITZEMABOSI* EN CRISANTEMO (*DENDRANTHEMA GRANDIFLORUM*)]. **R. Crozzoli[1], T. Hurtado[2], G. Perichi[1] and A. Arcia[2]. Universidad Central de Venezuela, Facultad de Agronomía, [1]Instituto de Zoología Agrícola, Laboratorio de Nematología Agrícola, [2]Laboratorio Expertabiol., Apdo. 4579, Maracay 2101-A, Venezuela. renatocrozzoli@gmail.com.—**In samples of chrysanthemum leaves from San Pedro de Los Altos, Miranda State, a species of foliar nematode belonging to the genus *Aphelenchoides* was detected. Chrysanthemum leaves appeared discolored and deformed. Spots and blackish brown, irregular, necrotic areas occupied 10 to 80% of the leaf surface. Tissue contained females, males, juveniles and embrionated eggs of the nematode. The nematode population was extracted by incubating leaves in distilled water. Morphological observations in the females showed four incisures in the lateral field, excretory pore posterior to nerve ring, ovary single with oocytes in multiple rows, post-vulval uterine sac extending more than one-half of the vulva-anus distance, tail elongate-conoid bearing a terminal peg with 2-4 minute process. Males present (20% females) posteriorly curved, tail conoid bearing a terminal peg with 2-3 process. Measurements of 10 females (body length = 896 ± 76 µm, a = 48.4 ± 1.6, b = 11.6 ± 0.5, c = 15.1 ± 1.8, Pex (%) = 10.3 ± 0.9, V = 69 ± 0.8, stylet length = 12 µm, tail length = 47 ± 0.7 µm) and 8 males (body length = 792 ± 48 µm, a = 42 ± 2, b = 10.4 ± 1.1, c = 18,2 ± 1.4, Pex (%) = 14.3 ± 1.2, spicules length = 22 ± 1.5 µm, T% = 55 ± 3.2) conformed to the description of the nematode *Aphelenchoides ritzemabosi*. This is the first report of *A. ritzemabosi* infecting chrysanthemum in Venezuela.

NEW INSIGHTS ON *RADOPHOLUS SIMILIS* (COBB) SURVIVAL IN SOIL IN THE ABSENCE OF HOST PLANTS [NUEVO ENFOQUE SOBRE LA SUBSISTENCIA DE *RADOPHOLUS SIMILIS* (COBB) EN SUELO EN AUSENCIA DE PLANTAS HOSPEDADORAS]. **C. Chabrier, C. Carles, C. Mauriol-Bastol and P. Quénéhervé. Laboratoire de Nématologie Tropicale, PRAM CIRAD-IRD, BP 214, 97232 Le Lamentin, Martinique, FWI. chabrier@cirad.fr.—**The burrowing nematode *Radopholus similis* is the most important nematode on bananas. To minimize application of nematicides, cropping systems based on rotation crop, fallow, combined with use of clean planting material have been developed. Study on soil survival of *R. similis* may be used to optimize the intercrop period and, thereby, to increase the financial income of such cropping systems. In the herein study, we monitored for six months in the laboratory the survival of calibrated populations of *R. similis* on two different soil types (nitisol and andosol), at different water potentials (from -0 to -700 kPa) in natural conditions and on soil previously sterilized by frost. We observed that the evolution of adult individuals follow a classical exponential decrease. *R. similis* survive better in wet (-0.1 kPa) sterilized soil than in dry soil (-100 to -700 kPa); but in undisturbed soil, (and therefore not sterilized) they survived better in

dry soil. Half lives of juveniles were two weeks inferior to than of adult females (from 27 up to 37 days), males survived significantly longer (from 40 to 71 days). These results are consistent with the absence of anhydrobiosis strategy in the *R. similis* species compared to the *Pratylenchus coffeae* species. These results also suggest that the energy of the males is totally directed towards the reproduction (no need for food foraging) in adverse conditions such as the absence of host plants.

EFFICACY OF ACIBENZOLAR-S-METHYL, FERTILIZER AND EXTRACT OF *AZADIRACHTA INDICA*, AGAINST *MELOIDOGYNE* SPP. AND *PRATYLENCHUS ZEAE* IN SUGARCANE (*SACCHARUM* SP.) [EFICACIA DE ACIBENZOLAR-S-METIL, FERTILIZANTE Y EXTRACTO DE *AZADIRACHTA INDICA*, CONTRA *MELOIDOGYNE* SPP. Y *PRATYLENCHUS ZEAE* EN CULTIVOS DE CAÑA DE AZÚCAR (*SACCHARUM* SP.)]. **A. Chaves[1], E. M. R. Pedrosa[2], R. S. B. Coelho[1], L. M. P. Guimarães[1] and S. R. V. L. Maranhão[1]. [1]Agronomy Department, [2]Technology Department, Universidade Federal Rural de Pernambuco, Recife, PE, 52171-900, Brazil. elvira.pedrosa@pq.cnpq.br.—**With the objective of evaluating Acibenzolar-S-Methyl (ASM), silicated fertilizer, and neem extract efficiency on integrated management of *Meloidogyne* spp. and *Pratylenchus zeae* in sugarcane (*Saccharum* sp.) on the Northeastern Brazil costal mesa, a field experiment was conducted in a randomized complete block design, with five replicates. The variety RB 813804 was used with the following treatments applied individually and in combination: ASM (100 g p.c./100 L) sprinkled on shoots at 2 and 4 months after planting; silicated fertilizer (600 kg p.c./ha); neem extract (1%) sprinkled on seed stalks; aldicarb (20 kg p.c./ha) in foundation; filter press mud (50 t/ha); ASM (100 g p.c./100 L) sprinkled on seed stalks and untreated control. *Meloidogyne* spp. densities increased with crop development in agreement with quadratic models. The association of filter press mud+aldicarb+neem extract sprinkled on seed stalks significantly increased plant height. ASM sprinkled on seed stalks and aldicarb+ASM sprinkled on shoots increased ($P \leq 0.05$) stalk diameter. Filter press mud and silicated fertilizer promoted the highest increases in productivity. There was no significant difference in stalk juice variables or in endoparasite densities in soil, in contrast to the roots, in which *Meloidogyne* spp. densities were significantly lower in plants with silicate fertilizer individually or in association with the other treatments. ASM did not affect significantly *Meloidogyne* spp. densities and neem extract was efficient only in association with aldicarb or filter press mud+aldicarb. *Pratylenchus zeae* was not affected by any treatment.

DIAGNOSIS OF QUARANTINE NEMATODES IN THE LABORATORY OF NEMATOLOGY AT INTA BALCARCE EXPERIMENTAL STATION [DIAGNÓSTICO DE NEMATODOS CUARENTENARIOS EN EL LABORATORIO DE NEMATOLOGÍA DE LA ESTACIÓN EXPERIMENTAL DEL INTA BALCARCE]. **E. J. Chaves and M. S. Torres. Laboratorio de Nematología, INTA-Estación Experimental de Balcarce, C.C. 276. (7620) Balcarce, Argentina. echaves@balcarce.inta.gov.ar.—**The Laboratory of Nematology at INTA Balcarce Experimental Station is a national and international center of reference. We collaborate with the National Quarantine Department (Cuarentena Vegetal, or plant quarantine) in nematode species identification to determine presence and geographic distribution of plant parasitic nematodes of quarantine significance in soil and plant material. A review of quarantined plant parasitic nematodes in Argentina will be presented with emphasis on the range of techniques currently used for the identification of species, geographic distribution, range of host plants, importance of extensive surveys to detect quarantine nematodes and collaboration with the National Institutes of Plant Protection and Quarantine (FUNBAPA, INASE, ISCAMEN, SINAVIMO). The presence of *Heterodera schachtii* in Argentina is discussed based on a revision of the original material deposited in the laboratory of Nematology at INTA Balcarce.

ENDEMIC LONGIDORIDS FROM SOUTH AMERICA [LONGIDORIDOS ENDÉMICOS DE SUDAMÉRICA]**.** **E. J. Chaves. Laboratorio de Nematología, INTA - Estación Experimental de Balcarce, 7620 Argentina. echaves@balcarce.inta.gov.ar.—**A review of endemic longidorids from South America will be presented. The genera *Xiphidorus, Paraxiphidorus* and *Australodorus* are considered endem-

ic because their present distribution is limited to Argentina, Bolivia, Brasil, Chile, Uruguay and Venezuela. Morphological and molecular species characteristics will be discussed based on bibliography as well as their geographical distribution and potential economic importance. The distribution of *Xiphidorus balcarceanus* and its host plants will be presented based on surveys conducted in Argentina. A discussion of the origin and distribution of genera *Xiphidorus, Paraxiphidorus* and *Australodorus* in South America will be presented.

ON THE OCCURRENCE OF THE GENUS *TUBIXABA* MONTEIRO AND LORDELLO, 1980 (DORYLAIMIDA, APORCELAIMIDAE) IN ARGENTINA [SOBRE LA PRESENCIA DEL GÉNERO *TUBIXABA* MONTEIRO AND LORDELLO, 1980 (DORYLAIMIDA, APORCELAIMIDAE) EN ARGENTINA]. **E. J. Chaves[1], P. Guerrero[2], J. Abolafia[2] and R. Peña-Santiago[2]. [1]INTA, Estación Experimental de Balcarce, 7620-Balcarce, Argentina, [2]Departamento de Biología Animal, Vegetal y Ecología, Universidad de Jaén, Campus "Las Lagunillas" s/n, Edificio B3, 23071- Jaén, Spain. echaves@balcarce.inta.gov.ar.—**Three specimens belonging to two undescribed species of the genus *Tubixaba* Monteiro and Lordello, 1980 have been recorded from Argentinian soils. Their discovery is a relevant nematological novelty because this taxon was never reported in South America after the original description of the type species, *T. tuxaua,* in Brazil; however, it was later described in South Africa (two species, *T. minima* and *T. parva*) and in Romania (one species, *T. saccata*), although some doubts persist on the identity of the latter. Two Argentinian specimens are characterized by their big size (L = 5.7, 5.6), odontostyle 24 µm long, uterus tripartite, and tail cuticle 15 µm thick and three-layered with middle and inner layers massive. The third specimen is distinguished by its body 4.3 mm long, odontostyle 18 µm long, uterus bipartite with a marked *pars dilatata distalis*, and tail cuticle 9 µm thick and two-layered with only the inner layer being massive. Measurements, short descriptions and illustrations of Argentinian material are provided. The biogeography and systematics of the genus *Tubixaba* are analyzed and discussed.

TUBULAR UTERINE STRUCTURES IN TRICHODORIDAE AND THEIR DIAGNOSTIC VALUE. [ESTRUCTURAS TUBULARES UTERINAS EN TRICHODORIDAE Y SU VALOR DIAGNÓSTICO]. **W. Decraemer. Recent Invertebrate Department, Royal Belgian Institute of Natural Sciences, Brussels and Biology Department, Gent University, Belgium. Wilfrida.decraemer@naturalsciences.be.—**Apart from morphometric data, the majority of diagnostic features for species identification of females within the family Trichodoridae belong to the reproductive system. The most important of these diagnostic characters is the shape and size of the vaginal sclerotized ring seen in lateral optical section as sclerotized pieces. Other morphological characters for female identification are shape of vulva in ventral view, shape and length of vagina (when vaginal constrictor muscles are relaxed), shape and sized of sperm cell and nucleus and sperm location in the genital branches. In *Trichodorus*, the characterization of the vaginal sclerotized pieces may be disturbed by the presence of a refractive structure at the outlet of the vagina, interpreted as a "secretion plug". Such tubular "secretory" structures have also been observed in the uterus of several species of *Trichodorus*. They appear to differ in structure and size and thus may provide an additional feature for species differentiation.

SYSTEMATICS ONLINE: METHODS FOR DIGITAL VOUCHERING AND MOLECULAR ANALYSIS OF TAXONOMIC REFERENCE SPECIMENS [SISTEMÁTICA EN LÍNEA: MÉTODOS PARA LA CONSERVACIÓN EN ARCHIVO DIGITAL Y ANÁLISIS MOLECULAR DE ESPECÍMENES DE REFERENCIA TAXONÓMICA]. **P. De Ley[1], I. Tandingan De Ley[1], O. Holovachov[1], M. Yoder[1], K. Morris[2] and W. K. Thomas[2]. [1]Department of Nematology, University of California Riverside, Riverside, CA 92521, USA, [2]Hubbard Center for Genome Studies, University of New Hampshire, Durham, NH 03824, USA. paul.deley@ucr.edu.—**Nematode systematics is severely hampered by the fragility and poor accessibility of nematode type specimens. Digital images and internet resources provide powerful means of creating permanent archives while facilitating access to reference specimens. We

present example applications of the latest equipment and resources available for recording and online archiving of nematode morphology as multifocal images integrated with phylogenetic sequence data. Consumer-priced High Definition Video camcorders and software now allow anyone with a quality research microscope to apply Video Capturing and Editing to taxonomically important specimens and obtain video clips with maximal optical detail and quality. These digital vouchers can be deposited online in http://nematol.unh.edu and linked directly to DNA sequence data. Resized clips download faster and can be accessed via intuitively navigable image maps constructed with basic web design skills (see: http://faculty.ucr.edu/~pdeley/vce/refspecs.html). Two examples are presented: one involves cryptic species in the plant-parasitic genus *Hirschmanniella* and the other centers on the unusual freeliving nematode *Hemiplectus muscorum*.

CONTROL DE NEMATODOS EN EL CULTIVO DE CAÑA DE AZÚCAR EN EL MUNICIPIO URACHICHE DEL ESTADO YARACUY, VENEZUELA [NEMATODE CONTROL IN SUGARCANE IN URACHICHE MUNICIPIO (URACHICHE COUNTY), YARACUY STATE, VENEZUELA]. **B. Delgado[1], R. Crozzoli[2], G. Perichi[2] and A. Solorzano[3]. Universidad Central de Venezuela, Fac. Agronomía, [1]Postgrado de Agronomía, [2]Postgrado de Zoología Agrícola, [3]Departamento e Instituto de Zoología Agrícola, Apdo. 4579, Maracay, Edo. Aragua. bleyra05@yahoo.com.—**El ensayo se realizó en una parcela cultivada con caña de azúcar (*Saccharum* sp. híbrido) var B80-408 e infestada con *Pratylenchus zeae* y *Helicotylenchus* spp. Los productos aplicados a la siembra fueron: Furadan (40 kg/ha), Biofertilizante (6 y 12 ton/ha), Vinaza (65 y 130 m^3/ha), Ferbiplant (8 y 16 ton/ha) y Testigo. Se hicieron evaluaciones mensuales de poblaciones de nematodos para evaluar el posible efecto nematicida de los productos, estudiar la dinámica de los nematodos y el efecto del control de nematodos sobre el rendimiento del cultivo, durante el primer año. Las poblaciones de *P. zeae* y *Helicotylenchus* spp. en las plantas a las que se le aplicó Furadan fueron menores con respecto al resto de los tratamientos. Las enmiendas que más redujeron las poblaciones de nematodos fueron Ferbiplant (16 ton/ha) y Vinaza (130 m^3/ha). El porcentaje de pol, porcentaje de pureza, rendimiento en azúcar, peso (ton/ha), toneladas de azúcar por hectárea (TPH) en parcelas donde se aplicó Ferbiplant (16 ton/ha) y Vinaza (130 m^3/ha), fueron significativamente superiores con respecto al resto de los tratamientos. Todas las enmiendas orgánicas lograron incrementar la productividad del cultivo, encontrándose los mayores valores donde se aplicó Ferbiplant (16 ton/ha) con aumentos de 9 ton de azúcar/ha de caña y Vinaza (130 m^3/ha) con 8 ton de azúcar/ha con respecto a las plantas testigo.

DISTRIBUCIÓN DE NEMATODOS FITOPARÁSITOS ASOCIADOS AL CULTIVO DE ZANAHORIA (*DAUCUS CAROTA*) EN LA PROVINCIA DE MENDOZA, ARGENTINA [DISTRIBUTION OF PLANT PARASITIC NEMATODES ASSOCIATED WITH CARROT (*DAUCUS CAROTA*) IN MENDOZA PROVINCE, ARGENTINA]. **M. S. del Toro, S. J. Castellanos, E. A. M. Moyano and C. M. Bustamante. Laboratorio de Nematología Vegetal, Facultad de Ciencias Agrarias, UNCuyo, Chacras de Coria, Mendoza, Argentina. mdeltoro@fca.uncu.edu.ar.—**Durante 5 años se relevaron propiedades dedicadas al cultivo de zanahoria, ubicadas en los departamentos de San Carlos, Maipú, Guaymallén, Lavalle, Luján de Cuyo, Las Heras, San Martín, Tupungato y Tunuyán, extrayendo suelo y plantas. El 76.3% de los suelos analizados estaban infestados solo con *Meloidogyne*; el 4.7% solo con *Ditylenchus dipsaci* y el 19% con *D. dipsaci* y *Meloidogyne*. En las raíces de zanahoria se determinó la presencia de *D. dipsaci*, *Meloidogyne* y *Nacobbus aberrans* + *Meloidogyne*. No se encontró *N. aberrans* solo. Las especies de *Meloidogyne* determinadas fueron: *M. hapla* en San Carlos y Tupungato; *M. javanica* y *M. incognita*, en Maipú, Las Heras, Guaymallén, Lavalle y Luján de Cuyo y *M. arenaria* en Luján de Cuyo. Las mayores poblaciones de *Meloidogyne* en suelo superaron 100 J_2/1000 g; las mayores poblaciones en raíces de zanahoria fueron de 340 ejemplares/20 g de tejido. Las mayores poblaciones de *D. dipsaci* en suelo superaron los 80 ejemplares/1000 g y 40 J4/20 g de piel y se encontraron en los departamentos de San Carlos, Tupungato y San Martín; las poblaciones de *N. aberrans* encontradas fueron de 35 juveniles/20 g de tejido en el Departamento de San Carlos.

ANÁLISIS DE LA COMUNIDAD DE NEMATODOS ASOCIADOS A LA RIZÓSFERA DE PAPAS CULTIVADAS EN LA REGIÓN DEL COFRE DE PEROTE, VERACRUZ, MÉXICO [ANALYSIS OF THE NEMATODE COMMUNITY ASSOCIATED WITH THE RHIZOSPHERE OF CULTIVATED POTATOES IN THE COFRE DE PEROTE REGION OF VERACRUZ, MEXICO]. **D. Desgarennes[1], G. Carrión[2], P. Sánchez-Nava[1] and M.L. Salgado-Syclán[3]. [1]CIRB, Universidad Autónoma del Estado México, Km. 14.5 carretera Toluca-Ixtlahuaca, Unidad San Cayetano de Morelos, C.P. 50030, México, [2]Instituto de Ecología, A.C., Apartado Postal 63 Xalapa, Veracruz, México, [3]FCA, Universidad Autónoma del Estado de México, Campus El Cerrillo Piedras Blancas, C.P. 50200, Toluca, México. damaris.desgarennes@gmail.com.—**El conocimiento de la nematofauna en papas cultivadas es escaso, al menos en México, ya que los estudios de nematodos en papas se han enfocado principalmente a *Globodera rostochiensis*, el fitoparásito más importante de este cultivo. Debido al valor potencial que tiene el análisis de la nematofauna de papas cultivadas para el desarrollo de nuevas estrategias de manejo y control, en el presente trabajo se determinaron las especies de nematodos presentes en la rizósfera de papas en cultivos con alta densidad de quistes de *G. rostochiensis* en el suelo (290 quistes/100 g de suelo) y se describen los cambios en la comunidad de nematodos de dicho cultivo bajo distintos manejos del mismo: control biológico con hongos nematófagos, manejo convencional con agroquímicos, rotación, control biológico con rotación y un testigo. Los hongos utilizados fueron *Acremonium incrustatum* y *Paecilomyces amoneoroseus*, aislamientos previamente de la localidad en estudio. La comunidad de nematodos fue evaluada durante un período de cultivo de temporal (antes de la siembra y a los 25, 50, 75 y 100 días después de la siembra), midiendo parámetros como densidad, riqueza, diversidad, equidad y similitud entre otros. Los resultados preeliminares muestran que antes de la siembra el número de larvas de *G. rostochiensis* es menor con respecto a las otras especies y que existen al menos cuatro especies de nematodos además de *G. rostochiensis*, tres rhabditidos, de los cuales una pertenece al género *Acrobeles*, y un tylenchido del género *Aphelenchoides*.

EFFECT OF THE JAVANESE ROOT-KNOT NEMATODE, *MELOIDOGYNE JAVANICA*, ON THE GROWTH OF COMMON BEAN (*PHASEOLUS VULGARIS* L.) IN POTS [EFECTO DEL NEMATODO AGALLADOR, *MELOIDOGYNE JAVANICA*, SOBRE EL CRECIMIENTO DE FRIJOL (*PHASEOLUS VULGARIS* L.) EN MACETAS]. **M. Di Vito[1], B. Parisi[2] and F. Catalano[1]. [1]Istituto per la Protezione delle Piante, C.N.R., Via Amendola 165/A 70126 Bari, Italy, [2]Istituto Sperimentale Colture Industriali, C.R.A., Via di Corticella 133 40129 Bologna, Italy. m.divito@ba.ipp.cnr.it.—**The relationship between a geometric series of sixteen *Meloidogyne javanica* initial population densities (*Pi*) between 0 and 1024 eggs and second stage juveniles/cm^3 and growth of common bean (*Phaseolus vulgaris*) was investigated in 600 cm^3 clay pots in a glasshouse at 26 ± 3°C. The Seinhorst model, $y = m + (1 - m)z^{P-T}$, was fitted to plant height, fresh top and root weight. Tolerance limits (T) to the nematode for plant height, fresh top and root weight of common bean were 1.7, 0.6 and 1.3 eggs and second stage juveniles/cm^3 soil, respectively. The minimum relative yields were 0, 0 and 0.2 at $Pi \geq 256$ eggs and second stage juveniles/cm^3 soil for fresh top and root weight and height, respectively. Maximum nematode reproduction rate was 307.2-fold at the lowest initial population density. These results provide evidence of the serious damaging effect caused by the Italian population of *M. javanica* to common bean.

INTROGRESSION OF GENES FOR ROOT-KNOT NEMATODE RESISTANCE IN COMMON BEAN [INTROGRESIÓN DE GENES PARA LA RESISTENCIA DEL NEMATODO FORMADOR DE AGALLAS EN FRIJOL]. **M. Di Vito[1], B. Parisi[2], P. Ranalli[2] and F. Catalano[1]. [1]Istituto per la Protezione delle Piante, C.N.R., Via Amendola 165/A 70126 Bari, Italy, [2]Istituto Sperimentale Colture Industriali, C.R.A., Via di Corticella 133 40129 Bologna, Italy. m.divito@ba.ipp.cnr.it.—***Meloidogyne incognita* is an important nematode damaging common bean (*Phaseolus vulgaris*) in bean growing areas of the world. Chemical management of this pest is effective, but is expensive and environmentally unsafe. The use of resistant cultivars offers a good alternative to nematicides. However, although several tol-

erant or resistant common bean cultivars are available, they are not suitable for the Italian market. Three different sources of resistance in Meso-American *gene pool* were used for a breeding program to introgress root-knot nematode resistance into the Italian common bean types. After five years of crosses, back crosses and selection cycles the first new common bean lines resistant to root-knot nematodes were obtained. One of these, named "Arechi", is now under agronomic trials for registration in the Italian Official Varieties List. This new variety is the first climbing snap Italian genotype which is resistant to *M. incognita* race 1, and possesses the agronomic traits requested by the Italian market.

***NACOBBUS ABERRANS* EN ARGENTINA Y SU RELACIÓN CON EL CULTIVO DE PAPA** [*NACOBBUS ABERRANS* IN ARGENTINA AND ITS RELATIONSHIP WITH POTATO CROPS]. **M. E. Doucet and P. Lax. Centro de Zoología Aplicada, Casilla de Correo 122, 5000 Córdoba, Argentina. mdoucet@com.uncor.edu.—**El nematodo muestra una considerable distribución en territorio argentino. Desde el punto de vista altitudinal, se extiende desde zonas ubicadas prácticamente al nivel del mar hasta aproximadamente 4500 m en los valles andinos. Aparece en regiones fitogeográficas muy diversas, atacando una gran variedad de plantas cultivadas y malezas. Entre los cultivos, se destaca la papa (*Solanum tuberosum*) y la papa andina (*S. tuberosum* subsp. *andigenum*) (tanto para consumo como para semilla). Estudios realizados con poblaciones provenientes de campos de papa mostraron diferencias en la capacidad reproductiva de cada una de ellas sobre pimiento, remolacha y tomate evidenciando que representan organismos con distintas aptitudes. La dispersión de este nematodo en el noroeste de Argentina aparecería como mucho más amplia que en el resto del país y se ha hallado vinculado hasta el momento con, al menos, tubérculos de veinte variedades de papa andina. En esta región los problemas ocasionados por *Nacobbus* se ven agravados por su asociación con otros nematodos fitófagos, entre los que se destacan *Meloidogyne* spp. y *Globodera* sp. Las prácticas culturales de los productores locales favorecen la diseminación de estos patógenos a nuevas áreas. A esta situación se suma el desconocimiento generalizado de las particularidades biológicas de una especie de nematodo tan compleja como *N. aberrans*. La estrecha relación de estos nematodos con los tubérculos favorece su dispersión, brindándoles la posibilidad de colonizar nuevas áreas.

THE GENUS *PACHYDORYLAIMUS* SIDDIQI, 1983 (DORYLAIMIDA, QUDSIANEMATIDAE), A REMARKABLE REPRESENTATIVE OF NEMATODE NEOTROPICAL FAUNA [EL GÉNERO *PACHYDORYLAIMUS* SIDDIQI, 1983 (DORYLAIMIDA, QUDSIANEMATIDAE), UN DESTACADO REPRESENTANTE DE LA FAUNA NEMATOLÓGICA NEOTROPICAL]. **A. Esquivel[1], P. Guerrero[2], R. Peña-Santiago[2] and T. Powers[3]. [1]Escuela de Ciencias Agrarias, Universidad Nacional, Costa Rica, [2]Departamento de Biología Animal, Vegetal y Ecología, Universidad de Jaén, Campus "Las Lagunillas" s/n, Edificio B3, 23071-Jaén, Spain, [3]Department of Plant Pathology, University of Nebraska. aesquive@una.ac.cr.—**The genus *Pachydorylaimus* Siddiqi, 1983 consists of seven species known to occur exclusively in neotropical forest. To date, the distribution includes four species from Colombia, two from Ecuador and one from Costa Rica. This report presents new data on two previously known species (*P. notabenus* Siddiqi, 1983 and *P. schizodontus* Loof and Zullini, 2000) as well as new undescribed species from Costa Rica. New observations of the labial region have been made by SEM. Details are provided on the nature of the short, massive odontostyle, modification of the typically flanged odontophore, the poorly developed female genital system, and the long tail which is similar in both sexes. Characteristics that indicate a close evolutionary relationship with *Metadorylaimus* Jairajpuri and Goodey, 1966 are noted. Additional significance is ascribed to *Pachydorylaimus* species due to their apparent exclusive distribution within neotropical forest.

MULTIPLICATION OF PARTHENOGENETIC SPECIES OF *APHELENCHOIDES*, *DITYLENCHUS*, AND *APHELENCHUS* RECOVERED FROM SEEDS OF *BRACHIARIA BRIZANTHA* IN CULTURES OF *DIDYMELLA BRYONIAE* AND *FUSARIUM* SP. [MULTIPLICACIÓN DE ESPECIES PARTENOGENÉTICAS DE *APHELENCHOIDES*, *DITYLENCHUS* Y *APHELENCHUS* RECUPERADAS DE SEMI-

LLAS DE *BRACHIARIA BRIZANTHA* EN CULTIVOS DE *DIDYMELLA BRYONIAE* Y DE *FUSARIUM* SP.]. **L. Favoreto[1], J. M. dos Santos[1], S. A. Calzavara[1], E. R. Borelli[2], A. C. Generoso[2] and L. S. C. Silva[1]. [1]UNESP/FCAV, Jaboticabal-SP, [2]ITES, Taquaritinga-SP, CEP14884-900, Brasil. lucianyfavoreto@hotmail.com.—**The multiplication of nematodes *in vitro* facilitates taxonomic and molecular studies, inoculum production for various purposes and biological studies in general. Plant parasitic nematodes in forage seeds sometimes are found at low population densities making species identification difficult. The multiplication of parthenogenetic *Aphelenchoides, Aphelenchus and Ditylenchus* species in vitro was studied in the Laboratório de Nematologia of the Universidade Estadual Paulista (UNESP/FCAV), Jaboticabal Campus, São Paulo State, Brazil. Cultures of isolates of *Fusarium* sp., obtained from yam (*Esculenta colocasia*) and *Didymella bryoniae* from melon (*Cucumis melo*) in Petri dishes were used as substrate for the multiplication of these nematodes. Ten females of each nematode species were axenized in 0.1% ampicilin solution, inoculated in the cultures of the fungi with five days of growth in PDA and incubated in BOD at 25 ± 1°C in the dark. After 30 days the nematodes were extracted by sugar centrifugal flotation with kaolin and quantified at the light microscope using the Peters chamber. All three nematode species studied reproduced abundantly in both fungal cultures.

STUDY OF THE INFECTION OF *BRACHIARIA BRIZANTHA* SEEDS BY *APHELENCHOIDES* SP. [ESTUDIO DE LA INFECCIÓN DE SEMILLAS DE *BRACHIARIA BRIZANTHA* POR *APHELENCHOIDES* SP.]. **L. Favoreto[1], J. M. dos Santos[1], S. A. Calzavara[1], E. R. Borelli[2], A. C. Generoso[2] and L. S. C. Silva[1]. [1]UNESP/FCAV, Jaboticabal-SP, [2]ITES, Taquaritinga-SP, CEP14884-900. lucianyfavoreto@hotmail.com.—**Forage seeds produced in Brazil are exported to more than 20 countries. About 60% are of *Brachiaria* spp. produced in different states. The infection of seeds by *Aphelenchoides* and *Ditylenchus* species threatens this industry due to quarantine concerns. The possibility of the seeds being infected when they fall to the ground was studied in a greenhouse experiment at Universidade Estadual Paulista (UNESP/FCAV), Jaboticabal Campus. One hundred cubic centimeters of previously autoclaved fine sand were placed in plastic pots and 50 ml of distilled water were added. Next, 10 grams of seeds of *Brachiaria brizantha* free from nematodes were placed on the wet sand in each pot, and 10 ml of a nematode suspension containing 3,000 specimens of a non identified parthenogenetic species of *Aphelenchoides* were added to each pot. This nematode is frequently found in *Brachiaria* spp. seeds and is easily distinguished from others by morphological details. After 2 days at intervals of 2 days three evaluations were made. The seeds were washed, triturated in a blender and the nematodes were recovered by sugar centrifugal flotation with kaolin. Nematodes also were extracted from the sand by the sugar centrifugal flotation with kaolin. The average of the number of nematodes recovered in five replicates of seeds and sand, respectively, in three evaluations were: 44 and 222; 43 and 478; 56 and 642 nematodes. This data indicate that the nematodes can infect the seeds after they fall to the ground.

INVESTIGATING NEURONAL SIGNALLING IN PLANT PARASITIC NEMATODES USING RNA INTERFERENCE [INVESTIGACIÓN DE SEÑALES NEURONALES EN NEMATODOS FITOPARÁSITOS CON RNA DE INTERFERENCIA]. **C. C. Fleming[1], S. McMaster[2], M. J. G. Johnston[2], P. Donnelly[2], M. J. Kimber[3] and A. G. Maule[2]. [1]Agri-Food and Biosciences Institute, Newforge Lane, Belfast BT9 5PX, UK, [2]Parasitology, School of Biological Sciences, Queen's University Belfast, Belfast BT9 7BL, UK, [3]Department of Biomedical Sciences, Iowa State University, Ames, IA 50011, USA. colin.fleming@afbini.gov.uk.—**A variety of genes expressed in juvenile (J2) plant parasitic nematodes appear to be vulnerable to gene silencing by RNA interference (RNAi). We have discovered that neuronally-expressed genes in *Globodera* and *Meloidogyne* are particularly susceptible to RNAi and that silencing can be induced by simple dsRNA soaking procedures. Since many chemicals that are used for the control of nematode parasites act to disrupt neuromuscular coordination, we argue that intercellular signalling processes associated with neurons have much appeal as targets for transgenic plant-based nematode control strategies. FMRFamide-like peptides (FLPs) are a large family of neuropeptides which are intimately associated with neuromuscular regulation and our studies on *flp* gene func-

tion have revealed that their expression is central to coordinated locomotory activities. We argue that the high level of conservation in nervous systems across nematodes, coupled with the RNAi-susceptibility of neuronally-expressed genes, provides a valuable research tool which could be used to interrogate neuronal signalling processes in plant parasitic species and develop effective control techniques.

***MELOIDOGYNE MINOR*: A MAJOR THREAT TO POTATO PRODUCTION IN NORTH-WESTERN EUROPE** [*MELOIDOGYNE MINOR*: UNA IMPORTANTE AMENAZA A LA PRODUCCIÓN DE PAPA EN EL NOROESTE DE EUROPA]. **C. C. Fleming and S. J. Turner. Agri-Food and Biosciences Institute, Newforge Lane, Belfast BT9 5PX, UK. colin.fleming@afbini.gov.uk.—**Since its discovery in the year 2000 on a potato crop in the Netherlands, *Meloidogyne minor* has become a major problem on soccer pitches and golf courses, particularly in the British Isles. Sampling of coastal grassland has shown this new species to be much more common than expected in Europe, and its spread into the amenity turfgrass sector appears to be a response to climate change and turf management practices. Early studies of the pest indicated that further damage to the European potato industry was likely in the future and eventually during 2007, *M. minor* was found causing severe damage to a potato crop in Ireland. Investigation of this recent outbreak has given a better indication of the potential threat from this new pest and here we will present data on the pathology of *M. minor* attack and the possible factors driving its spread into the European potato sector.

PÉRDIDAS ECONÓMICAS CAUSADAS POR *NACOBBUS ABERRANS* Y *GLOBODERA* SPP. EN EL CULTIVO DE LA PAPA EN BOLIVIA [ECONOMIC LOSSES IN POTATO CROPS CAUSED BY *NACOBBUS ABERRANS* AND *GLOBODERA* SPP. IN BOLIVIA]. **J. Franco. Fundación PROINPA, P.O. Box 4285, Cochabamba, Bolivia. j.franco@ proinpa.org.—**Luego de colectar y sistematizar la información contenida en la documentación disponible sobre la distribución (incidencia) y pérdidas en el rendimiento (severidad) causadas por *Nacobbus aberrans* y *Globodera* spp. en la producción de papa, esta fue analizada para estimar las pérdidas económicas que estos fitoparásitos ocasionan al cultivo. Los resultados obtenidos por la extrapolación de áreas cultivadas, incidencia, severidad de daño y precio de venta de los tubérculos han permitido estimar que las pérdidas económicas en el valor bruto de la producción de papa en Bolivia alcanzan a US$ 53,000,000 con *N. aberrans* y US$ 13,000,000 con *Globodera* spp. La especie dominante en este último género es *G. pallida* en relación a *G. rostochiensis*. Ambas especies se encuentran más frecuentemente entre los 3500 a los 4000 msnm a diferencia de *N. aberrans* que se le encuentra mayormente entre los 3000 a 4000 msnm.

HONGOS ASOCIADOS A RAÍCES DE GUAYABO (*PSIDIUM GUAJAVA* L.) INFECTADO CON *MELOIDOGYNE* SPP. Y TRATADO CON ENMIENDAS ORGÁNICAS, EN EL ESTADO ZULIA, VENEZUELA [FUNGI ASSOCIATED WITH ROOTS OF GUAVA (*PSIDIUM GUAJAVA* L.) INFECTED WITH *MELOIDOGYNE* SPP. AND TREATED WITH ORGANIC AMENDMENTS, IN THE STATE OF ZULIA, VENEZUELA]. **A. Garcia[1], F. Escalona[1], A. M. Casassa-Padrón[2], E. Pérez-Pérez[3], C. González-Palmar[2], C. González[3] and L. Sandoval[2]. Universidad del Zulia, [1]Facultad Experimental de Ciencias, [2]Facultad de Agronomía, Instituto de Investigaciones Agronómicas. Ciudad Universitaria, Apdo. 15205, Maracaibo, ZU4005, Venezuela, [3]Centro Frutícola del Zulia-CORPOZULIA, Municipio Mara, ZU4005. casassae@cantv.net.—**Con el objetivo de identificar los hongos asociados a raíces de guayabo, se llevo a cabo un estudio en el campo del Centro Frutícola del Zulia-CORPOZULIA (10°49'15'' LN, 71°46'20''LO), en el Municipio Mara, estado Zulia, infestado con una población mixta de *Meloidogyne incognita* y *M. mayaguensis* y tratados con enmiendas orgánicas. Se seleccionaron 21 árboles, de 7 años de edad, estableciendo los siguientes tratamientos: Testigo (T1), aplicaciones cada 45 días de 30 (T2) y 60 (T3) kg de estiércol de cabra/árbol, 30 (T4) y 60 (T5) kg de compost de cachaza de caña de azúcar/árbol, así como la combinación de ambos en dosis de 15 (T6) y 30 (T7) kg de cada uno. A los 0, 45 y 90 días de la aplicación de los tratamientos, se tomaron muestras de raíces de los árboles para el aislamiento (método de dilución y PDA) e identificación (claves taxonómicas) de los

hongos y cuantificar la población del nematodo (J2/100 g de suelo y 10 g de raíz). Los géneros fúngicos identificados fueron: *Alternaria*, *Aspergillus*, *Cephalosporium*, *Chaetomium Cladosporium*, *Colletotrichum*, *Cunninghamella*, *Curvularia*, *Fusarium*, *Paecilomyces*, *Penicillium*, *Phoma*, *Rhizoctonia*, *Stemphylium*, *Syncephalastrum* y *Trichoderma*, siendo los mas frecuentes a los 90 días, *Aspergillus*, *Fusarium* y *Penicillium*. El T7 registro la mayor frecuencia de hongos y menor población de *Meloidogyne* spp. Los resultados demuestran que la utilización de enmiendas orgánicas favorece el aumento significativo de la actividad microbiana y la disminución de las poblaciones de nematodos, representando una excelente alternativa en el manejo integrado de plagas en sistemas de producción frutícola.

EFECTO DE *TRICHODERMA HARZIANUM* Y *AZADIRACHTA INDICA* SOBRE LA POBLACIÓN DE NEMATODOS FITOPARÁSITOS EN PLÁTANO *MUSA* AAB CV. HARTÓN, EN EL MUNICIPIO FRANCISCO JAVIER PULGAR, ESTADO ZULIA, VENEZUELA [EFFECT OF *TRICHODERMA HARZIANUM* AND *AZADIRACHTA INDICA* ON PLANT-PARASITIC NEMATODE POPULATIONS IN PLANTAIN *MUSA* AAB CV. HARTÓN, IN THE MUNICIPALITY OF FRANCISCO JAVIER PULGAR, ZULIA STATE, VENEZUELA]. **L. M. García[1], H. Cárdenas[2], J. Labarca[1], L. Chávez[1], A. M. Casassa-Padrón[3] and L. Sandoval[3]. [1]Universidad Nacional Experimental Sur del Lago (UNESUR), Programa de Ingeniería de la Producción Agropecuaria, Apdo. postal 5148, [2]Centro Internacional del Plátano CIPLAT-CORPOZULIA, Carretera Vía 4 Esquinas, Pueblo Nuevo, El Chivo, Sector El Tocuyo, Estado Zulia, [3]Universidad del Zulia, Facultad de Agronomía, Instituto de Investigaciones Agronómicas, Maracaibo, Venezuela. johannalabarca@hotmail.com.—**Con el fin de evaluar el efecto del hongo *Trichoderma harzianum* y el nim (*Azadirachta indica*) sobre la población de nematodos fitoparásitos en plátano (*Musa* AAB cv. Hartón), se llevó a cabo un estudio en la finca Buenos Aires, ubicada en el sector Los Naranjos (N 8°46'8,6" y W 71°39'54,7"), en el Municipio Francisco Javier Pulgar, Estado Zulia, Venezuela. Se seleccionaron 35 plantas, estableciendo un diseño experimental completamente aleatorizado, con tres repeticiones por tratamiento, siendo T1: *T. harzianum* (600 g/ha), T2: *A. indica* (1500 ml/ha), T3: Carbofuran (2000 ml/ha), T4: testigo (0 ml/ha) y T5: *T. harzianum* (600 g/ha) + *A. indica* (1500 ml/ha). A los 0, 30, 60 y 90 días de la aplicación de los tratamientos se tomaron muestras de raíces de las plantas en prefloración para cuantificar la población de nematodos/g de raíces. El T2 mostró mayor efectividad en la disminución de la población del género *Pratylenchus* (600 ejemplares/100 g de raíces), el T3 para *Helicotylenchus* (2966 ejemplares/100 g de raíces), seguido del T1 (5766 ejemplares/100 g de raíces) y para *Radopholus* el T3 y T5 resultaron eficientes con 500 ejemplares/100 g de raíces cada uno. Los resultados de esta investigación indican que el *T. harzianum* y *A. indica* representan una alternativa a incluir en el manejo integrado de nematodos en el cultivo del plátano, contribuyendo a disminuir el uso del agroquímicos.

EVALUACIÓN DEL DAÑO CAUSADO POR NEMATODOS FITOPARÁSITOS ASOCIADOS A RAÍCES DE PLÁTANO (*MUSA* AAB CV. HARTÓN), TRATADAS CON *TRICHODERMA HARZIANUM* Y NIM (*AZADIRACHTA INDICA*), EN EL MUNICIPIO FRANCISCO JAVIER PULGAR, ESTADO ZULIA, VENEZUELA [EVALUATION OF THE DAMAGE CAUSED BY PLANT-PARASITIC NEMATODES ASSOCIATED WITH ROOTS IN PLANTAIN *MUSA* AAB CV. HARTÓN, TREATED WITH *TRICHODERMA HARZIANUM* AND NEEM (*AZADIRACHTA INDICA*), IN THE MUNICIPALITY OF FRANCISCO JAVIER PULGAR, ZULIA STATE, VENEZUELA]. **L. M. García[1], H. Cárdenas[2], J. Labarca[1], L. Chávez[1], A. M. Casassa-Padrón[3] and L. Sandoval[3]. [1]Universidad Nacional Experimental Sur del Lago (UNESUR), Programa de Ingeniería de la Producción Agropecuaria, Apdo. postal 5148, [2]Centro Internacional del Plátano CIPLAT-CORPOZULIA, Carretera Vía 4 Esquinas, Pueblo Nuevo, El Chivo, Sector El Tocuyo, Estado Zulia, [3]Universidad del Zulia, Facultad de Agronomía, Instituto de Investigaciones Agronómicas, Venezuela. johannalabarca@hotmail.com.—**Con el objetivo de evaluar el grado de daño causado por nematodos fitoparásitos asociados a raíces de plátano (*Musa* AAB cv. Hartón), tratadas con el hongo *Trichoderma harzianum* y nim (*Azadirachta indica*), se llevó a cabo un estudio en la finca Buenos Aires, ubicada en el sector Los Naranjos (N 8°46'8,6" y W

71°39'54,7"), en el Municipio Francisco Javier Pulgar, Estado Zulia, Venezuela. Se seleccionaron 35 plantas, estableciendo un diseño experimental completamente aleatorizado, con tres repeticiones por tratamiento, siendo T1: *T. harzianum* (600 g/ha), T2: *A. indica* (1500 ml//ha), T3: Carbofuran (2000 ml/ha), T4: testigo (0 ml/ha) y T5: *T. harzianum* (600 g/ha) + *A. indica* (1500 ml/ha). A los 0, 30, 60 y 90 días de la aplicación de los tratamientos se tomaron muestras de raíces de plantas en prefloración para determinar el porcentaje de grado de daño (PGD), porcentaje de raíces funcionales (PRF) y porcentaje de raíces no funcionales (PRNF), causado por representantes de los géneros *Helicotylenchus, Pratylenchus* y *Radopholus*. En el T5, a los 90 días se observó el menor PGD (28.08 %), PRNF (21.05 %) y el mayor PRF (78.95 %), seguido de T1 (74.82 %). Los resultados indican que a los 90 días se evidenció mayor efecto de los tratamientos sobre el daño causado por los nematodos en las raíces de plátano, siendo el T5 el más efectivo. Esto representa una estrategia a incluir en el manejo integrado de nematodos en el cultivo del plátano.

EFECTIVIDAD DEL AGUA CALIENTE Y EXTRACTO ACUOSO DE NIM (*AZADIRACTHA INDICA*) EN EL COMBATE DE *MELOIDOGYNE INCOGNITA* EN PLÁNTULAS DE GUAYABO (*PSIDIUM GUAJAVA* L.) [EFFECTIVENESS OF HOT WATER AND AQUEOUS EXTRACT OF NEEM (*AZADIRACTHA INDICA*) FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA* ON GUAVA (*PSIDIUM GUAJAVA* L.) PLANTS]. **Q. García[1], K. Parra[1], P. Güerere-Pereira[1], A. M. Casassa-Padrón[2], C. González[3] and E. Pérez-Pérez[3]. [1]Instituto Universitario de Tecnología de Maracaibo, Dpto. Ciencias Agropecuarias, [2]Universidad del Zulia, Facultad de Agronomía, Instituto de Investigaciones Agronómicas, Ciudad Universitaria, Maracaibo, ZU4005, Venezuela, [3]Centro Frutícola del Zulia-CORPOZULIA, Municipio Mara, ZU4005, Venezuela. casassae@cantv.net.—**Para estudiar la efectividad del uso de agua caliente y el extracto acuoso de nim (*Azadiractha indica*) en el combate de *Meloidogyne incognita* en plántulas de guayabo (*Psidium guajava*) de cinco meses de edad, se realizó una investigación en el vivero del Centro Frutícola del Zulia-CORPOZULIA. Para tal fin, se procedió al llenado de 20 bolsas de polietileno (1000 cc de suelo) con una mezcla de arena y materia orgánica en proporción 2:1. Los tratamientos evaluados fueron T_1: testigo absoluto, plántulas de guayabo en suelo esterilizado en autoclave y sin inoculación con *M. incognita*; T_2: plántulas en suelo esterilizado en autoclave e inoculado con 4000 huevos (h) + juveniles de segundo estadio (J2) de *M. incognita*/planta; T_3: plántulas en suelo desinfectado con agua caliente a una temperatura de 85°C, previa inoculación con *M. incognita* y T_4: plántulas en suelo desinfectado con extracto acuoso de hojas de nim (100 ml/bolsa de extracto de 48 horas) previa inoculación. Los resultaron mostraron diferencias significativas en las variables área foliar y peso aéreo seco de las plántulas del T_1 con relación al resto de los tratamientos. La población final del nematodo mostró diferencias estadísticamente significativas entre los tratamientos: T_2: 398, T_3: 65 y T_4: 3.105 h + J2 *M. incognita*/planta. El T_3 fue el más efectivo. Es muy importante señalar que se debe evaluar otras dosis del extracto acuoso de hojas de nim, debido a que se observó un efecto fitotóxico que posiblemente ocasionó mayor susceptibilidad de las plántulas de guayabo al nematodo.

ALTERNATIVAS BIOLÓGICAS PARA EL CONTROL DE *MELOIDOGYNE* SP. EN PIMIENTO DE INVERNADERO (*CAPSICUM ANNUUM* L.) [BIOLOGICAL ALTERNATIVES FOR ROOT-KNOT NEMATODE CONTROL IN GREENHOUSE-GROWN SWEET PEPPER (*CAPSICUM ANNUUM* L.)]. **P. Gauna. EEA INTA Bella Vista CC No. 5 (3432) Bella Vista, Corrientes, Argentina. pgauna@correo.inta.gov.ar.—**Especies del género *Meloidogyne* disminuyen el rendimiento de muchos vegetales entre los que se destacan las hortalizas. El objetivo de este trabajo fue evaluar la eficacia de dos productos biológicos y un nematicida químico sobre una población del género que ataca pimiento en condiciones de invernadero en Bella Vista, Provincia de Corrientes (Argentina). Los tratamientos fueron: 1) *Paecilomyces lilacinus* (pre-trasplante: 4 g/parcela, trasplante: 20 g/200 plantines y 4 aplicaciones pos-trasplante: 4 g/parcela); 2) Fenamifos (0.8cc/m^2: una aplicación al trasplante); 3) *Azospirillum brasiliensis* (una aplicación al trasplante: 1.5 l/20 l) y 4) Testigo. Se utilizó un diseño

en bloques completamente aleatorizado con 4 repeticiones de 50 plantas/parcela. Se realizaron análisis de suelo a los 30, 90 días y al final del cultivo. Se evaluó la presencia de agallas en raíces a los 150 días y al término del cultivo (20 plantas/parcela) en Marzo-Diciembre de 2006. Se determinaron los rendimientos pesando los frutos durante la cosecha. Las raíces de plantas tratadas con *A. brasiliensis* tuvieron alto índice de agallas; sin embargo, la cantidad de raíces superó a las correspondientes al resto de los tratamientos lo que influyó positivamente en el rendimiento. Al final del cultivo, la densidad de *Meloidogyne* sp. en suelo fue elevada en todos los tratamientos. Los rendimientos promedios (kg/m^2) en cada caso fueron: 1) 18.00; 2) 18.66; 3) 19.13 y 4) 16.83, indicando que *P. lilacinus* y *A. brasiliensis* contribuyeron a mejorar la producción con respecto al testigo.

IMPACT OF SOIL SOLARIZATION AND BIOFUMIGATION USING CASTOR CAKE AND CABBAGE TO THE NEMATOFAUNA, MICROBIOTA AND ASPECTS RELATED TO STRAWBERRY PRODUCTION [IMPACTO DE LA SOLARIZACIÓN Y BIOFUMIGACION DEL SUELO CON TORTA DE TÁRTARO Y REPOLLO SOBRE LA NEMATOFAUNA, MICROBIOTA Y PARÁMETROS RELACIONADOS A PRODUCCIÓN DE FRUTILLA]**. C. B. Gomes[1], D. L. Lima[1], A. B. Moura[3], S. D. A. Silva[1], A. C. Krolow[1], L. E. C. Antunes[1], M. L. Mattos[1], J. G. Casagrande, Jr.[1], J. S. Nascimento[2] and R. F. F. Cantillano[1]. [1]Embrapa Clima Temperado, C.P. 403, 96.001-970, Pelotas-RS and [2]UFPEL, Inst. Biologia, Pelotas-RS, [3]UFPEL, PPG Fitossanidade, Pelotas-RS, Brasil. cbauer@cpact.enbrapa.br.—** The effects of solarization, biofumigation and fallow soil to the nematofauna and microbiota were evaluated at field conditions. Also it was investigated the impacts of these control methods to the soil microbian biomass (Cmicrobian/Nmicrobian) and some aspects related to 'Camarosa' strawberry production were investigated. The following treatments were tested: soil biofumigation using cabbage (BCB); biofumigation with castor cake (BCK); biofumigation with cabbage and castor cake (BC-CK); solarization; and soil fallow (control). After 50 days, the nematode control and other variables were studied. Thereafter, strawberry plants were cultivated in the area to evaluate the *M. xenoplax* reproduction and some characteristics associated to fruit production. The solarization and biofumigation using both residues were efficient to control *M. xenoplax. Helicotylenchus* sp. suppression had more impact by BCK and BC-CK than the other treatments. *M. javanica* was better controlled using solarization and BCB. The reduction of free living nematode populations was less accentuated than the phytoparasitict nematodes. *Pseudomonas* sp. populations were negatively affected by the biofumigacion and solarization; but higher levels of actinomycetes and fungi were detected into the soil, except in the treatment BCK, where a higher Cmicrobian/Nmicrobian relation and a reduction 50% of *M. xenoplax* populations after the cultivation were observed. Growing strawberry in soil treated with BCK and BCB increased the fruit yield by 66-93%. There were no differences among the treatments in relation to the physical and chemical fruit characteristics. Thus all nematode management techniques tested can be used without affecting the quality of the strawberry fruits.

POTENCIALIDADES DE PRÁCTICAS AGRONÓMICAS PARA EL MANEJO DE *MELOIDOGYNE* SPP. EN LA PRODUCCIÓN PROTEGIDA DE HORTALIZAS EN CUBA [POTENTIAL OF AGRONOMIC PRACTICES FOR THE MANAGEMENT OF *MELOIDOGYNE* SPP. IN THE PROTECTED PRODUCTION OF VEGETABLES IN CUBA]**. L. Gómez[1], R. Enrique[1], L. Díaz-Viruliche[2], R. Cuadra[3], A. Casanova[4], F. M. González[4], L. Hidalgo[1], M. A. Hernández[1], O. Gómez[4], B. de la Noval[5] and M. G. Rodríguez[1]. [1]Centro Nacional de Sanidad Agropecuaria (CENSA), [2]Universidad Agraria de La Habana, [3]Instituto de Investigaciones Fundamentales de Agricultura Tropical, [4]Instituto de Investigaciones Hortícolas "Liliana Dimitrova", [5]Instituto Nacional de Ciencias Agrícolas. lucila@censa.edu.cu.—**En Cuba, *Meloidogyne* spp. constituye importante plaga de las hortalizas en producción protegida. La salida del Bromuro de Metilo ha urgido a los investigadores y productores a buscar alternativas para el manejo de las poblaciones de este género y varias tácticas fueron evaluadas con este propósito en condiciones semicontroladas y de producción. Se estudió el comportamiento de diferentes genotipos ante *M. incognita,* para su uso en el programa de injerto herbáceo, determinándose

como resistentes *L. hirsutum* ∞ *L. esculentum*, *L. peruvianum* y *S. torvum*, los que continúan en estudio para determinar su comportamiento ante *M. arenaria* y *M, mayaguensis*, especies que están asociadas también a las hortalizas. Se determinó que es factible utilizar lechuga (*Lactuca sativa* cv. BBS y Chile) como planta trampa para *M. incognita* y que se tiene que extraer entre 21 y 25 días. El uso de micorrizas, a través de la peletización de semillas, no limitó el desarrollo y multiplicación del nematodo, pero favoreció la emisión de raíces y un mejor desarrollo de las plantas, aun en presencia de los nematodos. Para la biofumigación se evaluaron *Brassica oleracea*, *Azaradichta indica, Tagetes* sp. y cachaza (4 kg/m^2), los que provocaron disminución en el Índice de Agallamiento (IA) en tomate, incremento en el porcentaje de materia orgánica y fauna benéfica. Los experimentos ejecutados en instalaciones de producción demostraron las potencialidades de esta táctica, donde se emplearon *B. oleracea*, *B. oleracea* var. *Itálica* y estiércol vacuno (7 kg/m^2), al producir disminuciones en el IA y aumento en los rendimientos del cultivo (pepino).

NEMATODES DETECTED IN GERMPLASM IMPORTED BY BRAZIL IN THE YEAR 2006 [NEMATODOS DETECTADOS EN GERMOPLASMA IMPORTADO POR BRASIL EN EL AÑO 2006]. **V. Gonzaga[1], R. C. V. Tenente[1] and J. E. Cares[2]. [1]Embrapa Genetic Resources and Biotechnology, PO Box 2372, (70770-900), Brasilia/DF, [2]University of Brasília, Plant Pathology Department (707910-900), Brasília/DF, Brazil. vilmar@cenargen.embrapa.br.—**The Embrapa Genetic Resources and Biotechnology Plant Quarantine Laboratory does phytosanitary analysis of most of the plant germplasm introduced into Brazil. During 2006, the Nematology Laboratory analyzed 13,624 germplasm accessions coming in from ten countries. Materials infected with nematodes included pumpkin, potato, gourd, cacao, oil palm, sugar cane, beans, raspberry, sunflower, *Lotus* spp., corn, quinoa, soybean, grape, wheat, *Paspalum* spp., *Lillium* spp. and *Sorghum* spp. Those materials were introduced from the following countries: Argentina, Costa Rica, France, Germany, Holland, Italy, Mexico, Thailand, Uruguay and USA. The techniques used for extraction and detection of the nematodes were Baermann funnel, the tray technique, sieving and blending, cyst detection by Fenwick and the sugar floatation technique. The nematodes detected were: *Alaimus* sp., *Anguina* sp., *Aphelenchoides abyssinicus*, *Aphelenchoides besseyi*, *Aphelenchoides bicaudatus*, *Aphelenchoides blastophthorus*, *Aphelenchoides* sp., *Aphelenchoides spicomucronatus*, *Aphelenchoides spinosus*, *Aphelenchoides subtenuis*, *Aphelenchoides tumuliscaudatus*, *Cephalobus* sp., *Ditylenchus acutus*, *Ditylenchus khani*, *Ditylenchus myceliophagus*, *Ditylenchus* sp., *Ditylenchus terricolus*, *Dorylaimus* sp., *Helicotylenchus* sp., *Malenchus* sp., *Monhystera* sp., *Plectus* sp., *Prodorylaimus* sp., *Rotylenchus* sp., *Tylencholaimus* sp., *Tylenchus* sp. The accessions were submitted to heat, dry and moist treatments and tissue culture (potato) for nematode eradication. With those phytosanitary procedures the Embrapa Genetic Resources and Biotechnology Plant Quarantine Laboratory collaborates actively to reduce the risk of introduction of new plant parasitic nematode species in Brazil.

STANDARD OPERATIONAL PROCEDURES TO BE USED AT THE NEMATOLOGICAL LABORATORY OF EMBRAPA, BRAZIL [PROCEDIMENTO OPERACIONAL PADRÃO PARA APLICAÇÃO NO LABORATÓRIO DE NEMATOLOGIA DA EMBRAPA, BRASIL]. **V. Gonzaga and R. C. V. Tenente. Embrapa/Cenargen, Parque Estação Biológica, W5 Norte final, (70.770-900), Brasília/DF, Brasil. vilmar@cenargen.embrapa.br.—**In 2005, Genetic Resources and Biotechnology of Embrapa started implementation of a Quality System to meet trade requirements, with the objective of obtaining the certification NBR ISO/IEC 17.025 and Laboratorial Good Performance, which is granted by the National Institute of Metrology, Normalization and Industrial Quality (INMETRO), for laboratorial analysis and research projects carried out by the Institute. The process started with eight laboratories that are dedicated to GMO research and/or attend to external demands such as the laboratory of Plant Quarantine, which includes the Nematology unit. Implementation of the Quality System follows 16 basic steps that include knowledge of the Quality Manual and Standard Operational Procedure (POP zero) for the improvement and management of documents. A master list of documents was made, the manager POPs, Technical POPs applied to pest detection and identification, and POPs

related to equipment used in analyses and research projects. Therefore, the objective of this paper is to report document improvements introduced by the Quarantine Nematology section, which contain technical operational procedures that provide rules, directrix, characteristics and methodologies for the development of efficient technical activity in the Nematology Laboratory, and assignment of individual or group responsibilities, with the objective of achieving excellence in nematode analysis. Seven POPs were improved relating to extraction methodologies; two on nematode preservation and one on nematode identification, to be used in analysis of plant germplasm exchanged among countries.

EL NEMATODO DEL QUISTE *GLOBODERA PALLIDA* Y EL CULTIVO DE PAPA EN EL PERÚ [POTATO CYST NEMATODE *GLOBODERA PALLIDA* AND POTATO CROPS IN PERU]**. A. Gonzalez and J. Franco. Fundación PROINPA, P.O. Box 4285, Cochabamba, Bolivia. j.franco@ proinpa.org.—**Durante varios años se efectuaron muestreos de suelo en diez de los principales departamentos andinos productores de papa nativa y mejorada. Todos los departamentos mostraron la presencia del nematodo quiste de la papa (NQP) y el 64.90% de las 3299 de muestras analizadas, fueron positivas, sobresaliendo por su amplia incidencia los departamentos de Cuzco, Huanuco, La Libertad y Huancavelica (90.45, 84.11, 80.06, 78.22%, respectivamente). Por otro lado, Huancavelica y Junín (55.44 y 41.67%) mostraron los más altos porcentajes de incidencia con niveles de infestación alta y muy alta (15.1-35 y >35 (huevos+J2)/g suelo). Los departamentos que aun mostraron áreas libres fueron Cajamarca y Ayacucho (69.04 y 62.08%). Los otros departamentos mostraron niveles de infestación incipiente y media (1-5 huevos/g suelo y 5.1-15 huevos/g suelo). Los mayores niveles de infestación se tuvieron en los departamentos de Junín, Huancavelica, Apurimac, Cuzco y Puno (2161, 2130, 1329, 840 y 821 huevos/g suelo, respectivamente). El efecto de la incidencia y la severidad del NQP sobre las pérdidas potenciales en el rendimiento del cultivo de las papas nativas y mejoradas en la región andina de Perú es analizado.

EFFECT OF RESISTANCE INDUCERS ON NEMATODE MANAGEMENT IN SUGARCANE FIELDS [EFECTO DE INDUCTORES DE RESISTENCIA EN EL MANEJO DE NEMATODOS EN CAMPO CULTIVADO CON CAÑA DE AZÚCAR]**. L. M. P. Guimarães[1], E. M. R. Pedrosa[2], R. S. B. Coelho, A. Chaves[1] and S. R. V. L. Maranhão[1]. [1]Agronomy Department, [2]Technology Department, Universidade Federal Rural de Pernambuco, Recife, PE, 52171-900, Brazil. achavesfiuza@yahoo.com.br.—**The objective of this research was to evaluate methyl jasmonate, potassium silicate and Ecolife 40® efficiency, in association or not with a systemic nematicide, for integrated nematode management in sugarcane (*Saccharum* sp.) variety RB863129, under field conditions. The experiment was a split plot randomized complete block design in a naturally nematode-infested area. Nematode density was evaluated in soil at planting and in soil and roots at 3, 6, and 12 months after planting. Shoot number and both productive and industrial variables were evaluated at 3 and 12 months, respectively. There was significant reduction of *Meloidogyne* spp. density in soil in plots with an inducer in association or not with a nematicide, and significant correlation between *Meloidogyne* spp. and *Pratylenchus zeae* in soil. Other nematodes in the field were not affected by inducers or nematicide. Yield-related variables were not affected, with the exception of shoot and stalk numbers. Values for shoots were significantly higher than the control in plots with Ecolife 40®, and stalk numbers were significantly higher than the control in plots with any one of the inducers.

FUMIGANT AND NONFUMIGANT NEMATICIDES FOR *MELOIDOGYNE CHITWOODI* CONTROL IN POTATOES [NEMATICIDAS FUMIGANTES Y NO FUMIGANTES PARA EL CONTROL DE *MELOIDOGYNE CHITWOODI* EN EL CULTIVO DE LA PAPA]. **S. L. Hafez and P. Sundararaj. University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA. shafez@uidaho.edu.—**Field experiments were conducted for two years at the University of Idaho, Parma Research and Extension Center, Parma, Idaho to study the efficacy of fumigant nematicides Telone II alone or in combination with Vapam HL for control of Columbia root-knot nematode

in potato. The experiments were laid out in a randomized complete block design with five treatments each with six replications in a sandy loam field. Telone II and Vapam were applied broadcast in the previous fall by ripper and fumigation bar to a depth of 16-18 inches and 8-10 inches, respectively. Nonfumigant, Mocap treatments were surface broadcast on April using a hand held sprayer with 8002 flat fan nozzles at 50 psi (pounds per square inch) calibrated to deliver 34.5 gallons per acre (gpa). Within one hour of application, all plots were disked twice to incorporate the chemicals to a depth of 4-6 inches. Potato cv. Russet Burbank seed pieces were planted in April in rows three ft apart. Plant protection practices, weeding and other standard cultural practices were followed. The tubers were hand-harvested in September from 20 feet of the middle two rows of each plot and weighed. The tubers were graded and evaluated for nematode infection. In both experiments, the incidence of nematode infected tubers as well as severity of nematode infection was significantly reduced by the treatments compared to control plots. Percent of tubers with nematode infection in treated plots ranged from 0.9 to 41.6. The lowest level of nematode infection was recorded in the Telone 15 gpa + Vapam 30 gpa treatment.

GREEN MANURE CROPS—A SUSTAINABLE MANAGEMENT STRATEGY FOR SUGAR BEET CYST NEMATODE IN IDAHO [CULTIVOS QUE PRODUCEN ABONO VERDE - UNA ESTRATEGIA DE MANEJO SOSTENIBLE PARA EL NEMATODO DEL QUISTE DE LA REMOLACHA EN IDAHO]**. S. L. Hafez and P. Sundararaj. University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA. shafez@uidaho.edu.—**Two experiments were conducted to study the efficacy of green manure crops for management of sugarbeet cyst nematode, *Heterodera schachtii,* under field conditions. In both experiments, oil radish (*Raphanus sativus* spp. *oleifera*) and white mustard (*Sinapis alba*) cultivars were seeded at the rate of 25 lb/acre in fall and incorporated twelve weeks later as the field was prepared for sugarbeet. For the first experiment, two varieties of oil radish (Colonel, Dacapo) and one variety of white mustard (Metex) were planted in the field infested with *H. schachtii.* For the second experiment four varieties of oil radish (Comet, Colonel, Luna, and Defender) and one of white mustard (Accent) were planted. Data from both experiments indicated that there was a significant increase in beet yield in the green manure planted plots compared to fallow. The highest yields (42 and 43.3 T/A) and sugar percentages (17 and 17.2%) were obtained with oil radish and mustard plots, respectively. In the second experiment, the highest yield was recorded in Luna (37.0 tons/acre) and Defender (36.0 tons/acre) plots.

GREEN MANURE CROPS FOR *MELOIDOGYNE CHITWOODI* MANAGEMENT ON IDAHO POTATOES [CULTIVOS DE ABONO VERDE PARA EL MANEJO DE *MELOIDOGYNE CHITWOODI* EN IDAHO]**. S. L. Hafez[1], P. Sundararaj[1] and G. Haroutunian[2]. [1]University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA, [2]UNDP-MeBr. Alternatives Project / Ministry of Environment, Lebanon. shafez@uidaho.edu.—**Two experiments were conducted with cultivars of oil radish, mustard, lentil and rapeseed to evaluate their ability to control *Meloidogyne chitwoodi* on potato. The experiment was in a randomized block design with five replications of each cultivar planted. In the first experiment, more biomass was recorded in the oilradish planted plots compared to lentil. Potato yield data at harvest indicated that there was a significant reduction in root knot nematode infested tubers in the green manure crop plots compared to fallow. The incidence of tuber infection was reduced from 84.2% in the fallow plots to 37% in the green manure planted plots. In the second experiment cultivars of oil radish (Defender, Comet) mustard (mustard blend) and rapeseed (Humus) were planted in the fall, incorporated into the soil, and in the subsequent spring planted with potato. More biomass was recorded in the Comet (2.4 tons/acre) and mustard blend (2.5 tons/acre) planted plots compared to other plots. There was a significant increase in marketable tuber yield in green manure crop plots as compared to fallow. Root knot nematode infected tubers were reduced from 16.5% in fallow plots to 1.0% in the green manure planted plots. In both experiments, marketable and total yield was also increased by the green manure crops as compared to fallow treatment.

NEMATICIDES FOR THE MANAGEMENT OF *MELOIDOGYNE CHITWOODI* IN POTATO [NEMATICIDAS PARA EL MANEJO DE *MELOIDOGYNE CHITWOODI* EN EL CULTIVO DE LA PAPA]. **S. L. Hafez and P. Sundararaj. University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA. shafez@uidaho.edu.—**Two field experiments were conducted at the University of Idaho, Parma Research and Extension Center, Parma, Idaho to study the efficacy of Vapam HL, Telone II alone or combination with Temik 15G, Mocap EC, Vydate L for the control of Columbia root-knot nematode in potato. The experiments were laid out in a randomized complete block design with eleven and ten treatments each with seven replications in a sandy loam field. Mocap treatments were surface broadcast; Vapam was applied broadcast by ripper and fumigation bar; Temik was applied in furrow at planting; Vydate was applied at plant and chemigated followed by a short irrigation starting at 1700 and 1800 degree-days, respectively. Potato cv. Russet Burbank seed pieces were planted in April in rows three feet apart. Five months after planting, the tubers were hand-harvested in September from 20 feet of the middle two rows of each plot and weighed. The tubers were graded and evaluated for nematode infection. In both experiments, the incidence of nematode infected tubers as well as severity of nematode infection was significantly reduced by the treatments compared to control plots. Percent of tubers with nematode infection in treated plots ranged from 0.5-13.8% and 0.4 to 20.9% for the first and second experiment respectively. The lowest level of nematode infection was observed in the Telone or Vapam treated plots.

POTATO CYST NEMATODE, *GLOBODERA PALLIDA*, UPDATE IN IDAHO [NEMATODO DEL QUISTE DE LA PAPA, *GLOBODERA PALLIDA,* EN IDAHO: INFORMACIÓN ACTUALIZADA]. **S. L. Hafez and P. Sundararaj. University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA. shafez@uidaho.edu.—**Discovery of pale cyst nematode (PCN) (*Globodera pallida*) in Idaho was significant to potato producers and exporters since it can attack the potato roots and reduce yields by up to 80%. Idaho is the largest potato producer in the United States, growing about one-third of the country's potato production (12.5 billion pounds), which paid farmers about $700 million and worth about $2 billion to the state. Early discovery of PCN in Idaho minimizes future potato production costs and enhances product quality and marketability. Though PCN is widely distributed in many potato-growing regions throughout the world, its infestation in Idaho appears to be isolated, but additional surveillance programs were initiated to contain further spread of the pest to neighboring field. Regulations were implemented to restrict the movement of plants and soil with appropriate sanitation procedures for equipment used on the regulated field for the spread of this nematode. Crop rotation and the use of certified seed and nematicides are effective and practical means of suppression. PCN discovery is an example of how an industry and government can come together in a crisis to ward off disaster.

POTATO NEMATODES AND CERTIFIED SEED PRODUCTION IN IDAHO, USA [NEMATODOS DE LA PAPA Y PRODUCCION DE TUBÉRCULO-SEMILLAS CERTIFICADAS DE PAPA EN IDAHO, USA]. **S. L. Hafez and P. Sundararaj. University of Idaho, Parma Research and Extension Center, 29603 U of I Ln, Parma, Idaho 83660, USA. shafez@uidaho.edu.—**Selection of high-quality seed is essential for the production of a profitable potato crop. Columbia root knot nematode, stem nematode and cyst nematode are the major nematodes of interest for the Idaho potato seed certification program. Idaho law requires that every field under the seed program should be free of all these nematodes and the seed stock planted by the grower must be approved by the ICIA. During the growing season, the ICIA inspects seed fields, to determine the fitness of the field for seed production and meet certification tolerance. Depending on the generation number and seed lot size, random samples of seed tubers will be collected at harvest and tested for zero nematode tolerance from each seed lot to be certified. All storage facilities are also inspected by the ICIA before harvest, and movement of seed potatoes from the original storage facility requires prior approval from the ICIA. A seed lot that passes the inspections is then eligible for shipping point inspection and tagging as certified seed

by a federal-state inspector. The inspector verifies the seed lot identity, tags the seed lot, and seals the transportation vehicle. The buyers will verify the certification number before accepting shipment to confirm that the potatoes being delivered are the same ones purchased.

CONTROL DEL NEMATODO DORADO DE LA PAPA *GLOBODERA ROSTOCHIENSIS* EN PARCELAS EXPERIMENTALES CON LOS HONGOS *ACREMONIUM INCRUSTATUM* Y *PAECILOMYCES AMONEOROSEUS* [BIOCONTROL OF GOLDEN POTATO CYST NEMATODE *GLOBODERA ROSTOCHIENSIS* IN EXPERIMENTAL PLOTS WITH THE FUNGI *ACREMONIUM INCRUSTATUM* AND *PAECILOMYCES AMONEOROSEUS*]. **T. I. Hernández-Leal[1], G. Carrión[1] and Á. E. Núñez-Sánchez[2]. [1]Instituto de Ecología, A. C., Apartado Postal 63, [2]Facultad de Ciencias Agrícolas. Universidad Veracruzana. Xalapa, Veracruz, México. gloria.carrion@inecol.edu.mx.—**Se evaluó la incidencia de dos hongos nematófagos en parcelas experimentales para el control biológico de *Globodera rostochiensis*, en la localidad de Los Pescados, Perote, Veracruz, México. Se instalaron 5 parcelas (25 m^2) por tratamiento en el ciclo primavera-verano de 2007 bajo cultivo de temporal en un diseño al azar: control biológico, control químico, testigo cultivado con papa; rotación y control biológico con rotación cultivados con avena. Los hongos fueron aplicados al suelo en diferentes etapas del cultivo, *A. incrustatum* se aplicó al momento de la siembra y 75 días después, con el objetivo de afectar los quistes. *P. amoneoroseus* 25 y 50 días después de la siembra para afectar larvas (J2). Los quistes separados por categoría de edad (jóvenes, maduros y viejos) y larvas afectados por los hongos aplicados, se obtuvieron al colocarlos por separado (N = 100) en placas de agar con avena. En la primera evaluación la densidad promedio de quistes de *G. rostochiensis* fue de 219 quistes/100 g de suelo, y la de larvas fue de 17 larvas/100 g de suelo. Antes de la aplicación de *A. incrustatum* los quistes y larvas del nematodo dorado no se encontraron infectados y sólo se encontró de manera natural *P. amoneoroseus* en el 2% de la muestra. En la segunda evaluación el primer hongo se encontró en 7 y 14% de larvas en las parcelas de control biológico y rotación con control biológico respectivamente. Ambos hongos se encontraron parasitando quistes y larvas en la tercera evaluación.

ACTIVIDAD NEMATOSTÁTICA DE EXTRACTOS FÚNGICOS CONTRA *MELOIDOGYNE INCOGNITA* [NEMATOSTATIC ACTIVITY OF FUNGAL EXTRACTS FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA*]. **E. Herrera, J. Cristóbal, J. Tún, S. de la Rosa, M. Reyes, G. Heredia and M. Gamboa. Instituto Tecnológico de Conkal, Yucatán, 97345-México. elian09@hotmail.com.—**Se colectaron 100 hongos de varias regiones del trópico mexicano a partir de hojarasca, ramas y troncos de los estados de Veracruz, Tabasco y Yucatán. Éstos se cultivaron y procesaron hasta obtener extractos de micelio con acetato de etilo. Los extractos fúngicos se evaluaron a 0.3 mg/ml; para ello, se depositó 1 ml de extracto en Siracusas. Posteriormente se incorporaron 10 juveniles J_2 de *M. incognita* y se procedió a evaluar la inmovilidad de los nematodos a las 24 y 48 h. Los 100 hongos conformaron los tratamientos con cuatro repeticiones, distribuidos en un diseño experimental completamente al azar en condiciones de laboratorio. Con los extractos fúngicos que causaron al menos 50% de actividad nematostática se seleccionaron para calcular dosis letales (DL_{50} y DL_{95}), evaluándolos a dosis de 0.1, 0.2, 0.3, 0.4 y 0.5 mg/ml. Se obtuvieron dos extractos sobresalientes con actividad nematostática, obtenidos de cepas identificadas como *Selenosporella* sp. y *Gliocladium roseum*, presentando 100, 87.5% y 87.5, 50% de actividad nematostática a las 24 y 48 h de evaluación, respectivamente. Las menores DL_{50} y DL_{95} se obtuvieron con el extracto proveniente de *Selenosporella* sp., al estimarse la menor cantidad de extracto para inhibir la movilidad de juveniles J_2 de *M. incognita* con 0.091 y 0.147 mg/ml, respectivamente.

NEMAPLUS, NUEVA ALTERNATIVA ORGÁNICA PARA EL CONTROL DE NEMATODOS [NEMAPLUS, NEW ORGANIC ALTERNATIVE FOR NEMATODE CONTROL]. **E. Herrera[1], P. Alegría[2] and G. Gatjens[3]. [1]Asesor Dirección de Investigación y Desarrollo, [2]Gerente General Industrial Vetsi Internacional S.A. Perú-México, [3]Representante Técnico Comercial Panamá-Costa Rica. eherreraalva@hotmail.com.—**Nemaplus, producto derivado de aminoácidos, tiene en su composición 50% de

extracto de gluten y 50% de extracto de *Quillaja saponaria*. Es un líquido oscuro, altamente soluble en agua y con un pH de 3 a 4. Las sustancias orgánicas de la fracción *Q. saponaria* actúan controlando los nematodos por contacto e ingestión a base de los compuestos polifenólicos. Además con la fracción gluten de maíz (azúcares) actúa promoviendo las defensas de la planta y estimulando la masa radicular. Los ensayos a campo realizados en los principales cultivos alimenticios demuestran que para el caso del pimiento (*Capsicum annumm*), Nemaplus a una dosis de 6 L/ha, muestra una efectividad del 90% en el control de las poblaciones (J2) de *Meloidogyne* spp., con un incremento en la producción de 22 TM/ha con respecto al testigo. En pruebas con limón sutil (*Citrus aurantifolia*) Nemaplus en una dosis fraccionada de 9 L/ha mostró un porcentaje de control del 80% frente a los daños ocasionados por el nematodo de los cítricos *Tylenchulus semipenetrans* con un incremento en la producción de 23 TM/ha. Ensayos en plantaciones francas de 5 años de vid (*Vitis vinifera*), variedad Red Globe, evidenciaron que Nemaplus a dosis fraccionadas de 6 L/ha presentó un porcentaje de control del 87% frente a *Meloidogyne* spp., con un incremento en la producción de 28 TM/ha. En pruebas con banano (sub-grupo Cavendish) al emplear dosis fraccionadas de 7.5 L/ha se obtuvo un 83% de control frente al ataque de *Radopholus similis*. El producto ha demostrado eficiencia en el control de los nematodos fitófagos antes mencionados.

INTEGRACIÓN DE AGENTES DE CONTROL BIOLÓGICO Y TÁCTICAS CULTURALES EN EL MANEJO DE *MELOIDOGYNE* SPP., EN LA PRODUCCIÓN DE HORTALIZAS EN CUBA [INTEGRATION OF BIOCONTROL AGENTS AND CROPPING TACTICS IN THE MANAGEMENT OF *MELOIDOGYNE* SPP., IN VEGETABLE PRODUCTION IN CUBA]. **L. Hidalgo and M.G. Rodríguez. Centro Nacional de Sanidad Agropecuaria (CENSA), Apartado 10, San José de las Lajas, Habana, Cuba. lhidalgo@censa.edu.cu.—**El desarrollo de agentes de control biológico a escala internacional ha tenido como uno de sus principales objetivos la obtención de productos comerciales, cuya finalidad ha sido en muchos casos "la sustitución" de productos de síntesis química. Sin embargo, hoy se conoce del impacto positivo de utilizar los biorreguladores dentro de programas de manejo, donde las prácticas culturales o agronómicas desempeñan un papel crucial en la regulación inicial de las poblaciones de plagas, así como en el establecimiento y/o funcionamiento exitoso del biorregulador en el agroecosistema. En este sentido Cuba ha incentivado esta práctica, fundamentalmente en la producción de vegetales para el consumo fresco. Un alto porcentaje de las hortalizas producidas, son obtenidas en instalaciones productivas pertenecientes a los Programas de Agricultura Urbana y de Cultivos Protegidos y Semiprotegidos, donde los nematodos del género *Meloidogyne* constituyen uno de los principales problemas sanitarios. Para su manejo, organismos como los hongos *Pochonia chlamydosporia* var. *catenulata*, *Trichoderma* spp. y las bacterias *Bacillus thuringiensis* y *Tsukamurella paurometabola* han sido introducidos en dichos sistemas productivos junto a prácticas como la rotación de cultivos, enmiendas al suelo con materia orgánica, solarización, uso de plantas trampa, biofumigación, uso conjunto con micorrizas y cultivares resistentes. La adopción de este tipo de manejo está relacionada con aspectos como el nivel de instrucción de los productores y decidores, así como de la ejecución de programas de capacitación adecuados a las características de cada forma y zona productiva. Se presentarán resultados del trabajo de 5 años en dos provincias en Cuba.

A REVIEW OF THE MOVEMENT OF PLANT-PARASITIC NEMATODES AROUND THE WORLD [UNA REVISIÓN DEL MOVIMIENTO DE LOS NEMATODOS PARÁSITOS DE PLANTAS EN EL MUNDO]. **S. Hockland. Pest and Disease Identification Team, Plant Health Group, Central Science Laboratory, and Hutton, York, England, YO41 1LZ, UK. s.hockland@csl.gov.uk.—**National Plant Protection Organisations (NPPOs) around the world inspect a range of consignments being imported into their countries for quarantine organisms. To determine any nematode infestation they will take samples of soil or other growing media that might also be associated with plants or plant products such as tubers. Samples are then sent to designated laboratories specialising in nematode identification to record any interceptions and assess the need for regulatory action. Nematologists have

identified a wide range of plant-parasitic nematodes in plant material and various growing media. Many are new species that are described far from their country of origin. The finding of some species may indicate a contravention of international phytosanitary rules for the production of certified stock, or can indicate whether growing media are sterile. They also pose interesting questions concerning the affect on national biodiversities. International trade in plants and plant products will continue to provide many challenges in complying with international quarantine legislation. Knowledge of the species being found in trade is essential to allow NPPOs to develop the requisite expertise to identify and regulate economically important organisms, so the exchange of information between nematologists in different climatic zones will continue to be of mutual benefit.

A REVIEW OF THE PLANT-PARASITIC NEMATODES INTERCEPTED ON CONSIGNMENTS IMPORTED INTO THE UK WITH SPECIAL REFERENCE TO THOSE FROM TROPICAL ZONES [ANÁLISIS DE LOS NEMATODOS PARÁSITOS DE PLANTAS INTERCEPTADOS EN REMESAS IMPORTADAS EN EL REINO UNIDO, CON ESPECIAL REFERENCIA A LOS DE ZONAS TROPICALES]**. S. Hockland, T. Prior, H. Moran, R. Cannon and D. Eyre. Plant Health Group, Central Science Laboratory, Sand Hutton, York, England, YO41 1LZ, UK. s.hockland@csl.gov.uk.—**The Plant Health and Seeds Inspectorate of the Department for Environment, Food and Rural Affairs for England and Wales inspects a range of consignments being imported into the UK from both Europe and other continents. They include plants or plant products such as potato tubers which may be associated with soil or other growing media. Samples are sent to the Central Science Laboratory to record any interceptions and assess the need for regulatory action. Nematologists in the Pest and Disease Identification Team, Plant Health Group in the Central Science Laboratory have identified a diverse range of plant-parasitic nematodes in recent years which are from tropical zones. This paper will review the changes in species being intercepted and the associated action that has followed. International trade in plants and plant products will continue to provide many challenges in complying with international quarantine legislation so the exchange of information between nematologists in different climatic zones will continue to be of mutual benefit.

THE USE OF MOLECULAR TOOLS FOR THE IDENTIFICATION OF QUARANTINE PESTS OF POTATO—A REVIEW [REVISIÓN DEL USO DE HERRAMIENTAS MOLECULARES PARA LA IDENTIFICACIÓN DE LAS PLAGAS CUARENTENARIAS DE LA PAPA]. **S. Hockland, R. Glover, N. Boonham and T. Prior. Plant Health Group, Central Science Laboratory, Sand Hutton, York, England, YO41 1LZ, UK. s.hockland@csl.gov.uk.—**A combination of morphological and molecular methods provides the most reliable means to identify quarantine species from non-quarantine and new species that are intercepted in trade. At the Central Science Laboratory morphological identification methods are increasingly being supported by PCR methods for *Globodera pallida* and *G. rostochiensis* as well as *Meloidogyne chitwoodi*, *M. fallax*, and *M. hapla*. Published procedures have been adapted or improved to provide reliable, accredited procedures. Molecular tools exist for the identification of the *Nacobbus aberrans* species complex but as yet these have not been incorporated into international protocols. We are developing real-time PCR methods (using TaqMan chemistry) that will enable us to deal with large numbers of viable cysts and ultimately enable direct soil testing without the need to extract the cysts. For other species where high throughput analysis is less critical, a DNA barcoding approach (direct sequencing of several conserved genes) is being developed, which is more akin to a molecular identification tool, rather than a specific detection tool. It is hoped these developments will allow most laboratories to provide increasingly reliable tools for the future at reasonable cost.

DIVERSITY OF THE NEMATODE SUPERFAMILY CEPHALOBOIDEA IN THE TROPICAL AMERICAS [DIVERSIDAD NEMATOLÓGICA DE LA SUPERFAMILIA CEPHALOBOIDEA EN AMÉRICA TROPICAL]. **O. Holovachov[1], S. Boström[2], P. De Ley[1] and M. Mundo-Ocampo[1]. [1]Department of Nematology, University of California, Riverside, CA 92521, USA, [2]Swedish Museum**

of Natural History, Stockholm, Sweden. oleksandr.holovachov@ucr.edu.—Cephaloboidea are widely distributed bacterial-feeding soil nematodes, most frequently represented by the family Cephalobidae, which includes over 275 nominal species. These nematodes occur in terrestrial environments worldwide and are especially speciose in arid and tropical regions. They include forms with strikingly complex labial structures and are typically the most abundant microbivores in nutrient-poor soils such as deserts, sand dunes and dry Antarctic valleys. A number of remarkable genera are known only from rainforest habitats. Countries of tropical and subtropical America have a rich but understudied fauna of Cephaloboidea. New species and genera were described in occasional papers from Argentina, Ecuador, Mexico and Peru while local surveys were published from Brazil, Costa Rica, Paraguay and Surinam. No published studies exist from the other thirteen continental countries or any of the caribbean island nations. Our personal observations suggest that the tropical Americas harbor a rich and diverse fauna, comparable to what is known from Africa and tropical Asia. The family Elaphonematidae has not yet been reported from Central or South America; we speculate that it must be present based on its known occurrence in Africa, Eurasia, Australia and North America.

NEMATODES OF THE FAMILY ONCHULIDAE—THEIR SYSTEMATICS AND BIOLOGY [NEMATODOS DE LA FAMILIA ONCHULIDAE—SU SISTEMÁTICA Y BIOLOGÍA]. **O. Holovachov. Department of Nematology, University of California-Riverside, Riverside, CA 92521, USA. oleksandr.holovachov@ucr.edu.—**The monophyletic family Onchulidae includes nine nominal genera: *Onchulus*, *Cyathonchus*, *Stenonchulus*, *Limonchulus*, *Kinonchulus*, *Paronchulus*, *Pseudonchulus*, *Caprionchulus* and *Tobriloides*, which are sporadically distributed over Europe, South-East Asia, Africa and South America. The phylogenetic analysis is based on 41 morphological characters of 13 out of 25 nominal species (including four new) representing seven out of the nine genera of the family, and using three different outgroup taxa from Triplonchida. The resulting cladogram supports the monophyly of the genus *Tobriloides* as well as its basal position on the tree together with its sister taxon Pseudonchulus. The genus *Limonchulus* is monophyletic and branches off in the most distal part of the cladogram. Two species of the genus *Onchulus* form a pharaphyletic group and cluster together with the genus *Limonchulus* in a monophyletic clade. Other two species of the genus *Onchulus* that were included in the analysis, are located with remaining three representatives of three monotypic genera in the paraphyletic grade. Most species and genera are known from single or few records only. The genus *Onchulus* has circumtropical distribution with only one species in Europe, *Limonchulus* is distributed over Africa and Tropical Americas. Based on the observation of the gut content in five species, we suggest that the members of the family Onchulidae can be bacteriovorous, predacious and omnivorous, depending on species, developmental stage and environmental conditions.

THE *AFENESTRATA* FROM FLORIDA [*AFENESTRATA* DE FLORIDA]. **R.N. Inserra[1], M. Mundo-Ocampo[2], A. Troccoli[3], S. Subbotin[4] and J.G. Baldwin[2]. [1]Florida Department of Agriculture and Consumer Services, DPI, PO Box 147100, Gainesville, FL 32614-7100, USA, [2]Department of Nematology, University of California, Riverside, CA 92521, USA, [3]Istituto per la Protezione delle Piante-CNR, Via G. Amendola, 122/D, 70126 Bari, Italy, [4]Plant Diagnostic Center, California Department of Food and Agriculture, 3294 Meadow Rd., Sacramento CA 95832-1448, U.S.A. inserrr@doacs.state.fl.us.—***Afenestrata* species are cyst forming nematodes that infect monocots in tropical and temperate areas. In the United States, these species have been detected only in Florida where they were introduced into ornamental nurseries and botanical gardens with the trade of ornamental monocots. *Afenestrata koreana* was found on *Phyllostachys aurea* in 1998 and *A. orientalis* on *Miscanthus sinensis* in 2005. These species were probably introduced from Korea and Far East Russia, respectively. The identification of *A. koreana* was based on the short stylet of the juveniles, the lateral field marked by three incisures and the tuberculated cuticular patterns of the female terminal portion of the vulval cone. The identification of *A. orientalis* was based on the lack of males and on the morphology of females, which have a long neck and longitudinal cuticular ridges on the terminal portion of the vulval cone. Molecular

analysis (ITS-rRNA gene sequences) confirmed these identifications. *Afenestrata orientalis* juveniles are similar to those of *A. africana* when observed by light microscope. The spread of these nematodes in Florida has been contained to their original detection sites. Information on their biology is scant.

NEMATODOS FITOPARÁSITOS ASOCIADOS CON EL CULTIVO DE LA PAPA EN EL ESTADO LARA, VENEZUELA [PLANT-PARASITIC NEMATODES ASSOCIATED WITH POTATO CROPS IN LARA STATE, VENEZUELA]. **N. Jiménez-Pérez[1], R. Crozzoli[2] and N. Greco[3]. [1]Universidad Centroccidental Lisandro Alvarado, Decanato de Agronomía, Apdo. 400, Barquisimeto, [2]Universidad Central de Venezuela, Facultad de Agronomía, Instituto de Zoología Agrícola, Apdo. 4579, Maracay, [3]Consiglio Nazionale delle Ricerche, Per la Protezione delle Piante, Sezione di Bari, Italia. nixonj@ucla.edu.ve.—**Con el fin de identificar los nematodos fitoparásitos asociados con el cultivo de la papa (*Solanum tuberosum* L.) se analizaron un total de 1060 muestras compuestas (suelo + raíces) colectadas en los principales municipios productores del estado Lara. Fueron identificados un total de 12 géneros y 11 especies: *Aorolaimus holdemani, Criconema californicum, Globodera rostochiensis, Helicotylenchus dihystera, Meloidogyne incognita, Mesocriconema ornatum, Paratylenchus nawadus, Pratylenchus brachyurus, Rotylenchulus reniformis, Tylenchorhynchus annulatus, Xiphinema dimidiatum* y una especie no identificada del género *Aphelenchoides*. Se identificó como patotipo Ro2 a la población de *G. rostochiensis*. Los nematodos señalados como patogénicos al cultivo y que se encontraron con mayor frecuencia fueron *G. rostochiensis, M. incognita, P. brachyurus* y *R. reniformis*.

NEMATODOS FITOPARÁSITOS ASOCIADOS CON MALEZAS DEL CULTIVO DE PLÁTANO EN LA ZONA BOSQUE HÚMEDO DEL SUR DEL LAGO DE MARACAIBO, VENEZUELA [PHYTOPARASITIC NEMATODES ASSOCIATED WITH WEEDS IN PLANTAIN CROPS IN THE RAIN FOREST REGION OF THE SOUTHERN ZONE OF MARACAIBO LAKE, VENEZUELA]. **J. Labarca[1], N. Jiménez-Pérez[2], C. Paredes[1], M. Pineda[1], M. Casanova[2] and E. Briceño[2]. [1]Universidad Nacional Experimental Sur del Lago (UNESUR). Programa Ingeniería de la Producción Agropecuaria, Apdo. postal 5148, [2]Universidad Centroccidental Lisandro Alvarado, Decanato de Agronomía, Apdo. 400, Barquisimeto, Venezuela. paredesc@unesur.edu.ve.—**Una de las principales enfermedades del cultivo de platano *Musa* AAB que se localiza en la zona Sur del Lago es causada por nematodos fitopatógenos. Con el propósito de conocer los nematodos fitoparásitos presentes en las malezas asociadas con el cultivo del plátano, se realizó un muestreo en la zona de bosque húmedo tropical. Se colectaron 32 muestras al azar de suelo y raíces, extrayendo la planta completa para su posterior identificación. Las muestras de suelo fueron procesadas por el método de Cobb modificado y los nematodos presentes en las raíces se extrajeron por el método de maceración con licuadora. La limpieza se realizó con el método de Baermann. Se identificaron 4 especies de nematodos: *Helicotylenchus multicinctus, H. dihystera, Radopholus similis* y *Pratylenchus brachyurus*, así como representantes de los géneros *Meloidogyne, Trichodorus, Tylenchus, Aphelenchoides* y *Aphelenchus*. Los nematodos encontrados con mayor frecuencia fueron *H. multicinctus* y *P. brachyurus*. Se destacaron las malezas *Corchorus orinosencis* H.B.K., *Ruellia tuberosa* L. y *Phyllanthus niruri* L. relacionadas con elevadas poblaciones de *H. multicinctus*. En las malezas *Croton glandulosus* L., *Thunbergia alata* L. se observaron importantes densidades de población de *P. brachyurus*. Estos resultados revelan la necesidad de realizar un adecuado control de malezas para disminuir las poblaciones de nematodos en el cultivo del plátano en la zona de estudio.

REPRODUCTIVE CAPACITY OF SEVEN *NACOBBUS ABERRANS* POPULATIONS FROM ARGENTINA ON TOMATO CULTIVAR 'PLATENSE' [CAPACIDAD DE REPRODUCCIÓN DE SIETE POBLACIONES DE *NACOBBUS ABERRANS* SOBRE TOMATE CULTIVAR 'PLATENSE']. **P. Lax[1], M. E. Doucet[1], N. B. Coronel[2], O. Luque[3], N. Rojas[4], D. Ramos[5] and J. Muzaber[6]. [1]Centro de Zoología Aplicada, Universidad Nacional de Córdoba, C.C. 122, 5000, Córdoba, Argentina, [2]Estación Exp. Agroindustrial Obispo Colombres, Tucumán, Argentina, [3]Universidad Nacional de Catamarca, Argentina, [4]Dirección de Extensión Rural del Ministerio de Producción, Catamarca, Argentina,**

[5]Universidad Nacional de Río Cuarto, Argentina, [6]INTA La Consulta, Mendoza, Argentina. plax@com.uncor.edu.—*N. aberrans* is widely distributed in Argentina, where it is represented by different populations. The objective of this study was to evaluate the reproductive capacity of 7 populations of the species on the tomato cultivar 'Platense'. Nematodes were of different origin and were associated with several hosts in different localities: Coronel Baigorria and Río Cuarto (Córdoba), Lisandro Olmos (Buenos Aires), El Pucará del Aconquija (Catamarca), Tunuyán (Mendoza), Lules and Tafí del Valle (Tucumán). Six replications per population were performed by inoculating with 100 active second stage juveniles per plant at planting. The experiment was conducted under greenhouse conditions at a mean temperature of 21°C. After 90 days, the final density of each population was estimated and the Reproduction Factor (RF = final density/initial density) was calculated. While all of these populations reproduced on the tomato cultivar, three significantly different groups of populations were detected: a) Tafí del Valle (RF = 5.5); b) El Pucará del Aconquija, Lisandro Olmos, Coronel Baigorria, and Tunuyán (with RF ranging between 17.2-35.9); c) Río Cuarto and Lules (RF = 38.5-46.1). The evaluation of *N. aberrans*'reproduction capacity confirms that the species is represented by different biological entities of diverse agronomical importance. This situation requires the development of detailed and accurate strategies to manage the pathogen.

MULTIPLICATION OF TWO *NACOBBUS ABERRANS* POPULATIONS ON PEPPER CULTIVARS [MULTIPLICACIÓN DE DOS POBLACIONES DE *NACOBBUS ABERRANS* EN CULTIVARES DE PIMIENTO]. **P. Lax[1], M. E. Doucet[1], O. Luque[2], N. Rojas[3], D. Ramos[4], R. Braga[5], R. Gioria[5] and R. Kobori[5]. [1]Centro de Zoología Aplicada, Universidad Nacional de Córdoba, C.C. 122, 5000, Córdoba, Argentina, [2]Universidad Nacional de Catamarca, Argentina, [3]Dirección de Extensión Rural del Ministerio de Producción, Catamarca, Argentina, [4]Universidad Nacional de Río Cuarto, Argentina, [5]Sakata Seed Sudamerica Ltda., Brasil. plax@com.uncor.edu.—**Multiplication of two Argentine populations of *Nacobbus aberrans* on the cultivars California wonder pepper (of known susceptibility to the nematode) and AF 8253 (carrier of an unknown gene of resistance to *Meloidogyne javanica* and *M. incognita,* races 1, 2, 3, and 4) was evaluated. The populations were from the locality of El Pucará del Aconquija (CAT), province of Catamarca, and Río Cuarto (RC), province of Córdoba. Eight replications per cultivar were performed by inoculating with 100 active second stage juveniles per plant at planting. The experiment was conducted in greenhouse conditions at a mean temperature of 27°C. After 70 days, final density of the population was estimated and Reproduction Factor (RF = final density/initial density) of each population on the plants considered was calculated. The two pepper cultivars showed susceptibility to the nematode attack. However, California wonder showed the greatest susceptibility, with RF values of 8.8 (CAT) and 23.6 (RC). Multiplication level in AF 8253 was lower for both populations (CAT = 3.5, RC = 9.4). Significant differences between populations on the same cultivar were observed; behaviour of the RC population differed significantly between the two pepper cultivars. Ongoing studies continue searching for pepper cultivars that show some degree of resistance to *N. aberrans.*

DEVELOPMENT OF ENTOMOPATHOGENIC NEMATODES AS BIOINSECTICIDES AND THEIR POTENTIAL MARKET IN BRAZIL [DESARROLLO DE NEMATODOS ENTOMOPATÓGENOS COMO BIOINSECTICIDAS Y MERCADOS POTENCIALES EN BRASIL]. **L. G. Leite, A. Batista Filho and F.M. Tavares. Laboratório de Controle Biológico, Instituto Biológico, CP 70, Campinas, SP 13001-970, Brazil. lgleite@biologico.sp.gov.br.—**In Brazil, entomopathogenic nematodes (EPN) were first tested against insects in 1986, when a *Steinernema carpocapsae* formulation was imported from the United States and assessed against *Migdolus fryanus,* an important soil pest of sugarcane. However, only after the year 2000 were EPNs included in official programs as potential agents for the biological control of pests, primarily because of the increase in the number of soil pests associated with several crops, coupled with heightened recognition of the potential market for EPNs in Brazil. The Instituto Biológico in Campinas has initiated a long-term study to (1) survey the occurrence of EPNs

in different ecosystems throughout Brazil, especially in the State of São Paulo; (2) evaluate the virulence and efficacy of native strains against several insect pests; (3) develop or adapt techniques and formulations for the mass production of EPNs; and (4) search for potential markets for these agents. EPNs have been produced at the Instituto Biológico on a small scale using an in vitro sponge method that has provided enough inocula for field trials and some semi-commercial applications. Field tests have shown a good potential for *Steinernema* sp. IBCB n06 against the sugarcane billbug, and for *Heterorhabditis indica* IBCB n05 against the fungus gnat. The implementation of a program for using EPNs against these insects requires additional research, particularly with regard to improving the procedures for large scale production of these organisms so companies can meet the huge demand in Brazil. Project supported by Fundação de Amparo à Pesquisa do Estado de São Paulo-FAPESP.

FORMULATION OF SOIL CONDITIONERS FOR THE CONTROL OF *MELOIDOGYNE JAVANICA* [FORMULACIÓN DE ACONDICIONADORES DEL SUELO PARA EL CONTROL DE *MELOIDOGYNE JAVANICA*]. **E. A. Lopes, S. Ferraz, P. A. Ferreira, S. L. Carvalho, L. G. Freitas, C. G. Gardiano and O. D. Dhingra. Departamento de Fitopatologia, Universidade Federal de Viçosa, Viçosa-MG, 36570-000, Brasil. silamar@ufv.br.—**The effect of eight potential soil conditioners on the control of *Meloidogyne javanica* was studied under greenhouse conditions. Two groups of soil conditioners were prepared and evaluated independently. In group 1, the basic formulation was prepared by mixing coffee husks and castorbean cake, and in group 2 coconut fiber replaced coffee husk. The treatments were: the unamended basic formulation (1A and 2A); basic formulation enriched with the fungus *Pochonia chlamydosporia* (1B and 2B), dry leaves of *Ricinus communis* and *Plectranthus barbatus* plus *Canavalia ensiformis* seed powder plus basic formulation (1C and 2C); and finally 1C or 2C further enriched with *P. chlamydosporia* (1D and 2D). Sixty grams of the soil conditioners and 5,000 eggs of *M. javanica* were mixed with soil in a 2-liter pot and after one week a tomato seedling was transplanted into each pot. The root system weight and gall and egg number per root system were evaluated after 60 days. None of the treatments had significant effect on the root weight, but all soil conditioners, except 1A, reduced the number of galls and eggs of *M. javanica*. The formulations 1D and 2D were the most effective.

PRODUCTION OF CHLAMYDOSPORES OF THE NEMATOPHAGOUS FUNGUS *POCHONIA CHLAMYDOSPORIA* IN DIFFERENT SUBSTRATES [PRODUÇÃO DE CLAMIDÓSPOROS DO FUNGO NEMATÓFAGO *POCHONIA CHLAMYDOSPORIA* EM DIFERENTES SUBSTRATOS]. **E. A. Lopes, S. Ferraz, P. A. Ferreira, S. L. Carvalho and L. G. Freitas. Departamento de Fitopatologia, Universidade Federal de Viçosa, Viçosa-MG, 36570-000, Brasil. silamar@ufv.br.—***Pochonia chlamydosporia,* a facultative parasitic fungus of nematode eggs, has shown potential as a biological control agent against *Meloidogyne* spp. The main objective of this study was to investigate the production of chlamydospores of the fungus in different substrates. *P. chlamydosporia* was grown in Erlenmeyer flasks containing 20 g of substrate for 15 days at 26°C. The substrates tested consisted of mixtures of *Ricinus communis* oilcake and *Canavalia ensiformis* seed powder at different rates (50:50; 37.5:62.5; 25:75; 12.5:87.5; 62.5:37.5; 75:25; 87.5:12.5) and a mixture of milled maize and sand (50:50) as the control treatment. *P. chlamydosporia* was cultivated in milled maize: sand produced an average of 6.5 times more chlamydospores than when cultivated in the other mixtures. No significant difference was observed among different mixtures of *R. communis* oilcake and *C. ensiformis* seed powder. Financial support: FAPEMIG/CNPq.

RESPUESTAS DE DEFENSA EN CHILE CM-334 INOCULADO CON *PHYTOPHTHORA CAPSICI* Y *NACOBBUS ABERRANS* [DEFENSE RESPONSES IN CM-334 INOCULATED WITH *PHYTOPHTHORA CAPSICI* AND *NACOBBUS ABERRANS*]. **N. López-Martínez and E. Zavaleta-Mejía. Colegio de Postgraduados, Montecillo, Estado de México, CP 56230. zavaleta@colpos.mx.—**El chile CM-334 es resistente al oomiceto *P. capsici* (*Pc*), pero *N. aberrans* (*Na*) rompe la resistencia. Conocer los cambios

metabólicos inducidos por *Na*, puede ayudar a entender el fenómeno de rompimiento de la resistencia. Se comparó la actividad de peroxidasas, fenilalanina amonio liasa (PAL) y el contenido de fenoles solubles totales (fst) en raíces de plantas CM-334 inoculadas con cada patógeno y con ambos. La máxima y la mínima actividad de peroxidasas correspondió a plantas inoculadas únicamente con *Pc* o con *Na*, respectivamente ($P \leq 0.005$); en plantas inoculadas con ambos patógenos y en las testigo sin inocular fueron muy similares. No obstante, sólo la actividad del tratamiento *Pc* fue significativamente diferente de los tres restantes. La actividad de PAL fue mayor en plantas inoculadas únicamente con *Pc*; en cambio ésta fue menor y similar ($P \leq 0.05$) en las del testigo y las inoculadas solamente con *Na* y con ambos patógenos. Generalmente el mayor contenido de fst se registró en las plantas inoculadas únicamente con *Pc* y las diferencias con los demás tratamientos fueron significativas ($P \leq 0.05$); en cambio las plantas inoculadas con *Na* sólo o en combinación con *Pc*, presentaron niveles significativamente ($P \leq 0.05$) más bajos en comparación con el testigo.

DESCUBRIMIENTO E IMPLEMENTACIÓN DE NEMATODOS ENTOMOPATÓGENOS PARA EL CONTROL DE LA BROCA DEL CAFÉ EN COLOMBIA [DISCOVERY AND IMPLEMENTATION OF ENTOMOPATHOGENIC NEMATODES FOR THE CONTROL OF COFFEE BERRY BORER IN COLOMBIA]. **J. C. López-Núñez[1] and S. P. Stock[2]. [1]Centro Nacional de Investigaciones de Café, Disciplina de Entomología, A.A: 2427, Manizales-Caldas, CENICAFÉ, Planalto-Chinchiná-Caldas, Colombia, [2]Department of Entomology, The University of Arizona, Forbes 410,1140 E. South Campus Drive, Tucson AZ 85721-0036, USA. JuanCarlos.Lopez@cafedecolombia.com.—**La broca del café, *Hypothenemus hampei* (Ferrari) (Coleoptera: Curculionidae), es la principal plaga en todos los países productores de café del mundo. Los frutos de café brocados que quedan en el campo y que no son retirados principalmente después de las cosechas, son factor de incremento y dispersión, afectando frutos sanos para cosechas posteriores. Trabajos en que consistentemente se presenten resultados, que permitan considerar a los nematodos entomopatógenos como una herramienta de control principalmente de poblaciones de broca en el suelo, son escasos. Investigaciones en que Cenicafé ha sido pionero, se han enfocado a obtener información de especies nativas de los géneros *Steinernema* spp., y *Heterorhabditis* spp. sobre su virulencia, comportamiento, ciclo de vida y estrategias de búsqueda sobre la broca del café. Adicionalmente, el conocimiento sobre sistemas de aplicación, su uso en mezcla con hongos entomopatógenos bajo condiciones de invernadero y de campo en pequeña escala, y el hallazgo de nuevas especies aisladas del ecosistema cafetero, virulentas a la broca del café, permiten considerar a esta herramienta biológica promisoria dentro del Manejo Integrado de la Broca. El conocimiento desarrollado durante estos años, y la disponibilidad de material invaluable con que se cuenta, ha posibilitado que en Colombia los nematodos entomopatógenos entren a ser parte activa de estrategias de control promisoria, no solo para el control de insectos plaga en la agricultura, sino también en campos como la veterinaria, y medicina.

ANTAGONISTIC POTENTIAL OF BACTERIAL ISOLATES FOR *MELOIDOGYNE GRAMINICOLA* CONTROL IN FLOODED RICE [POTENCIAL ANTAGÓNICO DE AISLAMIENTOS DE BACTERIAS PARA EL CONTROL DE *MELOIDOGYNE GRAMINICOLA* EN ARROZ BAJO RIEGO]. **J. Ludwig[1], A. B. Moura[1], V. K. Bosembecker[2], L. Somavilla[1], D. L. Lima[2] and C. B. Gomes[2]. [1]Universidade Federal de Pelotas/Fitossanidade/FAEM, 96010-900, [2]Embrapa Clima Temperado/ Pelotas-RS, Brasil. juludwig@yahoo.com.br.—**Rice is one of the most cultivated and consumed cereals in Brazil. However, this crop is subject to some disease problems, including the root-knot nematode *Meloidogyne graminicola*. Considering that there are neither resistant rice cultivars nor registered nematicides for rice in Brazil, eight bacterial isolates pre-selected for controlling *Bipolaris oryzae*, *Gerlachia oryzae* and *Rhizoctonia solani*, were evaluated for antagonistic potential against *M. graminicola*. Rice seeds of El Passo L144 cultivar were immersed in suspensions of the isolates DFs185 (*Pseudomonas synxatha*), DFs223 (*P. fluorescens*), DFs306 (not identified), DFs416, DFs418 and DFs419 (*Bacillus* sp.), DFs422 (*Bacillus subtilis*) or DFs471 (*Stenotrophomonas malthopilia*), individually. Seeds then were plant-

ed in pots filled with sterilized soil and maintained under greenhouse conditions. Seeds of rice immersed in saline water solution were used as a control. A randomized design with six replications with one plant per pot was used. After the emission of the fourth rice leaf (25 days microbial seed treatment), each plant was inoculated with 5,000 eggs + J2 of the nematode. Fifty days after the inoculation, the panicule and shoot number, plant height, aerial and root fresh mass, number of galls and eggs of the nematode and its reproduction factor (RF) were evaluated. As compared to the control all isolates were efficient in reducing the number of eggs, galls and the reproduction factor, suppressing about 24.76% of the *M. graminicola* reproduction. There were no significant differences in the other variables studied.

MANEJO DE *MELOIDOGYNE INCOGNITA* EN CAMPO CON ENMIENDAS ORGÁNICAS, SOLARIZACIÓN Y BIOFUMIGACIÓN EN EL ESTADO FALCÓN, VENEZUELA [MANAGEMENT OF *MELOIDOGYNE INCOGNITA* UNDER FIELD CONDITIONS WITH ORGANIC AMENDMENTS, SOIL SOLARIZATION AND BIOFUMIGATION IN FALCÓN STATE, VENEZUELA]**. Z. Lugo[1,2], R. Crozzoli[2], N. Greco[3], A. Fernandez[1] and A. Cortéz[1]. [1]Instituto Nacional de Investigaciones Agrícolas, Apdo. 4101, Coro, Edo. Falcón, [2]Universidad Central de Venezuela, Facultad de agronomía, Post Grado en Zoología Agrícola, Apdo. 4579, Maracay, Edo. Aragua, Venezuela, [3]Consiglio Nazionale delle Ricerche, Istituto per la Protezione delle Piante, Sezione di Bari, Bari, Italia. zlugo@inia.gob.ve.—**Se evaluó en campo el efecto de enmiendas orgánicas [materia verde de *Calotropis procera* (Aiton) R. Brown], diferentes periodos de solarización y biofumigación con *C. procera* para el control de *Meloidogyne incognita* en melón (*Cucumis melo* L.). El ensayo se realizó en el sector El Limoncito, municipio Miranda, durante mayo-julio de 2006. La parcela poseía suelo de textura franca y cada unidad experimental constó de 16.5 m^2. Se empleó un diseño de bloques al azar con cuatro réplicas y 13 tratamientos: T1) testigo; T2) solarización por 2 semanas con plástico transparente de 30 µm; T3) solarización por 4 semanas; T4) solarización 8 semanas; T5) incorporación de 5 ton/ha de *C. procera* 2 semanas antes de siembra; T6) 10 ton/ha *C. procera* 2 semanas antes de siembra; T7) solarización + 5 ton/ha de *C. procera* durante 2 semanas; T8) solarización + 5 ton/ha de *C. procera* durante 4 semanas; T9) solarización + 5 ton/ha de *C. procera* durante 8 semanas; T10) solarización + 10 ton/ha de *C. procera* durante 2 semanas; T11) solarización + 10 ton/ha de *C. procera* durante 4 semanas; T12) solarización + 10 ton/ha de *C. procera* durante 8 semanas; T13) 20 Kg/ha de carbofuran 30 días antes siembra. La solarización durante 2-8 semanas y la biofumigación durante 4 y 8 semanas redujeron las poblaciones de juveniles de segundo estadio (J2) en más de 90% al comparar con el tratamiento testigo. Asimismo, el rendimiento en estos tratamientos alcanzó 5.6 ton/ha, tres veces más que el de las parcelas testigo.

EL GÉNERO *XIPHINEMA* EN EL NEOTRÓPICO: PRINCIPALES ESPECIES Y SU DISTRIBUCIÓN [THE GENUS *XIPHINEMA* IN THE NEOTROPICS: PRINCIPAL SPECIES AND THEIR DISTRIBUTION]. **J. C. Magunacelaya[1] and M. E. Doucet[2]. [1]Universidad Católica de Valparaíso, Chile, [2]Universidad Nacional de Córdoba, Argentina. jmagunac@ucv.cl .—**La Región Neotropical está formada por América del Sur, Centroamérica, el Caribe y sur de Florida en USA. Comprende cinco vastos dominios que comparten numerosas especies de plantas y animales. En ese ámbito, el género *Xiphinema* está representado por, al menos, 43 especies diferentes. Fitoparásitas estrictas, son responsables de serios perjuicios para la agricultura de la Región. En algunos casos, ocasionan daños como consecuencia de la acción lacerante de su largo estilete. En otros, se agrega la particularidad que tienen determinadas especies para transportar y transmitir virus fitopatógenos del grupo de los nepovirus a un amplio rango de hospedantes. Entre estos, se cuentan tanto plantas autóctonas como introducidas, de importancia o no para la agricultura, así como numerosas gramíneas. El grupo *Xiphinema americanum*, *X. index* y *X. krugi* serían los nematodos de este género para los que se ha registrado la mayor frecuencia de aparición. La segunda especie está presente en la mayoría de las áreas vitícolas; a veces se encuentra en considerables densidades de población y con la aptitud para transmitir el fanleaf virus disease. Es importante destacar que, aparte esas especies, han sido detectadas

numerosas poblaciones para las que no se conoce su identidad específica, los hospedantes con los que se relacionan ni sus características biológicas. A nivel de la región, la información existente acerca del género puede ser considerada como muy fragmentada. Téngase en cuenta que entre 1995 y 2006 se registran 635 publicaciones en el mundo acerca del género; apenas 80 (el 12,6%) corresponden al neotrópico. De ese bajo porcentaje, se destacan sólo algunos países con cantidades variables de artículos acerca del tema (Chile: 22; Brasil: 21; USA, estado de Florida: 10; Venezuela: 8; Colombia: 6; Argentina: 4). En muchos de los restantes, los datos sobre el particular son escasos o inexistentes. La importante biodiversidad que caracteriza a la Región, justifica desarrollar proyectos de investigación tendientes a incrementar los conocimientos existentes sobre el género *Xiphinema*.

ACCIÓN NEMATICIDA Y BENEFICIOS PARA LA PLANTA (VAR. CHARDONNAY) DEL 1,3-DICLOROPROPENO (TRIFORM), EN SUELOS ALTAMENTE INFESTADOS CON *MELOIDOGYNE ETHIOPICA*, EN CHILE CENTRAL, DESPUÉS DE 5 AÑOS [NEMATICIDAL ACTION AND BENEFITS FOR THE PLANT (VAR. CHARDONNEY) OF 1,3-DICHLOROPROPENE (TRIFORM), IN SOILS HIGHLY INFESTED WITH *MELOIDOGYNE ETHIOPICA,* IN CENTRAL CHILE AFTER 5 YEARS]. **J. C. Magunacelaya, J. Pierce and T. Ahumada. Universidad Católica de Valparaíso, Valparaíso, Chile. jmagunac@ucv.cl.—**Entre las temporadas 2001-2002 y 2005-2006 se evaluó las poblaciones de nematodos post aplicación de 1,3-dicloropropeno, en viñedos Chardonnay, Viña Undurraga, Melipilla, Chile. Se consideró peso poda, rendimiento y calidad de raíces. Se aplicó 1,3-D, a 280, 370 y 467 litros/ha. A partir de la temporada 2003-2004 se aplicó Etoprofos. Se consideró plantas testigo en sectores no fumigados. Desde el 2003 hasta el 2006 hubo reducciones de *Meloidogyne ethiopica* con 1,3-D más Etoprofos. Hubo mayor presencia de machos de *M. ethiopica* en el testigo absoluto, y menor en las dosis baja, media y alta de 1,3-D, y en los tramientos de mocap. También hubo altas poblaciones de machos en los tratamientos testigos químicos Nemacur y Mocap. Al aplicar Etoprofos en sectores fumigados con Triform en las tres últimas temporadas, se obtuvo buen control de juveniles, presentándose reducciones poblacionales de *M. ethiopica* con Triform 467 L/ha. Los nematodos no fitoparásitos fueron poco afectados, y cuando hubo incidencia, se produjo una rápida recuperación. Las plantas del sector fumigado ya han iniciado su período productivo normal y presentan buen vigor, las plantas viejas presentan menor vigor, pero han sobrevivido, a diferencia de las plantas no tratadas que murieron al tercer año. El vigor de plantas del sector fumigado con Triform a dosis máxima mostró mayor uniformidad, y alcanzó los rendimientos de las plantas antiguas no fumigadas a las que se siguió aplicando nematicidas no fitotóxicos, y todos los tratamientos fumigantes presentan mejor calidad de raíces que los sectores no fumigados.

OVERVIEW ON THE USE OF BIOCONTROL AGENTS FOR NEMATODE CONTROL TO PHASE OUT METHYL BROMIDE [REVISIÓN DEL USO DE AGENTES BIOCONTROLADORES DE FITONEMATODOS PARA LA ELIMINACIÓN DEL BROMURO DE METILO]. **N. Marban-Mendoza[1] and F. Chaverri[2]. [1]Universidad Autónoma Chapingo, Posgrado en Protección Vegetal, Chapingo Edo. de México CP 56230, [2]Universidad Nacional Heredia, Inst. Regional en Sustancias Tóxicas, Costa Rica. nmarbanm@yahoo.com.mx.—**It is well known that research and development in industrial countries to look for new chemical and non-chemical products effective against soil borne pests has dramatically increased since 1990 due to the need to phase out methyl bromide (MB) within the framework of the Montreal Protocol. Much information has been published, primarily on chemical alternatives rather than non-chemical counterparts. During our talk, an overview of the impact of different alternatives to MB use on a worldwide basis will be discussed. Special emphasis will be placed on biocontrol tactics for controlling plant parasitic nematodes. A review of the MBAO proceedings over 6 years is analyzed. Both greenhouse and field data is used to compare the efficacy of different biocontrol agents, mainly against root-knot species and other nematodes attacking cash crops, such as pepper, tomato, eggplant, melon, watermelon, and orchard crops. It appears that biocontrol agents in combination with solarization, biofumigation, or soil emendation work well enough compared with

MB, particularly where pest pressure is not very high at the beginning of the season. In some instances of double cropping in a single year, they can perform well if the second crop season is reinforced with biocontrol agents followed by one chemical application at the beginning of the first season. Field data generated in Central American melon growing areas is used to illustrate some examples.

INCIDENCIA DE DISTINTOS MANEJOS DE SUELO EN POBLACIONES DE *MELOIDOGYNE INCOGNITA* (KOFOID AND WHITE, 1919) CHITWOOD, 1949, EN UN VIÑEDO DE LA CULTIVAR MALBEC, EN LA PROVINCIA DE MENDOZA, ARGENTINA [INFLUENCE OF DIFFERENT SOIL MANAGEMENT PRACTICES ON *MELOIDOGYNE INCOGNITA* (KOFOID AND WHITE, 1919) CHITWOOD, 1949, IN A VINEYARD CV. MALBEC, IN MENDOZA PROVINCE, ARGENTINA]. **M. D. Martinotti, S. J. Castellanos, M. S. del Toro and M.S. Marin. Departamento de Ciencias Biológicas, Facultad de Ciencias Agrarias, UNCuyo, Chacras de Coria, Luján de Cuyo, Mendoza, Argentina. mmartinotti@fca.uncu.edu.ar.—***Meloidogyne* spp., es el principal nematodo fitoparásito que ataca viñedos de Argentina. En la Provincia de Mendoza se han realizado varios trabajos de manejo integrado de nematodos, tales como enmiendas de suelo y el uso de pies resistentes, siendo la utilización de coberturas vegetales un tema importante a desarrollar. El objetivo de la experiencia fue evaluar la incidencia de distintos manejos de suelo sobre la densidad de una población de *M. incognita* en raíces de un viñedo de la cv. Malbec. Los tratamientos efectuados fueron: 1) Testigo: control de malezas con glifosato al pie de la planta y labranza mecánica en el interfilar; 2) cobertura perenne con *Lolium perenne* L. y *Lotus corniculatus* L.; y 3) incorporación de orujo de uva fresco durante el receso invernal, al pie de la planta. Se muestrearon raíces antes de la aplicación de la enmienda, (poscosecha 2005) y en poscosecha 2007. Se contaron juveniles y hembras con masas de huevos. Se determinó el Índice de Reproducción (IR = Pf/Pi). Los resultados obtenidos indicaron que la incorporación de orujo fresco (IR = 1.31) y la cobertura vegetal (IR = 0.97) resultaron estadísticamente superiores a la aplicación de herbicida al pie de la planta y labranza en el interfilar (IR = 4.16), sin diferencias estadísticas entre ellos. Se concluye que los distintos manejos de suelo afectaron la dinámica poblacional de *M. incognita*; el manejo de suelo con control mecánico de las malezas en el interfilar presentó el mayor IR.

PRINCIPALES NEMATODOS FITOPARÁSITOS DETECTADOS EN CULTIVOS DE PAPA (*SOLANUM TUBEROSUM* L.) EN CHILE [MAIN PHYTOPARASITIC NEMATODES DETECTED IN POTATO (*SOLANUM TUBEROSUM* L.) CROPS IN CHILE]**.** **I. Moreno-Lehuedé. Servicio Agrícola y Ganadero, División Protección Agrícola Av Bulnes 79, Santiago, Chile. ingrid.moreno@sag.gob.cl.—**El Servicio Agrícola y Ganadero (SAG) mantiene un programa nacional de vigilancia fitosanitaria, vigente desde comienzos de la década de los 80 hasta hoy en día, y cuyos principales objetivos han sido el conocer la situación de las plagas presente y ausentes del país condición que le permite confeccionar los listados de plagas cuarentenarias de acuerdo a la Convención Internacional de Protección Fitosanitaria (CIPF). Uno de los principales cultivos estratégicos lo constituye la papa (*Solanum tuberosum*) y por consiguiente muchos esfuerzos han sido orientados a conocer la situación de los nematodos enquistados de la papa. *Globodera rostochiensis* y *Globodera pallida*. Sin embargo las prospecciones en cultivos de papas también han permitido conocer la existencia de otros nematodos fitoparásitos de importancia económica tales como *Nacobbus aberrans* s.l. en el altiplano chileno, *Ditylenchus destructor* en la región austral, *Globodera rostochiensis* y *Globodera pallida* en las regiones altiplánicas, marítimas y del valle central y la ausencia de los nematodos enquistados en las zonas semilleros de papa semilla certificada y corriente del sur del país. El nematodo del nudo *Meloidogyne* esta distribuido principalmente en la región sur (VIII-IX y X Regiones) con las especies *M. hapla* y *M. incognita*. El género *Pratylenchus* esta presente en varias regiones con amplia distribución en el país y representado por las especies *P. brachyurus*, *P. crenatus*, *P. neglectus*, *P. thornei*, *P. penetrans*. Las prospecciones en cultivo de papa permiten señalar la ausencia de *Meloidogyne chitwoodi*, *M. fallax*, *N. aberrans*, *G. rostochiensis* y *G. pallida* en el área destinada a la producción de papa semilla certificada y corriente, localizadas en las Regiones VIII-IX-X y XI.

DIVERSITY OF *MELOIDOGYNE EXIGUA* (TYLENCHIDA: MELOIDOGYNIDAE) POPULATIONS FROM COFFEE AND RUBBER TREE [DIVERSIDAD DE POBLACIONES DE *MELOIDOGYNE EXIGUA* (TYLENCHIDA: MELOIDOGYNIDAE) PROVENIENTES DE CULTIVOS DE CAFÉ Y ÁRBOL DE LA GOMA]. **M. F. S. Muniz[1], V. P. Campos[2], P. Castagnone-Sereno[3], J. M. C. Castro[4], M. R. A. Almeida[5] and R. M. D. G. Carneiro[5]. [1]UFAL-Centro de CiÍncias Agr·rias, 57100-000 Rio Largo, AL, Brazi, [2]UFLA-Departamento de Fitopatologia, C.P. 3037, 37200-000 Lavras, MG, Brazil, [3]INRA, Lab. Biol. Inver., BP 2078, Antibes CÈdex, France, [4]Embrapa Semi-Árido, C.P. 23, 56302-970 Petrolina, PE, Brazil, [5]EMBRAPA/CENARGEN, C.P. 02372, 70849-970 BrasÌlia, DF, Brazil. recar@cenargen.em-brapa.br.—**Isozymes (esterase and malate desydrogenase), SCAR and RAPD-PCR were compared for populations of three races of *Meloidogyne exigua,* collected in coffee-producing areas in Brazil, Bolivia, and Costa Rica, and for one Brazilian population from rubber tree. This study revealed four esterase phenotypes (E1, E2, E2a, E3) and three malate desydrogenase phenotypes (N1, N1a, N2) for *M. exigua* populations. The most common multienzyme phenotype was E2N1. The enzymatic phenotypes do not separate *M. exigua* races. Sixteen populations of *M. exigua* were tested using SCAR primers ex-D15F/R that allowed the identification of all *M. exigua* populations. Phylogenetic analyses showed high intraspecific polymorphism (24.6-57.8%) for sixteen *M. exigua* populations. However, all populations clustered together with 100% of bootstrap showing the consistency of species identification. In addition, the RAPD markers produced were consistent with other approaches (isozyme phenotypes and SCAR).

COMPARISON OF METHODOLOGIES FOR EVALUATING COMPATIBILITY OF AGROCHEMICALS WITH ENTOMOPATHOGENIC NEMATODES (RHABDITIDA: STEINERNEMATIDAE, HETERORHABDITIDAE) [COMPARACIÓN DE MÉTODOS PARA EVALUAR LA COMPATIBILIDAD DE QUÍMICOS AGRONÓMICOS CON NEMATODOS ENTOMOPATÓGENOS (RHABDITIDA: STEINERNEMATIDAE, HETERORHABDITIDAE)]. **A. S. Negrisoli, Jr.[1], C. R. C. Barbosa[1] and A. Moino, Jr.[2] [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, Brazil, [2]Entomology Department, Federal University of Lavras, 37200-000, Lavras, MG, Brazil. asnegrisoli @gmail.com.—**Different methodologies for evaluating the compatibility of agrochemicals with entomopathogenic nematodes (NEPs) are found in the literature. Considering that the ideal method would be efficient yet also simple and cheap to use, a study was designed to compare the different methodologies. Four methods were tested: Krishnayya and Grewal, (2002) Rovesti *et al.* (1988), Hara and Kaya (1983) and Vainio (1992). All methodologies were compared based on two evaluation parameters: the viability of the IJs and the infection rate in *G. mellonella.* Some adaptations were made in each methodology to allow comparisons among methods. As a standard, in all methods, glylphosate (Glifosate 480 CS, Agripec) and the nematodes *S. carpocapsae* (Weiser, 1955) and *H. bacteriophora* Poinar, 1976 were used, because the herbicide was considered moderately compatible with JIs of *S. carpocapsae* and *H. bacteriophora* in a previous study. There is no difference between effects of glyphosate at equal concentration and exposure time on IJs of *S carpocapsae* and *H. bacteriophora.* The least costly method was the one described by Rovesti *et al.* (1988), followed by Vainio's protocol (1992), Krishnayya and Grewal (2002), and Hara and Kaya (1983). The best methodology was Vainio (1992) based on a combination of simple handling and low cost.

COMPATIBILITY EVALUATION OF AGROCHEMICALS WITH ENTOMOPATHOGENIC NEMATODES (RHABDITIDAE: *STEINERNEMA*, *HETERORHABDITIS*) [EVALUACIÓN DE LA COMPATIBILIDAD DE QUÍMICOS AGRONÓMICOS CON NEMATODOS ENTOMOPATÓGENOS (RHABDITIDAE: *STEINERNEMA*, *HETERORHABDITIS*)]. **A. S. Negrisoli, Jr.[1], C. R. C. Barbosa[1] and A. Moino, Jr.[2] [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, Brazil, [2]Entomology Department, Federal University of Lavras, MG, Lavras, 37200-000, Brazil. asnegrisoli @gmail.com.—**The use of chemicals, agrochemicals, and biological control agents in integrated pest management has been the goal of several studies. Entomopathogenic nematodes (EPN) can be uti-

lized as a strategy to control pests with the possibility of application together with other entomopathogens and agrochemicals in the tank mixture. Thus, the objective of this work was to evaluate the compatibility of selected agrochemicals with two species of EPN. Eighteen products were utilized, representing insecticides, nematicides, acaricides and herbicides. *H. bacteriophora* Poinar, 1976 and *S. carpocapsae* (Weiser, 1955) were exposed to the highest concentration recommended of each product for a period of 48 hours in test tubes and kept in an environmental chamber at 22 ± 1º C. After that time, the IJs were separated from the products, and their viability determined under a stereoscopic microscope. Infection was evaluated in 10 caterpillars of *G. mellonella*, in a petri dish with a filter paper, to which about 100 IJs were added. After five days the caterpillars were transferred to a drying chamber. Three days later, the caterpillars with EPN infection symptoms were counted. The products thiophanate metil (Cercobin 700 PM®), tiametoxan (Actara®) and imidacloprid (Premier®) decreased the viability and the infectivity of *S. carpocapsae*. Tiametoxan (Actara®), aldicarb (Temik®) and carbofuran (Furadan) reduced the viability of *H. bacteriophora*.

COMPATIBILITY OF AGROCHEMICALS WITH ENTOMOPATHOGENIC NEMATODES (RHABDITIDA: HETERORHABDITIDAE, STEINERNEMATIDAE) [COMPATIBILIDAD DE QUÍMICOS AGRONÓMICOS CON NEMATODOS ENTOMOPATÓGENOS (RHABDITIDA: HETERORHABDITIDAE, STEINERNEMATIDAE)]. **A. S. Negrisoli, Jr.[1], C. R. C. Barbosa[1] and A. Moino, Jr.[2] [1]Plant Pathology Department, Federal University of Pelotas, 96010-900, Pelotas, RS, Brazil, [2]Entomology Department, Federal University of Lavras, 37200-000, Lavras, MG, Brazil. asnegrisoli @gmail.com.—**Entomopathogenic nematodes (EPN) are efficient biological control agents used all over the world for pest control. In an Integrated Pest Management (IPM) program, different control strategies are utilized, making it important to determine the interaction between different agrochemicals and entomopathogens. This study examined compatibility of EPNs with selected chemical products. About 2,000 and 2,500 IJ/3 mL of *Heterorhabditis* sp. (strain PI) and/or *Steinernema arenarium* Artyukhovsky (1967) were added to tubes (10 mL) with an equal volume of agrochemicals at twice the highest recommended tank concentration. After 2 days, nematodes were separated from the products, and dead nematodes were counted. In that same period, an infectivity bioassay was accomplished by adding 2 ml of the washed IJs suspension to nine-centimeter-diameter petri dishes with one filter paper sheet and 10 last instar *Galleria mellonella* larva. After 8 days the number of dead larva was counted in each treatment. The products oxifluorfen (Goal CE®) and Dimethyl urea (Karmex 110 WG®) were considered incompatible with *Heterorhabditis* sp. (strain PI), causing viability and infectivity reduction; azafenidim (Ranger®) was toxic to *S. arenarium* causing loss of IJ infectivity.

SUSCEPTIBILITY OF *ALPHITOBIUS DIAPERINUS* (PANZER) (COLEOPTERA: TENEBRIONIDAE) TO ENTOMOPATHOGENIC NEMATODES (RHABDITIDA: HETERORHABDITIDAE, STEINERNEMATIDAE) IN THE LABORATORY [SUSCEPTIBILIDAD DE *ALPHITOBIUS DIAPERINUS* (PANZER) (COLEOPTERA: TENEBRIONIDAE) A NEMATODOS ENTOMOPATÓGENOS (RHABDITIDA: HETERORHABDITIDAE, STEINERNEMATIDAE) EN LABORATORIO]. **A. S. Negrisoli, Jr., C. R. C. Barbosa, D. Bernardi, A. Silva and M. S. Garcia. Plant Pathology Deptartament, Federal University of Pelotas, 96010-900, Pelotas, RS, Brazil. asnegrisoli@gmail.com.—***Alphitobius diaperinus*, or the lesser mealworm, is one of the main pests of aviculture found colonizing substrate in poultry farms. Control of this insect is difficult due its short life cycle and a behavior that favors reinfestation, by taking shelter in rifts, cracks, or even below the soil, close to the pillars of the hangars. Entomopathogenic nematodes (EPN), due to their searching behavior, are efficient agents of biological control of insects in cryptic environments, offering the possibility to control *A. diaperinus*. The objective of this study was to evaluate the efficiency of five concentrations (25, 50, 75, 100 and 125 JI/insect) of three species of EPN against larvae and adults of the pest. Adults were put in petri dishes and larvae in Eppendorff microtubes (1.5 mL), containing food (rabbit meal) and moistened filter paper. Mortality was observed 5 days after the treatment, and after 5 more days to confirm death was

caused by EPN. There was no mortality in the control. *Steinernema carpocapsae* caused high mortality in adults (87%) at the concentration of 125 IJ/adult. *Heterorhabditis* sp. RS 57 and *H. bacteriophora* HP88 induced low mortality (at most 16 and 27%, respectively). *S. carpocapsae* and *Heterorhabditis* sp. RS 57 caused, respectively, 83% to 100% mortality of larvae. *Heterorhabditis bacteriophora* HP88 caused 25% mortality at the concentration of 25 IJs/larvae. At concentrations of 50 and 125 JI/larva, this species provided 94 and 93% mortality, respectively.

BIOLOGICAL CONTROL OF NEMATODES WITH BACTERIA [CONTROL BIOLÓGICO DE NEMATODOS CON BACTERIAS]. **G. R. Noel. USDA, ARS, Urbana, IL 61801, USA. g-noel1@uiuc.edu.—**Biological control of nematodes is receiving increased attention as environmental considerations with the use of nematicides have increased in importance and their high cost prohibits use on many crops. In addition, nematode resistant cultivars are not available for many crops and resistance that is available often is not durable. Fungi and bacteria as biological control agents of nematodes have been studied more than other organisms with fungi receiving more attention than bacteria. Current knowledge of endophytic bacteria and rhizosphere inhabiting ectoparasitic and endoparasitic bacteria and their modes of action, including induced resistance, toxins, and direct parasitism will be discussed.

MANAGEMENT OF SOYBEAN CYST NEMATODE, *HETERODERA GLYCINES*, IN NORTH AMERICA [MANEJO DEL NEMATODO DEL QUISTE DE LA SOJA, *HETERODERA GLYCINES*, EN AMÉRICA DEL NORTE]. **G. R. Noel. USDA, ARS, Urbana, IL 61801, USA. g-noel1@uiuc.edu.—**The soybean cyst nematode, *Heterodera glycines*, is a serious yield limiting pest in both Canada and the USA. Management of the nematode relies on crop rotation with non hosts, usually maize, and planting of resistant cultivars. However, the cropping system produces soybean every other year and exerts selection pressure on the nematode. The PI88.788 source of resistance is in the pedigree of 99% of resistant cultivars grown at present. PI88.788 resistance has been durable since it was first released, but evidence indicates that populations of *H. glycines* in some areas have adapted and become virulent. In addition, the level of resistance in many proprietary cultivars is not adequate to manage the nematode. Gene deployment (rotation of resistance genes from different sources of resistance) may increase durability of sources of resistance. In addition, the lower yield potential of resistant cultivars causes many producers to not practice rotation optimally. In the future, new resistance obtained from perennial soybean, *Glycine tomentella*, and integration of biological control organisms such as *Hirsutella rhossiliensis* and *Pasteuria nishizawae* into the production system may provide sustainable soybean production that minimizes the yield-limiting effects of *H. glycines*. In addition to resistant cultivars and biological control, damage thresholds, planting of blends and effects of tillage will be discussed.

MOLECULAR CHARACTERIZATION AND PHYLOGENETIC ANALYSIS OF A *PASTEURIA* SP. INFECTING *MESOCRICONEMA ORNATUM* (RING NEMATODE) USING GENES INVOLVED IN SPORULATION [CARACTERIZACIÓN MOLECULAR Y ANÁLISIS FILOGENÉTICO DE *PASTEURIA* SP. QUE INFECTA *MESOCRICONEMA ORNATUM* (NEMATODO DEL ANILLO) USANDO GENES INVOLUCRADOS EN LA ESPORULACIÓN]. **J. I. Orajay[1], L. M. Schmidt[2], G. Nong[2], J. F. Preston[2], J. A. Brito[3] and D. W. Dickson[1]. [1]Entomology and Nematology Department, [2]Microbiology and Cell Science Department, University of Florida, Gainesville, FL 32611, [3]Division of Plant Industry, Gainesville, FL 32614, USA. jiorajay@ufl.edu.—***Pasteuria* spp. are obligate endospore-forming bacterial parasites that infect several species of plant-parasitic nematodes and are considered to have significant potential as biological control agents. Samples of ring nematode (*Mesocriconema ornatum*) from peanut fields in Alachua and Marion Co., Florida, were found to be infected with an undescribed *Pasteuria*. Endospores of this *Pasteuria* have a larger central core and thicker parasporium than *P. penetrans* P20, the previously described obligate parasite of *Meloidogyne arenaria* Race 1. Immunofluorescent microcopy revealed that a *Pasteuria* spp. specific monoclonal antibody raised to whole

spores of *P. penetrans* P20 recognized an epitope on the endospore surface of the ring nematode *Pasteuria*, providing an approach to quantify these endospores in the soil. Degenerate primers were designed to amplify selected sporulation genes, *sigE*, *sigF*, *spo0A* and *spoIIAB*, and the corresponding products were cloned and sequenced. Phylogenetic comparisons of the partial coding sequences of *sigE*, *sigF*, *spo0A* and *spoIIAB* were made to *Pasteuria* spp. and to other Gram-positive endospore-forming bacteria within the *Bacillus-Clostridum* spp. group, using the maximum parsimony method and bootstrap test of phylogeny. These results showed the ring nematode *Pasteuria* sp. shares significant similarity to *P. penetrans*, and the two species are shown to reside together in a distinct clade within the Gram-positive endospore-forming bacteria. Species-specific primers designed for *spo0A* were able to distinguish ring nematode *Pasteuria* and *P. penetrans*. This study provides an initial characterization of a *Pasteuria* species infecting ring nematode, establishing a molecular basis for its identification and quantification in the soil environment with which to assess its potential for biological control.

USING VERIFICATION STRIPS TO VALIDATE NEMATODE MANAGEMENT ZONES IN COTTON [UTILIZACIÓN DE ERAS DE VERIFICACIÓN PARA VALIDAR ZONAS DE MANEJO DE NEMATODOS EN ALGODÓN]. **C. Overstreet and M. C. Wolcott. LSU Agricultural Center-Department of Plant Pathology and Crop Physiology, Louisiana State University, Baton Rouge, LA 70803, USA. coverstreet@agctr.lsu.edu.**—The advent of GIS technology in cotton production has begun to make radical changes in nematode management of cotton. Previously, most fields were treated uniformly with a nematicide if nematodes such as *Meloidogyne incognita* were present in the field. Currently, fields can be separated into management zones based on aerial imagery, yield monitor data, apparent soil electrical conductivity, or intensive nematode sampling, and nematicides can then be applied to specific zones. Verification strips are a number of rows (usually 12-16 each) of untreated and fumigant treated (1,3-D dichloropropene) rows replicated several times throughout the field that pass through the various management zones. In subsequent years, the zones that will be treated can be adjusted depending on the response of the nematicide. Two cotton fields that were infested with *Meloidogyne incognita* were evaluated for three years using these verification strips during 2004, 2005, and 2006. The fumigant 1,3-D dichloropropene at 28.1 l/ha was applied pre-plant and injected 30 cm beneath the center of each row in 12 row strips and replicated 4 times in each field across either 6 or 7 zones based on apparent soil electrical conductivity. Yield response to the nematicide in each field was both spatially and temporally stable. Field 1 had a significant yield response to the nematicide in 1 of the 6 zones and field 2 in 5 of 7 zones. Verification strips can show where nematodes are causing serious losses in a field and provide the best delineation of zones for application of fumigants.

PRESENCIA DE LA FAMILIA HOPLOLAIMIDAE EN MUESTRAS DE SUELO ANALIZADAS POR EL SERVICIO AGRÍCOLA Y GANADERO DE CHILE [OCCURRENCE OF THE FAMILY HOPLOLAIMIDAE IN SOIL SAMPLES ANALYZED BY THE AGRICULTURAL AND LIVESTOCK SERVICE OF CHILE]. **H. Pacheco and E. Henríquez. Unidad de Nematología, Subdepartamento Laboratorios y Estación Cuarentenaria Agrícola, Servicio Agrícola y Ganadero (SAG), Ruta 68 Km 22, Complejo Lo Aguirre, Chile. hugo.pacheco@sag.gob.cl.**—En el Laboratorio Central de Nematología del Servicio Agrícola y Ganadero se analizan muestras de suelo provenientes de todo el país derivadas de programas del SAG, de intercepciones en puntos fronterizos y de particulares. Así también se reciben muestras de sustratos provenientes de distintas partes del mundo. Se han encontrado nematodos fitoparásitos pertenecientes a la familia Hoplolaimidae en variados cultivos. El género de mayor ocurrencia es *Helicotylenchus* spp. con un amplio rango de hospedantes. Sin embargo también se ha detectado los géneros *Scutellonema*, *Hoplolaimus* y *Rotylenchus*. *Scutellonema* spp. se ha reportado en vivero de olivos (*Olea europea*) en la III región y también asociado a Quillay (*Quillaja saponaria*) y Casuarinas (*Casuarina* spp.) en la región metropolitana así como en una intercepción de suelo desde Argentina. *Hoplolaimus* spp. se reportó en huerto de Olivos en la III región. *Rotylenchus* spp. se reportó en la región metropolitana en vivero de especies ornamentales y en una intercepción de suelo desde

Inglaterra. Resulta de importancia reconocer las especies correspondientes a esos géneros puesto que algunas de ellas pueden ocasionar severos daños a la agricultura.

BIODIVERSITY AND BIOGEOGRAPHY OF FREE-LIVING NEMATODES FROM SALTY ENVIRONMENTS [BIODIVERSIDAD Y BIOGEOGRAFÍA DE NEMATODOS DE VIDA LIBRE LIBRE EN AMBIENTES SALINOS]. **C. T. Pastor de Ward. Centro Nacional Patagónico (CONICET), C.C. 128 (9120) Puerto Madryn, Chubut, Argentina. pastor@cenpat.edu.ar.—**Free-living nematodes are the most abundant and diverse metazoans in the sea and play an important functional role in the ecosystem. They are excellent organisms to use in environmental assessment, especially when new biodiversity indexes, as variation in taxonomic distinctness, are applied to species lists. Papers related to their distribution density and biodiversity are scarce around the world, and especially on American coasts. This presentation intends to show species lists from different coastal environments (Chile, Argentina, Cuba and East North America), the low number of species registered and the urgent need, from an environmental assessment point of view, to increase that knowledge. Also a multivariate statistical analysis of American marine free-living nematode assemblages (data available from literature), will be presented as an exercise, to see the possible different faunas and their relations with geographic history. Coastal habitat diversity and free-living nematode species found in Argentina will be shown, as well as the past and present work that has been done.

PRELIMINARY OBSERVATIONS OF NEMATODES FROM PATAGONIAN COASTAL AND LAGOON WATERS (CHUBUT, ARGENTINA) [OBSERVACIONES PRELIMINARES DE NEMATODOS DE AGUAS COSTERAS Y LAGOS DE LA PATAGONIA (CHUBUT, ARGENTINA)]. **C. T. Pastor de Ward and V. Lo Russo. Centro Nacional Patagónico (CONICET), C.C. 128 (9120) Puerto Madryn, Chubut, Argentina. pastor@cenpat.edu.ar.—**This paper focuses on *Diplolaimelloides* a very cosmopolitan genus inhabiting lotic freshwater to salty water inland, groundwater and coastal water systems, and provides a review of their taxonomy with new keys, as well as their distribution in east coastal and inland Patagonia. Two probably new species belonging to the genus *Diplolaimelloides* of the family Monhysteridae are described from Patagonian salty lagoons and coastal areas, in Chubut and Santa Cruz provinces of Argentina: *Diplolaimelloides* sp. 1 has four bursal and three postcloacal papillae, short gubernaculum, and spicules longer than 50 µm. It has been found in Patagonian salty lagoons and in high coastal salt marsh areas. *Diplolaimelloides* sp. 2 is characterized by the angular shape of the spicules and the long gubernaculum.

PRELIMINARY STUDIES ON THE SPECIFICITY OF PRIMERS FOR SPECIES DIAGNOSIS OF PLANT PARASITIC NEMATODES OF THE GENUS *DITYLENCHUS* [ESTUDOS PRELIMINARES QUANTO A ESPECIFICIDADE DE "PRIMERS" NO DIAGNÓSTICO DE ESPÉCIES DE FITONEMATÓIDES DO GÊNERO *DITYLENCHUS*]. **M. S. Paula[1], L. S. T. Carmo[1], J. E. Cares[3], V. L. A. Marinho[2] and R. C. V. Tenente[2]. [1]Bolsita CNPq/Embrapa, [2]Embrapa Recursos Genéticos e Biotecnologia, CP. 02372, CEP 70770-900, [3]Universidade de Brasília, DF, Brasil. vmarinho@cenargen.embrapa.br.—**Nematodes of the genus *Ditylenchus* are considered one of the most important groups of agricultural pests, causing great damage in the production of several crops, and some species have wide host ranges. According to Brazilian Phytosanitary Legislation, all *D. dipsaci* races, with the exception of the garlic and onion races which occur in Brazil and all other species of the genus *Ditylenchus* are quarantine pests for the country. Species identification is based on morphological and morphometric characteristics that are difficult to identify, especially when species are morphologically close to each other, and the difficulty increases when race identification of the nematode is concerned. The objective of this study was to characterize species of *Ditylenchus* by using molecular techniques, such as PCR. DNA was extracted from *Ditylenchus* spp. and stored in a DNA collection in the Embrapa Genetic Resources and Biotechnology Center Nematology Laboratory. Viability and specificity of 44 DNA samples were tested by using universal primers, and Ribo1 and Ribo2. All DNA samples were viable. For evaluation

of specificity the primers DitNF1 and rDNA2 were used, specific for *D. dipsaci sensu stricto* (Subbotin, 2005). Forty-four samples were amplified with the universal primers, and 17 were characterized as *D. dipsaci*, in agreement with previous morphological identification. PCR amplificaion with specific primers was efficient for identification and differentiation of *D. dipsaci sensu stricto* from other species in this study. Additional assays in progress aim to obtain specific primers for correct identification of *D. africanus*, *D. destructor*, and other *Ditylenchus* species of quarantine concern for Brazil.

NEMATODE COMMUNITY ASSOCIATED WITH STILLAGE FERTIRRIGATION MANAGEMENT AND SOIL PROPERTIES [COMUNIDAD DE NEMATODOS ASOCIADA AL MANEJO DE FERTIRRIGACIÓN CON VINOTE Y PROPIEDADES DEL SUELO]. **E. M. R. Pedrosa, M. M. Rolim, C. V. M. A. Silva and F. V. Bebé. Technology Department, Universidade Federal Rural de Pernambuco, Recife, PE, 52171-900, Brazil. elvira.pedrosa@pq.cnpq.br.—**Nematode community structure constitutes a potential instrument for assessing the quality of soils and for the development of biomonitoring systems. In this study, spatial sampling of the nematode community was done in a sugarcane growing area under different stillage fertirrigation periods and correlated to physico-chemical soil variables. To achieve this, four areas were selected: Area 1, irrigated with stillage up to 5 years; Area 2, from 5 to 10 years; Area 3, more than 10 years; and Area 4, without stillage application. In each area, 20 sampling points were demarcated, with soil samples collected at 0-10, 10-20, 20-40, 40-60, and 60-80-cm depths. Plant parasitic nematodes were dominant in areas 2, 3 and 4. All taxa correlated negatively with depth, except for Cephalobidae and *Criconemella* sp. *Helicotylenchus* sp. was the taxon showing the most correlations with soil physico-chemical factors; K^{+}, Ca^{++}, CE were the soil factors most correlated with taxa, affecting positively Dorilaimidae, Rhabditidae, Cephalobidae, *Meloidogyne* sp. and *Helicotylenchus* sp., and negatively Aphelenchidade and *Criconemella* sp.

PROSPECCIÓN DE *GLOBODERA ROSTOCHIENSIS* Y *G. PALLIDA* EN SUELOS DE PAPA, *SOLANUM TUBEROSUM* L., EN EL ÁREA LIBRE DE PLAGAS CUARENTENARIAS DEL SUR DE CHILE [SURVEY OF *GLOBODERA ROSTOCHIENSIS* AND *G. PALLIDA* IN SOILS CULTIVATED WITH POTATO, *SOLANUM TUBEROSUM* L., IN THE QUARENTINE PEST-FREE AREA IN THE SOUTH OF CHILE]. **G. Peña[1] and M. T. Illesca[2]. Servicio Agrícola y Ganadero, Av. Bulnes 140 Santiago, CHILE, Departamento de Laboratorios y Estaciones Cuarentenarias, [1]Laboratorio Regional SAG Osorno, [2]Laboratorio Regional SAG Chillán. gloria.pena@sag.gob.cl.—**A lo largo de más de doce años se realizaron prospecciones de suelos destinados al cultivo de papa, *Solanum tuberosum* L., en las Regiones del Bio Bío, de la Araucanía y de Los Lagos. Las evaluaciones comprendieron períodos que contemplaban toda la época del cultivo (Octubre a Marzo). El propósito fue evaluar su estado sanitario y asegurar la calidad de Área Libre del nematodo dorado de la papa (*Globodera rostochiensis)* y el nematodo blanco de la papa (*G. pallida*) que, junto con *Tecaphora solani* (*Angiosorus solani*) y *Ralstonia solanacearum,* conforman las plagas cuarentenarias del cultivo. Dichas prospecciones se llevan a cabo permanentemente a través del Sistema de Vigilancia que mantiene el Servicio Agrícola y Ganadero. En este trabajo se presentan los resultados de los últimos cuatro años, período en el cual se utilizó el Sistema de Posicionamiento Global (GPS), para la identificación de los puntos prospectados y posteriormente el Sistema de Información Geográfica SIG (SAG-SINREN) para mapear la información. Las muestras fueron procesadas en los Laboratorios Regionales de Osorno, Región de Los Lagos y Chillán, Región del Bio Bío mediante Metodología de Fenwick. Los resultados indicaron la ausencia de los nematodos antes mencionados.

NEMATODE DIVERSITY IN NEOTROPICAL AREAS: THE CASE OF DORYLAIMS (ORDER DORYLAIMIDA) [DIVERSIDAD NEMATOLÓGICA EN EL NEOTRÓPICO: EL CASO DE LOS DORILÁIMIDOS (ORDEN DORYLAIMIDA)]**. R. Peña-Santiago[1], A. Esquivel[2], E. J. Chaves[3] and G. Liébanas[1]. [1]Departamento de Biología Animal, Vegetal y Ecología, Universidad de Jaén, Campus "Las Lagunillas" s/n, Edificio B3, 23071- Jaén, Spain, [2]Laboratorio de Nematologia, Escuela de Ciencias**

Agrarias, Universidad Nacional, AP 86-3000, Heredia, Costa Rica, [3]INTA, Estación Experimental de Balcarce, 7620-Balcarce, Argentina. rpena@ujaen.es.—Dorylaims (order Dorylaimida) are one of the most important nematode taxa, highly diversified and good bioindicators of both freshwater quality and soil health. Moreover, they are widespread in continental habitats, where they become very frequent and abundant. Nevertheless, with the exception of particular contributions by several authors and the pioneer project by InBio and Universidad Nacional in Costa Rica, they have received limited study in Neotropical areas, in which a huge nematode diversity presumably exists. A compilation of available (published) data of dorylaimid (non-longidorid) species hitherto recorded from the Neotropics was done to apprise the state of the art, in particular to (i) establish a current inventory of genera and species, (ii) quantify the relative importance of each family in that inventory, (iii) describe the geographical distribution of each taxon, (iv) analyse distributional data to detect (tentative) biogeographical patterns, and (v) classify the taxa (genera and species) with biogeographical criteria. The interest in Neotropical nematode dorylaimid fauna is analyzed and discussed in a worldwide context. Further general studies should be undertaken to advance our current knowledge of free-living nematodes in Central and South America.

CARACTERIZACIÓN MORFOLÓGICA, MORFOMÉTRICA, ENZIMÁTICA Y RESPUESTA A HOSPEDANTES DIFERENCIALES DE POBLACIONES VENEZOLANAS DE *MELOIDOGYNE* [MORPHOLOGICAL, MORPHOMETRIC AND ENZYMATIC CHARACTERIZATION, AND DIFFERENTIAL HOST RESPONSES OF VENEZUELAN POPULATIONS OF *MELOIDOGYNE*]. **G. Perichi and R. Crozzoli. Universidad Central de Venezuela, Facultad de Agronomía, Postgrado de Zoología Agrícola, Apdo. 4579. Maracay, Aragua, Venezuela. perichig@hotmail.com.—**Con la finalidad de caracterizar morfológica, morfométrica y enzimáticamente, y evaluar la respuesta frente a hospedantes diferenciales, fueron aisladas tres poblaciones de *Meloidogyne* del municipio Mara del estado Zulia y una del municipio Libertador del estado Aragua. Las especies identificadas fueron *Meloidogyne mayaguensis* y *M. incognita*, respondiendo esta última a los hospedantes diferenciales como raza 1. Sin embargo, *M. mayaguensis* se comportó como *M. incognita* raza 2. El poro excretor (EP) de las hembras de *M. mayaguensis* se encuentra generalmente ubicado a nivel del metacorpus, mientras que en M. incognita está ubicado anteriormente y cercano a la base del estilete (ST). La relación EP/ST fue de 4.1-4.5 y 1.2-2.5 para *M. mayaguensis* y *M. incognita*, respectivamente. Aproximadamente el 40% de las hembras de *M. mayaguensis* mostraron un patrón perineal redondeado u ovalado; el 60% restante presentó un arco dorsal alto y trapezoidal, parecido al de *M. incognit*a. Los machos de *M. mayaguensis* se caracterizaron por presentar una cabeza truncada, sin estriaciones y con un disco labial plano; en cambio, la cabeza del macho de *M. incognita* presentó un disco labial cóncavo centralmente. Los J2 fueron muy similares en ambas especies. El análisis enzimático de *M. mayaguensis* reveló dos bandas en la actividad de las esterasas (fenotipo M2), una en la malato deshidrogenasa (fenotipo N1a) y dos en la glutamato oxalacetato transaminasa (fenotipo H2) permitiendo separarla de *M. incognita* (fenotipos I2, N1 y H1, respectivamente) por diferencias en la movilidad relativa.

OBSERVACIONES NEMATOLÓGICAS EN PAPA SEMILLA [NEMATODE OBSERVATIONS ON POTATO SEEDS]. **C. Picca and L. Porcel. Calle el Vivero s/n, CP 5600, Rama Caída, San Rafael, Mendoza, Argentina and [1]Laboratorio de Sanidad Vegetal, Estación Experimental Agropecuaria Rama Caída, Centro Regional Mendoza-San Juan, INTA. cpicca@correo.inta.gov.ar.—**El análisis nematológico de papa semilla es fundamental para evitar la dispersión de plagas hacia áreas libres de nematodos fitófagos perjudiciales. En el laboratorio de Sanidad Vegetal de la Estación Experimental Agropecuaria (EEA) del INTA Rama Caída (Centro Regional Mendoza-San Juan), habilitado por INASE, se analizaron en el presente año, 450 muestras de papa semilla fiscalizada procedentes de la zona productora de Malargüe. La mayor parte de las muestras correspondieron a la variedad Spunta, y en menor medida a Kennebec, Chieftain, Asterix, Mona Lisa y Frital INTA. Cada muestra estuvo conformada por aproximadamente 100 tubérculos (siendo 85 el mínimo admitido). Fueron inicial-

mente analizados en forma visual a fin de detectar y contabilizar aquellos que presentaban algún síntoma externo visible. Posteriormente, se peló una franja del contorno longitudinal de cada papa de aproximadamente 2 mm de espesor recortando parte de la cáscara y el parénquima subyacente del tubérculo. El material obtenido fue procesado por el método de flotación-centrifugación y seguidamente analizado empleando lupa binocular y microscopio óptico. El 90% de las muestras analizadas apareció libre de nematodos fitófagos de los géneros *Meloidogyne* y *Nacobbus*. En el 10% restante se detectó representantes del género *Meloidogyne* (estadios larvales y adultos). En ninguna muestra se observaron especimenes del género *Nacobbus*. Los resultados de los análisis postcosecha de la temporada actual que indican muy baja presencia de nematodos perjudiciales son consecuencia, sin dudas, de las prácticas habituales de cultivo en la región de Malargüe, que incluyen rotaciones y uso de semilla de alta calidad originaria de la misma zona.

HOST RANGE AND BIOFUMIGANT ACTIVITY OF CRUCIFEROUS CROP CULTIVARS TOWARDS *MELOIDOGYNE INCOGNITA* [RANGO DE HOSPEDANTES Y ACTIVIDAD BIOFUMIGANTE DE ALGUNAS PLANTAS CRUCIFERAS PARA EL MANEJO DE *MELOIDOGYNE INCOGNITA*]. **A. T. Ploeg. Dept. of Nematology, University of California Riverside, CA 92521, USA. antoon.ploeg@ucr.edu.—**The multiplication of an *M. incognita* race 3 populations on a range of 32 cruciferous crop cultivars was compared to that on the excellent host tomato. Experiments were done in 1 gallon pots in a greenhouse and terminated 6 weeks after nematode inoculation. There were large and significant differences between the crop cultivars. Some varieties were excellent hosts, with population densities similar to those obtained from tomato. Most were moderately good hosts, and some were poor to very poor hosts. Based on the results from these tests, a selection of the cultivars was planted in February 2007 in *M. incognita*-infested microplots. Controls included a dry fallow, carrot, and a nematicide treatment. Plants were chopped and incorporated three months after planting, and followed by a susceptible tomato during the summer season. Nematode populations were determined at critical points in time, root-galling on the cruciferous crops and on the tomato, cruciferous biomass production, and tomato yields were also measured. Host status as determined in the pot tests largely corresponded with the host status as determined from the microplot trial. Tomato yield differed significantly between the treatments, with the nematicide treatment resulting in the highest yields. It appears that host status is more important than biofumigant efficacy under our experimental conditions. A selection of a few "promising" cruciferous crop cultivars will be further evaluated under larger scale field-plot conditions.

NEMATODE RESISTANCE IN BANANA: REVIEW AND RECENT ADVANCES ON DESSERT BANANAS IN THE CARIBBEAN [RESISTENCIA DE NEMATODOS EN BANANA: REVISIÓN DE AVANCES EN EL CARIBE]. **P. Quénéhervé. UMR IRD-CIRAD-UM2 "Résistance des plantes aux bioagresseurs", Pôle de Recherche Agroenvironnemental de la Martinique, BP 214, 97285 Le Lamentin, Martinique. patrick.queneherve@ird.fr.—**Due to increasing concern about environmental contamination by pesticides, the search for both plant resistance and/or tolerance to plant-parasitic nematodes of bananas is now a major challenge, with many research teams involved. The concept of using resistant cultivars is considered as a more sustainaible management option not only for commercial producers but also for subsistence banana growers. This paper will review the past decades of research looking for resistance to nematodes in bananas up to the most recent results. Currently, screening for nematode resistance is still an ongoing process, particularly as newly-developed banana hybrids become available. The results obtained in the Caribbean with the new synthetic banana hybrids (*Musa* spp., AAA group) from CIRAD, originally designed for their resistance to the Sigatoka Disease and Black Leaf Streak Disease, have demonstrated their potential from laboratory to field experiments in their resistance and/or tolerance to the burrowing nematode *Radopholus similis*. Definitely host resistance, which is an environment friendly management tactic that has much potential, needs to be more effectively used and the development of disease-resistant and high yielding banana hybrids should constitute the most significant scientific achievement of the near future.

RECENT ADVANCEMENTS WITH DITERA® BIOLOGICAL NEMATICIDE [AVANCES RECIENTES CON EL NEMATICIDA BIOLÓGICO DITERA®]. **L. Rehberger, R. Georgis and P. Warrior. Valent BioSciences Corp., 6131 RFD Oakwood Road, Long Grove, IL 60047, USA. linda.rehberger@valent.com.—**Multiple formulations of DiTera®, a biological nematicide based on the fungus *Myrothecium verrucaria,* have been commercially used in various countries including the U.S. over the past several years for the management of nematode populations in different crops. The recent development and commercialization of the dry flowable (DF) formulation has provided more flexibility using DiTera® through drip irrigations at pre- and post-planting applications in grapes, banana, tree fruits and vegetables in Mexico, Chile, Central America and the USA. Furthermore, the compatibility of the DF formulation with chemical nematicides and fertilizers enhanced the usage of DF in rotation programs in vegetables and melons. Along with more efficient application techniques of DiTera® to the target site, its subsequent positive impact on root health and growth under laboratory, greenhouse and field conditions will be reported.

COMPARATIVE EFFICACY OF TWO NEW SEED TREATMENTS AND STANDARD NEMATICIDES TO MANAGE RENIFORM NEMATODES (*ROTYLENCHULUS RENIFORMIS*) IN COTTON [EFICACIA COMPARATIVA DE DOS NUEVOS TRATAMIENTOS DE SEMILLAS Y NEMATICIDAS ESTÁNDARES PARA EL MANEJO DEL NEMATODO RENIFORME (*ROTYLENCHULUS RENIFORMIS*) EN ALGODÓN]. **J. R. Rich, M. V. Barber and T. W. Katsvairo. University of Florida, 155 Research Road, Quincy, FL 32351, USA. jimmyr@ufl.edu.—**The marketing of nematicidal seed treatments is a relatively new development. Avicta Complete Pak (Syngenta) and N-Hibit (Plant Health Care, Inc.) are registered for use on cotton in the USA. Avicta Complete Pak is a mixture of three chemicals used to suppress early season nematodes (abamectin), thrips (thiamethoxam), and fungal seed pathogens (azoxystrobin+). N-Hibit is a systemic acquired resistance (SAR) material containing harpin protein. The relative efficacy of Avicta Complete Pak and N-Hibit compared to the standard nematicides, Telone II (1,3-D) and Temik 15G (aldicarb), were tested in two replicated field trials in Florida USA. The N-Hibit, Avicta Complete Pak, Temik 15G and Telone II treatments improved cotton yield over the non-treated controls in the two tests by an average of 4, 35, 96, and 102 kg/ha, respectively. In the Telone II treatments, the use of either Temik 15G or Avicta improved yield over the Telone II treatment alone (29 kg/ha). These data indicate that Avicta Complete Pak could substitute for the Temik 15G applications when Telone II is used, but would not substitute for the recommended Temik 15G applications applied alone. N-Hibit had minimal effects on cotton yield. In situations, as in this test, where moderate populations of reniform nematodes are present, the standard nematicides Telone II and Temik 15G will provide greater efficacy than N-Hibit or Avicta Complete Pak.

TOLERANCE IN SELECTED PEANUT VARIETIES TO *MELOIDOGYNE ARENARIA* [TOLERANCIA DE ALGUNAS VARIEDADES DE MANÍ A *MELOIDOGYNE ARENARIA*]. **J. R. Rich, B. L. Tillman, D. W. Gorbett, M. V. Barber and W. D. Thomas. University of Florida, 155 Research Road, Quincy, FL 32351, USA. jimmyr@ufl.edu.—**Peanut is major agronomic crop in Florida U.S.A. but is often mono-cultured or grown in shortened rotations. These shortened rotations increase problems caused by *Meloidogyne arenaria* race 1. Resistance to *M. arenaria* has been incorporated into a single variety, NemaTam, but it does not posses good resistance to endemic fungal and viral pathogens. Over the past few years, however, we have observed 'field tolerance or resistance' to *M. arenaria* in several varieties released by the University of Florida. To confirm these observations, selected varieties were tested in three replicated field trials conducted over a period of three years. Each trial included 6-8 peanut varieties which were compared to the resistant NemaTam variety and the commonly grown Georgia Green variety. The test sites were moderately infested with *M. arenaria,* and to increase stress, only irrigated under extremely dry conditions. Two varieties, AP3 and Hull, yielded significantly higher (>600 kg/ha) than the standard Georgia Green. Yields of the varieties DP1, Carver, Andru II, and

C99R were lower than that of AP3 and Hull but generally higher than the standard Georgia Green. The resistant NemaTam produced lowest yields due to infection with the endemic tomato spotted wilt virus. Soil population densities of *M. arenaria* juveniles (J2) obtained at harvest were lowest in the NemaTam, followed by AP3 and Hull. Yield data indicated greater plant vigor with AP3 and Hull compared to other varieties tested. As a result of these data, AP3 and Hull have been recommended to Florida growers as a means of better maintaining peanut yields in the presence of *M. arenaria.*

NEW TOOL TO SUPPORT THE IDENTIFICATION OF *DITYLENCHUS* SPECIES, BASED ON COMPUTER SCIENCE [UMA NOVA FERRAMENTA PARA DAR SUPORTE A IDENTIFICAÇÃO DE ESPÉCIES DE *DITYLENCHUS,* BASEADA NA CIÊNCIA DA COMPUTAÇÃO]. **V. R. V. Rissoli[1], T. O. Santos[2], J. E. Cares[3], V. Gonzaga[4] and R. C. V. Tenente[4]. [1]Universidade Católica de Brasília, QS 07-L 01 (CEP 70.022-900), Taguatinga, DF, Brasil, [2]Scholarship of Embrapa, [3]Universidade de Brasília, CP 4457, Brasília, DF, Brasil, CEP 70.910-900, [4]Embrapa Recursos Genéticos e Biotecnologia, C.P. 02372 (70770-900), Brasília, DF, Brasil. renata@cenargen.embrapa.br.—**The identification of nematodes to the genus or species level is a slow and laborious job. When conducted without technical support of a specialist it may give inconsistent and dubious results. Among several possible ways to offset the absence of a specialist and to carry out pest identification with a certain degree of confidence, it is necessary to use efficient tools, including various technological, computer and communication resources. In order to enable nematode identification without continuous support of a professional expert, an Expert System was created that is capable of managing important data for consistent support for the identification of *Ditylenchus* species. This System has a prototype developed in Java programming language, and it is being improved by the specialists and collaborators of Embrapa Genetic Resources and Biotechnology. From morphological and morphometric characters, geographic distribution, and host plants information recovered from the literature, international databases, and virtual search sites, it was possible to develop an identification key coherent with the characteristics of this parasite, reaching the species level for *D. angustus* in the last version of the prototype. To facilitate nematode identification, the System will provide the user with access to the Embrapa image database, allowing access to images of specific features useful for taxon determinations. In this regard, this work will strongly support the Brazilian plant protection services, by providing it with one more resource to support correct identification of nematode species of the genus *Ditylenchus.*

SYSTEMATIC STUDY OF SPECIES OF THE *XIPHINEMA AMERICANUM*-GROUP FROM CHILE [ESTUDIO SISTEMÁTICO DE ESPECIES DEL GRUPO *XIPHINEMA AMERICANUM* DESDE CHILE]. **L. Rivera[1-3], L. Waeyenberge[2], E. Aballay[3] and W. Decraemer[1]. [1]Biology Department, University of Ghent, K.L. Ledeganckstraat 35, 9000 Ghent, Belgium, [2]Institute for Agricultural and Fisheries Research (ILVO), Burg. van Gansberghelaan 96, box 1, 9820 Merelbeke, Belgium, [3]Plant Health Department, Laboratory of Nematology, University of Chile, Santa Rosa 11315 Avenue, Santiago, Chile. lurivera@uchile.cl.—**In this study, we focussed on species of the *Xiphinema americanum* group, the members of which are morphologically very similar and difficult to identify. Five populations of the *Xiphinema americanum* group associated with different varieties of grapevine in Chile were analyzed. Morphological and morphometric characters of each population were studied. Morphometrics were examined and analyzed statistically by canonical discriminant analysis (CDA). The CDA results show strong overlapping between the different populations, suggesting we are dealing with a single species. The specimens studied were identified as *Xiphinema rivesi.* For the molecular analyses of five Chilean populations 18S ribosomal (rDNA) and D2D3 regions were sequenced. Sequences were compared with data of species of *X. americanum*-group in the genbank and subjected to phylogenetic analysis. The results showed that 18S rDNA and D2D3s region were homogeneous for the populations studied and for the species of *X. americanum*-group in the genbank. These regions could not discriminate putative species that were proposed based on minute differences in morphology and morphometrics.

PROJECTS DEVELOPING RESISTANCE TO *ROTYLENCHULUS RENIFORMIS* IN *GOSSYPIUM HIRSUTUM* [PROYECTOS DE DESARROLLO DE RESISTENCIA A *ROTYLENCHULUS RENIFORMIS* EN *GOSSYPIUM HIRSUTUM*]. **A. F. Robinson. USDA-ARS, 2765 FandB Road, College Station, TX 77845, USA. frobinson@cpru.usda.gov.—**In the United States, development of upland cotton (*Gossypium hirsutum*) resistant to reniform nematode (*Rotylenchulus reniformis*) began in the 1980s. Eleven breeding lines adapted to Louisiana and South Texas were tolerant to *R. reniformis* and resistant to *Meloidogyne incognita* but did not suppress *R. reniformis* field populations. Of 2,000 *G. hirsutum* genotypes tested, only about 20 were weakly resistant, necessitating introgression of resistance from other *Gossypium* species. Good resistance occurs in diploid *G. anomalum*, *G. herbaceum*, *G. longicalyx*, *G. raimondii*, *G. somalense*, *G. stocksii*, and *G. thurberi*, which do not, and in allotetraploid *G. barbadense*, which does freely hybridize with *G. hirsutum*. Currently, eight projects have made significant progress introgressing resistance from *G. barbadense*, *G. arboreum* and *G. longicalyx*. Very high resistance carried by one alien segment from *G. longicalyx* was backcrossed eight generations into *G. hirsutum*, and two resistant genetic stocks were released in 2007. There are six SSR makers from *G. longicalyx* for this gene(s); one is codominant and within ca. 1 cM. Major genes for resistance to *M. incognita* and *R. reniformis* on chromosome 11 are sufficiently separated to expect recombinants. Advanced lines with *G. longicalyx* resistance are being tested at 10 sites in 2007.

GRANULAR FORMULATIONS OF NA AND K AZIDES FOR CONTROL OF NEMATODES, WEEDS, AND OTHER SOIL-BORNE PESTS [FORMULACIONES GRANULARES DE LAS AZIDAS DE NA Y K PARA CONTROLAR NEMATODOS, MALEZAS Y OTRAS PLAGAS DE ORIGEN EDÁFICO]. **R. Rodríguez-Kábana, R. H. Walker and S. Wells. Auburn University and Alabama Agricultural Experiment Station, Auburn, AL, U.S.A. rrodrigu@auburn.edu.—**Sodium [NaN_3] and potassium [KN_3] azides are excellent nematicides with broad-spectrum activities against weeds and other soilborne pests. The compounds are soluble in water and can be applied in liquid or solid compositions. Although liquid formulations are most common, they can be formulated in a variety of clays, zeolites, paper and other types of granules. Formulations of NaN_3 and KN_3 in a type of calcined clay [Profile^R] and on cellulose-based granules [Biodac^R] proved effective in controlling *Meloidogyne* spp., *Rotylenchulus reniformis*, *Belonolaimus longicaudatus*, *Paratrichodorus minor*, and *Xiphinema* spp. in greenhouse, microplot, and field experiments. The granular formulations spread over the soil surface and watered-in proved effective at rates ≤30 kg a.i./ha. These solid formulations permitted treatment of established turf for effective control of *B. longicaudatus* without appreciable phytotoxicity. Development of new granular formulations offers the possibility of using NaN_3 or KN_3 in situations where the application of liquid formulations of the compounds is not advisable because of potential phytotoxic effects.

OIL SEED CROPS FOR THE MANAGEMENT OF PLANT PATHOGENIC NEMATODES AND OTHER SOIL-BORNE PESTS [CULTIVOS DE OLEAGINOSAS PARA EL MANEJO DE NEMATODOS PARÁSITOS DE PLANTAS Y OTRAS PLAGAS DE ORIGEN EDÁFICO]. **R. Rodríguez-Kábana and C. R. Taylor. Auburn University and Alabama Agricultural Experiment Station, Auburn, AL, USA. rrodrigu@auburn.edu.—**Exponential growth of the biodiesel industry has opened new markets for vegetable oil. The possibility of greatly expanded acreage of vegetable oil crops may pose problems with monoculture systems, but opens up new opportunities for sustainable farming systems. Oil seed crops can be useful for control of plant pathogenic nematodes (PPNS) and other soil-borne pests (SBPS) in sustainable crop production. Castor (*Ricinus communis*), a crop with high oil content, is very suppressive of root-knot nematodes (*Meloidogyne* spp.) and has been used to control these nematodes in peanut (*Arachis hypogaea*) and soybean (*Glycine max*). Sesame (*Sesamum indicum*), another oil crop, can be used in rotation with peanut or soybean, for the management of root-knot nematodes and with cotton (*Gossypium hirsutum*) to deal with root-knot problems or the reniform nematode (*Rotylenchulus reniformis*). Drought tolerant sorghum (*Sorghum bicolor*) and sunflower (*Helianthus annuus*) can be integrated into rain-fed production systems to suppress nematode problems. Root-knot resistant soybean and peanut

cultivars can be combined with castor and/or sorghum for high oil production systems with low incidence of problems caused by PPNS and other SBPS. Peanut production for oil is simpler and may be more profitable than peanuts for food consumption. Peanut is a non-host for the reniform nematode, thus offering possibilities for inclusion in long-term systems with cotton for production of oil and fiber. The ever-increasing world demand for energy makes oil seed crops particularly attractive for the design of new and profitable agricultural production systems that provide energy, food and fiber.

OBSERVATIONS ON THE VARIATION OF THE RIBOSOMAL AND ELONGATION FACTOR GENES IN *MELOIDOGYNE* SPP. POPULATIONS [OBSERVACIONES SOBRE LA VARIACIÓN DE LOS GENES RIBOSOMALES Y DEL FACTOR DE ELONGACIÓN EN POBLACIONES DE *MELOIDOGYNE* SPP.]. **L. C. Rosso and M. T. Maresca di Serracapriola. Istituto per la Protezione delle Piante, C.N.R., Via Amendola 122/D, I-70126 Bari, Italy. l.rosso@ba.ipp.cnr.it.—**Genomic DNA sequences from eight populations of *Meloidogyne* spp. from Italy (5), Spain, Argentina and Chile were obtained by PCR amplification using DNA from single females or isogenic lines. The nuclear gene coding for the elongation factor—1α (EF-1α), involved in the ribosomial translation, and the SSU rRNA genes were selected for analysis. At least three different variants of the EF-1α gene sequence were obtained from PCR products of four Italian populations of *M. incognita*. The sequences also included introns of variable length. The coding region blast analysis showed high levels of similarity with putative ESTs of the *M. incognita* EF-1α genes available in GenBank. Ribosomal DNA sequences of the same populations also showed nucleotide variations which mirrored different ribosomal sequence data available for the same species. Two variations of the EF-1α sequence were also found in the RKN population from Spain, identified through ribosomal data as *M. javanica*. Both sequences allowed discrimination of the latter species from the *M. incognita* Italian populations. An EF-1α sequence from the Chilean RKN population showed significant differences from the other amplified products, whereas the Argentinian population showed close similarities for both genes with the Italian and the Genbank *M. incognita* sequences. All variants of the EF-1α ESTs identified showed a high conservation of the corresponding amino acid sequences. Data suggest that a combination of the EF-1α and ribosomal variants may reveal specific speciation patterns useful to discriminate *M. incognita* from other *Meloidogyne* spp. by means of molecular procedures.

DOES AMMONIA TRIGGER THE JUVENILE EMERGENCE OF *STEINERNEMA*? [¿PUEDE EL AMONIO ACTIVAR LA EMERGENCIA DE LOS JUVENILES DE *STEINERNEMA*?]. **E. San-Blás and S. R. Gowen. School of Agriculture, Policy and Development, The University of Reading, Reading, RG6-6AR, UK. esanblas@yahoo.com.—**When entomopathogenic nematodes complete their live cycle inside an insect body, the new infective juveniles start emerging from the host. The reasons for this event are supposed to be associated either with the lack of food resources or with their declining quality as they are consumed by the new nematode generations. Since ammonia is a major nitrogen waste product in the metabolism of nematodes we considered that this compound could be accumulated in the insect cadaver and make this environment intolerable for the infective juveniles and trigger their emergence. We measured the ammonia concentration in *Galleria mellonella* which were infected by *Steinernema feltiae* nematodes, their symbiotic bacteria *Xenorhabus bovienii* or killed by freezing every 24 hours for 13 days; the results showed two peaks in the ammonia concentration, the first at 72 hours could be attributed to the bacteria, and the second starting at 192 hours might be attributed to the nematode excretions. Also we infected *G. mellonella* larva with 10, 20 or 50 *S. feltiae* and the ammonia concentration was measured when the first emerging infective juvenile was detected; the results showed no difference in any of nematode doses.

PERSPECTIVES OF THE ECOLOGICAL IMPORTANCE OF SCAVENGING IN ENTOMOPATHOGENIC NEMATODES [PERSPECTIVAS SOBRE LA IMPORTANCIA ECOLÓGICA DEL CARROÑERISMO DE LOS NEMATODOS ENTOMOPATÓGENOS]. **E. San-Blás and S. R. Gowen.**

School of Agriculture, Policy and Development, The University of Reading, Reading, RG6-6AR, UK. esanblas@yahoo.com.—Entomopathogenic nematodes are known for infecting and killing insects, but also these organisms have been reported as scavengers (especially from the genus *Steinernema*) which can use this behaviour as an alternative way of surviving. We consider scavenging as the use of a dead organism by the entomopathogenic nematodes but without their participation in the killing of the mentioned organism. In nature this behavior might be difficult to detect because it is very uncommon to find infected insects in the soil samples and there are no studies of the potential of long-term surviving due to this behavior. However in some cases the usage of a possible host and the character of the hosts themselves can be different if the nematodes are performing scavenging or doing "normal infections", these differences can be used as "ecological markers" in many cases and might drive new research in this area. The objectives of this work are to show the importance of scavenging in laboratory tests which have been done using different nematodes and hosts and to present and discuss some of the differences in scavenging and "normal infections" that we have found and how this knowledge could be used in order to understand how important this behavior could be in nature.

THE EFFECTS OF ACROLEIN (2-PROPENAL) SOIL TREATMENTS ON THE MICROBIOLOGY OF THE SOIL [EFECTOS DE TRATAMIENTOS DEL SUELO CON ACROLEINA EN LA MICROBIOLOGÍA DEL SUELO]. **L. J. Simmons and R. Rodríguez-Kábana. Auburn University and Alabama Agricultural Experiment Station, Auburn, AL 36849, USA. simmole@auburn.edu.—**Efforts to seek alternatives to methyl bromide for soil fumigation continue world-wide. Acrolein (2-propenal) a naturally occurring volatile compound is currently being studied as a possible alternative. While the nematicidal and herbicidal effects of this compound have been recently reported, little work has been done to determine its effects on the soil microflora. Greenhouse trials were conducted at Auburn University in 2006 and 2007 with acrolein soil drenches to determine effects on microorganisms and key soil biochemical activities. Soil samples were taken for enzymatic analyses and quantification of fungi, bacteria, and actinomycetes. Indicative of broad-spectrum effects, soil enzymatic activities were reduced as acrolein treatments increased from 2.5 to 100 mg per kg soil. Bacterial populations also decreased as acrolein rates increased. Most fungal populations decreased as acrolein rates were increased; however, *Trichoderma* spp., increased with increasing rates of acrolein. Actinomycetes populations were also increased as rates of acrolein were increased. Unlike methyl bromide and other broad-spectrum soil fumigants, acrolein applied to soil is not biocidal since it shows selective activity in the enhancement of certain groups of microorganisms that may be beneficial for control of soilborne pests.

REACCIÓN DE ESPECIES DE MALEZAS A *MELOIDOGYNE INCOGNITA*, *ROTYLENCHULUS RENIFORMIS* Y *PRATYLENCHUS* SP. [REACTION OF WEED SPECIES TO *MELOIDOGYNE INCOGNITA, ROTYLENCHULUS RENIFORMIS* AND *PRATYLENCHUS* SP.]. **S. Solórzano[1] and C. G. Triviño[2]. [1]Facultad de Ciencias Agropecuarias de la Universidad Técnica de Babahoyo, [2]Dpto. Nacional de Protección Vegetal, Estación Experimental Boliche del Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP), P.O. Box 7069 Guayaquil, Ecuador. trivino.carmen@gmail.com.—**Se evaluó la reacción de 49 especies de malezas a los nematodos *Meloidogyne incognita*, *Pratylenchus* sp y *Rotylenchulus reniformis*, de las cuales 31 fueron de hoja ancha y 18 de hoja angosta. A cada planta se inoculó con 1000 especímenes de los nematodos mencionados. A los 45 días se evaluó número de agallas (*Meloidogyne*), densidad poblacional de nematodos en raíces y suelo. El 64% del total de malezas fue susceptible a *Pratylenchus* sp. (24% hoja angosta, 40% hoja ancha), el 62% a *M. incognita* (20% hoja angosta y 42% hoja ancha) y el 6% a *R. reniformis* (todas hoja ancha). Las malezas susceptibles a las tres especies de nematodos fueron: *Echinochloa colonum*, *Caperonia palustris*, *Hyptis capitata* y *Emilia fosbergii*. Se mostraron susceptibles a *M. incognita* y a *Pratylenchus* sp.: *Leptochloa uninervia*, *Cenchrus echinatus*, *Echinochloa crusgalli*, *Momordica charantia*, *Cyperus rotundus*, *C. iria*, *Paspalum conjugatum*, *Paspalum virgatum*, *Rottboellia exalta* (hoja angosta), *Euphorbia heterophylla*, *E. hipericifolia*, *E. hirta*, *Phyl-*

lantus sp., *Chamaesyce prostata, C. indica, Amaranthus hibridus, Desmodium tortuosum, Mimosa pigra, Phoradendron, Malvestrum americanum, Achyranthes aspera, Chloris polydactyla, Mitracarpus vellosus* y *Tridax procumbens* (hoja ancha). Las especies de malezas susceptibles únicamente a *M. incognita* fueron *Portulaca oleracea, Ludwigia decurrens, Ipomoea fastigiata*; y solamente se comportaron susceptibles a *Pratylenchus* las especies *Eleusine indica, Cynodon dactilon, Amaranthus spinosus* y *Peperania peludica.*

HOST SUITABILITY OF TEMPERATE AND SUBTROPICAL FRUIT SPECIES TO *MELOIDOGYNE ETHIOPICA* [SUSCEPTIBILIDAD DE ESPECIES FRUTÍCOLAS DE ZONAS TEMPLADAS Y SUBTROPICALES A *MELOIDOGYNE ETHIOPICA*]. **L. Somavilla[1], C. B. Gomes[2], D. L. Lima[2], V. K. Bosembecker[1], L. E. C. Antunes[2] and R. P. Oliveria[2]. [1]Universidade Federal de Pelotas/PPG Fitossanidade/FAEM, 96010-900, Pelotas-RS, [2]Embrapa Clima Temperado/Pelotas-RS. lsomavilla@hotmail.com.—***Meloidogyne ethiopica* has been found in Brazil parasitizing kiwi plants and some annual crops in different areas of southern and midwestern regions. Considering the economic importance of fruit crops in South Brazil, the host suitability of nine commercial fruit plant species and five native fruit species to *M. ethiopica* was evaluated. Seedlings of *Morus nigra* Xavante and Guarani cvs., *Vaccinium asbey* Delite cv., *Eugenia involucrata, Eugenia guabiju, Eugenia uvalha, Eugenia uniflora, Campomanesia xanthocarpa, Myrciaria cauliflora, Psidium cattleianum, Prunus persica* Capdebosq cv., and C*itrus sunki* Maravilha and Tropical cvs. were inoculated with 10,000 eggs of *M. ethiopica*/plant. Seedlings of *Lycopersicum esculentum* Santa Cruz cv. and *Actinia deliciosa* Hayward cv. were used as controls. The experiment was conducted under greenhouse conditions and was a completely randomized design with six replications per treatment. Eight months after the inoculation, host plant suitability to the nematode was evaluated by counting the number of galls and egg masses in the roots of each fruit species according to Taylor and Sasser. Most of the species tested were non-hosts to the nematode, except *Prunus persica.* The results of this study suggest that all non host fruit crops could be planted in *M. ethiopica* infested areas. Support: Fapergs.

POTENTIAL REGULATORY IMPACT OF POTATO CYST NEMATODES TO FLORIDA AGRICULTURE [IMPACTO POTENCIAL REGULADOR DEL NEMATODO DEL QUISTE DE LA PAPA EN LA AGRICULTURA DE FLORIDA]. **J. D. Stanley, R. N. Inserra and W. N. Dixon. Florida Department of Agriculture and Consumer Services, DPI, Nematology Section, P.O. Box 147100, Gainesville, FL 32614-7100, USA. stanleyj@doacs.state.fl.us.—**Before 2006, the golden nematode (*Globodera rostochiensis*) was the most prevalent potato cyst nematode occurring in North America. The distribution of this pest was limited to New York State (U.S.A.), Newfoundland and Vancouver (Canada). The distribution of the golden nematode is wider in Mexico where this pest coexists with other native *Globodera* species. Previously, the only record concerning the pale potato cyst nematode (*G. pallida*) in North America was from Newfoundland (Canada). Longstanding strict quarantine programs in the United States and Canada prevented the spread of potato cyst nematodes to other potato growing areas of the country. However, the recent detection of *G. pallida* in Idaho (U.S.A.), in April 2006, and *G. rostochiensis* in Quebec province (Canada), in August 2006, has modified the distribution map of potato cyst nematodes in North America and has intensified the concern about the spread of these nematodes in potato growing states including Florida. The short potato crop cycle in Florida and the warm climate of the state may not be favorable for the establishment of potato cyst nematodes if they are accidentally introduced into Florida potato fields. However, the possibility that these pests can become established at low population densities on several wild hosts and also on solanaceous host crops such as tomato and eggplant cannot be discounted. The strict regulatory measures enacted by the Florida Department of Agriculture and Consumer Services have been very effective in preventing the introduction of these pests into Florida. These exclusionary programs require the use of nematode certified seed potatoes and seedlings of other crops (such as strawberry runners) that are used in rotation with potato. These propagative plant materials must originate from areas certified free of potato cyst nematodes. The regulatory actions are also being supplemented by an extensive potato cyst

nematode survey, which is still in progress in Florida and is part of a Cooperative Agriculture Pest Survey Program sponsored by USDA-APHIS-PPQ.

ENTOMOPATHOGENIC NEMATODES IN SOUTH AMERICA: THE DILEMMA OF THE IMPLEMENTATION OF NATIVE *VS.* EXOTIC SPECIES AND STRAINS [NEMATODOS ENTOMOPATÓGENOS EN SUDAMÉRICA: EL DILEMA DE LA IMPLEMENTACIÓN DE ESPECIES Y CEPAS NATIVAS *VS.* EXÓTICAS]. **S. P. Stock. Department of Entomology, University of Arizona, Tucson, 1140 E. South Campus Dr., Tucson, AZ 85721-0036, USA. spstock@ag.arizona.edu.**—Because of their biological control potential, entomopathogenic nematodes (EPN) *Steinernema* and *Heterorhabditis* and their symbiotic bacteria *Xenorhabdus* and *Photorhabdus* spp., respectively, are the most studied group of insect parasites. Moreover, EPN and their symbionts are increasingly viewed as an exciting subject for basic research in ecology, evolution, biochemistry and molecular genetics. Current knowledge of EPN diversity in South America is scattered. Available records indicate that EPN have been found only in seven countries: Argentina, Brazil, Chile, Colombia, Suriname, Uruguay and Venezuela. Many new species and strains have been discovered and described over the past decades. These new species and isolates represent a valuable resource not only from a biodiversity perspective but also from a more applied standpoint. Indigenous EPN may result more suitable for inundative release against local insect pests because of adaptation to local climate and other population regulators. However when consideration of native versus exotic species and/or strains has to weighed, issues such as limitation of infrastructure and resources play a key role in making appropriate decisions. In this presentation I will summarize current status on the implementation of EPN in South America and will discuss strategies for their consideration in intergarted pest management strategies.

ENTOMOPATHOGENIC NEMATODES (STEINERNEMATIDAE, HETERORHABDITIDAE) SYSTEMATICS: EVOLUTIONARY HYPOTHESES AND THE REASSESSMENT OF DIAGNOSTIC TOOLS [SISTEMÁTICA DE NEMATODOS ENTOMOPATÓGENOS (STEINERNEMATIDAE, HETERORHABDITIDAE): HISTORIAS EVOLUTIVAS Y LA RE-EVALUACIÓN DE HERRAMIENTAS PARA SU DIAGNÓSTICO]. **S. P. Stock. Department of Entomology, University of Arizona, Tucson, 1140 E. South Campus Dr., Tucson, AZ 85721-0036, USA. spstock@ag.arizona.edu.**—A variety of molecular methods have been used to diagnose, delimit species and infer the evolutionary histories of entomopathogenic nematodes (EPN) (Steinernematidae, Heterorhabditidae). Of all, DNA sequence analysis has been shown to yield more information about variation within and among nematode species than other methods previously used. In spite of these accomplishments, there still are many milestones and challenges that need to be achieved and unravelled in the study of EPN molecular biology. For example, until now, very little progress has been made in understanding the genetics of EPN at the infraspecific level. Yet, it remains to be defined what we understand as "populations" and delimit the geographic boundaries of such populations. This level of discrimination is yet much needed not only to meet possible requirements of registration for isolates but also to provide verification tools for proprietary rights to patented nematodes. For this, it is expected that new advances in molecular biology and comparative genomics will significantly expand our gamut of molecular markers and analytical tools. In this presentation, a summary of the current state of affairs in the application of molecular approaches for the study of EPN will be presented and discussed.

NEMATODOS FITOPARÁSITOS EN CULTIVOS DE TABACO DEL VALLE DE LOS PERICOS, JUJUY, ARGENTINA [PHYTOPARASITIC NEMATODES IN TOBACCO PLANTATIONS OF LOS PERICOS VALLEY, JUJUY, ARGENTINA]. **S. Tapia[1], M. Zampini[1], E. Agostini[1], J. M. Manero[1], V. Curzel[1] and G. Echenique[2]. [1]Facultad de Ciencias Agrarias, Universidad Nacional de Jujuy, Alberdi 47. S.S. de Jujuy, [2]Consorcio de Riego Los Pericos, Jujuy, Argentina. silvitapia@yahoo.com.ar.**—Los objetivos del trabajo fueron determinar los géneros de nematodos fitoparásitos en tabaco y relacionar su abundancia y daños con la variedad y características del suelo. Las localidades consideradas en el

Valle de los Pericos durante la campaña 2001/02 fueron: a) Pampacho, b) La Ovejería, c) Chamical, d) Pampa Vieja, e) El Milagro, f) Las Pampitas, g) El Ceibal, h) Santo Domingo, i) Campo La Tuna, j) Monterrico, k) San Vicente, m) El Cadillal, n) Los Lapachos y ñ) Perico. En cada lugar se registró la variedad cultivada y en un lote afectado se establecieron 2 puntos de muestreo: a) suelo con plantas con deterioradas y b) suelo con plantas sin síntomas de daño. Se tomó una muestra de suelo y de raíces en cada una de esas situaciones. Se determinó la textura y el pH del suelo. Mediante las técnicas de Fenwick, flotación-centrifugación y maceración de raíces se extrajeron nematodos fitoparásitos filiformes y quistes. Se constató la existencia de los géneros: *Pratylenchus* (f, g y j), *Helicotylenchus* (g), *Tylenchus* (b, e, g, i, h, j, m,) y *Tylenchorhynchus* (a, h y m), además de *Meloidogyne* spp. y *Globodera* sp. que predominaron en todo el valle. En el 61% de las muestras de suelo y raíz se observó relación entre la abundancia de los nematodos presentes y la manifestación de daños en las plantas. No se observó relación entre la infestación del suelo y su textura. Los suelos franco arcillosos, ligeramente ácidos presentaron menor infestación de fitóparásitos. De las variedades cultivadas registradas, las menos susceptibles fueron MN 493 y NC 71 y las más afectadas fueron MN 944 y K 326.

CONDUCCIÓN Y DISPERSIÓN DE NEMATODOS FITOPARÁSITOS POR EL AGUA DE RIEGO A CULTIVOS DE TABACO EN LA PROVINCIA DE JUJUY, ARGENTINA [TRANSMISSION AND DISPERSAL OF PHYTOPARASITIC NEMATODES VIA IRRIGATION WATER IN TOBACCO PLANTATIONS IN JUJUY PROVINCE, ARGENTINA]. **S. Tapia[1], M. Zampini[1], E. Agostini[1], J. M. Manero[1], V. Curzel[1] and G. Echenique[2]. [1]Facultad de Ciencias Agrarias, Universidad Nacional de Jujuy, Alberdi 47. S.S. de Jujuy, [2]Consorcio de Riego Los Pericos, Jujuy, Argentina. silvitapia@yahoo.com.ar.—**En este trabajo los objetivos fueron: constatar la capacidad de conducción de distintos nematodos fitófagos por el agua de riego a fincas tabacaleras y su contribución a la dispersión de los mismos. El estudio se realizó en 14 localidades del Valle de los Pericos: Pampacho, La Ovejería, Chamical, Pampa Vieja, El Milagro, Las Pampitas, El Ceibal Santo Domingo, Campo La Tuna, Monterrico, San Vicente, El Cadillal, Los Lapachos y Perico, durante la campaña 2001/02. En cada lugar se tomaron muestras de agua de 3 sectores diferentes: a) del canal de ingreso a la finca; b) al final de un surco regado con presencia de plantas de tabaco infestadas y c) del agua de escurrimiento de la parcela. El volumen de cada muestra fue de 1000 cc. En laboratorio, los análisis consistieron en la extracción e identificación de los nematodos filiformes fitófagos (NFF) y quistes de *Globodera tabacum* presentes, mediante el uso de tamices de 210 y 44 µm de abertura. En el primer sector, el 78% de las muestras presentaron NFF y el 17%, quistes. En el sector b, se registraron NFF en el 100% de los casos y en la mitad de ellos, quistes. En el último sector, el 79% de las muestras contenían NFF y el 34%, quistes. De los resultados se concluye que el agua de riego no solamente es un vehículo que conduce e introduce distintas formas de nematodos fitófagos a las fincas, sino que también contribuye a su dispersión dentro y fuera de las mismas.

DETECCIÓN DE *HEXAMERMIS* SP. (MERMITHIDA: MERMITHIDAE) EN EL BARRENADOR DEL BROTE DE LAS MELIÁCEAS, *HYPSIPYLA GRANDELLA* ZELLER (LEPIDOPTERA: PYRALIDAE), EN LA PROVINCIA DE JUJUY, ARGENTINA [DETECTION OF *HEXAMERMIS* SP. (MERMITHIDA: MERMITHIDAE) IN THE MELIACEAE SHOOT BORER, *HYPSIPYLA GRANDELLA* ZELLER (LEPIDOPTERA: PYRALIDAE), IN THE PROVINCE OF JUJUY, ARGENTINA]. **S. Tapia and S. Ochoa. Estación Experimental de Cultivos Tropicales Yuto INTA. Ruta Nacional No. 34, Km 1280, El Bananal, Yuto. Jujuy, Argentina. silvitapia@yahoo.com.ar.—**En el norte argentino, un factor limitante para el establecimiento de las plantaciones forestales comerciales de maderas preciosas (*Cedrela* sp. y *Swietenia* sp.), es el ataque de *Hypsipyla grandella* Zeller (Lepidoptera: Pyralidae) o barrenador del brote. Para su manejo integrado, además de la biología, resulta importante también conocer los factores de mortandad natural que influyen en la regulación de sus poblaciones. El objetivo de este trabajo fue identificar los enemigos naturales de *H. grandella* en plantaciones forestales del género *Cedrela* y *Swietenia*. Durante los años 2004/05 y 2006/07 se efectuaron monitoreos quince-

nales y muestreos extractivos de brotes apicales dañados en: 1- plantaciones de 3 años bajo cubierta de *Cedrela saltensis* Zapater and del Castillo; 2- de plantaciones de 2 y 5 años de edad a cielo abierto de *C. odorata* L. y *S. macrophylla* King ubicadas en Yuto, Jujuy. Se evaluaron en promedio 400 muestras/especie/año y el material colectado fue revisado, registrado y acondicionado para su cría en laboratorio. Sólo en los cedros rosados bajo cubierta se detectaron dos grupos de organismos afectando a las larvas del barrenador: avispas endoparásitas (Hymenoptera: Ichneumonidae) y nematodos entomófagos del género *Hexamermis*. El primer grupo ocasionó una mortandad del 0,25% en el año 2005, mientras que los nematodos dieron lugar a una mortandad del 7 y 1,6% en 2004/05 y 2006/07, respectivamente. Si bien los porcentajes de mortandad son muy reducidos para ambos entomófagos, investigaciones complementarias se consideran necesarias.

DIAGNOSTIC PROTOCOLS FOR REGULATED NEMATODES USED AT THE EMBRAPA QUARANTINE STATION [PROTOCOLOS DE DIAGNÓSTICO PARA NEMATÓIDES REGULAMENTADOS UTILIZADOS NA ESTAÇÃO DE QUARENTENA DA EMBRAPA]. **R. C. V. Tenente[1] and O. L. R. Silva[2]. [1]Embrapa Recursos Genéticos e Biotecnologia, Parque Estação Biológica, W5 Norte final, CEP 70.770-900, Brasília, DF, Brasil, [2]Secretaria de Defesa Agropecuária-SDA, Ministério da Agricultura, Pecuária e Abastecimento-MAPA, Esplanada dos Ministérios, Bloco D, Anexo B, Sala 406, Brasília, DF, Brasil. renata@cenargen.embrapa.br.—**Despite the interest in diagnosis protocols and their recognition by the international forum, the Quarantine Station of Embrapa, has been using different protocols for detection and identification of nematodes, associated with imported materials. The extraction methods used are: Seed Trituration; Sieving, Baermann Funnel; Glass Flotation; Centrifugation; Fenwick Flotation; Tray Technique and Germinated Paper. Those methods aim to detect nematode species belonging to COSAVE Quarantine Pest List 1 and 2. Nematode identification is based on morphological and morphometric adult characteristics, using optical and transmission or scanning electron microscopy. There are several other techniques that give support to nematode identification and the method of choice depends on several factors, such as the taxonomic type we want to test for. The bigger the taxonomic distance between the specimens, lowers the necessity of using techniques with great capacity of differentiation, such as RAPD-PCR; AFLP. The isoenzyme technique has been used to separate *Meloidogyne* species. It is possible to separate other nematode species by isoenzymes as demonstrated for *Pratylenchus* species, although this technique has failed to separate *Ditylenchu*s species. The PCR technique used by Embrapa's laboratory amplifies the ITS region of *Ditylenchus* using universal primers. An RFLP method was adapted for *Ditylenchus africanus*; *D. destructor* and *D. dipsaci* differentiation, but this technique has failed to identify different races of *D. dipsaci*. Therefore, to separate nematode populations or biotypes within the species, these techniques have not been successful. The important point is that any technique cannot be used alone for nematode species identification. To reach the characterization of pathotypes, races, species or genus, the biochemical or molecular techniques have to be integrated with morphological and virulence data. The Embrapa Quarantine Station has been studying the heteroduplex technique (HMA) for the purpose of identifying *Ditylenchus dipsaci* races and also, mass spectrometry, to develop a protocol to support the identification of *Ditylenchus* and *Pratylenchus* species. With this protocol we expect to be able to detect and identify nematodes using a lower quantity of protein in a larger number of samples and in a short period of time.

GENETIC VARIABILITY OF *MELOIDOGYNE ARENARIA* ISOLATES REVEALED BY MOLECULAR MARKERS [VARIABILIDAD GENÉTICA DE AISLAMIENTOS DE *MELOIDOGYNE ARENARIA* REVELADA POR MARCADORES MOLECULARES]. **M. S. Tigano, M. F. A. Santos, M. R. A. Almeida and R. M. D. G. Carneiro. Embrapa Recursos Genéticos e Biotecnologia, C.P. 02372, 70849-979 Brasília, DF, Brazil. myrian@cenargen.embrapa.br.—**The molecular markers RAPD and ISSR were used to analyze genetic variability among 13 *Meloidogyne arenaria* isolates from different geographical regions and isoenzyme phenotypes for esterase and malato desydrogenase (A3N3, A2N1, A2N3 and

A1N1). One isolate of each species, *M. incognita*, *M. javanica* and *M. morocciensis*, were used as outgroups. The analysis of molecular markers showed a high level of polymorphism among isolates. The trees obtained with RAPD or ISSR polymorphisms showed concordant results. The seven isolates with the isoenzymatic phenotype A2N1, and the only isolate of phenotype A1N1, appeared clustered by geographical origin. Regarding isolates with the phenotype A2N3, the single *M. arenaria* race 1 used in this study showed to be clearly separated in the trees, as did the outgroups *M. incognita* and *M. javanica*. However, the two other A2N3 isolates clustered with high bootstrap support (>89). The isolates with A3M3 phenotypes showed to be closely related with the isolate of *M. morocciensis*, which also presented the same isoenzymatic phenotype. These molecular results suggested that the taxonomy of *M. arenaria* and *M. morocciensis* should be reviewed, including other isolates belonging to race 1, and the analysis of conserved regions of the genome, as the sequence of the 18S rDNA.

ANÁLISIS HISTOPATOLÓGICO DE TUBÉRCULOS DE DOS VARIEDADES DE PAPA ANDINA (*SOLANUM TUBEROSUM* SUBSP. *ANDIGENUM*) INFECTADAS POR ESPECIES DEL GÉNERO *MELOIDOGYNE* [HISTOPATHOLOGICAL ANALYSIS OF TUBERS OF TWO ANDEAN POTATO VARIETIES (*SOLANUM TUBEROSUM* SUBSP. *ANDIGENUM*) INFECTED BY SPECIES OF THE GENUS *MELOIDOGYNE*]. **M. del C. Tordable[1], P. Lax[2] and M. E. Doucet[2]. [1]Morfología Vegetal, Facultad de Ciencias Exactas, Físico-Químicas y Naturales, Universidad Nacional de Río Cuarto, (5800) Río Cuarto, Córdoba, Argentina, [2]Centro de Zoología Aplicada, Facultad de Ciencias Exactas, Físicas y Naturales, Universidad Nacional de Córdoba, (5000), Córdoba, Argentina. mdoucet@com.uncor.edu.—**Se caracterizaron los sitios de alimentación inducidos por especies del género *Meloidogyne* en tubérculos de papa andina (*Solanum tuberosum* subsp. *andigenum*) de la Provincia de Jujuy, Argentina. Fueron analizadas las variedades 'Tuni' (Alfarcito, departamento Tilcara) atacadas por *M. javanica* y *M. incognita* y 'Collareja' (Humahuaca, departamento Humahuaca, y Yavi, departamento Yavi) infectados por *M. javanica*. Sectores superficiales del parénquima que mostraban puntos de color marrón fueron cortados, fijados en F.A.A. y posteriormente procesados para microscopía óptica. Se realizaron pruebas histoquímicas para identificar lignina y suberina. En ambas variedades se observó que las hembras de *Meloidogyne* indujeron modificaciones que comenzaban con hiperplasia celular. Algunas de estas células, experimentaban hipertrofia y modificaban sus características citológicas para constituir los sitios de alimentación (3 a 5 células gigantes). En 'Tuni', el cuerpo del nematodo, huevos y larvas estaban rodeados por estratos de las células hiperplásicas sin modificar, mientras que en 'Collareja' las células que los rodeaban eran de mayor tamaño y con paredes gruesas y suberificadas. Si bien las alteraciones histológicas fueron similares en las dos variedades, se observaron ciertas diferencias entre ellas. En 'Tuni', la citología de las células gigantes, así como la abundancia de larvas y hembras instaladas en los tubérculos, indicarían que ésta ofrece sitios de alimentación más especializados. En 'Collareja' se detectaron células con paredes gruesas, reforzadas e impermeabilizadas por suberina rodeando al nematodo, huevos y larvas. Esto indicaría una posible reacción del vegetal que podría restringir el desplazamiento y la reinfección de las larvas que nazcan en el tubérculo.

ANTAGONISTAS DE NEMATODOS FITOPARÁSITOS IDENTIFICADOS EN ECUADOR Y SUS POTENCIALES APLICACIONES [ANTAGONISTS OF PLANT-PARASITIC NEMATODES IDENTIFIED IN ECUADOR AND THEIR POTENTIAL APPLICATION]. **C. G. Triviño, D. Navia S. and S. Mestanza V. Dpto. Nacional de Protección Vegetal, Estación Experimental Boliche del Instituto Nacional Autónomo de Investigaciones Agropecuarias (INIAP), P.O. Box 7069 Guayaquil, Ecuador. trivino.carmen@gmail.com.—**Los nematodos fitoparásitos son los principales problemas fitosanitarios de cultivos sembrados en Ecuador, especialmente *Meloidogyne incognita*, *M. javanica*, *M. graminicola*, *Radopholus similis*, *Pratylenchus* spp., *Helicotylenchus multicinctus*, *H. dihystera*, *Rotylenchulus reniformis*, *Nacobbus aberrans*, *Globodera pallida* y *Hirschmanniella oryzae*. En la región Litoral se encontraron antagonistas asociados con varios nematodos. En rizósfera de banano y plátano se aislaron los hongos *Trichoderma harzianum*, *T. viride*, *Paecilomyces lilacinus*, *P. variotti*, *Penicillium rubrum* y *P. frecuen-*

tans. En tomate y hortalizas infestadas con *Meloidogyne* se aislaron *P. lilacinus, T. harzianum* y, con mayor frecuencia, la bacteria *Pasteuria penetrans*. En tomates infestados por *M. javanica* y *M. incognita*, el 70% de J2 resultaron parasitadas por *P. penetrans*. Niveles similares de prevalencia se determinaron en arroz con altas densidades de *M. graminicola*. En banano inoculado con 1000 *R. similis* tratados con *T. harzianum, T. viride, P. lilacinus, P. varioti, P. rubrum* y *P. frecuentans* no se observó efecto sobre el sistema radical de las plántulas, reduciéndose la densidad del nematodo. *T. harzianum* permaneció en las raíces hasta tres meses de la aplicación, formando más colonias que *T. viride*. *P. lilacinus* presentó más colonias en la rizósfera que *Trichoderma* y persistió hasta 90 días. En vivero se estimó una reducción del 36% de *R. similis*. La aplicación mensual de 50×10^6 esporas de estos hongos resultó equivalente a dos aplicaciones bimensuales, pero significativamente diferente de una aplicación trimestral. Aplicaciones de *P. penetrans* en campos de tomate y frijol atacados con *M. incognita* redujeron con eficacia las poblaciones del nematodo.

BIOLOGY AND MANAGEMENT OF TURFGRASS NEMATODES IN THE BRITISH ISLES [BIOLOGÍA Y MANEJO DE NEMATODOS DE CÉSPED EN LAS ISLAS BRITÁNICAS]. **S. J. Turner and C. C. Fleming. Applied Plant Science Division, Agri-Food and Biosciences Institute, Newforge Lane, Belfast BT9 5PX, United Kingdom. Sue.Turner@afbini.gov.uk.—**Nematode damage to sportsturf in northwestern Europe has been rising during the last 7 years. Damage has been caused by the increased occurrence of existing pest species (e.g., *Meloidogyne naasi, Helicotylenchus, Pratylenchus, Pratylenchoides*) and by the appearance of a new root knot nematode species, *Meloidogyne minor*. These changes may be a response to new management techniques in the European sportsturf industry, and to warmer soil temperatures (which may be driven by climate change). In the absence of any approved nematicides for turfgrass, field tests using seaweed biostimulants and plant-derived chemicals have been carried out over the last three years and results indicate that they may provide an effective nematode management tool for turfgrass managers.

MANAGEMENT OF THE POTATO CYST NEMATODE (*GLOBODERA PALLIDA*) WITH BIO-FUMIGANTS [MANEJO DEL NEMATODO DEL QUISTE DE LA PAPA (*GLOBODERA PALLIDA*) CON BIOFUMIGANTES]. **S. J. Turner, T. J. G. Martin and C. C. Fleming. Agri-Food and Biosciences Institute, Applied Plant Science Division, Newforge Lane, Belfast BT9 5PX, United Kingdom. Sue.Turner@afbini.gov.uk.—**In recent years the control of potato cyst nematodes (*Globodera rostochiensis, G. pallida*) (PCN) has been heavily reliant on synthetic nematicides, resulting in good marketable potato yields, but not necessarily reducing PCN levels. Many nematicides have now been withdrawn, or their use restricted due to health and safety concerns. Other methods for effective PCN control are now urgently required. Whilst populations of *G. rostochiensis* (Ro1) can be controlled effectively with resistant potato varieties, this has not been achieved for *G. pallida* populations. A number of plant-based products are now becoming available for agricultural use with claims to either kill a range of plant pests or to act as a plant bio-stimulant, resulting in crops better able to tolerate pest attacks. Field trials in Northern Ireland evaluated the effect of four plant-based bio-fumigants/stimulants on population levels of *G. pallida* and the resulting potato yields and quality. Three formulations contained seaweed biostimulants (Algifol, Nutridip and Metastim) and one bio-fumigant containing mustard and chilli pepper extracts (Dazitol). These were compared with the fumigant nematicide Nemathorin, and untreated controls. The effect of *G. pallida* on growing potato crops was assessed by recording haulm lengths and weights. All assessments indicated that Nemathorin and Dazitol treatments gave most protection to plants and were most effective at reducing PCN levels.