TRIALS WITH NEMATICIDES REGISTERED FOR USE ON SUGARCANE IN SOUTH AFRICA

By P. K. MOBERLY and M. ST. J. CLOWES **
South African Sugar Association Experiment Station, Mount Edgecombe

Abstract

Trials were conducted to compare the effects of the registered nematicides Temik 15G, Curaterr 10% G and Vydate L 24% on sugarcane grown on the recent sands of the Clansthal and Fernwood series soils of the Natal sugar-belt. Moderate responses to all three nematicides were obtained in most of the trials but the factors which influence the response are numerous and remain ill-defined. Vydate, which is registered only for ratoon cane, produced slightly smaller responses than Temik. The response to Curaterr tended to be less consistent and smaller than the response to Temik. The cost of Curaterr is lower per hectare than that of Temik and Vydate and the economics of nematicides are discussed. The influence of soil series on the response to Temik is substantial. In the weaker Fernwood series soil the response to nematicides was more predictable and greater than in the Clansthal series soil. Trials in which Temik was applied at various rates indicated that it could be more economical to reduce the registered rate of application. Earlier findings that the time of Temik application to ratoon crops after harvest is not critical were confirmed and ways of exploiting this are discussed. The effects of irrigation, filtercake, soil fumigation and varieties are discussed in the context of improving yields on the sandy soils where parasitic nematodes are a problem.

Introduction

The use of nematicides in the South African sugar industry is largely restricted to cane grown on the weak Fernwood or Clansthal series soils which occur primarily along the coast. These soils account for about 10 per cent of the total area of 350 00 ha currently under sugarcane in the Republic of South Africa.

Granular formulations of aldicarb (Temik 15G) and *Carbofuran (Curaterr (10% G) and a foliar spray of oxamyl (Vydate L 24%) are registered for use on sugarcane in South Africa. These three products are registered for use at the following rates of application :

Temik	20 kg/ha
Curaterr 10% G	30 kg/ha
Vydale L (24%)	12 *l*/ha

The granular formulations are registered for use on both plant and ratoon crops while Vydate L is registered for use on ratoon crops only.

Curaterr 10% (Robbertse[10]) and Vydate L (Richardson and Watt[8]) are reported to be as effective as Temik in South Africa when applied at the registered rates.

However in Fiji, Temik (15G) was more effective over the range 15-30 kg/ha than was *Furadan (3%) over the range 75-150 kg/ha (Narain and Krishnamurthi[7]). In Taiwan the best results were obtained with Counter† (10% G 30 kg/ha), followed by Temik (10G 30 kg/ha) and Furadan* (3% G 60-70 kg/ha) (Hu and Tsai[3]), while in Australia both Temik (15G 20 kg/ha) and Mocap‡ (10% G 60 kg/ha) have shown promise, but Temik gave superior results (Hitchcock[2]).

The objective of this paper is to evaluate results obtained using the registered nematicides and to discuss factors which may influence the efficacy of nematicides.

Materials and Methods

Trials were carried out on Fernwood and Clansthal series soils along the Natal and Zululand coast. A randomised block design was used in the trials and each treatment was replicated at least four times. Each gross plot was ten metres long and comprised five or six rows of cane spaced 1,0 m to 1,4 m apart. The three or four central rows, excluding a metre removed from the end of each row, comprised the net plot in which growth measurements were made and from which harvest results were obtained.

Variety N55/805 was used in most trials, while varieties N8, NCo 376, NCo 293, NCo 339 and NCo 382 were used in the remaining trials. The cane was fertilized according to the recommendations of the Fertilizer Advisory Service of the South African Sugar Association Experiment Station.

The granular nematicides Temik 15G and Curaterr 10% were placed in the furrow at planting or, in the case of ratoon cane, placed in a five to 10 cm deep furrow as close to the cane row as possible and covered with soil. The nematicide Vydate L was applied to the cane foliage using a Cooper Pegler (CP3) knapsack sprayer with a hand operated piston pump working at 100 kPa. In the initial trials a grey Desmarquest nozzle and a 0,15 swirl plate were used to deliver 25 ml/sec. At a walking speed of one metre per second the volume of spray solution applied varied from 180 *l*/ha at a 1,4 m row spacing to 250 *l*/ha at a 1,0 row spacing. Application in the more recent trials has been with a white Desmarquest nozzle and a 0,23 swirl plate. Operating at 100 kPa the volume of spray solution was increased to 300 *l*/ha at a 1,4 m row spacing and to 420 *l*/ha at a 1,0 row spacing. This change was made to produce larger droplets and thus reduce drift. Vydate L was applied when cane was in the six to eight leaf stage which is usually reached about two months after harvest.

The registered rates of application of nematicide were normally used in the trials but different rates were included in the most recent trials.

A methyl bromide soil fumigation treatment prior to planting was included in a few of the trials. Canisters of methyl bromide (Dowfume MC2 680 g containing 98% methyl bromide) were detonated under plastic sheets covering a 10 m x 10 m area. A 150 mm deep furrow around the edge of the plot was used to bury the edge of the sheet so that the methyl bromide gas would be retained under the plastic sheet after the detonation of the canisters.

Results and Discussions

1. *Temik versus Curaterr*

Comparisons between the effects of these two nematicides at the registered rates were made on ten different sites and the results from 21 crops are expressed in tons of estimated recoverable sugar per hectare (tons ers/ha)§ in Table 1.

* Curaterr and Furadan are trade names for Carbofuran.
† Counter is the trade name for terbufos.
‡ Mocap is the trade name for prophos.

§ ers % cane = sucrose % cane − 0,485 (moisture % cane) − 0,056 (fibre % cane).

** Present Address : Coffee Growers Association, P.O. Bov 4382, Salisbury, Zimbabwe.

TABLE 1
Results of experiments when Temik and Curaterr were applied at the registered rates

Trial	Crop	Site	Soil			Yield in tons ers/ha				Curaterr cf control at 100
			Series	Clay %	pH	Control	Temik	Temik cf control at 100	Curaterr	
NT2	1R	Umhlanga	Clansthal	7	8,7	15,0	15,4	103	15,2	101
	2R	Umhlanga	Clansthal	7	8,7	15,2	15,9	103	14,9	98
NT4	1R	Umhlanga	Fernwood	6	8,6	10,6	12,1	114	10,4	98
	2R	Umhlanga	Fernwood	6	8,6	8,1	8,6	106	8,4	104
NT12	2R	Umhlanga	Fernwood	5	8,4	11,2	13,0*	116	12,0	107
	3R	Umhlanga	Fernwood	5	8,4	8,9	9,4	106	8,7	98
	4R	Umhlanga	Fernwood	5	8,4	12,5	12,4	99	12,9	103
NT15	1R	Tongaat	Fernwood	6	5,2	13,2	12,8	97	12,3	93
	2R	Tongaat	Fernwood	6	5,2	10,0	12,2*	122	11,1	111
	3R	Tongaat	Fernwood	6	5,2	6,0	5,7	95	6,3	105
NT16	P1	Tongaat	Fernwood	6	5,2	10,3	12,4*	120	12,3*	119
	1R	Tongaat	Fernwood	6	5,2	11,0	11,2	102	11,3	103
	2R	Tongaat	Fernwood	6	5,2	10,5	10,6	100	10,0	94
	3R	Tongaat	Fernwood	6	5,2	7,1	7,4	104	6,9	97
NT17	P1	Umhloti	Fernwood	6	8,6	6,8	8,6	126	8,0	108
	1R	Umhloti	Fernwood	6	8,6	6,2	7,1	115	7,0	113
	2R	Umhloti	Fernwood	6	8,6	6,5	7,1	109	7,7	108
W.S.	3R	Margate	Fernwood	3	5,9	4,2	8,7*	207	9,0*	214
W.S.	4R	Illovo	Fernwood	5	6,2	3,7	8,4*	227	8,8*	238
NT18	P1	Mposa	Fernwood	2	6,2	5,4	6,7	124	5,1	94
NT3	3R	Empangeni	Fernwood	4	6,1	1,5	5,0*	333	1,7	113
		MEAN				8,75	10,03	115	9,52	109

* P = 0,05

TABLE 2
Result of experiments when Temik and Vydate L were applied at the registered rates

Trial	Crop	Site	Soil			Yield in tons ers/ha				Vydate cf control at 100
			Series	Clay %	pH	Control	Temik	Temik cf control at 100	Vydate	
NT 4	1R	Umhlanga	Fernwood	6	8,7	10,6	12,0*	113	10,1	95
NT 4	2R	Umhlanga	Fernwood	6	8,7	8,1	8,6	106	8,4	104
NT12	3R	Umhlanga	Fernwood	5	8,4	8,9	9,4*	106	9,5*	107
NT12	4R	Umhlanga	Fernwood	5	8,4	12,5	12,4	99	14,0	112
NT 2	2R	Umhlanga	Clansthal	7	8,7	15,2	15,9	105	16,0	105
NT15	1R	Tongaat	Fernwood	6	5,2	11,1	12,4*	112	12,0	108
NT15	2R	Tongaat	Fernwood	6	5,2	10,0	12,2*	122	11,1	111
NT15	3R	Tongaat	Fernwood	6	5,2	6,0	5,7	85	6,3	105
NT16	2R	Tongaat	Fernwood	6	5,2	10,6	10,6	100	10,0	94
NT16	3R	Tongeat	Fernwood	6	5,2	7,1	7,4	104	6,9	97
NT 3	3R	Empangeni	Fernwood	4	6,1	1,5	5,0*	333	4,9*	327
MEAN						9,23	10,14	110	9,92	107

* P = 0,05

With the exception of the trials at Empangeni, Illovo and Margate the average response to nematicides was not as large as had been reported earlier by Moberly, Harris and Millard[4], Rau and Moberly[7] and Rostron [11]. In only seven and three crops respectively did the response to Temik and Curaterr attain a level of statistical significance, largely because experiments conducted on recent sands generally have a high coefficient of variation for cane yield. The trends in the responses to treatments are therefore given consideration here.

The application of Temik resulted in a mean increase in yield of 1,28 tons ers/ha. The mean increase in yield from Curaterr was 0,77 tons ers/ha. The effect of Temik was

superior to that of Curaterr in 13 crops whilst the reverse was true in six crops. If the results from the trial NT3 were omitted because of the possibility of some phytotoxic effects, resulting from a double application of Sencor and diuron herbicide mixture, then the average response to Temik would be reduced from 15 to 13 per cent, whilst the average for Curaterr would still be nine per cent. There is a considerable difference between the two products in cost per hectare. The factors to be considered when assessing the economics of nematicides will be discusssed in a separate section.

2. *Temik versus Vydate L*

The two nematicides were compared in trials on six sites from which 11 crops were harvested. The yields expressed in tons ers/ha are presented in Table 2.

The response to nematicides in this series of trials was moderate. The mean response to Temik, 0,91 tons ers/ha, was not much greater than the mean response to Vydate, 0,69 tons ers/ha. Temik was slightly more effective than Vydate on seven crops and the reverse was true on four crops.

3. *Costs and economics*

The factors to be considered in an economic assessment of nematicides are numerous and complex. Apart from the direct costs of material and application, the costs of cutting and hauling the extra cane should also be included. In addition to the increase in sucrose yield, other advantages of using nematicides are a more rapid leaf canopy closure and a reduced weed problem, a thicker trash blanket resulting from a higher cane yield and, perhaps the most important factor, the likelihood that a higher level of crop production will be maintained, and therefore more ratoons will be obtained per planting.

The cost of nematicides depends on the quantities purchased but comparable costs per hectare are R125 for Temik, R90 for Curaterr and R120 for Vydate. The costs of the various methods of application to plant and ratoon crops are given in Table 3.

The method of application depends primarily on the presence or absence of a trash blanket. The mechanical applicator for granular nematicides through a trash blanket has not proved acceptable to cane growers; consequently Vydate L as a foliar spray is the logical choice of nematicide for trashed ratoons. A trash blanket conserves soil moisture, reduces soil erosion, suppresses weeds and increases cane yield on recent sands by about nine tons cane per hectare in an 18-month old crop. Trashing is therefore strongly recommended on sandy soils particularly on sloping land. When comparing the use of Vydate on trashed ratoons with the use of a granular nematicide on burnt ratoons the value of nine tons cane should therefore be credited to the Vydate treatment.

The responses to nematicides in this series of trials have been small (0,7 to 1,3 tons ers/ha) compared with the mean response of 4,0 tons ers/ha in 14 ratoon crops reported by Rau and Moberly[8]. It is considered that the abnormally low rainfall in the last two years has contributed to the comparatively poor responses, the value of which would nevertheless generally cover the cost of the chemicals used.

4. *Temik rates*

Table 4 is a summary of the results obtained from trials which were designed to test different rates of Temik on either Clansthal or Fernwood series soils.

It is clear that the response is greatest when Temik is applied to the weaker Fernwood series soil and that for both soils the shape of the response curve is curvilinear. Where the responses were profitable, results from half the number of trials showed that 10 kg per hectare was the most economical rate whilst the other half of the trials showed that the 20 kg per hectare is likely to be warranted. There has consequently been an application to change the Temik label to recommend a rate of 15 to 20 kg per hectare on ratoon crops and retain the rate of 20 kg per hectare for plant cane, where responses are frequently greater than in ratoons.

TABLE 3
The costs of various methods of applying nematicides

Type of nematicide	Crop	Method	Cost ha^{-1}
Granular	Plant	(i) Planter attachment ..	R0,50
		(ii) Wheelbarrow application	R2,50
	Ratoon:		
	Burnt	(i) Machine	R4,50
	Trashed	(i) Granular applicator trashed fields ..	R17,00
Foliar applied ..	Ratoon	(i) Knapsack	R2,50
		(ii) Tractor mounted boom sprayer ..	R3,50

TABLE 4
Summary of results from trials comparing different rates of Temik with control

Comparison	Number of trials		Comparative mean yields (tons ers/ha)				Number of trials where the value of the response did not cover the cost of the chemical
	Plant	ratoon	Control	10 kg	15 kg	20 kg	
1. *On Fernwood series soil*							
10 vs 15 kg	1	2	7,65	8,55 (2)*	8,65	—	1
10 vs 20 kg	2	5	7,62	9,50 (3)	—	9,97 (3)	1
15 vs 20 kg	1	2	7,65	—	8,65	9,25 (2)	1
2. *On Clansthal series soil*							
10 vs 15 kg	1	5	10,80	11,78 (2)	12,18 (2)	—	2
10 vs 20 kg	1	8	11,07	11,98 (3)	—	12,42 (3)	3
15 vs 20 kg	1	5	9,40	—	11,10 (2)	11,13 (1)	3
3. *Means — Both soils*							
10 vs 15 kg	2	7	9,22	10,16 (4)	10,42 (2)	—	3
10 vs 20 kg	3	13	9,34	10,74 (6)	—	11,20 (6)	4
15 vs 20 kg	2	7	8,52	—	9,88 (2)	10,19 (3)	4

* The figure in brackets indicates the number of trials in which the particular level of Temik was most economic.

5. *The influence of soils*

An examination of the results of all the trials conducted by the SASA Experiment Station using Temik on the wind-blown sands shows a substantially larger response to treating the Fernwood series soil than the Clansthal series soils. The criterion for classifying the soil into one series or the other was simply the mean clay content in the zero to 200 mm horizon. Soils with zero to six per cent clay were classified as Fernwood series and soils with seven to fifteen per cent clay as Clansthal series. The soil clay content at many of the trial sites was on the borderline (six to seven per cent) and so the division between series is not precise. However, the increase in mass of ers per hectare from treating with Temik in 69 formal experiments shows a clear trend which is demonstrated in Figure 1.

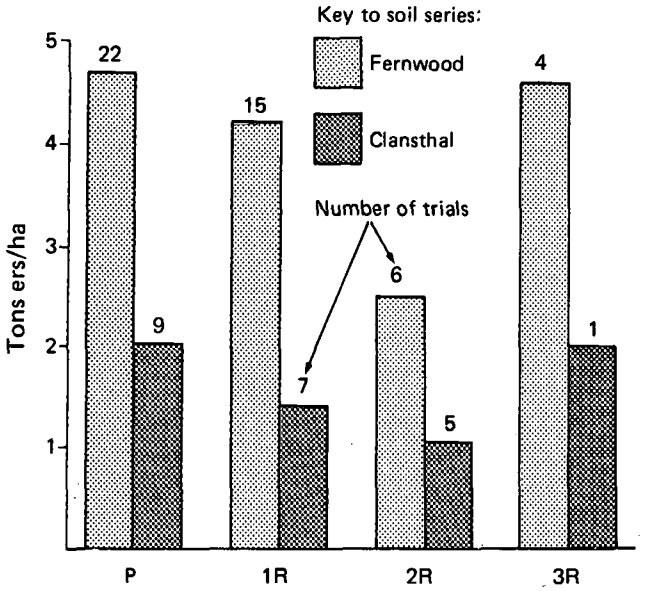

FIGURE 1 The mean increase in tons ers from applying Temik to plant and ratoon crops grown in Fernwood and Clansthal series soils. (The number of trial results from which the mean is derived is indicated).

The response to Temik on Fernwood series soils is generally twice as large as that from treatment on Clansthal series soils, but the mean response in all crops was above one ton ers per hectare, the value of which more than covers the cost of treatment. There was no consistent trend in terms of the degree of response in the different crops but the response in ratoon crops was never greater than that in the plant crop.

6. *Timing of granular nematicide application*

Results from earlier trials led Rostron[11] to conclude that there was no disadvantage under either wet or dry soil conditions, when the previous crop was cut in winter or in spring, in delaying the application of Temik by as long as nine weeks after harvesting the previous crop.

A series of trials to test this conclusion was recently established at Mposa, Tongaat, Noodsberg and Illovo. Cane from some of the trials has been harvested and the results are given in Table 5.

Because rainfall was extremely low the yields were poor but the response to Temik was substantial even when it was applied six months after harvest. Differences in response between the various times of application did not reach a level of statistical significance and a delay of about four months evidently did not reduce the efficacy of Temik applied to cane cut previously in May. Delayed treatment of cane cut in spring or summer seems, from growth measurements in current trials, to have an effect but because of the more rapid growth in summer, delays could not, for management reasons, be longer than eight to ten weeks.

The effectiveness of delayed applications of Temik may have important practical implications, particularly on the better Clansthal series soils. If the growing conditions after harvest are good and the previous crop was treated with a nematicide, then treating the new crop may not be warranted, whereas poor growth conditions after harvest may make treatment warranted.

By applying a nematicide to a few cane lines in the field shortly after harvest, one could assess the visual response within two months of harvest; if it is substantial then the whole field could be treated. On the poorer Fernwood series soils there should be no doubt about the benefits of treatment with a nematicide. Cane should be treated within about four and two months for cane cut previously in winter and summer respectively.

7. *The response of varieties to Temik and Curaterr*

On a Fernwood series soil at Empangeni the responses of five varieties to treatment with Temik were tested in the plant and first ratoon crops, whilst in the second ratoon the response to Temik and Curaterr of previously treated or untreated cane was measured.

The three varieties NCo 382, N55/805 and N8, normally accepted as being suited to sandy soils were included; NCo 339 (although a carrier of mosaic) was suggested by the co-operator and NCo 376 was used as a standard. The yields in tons ers per hectare are shown in Table 6.

All the varieties responded markedly to Temik in the plant and first ratoon crops and there was a statistically significant interaction between variety and Temik; variety NCo 339 responded the most whilst N8 responded the least; although the response was nevertheless substantial. Yields from the untreated control plots were extremely low in the first ratoon crop and in the subsequent crop the ability of Temik or Curaterr to rejuvenate poor growth was tested. Both nematicides were extremely effective in restoring yields to a reasonable level. The marked reduction in the co-efficient of variation per cent shown for the plant and first ratoon crops where Temik was applied indicates the extent to which yield variability is reduced by the use of nematicides. When the yields from the three crops are totalled the performance of N8, NCo 339, N55/805 and NCo 376 were similar whilst NCo 382 gave the lowest yield. On an adjacent site a trial with three replications of NCo 382, N55/805 and N8, all treated regularly with Temik, resulted in very similar yields being obtained from all three varieties (Table 7).

TABLE 5

The effects of delayed application of Temik to cane growing in Fernwood series soil when the previous crop was cut in May

Site	Treatment	Delay in weeks	tons cane per ha	
Mposa	No Temik	—	31	LSD (P = 0,05) 13,9
	Temik	0	59	
	Temik	8	52	
	Temik	18	65	
Mposa	No Temik	—	42	LSD (P = 0,05) 19,3
	Temik	18	77	
	Temik	22	64	
	Temik	26	61	
Tongaat	No Temik	—	26	LSD (P = 0,05) 10,9
	Temik	0	56	
	Temik	8	48	
	Temik	16	49	

TABLE 6
Yields in tons ers/ha from a variety × nematicide trial on a Fernwood soil at Empangeni

Variety	Plant crop		1st ratoon		2nd ratoon			
					No temik on P and 1R crops		Temik on P and 1R crops	
	No Temik	Temik 20 kg/ha	No Temik	Temik 20 kg/ha	Temik 20 kg/ha	Curaterr 30 kg/ha	Temik 20 kg/ha	Curaterr 30 kg/ha
NCo 376 ..	8,4	14,5	2,9	7,1	9,8	7,3	8,8	8,9
N55/805	9,0	15,3	2,5	6,9	9,8	9,0	8,9	8,1
NCo 382 ..	6,8	12,7	2,7	5,5	7,6	8,0	7,9	6,5
NCo 339 ..	6,5	14,9	2,4	8,2	7,8	8,2	8,6	9,8
N8	9,8	14,5	5,1	8,4	9,1	8,6	8,6	7,3
Mean	8,1	14,4	3,1	7,2	8,8	8,2	8,6	8,1

TABLE 7
Yield data from the plant and three ratoon crops of varieties N55/805, NCo 382 and N8 treated with Temik (3 replications)

Crop	Age at harvest	Variety	Tons cane ha^{-1}	Ers % cane	Tons ers ha^{-1}
Plant	12,4 months	N55/805	67	12,6	8,4
		NCo 382	92	10,2	9,3
		N8	73	11,1	8,1
1st ratoon	11,7 months	N55/805	104	13,7	14,3
		NCo 382	120	13,1	15,7
		N8	121	12,6	15,3
2nd ratoon	18,0 months	N55/805	106	15,4	16,3
		NCo 382	109	13,9	15,1
		N8	129	12,1	15,5
3rd ratoon	16,4 months	N55/805	49	14,5	5,9 (44,9)*
		NCo 382	41	11,1	4,5 (44,6)
		N8	47	12,9	6,0 (44,9)

* total yield all crops in brackets

TABLE 8
Harvest data from a 16,5 month old plant crop of NCo 376 and N8 growing on a particularly weak (2% clay) Fernwood soil at Mposa

Treatment	Variety					
	N8			Nco 376		
	Tons cane ha^{-1}	Ers % cane	Tons ers ha^{-1}	Tons cane ha^{-1}	Ers % cane	Tons ers ha^{-1}
Control	54	10,2	5,4	24	8,2	2,0
Temik 20 kg/ha	64	10,4	6,7	49	10,1	4,9
CV%	10,7	5,3	11,1	13,5	9,9	19,1
LSD (P = 0,05)	7,8	0,68	0,80	11,1	2,04	1,48

On a particularly weak Fernwood series soil (2% clay) at Mposa the response to Temik was smaller for N8 than for NCo 376 (Table 8). The yield of treated NCo 376 was lower than that of untreated N8. Under the conditions of poor rainfall and particularly weak sandy soils N8 is currently the best choice of variety despite its susceptibility to both smut and rust.

8. *Irrigation*

It has been established clearly that in the recent sands parasitic nematodes are one of the greatest growth limiting factors. There is nevertheless evidence that if adequate water could be applied to cane growing in the recent sands, the response is likely to be greater than the response from applying nematicides.

On the Fernwood sand on the Makatini Flats it was found (Anon[1]) that frequent irrigations (three to four day intervals in summer) were necessary to produce high cane yields and no response to treatment with Temik was recorded.

On a weak alluvial sandy soil (5% clay) at Glendale a five day irrigation cycle resulted in a cane yield of 6,3 tons per hectare per month and a relatively small (11%) response to nematicides where cane yields had been particularly poor in the past.

At Mposa, on a very weak Fernwood series soil a small plot of cane (10 by 10m) treated with Temik was irrigated with 20 mm water, initially every three to four days and later every seven days, and yielded 8,4 tons of cane per hectare per month. In the rainfed experiment adjacent to the irri-

gated plot, cane responded well to Temik but yielded only 3,9 tons cane per hectare per month.

On a relatively good Clansthal series soil at Hluhluwe an observation trial with drip irrigation was established in 1979. The two water regimes were intended to compare the effects of applying irrigation water equivalent to 1,0 (W1) and 0,75 (W2) of Class A pan evaporation.

Because of a lack of water due to the drought, considerably less water was applied than was intended, but the cane in treatment W1 received about 20% more water than that in W2. Temik was applied to some plots and not to others. N8 and NCo 376 were the varieties planted. Yields were exceptionally high despite the drought. NCo 376 outyielded N8 on this good soil by about 35%. The response to Temik was surprisingly large and once again was greater for NCo 376 than for N8. Of interest is the fact that under the drier regime (W2) the responses to Temik from NCo 376 and N8 were respectively 8,4 and 3,3 tons ers/ha whilst under the wetter regime (W1) the responses were 6,2 and 2,5 tons ers/ha respectively.

There is little doubt that the response to water, particularly through drip irrigation which can be applied frequently, would be far greater than that from nematicides on the coastal windblown sands.

9. *The effect of filtercake*

Results have been conflicting in respect of the effects of filtercake applied at the time of planting with Temik. Results from a trial on a Clansthal series soil at Tongaat (Moberly and Meyer[5]) showed that the efficacy of Temik was not affected when applied in the furrow with filtercake. On a very weak Fernwood series soil at Mposa there was no response when Temik and filtercake were applied together at planting, whereas Temik on its own resulted in a 19% yield increase. The cane in this trial suffered moisture stress and it is likely that under the very dry conditions experienced, filtercake aggravated the stress situation. Filtercake improves germination and increases tillering. If germination is followed by severe moisture stress, which may occur on very weak Fernwood series soil, the ultimate yield may be adversely affected by filtercake.

When planting cane on a weak Fernwood series soil variety N8 should be established with about 40 tons of filtercake per hectare. Unless severe dry conditions follow, a granular nematicide should be applied in a furrow adjacent to the cane row about two to three months later. In Clansthal series soils a nematicide at planting is considered preferable to filtercake as the effects of filtercake are comparatively short-lived.

10. *Soil fumigation*

Fumigating the recent sands with methyl bromide has resulted in dramatic increases and decreases in cane yield. On an akaline Clansthal series soil at Umhloti the application of methyl bromide at 266 kg/ha resulted in an ers yield of 13,0 tons/ha, compared with 8,6 tons/ha when Temik was applied at a rate of 20 kg/ha, and 6,8 tons/ha from the control plots in the plant crop. In the first ratoon the respective yields were 8,8 (residual methyl bromide) 7,1 (Temik re-applied) and 6,2 tons ers/ha. The residual response did not persist into the second ratoon crop. Fumigating a weak Fernwood series soil at Mposa resulted in a substantial yield depression of 35 tons cane per hectare which could have been the result of initial growth stimulation followed by a severe drought.

Conclusions

- The soil series and soil clay content are good indicators of the likelihood of a response to nematicides but an economic assessment of the use of nematicides should be done by the individual grower as has been described by Ringelman[9].
- The factors which cause a nematicide to be more or less effective than another are not clear. In this series of trials all nematicides were moderately effective and Temik tended to be more effective than Curaterr and slightly more effective than Vydate. Because of the many advantages of a trash blanket, it would be preferable to trash and use Vydate rather than to burn and use a granular nematicide.
- The response to nematicides is more consistent and likely to be greatest on a Fernwood and weaker Clansthal series soils.
- Because there is no disadvantage in delaying the application of a granular nematicide, a grower could apply test strips of a nematicide to determine whether a response is likely before deciding to treat the whole field.
- Economies can be made by reducing the rate of Temik to 15 kg/ha for ratoon crops grown in the Clansthal series soils containing more clay.
- At current prices an increase in yield of 5 to 6 tons cane per hectare is required to cover the nematicide costs.
- All varieties respond well to treatment with nematicides in the appropriate soils.
- Frequent irrigation of the weak sands is likely to produce far greater yields than treating rainfed cane with a nematicide.
- Under very dry conditions filtercake in the planting furrow may reduce the positive effects of a granular nematicide. Where filtercake is used when planting in a poor Fernwood series soil the nematicides should be applied two to three months later unless dry conditions prevail. In a Clansthal series soil a nematicide should be used in preference to filtercake.

Acknowledgements

It is a pleasure to acknowledge the willing assistance of the co-operators on whose farms and estates these experiments were carried out. Thanks are also due to members of the Agronomy department, especially Mr. K. Soobramoney for conscientious assistance in carrying out the trials, to the staff of the Chemistry department for cane analyses, and to the staff of the Biometry department for advice and for analysis of data.

REFERENCES

1. Anon (1980). SASA Experiment Station Report. Sugarcane production on the Makatini Flats.
2. Hitchcock, B. (1979). New chemicals for nematicide control in cane B.S.E.S. (Australia). *Cane Growers Quarterly Bull.* **42 :** 62-65.
3. Hu, C. and Tsai, T. (1978). Control of parasitic nematodes with Counter, Furadan and Temik and its effects on sugarcane yield. *Rep. Taiwan Sug. Res. Inst. No.* **81 :** 25-34.
4. Moberly, P. K., Harris, R. H. G. and Millard E. (1981). An investigation into the problem of poor sugarcane growth on some sandy soils of the Natal Sugar Belt. *ISSCT Proc* **17** (in press).

5. Moberly, P. K. and Meyer, J. H. (1978). Filtercake — a field and glasshouse evaluation. *SASTA Proc* **52**: 131-136.

6. Narain, T. and Krishnamurthi, M. (1980). The effects of nematicides and rainfall on the population densities of soil-borne nematodes in Fiji. *ISSCT Proc* **17** (in press).

7. Rau, S. and Moberly, P. K. (1973). Nematicide application to ratoon crops of sugarcane grown on some sandy soils of the Natal sugarbelt. *SASTA Proc* **47**: 171.

8. Richardson, F. E. and Watt, E. I. (1980). Foliar application of oxamyl to ratoon sugarcane for nematicide control. *ISSCT Proc* **17** (in press).

9. Ringelmann, E. H. (1980). The evaluation of nematicides on Mount Elias farm at Fawn Leas. *SASTA Proc* **54**: 158-160.

10. Robbertse, E. J. (1979). A new nematicide for use in sugarcane. *S. Afr. Sug. J.* **63**: p. 63.

11. Rostron, H. (1976). Rate, time and method of Temik application in ratoon sugarcane. *ISSCT Proc* **50**: 29-33.