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Your Ref.
Our Ref. PKM/GC/3.4.7/155

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

18th May, 1976.

Mr P. Turner,
S.A.S.A. Experiment Station,
P.O. MOUNT EDGECOMBE,
4300.

Dear Peter,

This is to confirm your membership of the South African Sugar Industry Agronomists' Association. As you already know, ours is an association which we try to keep as informal as possible. We have no written constitution and pay no fees. We operate under the auspices of the Experiment Station itself.

Our main objectives are to provide a forum for dialogue amongst the agronomists of the industry and to co-ordinate experimental work that is carried out at the Experiment Stations at Mount Edgecombe and in the Rhodesian lowveld, and on some estates. We meet once a year for a full day of discussion and try to have one or two activities of general interest during the remainder of the year.

We have been collating all of the available experiment results over the past ten years and so far seven Review Papers have been produced by members. Others will follow in due course. Reprints of the Reviews are enclosed for your interest.

A full set of the experiment results is kept at each estate in the industry and in the library at Mount Edgecombe, if you should wish to use them.

Yours sincerely,

Peter Nuttall

COMMITTEE CHAIRMAN

ENCLOSURE

SOUTH AFRICAN CANE GROWERS' ASSOCIATION G/474/76

ANALYSIS OF SECTION 3 (25,91Ha) JAN. 1975 TO JUNE 76

Operations.	Tractor Hours	Hours / Ha.	Materials etc. / Ha.	Man Days Mech, Ops	Man Days Man Ops	Man Days Total
LAND PREPARATION						
Cane slashing	124	4,8		4	10	14
General Clearing	353	13,6		-	996	996
Ploughing	347	13,4		57	-	57
Harrowing	296	11,4		49	-	49
Ripping	252	9,7		36	-	36
Land Dozing	223	8,6		40	-	40
Land levelling	200	7,7	(1)	32	-	32
SUB TOTAL	1 795	69,2	R 108	218	1 006	1 224
DRAINAGE, CONSERATION						
Waterway Construction	248	9,6		-	564	564
Inf[illegible]d Structures	408	15,7		-	83	83
Digging Drains	179	6,9		17	411	428
Carting Sand and Pipes	12	0,5		3	-	3
Back filling	94	3,6	(2)	-	-	-
SUB TOTAL	941	36,3	R 108	20	1 058	1 078
PLANTING						
Transport Seed Cane	4	0,2		-	128	128
Ridging	5	0,2		1	-	1
Planting (Fertilizing & Pre-emerg.)	134	5,2		-	117	117
Gapping	20	0,8	(3)	79	168	79
SUB TOTAL	163	6,4	R 150	80	413	493
MAINTENANCE, GENERAL						
Herbicide, Post-emerg.	90	3,5		13	124	137
Cane Salshing	16	0,6		4	10	14
Cultivation	56	2,2		10	72	82
Fertilizer, Side-Dressing	36	1,4		3	-	3
Road Maintenance	8	0,3		-	6	6
General	8	0,3	(4)	-	6	6
SUB TOTAL	214	8,3	R 114	30	218	248
BLOCK TOTAL	3 113	120,2	R 480	348	2 695	3 043

(1) Pro-rata Portion of Road Contractor Cost.

(2) Drainage Materials and Contractor Charges for Waterway Construction.

(3) Seed Cane Planting Application of Fertilizer and Pre-emergent Herbicide.

(4) Herbicide (Post-emergent) and Fertilizer Side Dressing.

SOUTH AFRICAN CANE GROWERS' ASSOCIATION

LA MERCY COSTS OVER EIGHTEEN MONTHS : JANUARY 1975 TO JUNE 1976 G/474/76

	Size Ha.	Mechanical Costs per Total Ha.				Labour Costs per Total Ha				Material Costs per Total Ha.									
Blocks	Ha. Planted / Ha. Total	Field Ops	Block Ops	Over-heads	Total	Field Ops	Block Ops	Over-heads	Total	Contra-ctors	Drain-age	Filter-Press	Herbicides Pre	Herbicides Post	Fertilizer Plant	Fertilizer Top Dr.	Seed Cane	Total	Block Total
		R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R
300	25,91 / 25,91	636	3	94	733	223	6	100	329	134	82	-	33	40	24	74	93	480	1 542
400	27,98 / 34,28	578	9	83	670	117	7	62	246	105	89	7	24	30	24	56	50	385	1 301
500	1,60 / 26,09	18	301	43	362	6	98	48	152	133	89	-	-	-	-	-	-	222	736
600	19,00 / 25,67	260	233	67	560	89	73	75	492	143	99	6	22	27	17	51	112	477	1 629

SUMMARY OF COSTS FOR BLOCK 300 (25,91 Ha) JANUARY 1975 TO JUNE 1976 G/474/76

Operations	Mechanical Costs per Ha.	Labour Costs per Ha.	Materials etc. per Ha.	Total Costs per Ha.	Percentage of Total
	R		R	R	
Development Land Preparation Cane Slashing	) 371	80) 24) 105 1,24)	) 108	) 584	38
Drainage and Conservation	195	76	108	379	25
Planting	42	30	150	222	14
Maintenance of crop and waterways	31	18	114	163	11
Overheads	94	100	-	194	12
TOTAL	733	329	480	1 542	100

SOUTH AFRICAN SUGAR INDUSTRY
AGRONOMISTS' ASSOCIATION

PROGRAMME FOR ANNUAL GENERAL MEETING 21 OCTOBER 1976

10.00	Chairman's Report General	
10.20	'The Use of Temik in ratoon crops' Dr. Harry Rostron	
10.40	'Equipment for applying Temik' Dr. Gerhard de Beer	
11.00	T E A	
11.20	'Some aspects of field application of herbicides' Stan Rau	
11.40	'Herbicide news items' Peter Turner	
11.45	'A new slant on the effects of the inevitable increase in burning' John Boyce	
12.30	L U N C H	
2.15	'Some field operation efficiencies from the La Mercy exercise' Neil Frean	
2.45	'A prognostication of the use of chemical ripeners in the industry' Dr. Harry Rostron	

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

A note on the use of Temik in ratoon crops

by

H. Rostron

Introduction

Ratoon crop responses to Temik have been reported in detail by Rau and Moberly (1975) and Rostron (1976). Large and statistically significant increases in cane and sugar yield, similar to those in plant crops, have been obtained in most experiments on problem sandy soils containing less than 10% clay. The objective of this short note is to summarise the main conclusions concerning the use of Temik and to bring members up to date with the results of experiments harvested recently.

Chemicals

Temik 15% granular material is the only systemic nematicide registered for use on sugarcane and is likely to remain so for some time to come. Two other products, Vydate as a liquid formulation and Curaterr, a 10% granule, are currently under test. One other nematicide, Miral, has not lived up to its earlier promise.

Time of Temik application after ratooning

Two experiments have just been harvested in which an attempt was made to determine the best time to treat a June ratooned crop. At Darnall, in a very low yielding crop there was a similar response of 21-29 tc/ha when the Temik was applied either as a single or as a split application, anytime between July and September. (Table 1).

Delaying treatment to October (4 months) gave a smaller response.

TABLE 1

Response of two June ratooned crops to delayed

Temik treatment

Temik 15G (20 kg/ha) applied	Tc/ha (a)	Tc/ha (b)	Ers% (a)	Ers% (b)	Ters/ha (a)	Ters/ha (b)
Control (actual)	40	108	15,1	14,9	6,0	16,0
July	+22	+12	+0,4	+0,3	+3,6	+2,2
July(10) + Sept(10)	+29	+10	+0,4	0,0	+4,7	+1,6
August	+21	+ 5	+0,6	+0,3	+3,7	+1,2
September	+28	+13*	+0,2	+0,6	+4,4	+2,7
October	+17	+10	+0,2	+0,5	+2,6	+2,1
Mean (July-Sept)	+25	+10	+0,4	+0,3	+4,1	+1,9
L.S.D.(0,05)	12,5	9,0	0,7	0,8	1,9	1,3
Cof V(%)	17,4	6,6	3,5	4,4	17,5	6,0

a) Darnall - harvested 18th August 1976

b) C.F.S. - harvested 15th October 1976

* A later September treatment applied immediately after 26 mm rainfall and before 83 mm, increased yield by +17 tc/ha or + 3,0 ters/ha. A second treatment applied immediately after the 83 mm rainfall had no effect on yield.

Despite high yields in untreated sugarcane at C.F.S. (Table 1) there was a statistically significant improvement in yield for all times of treatment except August, and for one September treatment (see footnote to Table 1). Of particular interest is the small but consistent improvement in Ers% following Temik treatment. This has been observed in many experiments and appears to be a real effect.

The highest yield responses occurred in two September treatments applied prior to between 83 and 109 mm of rainfall.

Similarly in a September ratooned crop in 1974 the best response was obtained where delayed treatments were applied just before a total of 136 mm of rain fell during one week. From these results it would seem that heavy rain following Temik application is, if anything, beneficial.

The results of these two experiment confirmed those detained at Tongaat in which there was no disadvantage in delaying Temik treatment of a July ratooned crop by six weeks.

In one crop ratooned at Natal estates in September 1974 there was a definite benefit from either delaying Temik treatment by up to 9 weeks or splitting the application (Figure 1). Results of weak sand experiments had also indicated that there was a slight benefit when Temik application to winter ratoons was delayed until spring. In the following crop on the same site at Natal Estates and also ratooned in September there was no response to Temik although some of the treatments were delayed by up to 12 weeks.

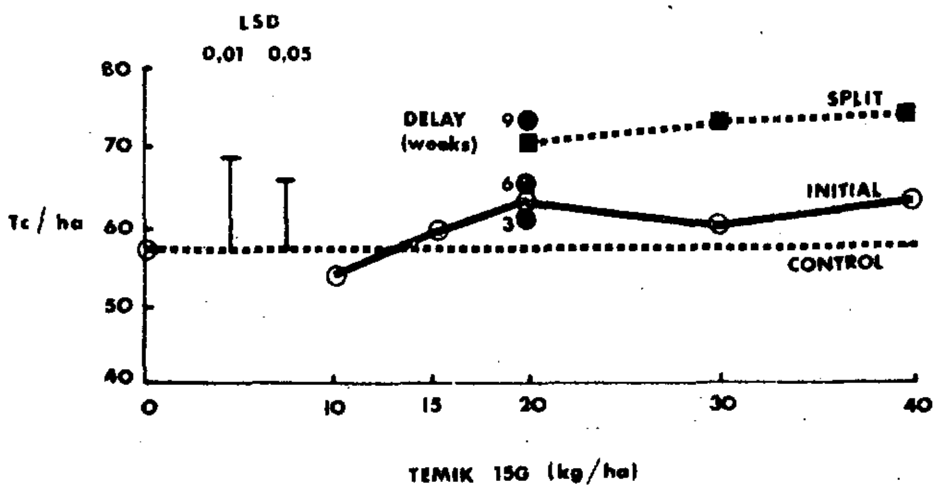

Figure 1 Rate, time and method of Temik application in a September, 1974 ratooned crop at Natal Estates

Rate of Temik application

Results from all experiments in which rates of Temik have been compared are given in Table 2. In none of the experiments has there been a statistically significant increase in yield above the lowest rate of Temik applied, which in some experiments was as low as 10 or 15 kg/ha of Temik 15G. In some instances there appear to be small increases in yield above a rate of 15 kg/ha but these are no greater than the apparent variations in response from experiment to experiment, from season to season on the same site, or even within an experiment where variations due to rainfall or method of Temik application have been observed. The evidence at present available therefore indicates that the rate of Temik for ratoon crops could be reduced from 20 to 15 kg/ha.

TABLE 2

Ratoon crop responses to rates of Temik (ters/ha)

Temik 15G (kg/ha)	Ratooned						
	July '73 W. Sands	July '74 (Padget)	Aug. '74 (Padget)	Sept.* '74 (Natal Est.)	October '74	Oct. '74 (Padget)	October '75 (Natal Est.)
Control (actual)	a) 6,2 b) 7,1	5,1	6,3	6,5	12,2	10,5	9,2
10**	-	-	-	-	-	$0,1^{NS}$	-
10	-	-	3,1	$-0,2^{NS}$	$1,6^{NS}$	$1,4^{NS}$	$+0,4^{NS}$
15	-	-	-	$0,9^{NS}$	2,5	-	-
20**	-	-	3,6	-	-	$1,0^{NS}$	-
20	a) 3,9	2,6	2,5	$0,9^{NS}$	2,4	$1,2^{NS}$	$-0,1^{NS}$
	b) 4,9	2,9					
30	-	-	4,2	$1,3^{NS}$	2,1	-	-
15 + 15	-	-	-	3,0	-	-	-
37	a) 5,0	-	-	-	-	-	-
	b) 5,9	-	-	-	-	-	-
40	-	3,8	-	$1,7^{NS}$	2,7	-	-
20 + 20	-	-	-	2,8	-	-	-

* Delayed applications of 20 kg/ha gave significant increases in yield
** *Applied to one side of row only*
NS Not statistically significant
a) Ellingham
b) Brand

Splitting Temik applications

In the only experiment in which there was a statistically significant improvement in yield from splitting the Temik application into two parts (Fig. 1) it is possible that the effect was due to delaying part of the application rather than the effect of splitting *per se*. In other experiments (e.g. Table 1) splitting has had no effect. In general, there appears to be no advantage in applying Temik to a crop on more than one occasion. An experiment at Mr Poynton's farm is at present investigating the effect of split Temik treatments on a very poor Fernwood sand.

Temik placement

At the presently recommended rate of application of 20 kg/ha results have been similar whether one or both sides of the row were treated. However, there was possibly some advantage in treating both sides of the row when the rate was reduced to the low rate of 10 kg/ha (Table 2). Therefore, if the rate of application was reduced from 20 to 15 kg/ha it would be advisable to treat both sides of the row wherever this was possible.

Omitting treatment of one crop

There was an average residual response in the first ratoon crop of 10 tc/ha to treatment of the plant crop in eight weak sand experiments but where Temik was reapplied in the first ratoon the yield was increased by 24 tc/ha above untreated plots. Therefore, where Temik is required, every crop should be treated.

When Temik was reapplied in one experiment to the second ratoon crop of plots that had received Temik in the plant crop but not in the first ratoon they still yielded 17 tc/ha less than plots that were treated in every crop. The yield difference over three crops between treating every crop and not treating the first ratoon was a total of 40 tc/ha, confirming the need to treat every crop.

Treating crops for the first time in the second ratoon

There was a remarkable recovery in five experiments in plots in which no Temik was applied until the second ratoon crop. The extent of the recovery is shown in Table 3 where the average yield of second ratoon crops that had received Temik as plant, first and second ratoon crops was only 5 tc/ha or 0,8 ters/ha higher than where Temik was applied to the second ratoon only. In fields where the stool population has not declined too seriously because of nematode damage, Temik application will increase yields significantly, and replanting can be delayed.

TABLE 3

The response of second ratoon crops to two Temik treatments

Experiment	Treatment A* Cane yield (Tc/ha)	Response (Treatment B - A)*		
		Tc/ha	Ers % c	Ters/ha
Grant	59	+ 6	0	+ 1,0
Starr	94	+ 3	0	+ 0,3
Chennels	66	+ 8	+ 0,2	+ 1,6
Ellingham	39	+ 5	+ 0,5	+ 0,2
Ocean View	70	+ 2	0	+ 0,8
Mean	66	+ 5	+ 0,1	+ 0,8

* Treatment A : 26 kg/ha Temik 15G applied to the 2nd ratoon crop only.

Treatment B : 37 kg/ha Temik 15G applied to both plant and first ratoon crops plus 26 kg/ha to the second ratoon crop.

Conclusions

The timing of Temik application to ratoon crops is generally not critical within a three month period but under some, as yet undefined conditions there may be some advantage in delaying application by at least six weeks. Variations in the response to Temik within experiments, from experiment to experiment, and from season to season on the same site, appear to be greater than differences between 15 and 20 kg/ha rates of Temik application. Therefore for all practical purposes the rate of application could be reduced to 15 kg/ha. Where nematodes are a problem all crops should be treated with Temik, preferably on both sides of the row. It is possible to rejuvenate low yielding crops with Temik, providing that they have an adequate, uniform stool population per hectare.

References

1. Rau, S. and Moberly, P.K. (1975) Nematicide application to ratoon crops of sugarcane grown on some sandy soils of the Natal Sugar Belt. SASTA Proc. 49: 171-173.

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

HR/AW

20th October 1976

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

TEMIK APPLICATORS

A. For plant cane or burnt ratoons

1. Gandy

Single unit sells for : R50.00
Two units as a sett : R95.00
Electric drive :R120.00

Agents : UNION WEED KILLERS, PINETOWN
Tel. 727897 (Mr P. Gibbs)

Comments: Each bin has a double outlet and two bins, driven by one electric motor, can thus deliver four streams of nematicide. In the past stainless steel rotors were used, this is to be replaced by neoprene rotors.

The units with motor can be mounted on a ridger for applying Temik at planting or to a toolbar with tines for ratoons.

2. John Deere

Two units sell for R155.00

Agents : MECHANIZED AGRICULTURAL SUPPLIERS, GREYTOWN
Tel. 567. (Mr Lyle).

Comments: These units are usually attached to maize planters and driven by a land wheel. For Temik application, a drive consisting of landwheel, sprockets and chain will have to be improvised. Drive from a landspeed PTO is also possible.

3. Microband

Single unit sells for R96.50.
Two units with landwheel on frame R250.00.

Agents : MULTISPRAY, HALFWAY HOUSE.
Tel. 011-8052091 (Mr Prozesky)

Comments: These units are based on earlier 'Horstine' applicators. Nylon rotors are now being used. One or two outlets are available from each applicator. Drive is from a landwheel via a V-belt, or much better, a chain. The agents claim that application by these units is not affected by speed due to its positive metering mechanism.

4. Horstine

Farmer's Organization has a number of these units in stock but will in future, rather sell the 'Sequip' applicator.

5. Sequip

Price per unit :	R195
Extra for barrow fitment :	R 50
Extra for toolbar, land wheel and tine:	R140

Agents : FARMER'S ORGANIZATION, DURBAN
(Mr B. Edwards)

This is a more sophisticated unit than the other makes listed above. Calibration is more precise and convenient.

B. For trashed ratoons

Development of a complete unit to apply Temik to one or two rows of trashed ratoons is progressing well. Delville Engineering, with sponsorship from Union Carbide and in co-operation with the Experiment Station, has a workable model which operates quite well but is rather heavy and cumbersome. The Experiment Station has a lighter, simpler prototype which also works very well. These machines must now be tested to establish the life of the cutting blades used in opening the trash.

AGdeB/AW

19th October 1976

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

SOME ASPECTS OF FIELD APPLICATION OF HERBICIDES

BY S. RAU

THE NATAL ESTATES LIMITED

Chemical weed control is highly dependant on the effectiveness of the field operator. The selection of herbicides to suit a particular weed spectrum and the control of the mixing process appear to be the key features of chemical weed control. However, the grower who is honest in his evaluation of herbicide non performance will, in many instances, find that poor field application was to blame.

A brief resume of some of the problems associated with, and possibly a few answers to, field application of herbicides, are presented below.

Sources of error in field application

(a) Lack of understanding of the importance of herbicides by both the grower and the operator.

(b) Lack of motivation of the operator (compared to the cane cutter).

(c) Difficulty in applying a set task to the job.

(d) Varying herbicide gang.

(e) Incorrect calibration of the application equipment.

(f) Tendancy to overspray weedy patches when spraying by hand.

(g) Incorrect height and positioning of the spray nozzle over the inter-row.

Means of improving the efficiency of field application

(1) A regular training programme where operators are led to appreciate the importance of their job - attain a sense of importance (provided with hand-out caps).

(2) Establishment of a permanent herbicide gang.

(3) Motivate the gang supervisor. Encourage inter-gang competition.

(4) Improved herbicide spray equipment

- (i) Wheel barrow sprayer
- (ii) Knapsack fitted with wheeled lance
- (iii) Illovo timing device.

(5) Maximum use of the tractor mounted sprayer.

Possible improvements for the future

(a) Metering device for knapsack sprayers; pay operators along the lines of cane cutters.

(b) Compressed air canisters fitted to the knapsacks to relieve the work load of the operator and improve his accuracy and output. (Large estates only?)

1/10/76

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

HERBICIDE NEWS ITEMS

P.E.T. TURNER

1. Herbicides Recently Registered

1.1 HERBICIDE : VELPAR K5

Company : E.I. Du Pont De Nemours
Components : Velpar + diuron (wettable powder formulation)
Registration : This is registered as a directed interrow spray in ratoon cane only, the registration being restricted in area pending further yield data and field observations.

Application : (a) Rate : 4,2[illegible] kg product/ha in 200-400 l water/ha.

(b) Timing : Pre- or early post-emergence of weeds.

Weed control efficacy: Excellent broadleaf control, good pre- and early post-emergence *Cyperus esculentus* control and good grass control including *Panicum maximum* (true pre-emergence or before the 2 leaf stage of growth). No control of *Cyperus rotundus* and little effect on *Sorghum verticilliflorum*.

Length of control : Pre-emergence : Broadleaf, grasses and *Cyperus esculentus* 8-12 weeks.

Early Post-emergence : Broadleaf, *Cyperus esculentus* and grasses ± 8 weeks.

Phytotoxicity : At higher rates it is phytotoxic to cane but acceptable at recommended rates in ratoon cane despite early chlorosis and slight stunting.

Price : ± R36/ha

1.2 HERBICIDE : PRIMEXTRA 500FW

Company : Ciba-Geigy (Pty) Ltd.,
Components : Dual + atrazine
Registration : Pre-emergence spray in plant and ratoon cane.

Application : (a) Rate : 6 l product/ha in 200-400 l water/ha.

(b) Timing : Pre-emergence of weeds only.

Weed control efficacy : Good broadleaf, grass (including *Panicum maximum*) and *Cyperus esculentus* control.

Length of control : Broadleaf + grasses ± 8 weeks
Cyperus esculentus ± 6 weeks.

Phytotoxicity : Can cause stunting but this does disappear with time.

Price : ± R36/ha

1.3 HERBICIDE : DESTUN 50WP

Company : 3M
Components : Perfluidone
Registration : As a pre-emergence spray in plant and ratoon cane in light sand to sandy clay loam (i.e. 35% clay) to be used alone or in combination with atrazine.

Application : (a) Rate : 5 kg product/ha alone OR
5 kg Destun + 1,25 kg atrazine 80 WP/ha OR
5 kg Destun + 2,0 l atrazine 500 FW/ha

(b) Timing : Pre-emergence of weeds only.

Weed control efficacy : Destun alone. Weak on broadleaf, fair on grasses but weak on Panicum maximum, and good on Cyperus esculentus.
With atrazine the broadleaf weed control is improved.

Length of control : Destun alone (a) Grasses ± 8 weeks
(b) Cyperus esculentus ± 10-12 weeks
Destun + atrazine Grasses + broadleaf ± 8 weeks
Cyperus esculentus ± 10-12 weeks.

Phytotoxicity : Alone and in combination with atrazine it does cause initial stunting of cane but this disappears with time. No chlorosis or necrosis is apparent at any stage.

Price : Destun alone R50/ha
Destun + atrazine ± R58/ha.

2. LOW VOLUME HERBICIDE APPLICATION

Herbicides in the S.A. Sugar Industry are currently only registered for application in 200-400 l water/ha.

The Micron Herbi distributed by Hortus Products (Pty) Ltd. is able to apply treatments at rates varying from 12 to 48 l/ha. With the obvious advantages involved in low volume applications, this sprayer has been tested with regard to weed control efficacy and drift. Further tests are envisaged.

Preliminary evaluation of the Micron Herbi has shown:

1. A constant spray swath within the normal height range above ground level, is obtained in calm conditions.

2. Drift, although not easily visible, does occur in that the swath remains intact but is moved by the wind at 3 km/hr.

3. Lower rates of certain herbicides may give the same weed control as standard rates used in the lever operated knapsack. This does however, vary depending on the herbicide.

3. ROGUING GLOVE

1) Certainly not robust enough for roguing sugarcane.

2) The practicability of controlling tall grasses e.g. *Sorghum* and *Panicum* spp. by means of the glove has not yet been seriously tested.

PETT/SN
18th October, 1976.

SOUTH AFRICAN SUGAR ASSOCIATION

EXPERIMENT STATION

A SUMMARY OF RESULTS OF SOME TRASH EXPERIMENTS

Because there is no evidence of cane quality being affected differently by burning or trashing, results are presented in terms of tons cane per hectare. The length of crop varied considerably and for this reason all cane yields have been corrected to a standard 12 month cycle e.g. tons cane per hectare per annum.

1. B.T. 1 Rydalvale soil series, Mt. Edgecombe.
(Variety NCo 376)

Response to trash blanket in:

Ratoon	1	2	3	4	5	6	7	8	9	10	Mean
i) tc/ha/an	13,7	8,7	10,0	20,7	12,4	12,2	18,4	12,1	8,4	8,3	12,4
ii) %	19	15	14	57	30	30	32	23	15	8	23
iii) tc/ha/100 mm rainfall	1,5	0,9	1,0	2,7	1,8	1,7	1,5	1,2	1,1	0,8	1,4

2. B.T. 2 Waldene soil series : Shakas Kraal
(Variety NCo 376)

Response to trash blanket in:

Ratoon	1	2	3	4	Mean
i) tc/ha/an	2,8	10,1	8,9	2,4	6,1
ii) %	4	12	13	3	8
iii) tc/ha/100 mm rainfall	0,2	1,1	0,9	0,3	0,6
iv) tc/ha/an:					
16 t trash/ha	5,1	10,6	9,2	6,1	7,75
39 t trash/ha	4,9	8,4	9,1	1,0	5,85
56 t trash/ha	1,6	11,3	8,3	0,1	4,53

3. B.T.3 Waldene soil series : Shakas kraal
(Variety NCo 339)

3.1 Response to trash blanket in:

Ratoon	1	2	3	4	5	6	7	Mean
i) tc/ha/an	6,5	0,3	5,4	7,0	-2,6	8,9	9,5	5,0
ii) %	12	1	9	10	- 9	25	11	8
iii) tc/100 mm rainfall	0,6	0,0	0,5	0,7	-0,3	1,1	0,9	0,5

3.2 Response to burnt tops spread in:

Ratoon	1	2	3	4	5	6	7	Mean
i) tc/ha/an	2,9	2,1	4,7	3,1	5,8	6,4	7,7	4;7
ii) %	4	6	7	4	11	19	9	8
iii) tc/100 mm rainfall	0,3	0,2	0,5	0,3	0,7	0,8	0,7	0,5

4. AT 6 Trash/Basin listing Waldene soil series: Shakas Kraal (Variety N50/211)

4.1 Response to trash blanket in:

Ratoon	1	2	Mean
i) tc/ha/an	0	13	6,5
ii) %	0	28	14

4.2 Response to basin listing in:

Ratoon	1	2	Mean
i) tc/ha/an	2	8	5,0
ii) %	3	17	10

5. Run-off lysimeters : Waldene series soil : Shakas Kraal

(Using run-off lysimeters 8 m long with 6 rows x 1,4 m)

5.1 Run-off expressed as % rainfall lost during January-June, 1963 (254 mm total rainfall)

Trash blanket	Trash lined alternate rows	No trash
1,9	3,4	16,4

5.2 Run-off expressed as % rainfall lost during September-March 1963/64 (584 mm total rainfall)

Trash blanket	No trash
1,2	5,2

5.3 Run-off expressed as % rainfall lost during period October-January 1963/64 (383 mm total rainfall)

Trash blanket	Basin listed	No trash
0,1	0,1	2,9

Comments

1. The mean response to a trash blanket on a Rydalvale series soil is 12 tc/ha/an (24%) compared with 6 tc/ha/an (8%) on a Waldene series soil. The poor drainage characteristics of the Waldene series soil and the lower soil temperatures caused by a trash blanket are considered to be the reasons for a lower % response to trashing on the Waldene series compared with the % response on the Rydalvale series soil.

2. Yields on the Waldene series were higher, on average, than those on the Rydalvale series soil because of the greater number of ratoons in BT 1, and also because of an average lower fertilizer level in BT 1 than in the Waldene experiments.

3. The improved yields as a result of spreading burnt tops is virtually equal to the effect of a trash blanket. Soil temperature under a trash blanket will be lower than that under burnt tops. The reason for basin-listing being almost as advantageous as a trash blanket on Waldene series soil is probably for the same reason.

4. Taking the industrial average on well-drained soils as 60 tc/ha/an, the response to trash may be estimated as 14 tc/ha/an ($60 \times \frac{124}{100}$).
   On poorly drained soils giving 50 tc/ha/an it would be 4 tc/ha/an ($50 \times \frac{108}{100}$), giving an overall average of 9 tc/ha/an.

5. The response to trash vs burn is currently being determined in a trial on a Fernwood sand (Asphalt barrier).

6. The value of the trash blanket, lined trash, basin listing or tops spread will be greater for a crop cut late in the season, i.e. after November, when rainfall intensity is high, as indicated by the results of the run-off experiments.

PKM/MH/15.1.2/25
9.8.1976

SOUTH AFRICAN SUGAR INDUSTRY AGRONOMISTS' ASSOCIATION

A NEW SLANT ON THE EFFECTS OF THE INEVITABLE INCREASE IN BURNING

BY

J.P. BOYCE

1. INTRODUCTION

At the 1975 A.G.M. of the Agronomists Association, Dr. G.D. Thompson led discussion with a paper entitled "Some Notes on the Advantages and Disadvantages of Trashing and Burning". He started by outlining the advantages and disadvantages of trashing and showed that anti-pollution laws can become an overriding factor when considering the pros and cons of burning or trashing. He isolated the north, where most cane is burnt and can be harvested with Australian type mechanical harvesters. Referring to the south, he again isolated the Midlands, where most cane is burnt, although trashing may well be advantageous in the Midlands from October onwards. Finally concentrating on the Coast, he indicated that the industry was not exploiting the benefits of trashing for several reasons and he indicated that, with current trends, there would be an inevitable increase in burning, in the face of opposition from the anti-pollutionists.

2. A NEW SLANT

The purpose of this paper is to provide a new slant on the probable effects that this inevitable increase in burning could have on cane yield, weed control and soil erosion in particular. At the outset, it is submitted that burning will not be unduly harmful, providing that no yield losses occur, that weed control on burnt canefields is just as effective at no greater cost, and that adequate steps are taken to ensure that soil erosion does not increase as a result of burning. This conception of the effects of burning is in direct conflict with the traditional view that the majority of land on the coast must be trashed in order to prevent yield losses, to control weeds at lowest cost, and to prevent soil erosion.

Although it may seem as if we wish to "have our cake and eat it" so to speak, it must be admitted that there are conditions on the coast where trashing is, with current technology, absolutely essential. On the other hand, a search for the conditions and techniques whereby burning can be a standard policy on the coast, will surely show that a high percentage of the area under cane on the coast can, in fact, be burnt without adverse effects. In addition, having defined the limits of burning on the coast within the constraints of modern technology, it is not inconceivable that a research project could be established to challenge those limits. The problem of anti-pollution laws as an over-riding factor can also be minimised by selective burning as and when necessary.

3. THE ADVANTAGES OF BURNING

In order to appreciate the basis for the inevitability of burning increasing in the future, the advantages of burning must be analysed under a range of sub-headings. It should become evident that the major advantages fall under harvesting and weed control. These two operations are labour-intensive. This suggests that an overall policy of trashing is a barrier to labour productivity on the coast.

3,1 Harvesting

Because trashing reduces the output of manual harvesting labour by an amount dependent largely on the thoroughness of trashing, the average output of cutters can be improved by as much as one ton of cane per manday in burnt cane, compared with trashed cane. The long handled cane knife can also be introduced to improve output. Because it is much more difficult to harvest green cane mechanically than to harvest burnt cane mechanically, it is clear that trashing constitutes a barrier to mechanisation of this labour intensive operation. With rapidly rising wages and other costs associated with employment of large numbers of labourers, it is inevitable that mechanisation will become economically more and more attractive with time.

	Burnt	Trashed	Topping only.
Fibre %	13,4	14,9	16,0
Purity %	84,5	84,1	83,7
ERS %	11,2	10,6	10,3

T/ha	20,55	16,9	12,96
Pulp %	13,1	12,6	12,0
Fibre %	13,4	15,1	15,1
Purity %	86,6	85	83,9
ERS %	11,6	11,0	10,3
T/ha	18,58	17,15	15,29
Pulp %	12,4	12,5	11,8
Fibre %	16,8	16,5	18,2
Purity %	86,1	85,3	83,9
ERS %	10,8	10,9	10,0

In the field during the harvesting operation, it is easier to see stones and other obstructions during operations, particularly mechanised operations. In addition, harvest yields from trashed fields may be reduced to an extent due to the loss of cut and uncut stalks hidden within and beneath the trash blanket. With burning, this loss can be eliminated.

Since manual loading is normally part of the harvesting operation, it can be stated that loading of bundles is easier with burnt cane than with trashed cane and therefore output is affected. In addition, mechanical loading is much more likely to be economically viable with burnt cane than with trashed cane.

3,2 Infield Transport, Transshipment & Road Transport

It is well established that bundles are heavier with burnt cane than with trashed cane and that the costs of transportation are lower with burnt cane.

3,3 Factory Milling

It is well known that factory crushing rates are reduced by the trash content of trashed cane. In addition, the quality of trashed cane is poorer in terms of lower sucrose content, higher fibre content and higher purity. A limited amount of data has been collected to quantify these factors.

3,4 Weed Control

It is now known that certain chemical companies selling herbicides are convinced that burning on the coast is essential for good weed control. This attitude is apparently based on the assumption that an inadequate trash blanket and poor management will lead to the value of the yield response being lost through poor weed control. The trash layer is a barrier to chemical weed control because it precludes the use of pre-emergent herbicides for weed control and even post-emergent chemical weed control is more difficult with a trash layer. The trash layer also precludes mechanical cultivation on flat land as a low-cost method of weed control. The trash layer permits grasses, mainly panicum maximum, to reach a stage of growth at which currently available herbicides will not kill. This leads to an accumulation of areas infested by grasses which must be cultivated by hand.

In addition, ratooning will generally be better with burnt ratoons and this favours high populations of shoots in the row and rapid canopy formation which in turn permits the crop itself to compete against weed populations. There is no doubt that a trash layer suppresses the initial rate of weed growth but it is equally true that modern pre-emergent herbicides can do the same if not a better job. Furthermore, the trash layer tends to allow grasses to grow not only in the cane row, but also between the rows to a stage requiring hand labour for control. With burnt ratoons, the dense stand within the row and the bare soil between the row provides a better medium for good weed control.

3,5 Insect and Nematode Control

At the present time, the control of nematodes with Temik necessitates burning on sandy soils. In addition, the control of Eldana borer and trash grub is facilitated by burning.

3,6 Ratooning and Varieties

Because trashing provides lower soil temperatures than burning, ratoon growth may be significantly impaired under some conditions and in the case of certain varieties, ratooning may be completely suppressed. Burning may also be advantageous in very high yielding areas where the trash layer may suppress ratooning. In addition, burning is advantageous in wet valley bottoms where the combination of wet soil conditions and low temperatures can severely impair ratooning.

3,7 Drainage

The burning of low lying areas which tend to be poorly drained, particularly in winter, is advantageous. The bare soil allows the free movement of surface water and evaporation from bare soil assists in the drying process.

4. IS COMPENSATION FOR BURNING POSSIBLE?

4,1 Water Use Efficiency

Because a trash layer conserves water by reducing runoff and evaporation resulting in a yield increase of 10 tons cane per ha per annum, the obvious disadvantage of burning is that this yield improvement is lost. The attached results of burning and trashing experiments provide a measure of the disadvantage due to burning. Nevertheless, it must be borne in mind that this disadvantage due to burning takes place predominantly during the period of incomplete canopy, when evaporation and runoff from the soil surface is a significant component of evapotransporation. It could be suggested, however, that ratoons harvested in winter could be burnt without any loss of yield compared with a trashed ratoon? The answer to this question is perhaps available from experiments which have already been conducted?

Another question which must be answered is whether or not after harvesting a burnt crop, the relatively small amount of trash consisting of singed and unburnt tops, could be raked into every third, fourth or fifth inter-row to provide a barrier against runoff water and against part of the evaporation losses? The lines of trash will provide effective weed control without interfering with cane growth and can at the same time provide effective barriers against water movement causing soil erosion. Lining the trash in this way would also provide a complete bare surface between lines suitable for chemical weed control. The only real loss which is apparent is the evaporation taking place from the bare soil between the lines of trash. In this connection, it could be suggested that the losses due to evaporation would be more than compensated for by the advantages of burning. This may depend on the relative proportions of soil moisture lost from bare soil by runoff and evaporation?

Yet another concept is the possibility that leaving the tops spread uniformly after harvesting a burnt field would provide the same yield of cane as a trashed crop? The assumption is that the spread tops would result in the same yield of cane per hectare for the same reasons that lined trash and tops may do so.

4,2 Weed Control

It has been traditional to regard a trash layer as being highly valuable for weed control, because it suppresses the rate of growth of weeds and also provides effective weed control at low cost.

It has also been traditional to view the prospect of a large area of bare land on any farm as a severe liability for effective weed control. This conception of the disadvantage of burning, because of its effect on weed control, is based on the assumption that management and resources will not be adequate to control weeds on bare land. It is noteworthy that the usage of herbicides has recently expanded very rapidly and that the many cane growers now have the knowledge, the training and the equipment to control weeds effectively on bare land. There is some doubt however, whether or not the cane grower should favour trashing for good weed control, or burning for good weed control?

4,3 Soil Erosion

There is every likelihood that soil erosion will be greater on burnt ratoons, particularly on steep land and sandy soils. The extent to which this disadvantage of burning can be compensated for will depend largely upon slope and soil type.

On steep slopes with sandy soils which are highly erodible, it will probably be essential to trash at all times. However, with heavier soils and flatter land, the need for trashing reduces. In addition, there are certain principles of field layout which can be adopted to reduce soil erosion, in spite of the fact that ratoons are burnt. In particular, the use of large-scale strip cropping associated with farming on the contour rather than farming between crests and waterways, will greatly reduce the amount of land which is bare, on any slope. Depending on the amount and intensity of rainfall, the accumulation of runoff water and the velocity of this runoff water will depend on the length of slope, the soil type and the degree of the slope. Sound field layout in all other respects (e.g. steepness of roads), is also essential under such circumstances.

Soil erosion on burnt ratoons may also be reduced significantly by lining the trash specifically in order to provide a barrier against an accumulation of runoff water and the increasing velocity of runoff water.

Another feature of burning which will affect the degree of erosion is the rapid ratooning which takes place in burnt ratoons.

The high population of shoots in the row will assist in providing a barrier against an accumulation of runoff water and the velocity of runoff water. It must be taken for granted that at all times a vigorous healthy crop will be required.

It should be borne in mind that the erosion hazard will be worse in summer than in winter and that the need for trashing is therefore greater in summer than in winter.

The question must be posed then whether or not these measures will be enough to control soil erosion within acceptable limits on a large area of coastal caneland?

4,4 Other Disadvantages of Burning

The deterioration of the quality of cane is an important factor to be taken into account as a disadvantage of burning, because the rate of deterioration of burnt cane exceeds that of trashed cane. For example, where excessive areas are burnt, either by controlled burning or by accident, the loss of sugar due to burning can be very significant. What steps can be taken to avoid such losses?

Another disadvantage of burning is that cane breaks are required for controlled burning and labour is required to cut these breaks prior to burning. In addition, the very process of burning is a fire hazard in that large areas may be burnt accidentally. What steps can be taken to reduce the cost of burning and the hazards of controlled burning?

It is true that air pollution due to burning can be important in certain circumstances, particularly surrounding urban areas and public highways adjacent to fields being burnt. What steps can the cane grower who wishes to burn take to avoid this problem?

5. DEVELOPING NEW POLICIES FOR BURNING CANE

In spite of the so-called inevitability of the increase in burning on the coast of the Sugar Industry, it is essential to ensure that wherever burning takes place, the potential losses are neutralised by management. This implies that managers will have to identify the areas under cane which can and cannot be burnt in terms of current technology, because of inherent limitations imposed by the combination of soil type and the slope of the land. For the purposes of discussion, it could be proposed that all flat land with a slope of less than 12° can be burnt regardless of soil type? Similarly, it could be proposed that all slopes from 12° to 24° should not be burnt unless adequate measures have been taken to control runoff of water and unless the soil type is relatively non-erodible? Finally it could be proposed that on all very steep land, no burning whatsoever should take place?

Policies concerning slope and soil type could well be modified according to season. Under what conditions can burning take place in winter, but not in summer? It could be proposed that only flat land should be burnt in summer?

The extent to which burning can take place without loss of yield will also be dependent upon the efficiency of lined trash and tops in controlling runoff and evaporation of water. Leaving the tops and trash spread evenly may be just as effective.

As far as weed control on burnt ratoons is concerned, the question must be answered whether or not cane growers have the knowledge, skill and resources to control weeds effectively on bare land?

With regard to soil erosion which could be attributed to burning, field layout incorporating large-scale strip cropping and contour farming, and the lining of trash and tops to control runoff of excess water will both help under certain conditions. However, the limitations of these measures will need to be established in relation to slope, soil type and managerial competence.

19th October 1976

JPB/SC

SOUTH AFRICAN SUGAR INDUSTRY

AGRONOMISTS' ASSOCIATION

THE USE OF CHEMICAL RIPENERS IN THE SOUTH AFRICAN AND SWAZILAND SUGAR INDUSTRIES

by

H. Rostron

South African Sugar Association Experiment Station

SUMMARY

Commercial applications of Ethrel, at present the most promising chemical ripener available, to some 1 400 ha of variety NCo 376 in Swaziland in 1976 confirmed that chemical ripening can be profitably used during the first three months of the milling season. The use of Ethrel is recommended at this time of the year for immature, actively growing crops of sugarcane not suffering from moisture stress in the Eastern Transvaal, Swaziland, Pongola, Hluhluwe and Umfolozi areas.

Experiments indicate that chemical ripening should be profitable in all sugarcane areas whenever, and wherever, immature crops are harvested at the beginning of the milling season. Further experimental work is needed; firstly, to confirm these indications, particularly in the Midlands area of Natal; secondly, to determine the response to ripeners at the end of the season; and finally, to try to find a more effective ripener then Ethrel.

1. Introduction

Chemical ripeners are growth regulating compounds, which when applied by aeroplane to well-grown, immature sugarcane some 6 - 12 weeks before harvest at the beginning of the milling season, improve S% c and juice purity and increase yields by between 0,5 and 2,0 ters/ha. Good ripening responses and increases in sucrose (and sugar) yield have been obtained in field-scale experiments in Swaziland over a five year period, the results being assessed on milling returns (Figure 1). Poorly grown plants, or plants suffering from moisture stress at the time of spraying, are unlikely to respond as well as high yielding crops with a low sucrose content and a low juice purity.

Experiments carried out by the Experiment Station since 1968 indicate that under South African conditions there are four products that have a true ripening effect. At present Ethrel is the most promising product available and is registered by the Government for use as a sugarcane ripener. Approximately 1 400 ha were commercially sprayed with Ethrel in Swaziland in 1976 and the ripening responses were similar to those obtained previously in experiments. Polaris, which has given similar results to Ethrel, is widely used in other parts of the world but is more expensive than Ethrel. At the time of writing, Polaris at the required rate of 4,5 kg product per hectare would cost, even after a recent price reduction, about R55 per hectare compared with about R34 per hectare for 1,5 l Ethrel.

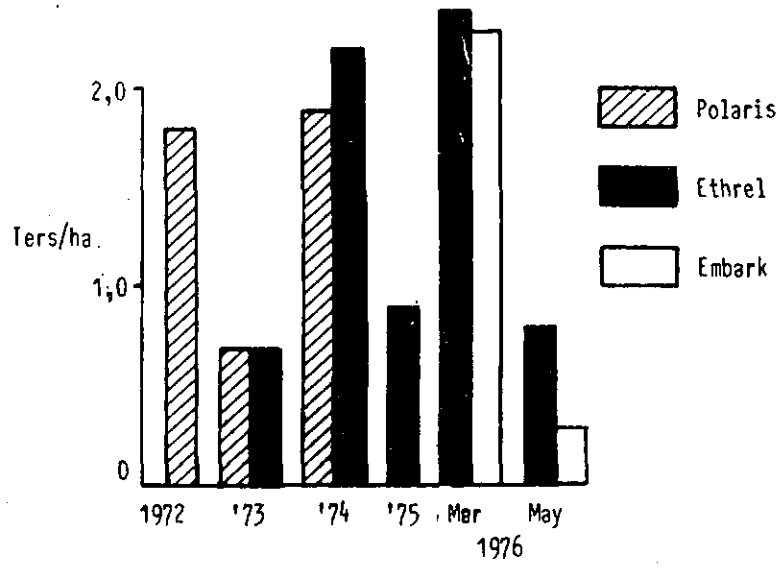

Fig. 1 Mill measurements of the increase in yield of NCo 376 following aerial application of ripeners in March (and May in 1976), 6 - 12 weeks before harvest.

An improved Ethrel formulation, Am 74/A382, and Embark, are two promising products in the early stages of investigation. Am 74/A382 appears to be twice as active as Ethrel whilst Embark appears to be as good as Ethrel when sprayed in March but may be less effective when applied either to naturally more mature cane in May (Figure 1), or to older cane in April (Figure 2). Further work will be necessary to determine the reasons for this apparent difference in the pattern of response of Embark.

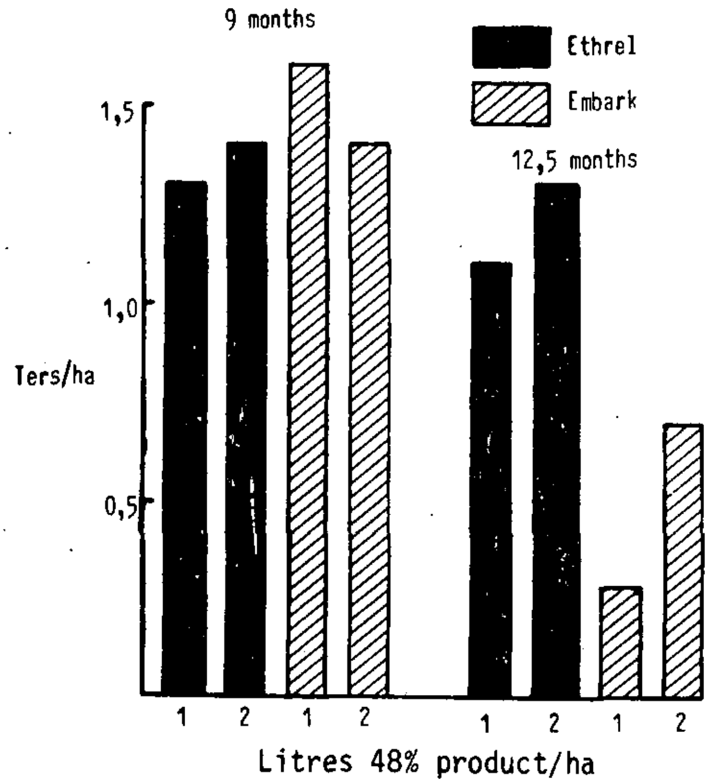

Fig. 2 The yield response to Ethrel and Embark of two different aged crops of NCo 376 sprayed at Chakas Kraal and sample harvested 12 weeks later.

Most ripening work has been carried out on variety NCo 376 but varieties NCo 334, N55/805 and L76 have been ripened successfully at the beginning of the milling season. In Malawi, good ripening responses have been obtained on variety NCo 310 with both Ethrel and Polaris.

The following discussion is based on the traditional May to December milling season. If mills were to open sooner this would mean that a greater amount of suitable sugarcane would be available for chemical ripening.

2. Start of the milling season (May to July)

2.1 Northern areas of the industry

Following the success of experiment station trials and commercial spraying at Tambankulu and Ubombo Ranches in 1976, these estates and Mhlume Sugar Company are proposing to use Ethrel commercially next year. There is also considerable interest in chemical ripening among growers in the Hluhluwe and Umfolozi areas. One Umfolozi grower, Mr. Havenga, used Ethrel in 1976 and is reported to be satisfied with the results.

In those areas where moisture stress is not normally a problem and cane quality is poor in May, June and July the use of ripeners should result in substantial improvements in cane quality and sucrose yield. Assuming that old, mature sugarcane is not being milled, the main areas that could benefit immediately from chemical ripening are:-

1. Eastern Transvaal
2. Swaziland
3. Pongola
4. Hluhluwe, Umfolozi

Because chemical ripeners improve juice purity as well as increasing sucrose yield they improve the recovery of sucrose in the factory. Miller-cum-planters and individual growers being paid according to cane quality, as well as sucrose content, therefore obtained the maximum benefit from chemical ripeners. Under these conditions, the cost of ripener application will be covered by a smaller response to the chemical than where payment is based only on tons sucrose delivered to the mill.

2.2 Traditional cane growing areas

There appears to be no reason why the use of sugarcane ripeners should not gradually extend into the main part of the sugar industry, providing that they are used under the right conditions.

2.2.1 Rain-fed cane

Results equivalent to those obtained in Swaziland and Pongola have also been obtained at Chaka's Kraal under irrigation. Therefore, in any season where growing conditions, particularly rainfall, increase the probability of immature crops of sugarcane being milled between May and July, (as in 1976), there will be many instances where ripeners can be used profitably.

Ripeners should not be used under conditions of moisture stress and the problem will be to identify those fields that should be artificially ripened. In general, the less mature the crop at the time of spraying, the greater the ripening response (Figure 3). It may be possible to identify fields suitable for spraying with a hand refractometer or by assessing the amount of green top on the stalks.

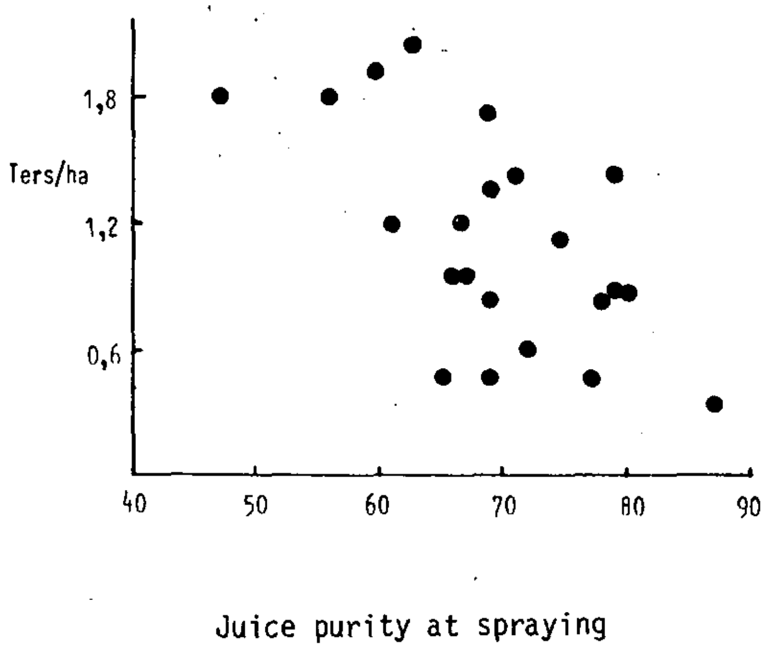

Fig. 3 Response of NCo 376 to Ethrel applied at 1,5 - 2,0 l/ha in large and small-scale experiments 1972-1976. The relationship of initial juice purity and average yield response, based on samples taken between 6 and 12 weeks after spraying.

2.2.2 Supplementary irrigated sugarcane

With the use of chemical ripeners it may be possible to advance the time of harvest of these comparatively young crops to June or July, the ripener compensating for the lower quality that can be expected compared with harvest in the August - October period. Such a move would permit earlier canopy development in the next crop ensuring maximum use of good growing conditions in summer. This should result in an indirect increase in production per crop, in addition to a direct increase in sucrose yield from the use of ripeners.

2.3 Midlands area

A positive ripening response was obtained in one large scale experiment (mill figures) on non-irrigated sugarcane at Sevenoaks that was sprayed in March and harvested in May 1972. It may be possible, therefore, to use chemical ripeners to alleviate the low sucrose problem in the Midlands. Recent experimental results have shown that the ripening response of variety NCo 376 can be maintained for up to 20 weeks after spraying in February or March. This effect could be of particular benefit in the Midlands by spraying in January or February for early season cutting, and spraying later onto cane to be milled up to the end of August.

In low-lying, frost prone areas where soil moisture is often non-limiting, ripeners may permit early harvest of well grown immature crops (e.g. CB 36/14 in valley bottoms).

Experimental work is needed to investigate both of these possibilities.

3. End of the milling season

Little work has yet been done at this time of the year because in experiments at Mount Edgecombe, and in Swaziland, ripening responses were smaller than at the beginning of the season. It is now evident that this may have been because the sugarcane in these trials was fairly mature at the time of spraying. There are also indications that lower rates of ripener application may be needed at this time of the year, which could make a smaller response still economic. Experiments have been designed to determine responses at this time of the year and until results of this work are known chemical ripening cannot be recommended for the end of the milling season.

4. Additional benefits of chemical ripeners

Chemical ripeners usually reduce the size of the tops of the stalks and increases the rate of senescence of lower leaves, resulting in a better burn and less extraneous material sent to the mill. Appreciable reductions in the wear of acrobat side-delivery rakes used to line tops after harvest have been reported at both Ubombo Ranches and Tambankulu Estates. It will probably not be necessary to use the topping attachment when chopper harvesting chemically ripened sugarcane.

5. Economics of chemical ripening

The current cost of Ethrel at a rate of 1,5 l/ha is R33,75 per hectare. With spraying and additional costs the total should be about R38 per hectare. At a price of R93 per ton of sucrose, a grower would require a response of 0,41 tons sucrose per hectare to cover costs. The Swaziland mill data (Figure 1) indicate that there would have been a profitable return at even the lowest ripener response and under good conditions the profit margin was very attractive. This is particularly so as the return is received within a 4 to 6 month period of buying the chemical.

HR/MH
4 October, 1976