TRIALS WITH CMU WEEDICIDES IN QUEENSLAND PINEAPPLE PLANTATIONS

By R. C. CANNON, B.Sc.Agr., Senior Horticulturist, and E. T. PRODONOFF, Horticulture Branch, Division of Plant Industry.

SUMMARY.

Trials were carried out in southern Queensland during 1954-1956 to evaluate parachlorophenyl dimethyl urea (CMU) as a weedicide in pineapple plantations, using sodium pentachlorphenate (PCP) as a standard for comparison.

Consistently better control of weeds was obtained with CMU at 4 lb. per acre than with PCP at 10 lb. per acre. No phytotoxic effects were detectable in pineapples sprayed with CMU at rates up to 8 lb. per acre.

I. INTRODUCTION.

Since 1951, sodium pentachlorphenate (PCP) has been used extensively as a weedicide in Queensland pineapple plantations. As a pre-emergence weedicide, used at the rate of 10 lb. per acre, it is effective and economical. Post-emergence sprays of PCP and emulsifiable oils, however, give only partial control, grasses being particularly resistant. The irritant properties of PCP and associated health hazards are also disadvantageous. There is therefore a need for an alternative weedicide for use in pineapples.

Parachlorophenyl dimethyl urea (CMU) has shown considerable promise overseas as a weedicide capable of exercising some post-emergence control of weeds, including grasses. Its toxicity to warm-blooded animals is stated to be considerably less than that of PCP.

In 1954 a preliminary trial was undertaken at the Maroochy Experiment Station, near Nambour, to compare the weedicidal properties of CMU and PCP and to check the phytotoxicity, if any, of CMU to pineapples. This was followed by a second trial on the Station in 1954–55, and a series of field trials in several districts in 1956.

II. 1954 TRIAL.

In 1954, an experimental sample of CMU as a 50 per cent. wettable powder (under the trade name "AK 100") was obtained. The trial was established in July 1954 in an area of young pineapples on the Maroochy Experiment Station.

Treatments were:—

(A) PCP 10 lb. per acre.

(B) CMU 2 lb. per acre.

(C) CMU 4 lb. per acre.

(D) Control—untreated.

The trial was laid out as 8 x 4 randomised blocks with plots 10 ft. by 6 ft.

The weedicides were dissolved (PCP) or suspended (CMU) in sufficient water to give a spraying rate of 100 gal. per acre over the soil surface. Before treatment, all weeds were removed by hand chipping. Sprays were applied by knapsack sprayer on July 27, following 0·12 in. of rain.

On Sept. 17 (52 days after treatment), weed counts, based on a 6 ft. by 1 ft. 6 in. random quadrat, were made in each plot. Grasses and other weed species were counted and recorded separately. The data are summarised in Table 1.

Table 1.

WEED COUNTS PER SQUARE YARD 52 DAYS AFTER TREATMENT.

Treatment.	Grasses.	Other Weeds.
(A) PCP 10 lb./ac.	25·7	18·4
(B) CMU 2 lb./ac.	21·8	6·7
(C) CMU 4 lb./ac.	9·1	3·6
(D) Control	32·3	63·0
	C<D, A, B. B<D	C, B, A<D

The main species present were:—

(*a*) *Grasses*: *Rhynchelytrum repens* (red Natal grass), *Digitaria adscendens* (summer grass) and *Eleusine indica* (crowsfoot grass).

(*b*) *Other Weeds*: *Ageratum houstonianum* (billygoat weed), *Stachys arvensis* (stagger weed) and *Stylosanthes sundaica* (Townsville lucerne).

Most of the weeds appearing in treated plots were in close proximity to the pineapple plants, suggesting faulty coverage by the sprays.

The trial was under observation for several months after the weed counts were made, and no toxicity symptoms were recognisable in any of the pineapple plants.

III. 1954–55 TRIAL.

The second trial followed closely on the first, and was commenced in November 1954 in an area of pineapples planted in the previous March. The same materials were used, but treatments included higher rates of CMU and PCP, and were:—

(A) PCP 10 lb. per acre.
(B) PCP 20 lb. per acre.
(C) CMU 4 lb. per acre.
(D) CMU 8 lb. per acre.
(E) Control—untreated.

The trial was laid out as 8 x 5 randomised blocks of plots 10 ft. by 6 ft., as in the previous year.

Sprays were prepared as in the first trial. The spraying rate was increased from 100 gal. to 300 gal. per acre, to improve the coverage, which appeared to have been inadequate in the first trial. Sprays were applied on Nov. 23, 1954.

Weed counts were on the same basis as those of the previous trial, and were made on Jan. 12 and Feb. 2, 1955 (50 and 71 days respectively after treatment). The results appear in Table 2.

Table 2.

WEED COUNTS PER SQUARE YARD 50 AND 71 DAYS AFTER TREATMENT.

Treatment.	50 Days.		71 Days.	
	Grasses.	Other Weeds.	Grasses.	Other Weeds.
(A) PCP 10 lb./ac.	52·8	16·1	86·3	65·7
(B) PCP 20 lb./ac.	24·2	6·1	59·6	57·3
(C) CMU 4 lb./ac.	15·9	3·9	35·3	17·6
(D) CMU 8 lb./ac.	11·8	3·5	20·0	9·6
(E) Control	69·4	25·2	112·8	106·5
	D, C<<E, A B<<E D<B B<A	D, C<<E, A B<<E B<A	D<<E, A, B C<<E C<A	D<<E, A, B C<<E C<A, B

The same weed species were encountered as in the previous trial, but populations were generally higher. Fewer weeds survived close to the plants than in the first trial, presumably due to the better coverage afforded by the higher spraying rate.

Even at 8 lb. per acre CMU failed to produce any injury to the pineapple plants in treated plots.

IV. 1956 FIELD TRIALS.

Since the two trials at Maroochy Experiment Station had demonstrated that CMU was an effective and safe weedicide for use in pineapples, further trials were undertaken to obtain additional information on rates of application. These were carried out during 1956 as follows:—

(1) On a brown sandy loam at Woombye (Apr. 27, 1956.)

(2) On a reddish-brown sand at Curra, near Gympie (May 2, 1956.)

(3) On a red clay loam at Buderim (June 22, 1956.)

In these trials a commercial product ("Karmex W"), containing 50 per cent. CMU as a dispersible powder, was used. The treatments in all three trials were:—

(A) PCP 10 lb. per acre.

(B) CMU 2 lb. per acre.

(C) CMU 4 lb. per acre.

(D) CMU 6 lb. per acre.

(E) Control—untreated.

They were laid out 6 x 5 randomised blocks of plots 20 ft. by 6 ft.

The spraying rate was reduced to 200 gal. per acre, a rate intermediate between the two rates used previously.

Weed counts were made as before on the basis of 1 sq. yd. random quadrats, and the results are given in Tables 3 and 4. For the purposes of statistical analyses the log (1 + x) transformation was used, and the figures shown in the tables are the "equivalent numbers" calculated from the transformed data.

Table 3.

"Equivalent Number" of Grasses per Square Yard.

Treatment.	Woombye Apr. 27–Aug. 29 (123 Days).	Curra May 2–Sept. 7 (128 Days).	Buderim June 22–Aug. 29 (68 Days).
(A) PCP 10 lb./ac.	5	19	11
(B) CMU 2 lb./ac.	12	5	1
(C) CMU 4 lb./ac.	4	3	0
(D) CMU 6 lb./ac.	2	2	1
(E) Control	26	21	18
	D<<E, B C<<E	B, C, D<<E, A	B, C, D<<E, A

Table 4.

"EQUIVALENT NUMBER" OF OTHER WEEDS PER SQUARE YARD.

Treatment.	Woombye Apr. 27–Aug. 29 (123 Days).	Curra May 2–Sept. 7 (128 Days).	Buderim June 22–Aug. 29 (68 Days).
(A) PCP 10 lb./ac.	5	34	31
(B) CMU 2 lb./ac.	10	2	122
(C) CMU 4 lb./ac.	1	1	28
(D) CMU 6 lb./ac.	1	0	12
(E) Control	61	199	174
	C, D<<E, B A, B<<E	B, C, D<<A	D, C, A<<E, B

Much the same weed species were involved as in the Maroochy Experiment Station trials, except at Buderim, where the principal species were *Fumaria officinalis* (common fumitory) and *Eleusine indica*. Fumitory was the dominant weed; it germinated freely and appeared to be rather resistant to CMU and, to a lesser extent, to PCP.

V. DISCUSSION.

The results of these trials clearly show that effective control of all the species of weeds encountered may be obtained with CMU at 4 lb. per acre. No significant decrease in weed survival was achieved by increasing the rate of application to either 6 lb. or 8 lb. per acre. In three of the five trials, 4 lb. per acre was significantly better than 2 lb. per acre.

At 4 lb. per acre CMU gave better control of weeds than PCP, even where the dosage of the latter was increased to 20 lb. per acre, and it has the added virtue of being innocuous to handle. Because of its relative insolubility, however, it requires constant and thorough agitation during spraying.

VI. ACKNOWLEDGEMENTS.

Servicing of the field trials in 1956 was carried out by Messrs. E. L. Hastie and L. G. Trim, of the Horticulture Branch, under the direction of Mr. K. King, Senior Adviser in Horticulture, and this assistance is gratefully acknowledged. Mr. P. B. McGovern (Senior Biometrician) was responsible for the statistical analyses.

(Received for publication Nov. 21, 1958.)