

EFFECT OF 2,4-D PREPLANT SOIL SPRAYING ON THE ESTABLISHMENT OF *CENTROSEMA PUBESCENS*

A field trial in the 1962-63 season at the Queensland Department of Primary Industries Utchee Creek Sub-Station in North Queensland showed that under wet tropical conditions the last cleaning cultivation for broad-leaved weed control prior to the establishment of a mixed pasture of guinea grass (*Panicum maximum* Jacq.) and centro (*Centrosema pubescens* Benth.) could be safely replaced by various preplant herbicide treatments. 2,4-D was one of the herbicides which gave satisfactory results in this trial.

The pot experiment reported in this note was established to determine whether or not it is necessary for rain to fall before it is safe to plant centro in soil which has been sprayed with 2,4-D.

The herbicide used was a concentrated emulsifiable solution containing 50 per cent. w/v 2,4-dichlorophenoxyacetic acid present as the dimethylamine salt.

The soil was a red-brown sandy clay loam of basaltic origin. Analysis of a composite sample to 6 in. from the area in which the soil had been taken gave the following results:—

pH	5.5
Available P ₂ O ₅	18 p.p.m.
Replaceable K	0.12 m-equiv. per 100 g
Morgan Test NO ₃ Nitrogen	Low
Morgan Test NH ₃ Nitrogen	Low

A 2 x 2 x 2 factorial design arranged in a randomized block of three replicates was used. The factors tested were:

- S0—No spray
- S1—2,4-D at 2 lb of acid equivalent per ac
- I0—No surface irrigation immediately after spraying
- I1—Surface irrigation with 1 in. of water immediately after spraying
- T0—Planted immediately after spraying and irrigating
- T1—Planted 7 days after spraying and irrigating

Free-draining 8½-in. dia. plastic pots were filled to a depth of 2½ in. with crushed metal. Each pot was then filled with 8 lb of air-dried soil which had passed through a ⅜-in. sieve. All pots were surface-watered with an excess of tap-water the day prior to spraying and allowed to free drain.

The herbicide concentrate was mixed with water and applied to the surface of the sprayed pots on March 14, 1963, with an Oxford Precision Sprayer at 20 gal per ac and 25 lb per sq. in. through flat fan nozzles. Rain immediately after spraying was simulated by rapid surface irrigation of the irrigated pots with tap-water.

To avoid surface watering during the first weeks of the experiment the pots were sub-irrigated by burying the lower 5 in. of each pot in two wooden boxes (3 ft x 3 ft x 1 ft) which had been partially filled first with a 3-in. layer of river sand, followed by a 3-in. layer of crushed metal, and finally a 3-in. layer of sand (Figure 1). The sand and metal in the boxes was kept in a near-saturated condition by frequent watering with tap-water. The boxes containing the pots were sheltered from the weather in a lath-house.

The T0 planting was made on March 14, 1963. Thirty-five scarified seeds of commercial centro which had been inoculated with the appropriate *Rhizobium* strain were planted at 1 in. x 1 in. spacings at a depth of approximately $\frac{3}{4}$ in. A hole for each individual seed was made with the unsharpened end of a lead pencil and the soil returned over each seed by pressing with a stick. Care was taken to ensure that 2,4-D was not transferred from sprayed to unsprayed pots at planting time. The T1 group was planted in the same way on March 21, 1963.



Fig. 1.—The experiment in progress. The pots were sub-irrigated through sand-boxes.

Four plants were retained in each pot by thinning at random one week after each planting. Seedlings which emerged after the initial thinnings were clipped off at the soil surface. The original plants remained alive in all treatments except in TOSIT1, where one died, and TOSII0, where three died (totals of the three replicates).

Supplementary surface waterings were made to each pot on four occasions, namely April 23 (1.72 in.), April 26 (0.86 in.), May 7 (0.43 in.) and May 10 (0.43 in.). The top growth of living plants was harvested on May 21, 68 days after applying the spray treatments, dried at approximately 95°C and weighed.

Table 1 shows that planting centro seed immediately after spraying suppressed the dry-matter yield of top growth by 74 per cent. over a growing period of 68 days. However, by delaying planting for 7 days after spraying the suppression in yield was reduced to 36 per cent. over a growing period of 61 days. There was no significant difference in dry-matter yield between sprayed treatments which received surface irrigation after spraying and those which did not.

TABLE 1
EFFECT OF TREATMENTS ON DRY-MATTER YIELDS
(g/pot)

Factor	S0	S1	Means
T0	1.197	0.310	0.753
T1	1.033	0.658	0.846
Factor	I0	II	
T0	0.615	0.892	
T1	0.823	0.868	
S0	1.025	1.205	1.115
S1	0.413	0.555	0.484
Means	0.719	0.880	0.800
Necessary differences for significance	Marginal	Individual	
	0.183	0.259	
	0.254	0.359	

S0 significantly greater than S1 at 1 per cent. level. The interaction term T×S is highly significant due to the fact that the difference between S0 and S1 is more marked with T0 than T1

The effect of treatments on trifoliolate leaf numbers is given in Table 2. Planting centro seed immediately after spraying reduced the number of expanded trifoliolate leaves by 53 per cent. However, seed planted 7 days after spraying showed a reduction of only 1 per cent. Again, there was no significant difference between sprayed treatments which received surface irrigation after spraying and those which did not.

TABLE 2

EFFECT OF TREATMENTS ON TRIFOLIATE LEAF NUMBERS
(No. of expanded trifoliolate leaves per pot at harvest*)

Factor	Transformed Means			Equivalent Means		
	S0	S1	Means	S0	S1	Means
T0	5.170	3.542	4.356	26.7	12.6	19.0
T1	4.502	4.471	4.487	20.3	20.0	20.1
Factor	I0	I1		I0	I1	
T0	4.122	4.590		17.0	21.1	
T1	4.397	4.577		19.3	21.0	
S0	4.789	4.884	4.836	22.9	23.8	23.4
S1	3.730	4.283	4.007	13.9	18.4	16.0
Means	4.259	4.584	4.421	18.1	21.0	
Necessary differences for significance	Marginal 0.505 1% 0.701	Individual 0.715 0.992				

* Only living plants at harvest counted

S0 significantly greater than S1 at 1 per cent. level. The T × S interaction is highly significant the S effect occurring only with T0

Analysis of variance showed that there was no significant difference between treatments in the total number of plants which had emerged up to the time of harvest.

These results indicate the need for delaying the planting of centro seed in red basaltic soil which has been treated with 2,4-D. Further field trials are necessary to determine the optimum period of delay under wet tropical conditions. It can be expected that rainfall of 1 in. or less following spraying would have little or no effect in reducing the toxicity of 2,4-D on centro planted in red basaltic soil which had been treated with 2,4-D.

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