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Arable Extra

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Group B herbicide resistance in ryegrass

Background

In New Zealand, ryegrass (*Lolium* spp.) is both an important crop and potentially a problem weed for many arable farmers. Traditionally, ryegrass has been grown for seed throughout New Zealand. The loss of seed through the harvesting process can exceed 500 + kg/ha, leading to significant weed problems in following crops. Subsequently, many crops following ryegrass seed crops have received some sort of herbicide to control ryegrass seedlings, e.g. Haloxyfop in broadleaf crops or iodosulfuron-methyl in cereals.

Global experience has shown that Italian ryegrass (*Lolium perenne* spp. *multiflorum*) can develop resistance to a wide range of herbicides. Currently, resistance has been recorded in six modes of action including glyphosate, ACCase inhibitors (fops and dim), and ALS inhibitors, across 12 countries. In perennial ryegrass (*Lolium perenne*), resistance has been recorded to herbicides from two different mode of action groups (glyphosate and ACCase inhibitors) in six countries (data sourced from www.weedscience.org).

The objective of this trial was to evaluate the tolerance of a population of ryegrass (*Lolium* spp.) to a range of sulfonyl-urea herbicides (Group B, ALS inhibitors) to determine the possibility that this population may show some resistance to this family of herbicides.

Method

Seeds of ryegrass were collected from a single farm near Methven which had reported difficulty controlling ryegrass. Seed contained awns and had characteristics similar to Italian ryegrass (although may be true annual). Seed was planted into potting mix in individual pots. Commercial seedlines of both annual and perennial ryegrass were also planted in individual pots. Each herbicide treatment was applied to four mature plants of each ryegrass type, (8-12 tillers) but prior to any stem extension occurring. Herbicide application included a standard label rate, double the standard label rate and quadruple the standard label rate of Hussar (iodosulfuron-methyl), Glean (chlorsulfuron), Chord (thifensulfuron-methyl), Sero WG (tribenuron-methyl) and Simplicity (pyroxsulam) and an untreated control. All products applied are Group B herbicides or ALS inhibitors.

Visual assessments of herbicide effects, on a 0 – 100 % damage scale (100% = damage on control plants), were made at 7, 14, and 21 days after treatment (DAT). Photographic records of salient features were taken along with the visual assessments.

Results

Slight damage was apparent in the suspected resistant ryegrass biotype 7 DAT but the plants quickly recovered. At the 21 DAT assessment the damage scores of the suspected resistant biotype were significantly different to both the susceptible lines of annual and perennial ryegrass, and growth was similar to the unsprayed control plants. This difference was apparent for all five different sulfonyl-urea herbicides evaluated in this trial.

Key points

- Ryegrass which is resistant to Group B (ALS inhibitor, sulfonyl-urea) herbicides has been detected in the Methven area.
- In a FAR trial, ryegrass plants suspected of resistance were treated with five different Group B herbicides.
- Slight damage was apparent in the resistant ryegrass biotype seven days after herbicide treatment, but the plants quickly recovered.
- There was significantly more damage in the susceptible annual and perennial ryegrass lines than in the resistant ryegrass biotype 21 days after treatment.
- The susceptible lines suffered significantly more damage from all five of the sulfonyl-urea herbicides tested than the resistant line.
- Farmers need to check to ensure ryegrass is killed by applications of sulfonyl-urea herbicides and destroy any potentially resistant surviving plants.

Table 1. Mean damage score on Day 21 for each treatment showing statistical comparisons of the suspected resistant variety to annual and perennial ryegrass.

Herbicide	Percent damage (%) Herbicide rate 1x	2x	4x
	Susceptible annual ryegrass nil		
Chord	20	0	93
Glean	95	60	80
Hussar	100	100	100
Sero WG	5	30	45
Simplicity	100	98	100
	Susceptible perennial ryegrass		
Chord	28	75	95
Glean	95	85	93
Hussar	100	100	100
Sero WG	45	35	78
Simplicity	100	100	100
	Resistant ryegrass		
Chord	0	0	0
Glean	0	0	0
Hussar	25	0	0
Sero WG	0	0	0
Simplicity	0	10	0
Overall LSD (P<0.05)	**27.9**		

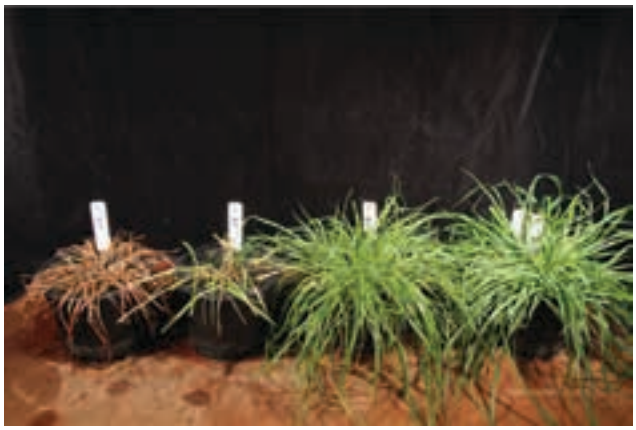

Figure 1. Treatment 3, Hussar at 4x the standard label rate, left to right, annual ryegrass, perennial ryegrass, suspected resistant ryegrass and untreated control, 21 DAT.

Figure 2. Treatment 15, Simplicity at 4x the standard label rate, left to right, annual ryegrass, perennial ryegrass, suspected resistant ryegrass and untreated control, 21 DAT.

Conclusion

This study provides strong evidence that ryegrass biotypes resistant to a range of sulfonyl-urea herbicides, e.g. Hussar (iodosulfuron-methyl), Glean (chlorsulfuron), Chord (thifensulfuron-methyl), Sero WG (tribenuron-methyl) and Simplicity (pyroxsulam), are present.

Farmers need to check to ensure the use of herbicides is killing the ryegrass plants. Any surviving plants should be killed using cultural controls or by using a different herbicide group. Samples should be kept for herbicide resistance screening. Contact FAR for more information about this.

Acknowledgements

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