

## FARMERS' PERCEPTION OF THE INCIDENCE OF HERBICIDE RESISTANCE IN GRASS WEEDS IN THE WHEAT BELT OF VICTORIA

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*Summary.* The lack of reports from the north-west of Victoria of grasses resistant to herbicides may be due to insufficient investigation or to some circumstances peculiar to the region. A mailed survey was therefore distributed to 3,000 farmers throughout the Victorian wheat belt, asking if they had problems controlling grasses with herbicides. Of the 265 who returned their survey cards, 65 believed that they had this problem. Fifty of these farmers were interviewed and seed was collected from affected areas. The survey indicated there is concern amongst the farming community about the development of herbicide resistance and that some farmers in the north-west of Victoria believe they already have populations resistant to herbicides. A large proportion of returns were from farmers cropping the fragile red duplex soils which deteriorate quickly with cultivation and where herbicides are particularly important. As herbicide use increases it is essential that close monitoring of resistance be maintained and that management strategies be developed which minimize resistance and control confirmed resistant populations.

### INTRODUCTION

The appearance of resistance to herbicides in weeds, particularly multiple resistance, is regarded as a serious problem facing future wheat production in Australia (Reeves pers. comm., 1988). Resistance and cross resistance to diclofop-methyl has been found to occur in annual ryegrass, *Lolium rigidum* L.(2), and wild oats, *Avena fatua* Gaudin (3). Resistance to this herbicide has in many instances been shown to lead to resistance to other chemicals (2,3). Resistant populations have been identified throughout the cereal belt of Australia with the notable exception of north-west Victoria (Howat pers. comm., 1990). The lack of occurrence of resistance in north-west Victoria could reflect insufficient investigations or be caused by some circumstances peculiar to the region such as extensive use of fallowing and farmer preference for trifluralin rather than diclofop-methyl. It is thus essential that the extent of herbicide resistance in the north-west of Victoria be quantified and any techniques which may be reducing the rate of build up of resistance be understood and exploited elsewhere.

### METHODS

Three thousand farmers throughout the Victorian wheat belt were surveyed by a postal questionnaire (Fig. 1) during October 1989. Survey cards were distributed to 57 mail points selected to approximate the distribution of wheat production in the state (Fig. 2). During November, 50 of the 65 farmers who returned survey cards indicating they believed they had problems controlling grasses were visited. Weed seeds from affected areas were collected to be tested for resistance to herbicides. Information was also collected on management techniques such as herbicide rates and water volumes used, environmental conditions prior, during and after herbicide application as well as previous herbicide history of the paddock.

Have you had problems with grasses resistant to herbicides **YES/NO\***

Area of problem (ryegrass/wild oats\*) control given in (hectares/acres\*)

HERBICIDE	1987	1988	1989
Trifluralin			
Hoegrass			
Glean			
(Fusilade/Sertin)			
(Assure/Verdict)			
Other _____			

Please write  
in area of  
problem grass  
control in  
each year

Name \_\_\_\_\_

Postal Address \_\_\_\_\_

Phone Number \_\_\_\_\_

Would you like us to contact you ? **YES/NO\***

\*Cross out whichever does not apply

Figure 1. Survey card distributed by mail to farmers in the Victorian wheat belt.

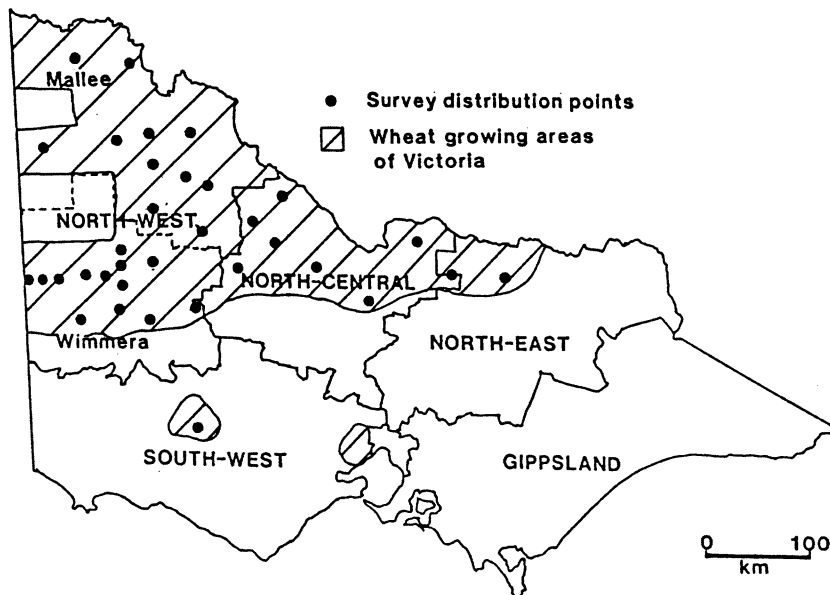


Figure 2. Distribution points for the mail survey on resistance in the Victorian wheat belt.

Seeds collected in the field were cleaned, bagged and treated with ammonia to assist in the breaking of dormancy (1) and stored dry at room temperature. A technique similar to that used by Heap and Knight (1986) will be used to assess for herbicidal resistance.

## RESULTS AND DISCUSSION

Twenty-five percent of the 265 farmers who returned their survey cards indicated they had problems controlling grasses with herbicides. Almost half the responses were received from the Wimmera (44%), whilst 36, 12, 4 and 2 % came from the Mallee, Western District, north-central and north-east respectively (Fig. 3).

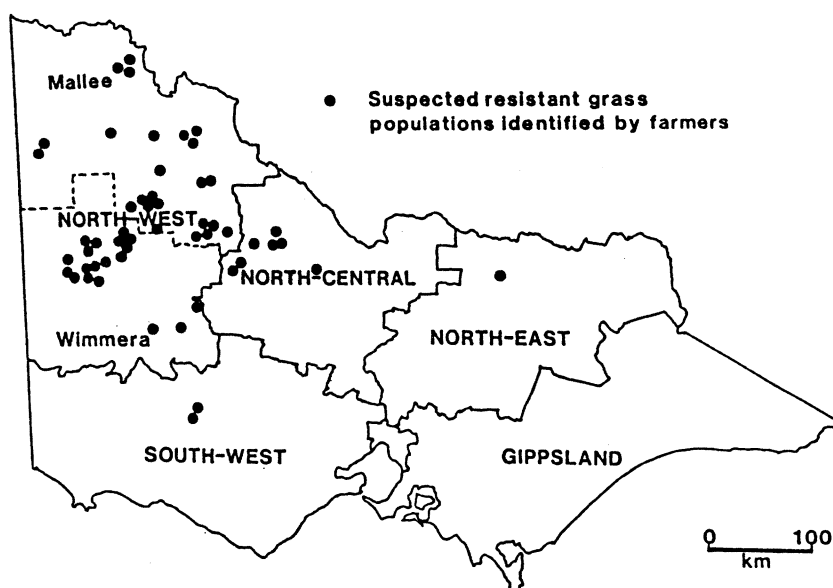


Figure 3. Suspected resistant grass populations as identified by farmers through the mail survey.

Concerns about ryegrass control were received from all areas surveyed whilst wild oat responses were received mainly from the southern area.

The three herbicides causing most concern because of declining or inadequate annual ryegrass control were trifluralin (50%), diclofop-methyl (20%) and chlorsulfuron (20%), while diclofop-methyl was of greater concern on wild oats. Current farmer practices in the Mallee and northern Wimmera are variable but generally consist of a three year rotation with a wheat, pasture, fallow sequence. Trifluralin is applied during the wheat phase and is not used again for two years and so should result in low selection pressure for the development of resistance. Diclofop-methyl is used as a post-emergent treatment if the trifluralin performance is not satisfactory. However, the main reasons for poor grass control in 1989 appeared to be due to poor herbicide application caused by the wet winter and we believe that it is unlikely that resistance problems will be common in this region. Resistance may become a bigger problem in the southern Wimmera, where continuous cropping is becoming more prevalent and where trifluralin is frequently applied in 2 out of 3 years with other herbicides being used to control grasses in intervening pastures and broad-leaf crops.

A large number of responses were received from the western Wimmera where their major soil type is a hardsetting red duplex which is difficult to manage. Many farmers in this area are using chemicals to establish fallows and opting for minimum cultivation to preserve soil structure and have thus become more reliant on chemical use for weed control. Their response to the survey indicates concerns with resistance developing in grasses.

Overall, judging from the weeds collected, at least four farms fit the classical symptoms for resistant populations but only one population was from north-west Victoria. This was a population of Wimmera ryegrass collected at Birchip which had been exposed to trifluralin 8 times in the last 10 years. Increasing rates from 800 ml/ha to 1 l/ha were not giving satisfactory control whilst on adjacent, recently cleared land, 800 ml/ha trifluralin gave 100 % control. This population was satisfactorily controlled by diclofop-methyl.

The remaining three were; (1) a biotype of wild oats collected from St James where diclofop-methyl was applied in 6 of the past 8 years and no longer gave satisfactory control; (2)

ryegrass collected from a property at Glenorchy where diclofop-methyl at 1.5 l/ha was satisfactorily controlling wild oats but not the ryegrass. The paddock had been cropped continuously to wheat/lupins with diclofop-methyl used in the wheat and fluazifop-butyl in the lupins; and, (3) a property at Lake Bolac where chlorsulfuron has been applied for 6 years continuously and ryegrass control has progressively declined.

The response to the survey indicated there is concern amongst farmers through out the wheat belt of Victoria about the declining efficiency of the control of grass weeds by herbicides. Although some of these problems may be due to seasonal conditions, further work needs to be carried out on the seeds collected to determine if resistance is building up in the populations. Management strategies such as that proposed by Powles & Howat (3) to minimize the development of resistance and manage confirmed resistant populations need to be brought to the attention of relevant farmers. This will help to ensure we have sustainable effective use of herbicides which gives the farmers the management option they require.

#### ACKNOWLEDGEMENTS

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#### REFERENCES

1. Cairns, A.L.P and De Villiers, O.T. 1986. *Weed Research* 26, 191-197.
2. Heap, I. and Knight, R. 1986. *Aust. J. Agric. Res.* 37, 149-156.
3. Powles, S.B. and Howat, P.D. 1990. *Weed Technology* 4, 178-185.