WILD OAT CONTROL IN LINSEED

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Summary

Asulam, barban and difenzoquat are compared for post emergence wild oat (*Avena fatua*) control in linseed (*Linum usitatissimum*). All chemicals produced visible effects on the crop and some recovery of wild oats occurred following all treatments. Asulam 1.0 and 1.5 kg/ha and difenzoquat 0.8 and 1.2 kg/ha gave adequate yield insurance control in the presence of moderately heavy infestations of wild oats. Barban allowed a considerable amount of regrowth without yield benefit. Tank mixture of asulam or difenzoquat with an MCPA/bromoxynil emulsifiable formulation gave satisfactory control of both wild oats and broad-leaved weeds.

INTRODUCTION

Although only a slight problem in terms of area infested, wild oat (*Avena fatua*) is a concern to growers in intensively cropped areas where linseed (*Linum usitatissimum*) is a profitable spring crop. Tri-allate and trifluralin are occasionally used for control but some plants escape the chemicals and grow normally.

Barban has been used but is unreliable both in wild oat control and crop tolerance. In a search for better wild oat seed suppression and more effective post emergence control, asulam plus wetting agent, as developed in Canada (Chow 1972), and difenzoquat have been compared in the last two seasons. The mixing of these two chemicals with broad-leaved weed herbicides was also investigated. The trials were conducted in the Lowcliff district of Mid-Canterbury.

METHOD

The treatments, set out in the accompanying tables, were applied with a bicycle wheel mounted, hand pushed, compressed air operated spray boom. Barban and asulam were applied in 100 litres/ha and difenzoquat and the broad-leaved herbicide mixtures in 200 litres/ha. Wetting agent ('Citowett') was added to the spray solution at 0.5% with difenzoquat and 0.125% v/v with asulam while in trial CB4/3 an asulam product formulated with wetting agent was included.

A randomised block layout was used with plots 2 m wide by 10 or 20 m long. Plots were sampled and hand threshed in 1974 and direct headed in 1975. Because of uneven ripening and poor drying conditions, trial CB4/3 plots were desiccated with diquat before harvest.

RESULTS AND DISCUSSION

The chemicals all produced visible effects on the linseed.

Barban checked growth and the apical leaves deflexed forming a rosette until growth resumed. At 0.45 kg/ha many of the primary shoots were killed, subsequent growth being from cotyledonary buds. Harvest delay was estimated at 7-10 days compared with untreated.

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Crop Weeds

Asulam caused yellowing of the foliage after about 10 days with marginal leaf scorch at rates above 1.0 kg/ha. Some reduction in height was observed at harvest and delay in maturity was estimated at 7 days for 1.0 kg/ha and 3 weeks for 2.0 kg/ha. Difenzoquat caused pale blotching of leaves which enabled plots to be distinguished by a yellowish tinge for about a week, 1-2 weeks after treatment. No height or maturity difference was observed at harvest. In observation strips, benzoylprop-ethyl, flufenprop-methyl and flufenprop-isopropyl virtually stopped linseed growth, the plants eventually reaching a length of about 10 cm and producing a single boll.

TABLE 1: WILD OAT COUNTS AND CROP YIELD, TRIAL CB4/1

Treatment	kg/ha	Applied 25 days after sowing		Applied 31 days after sowing	
		Wild oat plants/m ²	Yield % of untreated	Wild oat plants/m ²	Yield % of untreated
barban	0.3	20 cd	98 ef	27 bc	113 cde
barban	0.45	15 de	70 f	20 cd	105 def
asulam	1.0	8 e	194 a	16 de	124 cde
asulam	1.5	7 e	174 b	6 e	143 bcd
difenzoquat	0.4	37 b	131 cde	30 bc	138 bcde
difenzoquat	0.8	10 de	131 cde	10 de	147 bc
untreated				48 a	100 ef
untreated yield	1330 kg/ha			32	23
CV %					

Stage of growth:

25 days: wild oats, 90% 2-3 leaf; linseed, 9-11 leaf, 7 cm.

31 days: wild oats, 30% 3½ leaf +; linseed, 16-18 leaf, 9.5 cm.

Planted: 19/10/74; wild oats counted: 3-5/3/75.

Duncan's letters compare both application dates.

TABLE 2: WILD OAT COUNT, YIELD AND SEED WEIGHT, TRIAL CB4/3

Treatment	kg/ha	Wild oat plants/m ²	Spikelets/m ²	1000 seed wt.	
				Yield % of untreated	% of untreated
*asulam	1.0	23 bc	258 c	111 a	97 b
*asulam	1.5	13 cd	112 de	110 a	94 c
*asulam	2.0	4 d	48 ef	109 a	95 c
†asulam	1.0	22 bc	277 c	110 a	100 a
†asulam	2.0	3 d	12 f	104 ab	93 d
difenzoquat	0.4	26 b	328 b	110 a	100 a
difenzoquat	0.8	12 cd	142 d	111 a	100 a
difenzoquat	1.2	10 cd	89 def	111 a	99 a
untreated		62 a	1915 a	100 b	100 a
untreated yield				2610 kg/ha	7.29 g
CV %		46	30	5.4	1.4

Stage of growth: wild oats, 75% 3½ - 4½ leaf; linseed, 15-20 leaf (9-10 cm)

Planted: 29/10/75; treated: 27/11/75 (29 days post sowing); counted 27/2/76.

* as 'Asulox' + 'Citowett'. † as 'Asulox F' formulation.

Initially all wild oat control treatments stopped wild oat growth and killed the primary tiller. Subsequently re-growth occurred from the base of some plants in all treatments. All treatments reduced wild oats significantly when compared with untreated (Tables 1 and 2) but because of sampling variability the statistical analyses did not separate the treatments into clearly defined groups. However, when ranked on the basis of plant numbers, the treatment order corresponded with field observation and within test chemicals was consistently the inverse of rate of application. Panicles at or above the level of the crop at harvest in the barban, difenzoquat 0.4 kg/ha and asulam 1.0 kg/ha late in trial CB4/1 rendered these treatments visually unacceptable. At the other end of the scale, in trial CB4/3 (Table 2), though difenzoquat 0.8 kg/ha and 1.2 kg/ha and asulam 1.5 kg/ha did not differ significantly from asulam 2.0 kg/ha in plant numbers, the asulam 2.0 kg/ha plots were visually superior through absence of wild oat panicles above the crop.

In terms of spikelets (Table 2) the asulam 1.0 kg/ha treatments were superior to difenzoquat 0.4 kg/ha but inferior to the higher rates of asulam and difenzoquat. Assuming 2 grains per spikelet the grain produced on the asulam 2.0 kg/ha ('Asulox F' formulation) plots would have been insufficient to replace the originating population.

The yield figures (Tables 1 and 2) are only a guide to the consequences of the wild oat control. The marked difference in response between the best treatment in trial CB4/1 (+94%) and in trial CB4/3 (+11%) may have been caused by differences in competitive stress between seasons since the trial CB4/3 untreated yield was 95% more than that of trial CB4/1. Both crops were watered twice, the first occasion 50 days after sowing. However, in the 3 weeks before the first watering, trial CB4/1 received less than 1 mm of rain while trial CB4/3 received 18 mm, 12 mm in a single fall. Consideration of the asulam treatments in trial CB4/1 (Table 1) suggests that about half the benefit of spraying asulam occurred in the period between the first and second spraying (24 as against 31 days after sowing). Thus the four days longer between sowing and spraying (29 days) and the observed greater maturity of the wild oats (75% at 3½ leaf stage or older) could also account in part for the lesser response in trial CB4/3.

The significantly lower seed weight (Table 2) for some of the asulam treatments may be a consequence of the differences of maturity when the crop was desiccated and may have disappeared had the plots ripened naturally. The effect requires investigation.

Tank mixtures of wild oat and broad-leaved herbicides produced some contrasting effects (Table 3).

TABLE 3 : WILD OAT SCORE FOLLOWING APPLICATION OF MIXTURES OF WILD OAT AND BROAD-LEAVED HERBICIDES

Herbicide	kg/ha	Trial CB 4/2	None 0	Trial CB 4/4	difenzo- quat 0.8
		asulam 1.0		asulam 1.0	
MCPA	0.6)				
atrazine	0.4)	5.5	7.5 a	4.0 bc	2.6 ed
MCPA	0.4)				
bromoxynil	0.4)	3.0	7.2 a	1.5 de	1.1 e
MCPB	1.2	—	7.8 a	4.6 b	3.9 bc
None	0	3.5	—	4.0 bc	1.0 e
CV %		—	27.7		

Growth stage: CB 4/2, 30% 3½ leaf +; CB 4/4, 75% 3½ - 4½ leaf.
Score: 0 = no wild oats, 10 = panicles almost concealing crop.
Treatment date: CB 4/2, 19/11/74; CB 4/4, 1/12/75.

Crop Weeds

The asulam, MCPA, atrazine mixture was markedly less effective in controlling wild oats than asulam alone in 1974 and similar in effect in 1975. Difenzoquat was also less effective in this mixture while the addition of MCPB reduced the effectiveness of both wild oat herbicides. The combination of MCPA plus bromoxynil with asulam or difenzoquat markedly improved wild oat control. This enhancement occurred both with and without additional wetting agent.

Broad-leaved weed control was not affected. However, in CB4/3 which was oversprayed with MCPA the day after applying the wild oat herbicides, cornbind (*Polygonum convolvulus*) was controlled in asulam plots but not in difenzoquat and untreated plots.

CONCLUSIONS

The trials indicate that yield-ensurance control can be obtained in linseed crops moderately heavily infested with wild oats by the use of 1.0 and 1.5 kg/ha asulam or 0.8 to 1.2 kg/ha of difenzoquat. The treatments should be applied when the wild oats are at the 2-4 leaf stage of growth, asulam being applied somewhat earlier than difenzoquat.

When wild oat seed suppression sufficient to deplete soil seed reserves is sought, asulam at 2.0 kg/ha appears promising. It will be necessary to determine whether, in the absence of irrigation, the linseed will recover from the initial check by the higher rates of chemical required.

In view of the favourable results with asulam and difenzoquat and the poor yield and considerable wild oat recovery in the barban treatments, barban can no longer be recommended for post-emergence wild oat control in linseed.

When both wild oat and broad-leaved weed control is required, spray tank mixtures of asulam or difenzoquat with MCPA/bromoxynil formulations appear promising.

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REFERENCE

- Chow, P. N. P., 1972. Asulam — a new wild oat control herbicide in flax. *Proc. North Central Weed Control Conf.*: 27-39.