CONTROL OF NIGHTSTOCK IN CEREALS AND LEGUMES

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Summary. The cruciferous weed nightstock was not well controlled before 1987 in cereal and grain legume crops because of the poor efficacy of herbicides available commercially for these crops. The new herbicide diflufenican gave good control (at 75g/ha) in most situations in field experiments over 3 years. In cereals, addition of MCPA ester and diuron to diflufenican allowed the rate of diflufenican to be reduced (to 8 g/ha). However, yield of wheat was significantly less with this treatment. The experimental herbicide imazethapyr also gave good control of nightstock in field peas.

INTRODUCTION

Nightstock (*Matthiola longipetala* ssp. *bicornis*) is a cruciferous weed of crops and pastures in sandy soils in the Mid-North and Yorke Peninsula in South Australia. It is a problem weed in these areas because it produces dense stands, competing with crops. As well, it matures relatively late in the season and green pods of nightstock contaminate harvested grain samples.

The main problem with this weed has been that herbicides (such as diuron + MCPA amine, bromoxynil MCPA, metribuzin or metsulfuron methyl) that control other cruciferous weeds in young cereal crops are ineffective against this weed. The hormone herbicides 2,4-D ester and 2,4-D amine, at the highest recommended rates for cereals, stunt the plants and stop seed set but do not prevent competition to crops before application at tillering. In peas there have been no effective herbicides. Diuron and metribuzin alone give poor control and hormone herbicides such as MCPA sodium and MCPB amine are ineffective. Nightstock was controlled very well with a diflufenican/bromoxymil/MCPA ester formulation used in a field experiment in 1986. Some (commercially relevant) combinations of these chemicals and others have been tested further in field experiments in wheat, barley and peas and results are reported here.

METHODS

Control of nightstock was assessed in field experiments in wheat (1987), barley (1988) and field peas (1989). These were in infested areas in commercial crops. Herbicides were applied using a hand-held spray boom in 100 l water/ha using SS11001 nozzles at 220 kPa pressure. Plots measured 1.9x20m. Treatments were repeated 4 times in a randomized complete block design. Herbicides used were Brodal (500g/l diflufenican), Tigrex (25 g/l diflufenican + 250g/l MCPA ester), Diurex (500 g/l diuron) and SN106664 (200g/l imazethapyr). Wetting agent (0.05% v/v a.i.) was added to post-emergence applications of SN106664 only. Crop and weed growth stages at application are shown in Table 1. The soil type was a mallee sand.

RESULTS AND DISCUSSION

Diflufenican controlled nightstock very well at rates of 75 g/ha or above, but not in all situations (Table 1). The failure to control the weed post-emergence in 1989 cannot be readily explained. Addition of diuron or MCPA ester gave good control with lower rates (down to 25 g/ha) of diflufenican. Addition of both gave very good control with only 8 g/ha of diflufenican. Diuron alone (at rates up to 500g/ha pre-emergence) did not give good control of nightstock. Imazethapyr was more effective pre-emergence, at the lower rate (50g /ha) than post-emergence. Grain yield was significantly greater for most treatments in the wheat experiment but not in the other two.

Table 1. Control of nightstock with herbicides in cropping situations in three experiments and yield of wheat (1987).

Herbicide	Rate/ha (g a.i.)	Timing[A]	% Control of nightstock[B] 1987	1988	1989	Wheat yield (1987)[C] (%relative to control)
diflufenican	50	PSPE	-	-	65	-
diflufenican	75	PSPE	-	-	81	-
diflufenican	100	PSPE	-	-	96	-
diflufenican	50	PostEm	80	21	0	122
diflufenican	75	PostEm	94	46	-	123
diflufenican	100	PostEm	95	-	0	126
diflufenican + diuron	50 250	PSPE	-	84	84	-
diuron	500	PSPE	-	-	60	-
diflufenican + MCPA ester	13 125	PostEm	59	42	-	105
diflufenican + MCPA ester	25 250	PostEm	98	85	-	117
diflufenican + MCPA ester + diuron	8 75 150	PostEm	95	85	-	105
imazethepyr	50	PSPE	-	-	71	-
	100	PSPE	-	-	84	-
	50	PostEm	-	-	36	-
	100	PostEm	-	-	87	-
l.s.d. (P=0.05)			30	22	61	15

[A] Timing of crop : PSPE post-sowing pre-emergence; PostEm post-emergence

Crop	Wheat	Barley	Peas
Crop growth stage at application	Z12	Z13,21	4node
Weed growth stage at application	2-6 leaf	4-10 leaf	PSPE cotyledon PostEm 4 leaf
[B] No. of nightstock plants/m^2 in control plots	82	59	77

[C] Crop yield (t/ha) : 0.65

No herbicide treatment caused any apparent effect on the crops in these experiments when assessed visually during the growing season. A significantly lower yield of grain with the diflufenican/MCPA ester/diuron mixture than where nightstock was controlled to a similar extent with diflufenican alone suggests that the mixture may have been phytotoxic in this situation. Further work is needed to determine where this is likely to happen. Lack of significant differences in yield in the barley experiment (1988) is likely due to the relatively late germination of most of the nightstock seedlings at this site. A lack of significant increases in yield in the pea experiment (1989) was due to variation in pea yield across the site due to other factors. There were no significant infestations of any other weeds at any site.

These results show that there are good prospects for commercial control of the weed nightstock in cereals and field peas. In cereals, the most effective and cheapest treatment was a mixture of 300ml/ha of the product Tigrex (diflufenican + MCPA ester) with 500ml/ha of a diuron flowable product. In peas, the product Brodal (diflufenican) applied post-emergence needs to be assessed in further field experiments. The experimental product SN106664 (imazethapyr) gave good control.

Effective control measures will allow a greater diversity of cropping in these infested areas. In particular, legumes can now be grown in rotation with cereal crops and so provide better opportunities for control of grass, weeds and cereal root disease.