CONTROL OF *HELICOTYLENCHUS MULTICINCTUS* PARASITISING BANANAS USING SYSTEMIC NEMATICIDES [COMBATE DE *HELICOTYLENCHUS MULTICINCTUS* EN PLATANO CON NEMATICIDAS SISTEMICOS].

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ABSTRACT

Seven systemic nematicides were applied to bananas infected by *Helicotylenchus multicinctus* in two experiments. Nematode numbers were counted from root samples taken 6 mo. after the initial and 5 mo. after the second application in experiment 1, and 5 mo. after application in experiment 2. Optimal dose rates for the chemicals were determined. AC 64475 was the most active chemical, providing effective control for 5 months at 1,5 g a.i. per mat. Ethoprop at 2,0 g, aldicarb at 2,5 g and oxamyl at 3,0 g a.i. per mat also provided effective control. Phenamiphos after single applications of 2,4 g and 3,0 g a.i. per mat was ineffective but the second application at 2,4 g a.i. per mat in experiment 1 was effective.
Key Words: Musa, Nemacur®, Vydate®, Temik®, Mocap®, spiral nematodes.

INTRODUCTION

The effectiveness of systemic granular nematicides in reducing numbers of *Radopholus similis* (Cobb, 1893) Thorne, 1949 parasitising banana roots is well established (2, 3, 4, 7) and in a few cases *Helicotylenchus* spp. and *Meloidogyne* spp. were also reported as being effectively controlled (1).

In South Africa, *R. similis* infests only a few banana farms and the most abundant and widespread nematodes are *Helicotylenchus* spp. and *Meloidogyne* spp. (5). The bulk of bananas are grown on red clay soils where, though numbers of nematodes are lower than on light soils, populations of *Helicotylenchus multicinctus* (Cobb, 1893) Golden 1956 of 1000 per 50 g roots are common (5). The need for a suitable nematicide for use in controlling these nematodes is urgent so experiments were designed to test the effectiveness of a range of granular nematicides in controlling *H. multicinctus.*

MATERIALS AND METHODS

The two experimental sites were within blocks of bananas planted on 1976-12-24 on clay soils with a low pH (experiment 1:54% clay, pH 4,5; experiment 2:42% clay, pH 4,8). The experiments were designed as randomised blocks with 12 treatments replicated four times. The experimental plots consisted of two mats (mother plant plus sucker) of bananas. The nematicides tested at the rates listed in Table 1 were 2-methyl-2-(methylthio) propionaldehyde 0-(methylcarbamoyl) oxime, aldicarb and its sulphone, aldicarbsulphone; diethyl 1,3-dithientan-2-ylidenephosphoramidate, AC 64475; 2,3-dihydro-2, 2-dimethyl-7-benzofuranyl [(di-n-butyl) - aminosulfenyl] [methyl] carbamate, FMC 35001; 0-ethyl S,S-dipropyl phosphorodithioate, ethoprop; ethyl-4-(methylthio) -m-tolyl isopropylphosphoramidate, phenamiphos; and methyl-N[1], N-dimethyl-N-[(methylcarbamoyl) oxy]-1 thioxamidate, oxamyl. All the nematicides were tested as granular or powder formulations (concentrations of materials are

Table 1. Nematicides tested and dose rates applied.

Nematicides	Experiment 1			Experiment 2		
	Dose rate g a.i. per mat			Dose rate g a.i. per mat		
AC 64475	1,0	2,0	3,0	1,5	2,0	--
Aldicarb	[illegible],0	3,0	--	1,5	2,5	--
Aldicarb sulphone	3,75	7,5	15,0	--	--	--
Ethoprop	2,0	--	--	--	--	--
Phenamiphos	1,2	2.4	--	3,0	4,0	--
FMC 35001	--	--	--	2,0	4,0	--
Oxamyl	--	--	--	2,0	3,0	4,0

listed in Table 1) and they were applied by hand to an area of 1 m^2 around the sucker and mother plant.

In experiment 1, nematicides were applied on 1978-01-12 with a repeat application on 1978-08-01. In experiment 2, treatments 1 - 10 were applied on 1978-08-01 and treatments 11 and 12 on 1978-11-08. In experiment 1 root samples were taken six mo. after the first application and five mo. after the second and in experiment 2 five mo. after the initial application. Samples were taken from both mats within a plot by digging a hole 30 cm deep adjacent to the mother plant and sucker. The exposed roots from both holes were combined in a single sample and a nematode extract was made by macerating 50 g of washed roots for 10 sec. in a blender and placing the roots in a mistifier for one day. Nematode numbers were counted on a Hawksley 1 ml slide and either 5% of the total extract or 100 nematodes were counted per sample.

RESULTS AND DISCUSSION

The results indicate that significant differences in numbers of nematodes (p=0,001) existed between treatments in experiment 1 at the second sampling date (Fig. 1b) and in experiment 2 (Fig. 2). Numbers of nematodes extracted from the first root sample of experiment 1 (Fig. 1a) were low in all treatments (600 per 50 g of roots) and treatment differences were not significant. Jones (5) has shown that numbers of *H. multicinctus* decline from May, reaching a minimum population between July and September and that on red clay soils this minimum population was below 1000 per 50 g of roots. Thus the low numbers of nematodes present in this first (July) sampling of experiment 1 is due to this seasonal trend causing the small non-significant differences between treatment means.

The second treatment with nematicides in experiment 1 and the treatments of experiment 2 were applied in early August. In August, though overall numbers of

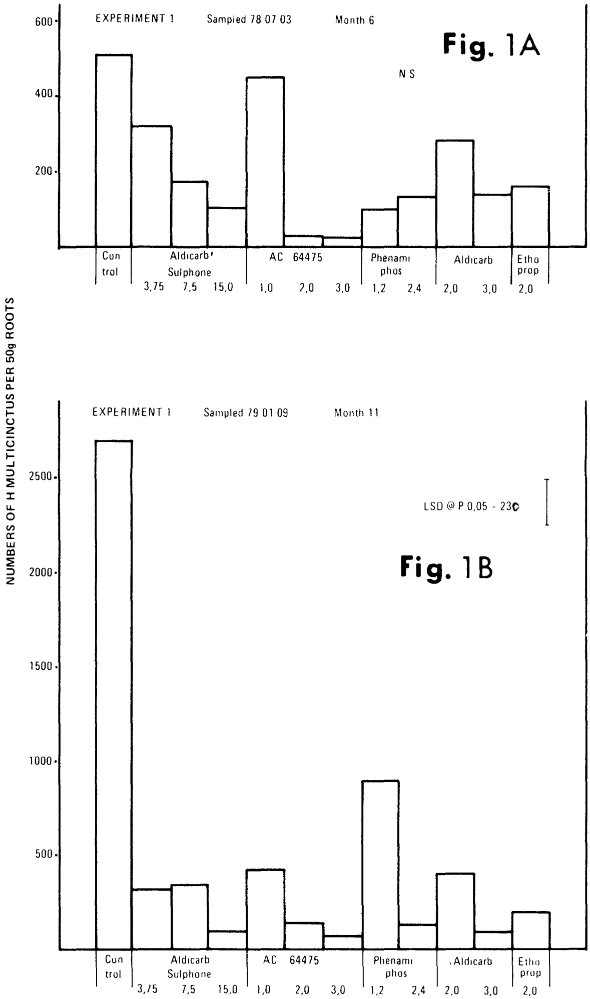

FIG. 1. Effect of nematicides on numbers of *H. multicinctus* in banana roots.

nematodes may still be declining, the percentage of adult nematodes has started to increase (5), indicating that development and hence nematode feeding has started. Thus nematicides were applied in August to correspond with the onset of feeding.

This application was highly effective and numbers of nematodes in all treatments were significantly below the numbers of control treatments. In addition, differences exist between nematicidal treatments such that optimal dose rates can be deduced from the results for each chemical. AC 64475 was the most active nematicide, with an optimal dose rate of 1,5 g a.i. per mat (= 1, 8 kg a.i. per ha), then ethoprop at 2,0 g a.i. per mat (=2,4 kg a.i. per ha), aldicarb at 2,5 g a.i. per mat (=3,0 kg a.i. per ha), oxamyl at

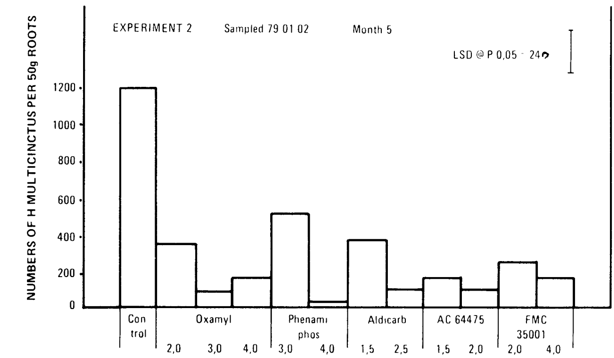

FIG. 2. Effect of nematicides on numbers of *H. multicinctus* (Exp. 2) in banana roots.

3,0 g a.i. per mat (=3,6 kg a.i. per ha) and aldicarb sulphone at 15 g a.i. per mat (= 18 kg a.i. per ha). Phenamiphos was erratic in reducing numbers in that 3,0 g a.i. per mat was the least effective treatment in experiment 2. In fact this erratic action of phemamiphos has been observed elsewhere (Jones, unpublished data) and it seems that it is not a suitable nematicide for use in red clay soils. FMC 35001 was only applied in experiment 2 in November 1978, and a fair comparative assessment with other nematicides cannot be made, but both dose rates reduced population below the control.

In conclusion, effective nematode control, at optimal dose rates, has been found for AC 64475, aldicarb, ethoprop and oxamyl and these rates will be further tested to demonstrate if yield increase of bananas results from effective nematode control.

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RESUMEN

Se aplicaron siete nematicides sistémicos a plátanos con *Helicotylenchus multicinctus* en dos pruebas. Después de períodos específicos, se tomaron muestras de raíces y se contaron las cantidades de nematodes. Se establecieron las proporciones de dosis óptimas para las substancias químicas. AC 64475 mostró ser la substancia química más activa, ofreciendo un control eficaz durante 5 meses a razón de 1,5 g i.a. por planta. El "ethoprop" a razón de 2,0 g, el "aldicarb" a razón de 2,5 g y el "oxamyl" a razón de 3,0 g i.a. por planta también ofrecieron un control eficaz. El "phenamiphos", tras aplicaciones simples de 2,4 g y de 3,0 g i.a. por plant, no resultó eficaz, pero una aplicación doble a razón de 2,4 g i.a. si fue eficaz.

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