ABSTRACTS OF PAPERS PRESENTED AT THE THIRTEENTH ANNUAL MEETING OF THE SOCIETY OF NEMATOLOGISTS, HOUSTON, TEXAS, 10-14 AUGUST 1975

ALBY, T., and C. C. RUSSELL. *Attractiveness of selected grasses and ornamentals to Helicotylenchus digonicus.*

Response of *Helicotylenchus digonicus* to root exudates of selected pasture grass species was studied. A tray was filled with silica sand, pots were placed on the surface of the sand at opposite ends of the tray, and water was leached through the pots and into the tray. Nematodes were recovered after 48 h, and their positions in the tray were noted. When empty pots were used at both ends of the tray, the nematodes did not move from the point of introduction. When pots containing seedlings of either *Bouteloa curtipendula*, a good host, or *Panicum virgatum*, a poor host, were used at both ends of the tray, approximately equal numbers of nematodes migrated in either direction. When *B. curtipendula* was placed at one end of the tray and *P. virgatum* at the other end, nematodes moved toward the *B. curtipendula*. When *Buchlöe dactyloides*, a good host, was tested against *P. virgatum*, no preferential nematode movement was obtained. Other grasses tested were *Sorghastrum nutans*, *Agrostis palustris*, *Andropogon scoparius*, and *Eragrostis curvula*. Data from all pairings suggested a weak correlation between host attractiveness and host suitability.—*Department of Entomology, Purdue University, West Lafayette, Indiana 47907; and Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74074.*

BALDWIN, J. G., K. R. BARKER, and L. A. NELSON. *Interactions of Meloidogyne incognita with Rhizobium japonicum and soybean.*

Soybean cultivars (root-knot susceptible 'Lee', and moderately resistant 'Forrest'), grown in sterilized soil in the greenhouse, were harvested 50, 75, 100 and 135 days following inoculation with 15,000 *Meloidogyne incognita* eggs/plant and *Rhizobium japonicum*. Fresh shoot and root weights, nodule numbers and nodule dry weights were determined. N_2-fixing capacity was measured at each harvest by acetylene-ethylene assay. Nematode populations, assayed by extracting and counting eggs and larvae from roots and soil, continued to increase on both varieties through 135 days. Nematodes on Lee were about 11 times more numerous than on Forrest at 50 days, but only about 3.5 times more numerous at 135 days. Nematodes inhibited N_2 fixation through 50 days in Forrest but had a highly stimulating effect on fixation by 75 days. Nematodes had little effect on N_2 fixation in Lee through 75 days. After 75 days, the rate of N_2 fixation declined for all treatments including controls; nematodes depressed N_2 fixation in Lee, but had little effect on N_2 fixation in Forrest. Nodule numbers and nodule dry weights were depressed by nematodes on Lee by 135 days. Root-knot nematodes were associated with greater root weights in both cultivars.—*Department of Plant Pathology and Department of Statistics, North Carolina State University, Raleigh NC 27607.*

BALDWIN, J. G., and H. HIRSCHMANN. *Comparative fine structure of the esophagus of males of Heterodera glycines and Meloidogyne incognita.*

The esophagus, including procorpus, muscular metacorpus, isthmus, glandular lobe and esophago-intestinal junction, has a cuticle-lined lumen, which is round in the procorpus, but triradiate from the metacorpus valve through the isthmus. Posteriorly, the esophageal lumen joins the intestine, as a network of junctional complexes. This junction occurs about 35 μm and 10 μm posterior of the valve in *H. glycines* and *M. incognita*, respectively. The syncytial intestine extends about 25μm anteriorly from this junction forming a distinct caecum in *M. incognita*. The gland lobe is syncytial with three serially arranged nuclei in *H. glycines*, but is cellular with apparently only two nuclei in *M. incognita*. Subventral and dorsal gland processes extend anteriad from the gland lobe and open into the esophageal lumen through cuticularized, branching ducts. Dorsal gland processes and ampulla are well developed in *H. glycines*, whereas in *M. incognita* no conspicuous dorsal gland process was observed. The esophagus of both species is

innervated by nerve processes which originate from ganglia associated with the nerve ring, as well as from perikaryons within the metacorpus.—*Department of Plant Pathology, North Carolina State University, Raleigh NC 27607.*

BARKER, K. R., D. W. BYRD, JR., W. E. GRIFFIN, C. A. STONE, and C. J. NUSBAUM. *A semi-automatic elutriator for extracting nematodes.*

An efficient, semi-automatic elutriator was developed for assaying soil samples for nematodes. This four-unit elutriator combines conventional methods with the following major additional features: automatic mixing of 500- to 1,500-cm^3 soil sample with air and water in an elutriator that is automatically dumped and washed after extraction; "turbinate" sample splitter from which fractions of one-fifteenth or greater are collected; facility for collecting roots, intact egg masses and cysts on 420- or 246-μm (40- or 60-mesh) sieves; and a variable speed motorized sieve-shaker. Secondary features include: air cylinders, solenoid valves, and time clock for dumping residual soil and water; air-water mixing unit with 15 holes (1.95-mm diameter) with rubber stopper attached above an air cylinder supplied with secondary water flow to prevent clogging when primary flow (60-80 ml/sec) is off; air flow to elutriators and air pressure for air cylinders regulated by filter-regulator units; coarser spray activated for 5 sec every 30 sec for washing nematodes through 420-μm (40-mesh) sieves; sample splitters rinsed by hand after air cylinders move them into "dump position"; adjustable rates of water and air flow, and timing; and nematodes collected on 38-μm (400-mesh) sieves, rinsed by hand, and separated from debris by centrifugation or Baermann trays. This machine also has promise as a tool for monitoring populations of certain other soil micro-organisms.—*Department of Plant Pathology and Engineering Research Services Division, North Carolina State University, Raleigh NC 27607.*

BRODIE, B. B. *Movement of non-volatile nematicides in different types of soil.*

The vertical movement of aldicarb, carbofuran, ethoprop, oxamyl, and phenamiphos was studied in muck, sandy loam, and clay loam soils. Granular formulations of the chemicals were incorporated in the top 2.5-cm of soil in 13-clay pots to which 3,000 larvae of *Meloidogyne* spp. had been added. Oxamyl was used at a dosage of 22 kg/ha; phenamiphos at 10 kg/ha; and aldicarb, carbofuran, and ethoprop at 11 kg/hectare (ha). The pots were immediately seeded to tomato (*Lycopersicon esculentum*), and plants were examined 6 weeks later for root galls. Extent of chemical movement was determined by the amount of galling on each 5-cm increment of root system and the distance from the soil surface to the occurrence of galls. Aldicarb and oxamyl significantly suppressed galling 25 cm deep in all soils, but did not eliminate galling at any depth. Ethoprop and phenamiphos eliminated galling 25 cm deep in clay loam and sandy loam soil. In muck soil, ethoprop and phenamiphos eliminated galling to only 10 cm, but suppressed galling 25 cm deep. Carbofuran eliminated galling 25 cm deep in sandy loam soil and suppressed galling 25 cm deep in the clay loam soil. In muck soil, carbofuran did not eliminate galling at any depth but inhibited galling 10 cm deep.—*U. S. Department of Agriculture, Agricultural Research Service, Department of Plant Pathology, Cornell University, Ithaca, NY 14853.*

BROWN, B. J., and E. G. PLATZER. *The effects of salts, conductivity, and pH on infectivity of preparasitic larvae of Reesimermis nielseni.*

The purpose of this study was to obtain more information on the ecological physiology of *Reesimermis nielseni* and, thereby, to facilitate the rational use of *R. nielseni* in biological control of mosquito larvae. The ability of preparasitic larvae of *R. nielseni* to infect the first instar of *Culex pipiens* was tested in nine concentrations (0-20,000 μg/ml) of 15 different salt solutions. The salts represented the most common cations and anions found in freshwater. The highest salt concentrations (in μg/ml) at which preparasitic larvae were infective were: NaCl (2,500), KCl (500), $CaCl_2$ (2,500); Na_2CO_3 (250), K_2CO_3 (250); Na_2SO_4 (500), K_2SO_4 (2,500); $NaNO_3$ (2,500), KNO_3 (2,500),

$Ca(NO_3)_2$ (5,000); $NaNO_2$ (500), KNO_2 (1,000); NaH_2PO_4 (2,500), $CaH_4(PO_4)_2$ (1,000). The highest conductivity at which infection occurred was 4,700 μmhos/cm. In addition, infection occurred over a pH range of 3.6 – 8.6. The establishment of these upper limits on the capacity of *R. nielseni* preparasitic larvae to infect mosquito, along with our earlier results on the effective temperature range for infection, will enable selection of optimal conditions for utilization of *R. nielseni* in future field studies.—*Department of Nematology, University of California, Riverside CA 92502.*

EGUNJOBI, O. A., and S. O. AFOLAMI. *Effects of water-soluble extracts of neem (Azadirachta indica) on Pratylenchus brachyurus and on maize.*

Fresh leaves of neem were extracted in 3 liters water as follows: (i) boiled with 150 g sliced lime (*Citrus aurantifolia*) fruits for 80 min; (ii) as in (i), but without lime; (iii) blended for 30 sec, sieved with Büchner funnel, and then treated with 60 ml lime fruit juice; (iv) as in (iii), but not treated with lime juice. Each type was prepared in concentrations of 1.5, 1.0, and 0.5 kg fresh leaves per 3 liters of water. *Pratylenchus bachyurus* was exposed to each concentration and dead nematodes were counted after 1, 4, 24, and 48 h. All extracts were toxic to *P. brachyurus*, and mortality was linearly correlated with extract concentrations. Lime fruit juice reduced neem toxicity. Extract (ii) was tried as soil drench in three of five treatments with each plant in four treatments which had received 1,000 *P. brachyurus*. Three of these were treated with 200 ml/plant of the three concentrations of extract (ii) once fortnightly instead of water. The fourth inoculated (control) and the fifth (noninoculated) treatments received no neem extract. When compared to controls 11 weeks after inoculation, root populations of *P. brachyurus* in plants treated with 1.5, 1.0, and 0.5 kg/3 liters extracts were reduced by 70.8%, 48.2%, and 29.8%, respectively. Increases in yield in these treatments were 80.65%; 80.34% and 61.2%, respectively. Root populations of *P. brachyurus* were negatively correlated with yield ($r = -0.96$) and root weights ($r = -0.96$).—*Department of Agriculture Biology, University of Ibadan, Nigeria.*

FELDMESSER, J., S. A. OSTAZESKI, and A. M. GOLDEN. *Nematodes in forage grasses.*

Surveys and research on chemical control indicate widespread occurrence of mixed populations of *Helicotylenchus*, *Tylenchorhynchus*, *Criconemoides*, and *Xiphinema*, associated with grass damage in the northeastern United States. *Pratylenchus* occurs less frequently. Each of eight sampled areas, including zoysia, perennial bluegrass, fescue pastures and waste areas (mixed grasses and broadleaf weeds), contained mixed populations of these nematodes at various densities. Symptoms associated with higher numbers include chlorosis, wilting, stunting, bare spots, and lack of response to extra water, fertilizers, and insecticides. In four of the areas, mostly perennial bluegrass, 90-95% effective nematicidal treatments resulted in enhanced turf quality, and/or a significant increase in clipping yields. The nematodes are widespread, seem to persist in equilibrium with reduced grass growth, and increase to high densities following conditions that favor grass growth. Their capacity for causing damage, coupled with improved grass condition and growth after nematicidal treatments, strongly suggest that plant-parasitic nematodes lower grass productivity.—*Agricultural Research Service, U. S. Department of Agriculture, Agricultural Research Center (West), Beltsville, Maryland 20705.*

FELDMESSER, J., M. J. THOMPSON, W. E. ROBBINS, and R. P. SPONAUGLE. *Secondary and tertiary straight- and branched-chain amides and amines: nematicides for Panagrellus and Meloidogyne.*

A number of $C_{11} - C_{15}$ secondary and tertiary alkyl amines that disrupt development, molting, metamorphosis and steroid metabolism in certain insects was shown to be lethal at 40 μg/ml or less to the two species of nematodes thus far examined. In the *Panagrellus redivivus* 48-h direct contact test, the straight-chain amides and amines ($LD_{100} = 5 - 10$ μg/ml) generally were more active than the branched-chain compounds ($LD_{100} = 20$ μg/ml). Second-stage larvae of *Meloidogyne incognita* group were

exposed by direct contact to a range of concentrations of five of the most active compounds, *N,N*-dimethyldodecanamide (I), *N,N*-dimethyl-10-undecenamine (II), *N*-ethyl-10-undecenamine (III), *N,N*-dimethyldodecanamine (IV), and *N*-ethyldodecanamine (V), for 48 h and then used as inoculum on tomato seedlings (cultivar Rutgers). Based on root-knot indexes and root staining, the amide I was ineffective at 100 μg/ml, and the amine IV was lethal at 40 μg/ml, whereas the three remaining amines were lethal at 20 μg/ml.—*Agricultural Research Service, U.S. Dept. of Agriculture, Agricultural Research Center (West), Beltsville, Maryland 20705.*

FERRIS, H., and R. H. SMALL. *Computer simulation of Meloidogyne arenaria egg development and hatch at fluctuating temperature.*

Young egg masses of *Meloidogyne arenaria* were stirred in a 0.21% NaOCl solution to dissolve the matrices. Liberated eggs were collected and rinsed on a 25-μm (500-mesh) screen. Two-celled eggs were collected with a suction device and placed on a water-agar surface in petri dishes or in water in 2-cm Syracuse dishes. The eggs were incubated at constant temperatures at 3-C intervals between 3 C and 39 C inclusive. Egg development was assessed at daily intervals. There was little development at 9 C or lower in 95 days, and there was very slow development, but no hatching, in 70 days at 12 C. Development was abnormal and incomplete at 36 C and 39 C. Regression equations were derived for egg development rate per h at different temperatures. Simulations based on the equations were tested against development of another series of eggs subjected to fluctuating temperature. The equations were incorporated into a simulation model of the complete *Meloidogyne* life cycle, improving simulation of a field population. —*Department of Nematology, University of California, Riverside CA 92502.*

FRECKMAN, D. W., and R. MANKAU. *Biological activity of a desert-soil nematode population.*

Soil samples were collected weekly for 12 consecutive months in 1974 from four shrub species at Rock Valley, Nevada. Nematode numbers, trophic groups, mean individual weights, biomass, and metabolism were determined for nematodes in nine samples at three depths, and three distances from the shrub bases. Respiration was calculated according to the formula: $R = 1.4OW^{072}$. Data for the nematode community from 0-10 cm at the base of the shrubs for a representative weekly sample in April, corrected for extraction efficiency, were: 678 nematodes/500 cm^3, 0.277 μg/mean individual weight, 0.75 kg/ha for biomass and 22 ml O_2 consumed/m^2/week. Total nematodes were correlated with shrub-root weight, soil moisture, and temperature in additional analyses. During annual dry periods nematodes appear to be in a cryptobiotic state, which suggests that cummulative annual nematode metabolism and productivity will be lower than that for other habitats.—*Department of Nematology, University of California, Riverside CA 92502.*

GOLDEN, A. M., and J. M. EPPS. *Morphometrics and relationships of Heterodera glycines, H. schachtii, and H. trifolii.*

We examined the morphology of one or more populations of *Heterodera glycines* from most of the 170 infested counties in 13 U.S. states, as well as specimens from Japan. Based mainly on larval tail and tail terminal length, three morphotypes were reported by us in 1965, and these were designated in 1968 as races 1, 2, and 3, followed soon by race 4, morphologically similar to race 3. Regardless of source, race, or host cultivar, length of larval stylet and outlet of dorsal esophageal gland, and male stylet, remained constant and stable. Concurrent studies on *H. schachtii* and *H. trifolii* (no males) showed similar stability of these characters and sufficient differences for separation of the three species. In 4 years of continuous crop association, *H. glycines* did not attack sugar beet or red clover and *H. trifolii* failed to develop on 'Lee' soybean and sugar beet. In 17 populations of *H. glycines* arising from crosses of races 1 and 2, measurements of larval tail and tail terminal length showed that a majority of the populations were race 2 and the remaining were race 3, intermediate between 1 and 2. None of the population averages indicated race 1, although some individual specimens

could fit into this race.—*U.S. Department of Agriculture, Agricultural Research Service, Beltsville, Maryland 20705; and Jackson, Tennessee 38301.*

GRIFFIN, G. D., and J. H. ELGIN, JR. *Comparisons of pathology caused by Meloidogyne hapla on alfalfa selections.*

Studies were made to determine if cuttings of a selection from 'Vernal' alfalfa (*Medicago sativa* L.) selection (M-4) were immune to *Meloidogyne hapla*, and if resistance to *M. hapla* was similar to that described for *M. incognita acrita*. M-4 was not immune, and infection following inoculation was equal to that of a resistant control entry, 'M-9'; 80, 85, and 100% of M-4, M-9, and a susceptible control cultivar, 'Ranger', were infected. Larval infection of M-4, and M-9 was similar but lower than that of Ranger when 3-week-old cuttings were grown in 1-liter containers at 20, 24, 28, or 32 C. Soil temperature only slightly affected nematode infection of M-4 and M-9. When 14-day-old seedlings of a resistant triplex-quadruplex selection, 'No. 298' were transplanted into 20 × 70-mm vials and inoculated with *M. hapla* larvae, there was a decline in infection after 6 days, especially at 20, 24, 28, and 32 C. Infection of resistant alfalfa line, 'Nev. Syn. XX', was compared to the susceptible alfalfa cultivar, 'Lahontan.' Significant development of larvae occurred in 'Lahontan' during 2-6 weeks, and eggs were observed after 5 weeks. Only occasional larvae were found in Nev. Syn. XX after 2 weeks, and no larvae were found in secondary root growth after 3 weeks. There were no signs of damaged areas of original attack in Nev. Syn. XX after 6 weeks, whereas significant numbers of second generation larvae were observed in Lahontan after 9 weeks.—*U. S. Department of Agriculture, Agricultural Research Service, Crops Research Laboratory, Utah State University, Logan 84322; and USDA, ARS, Agricultural Research Center (West), Beltsville, Maryland 20705.*

HACKNEY, R. W., and H. FERRIS. *Infection, development, and reproduction of Meloidogyne incognita in eight grape vine cultivars.*

Eight grape vine cultivars ('French Colombard', 'Barbera', 'Carignane', 'Ruby Cabernet', 'Cabernet Sauvignon', 'Pinot Noir', 'Harmony', and 'A × R #1') were inoculated with 146 second-stage larvae of *Meloidogyne incognita*. This population has 43 chromosomes. Parasitic larvae were counted 1-7, 9, and 11 days after inoculation. Females and eggs were counted 13, 15, 17, 19, 21, and 23 days after inoculation. Cultivars Carignane, Harmony, and A × R #1 showed resistance to *M. incognita*. Fewer ($P \leq 0.05$) parasitic larvae entered Carignane and A × R #1 roots. Fewer ($P \leq 0.05$) adult females developed in Harmony and A × R #1 roots. Fewer ($P \leq 0.05$) eggs were obtained from females developing in Harmony roots. Infection, larval development, and egg production parameters were calculated from the data. Computer simulation was used to test our ability to recognize needs of a mathematical model of root-knot nematode development in resistant and susceptible hosts.—*California Department of Food and Agric., 1220 N St., Sacramento 95814; and Department of Nematology, University of California, Riverside CA 92502.*

HARRISON, R. E., and G. C. SMART, JR. *Movement of Trichodorus christiei and Trichodorus proximus through soil toward roots of tomato plants.*

Sixteen liters of sifted, sterile, fine sandy soil, at a moisture content of 20% by weight, were placed into a plexiglass box (60 × 60 × 5 cm). A 21-day-old tomato seedling, *Lycopersicon esculentum* 'Rutgers', was planted 5 cm from the front of the box and 30 cm from each side. Distilled water was dripped onto the root zone of the plant at a rate of about 1 drop every 5 sec for 36 h. Then 2,000 *Trichodorus christiei* or *T. proximus* were placed into the soil at the center of the box. After 72 h in one test and 36 h in another, the soil was divided into 5 × 10-cm sections; each section was removed from the box and nematodes extracted by centrifugal-flotation. Each test was replicated six times. Seventy-two hours after inoculation, an average of 44% of *T. christiei* and 56% of *T. proximus* had moved to the root zone of the plant. Thirty-six hours after inoculation, an average of 15% of *T. christiei* and 39% of *T. proximus* had moved to the root zone of the plant. Relatively few nematodes were found in any of the sections outside a narrow band between

the inoculation point and the root zone of the plant, indicating not only attraction, but a relatively direct approach to the plant.—*Department of Entomology and Nematology, University of Florida, Gainesville 32611; and U. S. Department of Agriculture, Agricultural Research Center, Box 728, Hastings, Florida 32045.*

HARRISON, R. E., and G. C. SMART, JR.
Vertical distribution of Trichodorus christiei and Trichodorus proximus relative to soil moisture.

Soil cores taken to a depth of 150 cm and divided into 10-cm sections were collected every 2 weeks from a potato field near Hastings, Florida, from 2 March 1974, to 15 February 1975. Population densities of *Trichodorus christiei* and *T. proximus* remained relatively stable during the sampling period. Highest densities of *T. christiei* occurred at 10-40 cm and of *T. proximus* at 20-50 cm where soil moisture was 20-29% by weight. No nematodes were found below the water table which varied from 50-180 cm during the sampling period. In laboratory tests with tomato, *Lycopersicon esculentum* 'Rutgers' grown at constant soil moisture levels of 10, 20, 30, and 40% by weight, survival and reproduction of *T. christiei* was greatest at 10% moisture, and of *T. proximus* at 20% moisture. Few specimens of either species survived at 40% moisture. Vertical distribution of *T. christiei* and *T. proximus* was studied in the laboratory by placing 500 specimens of either species at the top of columns (10 × 175 cm) filled with sterile, fine, sandy soil [screened through a 250-μm (60-mesh) sieve to remove debris] and each planted with a 40-day-old tomato seedling. Water tables were maintained at 100, 125, and 150 cm below the soil surface. After 75 days, 71% of *T. christiei* were in the 10- to 60-cm sections, and 68% of *T. proximus* in the 10- to 40-cm sections.—*Department of Entomology and Nematology, University of Florida, Gainesville 32611; and U.S. Department of Agriculture, Agricultural Research Center, Box 728, Hastings, Florida 32045.*

HÖGGER, C. H., and R. H. ESTEY.
Preparation of Xiphinema americanum for scanning electron microscopy.

Specimens of all stages of *Xiphinema americanum* were first heat-relaxed by placing a suspension of them in an equal volume of boiling water, after which they were fixed at room temperature in 2.5% formaldehyde for at least 30 min, and washed in three changes of distilled water for 10 min each. Next, the specimens were transferred to 2% OsO_4 for 3 h, washed again three times for 10 min, and then dehydrated in ethanol by vapor exchange at 42 C overnight and critical-point dried in CO_2. Without post-fixation in OsO_4, the specimens tended to collapse more frequently, shrinkage was more severe, and fewer details were discernible. The complete procedure also was suitable for *Nippostrongylus* sp. and *Caenorhabditis briggsae.*—*Department of Plant Pathology, Mac Donald College of McGill University, Ste. Anne de Bellevue, Quebec, Canada, HGX 3MI.*

JATALA, P., and M. M. DE SCURRAH.
Mode of dissemination of Nacobbus spp. in certain potato-growing areas of Peru and Bolivia.

Nacobbus spp., the false root-knot nematodes, are important pests of potatoes in certain Andean regions of Peru and in all potato-growing areas of Bolivia. Because knowledge of the life cycle, behaviour, and the mode of dissemination of the nematodes in these areas is rather limited, experiments on mode of dissemination were conducted. Potato tubers collected from a field heavily infested with *Nacobbus* spp. were carefully washed, planted in 3,600-cm^3 clay pots containing methyl bromide-fumigated soil, and grown in a screenhouse. Two months after emergence pot contents were soaked in water to remove soil. Roots were checked for nematode damage; infected parts were stained in acid fuchsin-lactophenol and cleared in lactophenol. Microscopic examination revealed nematodes in various stages of development in all infected roots. Similarly, other tubers collected from the same field were sectioned (2 mm thick), stained, and examined. Many tuber sections contained nematodes in the 3rd, 4th, and 5th stages of development. Most sections containing nematodes were from the outer layer of the tubers, the tuber skin and the flesh immediately below the skin. These findings indicate the importance of infected tubers as a source of dissemination of *Nacobbus* spp.

The presence of nematodes on or near the surface of tubers may facilitate control by hot water or chemical dip treatments.—*The International Potato Center, Apartado 5969, Lima, Peru.*

JATALA, P., E. R. FRENCH, and L. GUTARRA. *Interrelationships of Meloidogyne incognita acrita and Pseudomonas solanacearum on potatoes.*

Pseudomonas-resistant potato cultivar 'BR-73.40' (*Solanum phureja* × *S. tuberosum* subsp. *tuberosum*) and susceptible cultivar 'Renacimiento' (*S. tuberosum* subsp. *andigena*) grown in 3,600-cm^3 clay pots, were inoculated with combinations of *Pseudomonas solanacearum* (20 ml water suspension 1×10^9 cells/ml) and freshly hatched *Meloidogyne incognita acrita* (2,000 larvae in 20 ml water/pot). Controls were with each organism alone, and with neither. In a second experiment, a lower bacterial concentration of 2.4×10^7 cells/ml was used. Inocula were introduced through three 12 × 1-cm glass tubes placed around the seed piece at planting, and protruding 3 cm above the soil line. Bacterial wilt symptoms were recorded daily. Using bacteria alone at either concentration induced wilt in 40% of Renacimiento in 21 days and 20% of BR-73.40 in 36 days. All plants of both cultivars wilted in 19 days. When soil was infested with both nematode and the bacteria at the higher concentration, all Renacimiento died within 42 days and 80% of BR-73.40 in 56 days. All Renacimiento and 60% of BR-73.40 died in 53 days at the lower bacterial inoculum concentration in combination with the nematodes. Noninoculated plants and those inoculated with the nematode alone did not exhibit wilt symptoms throughout the experiment.—*The International Potato Center, Apartado 5969, Lima, Peru.*

JOHNSON, A. W., D. R. SUMNER, C. A. JAWORSKI, and R. B. CHALFANT. *Control of nematodes and soil-borne pathogenic fungi in okra with fumigation and film mulch.*

Okra was grown in field plots of Tifton loamy sand naturally infested with root-knot and ring nematodes and pathogenic soil fungi. Treatments covered with biodegradeable film mulch (F) were: herbicide (H); soil fumigants [20% methylisothiocyanate + 80% chlorinated C_3 hydrocarbons (V) and 67% methyl bromide + 33% chloropicrin (MB)]; fungicide [8% granular sodium azide (A)]; nematicide [*O*-ethyl *S,S*-dipropyl phosphorodithioate (E)]; 60% chloroneb (C) + H; and A + E. H and VH were not covered with mulch. V and MB were injected 3-4 weeks before planting at 327 liters and 337 kg/hectare (ha), respectively, and the mulch was applied immediately in the F treatment. Control of nematodes and soil-borne pathogenic fungi was greatest with VF and MBF. Plant height was increased two-fold by F and three-fold by VF and MBF. Marketable yields averaged 5, 11, 17, and 16 metric ton/ha, respectively, in HF-, V-, VF-, and MBF-treated plots. Yields were greater when nematodes and soil-borne pathogenic fungi were controlled. The root-knot nematode/Fusarium-wilt complex was most severe in nonfumigated soil.—*Coastal Plain Experiment Station, Tifton, Georgia 31794.*

KIMPINSKI, J. *Population dynamics of Pratylenchus penetrans in red clover.*

A field of red clover in Prince Edward Island, Canada, was sampled 80 times from 2 May to 24 December 1973. Roots stained with methyl blue showed that *Pratylenchus penetrans* invaded roots by 21 June, 3 weeks after seeding. In early August, numbers of nematodes increased sharply from 40 in the previous generation to a mean of 579 per root system. The third generation began in mid-September when the number of nematodes increased to 1,534 per root system. In early November the fourth generation began when the mean number of nematodes increased to 3,510 per root system. Mean numbers of nematodes/kg of oven-dry soil were 8,200 prior to seeding, and 3,000, 8,480, 10,040 and 11,330 coincident with the four generations in roots. Between 6 and 18 November, when egg laying and hatching were evident, the mean soil temperature at a depth of 7 cm was 3.4 C with a range of 0.5 to 6.1 C, which indicates that *P. penetrans* can reproduce at relatively low soil temperatures.—*Research Station, Agriculture Canada, P. O. Box 1210, Charlottetown, Prince Edward Island, Canada C1A 7M8.*

KING, P. S., and R. RODRIGUEZ-KABANA. *Studies on the nematicidal properties of the fungicide hinosan.*

The nematicidal properties of the fungicide hinosan (*O*-ethyl-S, S-diphenyl-phosphorodithioate) were studied in vitro at concentrations of 0, 20, 40, 80, 100, and 200 μg/ml. Numbers of *Rotylenchulus reniformis* were reduced proportionately to concentration of fungicide, so that after 5.5 h of exposure to emulsions containing 100 or 200 μg/ml of the toxicant, their numbers were reduced by 80 or 85%, respectively. Times of exposure necessary to obtain 100% kill for lower concentrations were: 24 h for 80 μg/ml, 48 h for 40 μg/ml, and 74 h for 20 μg/ml. A similar type of response was obtained for *Aphelenchoides ritzemabosi*. *Aphelenchoides rutgersi* was more sensitive to hinosan, requiring only 3 h exposure to 200 μg/ml of hinosan to show 100% kill, and 22 h for the 20 μg/ml concentration. *Helicotylenchus dihystera* and *Hoplolaimus galeatus* were least sensitive to hinosan among the species tested. These nematodes required 187 h to attain total kill when exposed to emulsion with 200 μg/ml of the toxicant. *Meloidogyne incognita* and *Tylenchorhynchus* sp. exhibited an intermediate pattern of response, requiring 40 h of exposure to the highest concentration of hinosan to obtain 100% kill. However, *Tylenchorhynchus* was slightly more sensitive than larvae of *M. incognita*.—*Department of Botany and Microbiology, Auburn University, Auburn, Alabama 36830.*

LAPP, N. A., and A. C. TRIANTAPHYLLOU. *Heterodera glycines races in North Carolina.*

A survey of 30 fields in 15 counties revealed that the soybean cyst nematode (SCN) is widely distributed in eastern North Carolina. Field observations indicated that SCN populations have reached damaging levels in many fields. Testing of SCN populations on appropriate differential hosts revealed the presence of all four recognized races. Races 1 and 2 were more common in the southeastern and northeastern parts of the state, respectively. Race 3 was detected in one field in Gates County near the North Carolina – Virginia border, and race 4 was found in one field in Pamlico County. One field population reproduced well on cultivar Pickett 71, but not on cultivar PI-88788, and it may constitute a new race. Selection of SCN populations on various resistant soybeans demonstrated that field populations usually are not pure races, but are mixtures of nematodes that could be assigned to different races.—*North Carolina Department of Agriculture, Raleigh, NC 27611; and Department of Genetics, North Carolina University, Raleigh, NC 27607.*

MANKAU, R., and J. L. IMBRIANI. *Morphogenesis of Bacillus penetrans in Meloidogyne females.*

Fine structure changes during development and sporulation of the parasite *Bacillus penetrans* (= *Duboscqia penetrans*) within *M. javanica* females were investigated with electron microscopy. Nematodes at various stages of development were dissected from host roots, fixed in 2% glutaraldehyde, postfixed in 1% OsO_4, embedded, sectioned at 80 μm, stained with uranyl acetate and examined in a Hitachi HU-12 TEM at 75KV. Germ cells from one to six sporangia ("spores") adhering to the exterior of the larvae penetrated the cuticle before the second molt. A few days after giant-cell formation, vegetative cells developed in the pseudocoelom which did not separate on division, but elongated into a dichotomously branched, three-dimensional, filamentous structure which was roughly spherical in shape. Cell cytology was typically prokaryotic. Terminal cells of the repeatedly dichotomously branched divisions of the colony enlarged into typical *Bacillus* sporangia within which the endospore was formed. The bodies of infected nematodes eventually became filled with separated mature sporangia which had a distinctive, shallow-cup shape and the usual highly refractive central endospore body. Sporangium morphogenesis was similar to that of the bacterial "milky disease" pathogens of insects, but the filamentous vegetative cells were unique.—*Department of Nematology, University of California, Riverside, CA 92502.*

MC KENRY, M. V., and P. NAYLOR. *Red worms are sensitive to 1,3-dichloropropne nematicides.*

Regular and "hybrid" red fishing worms

identified predominantly as *Eisenia foetida* show a dramatic response when exposed to 1,3-dichloropropene (1,3-D) nematicides. This response is influenced by temperature as previously observed with plant parasitic nematodes. The influence of 1,2-dichloropropene and *trans*-1,3-D upon red worms is also similar to that reported for several plant parasitic nemas. In our experiments, red worms were exposed to a constant gaseous phase of toxicant for a known period of time. The dosage which resulted was expressed as a concentration × time value. At 20-23 C an exposure to 1.0 $\mu g/cm^{-3}$ day of *cis*-1,3-D in the vapor phase, or a calculated 26.0 $\mu g/cm^{-3}$ day in the soil water phase, resulted in the development of a red stain exuded from red worms. The response is coupled with the development of odorous, nonmotile red worms. The dosage required for this response is equivalent to that reported to control second-stage juveniles of *Meloidogyne* spp. and *Heterodera schachtii*. A simple field evaluation of a 1,3-D fumigation may be possible by the use of red worms as a bioassay.—*San Joaquin Valley Agricultural Research and Extension Center, Parlier, CA 93648.*

MILNE, D. L., and E. A. DE VILLIERS. *Foliar systemic nematicides for pineapple nematode control.*

A series of experiments comparing conventional soil fumigants with dipping of plant material and foliar spraying with the systemic nematicides phenamiphos and oxamyl were carried out on Cayenne pineapple. The main nematode species involved were *Meloidogyne javanica* and *Helicotylenchus dihystera*. Preliminary experiments showed that while oxamyl dips suppressed nematode attack, they did not prevent the eventual build-up of *Meloidogyne* during the first 12 months. Subsequent trials showed that combinations of preplant fumigant treatments with postplant foliar sprays, were highly effective in suppressing the nematode population over an extended period. Granular phenamiphos applied as a preplant treatment, resulted in the best yield increase, in spite of not giving the most effective nematode control. An oxamyl dip, with no preplant fumigation, but followed by monthly foliar sprays of oxamyl during the first year, also gave very good nematode control and high yields.—*Citrus and Subtropical Fruit Research Institute, Nelspruit 1200, Transvaal, Republic of South Africa.*

MILLER, P. M., and J. L. MC INTYRE. *Tylenchorhynchus claytoni feeding on tobacco roots inhibits entry of Pratylenchus penetrans.*

Lesion nematodes, *Pratylenchus penetrans*, did not enter roots of tobacco cultivar WS 117 when plants were grown in soil that also contained stunt nematodes, *Tylenchorhynchus claytoni*. Lesion nematodes were inhibited from entering the roots when plants were transplanted for 1 or 4 days into soil infested only with stunt nematodes before the plants were transferred into soil infested only with lesion nematodes. In this experiment, 8 to 60 stunt nematodes per 100 g of soil inhibited the subsequent invasion of transplants by lesion nematodes by 25 to 90%. Active lesion nematodes were present in the soil although they did not invade roots attacked by stunt nematodes. This suggests that factors responsible for preventing invasion are not toxins, but may cause changes within roots so that they either do not attract, or may repel, lesion nematodes. Using plants with split roots, we found that feeding of stunt nematodes upon one half of the root system drastically inhibited entry of lesion nematodes into the other half of the root system. This indicates that factors responsible for preventing invasion by the lesion nematodes can be translocated from the site at which stunt nematodes are feeding.—*The Connecticut Agric. Experiment Station, P.O. Box 1106, New Haven CT 06504.*

MINTON, N. A., and M. B. PARKER. *Effects of nematicides and subsoiling on yields of soybeans in three soil types in Georgia.*

Nematicides and subsoiling increased soybean yields in nine field experiments. The first study included cultivars Essex, Davis, Ransom, and Hutton grown in Tifton sandy loam infested with *Meloidogyne incognita*. The 2-year mean yield increases were 25, 16, and 30% for DBCP (D), subsoiling (S), and D plus S, respectively. In the second study, soybeans (cultivar McNair 800) were treated

with D, carbofuran, aldicarb, ethoprop, and ethoprop plus oxamyl in a Fuquay loamy sand infested with *M. incognita*. The 2-year mean yield increases in this study for nematicides (N), S, and N plus S were 33, 11, and 44%, respectively. McNair 800 soybeans were also used in the third study conducted on a Fuquay loamy sand infested with *M. incognita*. The 2-year mean yield increases due to D, S, and D plus S were 24, 15, and 42%, respectively. The fourth study was conducted for 3 years with McNair 800 on a Marlboro loamy sand infested with *Hoplolaimus columbus*. The 3-year mean yield increases due to D, S, and D plus S were 108, 41, and 138%, respectively. Mean yields in kg/hectare for the nine experiments were as follows: control, 1,685; N, 2,337; S, 1,974; and N plus S, 2,563.—*Coastal Plain Experiment Station, Tifton, Georgia 31794.*

NEMEC, S., and R. B. MALEK. *Effects of nematicides and strawberry growth on nematodes, especially Xiphinema americanum, in root-rot sites in Illinois.*

Xiphinema increased around healthy strawberry plants in a Hosmer silt loam throughout the summer, fall, and winter, but nematode numbers diminished as plant health declined. September preplant treatments of 1,2-dibromo-3-chloropropane (Nemagon EC), 3.1 and 6.1 liters/hectare (ha), in a Cisne silt loam, reduced *Xiphinema* populations to zero by May, and ethylene dibromide (EDB), 7.7 and 23 liters/ha, reduced populations to zero 2 months after treatment. May preplant treatments of the same rates of these chemicals and 1,3-dichloropropane, 1,2-dichloropropane (DD), 15.3 and 30.7 liters/ha, and Fumazone 86 EC, 3.1 and 6.1 liters/ha, reduced *Xiphinema* to low or zero levels by November, except Nemagon. *Xiphinema* increased between August and November in Nemagon plots, probably because survivors reproduced on plants which grew well in this treatment. In a Carmi sandy loam, October preplant treatments of methyl bromide and chloropicrin (MC-33), 36.7 and 73.5 kg/ha, and methyl isothiocyanate + chloropicrin (Vorlex 201®), 38.3 and 76.6 liters/ha, eradicated *Xiphinema* and *Tylenchorhynchus* by March. MC-33 and Vorlex, 76.6 liters/ha eradicated *Pratylenchus*. DD and EDB at the previous rates in this test were almost as effective. Fall treatments improved plant growth more than spring treatments, and, in general, best growth occurred with maximum control.—*U.S. Department of Agriculture, Horticultural Research Laboratory, 2120 Camden Rd., Orlando, Florida 32803; and Department of Plant Pathology, University of Illinois, Urbana, IL 61801.*

OVERMAN, A. J., and J. P. JONES. *Field response of wilt-susceptible tomato to carbofuran at three levels of soil pH.*

Carbofuran (3-dihydro-2,2-dimethyl-7-benzofuranyl N-methylcarbamate) 10% G 11.2 kg/ha was incorporated to 20 cm depth at time of transplanting tomato in a field of Myakka fine sand heavily infested with *Meloidogyne incognita, Fusarium oxysporum lycopersici* race 2 and *Verticillium albo-atrum*. Carbofuran and nontreated plots were adjusted to 3 pH levels: 5.0, 7.0, and 8.0. Raised beds were constructed, banded with fertilizer, and sealed with a full-bed poly-laminated paper mulch. Containerized 'Manapal' tomato seedlings were then set through the mulch on February 15. The crop was seep irrigated by a water table artificially maintained 46 cm below the surface of the bed. Yields of marketable tomatoes increased with increase in soil pH and with carbofuran treatment. Root-galling was more severe at higher levels of pH; however, galling was suppressed by carbofuran at all pH levels. Incidence of Fusarium wilt, which was severe in low pH soil, decreased with increasing alkalinity. Early wilt symptoms were suppressed by carbofuran at low pH. However, at 12 weeks when harvesting began, 50% of plants growing at pH 5.0 showed symptoms of Fusarium wilt, regardless of nematicide. At high pH, incidence of Fusarium wilt was so low (less than 10%) that no differences were detected between controls and carbofuran-treated plots. Verticillium wilt increased with increasing alkalinity, but carbofuran suppressed this disease, regardless of pH levels.—*Agriculture Research and Education Center, IFAS, University of Florida, Bradenton, FL 33505.*

RICH, J. R., and N. T. KEEN. *Association of coumestanes with the hypersensitive resistance of lima bean to Pratylenchus scribneri.*

Pratylenchus scribneri produces hypersensitive lesions on roots of lima bean,

Phaseolus lunatus 'White Ventura', and nematode reproduction is poor. On snap bean, *Phaseolus vulgaris* 'Wade', no discreet lesions are formed, and the nematode multiplies rapidly. Ethanol extracts of inoculated lima bean roots contained high concentrations of blue fluorescent compounds that were not present at high levels in extracts from healthy lima bean roots or inoculated snap beans. Four compounds were purified from inoculated lima bean roots and analyzed using mass spectrographic, ultraviolet, and thin-layer chromatographic methods. One of the compounds was coumestrol, and another was tentatively identified as psoralidin. Coumestrol did not appear to be toxic to *P. scribneri,* but effects on mobility were detected at 10-50 μg/ml. Two other related isoflavonoids, daidzein and 3,9-dihydroxypterocarpan, were tested and exhibited no effects on nematode movement at similar concentrations. The data support the hypothesis that inducible production of coumestanes is associated with the hypersensitive reaction of lima bean to *P. scribneri.* If the coumestanes are the chemical basis for lowered nematode reproduction, then they function as phytoalexins against *P. scribneri.*—*Departments of Nematology, and Plant Pathology, respectively, University of California, Riverside, CA 92502.*

RODRIGUEZ-KABANA, R., and J. R. ADAMS. *In vitro studies on the antifungal properties of the nematicide, ethoprop.*

The antifungal properties of ethoprop (*O*-ethyl, S, S-dipropyl phosphorodithioate) were studied in vitro by measuring its effect on radial mycelial growth of *Sclerotium rolfsii, Rhizoctonia solani, Rhizopus stolonifer, Trichoderma harzianum,* and *T. pseudokoningii.* Cultures of the fungi were established on plates with potato-dextrose agar containing 0, 10, 25, 50, 75, or 100 μg/ml ethoprop and incubated at 28 C. Mycelial growth of *S. rolfsii* and *R. solani* was suppressed in the first 5 days proportionately with increasing concentration of the nematicide; however, *S. rolfsii* was more sensitive to ethoprop than *R. solani.* Growth of *S. rolfsii* 5 days after inoculation in plates containing 100 μg/ml ethoprop was suppressed by 88%, that of *R. solani* by 69%. After 12 days, growth of *R. solani* in these plates was not different from that of the controls; however, growth of *S. rolfsii* remained considerably depressed. Significant inhibition in growth of *T. harzianum, T. pseudokoningii,* and *R. stolonifer* 48 h after inoculation was observed only in plates containing 50, 75, and 100 μg/ml of ethoprop. This effect was temporary and after 72 h was detected only in plates with 100 μg/ml ethoprop. After 5 days, there were no significant differences between treatments. These studies indicate that ethoprop possesses considerable antifungal activity, and it may result in fast-growing saprophytic fungi being selected.—*Department of Botany and Microbiology, Auburn University Agricultural Experiment Station, Auburn, Alabama 36830.*

RUSSELL, C. C., and L. S. MORRISON. *Induced ectoparasitic feeding of Meloidogyne hapla on tomato.*

Seedlings of tomato cultivar 'Rutgers' were grown on water-agar plates, the surface of which had been covered with a thin plastic film. After the seedlings were established and their roots actively growing, the periphery of the plate was sealed with molten wax to reduce moisture loss. Fourth-stage larvae and adult females were removed from stock colony roots, introduced through a slit in the plastic film, and positioned so their lip regions were in contact with the root immediately behind the root cap. The slit in the plastic film was resealed with wax. Observations were made with the aid of a compound microscope at magnifications up to ×1,000. Somatic muscular activity in the cervical region was observed. Stylet penetration of epidermal cell walls was accomplished repeatedly and accompanied with a high rate of metacorpal activity. Metacorpal activity was not restricted to periods of stylet insertion. Movement of materials in the esophageal lumen was observed during feeding. Most fourth-stage larvae died prior to intestinal clearing. Metacorpal activity was observed for 12 days in four individuals. During this time their intestinal contents became progressively more transparent. There was no indication that giant cell formation had been initiated following feeding.—*Department of Plant Pathology, Oklahoma State University, Stillwater, OK 74074.*

SITARAMAIAH, K., and R. S. SINGH. *Mononchus spp. as carriers of Rhizobium japonicum in soybean fields.*

High populations of *Mononchus* were encountered around roots of soybean, *Glycine max*. This lead us to investigate the possible association between *Mononchus* spp. and *Rhizobium japonicum*. Nematodes extracted by sieving were rinsed in sterile water and placed in petri plates containing *R. japonicum*. After 15 h, the nematodes were removed, rinsed in sterile water and surface sterilized in 0.02% ethoxyethyl mercury chloride (Aretan) and 0.1% dihydro streptomycin-sulphate. The nematodes were rinsed in sterile water and placed on manitol-agar medium and incubated at 28 C. *Rhizobium* colonies developed 4 days after placing nematodes on the medium. The association was tested further in autoclaved soil-sand mixture (3:1, v/v). *Mononchus* isolated from soybean fields were treated as in first experiment. *Rhizobium* inoculum was prepared in sterile water. 'Bragg' soybean seeds were planted 1 day after inoculation. After 60 days, root systems were removed, and the number and size of nodules recorded. Specific treatments with major results were: control (no bacteria or nematodes), with no nodule development; nematodes alone from soybean field, with 7.5 large nodules/plant; nematodes + bacteria, with 19.1 medium sized nodules/plant; and bacterium alone, with 27.7 small nodules/plant. *Mononchus* could not be isolated from any treatment. These results suggest that bacteria ingested by nematodes in soybean field were capable of forming nodules on roots.—*Department of Plant Pathology, College of Agriculture, U.P. Agricultural University, Pantnager (Nainital), India.*

STARR, J. L., and W. F. MAI. *A root rot of celery involving Meloidogyne hapla.*

Celery seedlings grown at 21 C with 12 h light 21,520 lx (2,000 ft-c) per day, in natural or autoclaved organic soil previously cropped to celery, were inoculated with *Meloidogyne hapla* at levels of 0 to 10^4 eggs per seedling. Seedlings inoculated with 10^4 eggs developed severe galling and root necrosis in natural soil, and seedlings not inoculated remained relatively free of root necrosis. Shoot dry weight of *M. hapla*-infected plants was 50% of noninoculated controls 4 weeks after inoculation. At 5×10^3 or more eggs per seedling, root necrosis in natural soil was three times that of seedlings not inoculated with *M. hapla* or inoculated with 10^3 or less eggs per seedling. Celery in autoclaved soil and inoculated with 10^4 eggs per seedling was severely galled, but without concomitant root necrosis or loss of shoot dry weight. Of the numerous fungi isolated from necrotic galls, *Fusarium* spp. and *Pythium* spp. were recovered with greatest frequencies. Numerous bacteria also were isolated from necrotic galls. These data suggest that the interaction of *M. hapla* and other organisms can result in significant damage to celery.—*Department of Plant Pathology, Cornell University, Ithaca, NY 14853.*

TOWNSHEND, J. L., and C. F. MARKS. *Available soil moisture and the expression of root-lesion nematode damage in flue-cured tobacco.*

Damage to tobacco from brown root-rot (caused by *Pratylenchus penetrans*) generally is most severe in years when the spring is wet. The relationship between soil moisture and nematode damage was studied on flue-cured tobacco cultivar Virginia 115 grown in a Fox loamy sand and in a Vineland silt loam, each infested with 20,000 nematodes/kg of soil. Available soil moisture levels were maintained in the infested Fox soil at 3% and 6% and in the Vineland soil at 9% and 18%. Tobacco plants infected with *P. penetrans* required less water than the noninfected plants in both soils. On Vineland silt loam growth of tobacco was retarded 60% by *P. penetrans* under both moisture levels; whereas on the Fox loamy sand, growth of tobacco was retarded 53% under the high moisture level, but only 37% under the low. The expression of lesion-nematode damage was obscured when tobacco was grown on Fox soil under moisture stress. Although there were no significant differences, ($P \geqslant 0.05$), more root-lesion nematodes tended to be recovered from soil and roots that were maintained under a high-moisture regime than under a low-moisture regime.—*Agriculture Canada, Research Station, Vineland Station, Ontario, LOR 2EO.*

VAN GUNDY, S. D., and J. D. KIRKPATRICK. *Nematode-nematode interactions on tomato.*

Host-parasite interactions of two endoparasitic nematodes, *Meloidogyne javanica* and *Pratylenchus scribneri* and two ectoparasitic nematodes, *Trichodorus christiei* and *Hemicycliophora arenaria* were studied on tomato plants grown at 27 C for 90 days. Each nematode species was studied separately and in all combinations in factorial arrangement with the other three nematodes. Compared to controls, growth of tomato was suppressed ($P = \leqslant .01$) in each treatment containing *M. javanica* except when *M. javanica* was in combination with *T. christiei*. There were no significant inhibitions in plant growth by *P. scribneri, H. arenaria,* and *T. christiei* individually. *Pratylenchus scribneri* and *T. christiei* in combination did suppress plant growth. Root growth was stimulated ($P \leqslant .01$) in treatments using *M. javanica* alone. In all other treatments there were no significant differences in root weights when compared with the checks. There were no significant differences in numbers of *T. christiei*, individually. *Pratylenchus scribneri scribneri* and *H. arenaria* were higher when they were tested alone than in combination with any other nematodes. Reproduction of *M. javanica* was inhibited when in combination with all other nematodes.—*Department of Nematology and Department of Plant Sciences, University of California, Riverside, CA 92502.*

WALKER, J. T., R. MOTSINGER, and J. MELIN. *Effects of repeated annual and semiannual nematicide applications to centipedegrass.*

Various nematicides were applied annually (spring or fall) or semiannually (spring and fall) to established centipedegrass on Edisto loamy-sand at the U.S. Department of Agriculture Plant Introduction Station (Savannah, Georgia) to determine if nematode control would affect centipedegrass. Liquid nematicides were applied with a hose-end proportioner. Granular materials were distributed evenly over the plots. All plots were watered immediately after application. Soil samples were removed every 3 months, and the populations of major nematodes determined by sieving-centrifugation. Ring nematodes (*Criconemoides ornatus*) were the most numerous averaging 112 per 100 cm^3 soil over the 3-year period. This population density was below that which would be expected to produce observable symptoms. Maximum population was 902. Neither Chemagro 7375 (2.22 kg 15G/100 m^2) nor oxamyl (Vydate-1.39 kg 10G/100 m^2) reduced ring nematode populations when applied semiannually for 3 years, but both reduced populations of other nematode species. Carbofuran (Furadan-1.45 kg 10G/100 m^2) or DBCP (Nemagon-9.71 kg 10G/100 m^2) applied semiannually for 2 years reduced ring, lesion, spiral, and dagger nematode populations. Carbofuran reduced overall populations by 80%; DBCP by 58%. Average ratings of grass coverage and appearance in treated plots were not different from nontreated plots during this 3-year period, indicating that populations present may not affect centipedegrass.—*University of Georgia, Experiment, GA 30212; and Athens, GA 30602.*

WEHUNT, E. J., J. C. ALDEN, and H. R. SMITH. *Peach tree survival on a short-life site in Georgia after treatment with potassium azide.*

A solution containing potassium azide, urea, and sodium hydroxide, at rates of KN_3 ranging from 0 to 264 kg/hectare (ha) was applied to plots in October 1969. Trees were planted in January 1970. In 1972, all but the control plots received postplant application of 68 kg/ha of 1,2-dibromo-3-chloropropane by injection. Nematode populations were reduced by all KN_3 treatments, and were almost eliminated at the 112 kg/ha and higher rates. Experimental yields of fruit were determined the third year of growth (first harvest year), but yield differences between treatments were not significant. There was no crop in the fourth and fifth years due to insufficient cold weather. Five years after planting, 72.2% of the trees in control (nontreated) soil were dead. No trees were dead in soil treated with 156 kg/ha KN_3 in a 2.75-m band and 224 and 264 kg/ha broadcast. In soil which received 28, 56, and 112 kg/ha KN_3 broadcast, 67, 58, and 25% of the trees were dead, respectively. Sixty-seven percent of the trees were dead in plots where only one-half of each plot was treated at the rate of 224 kg/ha of KN_3.—*Plant Pathologist Agricultural Research Service, U.S. Dept. of Agriculture, Southeastern Fruit and Tree Nut Research Station, Byron, GA 31008; and Director and Assistant Director, Technical Services, Woolfolk Chemical Works, Fort Valley, GA 31030, respectively.*