TOLERANCE OF DURUM WHEAT VARIETIES TO POST-EMERGENCE WILD OAT HERBICIDES

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Summary. Five durum wheat varieties and two bread wheat varieties were treated with difenzoquat at 2.24 kg ha^{-1}, flamprop-methyl at 1.35 kg ha^{-1} and diclofop-methyl at 2.25 kg ha^{-1} in weed-free conditions. The durum wheat varieties showed differential varietal tolerance to the wild oat herbicides. D31014 had the greatest tolerance to difenzoquat, flamprop-methyl and diclofop-methyl, whereas D31085 was the most susceptible. D30633 and D30561 were susceptible to difenzoquat but were less susceptible to flamprop-methyl and diclofop-methyl. Durati was susceptible to difenzoquat and diclofop-methyl and tolerant to flamprop-methyl. Egret and Songlen were generally more tolerant to all the herbicides. This result could be an important consideration in the selection of durum wheat lines.

INTRODUCTION

Wild oats (*Avena* spp.) is one of the most serious weeds of wheat in Australia. Grain yield losses due to wild oats range from nil to 75 percent (Wilson 1979). The weed can be controlled by post-emergence application of difenzoquat, diclofop-methyl and flamprop-methyl. However, these chemicals are expensive and are only economical for high yielding crops (Wilson 1979). Yields are maximized by correct use of the chemicals to minimize weed competition and crop damage from herbicides.

The susceptibility of some wheat varieties to herbicide damage is a well recognised problem. In some studies durum wheat varieties were susceptible to wild oat herbicides (Miller, Nalewaja and Olsen 1979; Catizone and Viggiani 1975), whereas in other studies they were unaffected (Miller, Nalewaja and Olsen 1978; Mayland and Frazier 1978). Experience has indicated that the durum wheat variety Durati is particularly susceptible to the wild oat herbicides (Fisher, Lemerle and Hinkley 1980).

Durum wheat varieties are expected to become more widely grown in Australia in the future (Hare, personal communication. 1981). The object of this research was to establish the tolerance to wild oat herbicides of durum wheat lines which are being developed for Australian conditions.

MATERIALS AND METHODS

The field experiment was conducted at the Agricultural Research Institute at Wagga Wagga on a site with soil type of Hareenya silty clay loam. Two bread wheat varieties (Songlen and Egret), one durum variety (Durati), and four durum wheat advanced lines from the breeding programme at Tamworth (D31014, D31085, D30633 and D30561), were sown at a rate of 50 kg ha^{-1} with 9.12 kg ha^{-1} P (in 100 kg ha^{-1} single superphosphate), on May 22 1980. Weed-free conditions were maintained. Flamprop-methyl, difenzoquat and diclofop-methyl were applied

on July 9 1980 (7 weeks after sowing) at the rates of 1.35 kg ha^{-1}, 2.24 kg ha^{-1} and 2.25 kg ha^{-1} respectively. The rates are three times the recommended rate. A wetting agent was used where required. The herbicides were applied with a tractor-mounted compressed-air sprayer in a volume of 100 L ha^{-1} at a pressure of 150 kPa. A split-plot design was used with two replications, and with herbicides as the main plots and varieties as the sub-plots. Plot size was 8 m x 9 rows. The trial was harvested in December 1980 with a small plot harvester.

The early part of the growing season was favourable but grain-filling was limited by lack of water. Plots which were damaged by spray were relatively less affected by drought than the untreated plots due to the reduced leaf area of the crop.

RESULTS

Four weeks after spraying,all the plots treated with difenzoquat, except Egret, Songlen and D31014, showed severe whole plant yellowing. All the plots sprayed with diclofop-methyl suffered some visual damage. The most severe damage was on the durum wheat varieties, in the form of burnt tips of leaves and yellow striations. Flamprop-methyl caused the least visual damage to all the plots. However, difenzoquat delayed tillering, stem elongation and spike development of D31085. Ten weeks after spraying all the varieties had grown out of this damage.

The durum wheat varieties showed differential varietal tolerance to the wild oat herbicides (Table 1). D31014 had the greatest tolerance to difenzoquat, flamprop-methyl and diclofop-methyl, whereas D31085 was the most susceptible. D30633 and D30561 were susceptible to difenzoquat but were less susceptible to flamprop-methyl and diclofop-methyl. Durati was susceptible to difenzoquat and diclofop-methyl and tolerant to flamprop-methyl. Egret and Songlen were generally more tolerant to all the herbicides.

Table 1. Tolerance of wheat varieties to wild oat herbicides.

Variety	Yield of unsprayed control (t ha^{-1})	Grain yield (% of unsprayed control)		
		Difenzoquat	Flamprop-methyl	Diclofop-methyl
T. aestivum				
Egret	3.724	94.5	84.9	92.5
Songlen	3.743	96.5	84.0*	83.5*
T. durum				
Durati	4.042	62.0***	88.0	76.4**
D31014	4.230	93.6	81.4*	85.9*
D31085	3.555	66.3***	68.9***	70.5**
D30633	4.023	66.0***	90.2	85.6*
D30561	3.778	60.9***	91.6	96.5
LSD (P=0.05)	0.773			

Asterisks indicate a significant reduction in yield compared to the unsprayed control.

DISCUSSION

The variability in reports of herbicide and durum variety interactions is probably due to differences in environment, herbicide rates, methodology and varieties used.

In this trial flamprop-methyl was the only herbicide tolerated by Durati, the only commercially available durum variety in Australia. However, D31014 was generally more tolerant indicating it is possible to select durum varieties which are tolerant to these herbicides.

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LITERATURE CITED

Catizone, P., and P. Viggiani, 1975. Atti Giomate Fitopatologiche. Cited in Weed Abs. 26: 1508.

Fisher, J.A., D. Lemerle, and R.B. Hinkley, 1980. Bulk Wheat 14: 49-50.

Mayland, P.G. and R.M. Frazier, 1978. Proc. N. Cent. Weed Control Conf. Cited in Weed Abs. 29: 1529.

Miller, S.D., J.D. Nalewaja, K.A. Adamczewski, 1978. Weed Sci. 26: 571-576.

Miller, S.D., J.D. Nalewaja, and W.A. Olsen, 1979. Weed Sci. 27: 91-95.

Wilson, B.J. 1979. Proc. 7th Conf. Asian-Pacific Weed Sci. Soc. p.441-444.