WEED CONTROL IN BRASSICA, FODDER BEET AND MANGOLD CROPS

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Summary

Satisfactory weed control and crop yields have been obtained in brassicas treated with nitrofen, trifluralin and DCPA. Diphenamid, ametryne and sodium chloroacetate treatments were less successful.

Fodder beet crops treated with mixtures of OMU/BIPC, propham plus endothal and propham plus sodium trichloroacetate, have given yields equal to hand weed control. Other materials screened for possible use in these crops gave less satisfactory results.

AS A PART of the continuing search for weedicides suitable for use in brassica and beet crops the trials described in this paper were conducted on Wanganui clay loam at the Dept. of Agriculture Experimental Area, Marton. In all of the trials discussed, treatments were replicated in randomized blocks and applied in water at 45 or 50 gal/ac. Treatment rates are given in terms of active ingredient per acre.

BRASSICAS

Two trials were conducted. Treatments are shown in Tables 2 and 3 and other details are given in Table 1.

TABLE 1: BRASSICA TRIALS — SOWING, SPRAYING AND
RAINFALL DATA

	<i>Trial A</i>	<i>Trial B</i>
Seed sown	Nov. 9, 1962	Feb. 8, 1963
Sprayed, pre-em.	Nov. 9, 1962	Feb. 8, 1963
Sprayed, post em. (2 to 3 leaf)	Nov. 29, 1962	March 2, 1963
Sprayed, post-em. (4 to 6 leaf)	Dec. 10, 1962	March 20, 1963
Soil condition at sowing	Moist	Dry
Rainfall after spraying (in.)		
Pre-em. 0 to 5 days	Nil	0.50
Pre-em. 6 to 17 days	Nil	2.00
Post-em. (2 to 3 leaf) 0 to 2 days	1.30	0.30
Post-em. (4 to 6 leaf) 0 to 2 days	Nil	Nil

Treatments in the spring Trial A were applied across parallel sowings of turnip, choumoellier and swede, while in Trial B the crop treated was choumoellier. Weed infestation in both trials was light to moderate, the main species in Trial A being redshank (*Polygonum persicaria*) with some nightshade (*Solanum nigrum*), fathen (*Chenopodium album*), redroot (*Amaranthus hybridus*) and a few spurrey (*Spergula arvensis*). In Trial B the dominant species was spurrey with some nightshade and dock (*Rumex obtusifolius*).

RESULTS

Choumoellier yields, and an indication of weed control are given for Trial A, sampled May 8, 1963, and for Trial B, sampled May 6, 1963, in Tables 2 and 3 respectively. All rates are given in lb active ingredient per ac.

TABLE 2: TRIAL A: CHOUMOELLIER YIELDS AND WEED CONTROL

<i>Treatments (lb)</i>	<i>Green wt. (tons per acre)</i>	<i>Plants per 10 ft. row</i>	<i>Weed Control</i>
Diphenamid 6 pre-em.	13.3 b A	51 ab A	V. Poor
DCPA 8 pre-em.	14.2 b A	45 b A	V. Poor
Ametryne 1 pre-em.	15.4 ab A	50 ab A	Nil
Trifluralin 4 pre-em.	16.9 ab A	53 a A	F. Good
Trifluralin 8 pre-em.	18.5 a A	49 ab A	Good
Nitrofen 4 post-em. (2 to 3 leaf)	17.0 ab A	52 ab A	Excellent
Sodium chloroacetate 12.5 post-em. (4 to 6 leaf)	13.6 b A	50 ab A	Good
Unweeded control	16.3 ab A	52 ab A	
C.V.	20.1%	12.2%	

TABLE 3: TRIAL B: CHOUMOELLIER YIELDS AND WEED CONTROL

<i>Treatments (lb)</i>	<i>Green weight (tons per ac.)</i>	<i>Plants per 10 ft row</i>	<i>Weed Control</i>
Diphenamid 6 pre-em.	5.9 d B	13 de BC	Poor
DCPA 8 pre-em.	8.4 abc AB	16 bcde ABC	Good
Ametryne 1 pre-em.	6.2 d B	11 e C	Poor-Fair
Trifluralin 4 pre-em.	10.2 a A	18 abcd ABC	F. Good
Trifluralin 8 pre-em.	8.0 c AB	15 cde ABC	Good
Nitrofen 2 post-em. (2 to 3 leaf)	10.1 ab A	20 abc AB	Fair
Nitrofen 4 post-em. (2 to 3 leaf)	9.4 abc A	21 ab AB	Good
Nitrofen 4 post-em. (4 to 6 leaf)	9.0 abc A	20 abc AB	Poor
Sodium chloroacetate 12.5 post-em. (4 to 6 leaf)	8.2 bc AB	19 abcd AB	Poor-Fair
Unweeded Control	10.1 ab A	22 a A	
C.V.	15.6%	23.6%	

Analyses of plant numbers and yield data from the turnip and swede section of Trial A gave results very similar to those shown for choumoellier in Table 2, indicating no important differences between the three crops in tolerance to any of the weedicides.

Crop damage by diphenamid and ametryne was sharply increased by rainfall after application but weed control, except of spurrey, remained inadequate. Under dry conditions ametryne was completely ineffective against weeds but diphenamid gave some control of redroot. DCPA had a moderate effect on the crops in both trials. Weed control in the absence of post-application rain was negligible but with reasonable rainfall the material appeared effective against spurrey, nightshade and dock but weak on redshank. With a period of dry weather after application trifluralin had no effect on the brassicas, but rainfall at this stage considerably increased damage by the higher rate. Weed control by 8 lb was good regardless of rainfall, and indications are that in average conditions 4 lb will give satisfactory control of most species except nightshade. Post-emergen nitrofen had little effect on brassica numbers or yield. Control of all weed species was excellent except for some weakness against spurrey, which survived 2 lb at the early treatment stage and 4 lb later. Sodium chloroacetate caused slight, but no significant, crop damage and gave poor control of spurrey and fathen.

At the 4 to 6 leaf stage in both trials, prometryne 1 lb and ametryne 1.5 lb were applied to Trial A and ametryne 0.75 and 1.0 lb to Trial B, but crop damage was so severe that no yields were obtained. Weed control by both materials at all rates was excellent.

FODDER BEET AND MANGOLD

MAIN TRIAL

Parallel sowings of Rex Fodder beet and Yellow Globe mangold were drilled on October 24, 1962, and the treatments shown in Tables 4 and 5 applied, "Tillam" and "Tillam" plus CDEC being incorporated into slightly moist soil immediately prior to sowing. Post sowing, pre-emergent treatments were applied on October 27, 1962, to soil saturated by 1.00 in. rain which fell in the period between sowing and spraying. A further 1.00 in. of rain was fairly evenly distributed over the 10 days after pre-emergent treatment. Beet and mangold plants were counted and thinned, and the interrow spaces on all treatments rotary hoed. A fairly severe infestation of spurrey, redshank, nightshade and hawksbeard (*Crepis capillaris*) with some redroot and fathen occurred in the trial area.

RESULTS

Plant counts and yield data from both crops harvested on April 28-29, 1963, are given in Tables 4 and 5.

TABLE 4: FODDER BEET — YIELDS, PLANT NUMBERS AND WEED CONTROL

Treatment (lb)	Green weight (tons per ac.)	Plants per 10 ft row before thinning	Weed Control
"Tillam" 4	16.0 c	D36 bcd AB	Poor
"Tillam" 6	20.1 b	CD37 abc AB	Fair
"Tillam" 4 + CDEC 4	21.4 b	BCD29 d B	Fair
OMU/BIPC 2.5	26.9 a	AB 30 cd B	Excellent
Chlorpropham 4	18.1 bc	D30 cd B	Fair
Propham 4 + Endothal 5	26.0 a	AB 39 ab AB	Excellent
Propham 4 + sodium trichloracetate 10	25.8 a	ABC 38 abc AB	Good
Weeded control	27.4 a	A 45 a A	Good
Control	8.0 omitted	43 ab A	
C.V.	15.2%	18.3%	

TABLE 5: MANGOLD — YIELDS, PLANT NUMBERS AND WEED CONTROL

Treatment (lb)	Green weight (tons per ac.)	Plants per 10 ft row before thinning	Weed Control
"Tillam" 4	19.9 c B	43 ab A	Poor
"Tillam" 6	21.4 bc B	44 ab A	Fair
"Tillam" 4 + CDEC 4	26.2 ab AB	37 b A	Fair
OMU/BIPC 2.5	26.0 ab AB	25 c B	Excellent
Chlorpropham 4	21.5 bc B	42 ab A	Fair
Propham 4 + Endothal 5	31.1 a	A 48 a A	Excellent
Propham 4 + sodium trichloracetate 10	30.4 a	A 45 ab A	Good
Weeded control	29.9 a	A 48 a A	Good
Control	9.6 omitted	47a A	
C.V.	18.4%	16.5%	

At harvest unweeded control was the only treatment with significantly lower fodder beet and mangold numbers.

"Tillam" was a relatively ineffective weedicide which, without inter-row cultivation, would have been of little value. It eliminated

spurrey but competition from inadequately controlled redshank and nightshade reduced yields. When combined with CDEC the improvement in control of redshank and nightshade more than compensated for the increased crop damage, but cultivation was again an important contributing factor to weed control and consequent yield. Fodder beet appeared to be more sensitive than mangold to both materials, CDEC in particular.

The fairly severe effect of the OMU/BIPC mixture on crop numbers was largely cancelled out by thinning, while recovery from early growth retardation was encouraged by the excellent weed control. Interrow cultivation, as a weed control measure, appeared quite unnecessary as the treatment seemed capable of maintaining weed-free conditions to a late stage of crop development. Chlorpropham gave good long-term control of most weed species except hawksbeard and associated flat weeds but caused fairly marked reductions in fodder beet numbers and yield. The effect on mangold numbers was slight but yield suffered a highly significant reduction. The reduction of flatweed competition by interrow cultivation was probably of considerable advantage to the treatment.

The mixture of propham plus endothal was slightly superior, both in crop tolerance and weed control, to the propham plus sodium trichloracetate mixture, but results from both treatments were highly satisfactory.

SCREENING TRIAL

This was laid down on fodder beet and mangold sown on October 24, 1962, with treatments applied pre-emergent on October 27, 1962, and therefore subject to the same weather conditions as the main trial. Treatments were diphenamid 4 and 8 lb, trifluralin 4 and 8 lb, linuron 0.5 and 1 lb, "Tenoran" 1 and 2 lb, G34698 1 lb and prometryne 1.5 lb. Plant counts and yield data were obtained but because of extreme variability the latter were of little value.

With the exception of diphenamid all treatments had a severe effect on both crops and caused highly significant reductions in plant numbers. Diphenamid's relative lack of toxicity to the crop was cancelled out by its inefficiency as a weedicide. The only species reasonably controlled even at 8 lb was spurrey.

Both of the triazines gave very good weed control but prometryne entirely eliminated the crops and G34698 reduced numbers by approximately 70%. Linuron 0.5 lb, "Tenoran" 1 lb and trifluralin 4 lb all reduced plant numbers on both crops by 40 to 50%. Weed control by linuron and trifluralin was fairly good but that by "Tenoran" was poor even at 2 lb.

DISCUSSION

The search for a weedicide for use in brassica crops appears to be meeting with some success. Nitrofen, because of its advantages as a post-emergent treatment, its apparently wide weed control spectrum and fairly low level of crop damage at an early stage of growth, is the most promising material for use in these crops. Trifluralin and DCPA are of interest and require further evaluation against nitrofen. Trifluralin is preferred to DCPA because it is comparatively unaffected by variations in soil moisture levels. Diphenamid and ametryne are of little value because of their dependence on adequate soil moisture, and relatively poor weed control at rates safe to the brassica crop. Diphenamid, however, should be further tested in areas where redroot is the main problem. Post-emergently applied triazines at the rates so far tested are much too severe on the crops but, in view of the excellent weed control obtained, lower rates may be worth further study.

In fodder beet and mangold the protham/endothal mixture was on balance the most promising of the materials tested, giving excellent weed control combined with negligible crop damage and highly satisfactory yields. Weed control by OMU/BIPC was equally good but initial crop damage was too high for safe recommendation. Most of the other materials tested in these crops had little promise either because of inadequate weed control or poor crop tolerance.

The value of interrow cultivation as an adjunct to weedicide treatment and also the ineffectiveness of such cultivation without herbicidal support were demonstrated.

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