TOLERANCE OF SPRING WHEAT CULTIVARS TO HERBICIDES USED FOR WILD OAT CONTROL

W.J.P. MITCHEL

Crop Research Division, DSIR, Palmerston North

SUMMARY

Six wheat cultivars were sprayed with three herbicides commonly used for wild oat (*Avena fatua*) control, at the normal recommended rates and double rates. Difenzoquat was the only chemical to produce a significant change in any measurements taken on the crop. The only specific cultivar effect was on Oroua, which suffered the greatest delay in maturity when sprayed with difenzoquat at the high rate.

INTRODUCTION

The wild oat is a problem weed in Canterbury (Allen (1962), and is now becoming established in the Manawatu. The use of chemicals to control wild oats in cereal crops has provided a means of avoiding substantial yield reductions due to competition and elimination of wild oats would make more farms suitable for pure seed production. The use of difenzoquat on cereals (Butler 1980; Allen 1980; Logan 1978) has been documented, as has the use of flamprop-methyl (Allen and Butler 1980). The use of dichlofop-methyl has been reported on by McLaughlan (1979). In all reports the use of herbicides has resulted in increased yields due to wild oat suppression. A non-ionic surfactant with difenzoquat increases its efficiency (Shafer 1974).

Since the release of the CRD-bred wheat cultivars Rongotea and Oroua, it has been reported from Canterbury that Rongotea has been adversely affected by applications of difenzoquat (B.P. O'Connor pers. comm.). An observational trials was laid down in November 1979 using difenzoquat and dichlofop-methyl at normal rates and double the normal rates on four spring wheat cultivars: Karamu, Rongotea, Oroua and 73SN279. Interactions between cultivars and chemicals occurred, Oroua being severely affected and showing delayed maturity, profuse tillering and small heads when sprayed with difenzoquat at double the normal rate. Interactions between wheat cultivars and herbicides used for the control of broad-leaf weeds were observed (Mitchel and Popay 1977), but only at double the recommended herbicide rates.

In 1980 a replicated trial was laid down on an oat-free site to test the tolerance of spring wheat cultivars to wild oat herbicides.

MATERIALS AND METHODS

Replicated plots of Karamu, Oroua, Rongotea, Tiritea, Gamenya, and 73SN279 were sprayed with difenzoquat plus surfactant, dichlofop-methyl, and flamprop-methyl, at the recommended rates and at double the recommended rates. The trial design was a four-replicate split plot with chemicals as main plots and cultivars as sub-plots. Seed was drilled on 6.10.80 with a cone seeder, with plots of three rows at 15 cm coulter spacing and 5.5 m long. Chemicals were applied by a propane-operated sprayer, using 730154 jets giving an application rate of 240 litres/ha. A post-emergence herbicide was applied to control broad-leaf weeds, and the experimental chemicals were applied 10 days later, when the crop was at the 4-6 leaf growth stage. Damage to the plants was scored 4 weeks after spraying, and relative maturity (days from sowing to 50% ear emergence), plants heights, and grain yields were recorded. Samples of grain were taken to determine screenings and test weights.

Proc. 34th N.Z. Weed and Pest Control Conf.

Cereals

RESULTS AND DISCUSSION

Damage scores (Table 1) show that difenzoquat at both rates caused the most plant damage. Moderate leaf spotting and yellowing occurred, and Tiritea and 73SN279 appeared to be least affected. Ear emergence was significantly delayed by applications of difenzoquat. There was a significant interaction between chemicals and cultivars, difenzoquat at the double rate causing a delay with Oroua of 14 days, and with Rongotea 4 days and Karamu 2 days.

TABLE 1: Main effect of chemical on growth of wheat and response of varieties.

Chemical (kg/ha)	Damage score 1—9	Height cm	Ear emergence days	Yield relative to untreated or Karamu	Screening loss %
untreated	1.0	93	71.3	100 (5.08 t/ha)	8.2
difenzoquat 1.0	3.2	87.5	72.7	92	3.9
difenzoquat 2.0	4.3	84.4	75.5	90	4.3
dichlofop-methyl 1.0	2.0	93.3	71.5	102	8.8
dichlofop-methyl 2.0	2.0	90.6	71.8	94	10.5
flamprop-methyl 0.75	1.2	91.9	71.3	98	7.9
flamprop-methyl 1.5	1.5	91.5	71.4	96	9.6
LSD 5%	-	3.1	0.4	7	2.6
<i>Cultivar</i>					
Karamu/9	2.0	79.5	69.4	100 (5.13 t/ha)	8.2
Oroua	2.4	86.6	71.6	94	8.0
Rongotea	2.1	90.4	76.7	112	5.1
Gamenya	2.3	102.5	70.3	60	6.9
73SN279	2.3	90.4	69.1	93	7.4
Tiritea	1.9	92.7	76.2	115	9.7
LSD 5%	-	1.5	0.3	6	2.6
Int. (chemical x cultivar)	-	NS	sig 1%	NS	-

Plant heights were reduced by difenzoquat at both rates, with no significant interaction between chemicals and cultivars. Difenzoquat reduced grain yields of all cultivars, and there were no significant interactions. Significant differences in percentage screenings occurred between chemicals and between cultivars. Differences between cultivars were expected, but the response to chemicals is unexplained. Seed weights as g/1000 kernels (not tabulated) showed cultivar differences, but no differences between chemicals. Test weights (weight of given volume of seed) (also not tabulated) showed small differences between cultivars and also between chemicals, difenzoquat at the low rate giving slightly higher test weight than control.

CONCLUSIONS

This paper discusses the tolerance of some spring wheat cultivars to some herbicides used for wild oat control. The efficiency of the chemicals is not discussed, as the trial was free of wild oats.

The chemicals caused moderate yield reductions, especially at rates higher than those recommended, in all the cultivars tested. The only specific cultivar reaction was in maturity; Oroua was severely retarded by difenzoquat at the double rate. A loss in yield

Cereals

of 8 to 10% should be balanced against a possible yield loss of up to 33% caused by wild oat competition, as reported by Allen and Butler (1980). The main consideration therefore is to use the chemical that will give the most economic control of wild oats.

ACKNOWLEDGEMENTS

The author wishes to acknowledge the assistance of the staff of CRD substation, Palmreston North, in running the trial, and the following chemical firms for supplying chemicals: ICI NZ Ltd., NZ Farmers Fertiliser Co., and Shell Oil Co. NZ Ltd.

REFERENCES

- Allen, F.C., 1962. Wild oats. *Proc. 15th N.Z. Weed and Pest Cont. Conf.*: 109-116.
- Allen, F.C. and Butler, J.H.B., 1980. Comparison of some post-emergent chemicals for wild oat control in cereals. *Proc. 33rd N.Z. Weed and Pest Cont. Conf.*: 181-184.
- McLaughlan, W., 1979. HOE 23408 for control of wild oats in peas and linseed. *Proc. 32nd N.Z. Weed and Pest Cont. Conf.*: 153-157.
- Mitchel, W.J.P. and Popay, A.I., 1977. Some effects of common herbicides on wheat cultivars. *Proc. 30th N.Z. Weed and Pest Cont. Conf.*: 8-11.
- Shafer, N.E., 1974. Difenzoquat, a new post-emergent wild oat herbicide for wheat and barley. *Proc. 12th British Weed Control Conf.*: 831.