Differential varietal tolerance of wheat cultivars to herbicides

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Certain cultivars of a crop may be damaged by a particular selective herbicide, whilst others are unaffected. As the ranges of cultivars and herbicides are continually changing the importance of herbicide by cultivar interactions may vary from year to year. Some forms of herbicide damage to wheat cultivars are obvious, for example crop yellowing and deformed heads. Other damage is more subtle and may be difficult for a farmer to recognize: for example, poor emergence, missing tillers or a reduction in grain size. Experiences in UK and Australia indicate a poor relationship between visual damage and yield reduction. Cultivar tolerance screening trials are therefore conducted under weed free conditions using grain yields from small plots. For the last 4 years field trials at Wagga Wagga have tested a wide range of wheat cultivars and advanced lines for tolerance to most commercially available herbicides. A summary of some results with 3 soil applied herbicides is presented below:

Cultivar	Trifluralin			Pendimethalin			Chlorsulphuron		
	I	II	III	I	II	III	I	II	III
Egret	N	N	N	N	N	*	-	*	N
Condor	*	N	**	N	N	N	-	*	N
Kite	*	N	N	N	N	*	-	*	*
Teal	N	N	N	N	N	N	-	N	N
Durati	*	N	N	N	N	N	-	**	*
Shortim	*	N	N	N	N	*	-	*	*
Songlen	*	N	N	N	N	N	-	*	*
Cook	*	N	N	N	*	N	-	N	N
Olympic	*	N	N	N	N	N	-	N	*

KEY
** A significant reduction in yield at the recommended rate.
* A significant reduction in yield at 3 times recommended rate.
N No significant reduction in yield at any rate.
I, II, III Results of 1979, 1980 and 1981.

Other more important herbicide by cultivar interactions identified are: the susceptibility of Avocet to diclofop-methyl; the susceptibility of Egret, Shortim and Olympic to the growth regulator herbicides; and the tolerance of an advanced durum line to difenzoquat (1). Also, the label recommendation for the time of application of herbicide mixtures containing low rates of MCPA and 2, 4-D has been changed from the 3-leaf stage to the 5-leaf stage as a result of this work at Wagga Wagga. Studies of the apical development of the wheat tillers at the time of spraying growth regulator herbicides show that cultivars with a synchronous tiller development pattern have a higher proportion of tillers at the 'safe' time for application to these herbicides. Early application of growth regulator herbicides can be achieved by growing a cultivar with an innate synchronous tiller development pattern, or by creating a synchronous pattern by increasing seed rate (2).

Seasonal variation of results obtained in screening cultivars for tolerance is a common phenomenon, making interpretation of the importance of various interactions often quite difficult. In 1979 Avocet suffered a significant yield reduction of 15% when treated with recommended rates of diclofop-methyl. In the following season the yield reduction at this rate was only 4%, even though in both seasons there was similar visual damage after spraying. Seasonal variation is also apparent in the results of the 3 soil-applied herbicides above.

1. Lemerle, D., Fisher, J.A. and Hinkley, R.B. 1981. Proc. 6th Aust. Weeds Conf. Vol. 1. 119-122.

2. Lemerle, D., Hinkley, R.B. and Fisher, J.A. 1981. Proc. 6th Aust. Weeds Conf. Vol. 1. 123-126.