numbers of *P. penetrans* ranged from 75 to 6140 with a mean number of 1276 nematodes/250 cc of soil. Losses of No. 1 tomatoes, or those exceeding 6.3 cm diameter and without visual defects, ranged from 1.7 T/ha to 15.5 T/ha with a mean loss of 2.9 T/ha due to nematodes. Number 2 tomato yields were generally unchanged. Nematode effect on yield increased throughout the season until a mean loss of 30% of the No. 1 tomatoes occurred by the 4th picking. In general, low fertility treatments resulted in higher nematode numbers. Nematode numbers were affected negatively by increased N fertilization and leaf P but related positively to higher pH, soil and leaf Mg. Highest yield (58.1 T/ha) of No. 1 tomatoes was obtained with 44.8, 112.1, 336.2 (NPK) at pH 6.0 and the additional loss due to nematodes was calculated as 7.8 T/ha. Processing tomatoes have about 17% of the value per acre of those sold as fresh market tomatoes and potential loss determines the amount that can be spent on controlling lesion nematodes. Yield relationship reduced to its simplest form was: yield loss = $\sqrt{b \text{ nematode numbers}}$, where b is the slope of a line. Considerably higher numbers of lesion nematodes may therefore be tolerated in fields containing processing tomatoes than in those picked for fresh market. The data indicate that yield, mineral nutrition, and nematodes have many interesting and complex interactions.

POSSIBLE *RADOPHOLUS SIMILIS* BIOTYPES REPRODUCING AND MIGRATING ON RESISTANT CITRUS ROOTSTOCKS [POSIBILIDAD DE BIOTIPOS DE *RADOPHOLUS SIMILIS* REPRODUCIENDOSE Y TRANSMUDANDOSE EN RAICES DE CITRUS RESISTENTE]. J. H. O'Bannon and H. W. Ford, U. S. Department of Agriculture, Science and Education Administration, Agricultural Research, Prosser, Washington 99350 and Agricultural Research and Education Center, IFAS, Lake Alfred, Florida 33850, U.S.A. --- *Radopholus similis* populations were found infecting Milam limon *(Citrus* sp.), a *R. similis* resistant rootstock in two groves in central Florida. One, the Conway population, was found to infect and reproduce on Milam limon, Ridge Pineapple and Algerian Navel orange *(C. aurantium)*, and Carrizo Citrange *(C. sinensis* x *P. trifoliata)* seedlings considered to be resistant to highly resistant to *R. similis*, in significantly greater numbers than the *R. similis* population that causes the disease "spreading decline" of citrus. The second, Ward's population, was found to readily infect Milam seedlings. Both populations migrated from infected to uninfected Milam seedlings in greenhouse soil tanks. In two years, the Ward population migrated further than the Conway population and appears to be more infective to Milam.

INFLUENCE OF SOIL TYPE AND TEMPERATURE ON THE MIGRATION OF *MELOIDOGYNE INCOGNITA* JUVENILES TOWARD TOMATO ROOTS [INFLUENCIA DEL TIPO DE SUELO Y DE LA TEMPERATURA SOBRE LA MIGRACION DE FORMAS JUVENILES DE *MELOIDOGYNE INCOGNITA* HACIA RAICES DE TOMATE]. J. C. Prot and S. D. Van Gundy, Department of Nematology, University of California, Riverside, California 92521, U.S.A. --- The effects of soil type and temperature on the migration of *M. incognita* juveniles towards tomato roots were tested in 20-cm PVC columns attached to styrofoam cups containing the plants and separated from the root system by a 85-um screen. Juveniles that had migrated 20 cm and penetrated the roots were counted after staining the roots in 0.05% cotton blue. Approximately 300 juveniles not more than 24 h old were introduced into the soil at the bottom of the column. At a constant temperature of 26° C the percent penetration in 10 days in soils containing: a) 8.8% clay (C) + 5.2% silt (S); b) 10.2% C + 11.9% S; c) 9.2% C + 16% S; d) 13.2% C + 19.5% S; and e) 18.5% C + 23.5% S was 32, 13, 10, 0 and 0, respectively. Migration in soil of composition a) was also studied as a function of time at 14, 16, 18, 20 and 22° C. The percent juveniles found in the roots after 5, 10, 15 and 20 days was, respectively: 0, 1, 1, 2 at 14° C; 0, 3, 3, 2 at 16° C; 0, 7, 6, 8 at 18° C; 1, 33, 34, 33 at 20° C; and 5, 35, 43, 40 at 22° C. These data indicate that increasing the fine soil particles has a limiting influence on the migration of *M. incognita* juveniles, and that very few juveniles are able to migrate and penetrate roots when the temperature is less than 18° C. Also, it would appear that some juveniles have the ability to migrate 20 cm whereas others do not, because penetration was not significantly different between 10 and 20 days at 18, 20, or 22° C.

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FEEDING PLUG FORMATION AND ULTRASTRUCTURE CHANGES IN COTTON ROOTS FOLLOWING RENIFORM NEMATODE PARASITISM [FORMACION DE UN TAPON ALIMENTICIO Y CAMBIOS DE ULTRAESTRUCTURA EN RAICES DE ALGODON PARASITADAS POR EL NEMATODO RENIFORME]. R.V. Rebois, USDA, Nematology Laboratory, Plant Protectin Institute, BARC-West, Beltsville, Maryland 20705.--- Susceptible *Gossypium hirsutum* 'Auburn 56' and moderately resistant *G. arboreum* 'Nanking' (C.B. 1402) seedlings were planted in vermiculite which was inoculated 3 days later with reniform nematodes, *Rotylenchulus reniformis*. At 3, 11, and 24 day intervals following inoculation, roots were washed free of vermiculite. Roots were cut into 1 mm pieces and processed for examination by transmission electron microscopy. Within the first three days, the infective female passed intracellularly through the cortex, usually perpendicular to the root axis, and came to rest with its lips in contact with an endodermal cell. The female inserted approximately half of the conical part of the stylet (3 um) into an endodermal or less frequently a pericycle cell (PC) to initiate feeding. This cell then became a prosyncyte, inital syncytial, or feeding cell (ISC). If the head or body of the nematode penetrated and ruptured the wall of a PC, feeding did not appear to be initiated. The portion of the stylet inserted in the ISC became surrounded with a cell-wall-like deposit or feeding plug (FP). The FP was thinner on the ventral or aperture side of the stylet and thicker on the opposite side. A feeding tube (FT) like structure was seen in the ISC and often extended into the adjacent PC. The FT appears to be formed from materials secreted through the stylet aperture which is located about 1 um fom the stylet tip. Portions of the FT near the stylet aperture were surrounded by smooth endoplasmic reticulum and electron dense spherical inclusions. The FT appeared in juxtaposition to the plasmalema, covering the FP, immediately surrounding the stylet aperture. Sections of the FT were found in the ICS and the adjacent PC at 3, 11, and 24 day following inoculation. On days 3 to 11 the syncytia consisted mainly of PC's. Eleven to 24 days after inoculation, the infection was observed deep in the stelar area between xylem elements in both hosts.

PATHOGENICITY AND CONTROL OF TWO SPECIES OF *MELOIDOGYNE* ON LATE SEASON SUNFLOWER [PATOGENICIDAD Y CONTROL DE DOS ESPECIES DE *MELOIDOGYNE* EN GIRASOLES]. J. R. Rich, Department of Nematology, University of Florida, Agricultural Research Center, P.O. Box 657, Live Oak, Florida, 32060 - - - Two field studies were initiated on August 11, 1978, to determine the influence of *Meloidogyne incognita* and *M. javanica* on sunflower (*Helianthus annuus* L.). In test A, the soil was previously cropped to corn and was a sand moderately infested with 204 *M. incognita*, 47 *Pratylenchus* sp., and 20 *Trichodorus christiei* per 250 cm³ soil. Five nematicide treatments, each replicated 6 times, included: a control, aldicarb (Temik 15G), and carbofuran (Furadan 10G) and two phenamiphos (Nemacur 15G) treatments. Three nematicide treatments were applied at 2.98 kg a.i./ha in a 20 cm band over the seed row at-planting, and an additional