

## CONCLUSIONS

The test presently reported demonstrated the nematicidal action of Dowco 275 against the migratory endoparasite *Pratylenchus brachyurus* infecting citrus. Its value as a pesticide is further enhanced by the lack of phytotoxicity at the rates used and by the growth response of plants to which it was applied.

## RESUMEN

La enmienda del suelo con el producto Dowco 275 (0-0 dietil 0-(6-fluoro-2 piridil) fosforotioato) granulado aplicado a razón de 5.6 a 22.4 kg/ha (i.a.) alrededor de la base del tallo de arbolitos de limón rugáceo (*Citrus jambhiri*) de dos años de edad, cultivados en macetas en el invernadero, controló significativamente el *Pratylenchus brachyurus* y estimuló el crecimiento de las plantas. El tratamiento resultó beneficioso a todos los niveles, excepto los más bajos. Las dosis de 5.6 y 11.2 kg/ha produjeron incrementos en altura y peso de los tejidos aéreos de 19-27% y de 43-54%, respectivamente, y redujeron la población del nematodo en 46-88% en comparación con el testigo. La aplicación de dosis más altas del químico no se tradujo en beneficios adicionales apreciables.

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EFFECTS OF NEMATICIDES ON THE NEMATODE POPULATIONS AND YIELD OF TOBACCO [LOS EFECTOS DE TRATAMIENTOS CONTRA LOS NEMATODOS SOBRE LAS POBLACIONES DE LOS MISMOS Y SOBRE LA PRODUCCION DE TOBACO]. N. D. Singh. RRC/CARDI OFFICE, The University of the West Indies, St. Augustine, Trinidad. W. I.

## ABSTRACT

In a field experiment, the effects of D-D, DD-MENCS (Vorlex), Ethoprop 6% E.C. and Ethoprop 10% G for the control of plant parasitic nematodes and on yield of tobacco were studied. Nematodes were counted in soil samples taken 54, 114 and 171 days after transplanting. All nematicide treatments significantly reduced *Meloidogyne incognita* after 54 days but, only D-D and Vorlex were significantly different from the control. Increased yields were harvested from plots treated with nematicides.

## INTRODUCTION

In a recent survey plant parasitic nematodes were found to be widely distributed in tobacco fields in Trinidad (11). High populations of *Meloidogyne* spp. were often associated with low yield tobacco, but no estimate of the loss in yield is available.

The purpose of this study was to evaluate the efficacy of 3 chemicals commonly used for nematode control on tobacco in other areas and to assess the influence nematodes have on the yield of tobacco under the climatic conditions in Trinidad.

## MATERIALS AND METHODS

The treatments were applied on Las Lomas sandy loam planted to tobacco the previous season. A typical particle size analysis for the 15 - 17 cm depth of soil was 10% coarse sand, 64% fine sand, 11% silt and 17% clay. The soil was infested naturally with *Pratylenchus zae* Graham, 1951; *Helicotylenchus dihystrera* (Cobb, 1893) Sher, 1961; *Meloidogyne incognita* Chitwood, 1949 and a *Tylenchorhynchus* sp. Also present in lesser numbers were *Aphelenchus avenae* Bastian 1865 and *Tylenchus* sp.

D-D (1,3-dichloropropene, 1,2-dichloropropane) and DD-MENCs (80% D-D & 20% methyl isothiocyanate) were injected by a hand-gun in the row 18 - 20 cm deep at loci 20 cm apart and later ridged to 30 cm above the point of injection. Injection holes were closed by pressing with the heel. Ethoprop (0 - ethyl S,S - dipropyl-phosphorodithioate) 6% EC were injected immediately before transplanting on top of the ridges as described above, while Ethoprop 10% G was spread by hand on top of the row and incorporated in the top 10 - 15 cm of soil with a hand-hoe. Immediately after transplanting 753 kg/ha of 6 - 18 - 24 NPK fertilizer was applied on each side of the plant row and then covered 6 - 7 cm deep with a hand-hoe. In addition 224 kg of potassium sulphate (48 - 50%) and 251 kg/ha of 8 - 0 - 24 NPK fertilizer was applied as a side dressing 2 wks after transplanting.

A randomized complete block design with four replicates was used. Each plot consisted of four rows 12.2 m long and 1.2 m apart. Six-wk-old tobacco seedlings (*Nicotiana tabacum* L. cv. Speights G28) were transplanted to about 48 cm spacings in the row. Soil samples for nematode assay were taken from each plot 54, 114 and 171 days after transplanting with a 1.5 cm borer to a depth of 18 - 20 cm. Each sample was made up of about 50 cores collected from around the plant roots. A sub-sample (200 cm<sup>3</sup>) was processed by modified Cobb's decanting and sieving method (4). Duplicate samples consisting of 10% of each suspension were examined under the stereo-microscope and generic counts made.

Foliage pesticides were applied and weeding was done as needed. Rainfall watered the crop. Leaves were hand-harvested and yields recorded as green and later as cured weight per plot. After the last harvest, 10 test plants were randomly dug up from each plot and their roots examined for galling (12). Logarithmic transformation of the nematode population density was used to stabilize variance.

## RESULTS

The effectiveness of the nematicides for control of *M. incognita* were significantly different ( $P=0.05$ ) at 54-day sampling (Table 1). Results of Duncan's multiple range test indicate that DD and DD-MENCs effectively controlled *M. incognita*. *Tylenchorhynchus* sp. were not recorded after 171 days, however, they were present in earlier samplings. *H. dihystrera*, present in relatively low numbers, were recovered from only a few plots. Test plots yielded widely varying numbers of *P. zae*.

The nematicides did not differ significantly in their effect on yield; all increased the yield over the control (Table 2). The highest yield was from plants in plots treated with Ethoprop 10% G. There was no significant correlation between the reduction of the total nematode population and increase in the yield. No significant differences were found in root-gall indices of plants among the various treatments (Table 2) and no phytotoxicity was observed.

## DISCUSSION

The lack of significant differences in yield among the nematicidal treatments may have been due to the low initial nematode population density in the plots. The importance of preplant population density of a nematode in determining the amount of damage caused by the nematode has been reported by several workers (2, 3, 5, 8, 9). The initial nematode population in the control plots were apparently below the economic threshold levels.

Several workers attributed reduction in tobacco yield to root-knot nematode infection during the first mo (2) or first 2 mos after planting (5). Ferris (3) found that in chemical control experiments with tobacco, population densities of *Meloidogyne* spp. determined 6-8 wks after transplanting were indicative of treatment effectiveness. Thus, it appears that the high *M. incognita* population recorded 171 days after transplanting had little detrimental effect on yield. For similar reasons root-knot indices taken after the last harvest did not reflect the nematicide effectiveness.

Several workers have also observed the stimulation of plant growth at low nematode densities (2, 6, 7, 9, 10). A similar growth response was observed in tomato, lettuce and radish (unpublished data). Oostenbrink (9) explained that with light nematode infection the plant can withstand a certain amount of damage or can compensate for it by re-generation of plant roots. Although growth response could be due to control of other soil disease organisms, including soil insects (1), in this test there was no evidence of root damage by any other soil pathogen. Yield response in the nematicidal treatments could conceivably be due partly to one or more of these factors.

It is known that soil moisture stress can influence the nematode population density and plant growth. However, in this study the effect of soil moisture on the nematode populations and plants during the growing season was not determined.

The results showed that Ethoprop 10% G was much more effective in controlling the nematode populations and increasing yield than Ethoprop 6% EC. These results agree with other findings (11). Although treatment with Ethoprop 10% G resulted in a greater yield than with DD-MENCs, the highest crop value of flue-cured tobacco came from plants treated with DD-MENCs. Particularly noteworthy is the fact that the increase in crop value resulting from the nematicide treatments consistently exceeded the cost of fumigation (approx. \$11 US/ha). Further observations are needed to evaluate the effects of these chemicals on tobacco yield under different soil conditions.

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Table 1. Effects of chemicals on nematode populations at different periods after planting (Mean number of nematodes per 200 cm<sup>3</sup> of soil).

TREATMENT	Dosage ai/ha	Days After Transplanting															
		0 <sup>(a)</sup>			54			114			171						
		54	114	171	0	54	114	171	0	54	114	171	0	54	114	171	
		<i>Pratylenchus zeei</i>			<i>Helicotylenchus dihystra</i>			<i>Tylenchorhynchus</i> sp.			<i>Meloidogyne incognita</i>						
CONTROL	-	10	3	8	50	10	10	3	0	30	25	3	0	120	125 <sup>(b)</sup>	158	4645
D-D 100%	225 liters	-	5	33	25	-	3	3	5	-	15	2	0	-	23 <sup>ab</sup>	78	905
DD-MENCs	101 liters	-	0	0	10	-	0	0	0	-	20	3	0	-	43 <sup>a</sup>	30	2930
ETHOPROP 10% G	6.7 kg	-	0	23	10	-	0	0	0	-	5	3	0	-	45 <sup>bc</sup>	113	825
ETHOPROP 6% EC	11 liters	-	5	58	35	-	0	3	0	-	10	8	0	-	110 <sup>bc</sup>	190	3055

(a) Initial population density before application of the nematicides.

(b) Mean in columns flanked by a letter in common do not differ significantly ( $P = 0.05$ ).  
No letter indicates non-significance.

Table 2. Root-gall indices, yield and quality of flue-cured tobacco as influenced by chemical soil treatments.

TREATMENTS	Dosage ai/ha	Root-gall indices	Yield		Crop <sup>(b)</sup> value (\$ US/ha)
			Cured Wt. kg/plot (a)	green wt. kg/plot (a)	
CONTROL	-	3.9	7.3	57.7	355
D-D 100%	225 liters	2.1	8.4	61.3	417
DD-MENCs	101 liters	3.0	8.7	63.6	476
ETHOPROP 10% G	6.7 kg	3.3	9.1	65.4	458
ETHOPROP 6% EC	11 liters	3.9	7.9	58.1	410

(a) Average of four replicates per plot size of 59 m<sup>2</sup>.

(b) Based on actual prices paid in 1974.

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### RESUMEN

En un experimento en el campo se estudiarón los efectos de (D-D, DD-MENCs, Ethoprop 6% E.C. and Ethoprop 10% G) para el control de los nemátodos parasíticos de plantas y sobre la producción de tabaco. Se contaron los nemátodos en muestras de suelo después de 54, 114, y 171 mes del trasplante. Todos los tratamientos contra, los nemátodos ocasionaron una reducción significativa de (*Meloidogyne incognita*) después de dos meses y solamente (D-D) y (DD-MENCs) fueron significativamente diferentes al control. Todos los tratamientos para los nemátodos sirven para aumentar la producción.

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### BOOK REVIEW - - REVISION DEL LIBRO

*PICTORIAL KEY TO GENERA OF PLANT PARASITIC NEMATODES*. 4th edition, revised, 1975. W. F. Mai with H. H. Lyon, photographer. 219 pp.

This Pictorial Key contains two classification schemes for the order Tylenchida and a brief scheme for the order Dorylaimida. A key is given for genera of plant parasitic nematodes without reference to pictures, and then the key is repeated with each genus represented pictorially (in most cases) on the page facing the page on which the genus is keyed out. A brief description is given of the type species of the genus plus a listing of the General Characteristics of the genus. This information, along with the picture, makes the Pictorial Key most useful.

The first five plates are general in nature and are included primarily to illustrate terminology. Also, near the end of the book is a short Glossary of Nematological Terms which certainly should be of assistance to students. In a few cases, however, while the definitions are helpful, they are not precisely accurate.

Immediately following the pictorial section of the book is a list of Selected References for each genus. The book ends with an Index to Genera.

The arrangement of this 4th edition makes it easier to use than the previous editions, and the 18 x 25.5 cm page size is more convenient than the 22 x 28 cm size of former editions. The user will be impressed by the sewn binding which not only gives durability, but also permits the book to stay open without having to use one hand or another book to hold it open.