

3. Early Sowing Wheat Trial

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KEY MESSAGES

- Disease pressure Barley Yellow Dwarf Virus (BYDV), and *Zymoseptoria triticii* is going to restrict sowing of susceptible varieties earlier than mid-May in the South East High Rainfall Zone.
- Growers who wish to sow early (dual purpose crops) should select BYDV resistant varieties (eg. Manning), and use resistant cultivars, fungicides and grazing to manage *Zymoseptoria triticii*.
- The photoperiod (daylength) requirements of Trojan increase its suitability to earlier time of sowing compared with other spring cultivars

Trial Information

Mackillop Farm Management Group hosted a collaborative trial between GRDC, CSIRO and SARDI at the Conmurra main field site.

The trial was established to assess the suitability of cultivars to early sowing. Sowing earlier than current practice (before early May) requires cultivars that are slower to develop, either through having a long vernalisation requirement (cold requirement eg. winter wheats), or a strong photoperiod (daylength requirement eg. slow maturing spring wheats).

The aim was to see if slow developing cultivars sown early can yield more than faster maturing cultivars sown later in a high rainfall environment. The experiment had six best-bet commercial cultivars of varying maturity (Table 1) sown at three times of sowing (mid-April, late-April and mid-May). The first time of sowing was established using drip irrigation in press-wheel furrows (26 mm of water) (Figure 1). This trial was carried out over 2 seasons to try and pick up some of the seasonal variability; 2014 and again in 2015.



Figure 1: Establishing early time of sowing trial with drip irrigation in mid-April.
Photo courtesy of SARDI, Straun.

Table 1: Commercial Cultivars used.

Cultivar	Maturity
Manning	Very slow winter (very strong vernalisation, unknown photoperiod)
Revenue	Slow winter (strong vernalisation, unknown photoperiod)
Forrest	Very slow maturing spring (weak vernalisation, very strong photoperiod)
Bolac	Slow maturing spring (moderate vernalisation, moderate photoperiod)
Trojan	Mid-fast maturing spring (moderate vernalisation, moderate photoperiod)
Cobra	Fast maturing spring (weak vernalisation, weak photoperiod)

2014

Sowing very early in 2014 (16 April) did not increase yields relative to sowing during May (Table 2). Highest yield (8.1 t/ha) came from Trojan sown 30 May, with yields of Trojan (7.3 t/ha) and Manning (7.5 t/ha) sown 6 May not significantly different to this.

Table 2: Grain Yield (t/ha) of different cultivars at different times of sowing at Conmurra.

Cultivar	16-Apr-14	6-May-14	30-May-14
Manning	6.4	7.5	5.8
Revenue	6.1	6.3	7.0
Forrest	4.5	6.9	6.5
Bolac	4.3	6.5	6.6
Trojan	2.7	7.3	8.1
Cobra	3.0	4.9	6.7
P-value	0.001		
LSD (P=0.05)	1.1		

Poor performance from the first time of sowing was due to frost damage in the faster maturing cultivars Cobra and Trojan, and widespread Barley Yellow Dwarf Virus (BYDV) infection in all other cultivars except Manning, which is BYDV resistant.

All trial seed was treated with imidacloprid, and two post-emergent insecticides were applied at the site to control aphids that were present. The mild temperature conditions in May are thought to have placed the site under high insect pressure, with aphids being observed during the establishment phase of plots (particularly the earlier sown plots). Due to the high level of BYDV infection at the site, the trial site was visually scored in October for level of infection across different plots. The relationship between visual BYDV symptoms and grain yield is shown in Figure 2.

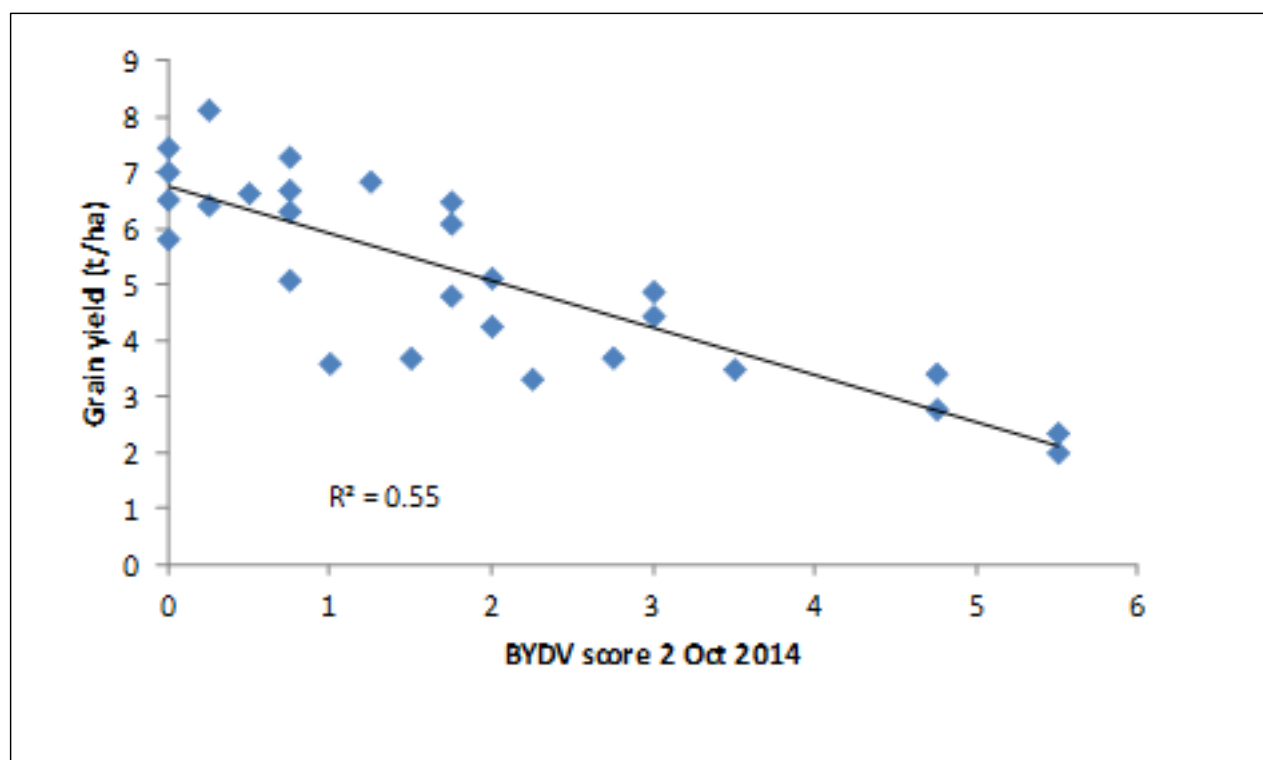


Figure 2: Grain Yield at Conmurra relative to level of visually assessed BYDV infection.

The same trial was sown in 2015; in the previous season Conmurra was the only site across South Australia where early time of sowing didn't result in large yield increases; a similar result occurred in 2015. The season in 2015 was very dry with a Decile 1 season for rainfall being experienced across the region.

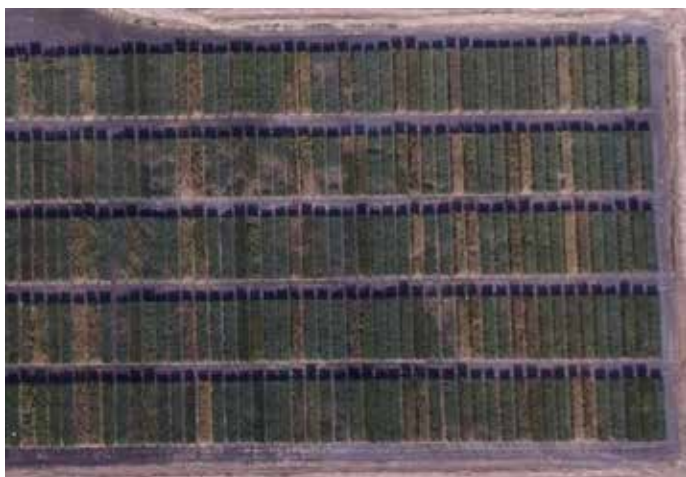


Figure 3: Site Overview on 30th October, 2015.
Photo courtesy of Grant Yates.

The earlier times of sowing did not increase yields relative to sowing during May (Table 3). Highest yields came from Trojan (5.5 t/ha) and Cobra (5.4 t/ha) sown 15 May, with yield of Manning sown 28 April (5.1 t/ha) not significantly different to this. These results are shown in Table 3. Manning (a winter wheat) was again the highest yielding variety in the earlier times of sowing, with no significant difference between the early and mid-sown timing suggesting its suitability as an early sowing and grain and graze option across the region. Manning's is resistant to BYDV and partially resistant to *Zymoseptoria tritici*, making it highly suited to early sowing in SE SA. Later sowings however resulted in a significant yield decrease (expected due to late flowering and dry seasonal conditions).

Table 3: Grain Yield (t/ha) of different cultivars at different times of sowing at Conmurra.

Cultivar	13-Apr-15	28-Apr-15	15-May-15
Manning	4.6	5.1	4.4
Revenue	4.3	4.4	4.4
Forrest	4.0	4.1	4.5
Bolac	3.4	4.1	4.7
Trojan	1.6	4.5	5.5
Cobra	2.1	4.2	5.4
P-value	<0.001		
LSD (P=0.05)	0.5		

Conclusions

After two years of trials, there appears to be limited benefit in sowing wheat earlier than the traditional "Anzac Day" break in the lower South-East (unless utilizing a variety for grazing prior to locking up for grain at Z30). If sowing early, growers need to ensure that they use BYDV resistant winter cultivars such as Manning or MacKellar as disease pressure (BYDV and *Zymoseptoria tritici*) in this environment is likely to restrict any theoretical benefit from sowing early with slow developing cultivars.

In both seasons (2014 and 2015), Trojan (APW) sown at a 'normal' timing (30 May in 2014, and 15 May 2015) was able to out yield the feed cultivars Manning and Revenue at most times of sowing (with the exception of Manning sown at the middle timing in 2015). Trojan is continuing to look like a good option for the HRZ of SE SA with commercial paddocks reflecting similar outcomes.

4. Wheat & Barley Varietal Response to Herbicides in South Australia

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Background

This research has been conducted across the mid north of South Australia to determine if new and existing varieties of wheat vary in tolerance to commonly used herbicides.

The sensitivity of the variety is summarised, using the following symbols based on the yield responses across all trials:									
-	not tested or insufficient data								
✓	no significant yield reductions above recommended rates or higher than recommended rates in 2 trials								
N (w/z)	narrow margin, significant yield reductions at higher than recommended rate, but not at recommended rate								
1 (w/z)	significant event occurring w years out of z years tested. (Eg. (2/5) – tested for 5 years, 2 returning a significant yield loss								
1% (1/z)	1% yield reduction (warning) significant yield reduction at recommended rate in 1 trial only in z years of testing								
xy% (w/z)	xy% yield reductions (warning) significant yield reductions at recommended rate in w years out of z years tested.								
Always follow label recommendations. All pesticide applications must accord with the currently registered label for that particular pesticide, crop, pest and region. Any research regarding pesticides or their use reported in this website does not constitute a recommendation for that particular use by the authors, the author's organisations or AGAB. It must be emphasised that crop tolerance and yield responses to herbicides are strongly influenced by seasonal conditions.									

Herbicide	2,4-D Amine G25																				Achieve®	Atfinity Force® + MCPA	Aly®	Aval®	Baravelle®	Bayer Gold®	Biomonol MCPA	Cadenza®	Conclude®	Cruiser®	Duesen500 SC + MCPA	Glean	Hussar®	Logran®	LVE MCPA	Sakura®	Tiger®
	2,4-D Amine		Triflurodim	2,4-D Amine + Etil + MCPA	Metathalon-methyl	Proxadim + Clozotol-methyl	MCPA + Dicamba	Proxadim + S-Metolachlor	Bromoxynil + MCPA + Dicamba	Dicamba	MCPA + Fluaziflur	Pyroxsulam	2010-2012	Pyroxsulam	Duesen + MCPA + Amine	Chloraziflur	Isoproturon + Metolachlor	Triflurodim	LVE MCPA	Pyroxsulam	MCPA + Dicamba																
	Variety	Year	1993-2014	1993-2014	2006-2014	1993-2014	2006-2014	1993-2009	2009-2014	1994-2014	2006-2014	2010-2012	2011-2012	2011-2012	1993-2014	2008-2012	2005-2014	1993-2009	1996-2008	2010-2014	1996-2014																
AGT Katana	2009-2012	✓(2)	✓(2)	✓(2)	6 (14)	N (14)	-	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)																	
Axe	2008-2009	6 (12)	N (12)	✓(2)	7 (12)	5 (12)	N (12)	✓(1)	✓(2)	10 (12)	-	-	6 (12)	9 (12)	10 (12)	N (12)	✓(1)	-	✓(2)																		
Catalina	2007-2012	N (13)	N (13)	✓(3)	N (13)	✓(3)	N (13)	✓(1)	✓(3)	6-10 (13)	✓(3)	N (13)	✓(2)	-	9 (13)	✓(3)	-	-	0 (13)																		
Cobra	2012-2013	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	✓(1)	✓(2)	-	-	✓(1)	✓(2)																		
Corack	2011-2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	✓(1)	✓(2)	-	-	✓(1)	✓(2)																		
Correll	2006-2009	14 (14)	10 (14)	✓(4)	8-25 (14)	✓(4)	6 (14)	✓(1)	✓(4)	N (14)	✓(2)	✓(1)	✓(3)	12 (12)	12 (14)	✓(4)	✓(3)	✓(2)	7 (14)																		
Cosmic	2014	✓(1)	✓(1)	✓(1)	-	✓(1)	-	✓(1)	✓(1)	-	-	-	✓(1)	-	✓(1)	-	-	✓(1)	✓(1)																		
Dart	2012-2014	✓(3)	✓(3)	✓(2)	N (12)	✓(2)	-	✓(2)	✓(2)	N (14)	-	-	N (12)	-	✓(2)	-	-	✓(3)	✓(2)																		
DBA Aurora	2013-2014	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	-	-	-	✓(2)	-	✓(2)	-	-	-	✓(2)																		
Derrimut	2006-2007	N (12)	✓(2)	✓(2)	N (12)	✓(2)	10 (12)	-	N (12)	✓(2)	-	-	✓(2)	-	✓(2)	N (12)	✓(2)	-	N (12)																		
Emu Rock	2011-2014	✓(3)	✓(3)	✓(2)	✓(3)	✓(3)	-	✓(2)	✓(3)	N (14)	-	-	✓(3)	✓(1)	✓(3)	-	-	5 (13)	✓(1)																		
Espada	2009-2010	N (12)	7 (12)	✓(2)	✓(2)	✓(2)	7 (12)	✓(2)	✓(2)	✓(2)	-	-	-	6 (12)	✓(2)	N (12)	-	-	7 (12)																		
Etoac	2009-2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N (14)	-	✓(2)	✓(2)	-	-	✓(2)	N (14)	✓(2)	-	-	-	✓(2)																		
Frame	1993-2010	5-19 (13)	3-12 (13)	✓(5)	4-21 (13)	✓(5)	5-21 (13)	✓(1)	2-7 (13)	8 (13)	✓(2)	✓(1)	4-6 (13)	✓(3)	N (13)	2 (13)	4 (13)	✓(2)	N (13)																		
Gladius	2006-2012	0-11 (12)	5 (14)	✓(4)	3-30 (14)	✓(4)	N (14)	N (11)	✓(4)	9 (14)	✓(3)	✓(2)	✓(3)	7 (12)	12-39 (14)	5 (14)	N (13)	✓(2)	7 (14)																		
Grenade CL+	2012-2014	N (12)	N (12)	✓(2)	✓(2)	N (12)	-	✓(2)	✓(2)	✓(2)	-	-	✓(2)	-	✓(2)	-	-	✓(2)	✓(2)																		
Harper	2013-2014	✓(2)	N (12)	✓(1)	✓(1)	✓(2)	-	✓(1)	✓(1)	✓(2)	-	-	✓(2)	-	✓(2)	-	-	✓(2)	✓(1)																		
Hypero	2009-2012	✓(2)	✓(2)	N (14)	9 (14)	✓(2)	-	✓(2)	5 (12)	9 (12)	-	3 (12)	✓(2)	N (14)	N (14)	-	-	-	✓(2)																		
Justica CL+	2011-2013	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	✓(1)	✓(2)	-	-	✓(1)	✓(2)																		
Kord CL+	2011-2013	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	✓(1)	✓(2)	-	-	✓(1)	✓(2)																		
Mace	2009-2013	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	N (14)	N (14)	N (14)	✓(1)	-	✓(2)	N (13)	✓(2)	-	-	✓(1)	✓(2)																		
Peak	2008-2009	11 (12)	✓(2)	✓(2)	N (12)	✓(2)	✓(2)	✓(1)	5 (12)	✓(2)	-	-	✓(1)	✓(2)	✓(2)	6 (12)	✓(1)	-	✓(2)																		
Phantom	2011-2012	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	-	✓(1)	N (12)	✓(2)	-	-	✓(1)	✓(1)	✓(1)	-	-	-	✓(1)																		
Saintly	2009-2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	✓(2)	-	-	6 (13)	N (13)	N (13)	-	-	-	✓(2)																		
Scout	2009-2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(3)	✓(2)	✓(2)	N (13)	✓(2)	-	-	✓(2)	✓(2)																		
Shield	2012-2014	✓(2)	N (12)	✓(2)	N (12)	✓(2)	-	✓(2)	✓(2)	✓(2)	-	-	✓(2)	-	N (12)	-	-	✓(2)	✓(2)																		
Tamaroi	1996-2003	3-4 (12)	5 (10)	-	11 (10)	-	✓(10)	-	N (10)	-	-	-	4 (10)	-	N (12)	N (10)	N (12)	-	✓(10)																		
Tijikuri	2009-2010	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	✓(2)	-	-	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)																		
Trojan	2012-2014	✓(2)	N (12)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	-	✓(2)	-	-	✓(2)	✓(2)																		
Wallup	2011-2012	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	✓(2)	✓(2)	N (12)	-	-	✓(2)	✓(1)	✓(2)	-	-	✓(1)	✓(2)																		
WID602	2010-2012	✓(2)	✓(2)	✓(2)	N (13)	✓(2)	-	✓(2)	✓(2)	✓(2)	-	-	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)																		
Wyalkatchem	2003-2005	9 (13)	N (13)	-	4-8 (13)	-	✓(13)	-	✓(13)	-	-	-	5 (13)	-	4 (13)	N (13)	✓(13)	-	7 (13)																		
Yawa	2009-2010	✓(2)	✓(2)	N (12)	8 (12)	N (12)	-	✓(2)	✓(2)	✓(2)	-	-	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)																		
Yipsi	1998-2012	2-9 (14)	✓(4)	-	2-8 (14)	-	N (14)	-	N (14)	-	8 (14)	✓(1)	✓(1)	-	-	8-10 (14)	N (14)	✓(2)	N (14)																		
Rates (product/ha)		1.4 L	360 g	100 mL + 500 mL	7 g	250 mL	1.4 L	2.5 L	1.4 L	200 g	700 mL	500 mL	500 mL + 350 mL	20 g	200 g	35 g	1.2 L	110 g	1 L																		
Crop stage at spraying		2 node	3 leaf	3 leaf	3 leaf	3 leaf	5 leaf	IBS	3 leaf	5 leaf	5 leaf	3 leaf	3 leaf	3 leaf	3 leaf	PSPE	5 leaf	IBS	5 leaf																		

Figure 1. Wheat variety response to herbicides in South Australia. (1993-2014)

Herbicide	2,4-D Amine 500G25	Achieve	Affinity Force® + MCPA	Ally	Axial	Barvel M	Boxer Gold®	Broadstrike	Bromoxynil MCPA	Cadence	Decision	Duron + MCPA Amine	Glean	LVE MCPA	Terbutryn	Tigrex
	2,4-D Amine	Tralkoxydim	Carfentrazone-ethyl + MCPA	Metasulfuron-methyl	Phosiden + Clopyralid	MCPA + Dicamba	Prosaflucarb + S-Metolachlor	Flumetsulam	Bromoxynil + MCPA	Dicamba	Deslprop-methyl + Sethoxydim	Duron + MCPA Amine	Chlorosulfuron	LVE MCPA	Terbutryn	MCPA + Diflufenican
Variety	Year	1993-2014	1993-2014	2005-2014	1993-2014	2005-2014	1993-2013	2009-2014	1993-2014	1994-2014	2005-2012	1993-2014	1993-2009	1996-2008	1993-2005	1996-2014
Bass	2009-2011	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	✓(2)
Blaudin	2009-2012	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	-	-	✓(2)
Blarques	1995-2000	6 (16)	N (14)	-	✓(6)	-	6-10 (26)	-	✓(6)	7-8 (26)	-	✓(6)	✓(3)	3 (15)	3-4 (25)	5-8 (25)
Buloke	2006-2009	✓(4)	N (14)	12 (14)	N (14)	✓(4)	N (14)	✓(1)	✓(4)	10 (14)	9-11 (24)	12 (14)	✓(2)	✓(3)	-	✓(4)
Commander	2005-2007	✓(3)	✓(3)	✓(2)	✓(3)	✓(2)	N (13)	-	✓(3)	✓(3)	12 (12)	✓(3)	✓(3)	✓(3)	✓(1)	✓(3)
Compass	2013-2014	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	-	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	-	✓(1)	✓(1)
Fairview	2013-2014	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	N (12)	✓(1)	✓(1)	✓(1)	-	-	-	✓(1)
Fathom	2011-2012	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N (12)	✓(2)	N (12)	✓(2)	✓(2)	-	-	✓(2)
Flagship	2004-2009	10 (16)	5 (16)	N (14)	✓(6)	N (14)	16 (16)	6 (17)	✓(6)	12 (16)	14 (14)	✓(5)	N (16)	✓(4)	✓(5)	8 (16)
Fleet	2004-2006	✓(3)	N (12)	✓(1)	✓(3)	✓(1)	5 (12)	-	✓(3)	N (12)	N (12)	N (12)	✓(3)	✓(3)	N (12)	2-4 (22)
Flinders	2015-2012, 2014	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	N (12)
Gardner	1998-2001	N (14)	7 (14)	-	✓(4)	-	4 (14)	-	✓(4)	7 (14)	-	6 (14)	✓(3)	6 (14)	8 (14)	3 (14)
Granger	2013-2014	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	-	N (12)	-	-	-	✓(1)
Hindmarsh	2007-2009	✓(3)	✓(3)	N (13)	N (23)	11 (13)	8 (13)	✓(1)	N (13)	6 (13)	✓(3)	7 (13)	10 (13)	✓(1)	✓(2)	8 (13)
LaTrobe	2013-2014	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	-	N (12)
Keel	1998-2001	✓(4)	✓(4)	-	✓(4)	-	4 (14)	-	✓(4)	3-8 (24)	-	✓(4)	N (12)	4 (14)	✓(4)	4-8 (24)
Maytime	2003-2005	✓(3)	N (12)	-	N (12)	-	✓(3)	-	5 (12)	N (12)	-	✓(1)	N (12)	N (12)	4 (12)	4-7 (32)
Navigator	2010-2011	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)
Orford	2009-2012	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	N (14)	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	-	-	✓(2)
Schooner	1993-1997	✓(5)	✓(5)	-	✓(5)	-	5-46 (25)	-	14 (15)	N (14)	-	N (25)	✓(1)	✓(2)	✓(5)	✓(2)
Scope	2010-2012	✓(2)	-	✓(2)	✓(2)	9 (14)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)
Shepherd	2011	✓(1)	-	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	✓(1)	-	-	-	✓(1)
Skipper	2010-2011	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	-	-	-	✓(2)
Sloop SA	2009-2010	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	-	-	✓(2)
Verningh	2009-2010	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	✓(2)	✓(1)	✓(2)	✓(2)	✓(2)	✓(1)	-	-	✓(2)
Westminster	2011-2012	✓(2)	-	✓(2)	✓(2)	✓(2)	N (13)	✓(2)	✓(2)	✓(2)	✓(2)	N (13)	-	-	-	✓(2)
Wimmera	2010-2012	✓(2)	-	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	✓(2)	N (23)	✓(2)	✓(2)	-	-	-	✓(2)
Rates (products)		1.4 L	300 g	100 mL + 500 mL	7 g	250 mL	1.4 L	2.5 L	25 g	1.4 L	200 g	10 L	500 mL + 250 mL	20 g	1.2 L	050 mL
Crop stage at spraying		2 node	4 leaf	3 leaf	4 leaf	4 leaf	6 leaf	IBS	6 leaf	4 leaf	6 leaf	4 leaf	4 leaf	6 leaf	4 leaf	6 leaf

Figure 2. Barley variety response to herbicides in South Australia. (1993-2014)

Research Site Location:

Kybunga, Mid North of South Australia

Site soil type:

Friable light clay loam overlying carbonate at varying depths

Site pH:

Water 8.2, CaCl 7.5

DISCLAIMER:

While every care has been taken in preparing this publication, the organisations involved accept no responsibility for decisions or actions taken as a result of any data or interpretation contained in this report.

