DETERMINATION OF THE EXTENT OF HERBICIDE RESISTANCE IN SOUTHERN NSW

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Summary. A random survey of southern NSW farms was undertaken to determine the extent of herbicide resistance in annual ryegrass (*Lolium rigidum*). Seed was collected from 161 farms and screened in pots for resistance to diclofop-methyl. Twenty two samples exhibited resistance, six of which had a very high level of resistance. However no pattern emerged with respect to geographical distribution. It can be expected, from this base level , that a substantial increase in the incidence of resistance will occur quickly unless herbicide usage practices are changed. Related resistance management issues are currently being addressed by way of a farmer questionnaire.

INTRODUCTION

Herbicide resistance is an increasingly important problem. Australia-wide resistance has been detected in at least five weed species (4). The extent of herbicide resistance is best illustrated by a recent telephone survey which indicated that some 3000 Australian farms have herbicide resistant ryegrass (3). In NSW more and more cases are being identified each year. This will continue , unless farmers practise integrated weed management (IWM) (2).

Surveys have demonstrated that annual ryegrass populations in Australia, resistant to diclofop-methyl, can be found in most areas where annual ryegrass occurs. One such survey in South Australia in 1988 detected resistance in approximately 9% of annual ryegrass samples screened. It also found that no susceptible samples had received more than four applications of diclofop-methyl (1).

This paper reports on the preliminary findings of a random survey which aims to determine the extent and distribution of diclofop-methyl resistance in annual ryegrass across southern NSW.

METHODS

Surveyed farms were selected at random from maps of the defined area, using grids to ensure a relatively even spread of collection sites. Letters were sent to 250 farmers seeking their cooperation in the survey, with 161 positive respondents. Annual ryegrass seed samples were collected in late 1991 from paddocks in crop. No paddock histories were known or examined prior to the collection and screening process. Collected seed was threshed and cleaned in early 1992.

Experiments were carried out between April and August in a poly house with sides open to the weather.

Screening for resistance to diclofop-methyl was done in the following manner. Aluminium trays were used containing 750mL of a coarse sandy loam soil. Trays were sown with 0.2g of annual ryegrass seed and watered as required. Following germination, trays were thinned to twenty seedlings and diclofop-methyl was applied at the 2 to 4 leaf stage in a spray cabinet.

Four rates of diclofop-methyl (0, 188, 375 and 750g a.i./ha) were applied in 90L/ha of water. A non-ionic surfactant was added at 0.25% v/v. All treatments were replicated through time and arranged in a randomised block design. Results were recorded 28 days after treatment (DAT) using the criterion of less than 85% control at the 375g a.i./ha rate, as the indicator of herbicide resistance. Analysis of two replicates is provided.

RESULTS AND DISCUSSION

The effectiveness of control by diclofop-methyl is shown in Table 1. Using the above criterion as indicating resistance, the data shows twenty two samples, approximately 14%, having significant resistance. Of these, six samples (approximately 4%) had a very high level of resistance whereby no commercial result could be expected from the application of diclofop-methyl.

Table 1. Number of samples (total 161) in each control category 28 DAT

Control (%)	Rate of diclofop-methyl (g a.i./ha)		
	188	375	750
85-100	70	139	153
70-84.9	66	12	2
50-69.9	18	4	0
0-49.9	7	6	6

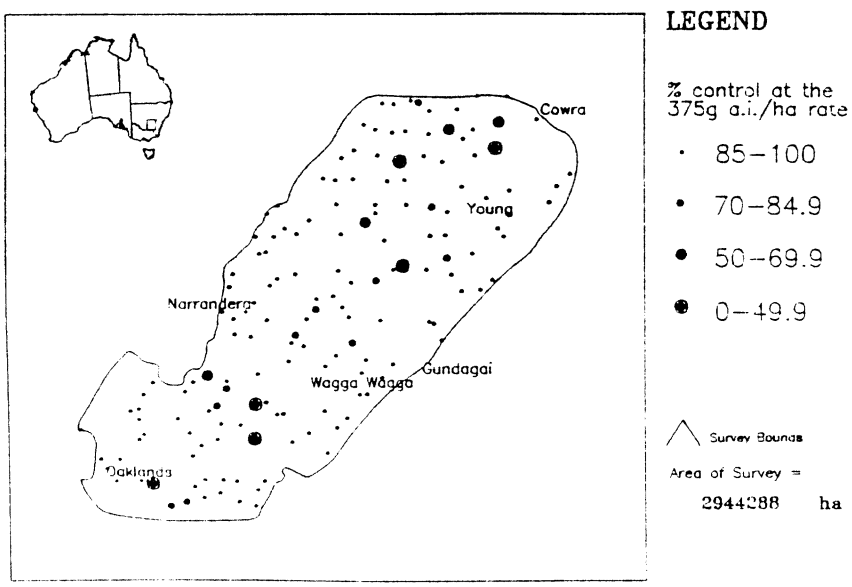

Figure 1. Area of southern NSW surveyed, showing the distribution of diclofop-methyl resistant annual ryegrass (showing all 161 farms).

No pattern has emerged with respect to their distribution within the sampling area (Fig. 1), thus indicating that influences external to the farm have not been significantly effective in respect of resistance development.

The interrelationship between the incidence of resistance and farm management practices is being addressed by way of a farmer questionnaire, which was sent to participating farmers in late 1992. From this the basis for the development or otherwise of resistance will be clarified. The information collected will be used to develop specific strategies for the amelioration of the problem, so as to minimise its spread within the region.

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