Cereal varietal herbicide tolerance – 2015 results

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Key outcomes

Background

Australian cereal varieties are extensively tested to determine level of tolerance to commonly used herbicides in South Australia as part of a GRDC funded national program. All newly released varieties are tested to identify any potential herbicide sensitivity to provide additional information to cereal growers for the agronomic management of new varieties. Varieties are first tested in preliminary trials at higher than recommended rates of the herbicides to identify any sensitivity to specific herbicides. Once a significant variety and herbicide interaction has been identified, the variety is tested with the specific herbicide in more advanced trials using recommended and higher than recommended herbicide rates to determine the severity of the yield reductions caused by the herbicide.

Trial Results

Preliminary screening trials were conducted at Mallala, SA and advanced herbicide tolerance trials were conducted at Kybunga, SA during 2015. Trials were sown relatively late in order to achieve a high weed germination to provide best possible weed control, prior to trial commencement. All herbicide treatments were applied with good levels of soil moisture available to the crop early in the growing season. All cereal variety and herbicide entries selected in advanced trials were based on results in preliminary trials from previous years. Preliminary screening in cereal crops included the use of the following herbicides; Sakura®, Boxer Gold®, Diuron + MCPA, Affinity Force® + MCPA, Hussar®, Achieve®, Bromoxynil + MCPA, Axial®, Conclude®, Ally® + MCPA, Glean®, Eclipse® + MCPA LVE, Broadstrike®, Dicamba + MCPA, Tigrex®, Precept® and 2,4-D Amine.

Wheat

Twelve (12) commercial and fourteen (14) breeder lines were screened in preliminary evaluation trials at Mallala during 2015. Varieties Cobalt, Cosmick, Hatchet CL Plus, Mace, SF Ovalo, Steel, Supreme, Tenfour, Viking, Yitpi and Zen including the durum variety DBA Aurora. Grain yield reductions (13-18%) were observed in Cobalt, Mace and SF Ovalo (Table 1). Preliminary screening involves the use of double the recommended rate of herbicides. These varieties will be further screened. Grain yield reductions were observed in 2-3 breeder lines with further testing to occur in coming years to evaluate these varieties further.

Table 1. Grain yield of wheat varieties with herbicide treatments applied at double the recommended rate in the Preliminary Evaluation trial at Mallala. Yields are expressed as a % of control. Shaded figures indicate a significant yield reduction at the P<0.05 level.

Herbicide >>	Unsprayed Control	Achieve	Affinity Force + MCPA	Ally + MCPA	Amicide 625	Axial	Boxer Gold	Brominil M	Dicamba + MCPA	Diuron + MCPA	Hussar	Sakura	Tigrex
Rates (rate/ha) >>		760 g	200 mL + 660 mL	14 g + 660 mL	2.8 L	500 mL	5 L	2.8 L	400 g + 660 mL	560 g + 660 mL	200 mL	256 g	2 L
Timing >>	Yield (t/ha)	3 leaf	3 leaf	3 leaf	2 node	3 leaf	IBS	3 leaf	5 leaf	3 leaf	3 leaf	IBS	5 leaf
Cobalt	2.88	101	99	98	92	95	100	95	95	84	93	93	**82**
Cosmick	3.09	101	95	96	101	93	109	103	97	94	92	100	95
DBA Aurora	2.72	105	96	90	97	107	105	97	115	105	93	110	102
Hatchet CL Plus	3.53	101	103	103	99	103	95	99	102	103	106	106	103
Mace	3.28	96	97	94	96	98	100	98	100	92	95	101	**87**
SF Ovalo	1.67	**87**	102	105	88	95	116	107	93	101	107	114	108
Steel	3.16	100	96	96	91	99	101	92	100	94	105	103	96
Supreme	3.11	93	96	90	89	94	97	95	99	103	100	94	95
Tenfour	3.46	96	97	104	98	99	109	96	103	102	101	106	95
Viking	2.53	93	99	98	99	100	99	98	98	101	106	98	100
Yitpi	3.03	92	94	91	93	97	95	92	94	104	96	103	93

Zen	3.24	93	99	104	93	107	104	102	100	100	103	107	98

Advanced evaluation trials conducted at Kybunga, saw further testing of Emu Rock with Sakura® (pyroxasulfone) after incurring yield losses in 2013. Trial results from 2014 and 2015 displayed no significant effects and Sakura was not observed to cause yield reductions Emu Rock as witnessed in 2013. There were not grain yield losses across any herbicide/ cultivar combinations in 2015. For more details on wheat variety herbicide safety refer to the long-term summaries found on the NVT website.

Barley

Six (6) commercial and nine (9) breeder lines were screened in preliminary evaluation trials at Mallala during 2015. Barley grain yields ranged between 2-3 t/ha, 0.5-1t/ha less than in 2014. Two (2) of the tested commercial lines, Compass and Maltstar were found to suffer slight yield reductions of 13% towards Tigrex (Table 2). Further testing of these interactions will now occur during 2016.

Table 2. Grain yield of barley varieties with herbicide treatments applied at double the recommended rate in the Preliminary Evaluation trial at Mallala. Yields are expressed as a % of control. Shaded figures indicate a significant yield reduction at the P<0.05 level.

Herbicide >>	Unsprayed Control	Achieve	Affinity Force + MCPA	Ally + MCPA	Amicide 625	Axial	Boxer Gold	Broadstrike	Brominil M	Dicamba + MCPA	Diuron + MCPA	Precept	Tigrex
Rates (rate/ha) >>		760 g	200 mL + 660 mL	14 g + 660 mL	2.8 L	500 mL	5 L	50 g	2.8 L	400 g + 660 mL	560 g + 660 mL	2 L	2 L
Timing >>	Yield (t/ha)	3 leaf	3 leaf	3 leaf	2 node	3 leaf	IBS	5 leaf	3 leaf	5 leaf	3 leaf	5 leaf	5 leaf
Brewstar	2.27	95	100	107	113	115	94	105	99	100	107	95	97
Commander	2.45	100	114	109	123	117	104	121	111	105	123	108	103
Compass	2.25	101	102	107	123	123	115	109	95	106	103	116	**87**
Hindmarsh	2.85	119	97	102	109	119	116	113	106	100	108	112	113
LaTrobe	2.67	95	116	122	111	118	119	110	117	109	107	116	97
Maltstar	2.48	102	102	104	105	108	109	104	108	99	99	93	**87**

Advanced evaluation trials conducted at Kybunga in 2015, saw further testing of varietal sensitivities detected in 2014. LaTrobe was the only cultivar with significant yield reductions of 13% with Affinity Force + MCPA applied at the label rate. No other significant yield reductions were observed in 2015. Despite no varietal sensitivity being identified during 2014 and limited sensitivity in 2015, it is important to refer to long-term herbicide tolerance summary (located on NVT website) as the degree of herbicide sensitivity can be strongly influenced by seasonal conditions.

Oat

Two (2) commercial and two (2) breeder lines were screened in preliminary trials at Mallala during 2015. Twelve (12) registered herbicides used in the screening process no significant yield reductions were observed in any of the variety and herbicide combinations tested (Table 3). Advanced evaluation experiments conducted at Kybunga, showed no significant yield reductions in any cultivars during 2015. Previous testing in 2013 reported narrow safety margins in the preliminary testing stage of Wombat towards Dicamba + MCPA. Despite no varietal sensitivity being identified during 2014 and 2015, it is important to refer to long-term herbicide tolerance summary (located on NVT website) as the degree of herbicide sensitivity can be strongly influenced by seasonal conditions.

Table 3. Grain yield of oat varieties with herbicide treatments applied at double the recommended rate in the Preliminary Evaluation trial at Mallala. Yields are expressed as a % of control. Shaded figures indicate a significant yield reduction at the P<0.05 level.

Herbicide >>	Unsprayed Control	Affinity Force + MCPA	Ally + MCPA	Amicide 625	Broadstrike	Boxer Gold	Brominil M	Conclude	Dicamba + MCPA	Diuron + MCPA	Eclipse + MCPA LVE	Glean	Tigrex
Rates (rate/ha) >>		200 mL + 660 mL	14 g + 660 mL	2.8 L	50 g	5 L	2.8 L	1.4 L	400 g + 660 mL	560 g + 660 mL	14 g + 800 mL	40 g	2 L
Timing >>	Yield (t/ha)	3 leaf	3 leaf	2 node	5 leaf	IBS	3 leaf	5 leaf	5 leaf	3 leaf	3 leaf	3 leaf	5 leaf
Bannister	1.75	106	121	110	103	104	103	98	108	120	95	111	115
Williams	2.27	103	110	102	95	102	101	102	99	103	91	112	105

Conclusion and into the paddock

This long running research has identified cereal varieties can differ substantially in their sensitivity to commonly used herbicides when applied at registered label rates and timings. Therefore it becomes important to check the safety of various herbicide and variety combinations prior to sowing and spraying. Long-term summaries should also be used to identify herbicide and crop varietal combinations for potential grain yield penalties, as herbicide tolerance is strongly influenced by seasonal conditions. Information pertaining to varieties, which have been tested in one year only, should be treated with caution pending further trials over multiple growing seasons as environmental conditions can strongly influence herbicide interactions. Long-term summaries of herbicide tolerance testing for all crops can be found online from the NVT website www.nvtonline.com.au

Acknowledgements

The SARDI New Variety Agronomy group is gratefully acknowledged for their support. This project is jointly funded by GRDC and the South Australian Government and is supported by cooperating farmers (Richard Konzag, Mallala and Dennis Dall, Kybunga).