THE RESULTS OF HERBICIDE SCREENING TRIALS IN SUGARCANE DURING 1965

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Introduction

Herbicide screening trials for sugarcane lands have been conducted in Natal each season since 1961/62, and these have led to the gradual development of an almost complete system of chemical weed control for commercial plant cane. The efficacy of 2, 4-D formulations in controlling a wide spectrum of weeds when used as a pre-emergent spray had long been recognised, but the persistence of watergrass (*Cyperus esculentus* and *Cyperus rotundus*) from tubers severely limited the reliance which farmers could place on herbicides. Paraquat, used as a post-emergent contact spray, gave excellent temporary control of watergrass (Thompson and Gosnell, 1963) when applied three or four weeks after emergence. If the herbicide was used at a sufficiently early stage of crop development, damage to the sugarcane could practically be avoided (Gosnell and Thompson, 1965).

When soil moisture conditions were favourable, and particularly where the cane stools were well developed with leaves openly exposed over the weed growth, the use of diuron with surfactant gave excellent control of a number of grasses as well as *Cyperus esculentus*, and could be recommended as a substitute for paraquat (Gosnell and Thompson, 1964). The extremely variable rainfall in Natal, however, limited the general applicability of substituted urea compounds. The uracils, and particularly bromacil, were found to be more effective than the substituted ureas over a much wider range of soil moisture conditions (Gosnell, 1965). The phytotoxicity of these compounds to sugarcane was acknowledged to be an important limitation.

The results of three post-emergence experiments harvested during 1965 have served to elucidate the effects of bromacil on sugarcane yields and also to indicate the considerable value of uracil-substituted urea combinations. In two pre-emergence experiments a wide range of herbicides were compared when applied shortly after planting. In all of these experiments the herbicides were applied on an 18-inch swath over the cane row only, interrow weed control being effected either by tractor-mounted or mule-drawn cultivators. Cane and sucrose yields are expressed throughout in short tons per acre.

Pre-emergence Experiments, I and II

Description

These two trials were identical in design. Each comprised three replications of a 4 × 5 rectangular lattice. The treatments are shown in Table I and details of the herbicide formulations are given in Appendix I.

Table I

Pre-emergent treatments compared in Experiments I and II

Treatment	Lb. a.i. per full acre	Quantity of product per acre, row only	Cost of herbicide/ac. R
Trifluralin	1.0	⅓ Pt.	—
Trifluralin	3.0	2 Pt.	—
Trifluralin	6.0	4 Pt.	—
Norea	3.2	1⅓ Lb.	—
Norea	4.8	2 Lb.	—
7175	2.0	1⅓ Lb.	—
7175	3.5	2⅓ Lb.	—
Norea + 7175	3.2 + 2.0	1⅓ Lb. + 1⅓ Lb.	—
DCPA	4.5	2 Lb.	—
DCPA	9.0	4 Lb.	—
DCPA + 2, 4-D amine	4.5 + 3.75	2 Lb. + 2 Pt.	—
DCPA + 2, 4-D amine	9.0 + 3.75	4 Lb. + 2 Pt.	—
2, 3, 6-TBA + MCPA	1.44 + 4.5	8 Pt.	3.00
Fenac	2.0	3 Pt.	3.39
Fenac	4.0	6 Pt.	6.78
Atrazine 80	3.2	1⅓ Lb.	2.93
2, 4-D glycol ester	3.0	1½ Pt.	0.78
2, 4-D glycol ester + silvex	2.0 + 1.0	1 Pt. + 1⅔ Pt.	2.39
No Weeding	—	—	—
Hand Weeding	—	—	—

Experiment I was located on a Williamson sandy loam at the Chaka's Kraal Experimental Farm. It was planted in October, 1964 and harvested at thirteen months of age in November, 1965. Supplementary overhead irrigation was applied until February, 1965, when the local river ran dry, and was resumed in June, 1965. The major weed species were *Cyperus esculentus*, *Portulaca oleracea*, *Digitaria adscendens* and *Eleusine indica*.

Experiment II was planted on the Mtunzini Propagation Farm on a Rosehill sandy loam in September, 1964, and harvested in October, 1965 when the cane was 13 months old. The experiment was not irrigated, but rainfall records and gravimetric soil moisture determinations indicated that conditions were ideal for soil-applied herbicides during the first three months after planting. The heavy rains which fell during this period caused water-logging to occur in a portion of the experiment, and the cane growth in Replication II was so poor that the results from these plots were omitted from the experimental data. The main weed species were *Cyperus esculentus*, *Paspalum distichum* (dominant in the poorly drained areas), and *Digitaria zeyheri* (see Plate I).

The mechanical analyses and moisture retention characteristics of the soils in Experiments I and II are shown in Table II.

Table II

Mechanical analyses and moisture retention characteristics of soils on the experiment sites

Soil series	Williamson		Rosehill		Fernwood	
Depth	0–3in.	3–6in.	0–3in.	3–6in.	0–3in.	3–6in.
Per cent Clay	19	18	15	16	8	8
Per cent Silt	14	12	12	12	2	3
Per cent Fine sand	46	50	50	46	26	33
Per cent Coarse sand	22	19	23	26	62	56
Per cent Organic matter	2.44	2.72	2.02	2.09	1.12	1.12
Moisture content at 100 mb.	26.4	27.6	22.3	23.4	8.2	7.6
Moisture content at 330 mb.	12.6	13.6	15.5	12.1	3.1	4.9
Moisture content at 15 bars	5.9	5.4	5.1	5.8	2.8	2.8

Results

Mean yield data from Experiments I and II are presented in Table III, together with the cane yields from the individual experiments.

Table III

Mean results of Experiments I and II and cane yield data from the individual experiments

Treatment	Rate of product row only	Mean cane yield	Mean sucrose % cane	Mean sucrose yield	Mean stalk counts (per acre $\times 10^{-3}$)	Experiment I cane yield	Experiment II cane yield
Hand Weeding	—	33.4	11.7	3.91	62.0	35.8	30.9
7175	2⅓	31.4	11.9	3.74	48.6	35.3	27.5
7175	1⅓	30.6	12.2	3.78	45.3	35.3	25.9
Norea + 7175	1⅓ + 1⅓	30.5	12.3	3.77	51.0	34.3	26.7
Atrazine 80	1⅓	28.5	12.0	3.40	42.3	33.6	23.3
DCPA + 2, 4-D	4 + 2	28.4	12.5	3.49	48.5	25.9	30.8
2, 3, 6-TBA + MCPA	8	28.3	12.1	3.40	45.7	25.5	31.1
Norea	1⅓	28.0	11.6	3.19	41.1	30.1	25.8
DCPA + 2, 4-D	2 + 2	27.1	12.6	3.42	43.3	29.2	25.0
Norea	2	25.5	12.4	3.24	46.5	30.9	20.0
2, 4-D + Silvex	1 + 1⅔	24.9	12.0	2.93	43.0	26.1	23.6
Fenac	3	24.3	12.3	3.06	41.2	24.6	23.9
DCPA	4	23.0	12.2	2.74	38.5	26.2	19.8
DCPA	2	22.3	12.4	2.70	37.2	19.3	25.2
Fenac	6	20.3	11.9	2.46	44.6	21.5	19.1
2, 4-D	1½	19.1	12.3	2.36	36.4	17.7	20.5
Trifluralin	⅔	14.4	12.2	1.71	—	0	28.8
Trifluralin	4	13.6	11.8	1.58	—	0	27.2
No Weeding	—	11.0	12.0	1.32	29.7	9.6	12.4
Trifluralin	2	10.0	12.3	1.20	—	0	20.0
S.E. of mean		—	—	—	—	4.7	2.5
L.s.d. (0.05)		—	—	—	—	13.6	7.3
L.s.d. (0.01)		—	—	—	—	18.3	9.9
C.V. per cent		—	—	—	—	30.1	15.3

Discussion

Visual scorings of weeds were carried out in these experiments on the basis of 0 (= no weed control) to 9 (= complete weed control). A scoring of 7 using this system reflects adequate weed control, such that further control is not immediately necessary.

In Experiment I, at one month after planting only three treatments were scored at an average greater than 7. These were fenac at 3 and 6 pints per acre row only and trifluralin at 4 pints per acre row only. However, cane vigour scorings carried out at the same time showed that both fenac treatments had resulted in a slight suppression of cane growth, and the trifluralin treatment had almost eliminated cane growth. The plots treated with 7175, which gave cane yields comparable with those from hand-weeded plots, were scored at 6.3 and 5.3 for the higher and lower treatment levels respectively.

In Experiment II a number of treatments gave adequate weed control after 5 weeks, but the effect was lost after 8 weeks and weed infestation was generally severe after 12 weeks. The progressive loss of weed control in these treatments is shown in Table IV, where the mean visual scorings are given. The low cane yields obtained from the plots treated with the high rate of fenac were the result of obvious cane damage. Once again relatively high yields were obtained from plots treated with 7175, without weed control ever having been adequate on the basis of visual scorings.

Table IV

Mean visual weed control scorings and yields for effective treatments in Experiment II

		Mean Scoring			Mean cane yield
Weeks after planting		5	8	12	
Treatment	Rate of product row only				
Hand Weeding	—	—	—	—	30.9
2, 3, 6-TBA+MCPA	8 pt.	8.3	6.7	4.2	31.1
Norea + 7175	1½ + 1½ lb.	8.0	6.3	3.8	26.7
DCPA + 2, 4-D	4 + 2 lb.	7.3	5.7	3.3	30.8
DCPA + 2, 4-D	2 + 2 lb.	7.3	6.3	1.8	25.0
Fenac	6 pt.	7.0	5.3	4.0	19.1
Norea	2 lb.	7.0	4.0	1.7	20.0
Atrazine	1½ lb.	7.0	3.7	1.3	23.3

The spectrum of weed control was very similar for all of the effective herbicides. There was generally good control of most broadleafed weeds and annual grasses, with a moderate to slight effect on *Cyperus esculentus*. DCPA (Dacthal) had previously given good control of grasses but not of broad-leafed weeds, and in these experiments it also gave good results when used with 2, 4-D.

Some interesting effects were observed in the plots treated with trifluralin. At Chaka's Kraal the chemical was sprayed into the furrow before planting and immediately covered with soil. The control of *Cyperus* spp. and grasses was good at the highest rate of application, but damage to the cane was so severe at all rates that no millable stalks were obtained from any of the trifluralin-treated plots. At Mtunzini trifluralin was sprayed as a normal pre-emergent herbicide on to the soil surface after planting and little effect was apparent for a period of two months. During the third month, however, a substantial improvement in the control of *Cyperus* spp. and grasses was noted, and the highest and lowest rates of application resulted in fairly good cane yields.

The large yield reduction from 33 tons to 11 tons of cane per acre, caused by complete lack of weeding, could be ascribed to the reduction in stalk populations from 62,000 per acre in hand weeded plots to 29,700 per acre in unweeded plots. Herbicide treatments giving similar yields to hand weeding generally had much lower stalk populations, however.

There were no consistent effects of treatment on sucrose content.

Post Emergence Experiments, III and IV

Description

Experiments III and IV were also identical in design, each comprising three replications of a 4 × 5 rectangular lattice with the treatments shown in Table V. Details of the herbicide formulations are given in Appendix I.

Table V

Post-emergent treatments compared in Experiments III and IV

Treatment	Lb. a.i./full acre	Quantity of product per acre row only	Cost of herbicide per ac. R.
7175*	3.5	2⅓ Lb.	—
Norea*	4.8	2 Lb.	—
Diuron + Bromacil*	2.4 + 1.2	1 lb. + ½ Lb.	4.77
Diruon + Bromacil*	1.6 + 2.4	⅔ Lb. + 1 Lb.	6.24
Bromacil*	1.2	½ Lb.	2.30
Bromacil*	2.4	1 Lb.	4.60
Bromacil*	3.6	1½ Lb.	6.90
Bromacil*	4.8	2 Lb.	9.20
Bromacil + Paraquat†	1.2 + 0.5	½ Lb. + ⅔ Pt.	3.80
Bromacil + Paraquat†	2.4 + 0.5	1 Lb. + ⅔ Pt.	6.10
Bromacil + Paraquat†	3.6 + 0.5	1½ Lb. + ⅔ Pt.	8.40
Bromacil + Paraquat†	4.8 + 0.5	2 Lb. + ½ Pt.	10.70
Atrazine 80*	3.2	1⅓ Lb.	2.93
Prometryne	2.0	1⅓ Lb.	3.33
Prometryne + Dalapon	2.0 + 5.1	1⅓ Lb. + 2 Lb.	5.00
Ametryne	2.0	1⅓ lb.	3.33
Ametryne + Dalapon	2.0 + 5.1	1⅓ Lb. + 2 Lb.	5.00
Dalapon	5.1	2 Lb.	1.67
No Weeding	—	—	—
Hand Weeding	—	—	—

* 0.5 per cent WK surfactant used. † 0.1 per cent Agral surfactant used.

Experiment III was located close to Experiment I at Chaka's Kraal and Experiment IV was adjacent to Experiment II at Mtunzini. The conditions in these experiments were therefore virtually identical to those already described for Experiments I and II.

Results

Mean yield data from Experiments III and IV are presented in Table VI, together with the cane yields from the individual experiments.

Table VI

Post. emergent

Mean results of Experiments III and IV, and can yield data from the individual experiments

Treatment	Rate of product row only	Mean cane yield	Mean sucrose % cane	Mean sucrose yield	Mean stalk count (per acre X10^{-3})	Exp. III cane yield	Exp. IV cane yield
Diuron + Bromacil	⅔ + 1	30.8	12.1	3.74	53.1	32.8	28.8
Diuron + Bromacil	1 + ½	30.5	13.1	4.07	55.4	31.1	29.9
Hand Weeding	—	29.0	12.9	3.73	59.7	28.0	29.9
Bromacil	1½	29.0	12.0	3.48	57.3	36.3	21.6
Bromacil	2	27.7	12.2	3.39	59.5	29.6	25.8
7175	2⅓	27.4	12.0	3.31	45.3	29.1	25.6
Bromacil + Paraquat	1 + ⅔	26.8	12.9	3.47	56.4	33.2	20.4
Bromacil	1	26.6	11.9	3.15	55.6	24.9	28.3
Bromacil + Paraquat	1½ + ⅔	26.1	12.1	3.17	56.9	32.0	20.2
Ametryne	1⅓	26.0	13.0	3.43	48.0	25.9	26.1
Prometryne	1⅓	25.8	12.8	3.31	48.6	27.0	24.6
Bromacil	½	25.1	12.3	2.97	45.3	28.2	22.0
Bromacil + Paraquat	½ + ⅔	24.9	12.7	3.12	48.6	26.0	23.7
Bromacil + Paraquat	2 + ⅔	23.2	12.0	2.79	50.6	23.2	23.1
Norea	2	22.6	12.9	2.91	37.3	22.1	23.0
Prometryne + Dalapon	1⅓ + 2	21.9	12.8	2.82	42.2	23.1	20.6
Ametryne + Dalapon	1⅓ + 2	21.0	12.6	2.63	47.3	21.4	20.6
Atrazine	1⅓	20.5	12.7	2.63	36.8	25.1	15.9
Dalapon	2	18.9	12.5	2.33	34.8	20.8	16.9
No Weeding	—	14.2	12.0	1.73	29.8	16.4	12.0
S.E. of Mean	—	—	—	—	—	3.5	2.7
L.S.D. (0.05)	—	—	—	—	—	10.2	7.9
L.S.D. (0.01)	—	—	—	—	—	13.6	10.7
C.V. per cent	—	—	—	—	—	22.9	20.6

Discussion

The outstanding post-emergent herbicide in these trials was bromacil (see Plates I and II), used either alone or in combination with other chemicals. The prolonged period of good weed control obtained from the various treatments is illustrated by the weed control scorings shown in Table VII. Cane vigour ratings were also carried out on the basis of 0 (= complete suppression of cane) to 9 (= no effect of herbicide on cane). The results, also presented in Table VIII show that a combination of diuron and bromacit can be used to avoid most of the phytotoxicity whilst still effecting adequate weed control. It is apparenl that potential yields, following adequate weed contro, four months after planting, were obtained by using 1 lb. diuron and ½ lb. bromacil per acre on the row only at a cost of R4.77 per acre. A most remarkable result, however, was the recovery of the cane sprayed with high rates of bromacil alone (1½ and 2 lb. per acre on the row only). Despite the low cane vigour scorings shown in Table VII for these treatments, the final yields were almost equal to those in hand-weeded plots. Weed control was almost perfect with these high rates of bromacil, and was always very good with the mixtures of diuron and bromacil. Lower rates of bromacil gave fairly good weed control which was usually improved by the addition of paraquat. Yields of cane were not appreciably affected, the improved weed control probably being offset by increased damage to the cane. The addition of paraquat to the higher rates of bromacil served only to reduce yields.

Table VII

Mean visual weed control and cane vigour scorings in Experiments III and IV

Experiment		Mean Scorings						
		III			IV			
Weeks after planting		7	11	11	8	12	16	16
Weeks after spraying		2	6	6	3	7	11	11
Scoring on		Weeds	Weeds	Cane	Weeds	Weeds	Weeds	Cane
Treatment	Rate product row only							
Bromacil	½	6.3	6.0	6.0	6.3	6.6	4.7	7.0
Bromacil	1	8.0	8.7	4.3	5.3	7.1	8.0	4.0
Bromacil	1½	8.3	9.0	2.7	7.7	7.8	8.7	3.7
Bromacil	2	8.3	9.0	2.7	8.7	8.4	8.3	4.0
Diuron + bromacil	1 + ½	8.0	8.7	7.3	8.0	7.4	7.0	7.0
Diuron + bromacil	⅔ + 1	8.7	9.0	3.3	8.0	7.2	7.0	6.7
Bromacil + praraquat	½ + ⅔	8.0	8.7	6.0	7.7	5.0	3.7	6.7
Bromacil + paraquat	1 + ⅔	9.0	9.0	3.7	8.3	7.7	7.0	6.0
Bromacil + paraquat	1½ + ⅔	8.7	9.8	2.7	8.0	8.3	7.3	4.3
Bromacil + paraquat	2 + ⅔	8.7	9.0	1.7	8.7	7.7	7.7	4.0

None of the remaining herbicides gave commercially acceptable degrees of weed control during the first three months of the experiments. It became noticeable later, however, that cane growth in the 7175, ametryne and prometryne treatments was surprisingly good in spite of the abundance of weeds present. The effects were confirmed at harvest when the plots treated with these chemicals gave yields only slightly below those of the hand weeded plots. Atrazine failed as a post-emergent herbicide while dalapon applications resulted in appreciable cane damage without much weed control being effected.

The general relationship between yield and stalk counts was quite marked, and it was observed that applications of bromacil, especially at high rates, resulted in the development of populations almost as high as those in hand weeded plots. This was probably due to the high degree of weed control obtained at an early stage of crop growth, which encouraged tillering. In contrast, treatment with 7175, ametryne and prometryne resulted in relatively low populations due to poor weed control in the early stages.

Treatments generally had relatively little effect on sucrose content, but increasing levels of bromacil tended to cause a decrease in sucrose content in Experiment IV. However, no such trends were apparent in Experiment III, and the mean results shown in Table VI are not conclusive.

Post Emergence Experiment V — Herbicides on *Panicum Maximum*

Description and Results

An area of plant cane on a Fernwood sand, where *Panicum maximum* and *Cyperus esculentus* were dominant, was selected for this experiment. *Panicum maximum*, or Ubabe, is a serious weed problem in many areas, particularly on sandy soils. It frequently occurs in competition with *Cyperus esculentus*, and experience has shown that where paraquat is used to control *Cyperus*, the *Panicum* problem increases.

The analytical results shown in Table II indicate that this soil was extremely poor. Cane growth was very slow following planting in March, 1964. The herbicides were applied in November, when there was an average of 11 leaves per stalk, and the crop was harvested in November, 1965. The design was a 4 × 4 partially balanced lattice, but the growth of the cane in Replication IV was so poor and uneven that the yield data from this replication were omitted from the results which are presented in Table VIII.

Table VIII

Treatments and results in *Panicum maximum* trial

Treatment	Lb.a.i./ full acre	Lb. product per acre row only	Cost of herbicide R	Cane yield	Sucrose % cane	Sucrose yield	Stalk counts (/ac.x10-3)
Hand Weeding	—	—	—	31.1	13.5	4.34	41.7
Bromacil	1.2	½	2.30	29.2	14.0	3.97	34.7
Bromacil	2.4	1	4.60	27.3	14.1	3.82	33.8
Dalapon + TCA	5.1 + 16.9	2 + 6	3.37	24.0	14.0	3.34	30.7
Uracil 629	2.4	1	—	23.0	14.4	3.28	29.6
Urea 1318	3.2	1⅓	—	22.1	14.7	3.26	26.6
Bromacil	3.6	1½	6.90	23.2	14.1	3.22	29.0
TCA	16.9	6	1.70	23.1	13.8	3.20	33.5
Dalapon	5.1	2	1.67	22.4	14.1	3.19	27.4
Uracil 733	2.4	1	—	19.6	13.8	2.78	25.5
No Weeding	—	—	—	18.5	14.3	2.66	23.7
Uracil 766	2.4	1	—	17.9	14.2	2.52	25.1
Uracil 767	2.4	1	—	17.8	14.3	2.52	25.3
Dalapon	7.6	3	2.50	15.9	13.5	2.15	23.9
TCA	25.4	9	2.54	14.4	13.9	2.04	24.1
Paraquat	0.75	1 pt.	2.08	14.2	14.0	2.01	25.6
S.E. of mean	—	—	—	4.0	0.2	0.56	—
L.S.D. (0.05)	—	—	—	12.3	0.7	1.71	—
L.S.D. (0.01)	—	—	—	17.3	1.0	2.40	—
C.V. per cent	—	—	—	32.2	2.7	31.9	

0.1 per cent Agral surfactant used with all treatments.

Discussion

Dalapon applied at a rate of 3 lb per acre on the row only eliminated *Panicum* but caused very severe cane damage, and TCA at 9 lb also gave good control of *Panicum* at the expense of the cane. The damage caused by dalapon was visually much more severe than that caused by TCA. The lower rates of dalapon (2 lb) and TCA (6 lb) caused far less cane damage but did not control *Panicum* adequately. The combination of 2 lb of dalapon and 6 lb of TCA, at a cost of R3.37 per acre, was effective and could be recommended providing that it was applied accurately to avoid local excesses of dalapon. Bromacil applied at a rate of 1½ lb per acre on the row only gave good control of *Panicum* without causing severe cane damage. Although the lower rates of this chemical did not control the grass adequately, yields were nevertheless high.

Of the remaining herbicides, only paraquat was of interest since it caused a reduction in cane yield due to the profuse tillering of *Panicum* which followed the scorching effect of the chemical.

Conclusions

A number of herbicides such as 2,3,6-TBA + MCPA, fenac, 7175, atrazine and diuron have given better results than 2, 4-D when applied pre-emergent, both in the current and in previously reported trials. However the costs of these herbicides range from five times the cost of 2, 4-D upwards. Because of soil moisture variability under dryland conditions, present recommendations for pre-emergent weed control include only the various 2, 4-D and MCPA formulations. However, under irrigated conditions, atrazine and 2, 3, 6-TBA + MCPA are worthy of field trial on a limited scale, when the economics of their use can be more accurately assessed.

The visually severe effects of bromacil on sugarcane need not apparently result in significant suppressions of yield. In view of the excellent weed control obtained consistently with this compound, it is important to know that such tolerance exists since accurate application rates are not always achieved in the field. However, the best results were obtained by using mixtures of diuron and bromacil. The use of these mixtures or of their analogues linuron and "Sinbar", will probably be the most important development in chemical weed control in the immediate future.

No entirely satisfactory chemical control of *Panicum maximum* in cane fields has yet been found. Where labour is available, hand-weeding is still to be preferred; where labour is not available the following treatments can be used, but some cane damage can be expected:

1. A mixture of 4-5 lb dalapon and 15 lb of TCA per acre full cover, or 2 lb of dalapon and 6 lb of TCA on the row only.
2. Bromacil at a rate of 3-4 lb per acre full cover or 1½ lb row only on sands, and higher rates on heavier soils.

Summary

In two experiments where pre-emergent herbicides were compared, the best results were obtained with 7175, 2,3,6-TBA + MCPA, DCPA + 2,4-D, atrazine and norea. In two trials to compare post-emergent herbicides, bromacil was outstanding. Mixtures of diuron and bromacil gave the best results but bromacil alone at relatively high rates (1½-2 lb per acre on the row only) gave excellent weed control and the cane recovered well from initial damage. In general, the addition of paraquat to bromacil served little purpose.

The best control of *Panicum maximum* was obtained by using either a mixture of dalapon and TCA or high rates of bromacil. Cane damage was evident, however, in all treatments which controlled *Panicum*.

Effect of bromacil, at ½ lb./acre row only, in Experiment IV 3 months after planting. The plot was adjacent to the No-Weeding plot which can be seen in the background.

Uncontrolled weeds in Experiment IV 3 months after planting.

Appendix I

Herbicides used

Short Chemical Name	Commercial product	Composition
2, 3, 6-TBA + MCPA	Fisons 1815	0.48 lb. a.e. + 1.5 lb. a.e. per gall.
2, 4-D amine	Fernimine 5	5 lb. a.e. per gall.
2, 4-D glycol ester	Esteron 10–10	4.8 lb. a.e. per gall.
'7175'	Hercules 7175	50 per cent a.i.
Ametryne	Ametryne 50W	50 per cent a.i.
Atrazine	Atrazine 80W	80 per cent a.i.
Bromacil	Hyvar X	80 per cent a.i.
DCPA	Dacthal	75 per cent a.i.
Dalapon	Dowpon S	85 per cent a.i.
Diuron	Karmex	80 per cent a.i.
Fenac	Weedac	1.85 lb. per gall.
Linuron	Afalon	50 per cent a.i.
Norea	Hercules 7531	80 per cent a.i.
Paraquat	Gramoxone	2 lb. a.i. per gall.
Prometryne	Prometryne 50W	50 per cent a.i.
Silvex	Kuron	3.33 lb. per gall.
Trifluralin	Treflan	3.33 lb. per gall.
Uracil 629	Uracil 629	80 per cent a.i.
Uracil 732	Sinbar	80 per cent a.i.
Uracil 733	Uracil 733	80 per cent a.i.
Uracil 766	Uracil 766	80 per cent a.i.
Uracil 767	Uracil 767	80 per cent a.i.
Urea 1318	Urea 1318	80 per cent a.i.

a.e. = acid equivalent; a.i. = active ingredient

Surfactants used

Agral 90 (non-ionic) contains an alkylated phenol-ethylene oxide condensate.

WK (non-ionic) contains the dodecylether of polyethylene glycol.

References

Gosnell, J. M. (1965). Herbicide trials in Natal Sugarcane, 1964-65. Proc. 39th Cong. S.A. Sugar Tech. Assn. pp. 171-181.

Gosnell, J. M. and Thompson, G. D. (1964). The results of herbicide trials, 1963-64. Proc. 38th Cong. S.A. Sugar Tech. Assn. pp. 166-174.

Gosnell, J. M. and Thompson, G. D. (1965). The effects of paraquat on the growth and yield of sugarcane. Proc. 12th Int. Cong. Sug. Cane Techn. Puerto Rico.

Thompson, G. D. and Gosnell, J. M. (1963). The results of herbicide trials conducted in the cane belt of Natal, 1962-63. Proc. 37th Cong. S.A. Sugar Tech. Assn. pp. 143-152.

Mr. Wyatt: In the last slide it was mentioned that 3 pints of paraquat per acre were applied, in line only, and this seems rather a lot.

Dr. Thompson: The figure should have been one pint on the row only.

Mr. Gilfillan: Why were 3 pints pre-selected instead of 2, which is the usual application?

Dr. Thompson: Mr. Gosnell chose 3 pints full cover, but I would have preferred one pint, row only.

Mr. Coignet: Is not a lot of damage done to the cane by weeds by the time a post emergent treatment is applied? Why not use chain harrowing?

Under drought conditions weeds of course will not grow, but they are a big problem under irrigated conditions.

Dr. Thompson: We would always recommend pre-emergent spraying after planting or burning and harvesting a ratoon, and it is agreed that weeds which survive this treatment should be eliminated as soon as possible. Suitable herbicides can be used but if the soil conditions favour the use of a chain harrow, use it by all means.

Mr. Wardle: Is bromacil a systemic? If so, could it not be combined in very small quantities with 2, 4-D in order to produce a more effective control of water grass?

Dr. Thompson: Bromacil is systemic in action and we have not used it with 2, 4-D.

Mr. Browne: We had residual damage when bromacil was used at Muden.

Dr. Thompson: We are not sure how long bromacil effects may persist in the soil, but Mr. Anderson tells me that the final applications on citrus at Muden were made only four months before the trees were taken out and sugarcane planted. From the analyses of the Muden soils where recent damage to cane was done, it appears that the recommended levels of bromacil were too high for the sandy nature of these soils and their low organic matter contents.

Mr. Gilfillan: We have found bromacil and diuron very effective against weeds but I must issue a warning that they can cause stunting in old ratoons, when used together under certain conditions.

Dr. Thompson: Damage to cane, I believe, is always related to soil texture and organic matter content, and these should be carefully evaluated.