

EFFECTS OF MELOIDOGYNE INCOGNITA AND PRATYLENCHUS BRACHYURUS SINGLY AND COMBINED ON GROWTH OF NIGERIAN TOBACCO (NTC 5) [EFECTOS DEL MELOIDOGYNE INCOGNITA Y EL PRATYLENCHUS BRACHYURUS EN COMBINACION E INDIVIDUALMENTE SOBRE EL CRECIMIENTO DE TABACO NIGERIANO (NTC 5)]. R.O. Ogbuji, Crop Science Department, University of Nigeria, Nsukka, Nigeria.

Accepted:

28.VI.1978

Aceptado:

ABSTRACT

A Nigerian tobacco (NTC 5) was inoculated with 600 larvae of *Meloidogyne incognita* and 600 larvae of *Pratylenchus brachyurus* singly and in combination. Plants inoculated with *P. brachyurus* alone were more severely affected both in foliar growth and in root development. *M. incognita* was the dominant species when both nematodes were inoculated together on the same plants.

Key Words: root-knot nematodes, lesion nematodes, *Nicotiana tabacum*, nematode interactions.

INTRODUCTION

Tobacco (*Nicotiana tabacum*), a plant of the Solanaceae family is grown in Nigeria. As the local demand for tobacco has increased rapidly in recent years, farmers are planting large areas and are selling their crops to tobacco companies. Areas with lighter soils, low in nitrogen, are good for growing tobacco. Its main requirements are good drainage, enough rain and plant food (10). But farmers' efforts to grow tobacco in large commercial quantity are troubled by nematode diseases in the field. Species of the root-knot nematodes are known to attack in Nigeria (4). Root-knot nematodes also are major economic pests in the tobacco industry of other parts of Africa like Rhodesia (5, 6, 7, 8), South Africa (3) and Malagasy (2). Actual loss estimates in Nigeria have not been made. In North Carolina (USA) where nematicides were used on 85% of the land planted to tobacco in 1976, it was possible to find fields where yields were only 75.5% of the potential. In other words lack of treatment to control nematodes and associated pests would cost the farmer 24.5% of his potential yield (11). In developing countries losses to the small farmers may be as much as 25% to 50% over wide areas of the available farm land (11).

MATERIALS AND METHODS

Tobacco seedlings were grown in wooden boxes (45 x 30 x 12.5 cm) in a greenhouse. Soil mix was composed of sandy loam, organic soil and sand in a 3: 2: 1 ratio. Populations of *P. brachyurus* and *M. incognita* were maintained on corn 'Western White' and tomato 'Bonny Best' seedlings, respectively. Larvae were extracted from infected roots by the Baermann funnel method. Four-week old tobacco seedlings were transplanted in 20 - cm plastic pots infested with 600 *M. incognita* larvae/plant, 600 *P. brachyurus* larvae/plant, and 600 of each of *M. incognita* and *P. brachyurus*/plant. Uninoculated plants served as controls. Each treatment was replicated three times in a randomized block design. All pots placed in the greenhouse were on wooden benches

and at safe distances from each other to avoid contamination with nematodes from adjacent pots. Air temperature recorded during the experiment averaged 26.4C. After 7 weeks nematodes were extracted by the Baermann funnel technique from 100 cm³ of soil and counted.

RESULTS

Up to the third week of inoculation, control plants and plants inoculated with *P. brachyurus* alone were growing better than those in other treatments. Plants inoculated with *M. incognita* and those inoculated with combined *M. incognita* and *P. brachyurus* were growing poorly and they generally wilted at mid-day, but recovered in the evenings when temperatures dropped. From the fourth week, however, plants inoculated with *M. incognita* and those inoculated with combined *M. incognita* and *P. brachyurus* improved and started a vigorous growth. By the sixth week they were taller than the control plants and plants inoculated with *P. brachyurus* (Fig. 1). Growth of plants with the *P. brachyurus* inoculum slowed down from the fourth week; they were severely stunted at the end of the experiment (Fig. 1). Plant roots inoculated with *P. brachyurus* had brownish lesions and were stunted (Fig. 2). Plant roots with concomitant infection of *M. incognita* and *P. brachyurus* had fewer brownish lesions, but most roots were galled. Average top and root weights (fresh and dry) of plants in the different treatments are given in Table 1. Nematode populations densities at harvest were counted and averages taken (Fig. 3). The number of larvae of *M. incognita* recovered from soil of inoculated plants was higher than *P. brachyurus* (Fig. 3). It can be concluded that in terms of reproduction, factors were more favourable to *M. incognita* than *P. brachyurus* in the roots of tobacco plants. Although the tobacco variety used was susceptible to both nematode species *M. incognita* apparently was the dominant species in the concomittant inoculations. On the other hand the pathogenic effect was more severe in plants inoculated with *P. brachyurus* than those inoculated with *M. incognita*. Foliar growth and root development was poor in plants inoculated with *P. brachyurus* alone. Analysis of variance indicated significant differences among treatments as shown in Table 1.

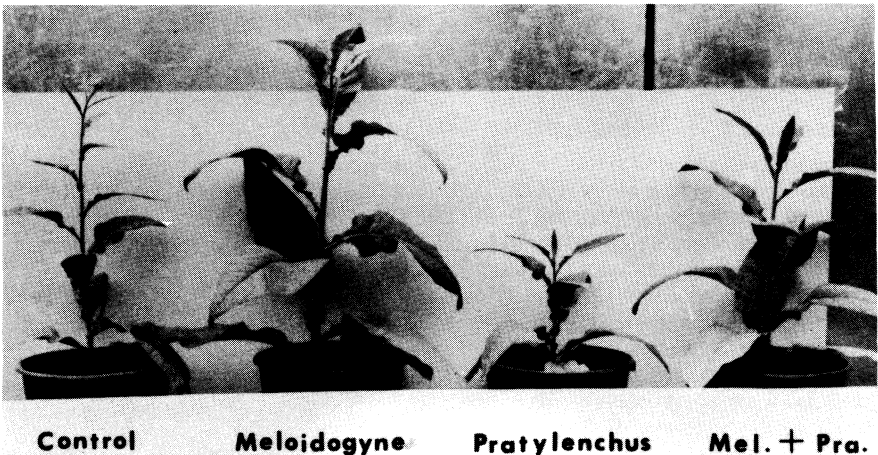


FIG. 1. Foliar development of eleven-week old Nigerian tobacco seedlings inoculated with *Meloidogyne incognita* and *Pratylenchus brachyurus*.

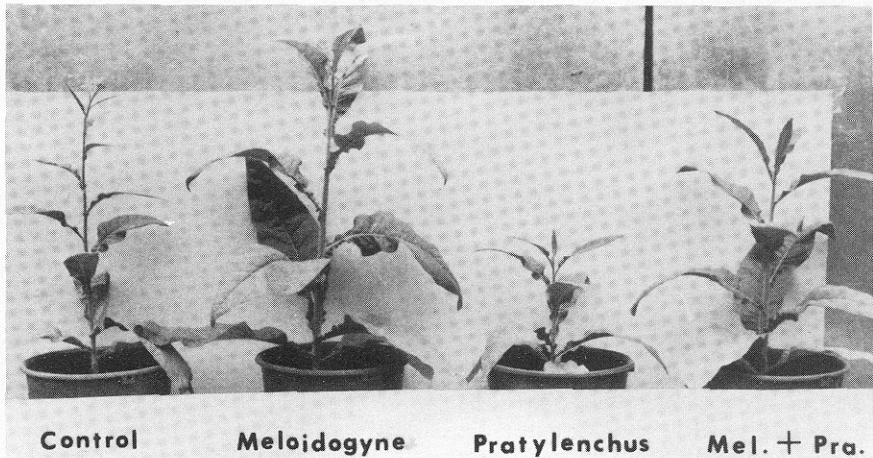


FIG. 1. Foliar development of eleven-week old Nigerian tobacco seedlings inoculated with *Meloidogyne incognita* and *Pratylenchus brachyurus*.



FIG. 2. Pathogenicity of *Meloidogyne incognita* and *Pratylenchus brachyurus* to roots of eleven-week old Nigerian tobacco seedlings. 1 : control (no infection); 2 : *M. incognita* infected; 3 : *P. brachyurus* infected; 4 : *M. incognita* plus *P. brachyurus* infected.

Table 1. Influence of *Meloidogyne incognita* and *Pratylenchus brachyurus* singly and in combination on the growth of tobacco plants.

Nematode species	Top Wt. (gm)		Root Wt. (gm)	
	(fresh)	(dry)	(fresh)	(dry)
<i>Meloidogyne incognita</i>	62.37	8.06	30.89	5.44
<i>Pratylenchus brachyurus</i>	13.47	2.95	5.9	1.21
<i>Meloidogyne incognita</i> plus <i>Pratylenchus brachyurus</i>	40.81	6.84	22.02	4.77
Control	26.37	3.79	12.11	1.81
L.S.D. 0.05	17.2	2.70	11.9	2.21

DISCUSSION

Evidence on the association between different species of root-feeding nematodes in different crops indicates that the reproduction of one of the species may be affected favourably, unfavourably, or not be affected when the concomittant species are present (9). Acosta and Ayala (1) found that the reproduction of *Scutellonema bradys* was greatly inhibited when *S. bradys* and *Pratylenchus coffeae* were inoculated together to Guinea yam (*Dioscorea rotundata* Poir). In this experiment *P. brachyurus* was inhibited when inoculated together with *M. incognita*. In terms of host-parasite relationships, *M. incognita* appeared to have adjusted better with the host plant, since, despite its higher population counts, pathogenicity on the Nigerian tobacco was such that foliar and root developments were comparatively better than in the other treatments. It is also considered that the pathogenic potential of *P. brachyurus* on the Nigerian tobacco is high. Although at the inoculum level used in this experiment the stunting effect on the tobacco by *P. brachyurus* started showing at the third week, this estimate could very likely be reduced, if plants are given higher nematode inoculum.



FIG. 2. Pathogenicity of *Meloidogyne incognita* and *Pratylenchus brachyurus* to roots of eleven-week old Nigerian tobacco seedlings. 1 : control (no infection); 2 : *M. incognita* infected; 3 : *P. brachyurus* infected; 4 : *M. incognita* plus *P. brachyurus* infected.

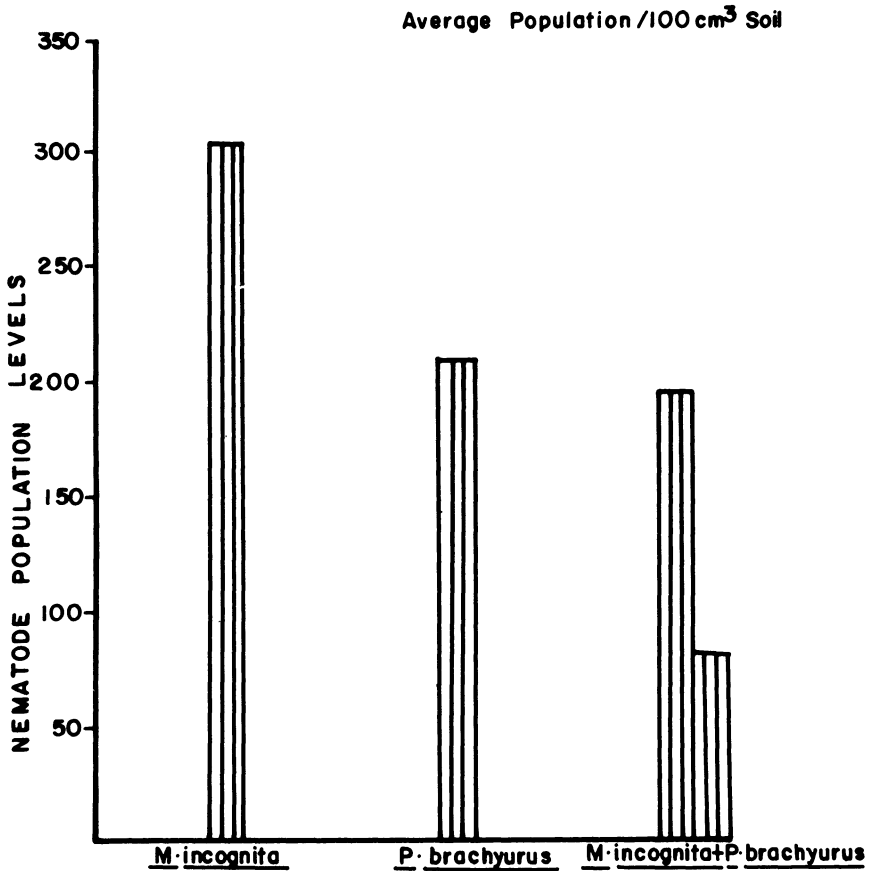


FIG. 3. Nematode-population density at harvest. Tobacco initially inoculated with 600 *Meloidogyne incognita*, 600 *Pratylenchus brachyurus*, alone and in combination.

RESUMEN

La variedad de tabaco nigeriano NTC 5 fue inoculada con 600 larvas de *Meloidogyne incognita* y 600 de *Pratylenchus brachyurus* separadamente y en combinación. Las plantas inoculadas con sólo *P. brachyurus* fueron las más severamente afectadas tanto en el crecimiento foliar como en el desarrollo de las raíces. *M. incognita* resultó ser la especie dominante cuando ambos nematodos fueron inoculados en una misma planta.

Claves: nematodo nodulador, nematodo lesionado, *Nicotiana tabacum*, interacciones de nematodos.

REFERENCES

1. Acosta, N., and A. Ayala. 1975. *J. Nematol.* 7:1-6; 2. Breniere, J. 1959. *Bull. Inst. Rech. Agron. Madagase* No. 3 pp 102-146; 3. Calitz, P.C., and D.L. Milne. 1962. *S. Afr. J. Agric. Sci.* 5L 123-126; 4. Caveness, F.E. 1967. End of Tour Progress Report on the Nematology Project. Lagos 135pp; 5. Cockbill, G.F. 1952. *Rhodesia Agric. J.* 49: 303-312; 6. Collins, A.D. 1938. *Rhodesia Agric. J.* 35: 448-451; 7. Daulton, R.A.C. 1950. *Rep. Trelawney Job. Res. Stn. Year 1949* pp. 45-52; 8. Daulton, R.A.C. 1955. *Rhod. Job. No 11* pp 21-24; 9. Ferris, V.R., J.M. Ferris, and R.L. Bernard. 1966. *Nematologica* 13: 143 (Abstr); 10. Irvine, F.R. 1969. *West African Crops Vol. 2.* Oxford Univ. Press 272 pp; 11. Taylor, A.L., and J.N. Sasser. 1978. *Biology, Identification and Control of Root-Knot Nematodes (Meloidogyne species).* Int. Mel. Project. North Carolina State Univ. Graphics 111 pp.

ESTUDIO PRELIMINAR SOBRE LOS NEMATODOS FITOPARASITOS ASOCIADOS AL CULTIVO DE LA VID (*Vitis vinifera* L.) EN VENEZUELA [PRELIMINAR STUDY ON PLANT PARASITIC NEMATODES ASSOCIATED WITH GRAPE (*Vitis vinifera* L.) IN VENEZUELA]. Pastor Petit Rondón, Universidad Centro Occidental, Instituto de la Uva, Apartado 400, Barquisimeto, Venezuela.

Aceptado:

22.IX.1978

Accepted:

RESUMEN

En un reconocimiento para nematodos realizado en plantaciones de uva (*Vitis vinifera* L.) en las variedades Cardinal, Italia, Alphonse Lavalle, Rosseti, Violeta y Tucupita en Venezuela, se analizaron 100 muestras compuestas de suelo y raíces provenientes de los Distritos Morán, Palavicino, Torres y Urdaneta del estado Lara. Se encontraron géneros de nematodos fitoparasitos o los que se sospecha pudieran actuar como tales asociados al cultivo, siendo *Meloidogyne*, *Pratylenchus*, *Helicotylenchus* y *Rotylenchulus* los más frecuentemente observados. Otros géneros encontrados fueron *Tylenchorhynchus*, *Aphelenchus*, *Tylenchus*, *Paratylenchus* y *Xiphinema*.

Claves: nematodos noduladores y otros, nuevos registros.

INTRODUCCION

La vid (*Vitis vinifera* L.) se cultiva en Venezuela desde hace años en forma esporádica y con carácter estrictamente familiar. A partir de la década del 60 el referido cultivo empezó a expandirse gradualmente en el país, concentrándose la mayor área de siembra especialmente en los estados Zulia, Aragua y Lara. En la actualidad existen aproximadamente unas 1.000 ha. bajo cultivo de uva en todo el territorio nacional (2). Concretamente en el estado Lara la extensión dedicada al referido cultivo sobrepasa las 200 ha, distribuidas principalmente en los distritos Morán, Torres, Urdaneta y Palavecino.

Desde hace varios años se ha venido reportando que los nematodos fitoparásitos juegan un importante papel en el decaimiento y muerte progresiva de la vid en muchos