WEED CONTROL IN LINSEED

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Summary

Field trials and farmer assessments of herbicides and herbicide mixtures for the selective control of broadleaf weeds in linseed are discussed. Although finite conclusions could not be drawn, it would appear that a truly selective herbicide with acceptable weed control activity has yet to be developed. Linuron and dicamba/MCPA mixtures appear worthy of further evaluation. The tolerance of linseed to MCPA is discussed.

INTRODUCTION

WITH an average annual sowing of not more than 15,000 acres, linseed is one of the minor agronomic crops in New Zealand. Because of this, the obvious deficiencies of the accepted herbicide MCPA has largely been ignored by research workers. However, Leonard (1965) indicated that the compounds linuron, the unnamed triazine G34,698 and mixtures of dicamba or picloram with MCPA were worthy of further evaluation, particularly for the control of the problem weeds spurrey (*Spergula arvensis*) and *Polygonum* spp. During 1965-6, a series of replicated field trials were conducted in Canterbury and Taranaki to further study these and other candidate compounds. Farmer-scale field assessment was also carried out in Canterbury with linuron and with dicamba/MCPA and picloram/MCPA mixtures.

EXPERIMENTAL

In the small-scale trials, treatments were applied to randomized, replicated 31 ft × 7 ft plots with an Oxford Precision Sprayer applying 64 gal per acre at 30 lb/sq. in. pressure. Visual assessments were made on a 0-10 scale (0 = no effect, 10 = complete effect) and are the mean of two or more observers. Yield data were obtained by a Poynter small plot harvester. Treatments are shown in oz active ingredient per acre.

RESULTS

Trial A was laid on an Ashburton peat loam. At the time of treatment, the crop was 3 to 6 in. in height. The predominant weeds were redshank (*Polygonum persicaria*), fathen (*Chenopodium album*) and sorrel (*Rumex acetosella*). The weeds were at the 3- to 6-leaf stage and both crop and weeds were in active growth. Visual observations and yield data are shown in Table 1.

Acceptable crop selectivity was shown by linuron and G34,698 at all rates used in this trial. Both dicamba/MCPA mixtures and the low rate of picloram 0.6/MCPA 9 showed marginal selectivity. The mixture of picloram 0.8/MCPA 12 and 2,4-DB proved noticeably phytotoxic to the crop.

TABLE 1: TRIAL A

Sown: October 11, 1965 Treated: November 21, 1965
Harvested: March 9, 1966

<i>Treatment</i> (oz)	<i>Crop Vigour</i> 3 weeks	<i>Crop Vigour</i> 6 weeks	<i>Weed Control</i> 3 weeks	<i>Yield</i> (cwt/ac)
Linuron 8	8.8	8.4	3.0	18.3
Dicamba 1.5/MCPA 9	7.8	7.3	8.8	16.9
Linuron 4	9.2	8.3	2.4	16.2
Picloram 0.6/MCPA 9	8.7	7.8	5.8	15.9
MCPA 12	8.3	7.6	5.2	15.8
2,4-DB 24	7.7	6.5	4.6	15.6
G34,698 12	9.4	8.3	2.8	15.0
G34,698 6	9.4	8.9	2.3	15.0
Dicamba 2/MCPA 12	7.7	7.0	8.8	14.6
Control	9.8	9.5	0	14.5
Picloram 0.8/MCPA 12	6.8	6.3	7.6	12.8

No significant differences.

The superior weed control given by the dicamba/MCPA mixtures was particularly noticeable on redshank but the picloram/MCPA mixture was surprisingly ineffective on this weed. All other treatments gave poor weed control and weeds were present in sufficient density at harvest to probably affect seed quality. The peat soil proved variable in fertility and moisture retentiveness, and yield data did not show significant differences.

An extremely heavy infestation of redshank was present in Trial B. Other weeds present were docks (*Rumex* spp.) and fathen. At the time of treatment, the crop was 3 to 8 in. in height and the weeds ½ to 4 in. in height. This could be regarded as a "salvage type" situation. Weed control ratings are shown in Table 2. Unfortunately, cattle invaded the area, precluding the collection of reliable yield data.

TABLE 2: TRIAL B

Sown: October 2, 1965 Treated: November 24, 1965

<i>Treatment</i> (oz)	<i>Weed Control</i> (3 weeks)
Dicamba 1.5/MCPA 9	6.6
Dicamba 2/MCPA 12	6.6
Picloram 0.8/MCPA 12	4.4
Picloram 0.6/MCPA 9	4.0
2,4-DB 24	3.9
G34,698 12	2.4
G34,698 6	1.4
Linuron 8	1.1
MCPA 12	0.8
Linuron 4	0.3
Control	0.3

Dicamba/MCPA mixtures again showed the greatest herbicidal activity. Picloram/MCPA mixtures gave good control of fathen and docks but were less effective on redshank. All other treatments gave inadequate control of these more advanced weeds.

Field-scale farmer assessment of mixtures of 1½ to 2 oz dicamba and 9 to 12 oz MCPA have consistently given very acceptable control of polygonaceous weeds and spurrey. However, under certain moisture and fertility stresses yet to be defined, severe crop damage has occurred. This has been more noticeable where spray overlapping has resulted in increased dosages. Mixtures of ½ to 1 oz picloram and 9 to 12 oz MCPA have given good control of cornbind (*Polygonum convolvulus*) and spurrey but have been generally unsatisfactory on redshank. 2,4-DB has given variable weed control and crop damage has been reported when moisture stress has followed treatment. Linuron has given good control of spurrey but appeared less effective on well-established polygonaceous weeds. Crop selectivity appeared marginal at rates of linuron in excess of 6 oz, but there is some evidence that application when the crop is less than 3 in. in height improves both crop selectivity and weed control.

In preliminary screening trials in Taranaki, the octanoyl ester of bromoxynil, bromacil and the potassium salt of an MCPA methoxyacetamide have shown some selectivity on linseed in logarithmic applications. Further work will be required to ascertain whether crop tolerance will be satisfactory at herbicidally effective rates.

CONCLUSIONS

Although MCPA has for many years been the accepted herbicide for linseed, crop tolerance may not be entirely satisfactory at normal rates of application. Symptoms of crop damage are frequently evident shortly after treatment and often persist until harvest. Because of this lack of selectivity, the crop tolerance data obtained from the present mixtures of dicamba and picloram with MCPA are not true reflections of the relative selectivity of dicamba and picloram. Crop tolerance may be improved by reducing the rate of MCPA applied in the mixtures.

In particular, the herbicidal activity of dicamba justifies further evaluation of this compound as a linseed herbicide. Definition of the conditions under which crop tolerance declines will be necessary before commercial usage of dicamba can be recommended. Minimal rates of MCPA, sufficient only to supplement the low rates of dicamba tolerated by the crop and to control dicamba-tolerant weeds should be evaluated.

The inability of low rate picloram/MCPA mixtures to adequately control redshank virtually precludes their use as versatile linseed herbicides. This contrasts with the activity against cornbind of picloram alone or in mixtures with MCPA seen in New Zealand and reported in Australia (Ferguson and Klose, 1965) and from Canada (Molberg, 1965).

When applied as a post-emergent herbicide, linuron is known to be much more effective on seedling than well-established weeds. With linseed, crop tolerance may also be greater from early application. Linuron has already shown sufficient promise as a linseed herbicide to warrant further evaluation.

The commercial future of G34,698 is uncertain and does not justify any intensification of research effort.

2,4-DB appears to be marginally selective under some conditions and inadequate as a herbicide when weeds are in an advanced stage of growth.

Because of a fall in the price of linseed, this crop may no longer be an economic proposition on light land. Production may in future be confined to more fertile soils where intensified and more varied weed problems will be encountered. The need for improved herbicides will become more acute.

Although the data obtained during 1965-6 are not conclusive, it would appear that a truly selective linseed herbicide with acceptable activity against the full spectrum of problem weeds has yet to be developed. Candidate compounds and mixtures previously reported have all failed to meet requirements under all conditions in 1965-6.

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