

WEED CONTROL IN SUGAR CANE IN FIJI

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SUMMARY

BECAUSE of the likelihood of an increase in the cost and shortage of labour chemical weed control methods have been investigated on estates owned by the Colonial Sugar Refining Company in Fiji. Trials showed butoxy ethanol ester of 2,4-D to be satisfactory as a post- and pre-emergence spray for the control of broad-leaved weeds. Dalapon has been used for grass control.

INTRODUCTION

The Colonial Sugar Refining Company operates 5 raw sugar mills in Fiji. The crop is grown mainly by Indian and Fijian farmers and the company grows cane only on several small estates.

The company maintains several experimental stations investigating disease control, breeding and testing of new varieties, and general agronomic work. The results of these investigations are passed to growers by company's field officers.

Cane is planted from cuttings in rows some 4½ to 5½ ft. wide. The peak planting period is April-May. Growth continues slowly through the cooler dry season until September-October when higher temperatures and rainfall cause an increase in the rate of growth. Rows tend to "close in" after this period and except for several types of vines, weed growth is suppressed.

On the company estates the normal form of weed control is by the use of tractor-mounted cultivation implements in the inter-row and hand-weeding in the row. Some Indian growers use tractor implements, but more generally bullock-drawn implements in the inter-row and hand weeding in the row.

Labour costs will probably rise in the future and there are times when workers are not readily available for weed control measures. With this in mind investigations are being carried out on chemical methods of control on our estates.

INVESTIGATIONS

The use of 2,4-D against species such as Ipomea had already been established. Several lines of investigation remained. Firstly in the cane field pre-emergence control and costs had to be evaluated, satisfactory grass inhibitor examined, and some attention paid to the more hard-to-kill weeds such as kaumoce (*Cassia occidentalis*) and wild gooseberry (*Physalis peruviana*). Secondly, on field edges and drains a control had to be found for para grass (*Brachiaria mutica*) and Johnson grass (*Sorghum halepense*).

IN THE CANE FIELD

Pre-emergence sprays: Most of this work took the form of field trials to assess the rates and form of 2,4-D and the use of other materials.

Altogether 5 trials were set down varying in type from large strip trials to replicated trials with 1/100 acre plots. These trials showed that control from 4 to 7 weeks can be expected from the 2,4-D ester and possibly the

amine and salts of MCPA. After assessing these trials the recommendation for pre-emergence spraying was 2.5 lb. per acre acid equivalent of the ester of 2,4-D in 30 gallons of water.

Monuron gave disappointing results in this series, although it proved very successful on the wet side of the island, where the average rainfall is approximately 110 in. per annum. Simazin also proved an unsatisfactory material under the condition of the trials.

GERMINATION

There were indications that if 2,4-D solutions were sprayed directly on to cane setts lying uncovered in the row, germination would be seriously retarded.

Germination counts were taken on a trial where final covering was poor. Averages are shown below:

3.7 lb. acid equivalent per acre 2,4-D	88 shoots per chain
2.3 lb. acid equivalent per acre 2,4-D	106 shoots per chain
.9 lb. acid equivalent per acre 2,4-D	140 shoots per chain
Control	177 shoots per chain

It is necessary that setts be covered before pre-emergence spraying.

Young emerging shoots have been sprayed directly with 2,4-D, but have not been affected except for a slight withering of the tip occasionally.

Grass inhibitors: The problem in the search for satisfactory grass inhibitors is that sugar cane itself is a grass and therefore liable to damage. Rates and the method of application need careful attention.

A number of readily available grass inhibitors was selected and tested by spraying solutions on young sugar cane and the grass growing in the row.

Results are shown below:

	Rating after	
	2 weeks	5 weeks
Dalapon 3.5 lb. per acre row	5	4
Amitrol 3.5 lb. per acre row	4	3
TCA 7 lb. per acre row	2	1
Monuron 3.5 lb. per acre row	4	3.5
Monuron 10.5 lb. per acre row	5	4

Rating:

- 5: Good control, no need for further immediate treatment.
- 4: Control, no need for further immediate treatment.
- 3: Needs re-treatment soon.
- 2: Needs re-treatment now.
- 1: Should have had re-treatment some time ago.

Monuron at these rates was most expensive and amitrol caused much damage to the emerging leaf of the cane plant.

Ten observational trials were put down using dalapon at 2 and 5 lb. per acre row plus 1.4 lb. acid equivalent of the ester of 2,4-D. In some trials this treatment was compared with TCA at 4 and 8 lb. per acre row plus 1.4 lb. of 2,4-D acid equivalent per acre.

Results show that 5 lb. of dalapon and 1.4 lb. of 2,4-D acid equivalent per acre row gave satisfactory control in the cane row from 6 weeks up to 8 months.

TCA caused severe cane damage, although it gave fairly satisfactory control at 8 lb. per acre row. On the wet side of the island 15 lb. of TCA gave control equivalent to 5 lb. of dalapon.

It appears that damage to cane crops is negligible, provided the following conditions are fulfilled:

1. The crop should be more than 2 months old.
2. The rate of application of dalapon should be less than 5 lb. per acre row.
3. Direct spraying of the cane should be avoided as far as possible.

2,4-D resistant weeds: An ester of 2,4,5-T proved effective in the control of kaumoce and wild gooseberry. Rates were 2lb. acid equivalent per acre row.

ON FIELD EDGES AND DRAINS

Para grass control: This grass blocks drains in wet areas and encroaches into cane fields.

The following gives a summary of the work on this problem:

(1) Monuron, TCA, and dalapon were compared in one trial on the wet side of the main island.

Monuron at 40 lb. and 60 lb. per acre gave nearly perfect control for at least 8 months.

Dalapon at 10 lb., 20 lb., and 30 lb. per acre gave control of para grass, but allowed a prolific encroachment of broad-leaved weeds.

(2) TCA at 120 lb. per acre on the dry side of the island gave control for 3 months.

However, when TCA was applied at 33 lb. per acre per application for three applications at 5-week intervals control was obtained for at least 10 months.

(3) Six trials with dalapon showed that 15 to 20 lb. can give at least several months control in a single application.

However, in some cases 5 lb. per acre depressed para grass growth enough to allow nadi blue grass (*Dicanthium caricosum*) to become dominant. This grass is generally not troublesome.

(4) Three dalapon applications of 5 lb. each at 5 weekly intervals gave control for at least 10 months.

CONCLUSIONS

It appears that although TCA and monuron are effective, 3 applications of 5 lb. of dalapon per acre per application at about 4 weekly intervals are more economical.

Johnson grass: Initial applications with dalapon showed that 10 and 20 lb. per acre depressed the growth, but did not kill this grass in drains.

To investigate the problem further pot trials were initiated. Johnson grass plants were wetted with a 2 per cent solution of dalapon alone, with amitrol plus Agral "LN" added, and the combination of the two (dalapon plus amitrol and Agral "LN").

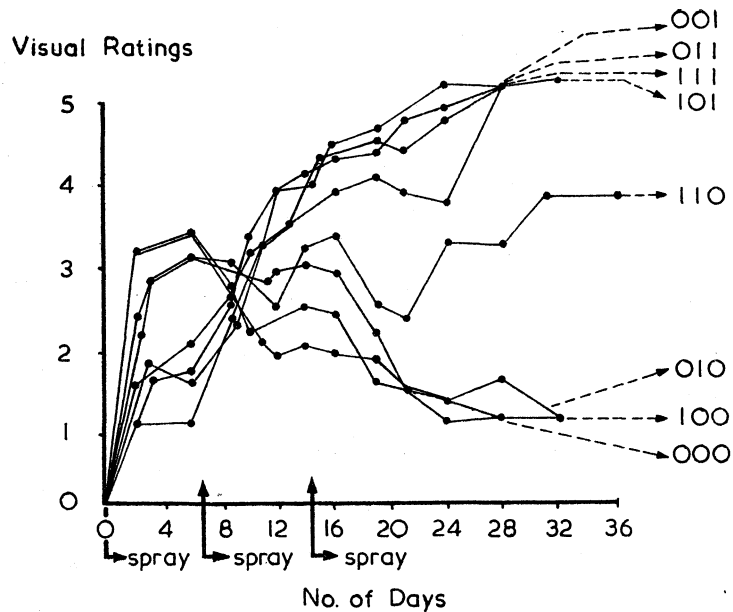
Each of these treatments was applied (1) as a single application and (2) as a split application at weekly intervals for 3 weeks.

Results show that under the conditions of the trial dalapon is effective against Johnson grass if used as a split application and that neither amitrol nor a detergent is an advantage. (See graph on next page.)

EQUIPMENT

Pre-emergence sprays are applied with a Lo-Vol boom spray rig. Post-emergence sprays can be applied by:

- (1) Lo-Vol boom spray rig with a telescopic drop arm attachment to minimise cane damage by grass inhibitors.



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1st number	amitrol.	without.	with.
2nd number	agral LN.	without.	with.
3rd number	application.	single.	split.

(2) "Sasaki" pressure knapsack sprays for tall cane or wet conditions. These are Hawaiian designed and made.

(3) "Rega" hand-pump knapsack sprays are used by Indian cane growers. Drains are sprayed by hose extensions from tractor-attached Lo-Vol pumps.

COSTS

Pre-emergence spraying costs approximately £F45 per acre using 2.8 lb. per acre 2,4-D acid equivalent.

Spraying in growing cane at $\frac{1}{2}$ to $\frac{3}{4}$ lb. per acre row 2,4-D acid equivalent costs approximately F13s. 6d.

Dalapon spraying in drains costs approximately F2s. to 2s. 6d. per chain with a 5 lb. per acre application.

Some estates use extensive tractor cultivation methods, costing about F3s. to 4s. per operation.

Cultivation is carried out at least every 2 weeks.

* Hand weeding, averaging from F7s. to 44s. (depending on the weed population) supplements the tractor cultivation.

CONCLUSIONS

At the moment full chemical control is not economical for estates and certainly not for growers. However, full mechanical control tends to destroy soil structure and is likely to be held up due to wet conditions. A compromise, therefore, appears to be the use of a pre-emergence spray plus mechanical cultivation with several spot spraying operations.

Indian growers with larger holdings are making use of the results of our investigations.

DISCUSSION

Q.—What is the role of nutrition on the effectiveness of dalapon on grass?

A.—Para grass appears easier to kill where the soil is derived from lateritic materials. Moisture also plays a part.

Q.—With the pressurised knapsack sprayer, how is the air retained in the tank when all liquid has been expended?

A.—If it gurgles, switch it off. There is no special valve built in to prevent loss of air at this stage.

Q.—What is the rainfall on the wetter side of the island?

A.—68 in. on the west side of the island, but distribution is poor. Over the period concerned in these trials, March rainfall was 14 to 15 in., May 1.2 in., and June to July 1 in.

Q.—What is the cost per chain for split applications of dalapon for drain weed control?

A.—Three shillings per chain equals the total cost of three split applications.