RESUMENES DE LA XXV REUNION ANUAL DE ONTA
ABSTRACTS OF THE XXV ANNUAL MEETING OF ONTA
4-9 ABRIL 1993, COCHABAMBA, BOLIVIA

NIVEL DE DAÑO DE *NACOBBUS ABERRANS* [THE LEVEL OF DAMAGE OF *NACOBBUS ABERRANS*]. **J. Arcos & R. Cahuana. Estación Experimental Illpa-puno, Perú .**—Con el objectivo de determinar el nivel de daño que causa *Nacobbus aberrans* en papa, se realizó un experimento en un campo infestado naturalmente. Como tratamiento se consideraron parcelas desinfestadas con bromuro de metilo, parcelas altamente infestadas (sin tratar) y parcelas con nematicida (Carburan G 10%). El rendimiento de papa en la parcela desinfestada con bromuro de metilo fue significativamente mayor que los rendimientos de la parcela con el nematicida Curater y la parcela sin tratar (infestada). La parcela desinfestada con bromuro de metilo rindió 73.4% más que la parcela sin tratar y 44.68% más que la parcela con nematicida. El índice de nódulos y la tasa de reproducción de *Naccobus aberrans* fue cero en la parcela desinfestada con bromuro de metilo.

LOS NEMATODOS DE LA FAMILIA LONGIDORIDAE EN SAO TOME [THE NEMATODES OF THE FAMILY LONGIDORIDAE IN SAO TOME]. **M. Arias & F. Lamberti. Centro de Ciencias Medioambientales. CSIC. Serrano, 115 dpdo. 28006 Madrid, España e Istituto di Nematologia Agraria, CNR, Italia.**—Se realizó un estudio de los nemátodos fitoparásitos de la familia Longidoridae en la República de Sao Tomé y Principe. *Xiphinema longicaudatum* es la especie más frecuente, apareciendo en el 59% de las muestras del cultivo de café, así como en mandioca, platanera y tomate. *Xiphinema vulgare*, la siguiente especie en frecuencia, presenta una mayor diversidad de hospedadores, tanto en plantas cultivadas (cacahuete, café, hortícolas, limonero y platanera) como espontáneas (*Aminocarpus longifolia* y gramíneas silvestres); *Xiphinema brasiliense* aparece asociado a palmera cocotera, papaya, *Podocarpus mannii* y *Piper capense*. *Xiphinema ifacolum* aparece asociado a limonero y palmera cocotera y *Xiphinema* sp. a limonero, *Ficus* sp. y *Piper capense*. Por último, *Longidorus laevicapitatus* se ha encontrado en café y en *Panicum* sp. Todas las especies de *Xiphinema* son citas nuevas para las Islas y para el cultivo del café, aúnque son propias de climas y cultivos tropicales. Se destaca su presencia en la fracción peri-radicular de la mayor parte de las muestras, lo que podría indicar su implicación fitopatológica.

BEAUVERIA BRONGNIARTII* COMO POTENCIAL BIOCONTROLADOR DEL "ROSARIO" DE LA PAPA, *NACOBBUS ABERRANS [*BEAUVERIA BRONGNIARTII* AS A POTENTIAL BIOCONTROL AGENT FOR POTATO "ROSARIO", *NACOBBUS ABERRANS*]. **P. Balderrama, J. Franco & R. Montecinos. Programa de Investigación de la Papa (PROINPA), Apartado 4285, Cochabamba, Bolivia.**—En pruebas *in vitro* se determinó que *Beauveria brongniartii* es capaz de parasitar a todos los estados biológicos del nemátodo, no así a los individuos que se encontraban en fase de muda. Los substratos más eficientes para la multiplicación masiva del hongo fueron el arroz y la cebada flotante previamente autoclavados. Para la incorporación de *B. brongniartii* el estiércol de ovino fue el que más favoreció el establecimiento del hongo. En la gallinaza no se estableció. La patogenicidad de *B. brongniartii* se investigó por un ensayo de invernadero en el que se compararon tres estiércoles (ovino, vacuno y gallinaza) a una dosis equivalente 7 T/ha con y sin adición del hongo (inoculadas con 7% de CF infectada) incorporados antes y a la siembra. Estadisticamente *B. brongniartii* no controló el nematodo en invernadero. Sin embargo se observó un menor porcentaje de eclosión de los huevos provenientes de el estiércol de ovino, donde existió un mejor establecimiento del hongo. El efecto de los estiércoles sobre las plantas se manifestó en un mayor desarrollo.

DETERMINACION DE FRACCIONES ACTIVAS DE EXTRACTOS CLOROFORMICOS DE HOJAS Y RAICES DE *TAGETES MINUTA* [DETECTION OF ACTIVE FRACTIONS FROM CHLOROFORM EXTRACTS OF LEAVES AND ROOTS OF *TAGETES MINUTA*]. **W. Bautista, Lily Gavilano & P. Jatala. Centro Internacional de la Papa, Apartado 5969, Lima Perú.**—En estudios anteriores, varios extractos de hojas, tallos y raíces de *Tagetes minuta* mostraron efecto nematicida o nemastático. En el presente estudio se extrajo los metabolitos de muestras de hojas y raíces de *T. minuta* utilizando cloroformo. Se hizo un análisis cromatográfico de estas muestras para separar compuestos activos. Se obtuvieron doce fracciones de las muestras de hojas y once de las muestras de raíces. Las fracciones obtenidas de las muestras de hojas y de las raíces con Rf = 0.85 tuvieron efecto nematicida sobre los juveniles de *Meloidogyne incognita*. La caracterización de los compuestos de esta fracción será necesaria para determinar la sustancia nematóxica.

"EL MINADO" TECNICA DE INTERES EN EL CONTROL DE *GLOBODERA PALLIDA* EN CANARIAS ["EL MINADO" TECHNIQUE FOR CONTROLLING *GLOBODERA PALLIDA* IN THE CANARY ISLANDS]. **A. Bello, J. A. González, J. López-Cepero & M. Bun. Centro de Ciencias Mediambien-**

tales, CSIC. Serrano, 115 dpdo. 28006 Madrid, España.—Se centra el estudio en los cultivos de papas sobre sustratos de pumitas en el sur de Tenerife (Islas Canarias), donde la utilización reiterada de la variedad "Cara" con el gen de resistencia Hl ha seleccionado en favor de la especie *Globodera pallida*, que en la actualidad representa un grave problema difícil de resolver con la aplicación de nematicidas o la utilización de variedades resistentes. Se están investigando técnicas alternativas de control, basadas en las prácticas agronómicas tradicionales y dentro de esta línea hacemos un análisis de el "minado," que consiste en un riego abundante previo a la siembra, y de su influencia sobre las poblaciones de *G. pallida*. Se encuentra que después del "minado" aparece un mayor número de quistes del nemátodo en los primeros 5 cm del sustrato y que al mismo tiempo la temperatura puede alcanzar entre 45.5 y 53.6 °C durante cinco horas y media, período que se considera letal para los juveniles contenidos dentro de los quistes.

REVISION OF THE INTERNATIONAL RACE CLASSIFICATION SCHEME FOR IDENTIFICATION OF PHYSIOLOGICAL RACES OF *NACOBBUS ABERRANS* [REVISION DEL SISTEMA INTERNACIONAL PARA CLASIFICACION DE RAZAS EN LA IDENTIFICACION DE RAZAS FISIOLOGICAS DE *NACOBBUS ABERRANS*]. **Tatiana Boluarte & P. Jatala. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—A study was conducted to determine the physiological races of 25 populations of *Nacobbus aberrans* from Argentina, Bolivia, Ecuador, Mexico, Perú and the USA. Differential hosts used were: *Lycopersicon esculentum* cv. Marglobe, *Solanum tuberosum* cv. Desiree, *Beta vulgaris* (sugarbeet) cv. Monohikari, *Chenopodium quinoa* cv. Sajama, *Capsicum annum* (bell pepper) cv. California Wonder and *C. annuum* (chile pepper) cv. Anaheim Chile. Based on the number of galls on roots of these plants, five physiological races and one variant each of races 2 and 3, were identified for this nematode. In this new classification, the population from the U.S.A. is indicated as race 2a while one population from Argentina, one from Perú, and all from Ecuador are considered as race 2b. Races 4 and 5 include four and one population from Perú, respectively. Race 1 is represented by a population from Bolivia while race 3a is represented by five populations from Bolivia, two from Perú and one each from México and Argentina. Race 3b includes one population from Perú and one from Argentina.

CROP ROTATION FOR THE CONTROL OF *GLOBODERA PALLIDA* IN CAJAMARCA, PERU [ROTACION DE CULTIVOS PARA EL CONTROL DE *GLOBODERA PALLIDA* EN CAJAMARCA, PERU]. **Felicita Caceres, M. Canto-Sáenz, A. González & I. Bendezú. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Experiments were carried out during two growing seasons in a *G. pallida* (PCN) infested field at Cajamarca, Perú. Potato, quinoa, oat, lupine, barley, wheat, corn, ollucus, faba bean, and pea were planted in an Oostenbrink cross trial. Nematode populations were measured at planting and at harvest of each crop. The economics of crop rotation were also analyzed. All crops reduced the nematode population in the soil except for potato which increased it by 615%. The crops that reduced the nematode population most were quinoa, corn, oat, lupine, ollucus, and faba bean. The highest PCN population increase occurred when potato was grown after faba bean, lupine, and barley. The crop sequences that reduced the nematode population most were ollucus-wheat, oat-corn, quinoa-ollucus, oat-ollucus, and wheat-ollucus. The highest yields for the crops of the second growing season were obtained with the sequences corn-potato, potato-quinoa, faba bean-oat, faba bean-lupine, potato-barley, potato-wheat, ollucus-corn, potato-ollucus, ollucus-faba bean, and corn-pea. The best control alternatives for PCN would be corn, ollucus, faba bean, and oat. These crops ranked among the first to reduce nematode populations and gave the highest economic profits, net benefit, and marginal rate of return.

EVALUACION DE DIFERENTES ALTERNATIVAS PARA EL MANEJO DE *MELOIDOGYNE INCOGNITA* EN TOMATE EN EL VALLE DE SEBACO, NICARAGUA [EVALUATION OF DIFFERENT ALTERNATIVES FOR THE MANAGEMENT OF *MELOIDOGYNE INCOGNITA* IN TOMATO IN THE SEBACO VALLEY OF NICARAGUA]. **Marywbska Calderón V., Glenda Morales V. & Lillian Rodríguez T. Proyecto CATIE-MAG-Apdo. P-11b, y CENAPROVE, Apdo. P-246, Managua, Nicaragua.**—Se realizó una prueba de campo durante la época de riego 1990–1991. Se aplicó gallinaza y deshecho de hoja de repollo a razón de 8 TM/ha, solarización con plástico negro (calibre: 1000) 4 semanas antes del trasplante. Se establecieron parcelas de control químico (carbofurán 10G, 27 kg/ha) y un testigo. Treinta días después del trasplante se encontró que todos los tratamientos presentaron menos números de agallas por planta en comparación con el testigo, siendo la solarización y el deshecho de hoja de repollo más efectivos. Se obtuvieron redimientos mayores en todos los tratamientos en comparación con el testigo obteniéndose un incremento de 33% con gallinaza. No hubo diferencias significativas en el rendimiento entre el tratamiento químico y los no químicos.

QUARANTINE REGULATIONS FOR POTATO SEED PRODUCTION [REGULACIONES CUARENTENARIAS PARA PRODUCCION DE SEMILLA DE PAPA]. **M. Canto- Sáenz. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—In places where potato cyst nematode is widespread, unfortunately no quarantine regulations are in effect. However, due to the presence of different nematode races, the following regulatory measures are suggested for potato seed production: 1) potato seed should be produced in farms subjected to an IPM program for the nematode; 2) the seed that is going to be commercialized outside of production areas or is sent to other places for research purposes must be treated with hot water. Hot water treatment will be effective not only against potato cyst nematode but also against other nematodes that are inside seed tubers. In places where hot water treatment is not possible, chemical seed disinfection should be considered.

RESISTANCE AS AN IPM COMPONENT TO CONTROL POTATO CYST NEMATODE [LA RESISTENCIA COMO TACTICA MIP PARA CONTROLAR EL NEMATODO ENQUISTADO DE LA PAPA]. **M. Canto-Sáenz. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—The use of resistant cultivars is one of the most effective control methods for combating potato cyst nematodes. However, if the resistance is not used properly, new aggressive races of nematodes may develop. Resistant cultivars often are not as readily accepted by farmers as are the high yielding susceptible or tolerant cultivars. Therefore, their use in the Andes must be as a component of IPM in a cropping sequence with non-host crops (such as *Ullucus tuberosus, Vicia faba*, and *Zea mays*, which were the best alternatives for crop rotation in Cajamarca-Perú), tolerant potato cultivars (in places where the nematode is widespread), and susceptible potato cultivars. Cultural practices such as soil plowing, organic amendments (*e.g.*, chicken manure), elimination of volunteer plants, and good quality seed are other important components of IPM in Perú.

INTEGRATION OF CHEMICAL CONTROL WITH RESISTANCE, TOLERANCE, AND SUSCEPTIBILITY OF POTATO TO *GLOBODERA PALLIDA* IN CAJAMARCA PERU [INTERACCION DEL CONTROL QUIMICO CON VARIEDADES RESISTENTES, TOLERANTES Y SUSCEPTIBLES DE PAPA PARA EL CONTROL DE *GLOBODERA PALLIDA*]. **M. Canto-Sáenz & A. González. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—The effects of soil application of aldicarb 15G (2.0 kg a.i/ha) and foliar application of oxamyl L 25.2 (5%) on potato cyst nematode reproduction and the yield of potato cvs. María Huanca (resistant), Yungay (tolerant), and Revolución (susceptible) were determined in an infested field in Cajamarca, Perú. Aldicarb + oxamyl increased significantly the yield of Yungay and Revolución compared with untreated plants. However, there were no significant differences between plants treated with aldicarb alone and those treated with aldicarb + oxamyl. The number of females and nematode reproduction were significantly greater in the plants treated with aldicarb + oxamyl than in the untreated plants of cv. Revolución, but in cv. Yungay there were no significant differences. In cv. María Huanca nematode reproduction was low in all the treatments and in the control. The yield of María Huanca was also statistically similar in treated and untreated plants.

INTEGRATION OF *BEAUVERIA BRONGNIARTII* WITH RESISTANCE, TOLERANCE, AND SUSCEPTIBILITY OF POTATO FOR THE CONTROL OF *GLOBODERA PALLIDA* [EL USO DE *BEAUVERIA BRONGNIARTII* EN RELACION A LA RESISTENCIA, TOLERANCIA Y SUSCEPTIBILIDAD DE LA PAPA PARA EL MANEJO DE *GLOBODERA PALLIDA*]. **M. Canto-Sáenz & A. González. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—The effect of *B. brongniartii* on potato cyst nematode (PCN) reproduction and yield of potato cvs. María Huanca (resistant), Yungay (tolerant), and Revolución (susceptible) were determined in an infested field at Cajamarca, Perú. *Beauveria brongniartii* alone and in combination with aldicarb significantly increased yield of cvs. Yungay and Revolución in 1991–1992, confirming results obtained in 1990–1991. Yield of María Huanca was not increased significantly by fungus application. Nematode reproduction and the percentage of eggs parasitized were not affected by the fungus.

FIELD EVALUATION OF TOLERANCE TO *GLOBODERA PALLIDA* IN POTATO CLONES RESISTANT TO FROST AND *PHYTOPHTHORA INFESTANS* [EVALUACIONES EN CAMPO DE TOLERANCIA A *GLOBODERA PALLIDA* EN CLONES DE PAPA RESISTENTES AL FRIO Y A *PHYTOPHTHORA INFESTANS*]. **M. Canto-Sáenz, J. Landeo, A. González & L. Calua. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Forty-seven and 49 potato clones resistant to frost and late blight, respectively, were evaluated for tolerance to potato cyst nematode (PCN) in a *G. pallida* infested field at Porcón Bajo, Cajamarca. Potato cvs. María Huanca (resistant) and Yungay (tolerant) were used as experimental controls.

At flowering, the females of PCN on the root system were counted, and at harvest, tuber yield per plant was recorded. Six frost resistant clones (386515-3, HFF 18-3, 386536-2, 84FF138-9, 377740-2, and 82FY 1.4-10) and three late blight resistant clones (387315-27, 380389-1, and 85LB70-5) were rated as tolerant to PCN since they had higher yields than the checks despite allowing a higher nematode reproduction rate. Clone 85LB54-24 had a higher yield than the control and was resistant to PCN.

FIELD EVALUATION OF TOLERANCE AND RESISTANCE OF SOME ADVANCED POTATO CLONES TO *GLOBODERA PALLIDA* [EVALUACIONES EN CAMPO DE ALGUNOS CLONES MEJORADOS DE PAPA RESISTENTES Y TOLERANTES A *GLOBODERA PALLIDA*]. **M. Canto-Sáenz, J. Landeo, A. González & L. Manrique. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Clones selected for resistance to potato cyst nematode (PCN) since 1985 were evaluated in a *G. pallida* infested field at Porcon Bajo, Cajamarca, during two growing seasons. Potato cvs. Yungay (tolerant) and María Huanca (resistant) were used as experimental controls. At flowering, the nematode females on the roots were counted, and at harvest the tuber yield per plant was recorded. Clones G89202-3, GLB87236-5, G88083-1, G89022-3, G89028-2, and G85290-1 were considered resistant (very low nematode reproduction and good yield). Clones G85304-26 and G85461-25 were considered partially resistant. Clones G85461-7, G85241-30, G87540-21, G87541-9, G89005-1, G88080-1, G89065-7, G89054-2, G86174-9, G89124-1, G89132-2, G89122-3, and G89202-3 were considered tolerant (high nematode reproduction but higher yield than that of cv. Yungay).

USE OF ORGANIC AMENDMENTS FOR THE CONTROL OF *GLOBODERA PALLIDA* (PCN) IN PERU [USO DE ENMIENDAS ORGANICAS PARA EL CONTROL DE *GLOBODERA PALLIDA* EN PERU]. **M. Canto-Sáenz, M. Torrel, Angela Matos, O. Chávez & A. González. Internacional Potato Center (CIP), Apartado 5969, Lima, Perú.**—The effects of several organic amendments on reproduction of potato cyst nematode (PCN) and yield of potato cv. Yungay were determined. Fruits of *Capsicum pubescens, C. chinensis, C. frutescens*, and *Schinus molle*, ground seeds of *Cucurbita maxima*, and ground leaves of *Mentha virides, Chenopodium ambrosoides, Tagetes minuta*, and *Eucaliptus globulus*, were used as amendments in a greenhouse test. In a microplot test, leaves and flowers of *T. minuta*, leaves and fruit of *S. molle*, leaves and sawdust of *E. globulus*, leaves and stems of *M. viridis*, sugar cane bagasse and corncob were tested as amendments. Sawdust and wood shavings of *E. globulus* (10 T/ha and 10 m^3/ha, respectively), cow manure (10 T/ha), and *C. pubescens* (ground and diluted to 3% and 12%), were tested as amendments in the field and compared with aldicarb 15G (2.25 kg a.i./ha) as well as with the PCN resistant cv. María Huanca. In the greenhouse test, seeds of *C. maxima* and fruit of *C. chinensis* increased yield and were the best control alternatives. In microplots, leaves and stems of *M. virides* and leaves and flowers of *T. minuta* decreased nematode reproduction 87% and 72%, respectively. However, there was no positive effect on tuber yield. In the field, sawdust of *E. globulus* and chicken manure decreased nematode reproduction; there were no significant differences in tuber yield among the treatments.

SOURCES OF RESISTANCE IN *LYCOPERSICON* TO THE FALSE ROOT-KNOT NEMATODE *NACOBBUS ABERRANS* [FUENTES DE RESISTENCIA EN *LYCOPERSICON* PARA EL FALSO NEMATODO NODULADOR *NACOBBUS ABERRANS*]. **G. B. Cap, P. A. Roberts* & I. J. Thomason.* Laboratorio de Nematologia, I.M.Y.Z.A.-I.N.T.A., C.C. 25 (1712) Castelar, Buenos Aires, Argentina and *Department of Nematology, University of California, Riverside, CA 92521, U.S.A.**—Accessions of *Lycopersicon chmielewskii, L. penelli, L. cheesmanii, L. parviflorum, L. peruvianum, L. peruvianum* var. *glandulosum, L. esculentum* var. *cerasiforme*, and two interspecific F1 hybrids (*L. esculentum* cv. UC 82 X *L. peruvianum* P.I. 270435 and *L. esculentum* line ms-31 X *L. peruvianum* var. *glandulosum* P.I. 126443) bearing the heat-stable resistance gene Mi-2 to root-knot nematode *Meloidogyne incognita* race 1, were screened for resistance to the false root-knot nematode, *Nacobbus aberrans* (Thorne, 1935) Thorne & Allen, 1944 in greenhouse pot tests. Accessions *L. chmielewskii* LA 2695 and LA 2663, *L. peruvianum* LA 153 and *L. peruvianum* var. *glandulosum* LA 1973 were moderately to highly resistant to a population of *N. aberrans* from Argentina, based on an index of resistance using numbers of eggs per gram of root tissue. Variability was observed in some cases within the accessions, suggesting segregation for resistance. All other accessions and the F1 hybrids were susceptible.

THE PLANT NEMATODES CATALOGUE FROM BRAZIL [CATALOGO DE FITONEMATODOS DEL BRAZIL]. **E. Costa-Manso, R. Mesquita & R. Oliveira. Germplasm Exchange and Quarantine Area,**

CENARGEN/EMBRAPA, Cx. Postal, 02372, (70849-970) Brasilia/DF, Brazil.—The Plant Nematodes Catalogue lists 281 nematode species associated with or parasiting plants, including 230 publications from 1960 to 1992, from Brazil. Only articles describing surveys of natural nematode infestations are listed. Articles reporting greenhouse work and artificial nematode infestations have been excluded. The Plant Nematode Catalogue is arranged by nematode scientific names in alphabetical order. Nematode names are mentioned as in the original publications, but new proposed scientific names are also listed with a cross reference. Associated plants are indicated for each nematode species. The plants are arranged alphabetically by their scientific names, followed by their common names. The places in Brazil where they have been found, the date, and the references are also included.

VARIACION MORFOLOGICA Y PRUEBA DE HOSPEDANTES A POBLACIONES MEXICANAS DE *NACOBBUS ABERRANS* [MORPHOLOGICAL VARIATION AND HOST TEST FOR MEXICAN POPULATIONS OF *NACOBBUS ABERRANS*]. **I. Cid del Prado. Centro de Fitopatología, Colegio de Postgraduados 56230, Montecillo, México.**—Se estudiaron las poblaciones de los estados de Puebla, México e Hidalgo, su morfología y su respuesta patogénica a varios cultivos de importancia agrícola. La mayor variabilidad morfológica se encontró en la elongación anterior o posterior del cuerpo de las hembras; en la forma y desarrollo de la placa basal del esqueleto cefálico, tanto en hembras como en machos; el ala caudal presenta una variación en el número de anillos del inicio del ala al nivel de la abertura cloacal. La respuesta de algunas variedades de hospedantes estudiadas en condiciones de invernadero fueron: *Spinacea oleracea* var. Viroflay y *Beta vulgaris* Cicla, mostraron elevados índices de agallamiento con la población de Puebla; las poblaciones del resto de las localidades tuvieron un índice de 2. Las plantas de chile, *Capsicum annuum* variedades Apaseo, Tampiqueño y Ancho Esmeralda, todas las poblaciones las atacaron produciendo un índice de 3 a 4. Con respecto a las plantas de papa (*Solanum tuberosum* variedades San Gema, López y Montsana), el 99% de ellas, tuvieron un índice de agallamiento muy bajo, de 1 a 2 y la variedad Montsana fue resistente a la población de Hidalgo. Las poblaciones mexicanas mostraron una patogenicidad diferente a las poblaciones de Sudamérica, sobre todo en el cultivo de la papa; en México no se ha encontrado a *N. aberrans* parasitando a este cultivo en el campo.

IDENTIFICACION DE LA NEMATOFAUNA ASOCIADA AL CULTIVO DE AJO EN LA PROVINCIA DE AREQUIPA, PERU [IDENTIFICATION OF THE NEMATOFAUNA ASSOCIATED WITH GARLIC CROPS IN THE PROVINCE OF AREQUIPA, PERU]. **M. Delgado, G. Zumarán & M. Mundo-Ocampo. Universidades Católica Santa María y San Agustín de Arequipa, Apdo. 1638, Arequipa, Perú y Department of Nematology, University of California, Riverside, CA 92521, U.S.A.**—Campos sembrados con ajo (*Allium sativum*), fueron seleccionados para este estudio. Un total de 36 muestras de suelo fueron obtenidas de las nueve zonas productoras más representativas de la provincia de Arequipa. El suelo fue procesado por el método del embudo de Baermann. Fueron identificados los siguientes nematodos: *Aphelenchoides* sp., *Aphelenchus* spp., *Cephalobus* sp., *Eucephalobus* sp., *Diplogaster* spp., *Ditylenchus dipsaci*, *Dorylaimus* sp., *Helicotylenchus* sp., *Meloidogyne* spp., *Mesorhabditis* sp., *Mononchus* spp., *Pratylenchus* sp., *Rhabditis* spp., *Sakia* sp., *Seinura* sp., *Trichodorus* sp., *Tylenchorhynchus* sp. y *Tylenchus* sp. Entre los nematodos fitoparásitos, *D. dipsaci* es el que más causa pérdidas a los productores de ajo en la provincia de Arequipa.

ENSAYOS PARA UN MANEJO DEL NEMATODO *DITYLENCHUS DIPSACI* EN AREQUIPA, PERU [NEMATODE MANAGEMENT EXPERIMENTS ON *DITYLENCHUS DIPSACI* IN AREQUIPA, PERU]. **M. Delgado, G. Zumarán,* M. Mundo** & R. Mankau.** Univ. Católica Santa María, Fac. Agro., Casilla 1350, *Univ. Nal. San Agustín, Casilla 23 Arequipa, Perú y **Univ. California, Riverside, U.S.A.**—En 1990 se detectó en Arequipa la presencia del nematodo del tallo y bulbo *Ditylenchus dipsaci* como problema de gran importancia económica en el cultivo de ajo. Las medidas desarrolladas para su control se enfocaron en tres fases: I Fase - identificación, oficialización y difusión del problema en Agro Arequipeño, determinación en el suelo, bulbo-semilla y plantas, ocurrencia poblacional, plantas hospederas, razas y rotación de cultivos, hongos e insectos nematófagos, insolación del suelo, niveles de población, servicio de análisis de semillas y suelo, desinfección de semilla con termoterapia, control químico; II Fase - difusión del método de la disinfección de la semilla con agua caliente en las diferentes zonas productoras de ajo (Valle de Tambo, Campiña, La Joya, Camaná, *etc.*) e implementación de otras medidas de control con agricultores pilotos, manejo nematológico, zonas semilleras, resistencia de cultivares de ajo y cebolla; III Fase - uso masivo de la termoterpia, plantas de desinfección de semilla de ajo, asociación de productores de ajo, regulación cuarentenaria.

CONTROL DE *MELOIDOGYNE INCOGNITA* POR SOLARIZACION EN CAMAS DE PRODUCCION DE SEMILLA DE PAPA A PARTIR DE SEMILLA SEXUAL EN LOS CAMPOS DE AGRICULTORES [CONTROL OF *MELOIDOGYNE INCOGNITA* BY SOLARIZATION IN COMMERCIAL NURSERIES PRODUCING SEED POTATOES FROM TRUE SEED]. **R. Delgado de la Flor, R. Echegaray, P. Jatala & R. Cabello.* Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú y *Depto. Técnico, Cooperativa Alto Urubamba, Cusco, Perú.**—Se realizó el presente estudio para deteminar la eficiencia de solarización en el control de *Meloidogyne incognita* en camas de producción de tuberculillos-semilla de papa en los campos de agricultores de la zona Quillabamba, Cusco. Se utilizó plástico transparente, dispuesto en doble cobertura por un período de 45 días. Una semana después, se sembró las semillas sexuales de papa de la progenie "ATZIMBA X LT-7." La cosecha se realizó 80 días después. Los tuberculillos producidos en las camas solarizadas tuvieron un mayor peso y un menor índice de agallamiento radicular en comparación de los tuberculillos procedentes de camas no solarizadas. Asimismo, estos tuberculillos también presentaron menos daños causados por hongos como *Rhizoctonia, Fusarium*, y *Pythium* sp. Este método de control viene siendo adoptado por los agricultores de la zona por su bajo costo y eficiencia en el control de nematodos y hongos además de adecuarse a este sistema de producción de semilla de papa.

EFECTO DE VARIOS CLONES DE CAMOTE SOBRE LAS POBLACIONES DE *MELOIDOGYNE INCOGNITA* EN CAMPO [EFFECT OF VARIOUS CLONES OF SWEETPOTATO ON FIELD POPULATIONS OF *MELOIDOGYNE INCOGNITA*]. **R. Delgado de la Flor, E. Guevara & P. Jatala. Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Se sembraron 37 clones de camote resistentes a *Meloidogyne incognita* y *M. javanica*, y cultivares susceptibles a estos nematodos como Inkampa Makaskan y María Angola, en un campo altamente infestado con *M. incognita* cuyo cultivo anterior fue frijol. Se determinó la población inicial al momento de instalar el experimento, y la población final después de la cosecha. Los resultados indican que todos los clones con alta resistencia a *M. incognita* y *M. javanica* redujeron la población de *M. incognita* significativamente en campo. La reducción de las poblaciones de *M. incognita* estuvo inversamente correlacionada con el grado de resistencia de los clones utilizados en este experimento. La utilización de los clones de camote resistentes a *M. incognita* en un sistema de cultivo o como cultivo rotativo en un programa de manejo integrado de nematodos, se presenta como una alternativa de control de este nematodo. Los clones o cultivares resistentes deben ser utilizados en forma adecuada, evitando el monocultivo en forma continua, para impedir el desarrollo de nuevas razas de nematodos capaces de romper su resistencia.

EFECTO DE CUATRO ESPECIES DE *LONCHOCARPUS* SP. SOBRE *MELOIDOGYNE INCOGNITA* EN PAPA [EFFECT OF FOUR SPECIES OF *LONCHOCARPUS* SP. ON *MELOIDOGYNE INCOGNITA* IN POTATO]. **R. Delgado de la Flor & P. Jatala. Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Se realizó el presente estudio para determinar el efecto de cuatro especies de *Lonchocarpus* procedente de Quillabamba, Chanchamayo, Oxapampa, (Perú) y de Filipinas sobre el desarrollo de *Meloidogyne incognita* en el cultivo de papa. Se sembró tubérculos de papa cv. Désirée en macetas de 200 cm^3, conteniendo suelo esterilizado. Se inoculó una suspensión de 20 huevos/cm^3 de suelo de *M. incognita* y se incorporó en unas macetas, raíces secas y pulverizadas de cada *Lonchocarpus*, a dosis de 3, 6, y 9 cm^3 por planta y en otras 10 cm^3 de macerado acuoso de raíces de cada *Lonchocarpus*. Raíces de papa fueron extraídas de macetas después de 45 días y observadas para determinar la densidad de infección por *M. incognita*. Los resultados indican diferencias significativas entre los tratamientos. Las raíces de plantas tratadas con *Lonchocarpus* de Quillabamba y Chanchamayo tuvieron un índice de agallamiento menor que los otros tratamientos. Mejores resultados fueron obtenidos con la incorporación de raíces pulverizadas de *Lonchocarpus*.

EMPLEO DE *TROPAELUM TUBEROSUM* COMO CULTIVO DE ROTACION PARA EL CONTROL DE *GLOBODERA PALLIDA* EN CAMPO [USE OF *TROPAELUM TUBEROSUM* AS A ROTATION CROP FOR THE CONTROL OF *GLOBODERA PALLIDA*]. **R. Delgado de la Flor, P. Jatala & R. Ortega.* Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú, y *Universidad Nacional San Antonio Abad del Cusco, Cusco, Perú.**—El presente estudio se realizó para determinar el efecto de *Tropaelum tuberosum* cultivar Q'ello-Chacchu, sobre las poblaciones de *Globodera pallida* en un campo infestado (24 huevos/g de suelo) en la Localidad de Kayra, Dpto. de Cusco. La población final del nematodo (Pf) se determinó a la cosecha. Los resultados muestran que el cultivo de *Tropaelum*

tuberosum es capaz de reducir significativamente las poblaciones de este nematodo en campo (Pf 11 huevos/g de suelo) en relación a las parcelas de control cuyo Pf fue 20 huevos/g de suelo. La inclusión de este cultivo como un componente de rotación para el control de *G. pallida*, en la zona andina se presenta como una buena alternativa de control.

POTENTIAL OF *PASTEURIA* SPP. FOR NEMATODE CONTROL [POTENCIAL DE *PASTEURIA* SPP. PARA EL CONTROL DE NEMATODOS]. **D. W. Dickson, M. Oostendorp, B. Hatz & D. J. Mitchell. Entomology & Nematology Department, University of Florida, Gainesville, FL 32611, U.S.A.**—A *Pasteuria* sp. specific to *Meloidogyne arenaria* race 1 has been studied extensively in the laboratory and field. The greatest rate of attachment of endospores to *M. arenaria* second-stage juveniles (J2) occurs at 30 °C, and the bacterium develops within its host more quickly at 30 and 35 °C than at 25 °C or below. The organism survives wetting and drying of soil and appears to move down in soil with percolating water. The bacterium has been found on *M. arenaria* J2 in field soil as deep as 1–1.2 m. In peanut microplots infested with endospores of *Pasteuria* sp. and *M. arenaria*, the bacterium increased to levels that were highly suppressive to the nematode. After 6 years of continuous peanut culture in the *M. arenaria-Pasteuria* sp. infested microplots no galling was detected on pod, peg, or root samples taken at harvest. The density of endospores in each microplot was estimated to be 4–5 $\times$ 10^6/g soil.

ENSEÑANZA EXPERIENCIAL EN EL ZAMORANO: EL MUESTREO DE SUELOS PARA EL DIAGNOSTICO DE NEMATODOS [PRACTICAL TRAINING IN ZAMORANO: SOIL SAMPLING FOR NEMATODE IDENTIFICATION]. **H. E. Domínguez & J. Ordóñez. Departamento de Protección Vegetal, Zamorano, A.P. 93, Tegucigalpa, Honduras.**—En el Zamorano (Escuela Agrícola Panamericana) se trabaja bajo el lema Aprender-Haciendo. Este lema es una referencia al Aprendizaje Experiencial de Dewey y después Kolb. El Departamento de Protección Vegetal (DPV) imparte el laboratorio de campo de fitoprotección. El DPV intenta formar agrónomos que sean generalistas en la fitoprotección, mediante conceptos, destrezas y actividades que sean compatibles con el manejo integrado de plagas. El DPV emprende investigación de pedagogía con un estudio evaluando el laboratorio. El muestreo de nematodos se presenta según criterios del aprendizaje experiencial y se evalúa mediante la Prueba t de Valores Emparejados.

IMPACT AND MANAGEMENT OF NEMATODE PROBLEMS IN THE ORNAMENTAL PLANT INDUSTRY OF FLORIDA [IMPACTO Y MANEJO DE PROBLEMAS FITONEMATOLOGICOS EN LA INDUSTRIA DE ORNAMENTALES DE FLORIDA]. **R. A. Dunn. Department of Entomology and Nematology, University of Florida, P. O. Box 110620, Gainesville, FL 32611-0620, U.S.A.**—Nursery production of ornamental plants in Florida had a net wholesale value of over $520 million in 1991. Phytoparasitic nematodes interfere with this industry in many ways, including direct damage to plants in the nursery, costs of measures to avoid and (or) control them, increased costs of cuttings, *etc.* (because of U.S. quarantines against nematode pests in countries which might otherwise be excellent sources for them), and limitation of access to external markets (because of quarantines against nematodes found in Florida production areas). Nematicides do not solve the problem, because few are available for use on living ornamental plants and they are of limited efficacy. The most effective way to avoid nematode damage to nursery crops is to follow basic principles of sanitary plant production, based on nematode-free propagating material. Development of more accurate and rapid techniques for nematode detection and identification would facilitate monitoring and improving nursery practices, and more effective phytosanitary regulatory programs.

NEMATODO QUISTE DE LA PAPA (*GLOBODERA* SPP.) EN PARCELAS CAMPESINAS EN FUNCION AL TIEMPO DE DESCANSO-ALTIPLANO CENTRAL BOLIVIANO [THE POTATO CYST NEMATODE (*GLOBODERA* SPP.) IN FARM FIELDS IN RELATION TO NUMBER OF YEARS FIELDS ARE NOT IN POTATO PRODUCTION IN THE CENTRAL BOLIVIAN PLATEAU]. **R. Esprella, J. Franco & D. Herve. Programa de Investigación de la Papa (PROINPA), Apartado 4285, Cochabamba, Bolivia.**—Se determinarán las densidades poblacionales de *Globodera* spp. en parcelas con diferentes precedentes culturales (descanso de 1 a 20 años, un año de cultivo de papa y 5 a 8 años de cebada), ubicadas en una comunidad originaria del Altiplano Central boliviano. La recolección de muestras de suelo se realizará al azar y dependiendo de los años de descanso. En parcelas de 1–4 años se extrae una muestra compuesta y en parcelas de 5, 10, 15 y 20 años se realiza un cuadriculado dividiéndolo en treinta cuadrados, los cuales se muestrean proporcionalmente al número de años de descanso. Las muestras de suelo se procesarán por

el método modificado de Fenwick y con los quistes se determinará el nivel de infestación. Además por pruebas de bioensayo se observarán los cambios de color de hembras inmaduras en desarrollo.

NEW APPROACHES FOR POTATO CYST NEMATODE MANAGEMENT [NUEVOS ENFOQUES PARA EL MANEJO DEL NEMATODO ENQUISTADO DE LA PAPA]. **K. Evans. Department of Entomology and Nematology, AFRC-IACR, Rothamsted Experimental Station, Harpenden, Herts, AL5 2JQ, U.K.**—Integrated control methods, devised where *Globodera rostochiensis* was the dominant species of potato cyst nematode (PCN), have had to be revised where *G. pallida* has become common. This second species of PCN is more difficult to control because its population densities decline less rapidly than those of *G. rostochiensis* in the absence of a host, or overwinter, and because it is less susceptible to the action of granular nematicides. Also, commercial cultivars have only partial resistance to *G. pallida*. Biochemical and immunological assays are proving useful in the diagnosis of the species composition of field populations of PCN. This is essential for properly planned nematode management, and further help may come from molecular technology (perhaps from novel mechanisms of resistance) and from the biocontrol agents currently under investigation.

EVALUACION DE RESISTENCIA DE CULTIVARES DE CAMOTE *IPOMOEA BATATA* A *MELOIDOGYNE INCOGNITA* EN SUELO ARIDO-SALINO EN TACNA, PERU [EVALUATION OF RESISTANCE OF SWEETPOTATO CULTIVARS TO *MELOIDOGYNE INCOGNITA* IN ARID, SALINE SOIL IN TACNA, PERU]. **R. Flores, E. Guevara, P. Jatala & R. Chávez. Universidad Nacional Jorge Basadre Grohman de Tacna y Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Se realizó el presente estudio con el objeto de observar la reacción de 30 clones de camote a *Meloidogyne incognita* en un campo altamente infestado con *Meloidogyne incognita* y altamente salino y con concentraciones de boro mayores a 5 ppm. Los parámetros de evaluación a la cosecha fueron bioensayos, análisis de población final/población inicial (Pf/Pi) y el rendimiento. Los resultados de Pf/Pi y de bioensayo confirmaron los resultados obtenidos previamente en las pruebas de invernadero en los que tuvieron 56.6% de material como resistente. Clones resistentes tuvieron un rendimiento significativamente mayor que los clones susceptibles.

PROBLEMAS DE NEMATODOS EN LA PRODUCCION DE PAPA EN CLIMAS TEMPLADOS DE LA REGION ANDINA DE LATINO AMERICA [NEMATODE PROBLEMS IN POTATO PRODUCTION IN THE TEMPERATE CLIMATES OF THE ANDEAN REGION OF LATIN AMERICA]. **J. Franco. Depto. de Nematología, PROINPA, Casilla 4285, Cochabamba, Bolivia.**—El cultivo de la papa se realiza bajo un amplio rango de altitudes, latitudes y condiciones climáticas que supera a cualesquiera otro cultivo de importancia económica mundial. Sin embargo, las principales limitantes del cultivo de papa se presentan en áreas geográficas específicas y sus respectivas condiciones agroecológicas, tales como las zonas templadas y de tierras altas que ocurren en los países andinos de Latino América. Sin duda alguna, entre los problemas más importantes en relación a los nematodos fitoparásitos del cultivo que limitan su producción se encuentran el nematodo quiste de la papa (*Globodera rostochiensis* y *G. pallida*) y el nematodo rosario de la papa (*Nacobbus aberrans*). Los factores que soportan la importancia de estos nematodos en la producción de papa (por ejemplo, pérdidas económicas, distribución, razas, hospedantes, diseminación, diagnóstico, cultivos alternantes, medidas de control efectivas, resistencia e interacción con otros organismos), así como el desarrollo de estrategias para su manejo integrado que se viene conduciendo en Bolivia, Ecuador y Perú serán presentados para su consideración.

PERDIDAS EN EL CULTIVO DE LA PAPA CAUSADAS POR *NACOBBUS ABERRANS* EN COCHABAMBA [POTATO CROP LOSSES CAUSED BY *NACOBBUS ABERRANS* IN COCHABAMBA]. **J. Franco, R. Montalvo & R. Montecinos. Programa de Investigación de la Papa (PROINPA), Apartado 4285, Cochabamba, Bolivia.**—Para obtener información más precisa sobre las pérdidas ocasionadas por *N. aberrans* se establecieron ensayos en red en diferentes departamentos de Bolivia. En Cochabamba se seleccionaron dos campos naturalmente infestados por *N. aberrans* (25 y 338 individuos/100 cm^3 suelo, respectivamente) donde en diseño de parcelas divididas se establecieron los ensayos. Las parcelas estaban constituídas por la incorporación y no incorporación de un nematicida (que simularía suelos sin *N. aberrans* e infestado respectivamente) y las sub-parcelas por seis cultivares de papa. Resultados de las evaluaciones efectuadas con respecto al índice de nodulación, tasa de multiplicación y rendimientos en los seis cultivares,

confirmaron la resistencia parcial de cv. Gendarme (1.69 y 2.31 en índice de nodulación, respectivamente) y su capacidad rendidora en terrenos infestados por *N. aberrans* (22.8 y 8.1 T/ha). Las pérdidas en rendimiento en Toralapa y Vacas se estimaron entre el 10.9 al 27.6% y el 40.4 al 61.5%, respectivamente.

TRATAMIENTO QUIMICO DE TUBERCULOS INFECTADOS POR *NACOBBUS ABERRANS* PARA EVITAR SU DISEMINACION [CHEMICAL TREATMENT OF TUBERS INFECTED BY *NACOBBUS ABERRANS* TO AVOID NEMATODE DISPERSAL]. **J. Franco, R. Montecinos & R. Montalvo. Programa de Investigación de la Papa, (PROINPA), Apartado 4285, Cochabamba, Bolivia.**—El empleo de tubérculos-semillas infectados por *N. aberrans* constituye el principal medio de diseminación de este nemátodo, por lo que se ha venido investigando el empleo de compuestos químicos (nematicidas e insecticidas) y de extractos de plantas (aceites esenciales). Tubérculos altamente infectados (15.7 individuos por 2 gramo de cáscara) por *N. aberrans* fueron sumergidos en concentraciones de nematicidas por 1.5 y 10 minutos. Luego de secados los tubérculos al medio ambiente fueron sembrados en macetas conteniendo suelo estéril. La efectividad de los tratamientos se efectuó por el número de nódulos formados antes de la madurez fisiológica de las plantas. Así se determinó que los tratamientos Nemacur 400 EC al 2% y Carbodan 48 FW al 12.5% por 10 minutos fueron los más efectivos, ya que no permitieron la reproducción del nematodo y por lo tanto su establecimiento.

RESISTENCIA AL NEMATODO-ROSARIO (*NACOBBUS ABERRANS*) [RESISTANCE TO THE FALSE ROOT-KNOT NEMATODE (*NACOBBUS ABERRANS*)]. **W. Garcia, N. Estrada, J. Gabriel & J. Franco. Programa de Investigación de la Papa (PROINPA), Apartado 4285, Cochabamba, Bolivia.**—*Nacobbus aberrans* causante del "rosario de la papa" se encuentra ampliamente diseminado en muchas regiones paperas de Bolivia (2 000–3 800 msnm), parasitando la raíz y alterando funciones fisiológicas que se manifiestan en bajos rendimientos. Durante tres campañas agrícolas (1989–1991) la colección de cultivares bolivianos BOT (1 000 clones) fué sembrada en campos altamente infestados en la E.E. Toralapa, con el objeto de identificar material con resistencia y (o) tolerancia, en base a lecturas de campo y laboratorio. De acuerdo a las evaluaciones efectuadas, 63 clones (*adg* y *stn*) confirmaron la presencia de pocos o ningún nódulo en las raíces. Estos clones han sido sembrados en diferentes localidades del país para determinar la existencia de razas de *N. aberrans*.

EFFECT OF SOME COMPONENTS OF CULTURAL CONTROL, ALDICARB AND *BEAUVERIA BRONGNIARTII* ON THE CONTROL OF *GLOBODERA PALLIDA* [EFECTO DE ALGUNOS COMPONENTES DEL CONTROL CULTURAL, ALDICARB Y *BEAUVERIA BRONGNIARTII* EN EL CONTROL DE *GLOBODERA PALLIDA*]. **A. González & M. Canto-Sáenz. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Experiments were carried out in a field infested with the potato cyst nematode (PCN) *Globodera pallida* at Porcón Bajo, Cajamarca, Perú, to examine the effects of several management strategies on nematode reproduction and tuber yield. Treatments included chicken and cow manures (10 T/ha), 20 kg/ha extra fertilization with P and K (160-180-100), aldicarb 15G (2.5 kg a.i./ha), and application of *Beauveria brongniartii*, as well as the integration of some of these components. In cv. Revolución (susceptible to PCN), chicken manure increased yield significantly compared with the other treatments except cow manure. In a second growing season the highest yields were obtained with chicken manure alone and in combination with aldicarb and *B. brongniartii*. Nematode reproduction was higher in the control than in the other treatments. In cv. Yungay (tolerant to PCN), chicken manure alone or integrated with other control measures reduced nematode reproduction and provided the best tuber yield. In cv. María Huanca, the treatments had little effect on yield and PCN reproduction. During the second growing season the percentage of egg infection was higher with aldicarb 15G + *B. brongniartii* than with the other treatments.

INTEGRATION OF POTATO RESISTANCE, TOLERANCE, AND SUSCEPTIBILITY WITH NON HOST CROPS FOR THE CONTROL OF *GLOBODERA PALLIDA* [INTEGRACION DE PAPAS RESISTENTES, TOLERANTES Y SUSCEPTIBLES CON CULTIVOS NO HOSPEDANTES PARA EL CONTROL DE *GLOBODERA PALLIDA*]. **A. González, M. Canto-Sáenz & I. Bendezú. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—To select a cropping sequence for the control of *Globodera pallida*, wheat, barley (non host crop), and the potato cultivars María Huanca (resistant), Revolución (susceptible), and Yungay (tolerant) were tested in an Oostenbrink cross trial field plot during two growing seasons. The initial population (Pi) of the nematode at planting, the final population (Pf) at harvest, and crop yield

were recorded. Barley-wheat rotation was one of the best sequences for reducing nematode populations after potato. Potato cv. Yungay or María Huanca caused the highest nematode population increase. The cropping sequence Revolución -María Huanca provided the best yield and Yungay-Revolución provided the poorest. The cropping sequences of Yungay or Revolución-wheat were the best for wheat yield and the sequences Yungay or Revolución-barley were the best for barley yield.

NEMATODE PROBLEMS AFFECTING POTATO PRODUCTION IN SUBTROPICAL CLIMATES [PROBLEMAS NEMATOLOGICOS QUE AFECTAN LA PRODUCCION DE PAPA EN CLIMAS SUBTROPICALES]. **N. Greco. Istituto di Nematologia Agraria, C.N.R., Via Amendola 165/A, 70126 Bari, Italy.**—*Globodera rostochiensis* and *G. pallida* are the principal nematodes affecting potato in subtropical areas. In these areas, potatoes are cultivated year-round influencing nematode dynamics and yield losses. *Meloidogyne* spp. and *Pratylenchus* spp. have local importance. The tolerance limit of potato to both cyst nematodes is 1.3–2.1 eggs/g soil and the minimum yield ranges from 0 to 40% at highest nematodes densities. In Chile, short-cycle potatoes planted in summer (February) and harvested in fall (June) minimize nematode reproduction and yield loss. Long-cycle potatoes planted in fall (May) and harvested in spring (October) allow slow nematode reproduction and suffer greater yield losses compared to short-cycle potatoes. Potatoes sown in spring (September) and harvested in summer (January) allow maximum cyst nematode reproduction (39–65×) and heaviest crop losses. Nematode reproduction is influenced by the number of generations completed and the length of the potato cycle. Quarantine regulations and crop rotations are major control measures. The use of resistant cultivars is effective if the nematode pathotype is known. Soil solarization is effective but costly. The use of chemical nematicides is also expensive and causes environmental concerns.

EPIDEMIOLOGY AND MANAGEMENT OF *DITYLENCHUS DIPSACI* ON VEGETABLE CROPS IN SOUTHERN ITALY [EPIDEMIOLOGIA Y MANEJO DE *DITYLENCHUS DIPSACI* EN CULTIVOS HORTICOLAS DEL SUR DE ITALIA]. **N. Greco. Istituto di Nematologia Agraria, C.N.R., Via Amendola 165/A, 70126 Bari, Italy.**—*Ditylenchus dipsaci* is widespread in southern Italy. It reproduces on a number of wild and cultivated plant species. Among vegetables, the more severely damaged are onion and garlic, but broad bean, pea, and celery also suffer damage by *D. dipsaci*. In the Mediterranean area, the nematode infects host plants mainly from September–October to May, but reproduction is greater in October–November, March, and April when soil moisture, air humidity, and temperatures are optimal. Symptoms of nematode attack are obvious in the field in late February, March, and April and in the nurseries in October and November. Therefore, early crops are more damaged than late crops. Nematodes survive in soil and plant residues. However, seeds from infested plants, except those of broad bean and pea, have rarely been found to harbor nematodes. The use of seeds, bulbs, and seedlings free of nematodes is a prerequisite for successful crop production. Cropping systems, soil treatments with fumigant and non-volatile nematicides, and soil solarization of infested fields are recommended for effective and profitable nematode control. Investigations to identify sources of resistance to the nematode must be encouraged.

SCANNING ELECTRON MICROSCOPE EXAMINATION OF CRYOFRACTURED TISSUE OF SWEETPOTATO INFECTED WITH *DITYLENCHUS DESTRUCTOR* AND *D. DIPSACI* [OBSERVACIONES BAJO MICROSCOPIO DE BARRIDO DE TEJIDOS CRIOFRACTURADOS DE BATATA INFECTADOS CON *DITYLENCHUS DESTRUCTOR* Y *D. DIPSACI*]. **Rossio Haddad & P. Jatala. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Sweetpotato storage roots inoculated with *Ditylenchus destructor-D. dipsaci* complex were fixed in 2% glutaraldehyde for at least 4 days, then transferred into a solution of 2% osmium tetroxide for 24 hr prior to dehydration and cryofracture preparation. Samples were placed in liquid nitrogen and fractured with a sharp razor blade longitudinally and transversely. Cryofractured samples were processed for scanning electron microscope examination. Observation of samples revealed the presence of a large number of vacuoles in cells around or near the nematodes in the affected tissue. The most outstanding characteristics of nematode infection were the dissolution of the middle lamella of the cells and the subsequent coalescence of infected cells. Formation of wound periderm and the corky appearance of the infected tissue followed the process of infection. These tissues eventually became infected with secondary organisms and turned light brown to almost black in color.

MANAGEMENT OF NEMATODE PROBLEMS RELATIVE TO POTATO PRODUCTION IN THE PACIFIC NORTHWEST OF THE UNITED STATES [MANEJO DE PROBLEMAS

FITONEMATOLOGICOS DE LA PAPA EN LA REGION NOROESTE DE LOS ESTADOS UNIDOS]. **S. L. Hafez. Dept. PSES, University of Idaho, Parma, ID 83660, U.S.A.**—Root-knot nematodes (*Meloidogyne hapla* and *M. chitwoodi*), root-lesion nematodes (*Pratylenchus neglectus* and *P. penetrans*) and stubby-root nematodes (*Trichodorus* spp. and *Paratrichodorus* spp.) are the most serious problems to potato production in the Pacific Northwest of the United States (PNW-USA). Nematode management in general is the coordinated application of several control tactics over an extended period of time to manipulate nematode populations and keep them below damaging levels. The basic elements of the management strategy commonly used in the PNW-USA are prevention, chemical control, and cultural practices. Prevention includes the use of nematode free seed and avoidance of machinery transport from infested fields to clean ones. Chemical control includes the use of fumigant and non-fumigant nematicides. Cultural practices include crop rotation, clean fallow, early harvest, planting early varieties, the use of aged organic manure and planting green manure crops. Recently in PNW-USA certain varieties of rapeseed and sudangrass have been planted as a green manure crop, to reduce the soil population of root-knot nematodes. Rapeseed and sudangrass contain glucosinolate compounds having a nematicidal effect. These compounds are released when the plant is incorporated into the soil.

THE ROLE OF SUGARBEET TARE DIRT IN THE SPREAD OF PLANT PARASITIC NEMATODES [EL PAPEL DE RESIDUOS DE REMOLACHA EN LA DISEMINACION DE NEMATODOS FITOPARASITOS]. **S. L. Hafez, M. Seyedbagheri, F. Rashid & K. Hara. Dept. PSES, University of Idaho, Parma, ID 83660, U.S.A.**—Nematodes are major pests of sugarbeets and several other crops that are grown in rotation. It is known that tare dirt and irrigation water are efficient carriers and an important means by which plant-parasitic nematodes spread. In Idaho and eastern Oregon, the sugarbeet cyst, stubby root, root-knot, and lesion nematodes have been recognized to be the most serious soilborne problems for the sugarbeet and potato industries. In the fall of 1990, 1991, and 1992, a total of 223 tare dirt samples were randomly collected from the major sugarbeet production areas in Idaho and were analyzed for the number and identity of plant-parasitic nematodes present. Results indicated that most samples contained more than one genus of nematodes: 70% contained *Pratylenchus* spp., 21% contained *Meloidogyne* spp., 14% contained *Heterodera schachtii*, 64% contained *Paratylenchus* spp., and 28% contained *Tylenchorhynchus* spp. These results also demonstrated that the common practice of returning tare dirt from sugarbeet receiving stations to the field is helping the spread of sugarbeet cyst nematode and other serious plant-parasitic nematodes such as root-knot and stubby root nematodes in crop production areas of Idaho.

THE EFFECT OF COMPOSTING SUGARBEET TARE DIRT AND CULL ONIONS ON THE VIABILITY OF SUGARBEET CYST NEMATODE [EFECTO DE COMPOSTAS DE RESIDUOS DE REMOLACHA Y CEBOLLA SOBRE LA VIABILIDAD DEL NEMATODO ENQUISTADO DE LA REMOLACHA]. **S. L. Hafez, F. Rashid & K. Hara. Dept. PSES, University of Idaho, Parma, ID 83660, U.S.A.**—*Heterodera schachtii* is a serious pest of sugarbeet and causes severe crop losses to the sugarbeet industry. Poor sanitation practices and returning tare dirt back to the field is considered the major means of nematode spread and reinfestation. Cull onions are treated as a waste product, and disposal methods for these culls present environmental and pest problems. The objective of this study was to investigate the possibility of controlling sugarbeet cyst nematode in the tare dirt by composting the tare dirt alone or along with cull onions. Three experiments were conducted over a 3-year period during 1990–1993. In the first experiment, wooden boxes (1.2 × 1.2 × 2.4 m) were used to compost tare dirt infested with cyst nematodes. In the second experiment, nematode infested tare dirt was composted in two piles (2.4 × 7 × 61 m). In the third experiment, onion culls were mixed in piles with the tare dirt in the ratio of 1:5 (v:v), respectively, and composted as in the second experiment. Tare dirt samples were taken before and after composting for nematode and nutrient analysis. The results of these studies indicated that no stage of sugarbeet cyst nematode survived the composting process in wooden boxes. Composting of sugarbeet tare dirt in open field piles killed 98% of sugarbeet cyst nematodes. Sugarbeet tare dirt, after adequate composting may be used as a soil amendment or potting mix.

IDENTIFICATION OF SECOND-STAGE JUVENILE FEMALES (J2) OF *TYLENCHULUS* SPP. ON THE BASIS OF THEIR POSTERIOR BODY MORPHOLOGY [IDENTIFICACION DEL SEGUNDO ESTADIO JUVENIL (J2) DE LA HEMBRA DE *TYLENCHULUS* SPP. CON BASE EN LA MORFOLOGIA DE LA REGION POSTERIOR DEL CUERPO]. **R. N. Inserra, N. Vovlas* & M. Di Vito.* Florida Dept. Agric., DPI-Nematology, Gainesville, FL 32614-7100, U.S.A. and *Istituto Nematologia Agraria, CNR, Bari, Italy.**—Tail lengths were measured in live second-stage juveniles (J2) of two, four, and eight popula-

tions of *Tylenchulus graminis*, *T. palustris*, and *T. semipenetrans*, respectively. One population of *T. palustris* was from Costa Rica, two populations of *T. semipenetrans* were from Italy, and all others were from Florida. Ranges in tail length values were 59–72, 42–54, and 55–70 μm for *T. graminis*, *T. palustris*, and *T. semipenetrans*, respectively. The canonical discriminant analysis for this character allows the separation of *T. palustris* J2 from the *T. graminis* and *T. semipenetrans* J2, which did not differ. The nearly hyaline portion of the posterior body without fat globules > 2 μm in diameter was measured in selected populations of *T. graminis*, *T. palustris*, and *T. semipenetrans* J2 from Florida. Ranges in values for this class of measurements were 59.0–75.0, 24.0–59.0, and 35.0–60.0 μm for each of the three species, respectively. Another class of measurements of the nearly hyaline portion of the posterior body without fat globules > 3 μm diameter was also taken in selected populations of the three species from Florida. Ranges in values for this class of measurements were 64.0–78.0, 42.0–59.0, and 40.0–64.0 for each of the three species, respectively. The canonical statistical analysis for all characters (tail length included) allows the separation of *T. graminis* J2 from *T. palustris* and *T. semipenetrans* J2, which did not differ. The remaining species of the genus, *T. furcus*, has J2 with a characteristic furcate tail tip, unlike the tapered tails of other *Tylenchulus* species.

RESISTANCE TO *MELOIDOGYNE* SPP. IN POTATO AND SWEETPOTATO [LA RESISTENCIA A *MELOIDOGYNE* SPP. EN PAPA Y BATATA]. **P. Jatala & E. Guevara. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Of the culivated potato clones of the world germplasm collection maintained at CIP, none were found to have high degrees of resistance to *Meloidogyne* spp. As a result, over 62 wild tuber-bearing *Solanum* species were evaluated and high degrees of resistance were found in *S. sparsipilum*, *S. chacoense*, *S. microdontum* and a few other species. This material was used in a breeding program in which cultivated potatoes were developed with high degrees of combined resistance to *M. incognita*, *M. hapla*, *M. javanica*, *M. arenaria*, and *M. chitwoodi*. The first potato cultivar with resistance to these nematodes is being released in Burundi under the name of Nemared. Additional clones with resistance are being evaluated by the national programs of different countries. It is important to note that some of these materials have resistance to both *Melodiogyne* spp. and *Pseudomonas solonacearum*. In contrast, many of the sweetpotato clones of the CIP germplasm collection obtained from different sources have high degrees of resistance to *Meldoidogyne* spp. The nematology and breeding programs at CIP have recently developed a sweetpotato cultivar, 'Alto Urubamba,' for the tropical region of Perú that has a high degree of resistance to *Meloidogyne* spp. and a yielding capacity of up to 60 T/ha. Additional clones with resistance to *Meloidogyne* spp., high yielding capacity, and adaptability to different environmental conditions are being evaluated for possible release as new cultivars by different institutions and the national program in Perú.

***NACOBBUS ABERRANS*, ONE SPECIES OR MORE?** [*¿NACOBBUS ABERRANS*, UNA SOLA ESPECIE O MAS?]. **P. Jatala. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Since the revision of the genus *Nacobbus* and synonymization of *N. aberrans*, *N. batatiformis*, *N. seredipiticus*, and *N. seredipiticus bolivianus* as the single species, *N. aberrans*, and its later consideration as not being a homogeneous species, but a species complex, there has been considerable confusion as to its identification in different race classification schemes and correct taxonomic status. Recently, the presence of six races, two variants of race 2, and three variants of race 3 has been established. Similarly, results of recent electrophoretic studies of esterase patterns, morphological and cytogenetic studies, and subsequent grouping of the populations with similar chromosomal elements, host range, esterase patterns, and morphological characteristics, provide sufficient justification for separating this species into more than two species.

CYTOGENETIC STUDIES OF 25 *NACOBBUS ABERRANS* POPULATIONS FROM NORTH AND SOUTH AMERICA [ESTUDIOS CITOGENETICOS DE 25 POBLACIONES DE *NACOBBUS ABERRANS* DE AMERICA DEL NORTE Y AMERICA DEL SUR]. **P. Jatala & T. Boluarte. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Thirty, young egg-laying females from each of 25 populations of *Nacobbus aberrans* from Argentina, Bolivia, Ecuador, México, Perú, and the U.S.A. were processed for cytogenetic studies, utilizing a propionic acid-orcein staining technique. Results indicate that the *N. aberrans* species complex is composed of two groups, having seven and eight chromosomal complements. Results further indicate that all the populations of *N. aberrans* used in this study are amphimictic. Grouping of the nematode populations based on chromosomal counts was consistent with differences in host range. Such variation and polymorphism in the chromosomal complement of *N. aberrans* warrant reevaluation of the taxonomic position of this species.

OBSERVACION DE LAS ACTIVIDADES QUITINOLITICA Y PARASITARIA DE ALGUNOS HONGOS AISLADOS DE LOS CAMPOS DE TRIGO Y DE MANI [CHITINOLYTIC AND PARASITIC ACTIVITIES OF SOME FUNGI ISOLATED FROM WHEAT AND PEANUT FIELDS]. **P. Jatala, T. Boluarte & L. Gavilano. Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—La actividad quitinolítica de 75 especies de hongos aislados de 135 campos de trigo y de maní fue determinada haciéndolos crecer en medio de cultivo de agar-quitina-coloidial. A los 5 días de crecer sobre este medio cultivo, algunos hongos fueron capaces de asimilar quitina en el medio de cultivo, produciendo un halo claro alrededor de la colonia y sobre el espacio en que crecieron. La actividad parasítica de estos hongos sobre huevos de *Meloidogyne incognita*, se determinó colocando las masas de huevos sobre las hifas de hongos que se desarrollaban en agar agua. Después de 10 días las masas de huevos fueron tenidas con ácido fucsina en lactofenol para observar el parasitismo. Un gran número de estos hongos tuvieron actividad quitinolítica, y mayoría de estos fueron capaces de infectar huevos de *M. incognita*. Algunas especies de los géneros *Trichoderma, Fusarium, Paecilomyces, Penicillium, Aspergillus* y *Gliocladium* demostraron predominantemente tales características.

INTERACTION OF *MELOIDOGYNE INCOGNITA* AND *FUSARIUM OXYSPORUM* ON RESISTANT AND SUSCEPTIBLE SWEETPOTATO CLONES [INTERACCION DE *MELOIDOGYNE INCOGNITA* Y *FUSARIUM OXYSPORUM* EN CLONES RESISTENTES Y SUSCEPTIBLES DE BATATA]. **P. Jatala, T. Boluarte & E. Guevara. Dept. of Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Twenty sweetpotato clones differing in resistance or susceptibility to *Meloidogyne incognita* and *Fusarium oxysporum* were examined in a greenhouse experiment. Among the clones examined, two were moderately resistant (MR), three were susceptible (S), four were resistant (R), and three were highly resistant (HR) to *Meloidogyne incognita*; one was MR, one was R, two were S, and one was highly susceptible (HS) to *Fusarium oxysporum*. The three remaining clones were susceptible to both organisms. Rooted cuttings of each sweetpotato clone were transplanted into 500-ml plastic pots. Three glass tubes were placed around the roots at transplanting with one end extending 5 cm above soil level. After 7 days, plants were inoculated through the glass tubes with 1 500 *M. incognita* J2 alone, 100 000 and 200 000 *F. oxysporum* spores alone, and both concentrations of *F. oxysporum* in combination with 1 500 *M. incognita* J2. Control plants received no inoculum. Wilting was first initiated in all clones susceptible to both organisms and inoculated with both organisms. After 1 week, *F. oxysporum* MR, S, and HS clones and *M. incognita* MR and S clones inoculated with 200 000 spores + nematodes showed wilting. This pattern followed with those inoculated with 100 000 spores + nematodes. All *M. incognita* R and HR clones did not show any wilting after 45 days of inoculation.

ELECTROPHORETIC DIFFERENCES IN ESTERASE PATTERNS OF 25 *NACOBBUS ABERRANS* POPULATIONS FROM NORTH AND SOUTH AMERICA [DIFERENCIAS ELECTROFORETICAS EN PATRONES DE ESTERASAS DE 25 POBLACIONES DE *NACOBBUS ABERRANS* DE NORTE AMERICA Y SUD AMERICA]. **P. Jatala, L. Gavilano, I. Bendezú & T. Boluarte. Department of Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—More than 20 individuals and aggregates of 10 and 20, young egg-laying females of each of 25 *Nacobbus aberrans* populations from Argentina, Bolivia, Ecuador, México, Perú, and the U.S.A. were processed for electrophoretic studies of alpha esterase patterns, utilizing the PHAST System. Data indicate that there were distinct differences in the esterase patterns amongst the different populations of *N. aberrans* examined. In most populations there was no significant difference between the individual female esterase pattern and that of the aggregate of 10 or 20 females. There were similarities in the esterase patterns of populations within the same physiological race in the race classification scheme.

DETERMINACION DE LA PRESENCIA DE METABOLITOS SECUNDARIOS ACTIVOS CONTRA *MELOIDOGYNE INCOGNITA* PRODUCIDOS POR HONGOS AISLADOS DE LOS CAMPOS DE TRIGO Y DE MANI [DETERMINATION OF THE PRESENCE OF SECONDARY METABOLITES FROM FUNGI ISOLATED FROM WHEAT AND PEANUT FIELDS, THAT ARE ACTIVE AGAINST *MELOIDOGYNE INCOGNITA*]. **P. Jatala, L. Gavilano & T. Boluarte. Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Se realizó el presente estudio para determinar la presencia de los hongos biocontroladores de nematodos en los campos de trigo y de maní en Oklahoma, EE.UU. Se aislaron un total de 75 especies de hongos de los 135 muestras de suelos procedentes

de los campos mencionados. Los hongos se cultivaron en medio líquido y se extrajeron metabolitos secundarios, utilizando solventes orgánicos como cloroformo. Se realizó un bioensayo para determinar la actividad nematicida de los extractos, utilizando J2 de *Meloidogyne incognita*. Los resultados indican que varios hongos producen metabolitos con efecto nematóxico y nemastático. Varias especies de los géneros *Trichoderma, Penicillium, Fusarium, Paecilomyces, Cladosporium,* y *Gliocladium* demostraron la capacidad de producir metabolitos secundarios con efecto nematicida.

REACTION OF SOME *IPOMOEA TRIFIDA* AND *IPOMOEA BATATA* BREEDING MATERIAL AND THE SWEETPOTATO GERMPLASM COLLECTION TO *MELOIDOGYNE INCOGNITA* [RESPUESTA DE ALGUNOS MATERIALES PARA MEJORAMIENTO DE *IPOMOEA TRIFIDA* E *I. BATATA* ASI COMO MATERIALES DE LA COLECCION DE GERMOPLASMA DE BATATA A *MELOIDOGYNE INCOGNITA*]. **P. Jatala & E. Guevara. Dept. of Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Five hundred sixty-one *Ipomoea* clones of a germplasm collection originating from Colombia, Cuba, Dominican Republic, Ecuador, Guatemala, México, U.S.A., and Venezuela, plus 155 clones of *Ipomoea batata* breeding material, and 255 clones of *Ipomoea trifida* crosses, were tested for their reaction to *Meloidogyne incognita*. Based on the final designated host reaction (taking the root galling index and root necrosis index into consideration), 14 and 45 clones of the *Ipomoea trifida* crosses showed either a high degree of resistance or some resistance to *M. incognita*, respectively. Only some clones of *I. batata* crosses and 7 clones from Colombia, Ecuador, Venezuela, and the U.S.A. were resistant. No acceptable resistance was found in clones originating from other countries.

REACTION OF SOME DIVERSE POTATO BREEDING MATERIAL TO *MELOIDOGYNE INCOGNITA* [RESPUESTA DE ALGUNOS MATERIALES PARA MEJORAMIENTO DE PAPA A *MELOIDOGYNE INCOGNITA*]. **P. Jatala & E. Guevara. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—An evaluation was made of the reaction to *Meloidogyne incognita* of 1 463 clones formed by 2X crosses of *Solanum phureja* and *S. sparsipilum* that have genes for resistance to *Pseudomonas solanacearum* and *M. incognita*, and 535 clones of 4X crosses of breeding material with immunity to PVX and PVY viruses and some resistance to *M. incognita*. Approximately 8% of the 2X clones and 18% of the 4X clones showed a high degree of resistance to *M. incognita*. In another test, 306 clones of 2X-2X crosses with parents having genes for resistance to PLRV, PVX, PVY, late blight, bacterial wilt, and root-knot nematodes as well as producing 2n pollen were tested for resistance to *M. incognita*. Only 16% of the clones showed resistance while 3.9% were moderately resistant to *M. incognita*. Parallel to this test, 1 044 clones generated from 4X-2X crosses and 222 clones of 4X-2X crosses of material from the Polish breeding program with good agronomic characters and producers of 2n pollen were tested. While 0.6% of the 4X-2X clones and 4.5% of the 4X-4X clones showed resistance to *M. incognita*, 4.7% and 5% of the material, respectively, were moderately resistant.

FIELD APPLICATION OF SOME RHIZOBACTERIAL CULTURES FOR THE CONTROL OF *MELOIDOGYNE INCOGNITA* AND *PSEUDOMONAS SOLANACEARUM* ON POTATO [APLICACIONES EN CAMPO DE ALGUNOS CULTIVOS RIZOBACTERIALES PARA EL CONTROL DE *MELOIDOGYNE INCOGNITA* Y *PSEUDOMONAS SOLANACEARUM* EN PAPA]. **P. Jatala, E. Guevara & T. Boluarte. Dept. of Nematology and Entomology, International Potato-Center (CIP), Apartado 5969, Lima, Perú.**—Tests were conducted to determine the possibility of reducing *Meloidogyne incognita* and *Pseudomonas solanacearum* damage on potato under field conditions by application of some Rhizobacterial cultures. Treatments consisted of row application and seed treatment (tuber dip) as follows: liquid culture medium alone, three different Rhizobacterial liquid cultures, sterilized Rhizobacterial cultures, and a control with no application. Plants grown in all plots, except for the control and those with tubers dipped in culture medium alone, had higher numbers of healthy plants at harvest. In a follow up test, yield of healthy tubers of potato cv. Désirée increased when ubers were dipped separately in three different Rhizobacterial liquid culture media prior to planting. No considerable changes in the nematode population were noted in all treatments.

HISTOPATHOLOGICAL CHANGES DUE TO *NACOBBUS ABERRANS* INFECTION IN ROOTS OF RESISTANT POTATO CLONES [CAMBIOS HISTOPATOLOGICOS DEBIDOS A LA INFECCION DE *NACOBBUS ABERRANS* EN RAICES DE CLONES SUSCEPTIBLES Y RESISTENTES DE PAPA]. **P. Jatala & R. Haddad. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Histopathological changes caused by *Nacobbus aberrans* in roots of resistant potato clones

B4 and B25 of *Solanum tuberosum* ssp. *andigena* were examined *in vitro*. Data indicate that juveniles and immature vermiform females penetrate roots of resistant potato with the same frequency with which they penetrate roots of susceptible potato. Once penetration occurs, the juveniles and immature females move intra and intercellularly in the cortical tissues. Small cavities are formed around the nematodes 7 days after penetration. In resistant potato, cytoplasm of cells surrounding these cavities becomes dense but contains few or none of the small starch granules that are abundant in infected roots of susceptible potato clones. These starch granules were less frequent in B4 than in B25. This is in accordance with the higher degree of resistance in B4. Usually, severe necrosis was associated with these cells and nematodes did not complete the life cycle. Although some syncytia were formed when roots were inoculated with immature females, they were very small and no hypertrophy or galling was noted on the roots.

***IN VITRO* STUDIES OF THE LIFE CYCLE OF *NACOBBUS ABERRANS* IN ROOTS OF SUSCEPTIBLE AND RESISTANT POTATO CLONES** [ESTUDIOS *IN VITRO* DEL CICLO DE VIDA DE *NACOBBUS ABERRANS* EN RAICES DE CLONES SUSCEPTIBLES Y RESISTENTES DE PAPA]. **P. Jatala & R. Haddad. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Roots of the susceptible potato cv. Désirée growing on water-agar in petri plates were inoculated with juveniles of *Nacobbus aberrans*. Every 24 hr until 45 days, infected roots were excised and stained with acid fuchsin in lactophenol, and the nematodes were extracted for observation. Seven days after inoculation with 30 second-stage juveniles, nematodes had molted to the third stage and left the root. They remained outside the root system for about 5–6 days before penetrating roots again and molting to fourth-stage juveniles (J4) and immature females. The J4 and immature females exited roots 18–19 days after inoculation and remained in a quiescent state for approximately 2 days before penetrating roots again. Within 24–28 days, galling was noted on the inoculated and noninoculated roots, indicating that nematodes had also penetrated the noninoculated roots. Egg masses were formed after 35 days and the second generation of nematodes was observed 45 days after inoculation. Completion of the life cycle was accelerated in the presence of a large inoculum load and favorable environmental conditions.

OBSERVACIONES AL MICROSCOPIO ELECTRONICO DE BARRIDO DE *DITYLENCHUS DIPSACI* COLECTADO DE AJO EN AREQUIPA-PERU [SCANNING ELECTRON MICROSCOPE OBSERVATIONS OF *DITYLENCHUS DIPSACI* FROM GARLIC IN AREQUIPA, PERU]. **P. Jatala & R. Haddad. Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Varios individuos de *Ditylenchus dipsaci* colectados de ajos en Areqipa-Perú, fueron procesados para ser observados al microscopio electrónico de barrido. Las anulaciones externas de la cutícula en la región labial son similares en juveniles y adultos. La porción anterior de la cutícula está marcada por una abertura estomatal redondeada en forma de poro que está localizada en una depresión hexagonal, sobre el prostoma y rodeada de pequeños poros en la sencilla labial interna. Los pares de labios subdorsales y subventrales son notorios y separados. Los labios laterales son pequeños y algo más bajos que los labios subdorsales y aparecen como pequeños puntos refractivos. Los anillos transversales del cuerpo son muy prominentes y miden alrededor 1 μm de ancho que pueden ser observados en toda la longitud del cuerpo. El campo lateral está marcado por cuatro líneas. Las alas se adelgazan en la región de la cola y desaparecen. El campo finaliza cerca de la punta de la cola, la que es punteaguda. El ano es pequeño y en forma de luna en cuarto creciente y no afecta las anulaciones normales del cuerpo. A pesar que se examinaron muchos especímenes no se han encontrado machos.

SCANNING ELECTRON MICROSCOPE EXAMINATION OF *DITYLENCHUS DESTRUCTOR* FROM SWEETPOTATO [ESTUDIOS BAJO MICROSCOPIO ELECTRONICA DE BARRIDO DE *DITYLENCHUS DESTRUCTOR* EN BATATA]. **P. Jatala & R. Haddad. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Juveniles, adult females, and males of *Ditylenchus destructor* attacking sweetpotato were processed for scanning electron microscope examination. The anterior portion of juveniles, adult females, and males are similar. The stomatal opening is round, pore-like and localized in a hexagonal depression over prostoma and surrounded by small pores on the internal labial sensilla. Subdorsal and subventral lips are pronounced and separated. Lateral lips are small and positioned at a lower level than those of subdorsal and subventral lips. The outstanding morphological characteristic of this species is the presence of six incisures in the lateral fields with the outer two incisures being areolated. Lateral fields narrow and disappear in the tail region. Transversal striae are more prominent in the neck region and about 1 μm apart. The anal opening is in form of small crescent and is found on the transversal striae. The tail is long and filiform.

SCANNING ELECTRON MICROSCOPE EXAMINATION OF 25 POPULATIONS OF *NACOBBUS ABERRANS* FROM NORTH AND SOUTH AMERICA [OBSERVACIONES BAJO MICROSCOPIO DE BARRIDO DE 25 POBLACIONES DE *NACOBBUS ABERRANS* DE NORTE AMERICA Y SUD AMERICA]. **P. Jatala, R. Haddad & T. Boluarte. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Juveniles, vermiform immature females, males, and mature sedentary females of 25 populations of *Nacobbus aberrans* collected from Argentina, Bolivia, Ecuador, México, Perú and the U.S.A. were extracted from infected susceptible potato roots and processed for scanning electron microscope examination. There were distinct morphological differences in the tail region of the mature females of *N. aberrans* among the different populations. Similarly, *en-face* view of the females revealed differences in the lip regions of the different populations examined. Distinct morphological differences were also noted amongst the second-stage juveniles, immature females, and males of different populations. The differences in the morphology of the different populations of *Nacobbus aberrans* observed in this study justify reevaluation of the taxonomic status this species.

SCANNING ELECTRON MICROSCOPE EXAMINATION OF CRYOFRACTURED GALLS CAUSED BY *NACOBBUS ABERRANS* ON ROOTS OF SUSCEPTIBLE POTATO [ESTUDIOS EN MICROSCOPIO ELECTRONICA DE BARRIDO DE AGALLAS CRIOFRACTURADAS INDUCIDOS POR *NACOBBUS ABERRANS* EN RAICES DE PAPA SUSCEPTIBLES]. **P. Jatala, R. Haddad & T. Boluarte. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Galls caused by *Nacobbus aberrans* on roots of potato cv. Désirée were fixed in 2% glutaraldehyde for at least 4 days, then transferred into a solution of 2% osmium tetroxide for 24 hr prior to dehydration and cryofracture preparation. Samples were placed in liquid nitrogen and fractured with a sharp razor blade longitudinally and transversely. Cryofractured samples were processed for scanning electron microscope examination. Observation of samples revealed the secondary wall thickening of the syncytial cells that was reported in light microscope examinations. Secondary cell wall thickening and deposition of silica was noted in the endodermal cells surrounding or near the syncytial cells. Cytoplasm of syncytia appeared more dense than cytoplasm of noninfected tissue. The presence of starch granules was quite evident in the cells surrounding syncytia as well as in the cortical region near infection sites. Superficial infection of galls and egg masses by an unidentified fungus was noted in several samples.

EFFICACY OF THE VARIOUS EXTRACTS OF DIFFERENT PLANT PARTS IN CONTROLLING PLANT PARASITIC NEMATODES [EFICACIA DE VARIOS EXTRACTOS DE DIFERENTES PARTES DE PLANTAS EN EL CONTROL DE NEMATODOS FITOPARASITOS]. **P. S. Jatala, P. Jatala, K. R. Schubert,* L. Gavilano & I. Delgado. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú, and *Dept. Botany and Microbiology, The University of Oklahoma, Norman, OK 73019-0245, U.S.A.**—In an attempt to determine the role of plant metabolites in the control of plant-parasitic nematodes, leaves, stems, roots, flowers, and fruits of 13 plant genera were processed to extract metabolites. Six extraction methods were used to obtain the aqueous extracts of fresh and lyophilized plant parts, aqueous extracts of fresh and lyophilized plant parts after 20 min boiling, and chloroform and methanol extracts of lyophilized plant parts. Data indicate that only extracts of various plant parts of five different plant genera had either nemastatic or nematoxic effects on the second-stage juveniles of *Meloidogyne incognita*. The action of extracts of different plant parts varied according to the extraction procedure. Results indicate the necessity and importance of utilizing various methods for extracting plant metabolites to be used in bioassays for determination of their nemastatic or nematoxic activities.

RACES OF *DITYLENCHUS DIPSACI* ATTACKING GARLIC, ONION, AND ALFALFA IN AREQUIPA, PERU [RAZAS DE *DITYLENCHUS DIPSACI* QUE ATACAN AL AJO, CEBOLLA Y ALFALFA EN AREQUIPA, PERU]. **P. Jatala, G. Laban & A. Flores. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Recent reports indicate that *Ditylenchus dipsaci* has become a major threat to the production of healthy garlic and onion crops in Arequipa, Perú. Alfalfa is also an important crop for the region and has also been found to be affected by this nematode in certain areas. Studies were conducted to determine the races of the nematode affecting these important crops. Plant and soil samples were collected from several fields, and the nematodes were extracted from soil and plant tissues. Results of host range studies indicate the presence of two races of *Ditylenchus dipsaci* in Arequipa. Most of the nematode populations collected from different fields belonged to the strawberry race

while only two populations belonged to the garlic and onion race. Apparently, the introduction of this nematode to the area must have been from two different locations having these races. If proper rotation schemes are to be applied in conjunction with hot water treatment, care should be taken to limit the distribution and dissemination and possible mixing of these races.

REPORT OF *DITYLENCHUS DESTRUCTOR* ATTACKING *LIATRIS* SP. AND *BELTRARD* SP. IN HUACHO AND CARAZ, PERU [REPORTE DE *DITYLENCHUS DESTRUCTOR* ATACANDO *LIATRIS* SP. Y *BELTRARD* SP. IN HUACHO Y CARAZ, PERU]. **G. Laban, M. Laban & P. Jatala. Dept. Nematology and Entomology, International Potato Center (CIP), Apartado 5969, Lima, Perú.**—Recently, the flower industry in Huacho and Caraz, Perú discovered that field-grown plants of *Liatris callillepsis, L. spicata, L. michx,* and *Beltrard* sp., which are produced exclusively for exportation, were wilting and their corms rotted after a short period of storage. Soil and tissue analysis of these plants revealed the presence of large populations of *Ditylenchus destructor*. The area where these plants are cultivated for exportation is about 35 ha. Although the presence of *D. destructor* on potato was reported from Huanuco, Perú in 1977, there is no indication that it was disseminated from this area. In fact the population of this nematode in Huanuco has been greatly reduced due to different cultural practices and environmental conditions. It is presumed that the *D. destructor* found in Huacho and Caraz has been introduced to Perú through infected corms of the above-mentioned flowers. Care should be taken to limit the distribution of this nematode to other areas where it can become a limiting factor to the production of important food crops.

EFFECT OF SOME INSECTICIDES AND FUNGICIDES ON *GLOBODERA PALLIDA* RACE P5A [EFECTO DE ALGUNOS INSECTICIDAS Y FUNGICIDAS SOBRE LA RAZA P5A DE *GLOBODERA PALLIDA*]. **C. Lara & M. Canto-Sáenz. International Potato Center (CIP), Apartado 5969, Lima, Perú.**—The effect of four insecticides [Triflumuron (alsystin 25 PM), Matamidophos + cyfluthin (baytroid 525 SL), lindano (kurowañuchig 99%), and aldicarb 15G], two fungicides [mancozeb (dithane M 45) and metalaxil + mancozeb (ridomil MZ 72)] and a plant nutrient (polibar) on *G. pallida* (PCN) were determined in petri dish plates (1 000 and 500 ppm) and in the greenhouse. In the greenhouse most of the chemicals were applied at 1 and 2%; aldicarb was applied at 0.75 g/plant and lindano at 1.5 and 0.75 g/plant. At 1 000 ppm all pesticides were phytotoxic. At 500 ppm, aldicarb and baytroid inhibited female development. The other pesticides and polibar allowed a high PCN reproduction. In the greenhouse the plants were evaluated 10 weeks after planting. Fresh and dry top weights, tuber yield, nematode root density and the final/initial population ratio were determined. Aldicarb, baytroid, and polibar reduced significantly the number of females in the root ball and the Pf/Pi of PCN compared with the check. The pesticides that did not affect PCN were lindano, triflumuron, zidomie, and dithane.

GROWTH OF SOYBEAN IN SOIL INFESTED WITH ISOLATES OF *MELOIDOGYNE ARENARIA* [CRECIMIENTO DE LA SOYA EN SUELOS INFESTADOS CON AISLAMIENTOS DE *MELOIDOGYNE ARENARIA*]. **S. A. Lewis & J. D. Mueller. Department of Plant Pathology and Physiology, Clemson University, Clemson, SC 29634-0377, U.S.A.**—Centennial soybean, resistant to *Meloidogyne incognita* and susceptible to *M. arenaria*, was grown in field microplots containing sandy loam soil. Different geographical isolates of *M. arenaria* races 1 and 2 were added at rates of 400, 800, 1 200, and 1 600 eggs/100 cm^3 soil at the time of seeding. The race 2 isolate, common in South Carolina, was most aggressive, resulting in the mid-season death of Centennial soybean. Race 1 isolates from the states of Georgia, Florida, and South Carolina did not appear to significantly suppress plant growth. The race 2 isolate produced more and larger root galls than the race 1 isolates. The greatest plant growth suppression by the race 2 isolate occurred in the treatment with the highest number of eggs. As the season progressed, however, differences in growth suppression due to inoculum level decreased. Soybean may be able to be grown where race 1 of *M. arenaria* is present.

THE INFLUENCE OF DIFFERENT CONCENTRATIONS OF LYSINE ON THE EMBRYOLOGY AND HATCH OF *PRATYLENCHUS ZEAE* EGGS [LA INFLUENCIA DE DIFERENTES CONCENTRACIONES DE LISINA SOBRE LA EMBRIOLOGIA Y ECLOSION DE HUEVOS DE *PRATYLENCHUS ZEAE*]. **G. C. Loots & S. Steenkamp. Department of Zoology, Potchefstroom University for CHE, Potchefstroom 2520, Republic of South Africa.**—Newly laid eggs of *Pratylenchus zeae* were exposed to different concentrations of the amino acid lysine and observed at 2-hr intervals during the first day after the treatment

and every 6–8 hr for the rest of the 10-day experiment. Embryogenic development from one-cell stage to the appearance of the second-stage juvenile (J2) was completed within both treated and untreated eggs. However, only treated eggs hatched, whereas the untreated did not.

INFLUENCIA DE LA COMPACTACION DEL SUELO SOBRE LA NEMATOFAUNA EN AMBIENTE SEMIARIDO [INFLUENCE OF SOIL COMPACTION ON THE NEMATOFAUNA IN SEMIARID ENVIRONMENTS]. **C. López-Fando & A. Bello. Centro de Ciencias Medioambientales, CSIC. Serrano, 115 dpdo. 28006 Madrid, España.**—Se estudia la influencia de la compactación producida por la huella del tractor sobre la nematofauna, en cultivos de cereal y girasol bajo laboreo convencional y no-labores en suelos semiáridos de España Central. Se encontró en los suelos compactados un significativo aumento de las poblaciones de *Paratylenchus minor,* así como de *Heterodera avenae, Longidorus belloi* y *Alaimus* sp. y una disminución de *Merlinius brevidens.* Se destaca el valor indicador de *P. minor* en el nivel de compactación del suelo y se analiza el comportamiento de la nematofauna en relación con otros parámetros, teniendo en cuenta el sistema de manejo empleado.

MIGRACION VERTICAL DE *MELOIDOGYNE* SP. EN EL CULTIVO DEL KIWI, *ACTINIDIA DELICIOSA* , EN CHILE [VERTICAL MIGRATION OF *MELOIDOGYNE* SP. IN KIWI (*ACTINIDIA DELICIOSA*) IN CHILE]. **J. C. Magunacelaya, P. Saavedra & A. Valenzuela. Lab. Nematología, Universidad de Chile, Casilla 1004, Santiago, Chile.**—Se estudia la dinámica poblacional de *Meloidogyne* spp. en kiwi, nódulos en raíces, individuos en el suelo y distribución vertical de juveniles hasta un metro, durante 18 meses. Hay disminución de niveles poblacionales en el suelo a fines de primavera (diciembre) y en invierno (agosto). Se observa gran movilidad vertical de las poblaciones de juveniles de segundo estado y gran número de individuos a un metro de profundidad, donde las raíces de los kiwis no alcanzan a penetrar. Cuando disminuyen los niveles poblacionales en superficie, se produce incremento a profundidades mayores, así como, incremento de los niveles poblacionales superficiales están vinculados con bajas poblaciones en profundidades.

MANEJO DE PROBLEMAS FITONEMATOLOGICOS EN ORNAMENTALES DE FOLLAJE EN COSTA RICA [MANAGEMENT OF PHYTOPARASITIC NEMATODE PROBLEMS IN LEAFY ORNAMENTALS IN COSTA RICA]. **N. Marbán-Mendoza, L. Flores & N. Ortuño Castro. IPM Project, CATIE, Code 7170, Turrialba, Costa Rica.**—Las plantas ornamentales de follaje constituyen un rubro muy importante en la economía de Costa Rica. Desde hace 18 meses venimos efectuando diversos estudios sobre la distribución y patogenicidad de los fitonematodos en los ornamentales de follaje (*Aglaonema* y *Dracaena*) del Atlántico costarricense. Los nematodos *Pratylenchus coffeae* y *Helicotylenchus* spp. tuvieron la mayor distribución y frecuencia en las variedades María, S. Queen, Cristina y Lilliam de *Aglaonema commutatum. Pratylenchus coffeae* es patogénico y produce severos daños a las variedades María y Queen. El nematicida aldicarb 10G (55 kg/ha) dió el mejor porto, altura y producción comparado con ethoprop 10G (30 kg/ha), gallinaza (13 T/ha), broza de café (12 T/ha) y el testigo sin tratar. *Meloidogyne incognita* fue el nematodo más frecuente y de mayor distribución en las plantas de *Dracaena marginata.* La susceptibilidad varió con las variedades encontrándose un gradiente de susceptibilidad de mayor a menor en las variedades Bicolor, Colorama, Tricolor, Magonta y Verde.

WORLDWIDE DISTRIBUTION OF POTATO CYST NEMATODE *GLOBODERA* SPP. [DISTRIBUCION MUNDIAL DEL NEMATODO ENQUISTADO DE LA PAPA *GLOBODERA* SPP.]. **A. Matos & M. Canto-Sáenz. International Potato Center (CIP), Apartado 5969, Lima Perú.**—Based on information obtained at the International Potato Center and from the literature, the presence of potato cyst nematode (PCN) *Globodera pallida* has been reported in the following countries: Algeria, Bolivia, Canada, Colombia, Chile, Ecuador, France, Finland, Holland, India, Ireland, Italy, Norway, New Foundland, New Zealand, Pakistan, Panamá, Perú, Portugal, Sri Lanka, Spain, Switzerland, Sweden, ex-Soviet Union, United Kingdon, U.S.A., and Venezuela. In 14 of these countries, races of the nematode have been also identified. *Globodera rostochiensis* has been reported in Austria, Australia, Algeria, Belgium, Bolivia, Canada, Costa Rica, Chile, Czechoslovakia, Denmark, Esthonia, Finland, Germany, Greece, Holland, Hungary, India, Iceland, Israel, Italy, Japan, México, Morocco, New Zealand, Pakistan, Panamá, Perú, Philippines, Poland, Portugal, Sri Lanka, Spain, ex-Soviet Union, South Africa, Sweden, United Kingdom, U.S.A., Vancouver Island, Venezuela, and Yugoslavia. In 16 of these countries there is also information about the races of the nematode. In 63% of these countries infested with PCN there are no data about races. The International Potato Center maintains a worldwide collection of races and offers species and race identification as a free service.

UNDESCRIBED *GLOBODERA* SPECIES FROM MEXICO, VENEZUELA, AND BOLIVIA [ESPECIES NO DESCRITAS DE *GLOBODERA* DE MEXICO, VENEZUELA Y BOLIVIA]. **L. I. Miller. Dept. Plant Path., Physiol. and Weed Sci., Virginia Tech., Blacksburg, VA 24061, U.S.A.**—A morphological comparison was made of undescribed *Globodera* species isolates from Juchitepec, México (X 140), Mucuruba, Venezuela (V 105), and Colomí, Bolivia (BOL 1) with one isolate each of *G. rostochiensis* (ROS W), *G. tabacum tabacum* (TAB H), *G. t. virginiae* (VIR C), *G. t. solanacearum* (SOL W) and two isolates of *G. pallida* (PAL C and PAL G). All isolates were cultured on *Solanum dulcamara*. The cyst perineal patterns of V 105, BOL 1, and PAL C resemble those of SOL W; patterns of PAL G resemble those of TAB H; and patterns of X 140 resemble those of the ROS W. The width of J2 stylet knobs for X 140 and ROS W were less broad that those of the other isolates. The eccentricity value of cysts without neck indicates that X 140 is almost spherical; V 105, BOL 1, ROS W, and TAB H are globose; and PAL C, VIR C, PAL G, and SOL W are turbinate. Granek's ratio values of ROS W and X 140 are larger than in all other isolates and those of TAB H and V 105 are the smallest. The undescribed species isolates have yellow fifth-stage females and only BOL 1 reproduces on *S. tuberosum tuberosum*. Miller's Θd values of the female stylet knobs of BOL 1, V 105, X 140, and TAB H are smaller than those for ROS W and PAL C, but larger than those of PAL G, VIR C, and SOL W.

INTERACCION *NACOBBUS ABERRANS* Y *SYNCHYTRIUM ENDOBIOTICUM* EN DOS VARIEDADES DE PAPA [INTERACTION BETWEEN *NACOBBUS ABERRANS* AND *SYNCHYTRIUM ENDOBIOTICUM* IN TWO POTATO VARIETIES]. **R. Montalvo, R. Montecinos, J. Franco, J. Parker & R. Llerena. Programa de Investigación de la Papa (PROINPA), Apdo. 4285, Cochabamba, Bolivia.**—En las zonas productoras de papa en Bolivia es frecuente la presencia conjunta de *N. aberrans* y *S. endobioticum*. Bajo condiciones de invernadero plantas de las variedades Waycha e I. Blanca se inocularon con cinco densidades puras de *N. aberrans*, cinco de *S. endobioticum* e inoculaciones concomitantes con todas las combinaciones entre ellas. La presencia individual y conjunta de *N. aberrans* y *S. endobioticum* afectaron significativamente el peso fresco de la raíz y el follaje, el número de tubérculos y la altura de las plantas en ambas variedades. Por otra parte se observó un efecto sinergético en la reducción del peso de los tubérculos, el cual fue más influenciado por la presencia del nematodo. No se evidenció ningún efecto antagónico o estimulatorio por parte de *S. endobioticum* a la infección por *N. aberrans* y ni viceversa.

EFECTO DE TRES NEMATICIDAS (CARBOFURANES) SOBRE LA MULTIPLICACION DE *NACOBBUS ABERRANS* Y EL RENDIMIENTO DE PAPA (VAR. WAYCHA Y ALPHA) [EFFECTS OF THREE NEMATICIDES (CARBOFURANS) ON THE MULTIPLICATION OF *NACOBBUS ABERRANS* AND THE YIELD OF POTATO (VAR. WAYCHA AND ALPHA)]. **R. Montecinos & J. Franco. Programa de Investigación de la Papa (PROINPA), Apdo. 4285, Cochabamba, Bolivia.**—Nematicidas con el mismo ingrediente activo (carbofuran) pero bajo diferentes nombres y concentraciones (Furadan 5G, Curater 10G y Carbodan 5G) fueron comparados por su efecto sobre *N. aberrans* en el cultivo de las variedades Waycha (ssp. *andigena*) y Alpha (ssp. *tuberosa*), en un suelo altamente infestado con *N. aberrans*. Las tasas de multiplicación (Pf/Pi) no mostraron diferencias significativas; esto explica que la reproducción del nemátodo fue similar para ambas variedades y nematicidas. El índice de nodulación presentó diferencias significativas entre nematicidas. El rendimiento presentó diferencias estadísticas entre el promedio de los nematicidas (7.52 kg/parcela) y el testigo (2.04 kg/parcela). Los tres productos tuvieron un comportamiento similar.

LA FERTILIZACION INORGANICA EN EL MANEJO INTEGRADO DE *NACOBBUS ABERRANS* EN PAPA [INORGANIC FERTILIZERS IN THE INTEGRATED MANAGEMENT OF *NACOBBUS ABERRANS* IN POTATO]. **R. Montecinos, J. Franco & R. Montalvo. Programa de Investigación de la Papa (PROINPA), Apdo. 4285, Cochabamba, Bolivia.**—Durante dos campañas agrícolas, se investigó el efecto de diferentes dosis de N,P,K, sobre la multiplicación (TM) de *N. aberrans* y el rendimiento de los cultivares Waycha (*Solanun tuberosun* ssp. *andigena*) y Alpha (*Solanum tuberosum* ssp. *tuberosa*). Los tratamientos fueron distribuídos completamente al azar en un diseño factorial de 2×3×2×2 (N-P-K × cv.), con cuatro repeticiones. Resultados sobre la TM mostraron que *N. aberrans* decreció con el incremento de los niveles de nitrógeno (80 kg/ha). Por el contrario para la interacción N-P-K se observó un incremento poblacional de *N. aberrans* con niveles de fósforo de 60 y 120 kg/ha., con potasio a 60 kg/ha y ausencia de nitrógeno. La variedad Alpha incrementó significativamente la TM en relación a la variedad Waycha. Los rendimientos mostraron diferencias significativas y un incremento de tendencia lineal para las dosis de fósforo (60 y 120 kg/ha) siendo mayor éste, cuando interaccionaron con N (80 kg/ha) y K (60 kg/ha).

OBSERVATIONS ON THE HOST RESPONSE OF *MELOIDOGYNE FLORIDENSIS* WITH COMPUTER VISUALIZATION [OBSERVACIONES SOBRE LA RESPUESTA DE HOSPEDANTES A *MELOIDOGYNE FLORIDENSIS* MEDIANTE LA VISUALIZACION COMPUTARIZADO]. **Manuel Mundo-Ocampo, M. Greene, J. G. Baldwin & M. Flaxman. Department of Nematology and Computer Graphics Facility, University of California-Riverside, Riverside, CA 92521, U.S.A.**—The host response induced by *Meloidogyne floridensis* on pine roots includes a cell with such deeply invaginated nuclear material that it is difficult to determine the number of nuclei without computer-assisted reconstruction. Using advanced-visualization system software, we reconstructed the three-dimensional image of the nuclear material in the cell from serial sections. What appears to be independent nuclei in a single plane is shown in three-dimensions to be interconnected lobes of one large nucleus with several nucleoli. This technique provides new information on the host response induced by *M. floridensis* and has additional applications in nematode morphology and host parasite relationships.

A PRACTICAL METHOD FOR CULTURING *GLOBODERA* AND *PUNCTODERA* [UN METODO PRACTICO PARA CULTIVAR A *GLOBODERA* Y *PUNCTODERA*]. **Manuel Mundo-Ocampo. Department of Nematology, University of California-Riverside, Riverside, CA 92521, U.S.A.**—Traditional soil culturing of round cyst-forming nematodes such as *Globodera* and *Punctodera* is not suitable for direct dissecting microscope observations of nematode development on roots. Seedlings of nightshade (*Solanum dulcamara*) and corn (*Zea mays*) were developed in seed-pack growth pouches and inoculated with juveniles of *G. solanacearum* and *P. chalcoensis*, respectively. The pouches were maintained in a Conviron EF7 growth chamber at 17–20 °C. Adult and cyst stages were observed 30–40 days after root penetration. This method minimizes space needed and is ideal for studies of host parasite interactions. It results in nematode infected roots clean of soil particles, which can be further processed for light and EM sectioning and histological observations.

TRES METODOS PARA OBSERVAR NEMATODOS CON EL MICROSCOPIO ELECTRONICO DE BARRIDO (SEM) [THREE METHODS FOR EXAMINING NEMATODES BY SCANNING ELECTRON MICROSCOPY]. **M. Mundo-Ocampo, P. Jatala,* R. Haddad* & G. Zumarán.** Department of Nematology, University of California, Riverside, CA 92521, U.S.A., *Depto. de Nematología y Entomología, Centro Internacional de la Papa, Apartado 5969, Lima, Perú y **Universidad Católica de Arequipa, Perú.**—Larvas, hembras y machos de *Ditylenchus dipsaci*, fueron preparados con los tres siguientes métodos y evaluados con el microscopio electrónico de barrido. 1) Los nematodos se fijaron en tetraóxido de osmio y secaron al punto crítico. Se observó, que los especímenes se conservan mejor, la resolución de las estructuras es precisa, pero se nota una distorsión fina en la cutícula. 2) Los nematodos se infiltraron en glicerina pura. Este método elimina la distorsión de la cutícula pero los especímenes son más sensibles al haz de electrones. 3) Los nematodos son primero fijados en glutaraldehido y luego en tetraóxido de osmio. Este método es rápido de preparar, se logra una determinación morfológica adecuada, pero es sólo útil para un diagnóstico rápido.

***PRATYLENCHUS MEDITERRANEUS*, AN ECTO AND ENDOPARASITE OF POTATO ROOTS** [*PRATYLENCHUS MEDITERRANEUS*, UN ECTO Y ENDOPARASITO DE RAICES DE PAPA]. **D. Orion & D. Lapid. Department of Nematology, A.R.O., The Volcani Center, Bet-Dagan 50-250, Israel.**—Potato (*Solanum tuberosum* cv. Nicola) excised roots were inoculated with *Pratylenchus mediterraneus*. Direct observations on the behavior of the nematode were done daily. Twenty-four hours following inoculation, nematodes were feeding on root tips, root epidermal cells, and root hairs. Three to five days later, growth deformations of swollen cells were evident in these locations. Root hairs were curtailed by the feeding nematodes. Roots were also invaded by the nematodes, inducing epidermal lesions, that were somewhat swollen and yellowish brown or dark brown in color. Quite often epidermal lesions became cracked revealing nematodes and their eggs among the damaged tissues. Roots heavily infected by the nematode were often adjacent to healthy ones.

G 84131.12 POSIBLE NUEVA VARIEDAD DE PAPA RESISTENTE AL NEMATODO QUISTE PARA LA ZONA SUR DEL PAIS [G84131.12, A NEW POTATO VARIETY WITH POSSIBLE RESISTANCE TO THE POTATO CYST NEMATODE IN THE SOUTHERN ZONE OF PERU]. **M. A. Pacheco, M. Scurrah & M. Canto. INIA, Estación Experimental Agropecuaria Andenes, Cusco, y Centro Internacional de la Papa, Apartado 5969, Lima, Perú.**—Las principales zonas semilleras de papa en el Departamento del Cusco se encuentran fuertemente infestadas por el nematodo quiste de la papa, ocasionando pérdidas

considerables en la producción que en algunos casos llegan hasta un 60%. Como una alternativa para frenar este importante factor limitante de la producción se empezó a probar genotipos resistentes al nematodo proporcionados por el Centro Internacional de la Papa. Al cabo de 5 campañas de selección en la que se estudiaron alrededor de 600 genotipos, se tiene la posibilidad de liberar un genotipo como una posible nueva variedad con alta resistencia a este factor. Se trata del genotipo avanzado G 84131.12 que desde un inicio mostró muy buenas condiciones de rendimiento, tipo de planta, color de tubérculo, precocidad, calidad y sobre todo resistencia al nematodo quiste de la papa. Fue seleccionado bajo condiciones de sierra subtropical en terrenos con fuerte infección del nematodo con predominancia de las razas P4A, P5A, P6A, con directa participación de los agricultores. Actualmente se cuenta con 5 TM de semilla a disposición de los campesinos.

PATHOGENICITY OF *PRATYLENCHUS VULNUS* ON PLUM [LA PATOGENICIDAD DE *PRATYLENCHUS VULNUS* EN CIRUELO]. **J. Pinochet, J. Marull, R. Rodríguez-Kábana,* A. Felipe** & C. Fernández. Depto. de Patología Vegetal, IRTA, Crta. de Cabrils s/n 08348, Cabrils, Barcelona, Spain, Dept. of Plant Pathology, Auburn University, Auburn, AL 36849, U.S.A., and Depto. de Fruticultura, Servicio de Investigación Agraria, Apartado 727, 50080 Zaragoza, Spain.**—The effects of *P. vulnus* on development of five commercial plum rootstocks were evaluated. In a greenhouse test, Montizo, PSM 101, Citation, and San Julian 655-2 were good hosts for *P. vulnus*. Root weights of uninoculated Montizo and San Julian were higher ($P \leq 0.05$) than for inoculated plants, whereas fresh top weights of uninoculated Citation and Montizo were significantly higher from those of inoculated plants. Only Montizo showed a significant increase in shoot length in uninoculated over inoculated plants. In a microplot experiment lasting 28 months, inoculation with *P. vulnus* reduced top and root weights of PSM 101, Marianna 2624, and San Julian 655-2 but did not affect trunk diameter. Parasitism was high, fluctuating from 2 890 (Marianna) to 7 220 (PSM 101) nematodes per gram of root. The rootstock most susceptible to *P. vulnus* was San Julian.

EFECTO DE *NACOBBUS ABERRANS* EN EL CRECIMIENTO Y DESARROLLO DE DOS CULTIVARES DE PAPA [EFFECT OF *NACOBBUS ABERRANS* ON THE GROWTH AND DEVELOPMENT OF TWO POTATO CULTIVARS]. **J. Ramos, A. Devaux, J. Franco & J. Herbas. PROINPA, Cochabamba, Bolivia.**—En un campo infestado por *Nacobbus aberrans* se estudió el efecto de la aplicación de riego y nematicida, sobre dos cultivares de papa, Alpha (*S. tuberosum*) y Waych'a (*S. andigena*). En ambos cultivares se observó que el nematodo tuvo una mayor tasa de multiplicación bajo condiciones de riego. La acción de los nematodos bajo riego como en condiciones a secano redujo el índice de área foliar, peso fresco y seco del follaje, estolones y tubérculos y el número de tubérculos. Lo cual se observó más claramente en el cv. Waych'a. El rendimiento fue mayor con poblaciones bajas de nematodos (22.8 y 19.3 T/ha), versus poblaciones altas (15.0 y 14.9 T/ha), bajo condiciones de riego y a secano, respectivamente. En Waych'a, los riegos inducieron cierta tolerancia al nematodo (21.7 y 21.4 T/ha con y sin aplicación de nematicida, respectivamente), situación que no se observó bajo condiciones a secano (17.0 y 14.1 T/ha).

NEMATODOS FITOPARASITOS EN CULTIVOS Y/O PLANTAS SILVESTRES EN VENEZUELA [PHYTOPARASITIC NEMATODES IN CROPS AND NATIVE PLANTS IN VENEZUELA]. **J. Renaud, S. Zerpa, E. Ericeno & A. Maggiorani. Posgrados de Agronomía, Universidad Centroccidental L. Alvarado, Barquisimeto, Venezuela.**—Desde 1979 se han venido analizando muestras de suelo alrededor de raíces de plantas cultivadas y/o silvestres en todo el territorio nacional; 3 475 muestras han sido tomadas. De ellas se han determinado los síguientes géneros: *Aphelenchoides, Basiria, Basiroides, Boleodorus, Cephalenchus, Criconema, Criconemoides, Ditylenchus, Dolichodorus, Ecphyadophora, Ecphyadophoroides, Helicotylenchus, Hemicriconemoides, Hemicycliophora, Hoplolaimus, Heterodera, Meloidogyne, Nothotylenchus, Paratrophurus, Paratylenchus, Peltamigratus, Pratylenchus, Psilenchus, Radopholus, Rhadinaphelenchus, Scutellonema, Trichotylenchus, Trophotylenchulus, Trophurus, Tylenchocriconema, Tylenchorhynchus, Tylenchulus, Tylenchus* y *Xiphinema*.

EFECTO DEL AGREGADO DE MATERIA ORGANICA Y NEMATICIDAS SOBRE LA DINAMICA POBLACIONAL DE *PARATYLENCHUS* SP. EN APIO, EN LA PLATA (ARGENTINA) [EFFECT OF INCREASED ORGANIC MATTER AND NEMATICIDES ON THE POPULATION DYNAMICS OF *PARATYLENCHUS* SP. IN CELERY IN LA PLATA, ARGENTINA]. **J. Roán, G. Mareggiani & M. García. Fac. Agronomía U.N.L.P. CC 31(1900) La Plata, Argentina, Fac. Agromonía UBA, Av. S. Martín 4453, (1417) Buenos Aires, Argentina y E.E. Gorina Min. Prod.**—Se evaluó la fluctuación de la población de *Paratylenchus* sp. en un cultivo de apio, cv. Golden Spartan, en parcelas tratadas con aldicarb, benfuracarb, viruta de salicáceas, y testigo. Se usó un diseño de bloques al azar con cuatro tratamientos y cinco repeticiones,

con parcelas de 2.4 m². Se realizaron siete muestreos de suelo, y al cosechar se pesó la parte aérea. A partir del tercer muestreo se determinaron densidades poblacionales significativamente superiores ($P < 0.05$) en el testigo frente a los tratamientos restantes, observándose un incremento paulatino en la población en todos los tratamientos hasta la cosecha, en que se alcanzaron niveles de 814 a 1 452 nematodos/200 g de suelo. El peso de parte aérea fue significativamente inferior ($P < 0.05$) en el testigo con respecto a los otros tratamientos.

DISINFESTATION STRATEGIES TO MANAGE *DITYLENCHUS DIPSACI* IN GARLIC AND BULBOUS CROPS [ESTRATEGIAS DE DESINFECCION PARA EL MANEJO DE *DITYLENCHUS DIPSACI* EN AJO Y OTROS CULTIVOS BULBOSOS]. **P. A. Roberts. Department of Nematology, University of California, Riverside, CA 92521, U.S.A.**—The stem and bulb nematode, *Ditylenchus dipsaci*, is a serious pest of garlic and other bulbous crops. In garlic production, infections can arise from planting in nematode-infested soil or more commonly from planting infected garlic seed cloves. Crop injury from seed clove infection can be prevented by disinfection of cloves by hotwater-formalin dip treatment, combined with efforts to produce nematode-free planting stock. Recent suspension of formalin use in California has focused research into alternative dip treatments. Tests on the effect of varied time and temperature exposure with or without dip additives for disinfestation relative to phytotoxicity have demonstrated the lack of control in hot-water, and the efficacy of commercial dip treatment of cloves in hot or cold sodium hypochlorite (bleach) or avermectin solutions. This research is presented together with discussion of the California garlic production system.

CROPPING SYSTEMS FOR THE MANAGEMENT OF PLANT PARASITIC NEMATODES [SISTEMAS DE CULTIVOS PARA EL MANEJO DE NEMATODOS FITOPARASITOS]. **R. Rodríguez-Kábana. Department of Plant Pathology, Auburn University, Auburn, AL 36849, U.S.A.**—Cropping systems can be used effectively to manage problems caused by nematodes. Research at Auburn has shown that tropical crops can be used effectively in rotation to manage nematode problems in peanut (*Arachis hypogaea*) and soybean (*Glycine max*). Rotations with American jointvetch (*Aeschynomene americana*), castor (*Ricinus communis*), hairy indigo (*Indigofera hirsuta*), partridge pea (*Cassia fasciculata*), sesame (*Sesamum indicum*), and velvetbean (*Mucuna deeringiana*) have resulted in good nematode control and increased yield of peanut and soybean. Some crops are considered "active" in that they produce compounds that are nematicidal, whereas others are simply non-host or "passive".

ANNUAL WARM-WEATHER GRASSES FOR THE MANAGEMENT OF NEMATODE PROBLEMS [PASTOS ANUALES DE CLIMAS CALIDOS PARA EL MANEJO DE PROBLEMAS CON NEMATODOS]. **R. Rodríguez-Kábana, D. I. Bransby & D. G. Robertson. Auburn University, Auburn, AL 36849, U.S.A.**—*Bothriochloa ischaemum, Chloris gayana, Eragrostis teff, Pennisetum flaccidum, Bouteloua gracilis, Panicum coloratum, Andropogon gerardii, Digitaria sanguinalis, Eragrostis curvula, Panicum virgatum,* and *Tripsacum dactyloides* suppressed development of *Meloidogyne arenaria* and *Heterodera glycines* in greenhouse tests with naturally infested soil. The suppressive effect of two switchgrass (*P. virgatum*) cultivars ('Alamo' and 'Cave-in-Rock'), 'Red River' crabgrass (*D. sanguinalis*) and 'Eastern' Gammagrass (*T. dactyloides*) on the nematodes was confirmed in microplot experiments where the grasses were in rotation with hairy vetch (*Vicia villosa*) and eggplant (*Solanum melongena*). An experiment in a peanut (*Arachis hypogaea*) field showed that numbers of *M. arenaria* juveniles in soil from plots with 'Alamo' switchgrass were as low as those in plots with cotton (*Gossypium hirsutum*) and significantly lower than the numbers in plots with peanut.

BAHIAGRASS-COTTON ROTATIONS AND THE MANAGEMENT OF NEMATODE PROBLEMS [ROTACION PASTO BAHIA-ALGODON EN EL MANEJO DE PROBLEMAS CON NEMATODOS]. **R. Rodríguez-Kábana, D. G. Robertson & J. S. Bannon. Auburn University, Auburn, AL 36849, U.S.A.**—A 3-year experiment was conducted to determine the value of 'Pensacola' bahiagrass (*Paspalum notatum*) as a rotation crop for the management of nematode problems in cotton (*Gossypium hirsutum*). The experiment was in a field infested with *Meloidogyne incognita* and *Hoplolaimus galeatus*, as the principal nematodes, with small populations of *Helicotylenchus dihystera, Paratrichodorus minor, Tylenchorhynchus claytoni,* and *Pratylenchus* sp. Yields of cotton cultivars (Deltapine 20, Deltapine 50, Coker 320, Coker 315, Stoneville 453, DES 119, and S 1001) following 2 years of bahiagrass were higher than in a cotton monoculture system. The magnitude of the yield response to the rotation was cultivar dependent. At-plant application of nematicide (aldicarb at 17 g a.i./100 m row) improved cotton yields in both the monoculture and the rotation systems. Yield response to the nematicide was more pronounced in the monoculture than in the rotation; in both systems the response was cultivar dependent.

ALTERACIONES HISTOLOGICAS EN *PASSIFLORA EDULIS* F. SP. *FLAVICARPA* INDUCIDAS POR *ROTYLENCHULUS RENIFORMIS* [HISTOLOGICAL ALTERATIONS IN *PASSIFORA EDULIS* F. SP. *FLAVICARPA* INDUCED BY *ROTYLENCHULUS RENIFORMIS*]. **Z. Suarez H., Ma. S. González, L. C. Rosales & V. Tellechea. Departamento de Protección Vegetal., Centro Nacional de Investigaciones Agropecuarias, Apdo. 4653, Maracay 2101, Aragua, Venezuela.**—Segmentos de raíces infectadas con *Rotylenchulus reniformis* fueron fijadas en Craff III, deshidratadas en terbutanol, incluídas en parafina, cortadas al micrótomo en secciones de 15 μm y coloreadas con la tinción cuadruple de Triarch. Se realizó, además, tinción con fuccina ácida. En la histopatología se observó a las hembras jóvenes localizadas perpendicularmente al sistema vascular. El sincitio, con citoplasma granular y denso se originó en la endodermis, involucrando varias células del periciclo. Alrededor de las hembras adultas, las células del parénquima cortical se colapsaron y finalmente todo el tejido de la planta se necrosó.

EL NEMATODO DE LOS CITRICOS EN LOS HUERTOS DE CHUQUISACA [THE CITRUS NEMATODE IN CITRUS GROVES IN CHUQUISACA]. **S. Tapia & J. Franco. CORDECH, Sucre, y PROINPA, Cochabamba, Bolivia.**—Por muestreos realizados en plantaciones de cítricos ubicados entre las zonas de Machareti y el Río Chico (ca. 2 500 ha) se estableció que el 80 al 90% de los huertos de naranja agria, lima, pomelo, cidra, mandarina y naranja dulce se encuentran atacados por el nematodo de los cítricos *Tylenchulus semipenetrans*. La presencia de este fitoparásito se manifiesta en variedades introducidas, por un raquitismo generalizado en plantaciones jóvenes de las zonas bajas con riego. Sin embargo plantaciones de kinotto (*Fortunella japonica* (Thumb.) Swingle) han demostrado una menor incidencia y se viene investigando un estrategia que permita recuperar las plantaciones de cítricos. Ensayos con Furadan 350 lograron disminuir las densidades poblacionales en un 10%, lo que se muestra antieconómico y poco recomendable.

SOME ANATOMICAL ODDITIES WITHIN ORDERS OF THE MARINE NEMATODES [ALGUNAS CURIOSIDADES ANATOMICAS DENTRO DE ORDENES DE NEMATODOS MARINOS]. **A. C. Tarjan & E. J. Keppner. Professor Emeritus, Dept. of Entomology and Nematology, University of Florida, Gainesville, FL 32611, and Branch Chief, National Marine Fisheries Service, U.S. Dept. Commerce, Panama City, FL 22408, U.S.A.**—The free-living marine nematodes are an ecological group of animals with diverse anatomy and morphology, infinitely more spectacular than that of their terrestrial relatives. A simplified, but workable, systematics of the group results in five orders. In the order Enoplida, the genus *Halalaimus* has an extremely elongated amphid. *Metoncholaimus* has massive teeth and a unique Demanian system. *Polygastrophora* is unique in having multiple esophageal basal bulbs. A common coloaca contains the male or the female sexual openings in *Lauratonema*. The *Pseudocella* head displays a helmet-like cephalic capsule, and *Trefusia* possesses jointed setae. In the order Araeolaimida, *Campylaimus* exhibits an amphid that occupies almost the entire body length and has male supplements extending through the anterior part of the body. *Diplopeltula* has a folded loop-like amphid. The anterior body of *Manunema* is narrow and bent ventrally. *Paratarvaia* has an amphid mounted on a gelatinous appearing plaque (shield). The head of *Camacolaimus* bears a distinct spear-like structure, while *Procamacolaimus* has male alveoli extending through the anterior part of the body. The order Desmoscolecida characteristically has large vesicular amphids and a strongly annulated integument with concretion rings of granular incrustations (*Desmoscolex*), setae (*Greeffiella*), or warts (*Pareudesmoscolex*). The genus *Quadricoma* has intermediary rings bearing granular incrustations while the main rings are quadricomoid in lateral outline. The order Chromadorida is the largest of the marine nematode orders and contains numerous genera with unique anatomical features. *Actarjania* has an elaborate spiral amphid, a spicular velum and a gubernaculum with an elongated apophysis. *Chromadora* is recognized by four longitudinal rows of integumental punctations. *Monoposthia* has an integument which shows "V-shaped" markings, while the head of *Desmodora* shows a helmet-like cephalic capsule. *Draconema* has anterior and posterior adhesion tubes and its greatest width occurs at mid-body while the closely-related genus, *Epsilonema* has stilt setae but its greatest body width is in the anterior and posterior regions of the body. Another related genus, *Prochaetosoma*, has a symmetrical body of uniform width equipped with adhesion tubes. *Eubostrichus* often has a marine alga growing on its body. *Euchromadora* exhibits heterogenous cuticular ornamentation. *Hypodontolaimus* has an esophagus with an asymmetrical dorsally enlarged pharyngeal bulb. The vestibule of *Pomponema* is striated, and the genus has annular punctations and an elaborate amphid. The integument of *Richtersia* displays retrorse annules. *Selachinema* bears large mandibular teeth while *Spilophorella* has a massive double esophageal bulb. *Xennella* is characterized by a narrow, tapering anterior part of the body and an unusual transversely-elliptical amphid. The order Monhysterida contains taxa which show circular amphids. *Rhynconema* has a probosciform (elongated) anterior body with a long tubular stoma.

Filipjeva species have unusually shaped spicules which are extraordinarily long. *Xyola* exhibits characteristic "X-shaped" annular markings and *Tubuligula* has an elongated stoma and characteristic amphid. *Scaptrella* bears hooked mandibles around the oral opening.

REPRODUCTION OF TWO POPULATIONS OF *DITYLENCHUS DIPSACI* ON THREE SPECIES OF FUNGI [LA REPRODUCCION DE DOS POBLACIONES DE *DITYLENCHUS DIPSACI* SOBRE TRES ESPECIES DE HONGOS]. **R. C. V. Tenente, M. A. S. Mendes & E. Gomes Neto. Germplasm Exchange and Quarantine Area, CENARGEN/EMBRAPA, Cx. Postal 02372, (70849- 970) Brasilia DF, Brazil.**—The multiplication of two populations of *Ditylenchus dipsaci* (denoted C and D) was studied under laboratory conditions, using known numbers of juveniles as initial inocula and the fungi *Fusarium* spp. and *Macrophomina phaseolina* as hosts. After inoculation the fungi were held at controlled temperature (20 °C) for 1 month when the nematodes recovered from fungal cultures were counted. Treatments in which three species of fungi were inoculated with two populations of *D. dipsaci* (200 J4) showed no nematode multiplication although very few numbers of the inoculated individuals moulted to adults. For both populations C and D, there were differences in nematode numbers recovered from the different fungus species. The largest numbers of nematodes were recovered from *Macrophomina phaseolina* cultures (106 and 96 fourth-stage juveniles for the C and D populations, respectively). The nematode recovery from *Fusarium* spp. cultures was lower (13 J4/petri dish). These results demonstrated that the multiplication of *D. dipsaci* using cultures of *M. phaseolina* and two species of *Fusarium* is not adequate.

MANAGEMENT STRATEGIES FOR NEMATODE AND SOIL BORNE DISEASE CONTROL IN SUBTROPICAL POTATOES IN FLORIDA [ESTRATEGIAS DE MANEJO PARA EL CONTROL DE NEMATODOS Y DE PATOGENOS DEL SUELO EN PAPAS SUBTROPICALES DE FLORIDA]. **D. P. Weingartner & R. McSorley. University of Florida, IFAS AREC-Hastings, FL 32145, U.S.A., and Department of Entomology and Nematology, Gainesville, FL 32611, U.S.A.**—A winter-spring potato (*Solanum tuberosum*) crop exceeding 350 000 MT valued at nearly 100 million $U.S. is produced annually on 17 400 ha in Florida. The most important centers of production are in southeastern and northeastern Florida. There are significant differences between the two regions in soil types, pests, and pathogens present, cultural methods used, cultivars grown, and markets targeted. *Meloidogyne incognita* is the most important pathogen in southeastern Florida whereas *M. incognita, Belonolaimus longicaudatus*, and trichodorids are the most important nematodes among 12 genera common in potato fields in northeastern Florida. Corky ringspot (caused by trichodorid-transmitted tobacco rattle virus) and bacterial wilt are also important in northeastern Florida. Management strategies differ in the two regions depending upon the pests, and pathogens present, market destination (*i.e.* fresh or processed), soil conditions, and other factors. Management strategies include use of different summer cover crops, timing of cover crop production relative to potato, delaying potato harvest, soil fumigation, foliar and soil-applied nonvolatile nematicides, and cultivar resistance.

EMPLEO DE TEMIK 15G (ALDICARB) EN EL CONTROL DE *DITYLENCHUS DIPSACI* EN AJO DE AREQUIPA, PERU [THE USE OF TEMIK 15G (ALDICARB) IN THE CONTROL OF *DITYLENCHUS DIPSACI* IN GARLIC IN AREQUIPA, PERU]. **G. Zumarán, M. Delgado, E. Gonzales & J. M. Lucena. Universidades San Agustín y Católica Santa María, Apdo 1638, Arequipa, Perú y Rhône-Poulenc Andina, FAX 613742, Lima, Perú.**—Este estudio se realizó bajo condiciones de invernadero en macetas de un kilogramo de capacidad y con diferentes niveles poblacionales de *D. dipsaci* (20, 100 y 200 nematodos/kg de suelo) en ajo. Dosis completas de 15 y 20 kg/ha de Temik 15G se usaron al momento de la siembra, y en otro tratamiento estas dosis fueron fraccionadas con la mitad al momento de la siembra (7.5 y 10 kg/ha) y después de 60 días de establecido el cultivo. Los resultados de las evaluaciones a los 60, 90 y 120 días, demuestran que en los tres tratamientos de los diferentes inóculos estudiados, el Temik 15G se comporta mejor cuando se aplicó la dosis de 15 a 20 kg/ha al momento de la siembra, ejerciendo un buen control hasta los 90 días.