

Developments in herbicide resistance and new products



Peter Boutsalis and **Chris Preston** (*School of Agriculture, Food & Wine, University of Adelaide*)

Take home messages

- High levels of herbicide resistance are present in annual ryegrass in SA & Victoria
- Trifluralin resistance is high in SA, but lower elsewhere
- There is no cross resistance to the new pre-emergent herbicides Boxer Gold and BAY-191
- Trifluralin must be conserved because the new pre-emergent herbicides are not selective in canola.

Surveys of herbicide resistant annual ryegrass

Recent surveys of cropping regions in South Australia and Victoria have indicated that most farms have annual ryegrass with resistance to Group A or B herbicides (Table 1). The worst examples of resistance are occurring in continuously cropped areas where Group A and B herbicides have been intensively used for many years. Resistance to DIM herbicides is increasing, including resistance to Select. Resistance to trifluralin is high in South Australia, but lower in other areas.

Group D resistance in annual ryegrass

There has been a significant increase in the amount of trifluralin being used to control annual ryegrass in Australia. Much of this is being used in no-till cropping systems and where there is existing resistance to the Group A and/or Group B herbicides (Table 1). This increased use of trifluralin is inevitably applying additional selection pressure for trifluralin resistance in annual ryegrass (Figure 1).

A recent survey has identified an emerging problem with trifluralin resistance in annual ryegrass in South Australia (Figure 1). Half of all the populations tested had at least 20 percent of the plants surviving trifluralin. At present, South Australia seems to be the worst affected state. There is some trifluralin resistance apparent in Victoria, but little yet in New South Wales or Western Australia. The challenge for the future will be to manage populations that are resistant to all the selective herbicides in cereals. These populations are cross-resistant to pendimethalin.



Table 1. The level of resistance in ryegrass detected across the southern Australian wheat-belt. Paddocks were chosen at random without any prior knowledge of the herbicide history. The Victorian and South Australian results are courtesy of Dr Peter Boutsalis and Dr Christopher Preston (The University of Adelaide). The data represents the percentage of resistant paddocks out of the total paddocks that contained ryegrass.

Region	Year of survey	Total paddocks sampled	Paddocks with ryegrass	Trifluralin	Hoegrass	Glean	Achieve	Axial	Select
SA - northern Mallee	2007	82	44	5	0	75	2	2	2
SA - southern Mallee	2007	74	68	35	12	59	2	2	2
SA - upper South East	2007	66	37	43	60	71	50	53	43
SA - Lower South East	2007	24	14	12	62	58	52	52	29
SA - Mid North	1998	54	52	2	37	16	nt	nt	4
SA - Lower North	1998	85	82	9	50	15	nt	nt	30
SA - Yorke Peninsula	1998	57	56	16	21	37	nt	nt	12
SA - Mid North	2003	48	39	19	74	68	62	53	as
SA - Lower North	2003	107	95	44	77	82	30	26	as
SA - Yorke Peninsula	2003	32	29	84	77	75	61	43	as
Vic - Wimmera	2005	56	53	2	60	60	55	55	26
Vic - Mallee	2005	69	59	20	12	54	3	7	0
Vic - North East	2006	52	52	2	18	19	nt	6	4
Vic - North Central	2006	66	64	2	63	68	nt	63	18

nt = not tested

as = available soon

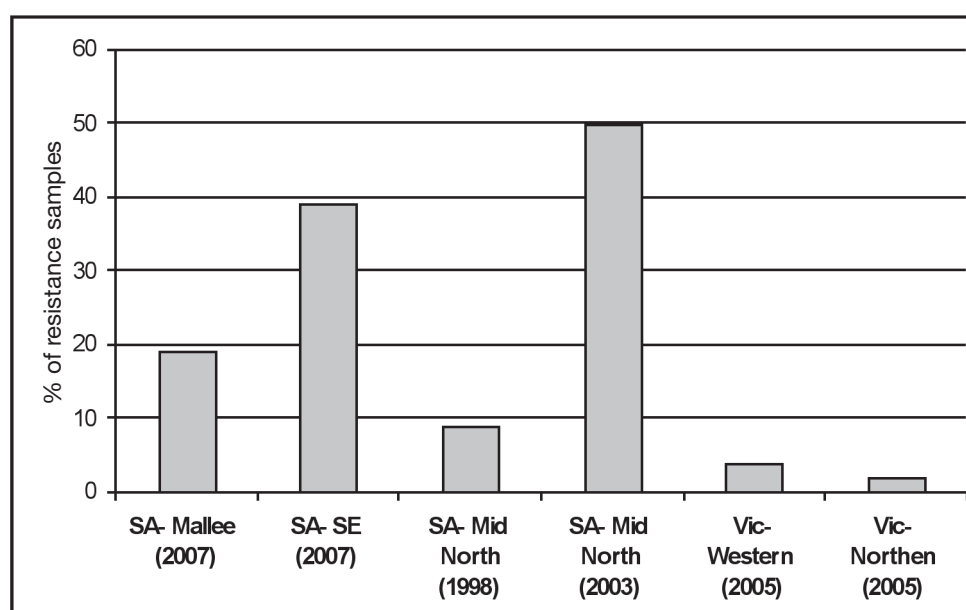


Figure 1. Resistance to trifluralin in South Australia and Victoria in key agricultural regions between 1998 and 2007. Resistance is defined as all samples with survival greater than 19 percent survival at 200 g ai ha⁻¹.

New pre-emergent herbicides

Since 2005, the efficacy of trifluralin has been compared to alternative pre-emergent herbicides including Boxer Gold (Prosulfocarb + S-Metolachlor) currently marketed by Syngenta, BAY-191 being developed by BayerCropScience and NUL-1493 being developed by Nufarm. A number of field trials conducted in South Australia showed that these herbicides give effective control of annual ryegrass on sites where trifluralin resistance is present (Figure 2). Mixtures with other herbicides, such as triallate, can provide additional control.

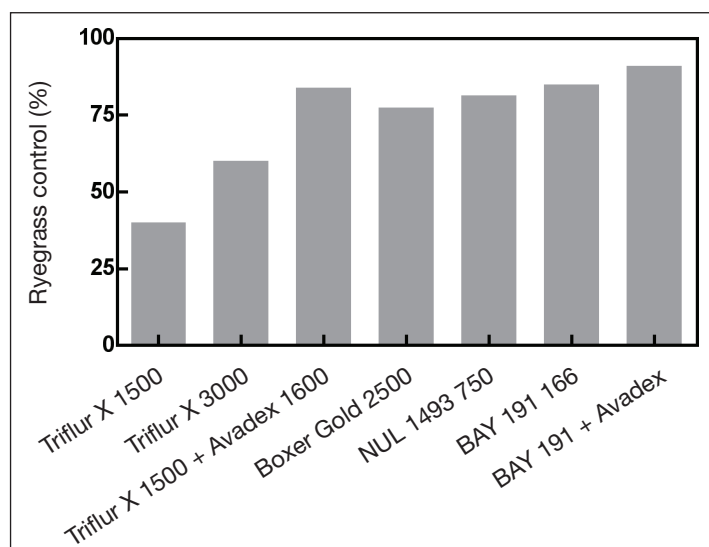


Figure 2. Effect of pre-emergent herbicides in a replicated field trial in a paddock with trifluralin-resistant ryegrass. The trial was conducted in 2007 at Roseworthy, SA. The rates used in the field trial (X-axis) are represented in ml or g/ha.

These new herbicides have varying advantages and disadvantages (Table 2). Most importantly, none of these new products can be used safely in canola or oats. Growers should aim towards preserving trifluralin as a pre-emergent product for use in canola.

Table 2. Advantages and disadvantages of new pre-emergent ryegrass chemistry.

Product	Advantages	Disadvantages	Crops
Boxer Gold	<ul style="list-style-type: none"> - Flexible incorporation window - Controls trifluralin resistant ryegrass 	<ul style="list-style-type: none"> - Some crop damage when used with disc seeders - Some crop damage in light soils - Broadleaf weeds 	- Not canola or oats
BAY-191	<ul style="list-style-type: none"> - Can be used with disc seeders - Incorporated by rainfall - Very soft on wheat - Controls trifluralin resistant ryegrass 	<ul style="list-style-type: none"> - No volunteer cereal control - No wireweed control 	- Not canola or oats
NUL-1493	- New chemistry	- Not for cereals	- Pulses only

GRDC Project UA00098

Unregistered chemicals: BAY-191 and NUL-1493 are currently in development.