NOTES ON TWO EXPERIMENTS WITH NEMATODE CONTROL IN SUGARCANE [NOTAS SOBRE DOS EXPERIMENTOS PARA EL CONTROL DE NEMATODOS EN CAÑA DE AZUCAR]. R. H. G. Harris, South African Sugar Association Experiment Station, P. O. Mount Edgecombe, 4300, North Coast, Natal, Republic of South Africa.

ABSTRACT

When DBCP, D-D and 2 formulations of EDB were applied at 34 liters, 303 liters and 101 kg active ingredient (ai) per ha respectively over the entire area, and at higher rates of 45 liters, 404 liters and 136 kg ai respectively, sugarcane yields were increased by fairly similar amounts in all instances. Injecting EDB into the soil at a depth of 38 cm appeared to give no advantage over injecting it at a depth of 23 cm. The reasons for the relatively poor responses obtained, including those due to treatment with aldicarb and filtercake (an organic by-product of sugar manufacture) are discussed.

INTRODUCTION

In South African sugarcane fields, yields were improved to an even greater extent when alkyl halide nematicides were concentrated in the base of the planting furrow or along the line where the furrow was later to be drawn, than they were when the chemicals were applied to the entire area before drawing furrows (3). This indicated that the rates of the applications over the whole area were probably too low to have given satisfactory control of plant-parasitic nematodes. Treating the entire area is preferable because: (a) it avoids leaving the furrows unplanted for at least 14 days following application , or (b) it avoids the practical difficulties of drawing the furrows along predetermined lines of application. Heavy full cover application might therefore be economically warranted.

Nematodes which damage the roots of sugarcane can occur at depths of at least 3 m (4). It was thought that an increase in the depth of application of fumigant nematicide might result in more effective nematode control and improved sugarcane growth.

The nematicide aldicarb (4) and filtercake (2), a by-product of sugar manufacture, are known to be effective against nematodes which attack the roots of sugarcane. It was therefore of interest to compare these 2 materials, and to establish whether or not their effects were cumulative.

Glasshouse experiments and laboratory tests indicated that filtercake direct from the mill reduced plant parasitic nematode numbers more effectively than did filtercake which had been dumped for 3 or 4 mos (1). A comparison of 'fresh' and 'old' filtercake in the field therefore seemed to be warranted.

The 2 experiments described here were designed to study these various factors. Both experiments were planted on Fernwood series soils (deep structureless grey sands of low clay content) infested with nematodes.

Both sites were very heavily infested with *Meloidogyne* sp. Other plant parasitic nematodes found were *Pratylenchus* sp., *Criconemoides* sp., *Trichodorus* sp., *Xiphinema* sp., and sporadically, *Tylenchorhynchus* sp. and *Rotylenchulus* sp.

MATERIALS AND METHODS

Exp. 1: Treatments Nos. 3 to 11 in the following list were applied by hand injector gun 22 days before planting. Injections were made on the intersections of the lines of a 30 cm square grid at a depth of 23 cm in all treatments except No. 11, where the depth was 38 cm. At the time of treatment the soil temperature was 22C and the moisture content was 7.5% at 23 cm.

The treatments applied were: 1 & 2. Control (untreated); 3. 1,3 dichloropropene - 1,2 dichloropropane (D-D). Rate: 303 liters/ha; 4. D-D. Rate: 404 liters/ha; 5. 1.2 dibromo-3-chloropropane (DBCP 80 EC). Rate: 34 liters/ha; 6. DBCP 80 EC. Rate: 45 liters/ha; 7. Ethylene dibromide (EDB) water miscible concentrate; Rate: 101 kg ai/ha; 8. EDB water miscible. Rate: 136 kg ai/ha; 9. EDB 4.5 in hydrocarbon diluent. Rate: 101 kg ai/ha; 10. EDB 4.5 in hydrocarbon diluent. Rate: 136 kg ai/ha; 11. EDB 4.5 in hydrocarbon diluent. Applied at 38 cm depth; Rate: 136 kg ai/ha; 12. 2-methyl-2-(methylthlio propionaldehyde *0*-(methyl-carbamoyl) oxime, (aldicarb). Rate: 56 kg/ha (6,7 g/m) of a 10% granular formulation applied in the furrow at planting.

The experimental design was a twice replicated reticulated lattice (12 x 4). Each plot was planted with 5 rows, 10 m long and spaced 1.2 m apart. To overcome a heavy weed infestation both sites were cultivated the day before planting. The area was ridged out and the experiment planted to variety N55/805 on 7th December 1971. It was harvested 588 days later. Exp. 2: The following treatments were made in the furrow at the time of planting: 1. Control (untreated); 2. 'Old' filtercake (60-70% moisture). Rate: 44 MT/ha; 3. 'Fresh' filtercake (60-70% moisture). Rate: 44 MT/ha; 4. Aldicarb 10% granule. Rate: 67.2 kg/ha (8 g/m); 5. Combination of Treatments 2 and 4; 6. Combination of Treatments 3 and 4.

The experiment was planted at the same time as Exp. 1 on an adjacent site. The variety was N55/805. The statistical design was a randomized block (6 x 6) replicated 3 times. Plots were the same size as those in Experiment 1.

RESULTS

Exp. 1

It was evident from observations in the field that all treatments had caused growth responses. Growth in the untreated controls was noticeably poorer. Using DBCP, D-D and EDB at higher rates had no marked beneficial effect on yields. There was no advantage in placing EDB at a greater depth. This was perhaps not surprising since a sandy soil fumigant nematicide placed at a depth of 23 cm was found to be active against nematodes to a depth of 2 m (Harris, in press).

In Table 2 it can be seen that the yields from the control plots were again the lowest, although the difference between yields from control and treated plots were not statistically significant. Growth differences were evident in the field at an early stage of growth but became less as the time of harvest approached.

DISCUSSION

The relatively good performance of DBCP is noteworthy because in other trials this nematicide has been erratic and disappointing in its effect when compared with aldicarb D-D or EDB. Cultivation of the site on the day before planting could explain the superior performance of DBCP. Because it is less volatile than either D-D or EDB, it lasts longer in the soil, and was probably still active and able to decrease the amount of nematode-inoculant carried from untreated to treated areas by cultivation.

TABLE 1 Yield results of Expt. 1

Treatment Number	Treatment		MT cane/ha
6	DBCP	45.0 liters	86.0
5	DBCP	34.0 liters	85.0
7	EDB water miscible	101.0 kg	84.0
11	EDB deep placement	136.0 kg	81.0
3	D-D	303.0 liters	80.0
4	D-D	404.0 liters	76.0
10	EDB in hydrocarbon diluent	136.0 kg	75.0
9	EDB in hydrocarbon diluent	101.0 kg	75.0
8	EDB water miscible	136.0 kg	75.0
12	Aldicarb 10%	67.2 kg	75.0
1	Control		69.0
2	Control		62.0
	LSD (0.05)		11.2
	(0.01)		15.0
	Coefficient of variation = 10.2%		

Expt. 2

TABLE 2 Yield results of Expt. 2

Treatment Number	Treatment	MT cane/ha
5	Aldicarb + 'old' filtercake	70.0
2	'Old' filtercake	68.0
4	Aldicarb	67.0
6	Aldicarb + 'fresh' filtercake	64.0
3	'Fresh' filtercake	61.0
1	Control	61.0
	LSD (0.05)	13.6
	(0.01)	19.1
	Coefficient of variation = 13.0%	

When compared with other trials and in particular those with aldicarb (4) the crop yields and growth responses to nematicide treatments were disappointing. Two factors which may have been responsible for this were: (a) an exceptionally dry and hot 10-week period following planting, when only about 80 mm of rain fell and, (b) a particularly heavy infestation of *Meloidogyne* sp. Although sugarcane had been grown at this site for a number of yrs, the heavy *Meloidogyne* sp. infestation was thought to have been caused originally by the cultivation of vegetables and sub-tropical fruit crops susceptible to root-knot nematode. *Meloidogyne* sp. was not adequately controlled by any of the treatments. Examination of roots from all plots as soon as 38 days after planting showed severe galling.

The rapid reinfestation rate may have been partly due to the reinoculation by cultivation. The problem was compounded by drought which prevented rapid and adequate root development immediately after the treatment when the populations of nematodes should have been relatively low. By the time the rains came the roots had already been severely damaged, and in autumn there followed a period of less favourable growth. The effectiveness of aldicarb which has performed well in other trials (4) was probably dissipated during the dry period.

Reasons for the small responses measured in Expt. 2 were probably the same climatic factors as those suggested for Expt. 1, and also because of the relatively small amounts of filtercake applied. From past results and experience it becomes apparent that if filtercake is to be used to control nematodes, quantities of at least 100 MT/ha must be applied in the furrow at planting.

Contrary to expectation the results suggest that the effects of 'old' filtercake were superior to those of 'fresh' filtercake. Differences between treatments were too small to suggest that there was any interaction between aldicarb and filtercake. In past experiments interactions between alkyl halide nematicides and filtercake were not apparent (2).

CONCLUSIONS

In sugarcane it appears that the effectiveness of nematicides can be severely impaired if growing conditions are unfavourable during the early stages of crop growth. Because nematicides offer protection for a limited period only, they should only be used when there is a reasonable assurance that the crop will get away to a good start.

RESUMEN

Cuando se aplicaron los nematicidas DBCP, D-D y dos formulaciones de EDB a razón de 34 litros, 303 litros y 101 kg del ingrediente activo (i.a.) por ha, respectivamente al voleo, y en dosis altas de 41 litros, 404 litros, y 136 kg i.a., respectivamente, los rendimientos de la caña de azúcar aumentaron al mismo nivel en todos los casos. No se apreció ventaja alguna al inyectar el EDB a una profundidad de 3 cm comparado con inyecciones a 23 cm. Se discuten las causas de los resultados relativamente bajas, especialmente de aquellos tratamientos con Aldicarb o cachaza.

LITERATURE CITED

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GENEROS DE NEMATODOS FITOPARASITOS ASOCIADOS AL CULTIVO DE AJONJOLI (*SESAMUM INDICUM* L.) EN VENEZUELA [PLANT PARASITIC NEMATODE GENERA ASSOCIATED WITH SESAME (*SESAMUM INDICUM* L.) IN VENEZUELA].

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RESUMEN

En un reconocimiento para nematodos realizado en siembras de ajonjolí (*Sesamum indicum* L.) en Venezuela, se analizaron 101 muestras representativas provenientes del Estado Portuguesa, la principal zona productora del país. Se encontraron 7 géneros de nematodos fitoparásitos, o los que se sospecha que pudieran actuar como tales, asociados con el cultivo. Los géneros *Criconemoides* y *Helicotylenchus* fueron encontrados en todas las muestras. Otros géneros encontrados fueron: *Tylenchus, Tylenchorhynchus, Aphelenchus, Psilenchus* y *Meloidogyne.* Estados juveniles de *Meloidogyne* fueron observados en una sola muestra.

INTRODUCCION

El ajonjolí (*Sesamum indicum* L.) en Venezuela integra el grupo de cultivos destinados a la obtención de sustancias oleaginosas usadas principalmente como aceites comestibles. Es una planta tropical, anual, que requiere temperaturas uniformemente elevadas; su exigencia de humedad es baja, sobre todo después del desarrollo de la planta. En el país muchas veces forma parte de un ciclo rotativo con el maíz (*Zea mays* L.) o en otras ocasiones con el arroz (*Oryza sativa* L.).

La principal zona de producción comercial en Venezuela está ubicada en Turén y sus alrededores, en el Estado Portuguesa. De esta región se obtiene alrededor del 92% de la cosecha del país. Se produce aproximadamente un poco más del 1% en el Estado Barinas y el 7% restante viene de los Estados Falcón, Apure, Cojedes y Guárico (1). Durante los últimos años el Fondo para el Desarrollo del Ajonjolí ha fomentado el estudio y la intensificación de este cultivo. Para el año 1973-74 fueron sembradas 165,000 ha con una producción de aproximadamente 75,500 TM (2). El objectivo de este trabajo fue determinar los nematodos fitoparásitos asociados con las siembras de ajonjolí en Venezuela a fin de constatar la existencia de expecies dañinas que pudieran ser factores determinantes en los rendimientos de este cultivo.