"Barley Variety Trials"

Trent Potter, SARDI, 08 8762 9132, trent.potter@sa.gov.au
Rob Wheeler, SARDI

Key Outcomes:

- Both scald and Leaf Rust had a major effect at Conmurra
- Varieties like Capstan and Oxford lodged less than the other varieties, resulting in a tendency to yield better

Trial Objectives: To assess the yield of a range of barley varieties at several sites

Trial Duration: 2010-11

Location: Various

Soil Type: Various

Paddock History: Various

Farmer Co-operators: Kim Makin, Ross Lutt, Kraig Johnson, Lachie Seears, Martin & Kirsty Flower, James & Chris Gilbertson

Monthly Rainfall:

Rain	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec	April-Oct	Total
Keith, 2010	15.6	31.3	28.4	55.2	32.4	38.8	40.4	96.2	57	18.8	27.4	137.8	338.8	579.3
Sherwood, 2010	13	33.5	33.5	58.5	33.5	40.5	31.5	113	57.5	30	50	105	364.5	599.5
Wolseley, 2010	14	28.8	26.8	70.8	26.8	35.6	39.8	111	46.8	27	59.6	129.6	396.8	615.6
Frances, 2010	14.4	40.8	26.8	60.6	31.6	57.6	43.8	119.2	55.4	29.8	29.2	92.2	398	601.4
Conmurra, 2010	18	35.2	24.8	65.2	42	77.4	48.8	146.8	74.8	29.4	27.4	130.2	484.4	720
Millicent, 2010	16	30.8	23.2	89.2	44.4	74	76.2	192.8	83.8	22.4	51.4	105.2	582.8	809.4

Yield Limiting Factors: Early finish

Type of Trial: Replicated Plot Trial

Trial Design: 8m Long Plots x 8 Rows at 15cm Spacings (1.2m); 3 Replicates

Treatments:

All trials were sown with small plot equipment and managed as per usual agronomic treatment. All sites were sprayed with fungicides to control disease. Grain yield was determined by machine harvest.

Table 1: Upper South East barley variety trials in 2010 and long term

	2010 (% site average)		Long Term average across sites(04-10)		
Variety	Bordertown	Keith	t/ha	as % sites average	# trials
Barque	-		3.31	101	10
Baudin	**97**		**3.18**	**97**	**13**
Buloke	114		3.42	105	13
Capstan	**131**		**3.54**	**108**	**13**
Commander	111		3.57	109	13
Finniss	**87**		**3**	**92**	**13**
Flagship	94	VARIABLE	3.31	101	13
Fleet	**105**	**NO**	**3.58**	**109**	**13**
Gairdner	85	VALID	3.23	99	13
Hindmarsh	**83**	**RESULT**	**3.56**	**109**	**9**
Keel	77		3.4	104	13
Maritime	-		**3.28**	**100**	**12**
Oxford	123		3.58	110	5
Schooner	**83**		**3.12**	**95**	**13**
Scope	111		3.32	102	3
Skopp SA	**95**		**3.24**	**99**	**13**
Vlamingh	105		3.32	101	11
Yarra	**97**		**3.41**	**104**	**13**

Site av. yield t/ha	3.96	3.27
LSD (%)	11	

	Bordertown	Keith
Date Sown	1-Jun	31-May
Soil type	LC	L
A-O Rain (2010)mm	357	339
pHw	7	8.2
Site Stress Factors	sc,lr	

Abbreviations

Soil type:
S=sand, L=loam, C=clay,
Li=light, M=medium, H=heavy,
F=fine

Site stress factors:
e=emergence(eg. mice),
sc = scald,
r=rhizoctonia,
wg=grassy weeds,

Data source: NVT & SARDI/GRDC (long term data based on weighted analysis of sites, 2000-2010) Data analysis by GRDC funded National Statistics Group.

Table 2: Coonumra Barley Variety Trial 2010

	Replicated trial		single rep, unsprayed	Disease scores on untreated single rep		
Variety	kg/ha	% site mean	kg/ha	Scald	Leaf rust	Others
Barque	4598	102	3965	7	6	NFNB
Baudin	**5438**	**121**	**3534**	**7**	**8**	**PM**
Buloke	3852	86	3818	4	6	
Capstan	**5060**	**112**	**5023**	**4 hs 7**	**5**	**PM & NFNB**
Commander	5098	113	5198	7	4	
Eld-Henley	**6106**	**136**	**5504**	**8**	**1**	
Eld-Oxford	5627	125	5684	4 hs 9	1	
Flagship	**4931**	**109**	**4282**	**4**	**5**	
Fleet	4888	109	4324	6	4	
Gairdner	**4308**	**96**	**3284**	**6**	**5**	
Hannan	3674	82	3997	4?	7	PM
Hindmarsh	**2987**	**66**	**3441**	**1 hs 9**	**5**	
Keel	3837	85	4314	-	9	
Lockyer	**4288**	**95**	**4786**	**1**	**4**	
Maritime	5445	121	4196	hs 8	-	
NSL02-3353	**4920**	**109**	**4576**	**7**	**2**	
Roe	4867	108	4371	8	8	
Schooner	**4029**	**89**	**3377**	**4**	**8**	
Scope	3828	85	3714	4 -5	6	
Sloop	**4445**	**99**	**4248**	**7**	**6**	
SloopSA	3902	87	4177	hs7	8	
Torrens	**3875**	**86**	**3878**	**4**	**4**	**Yr**
Vlamingh	4769	106	4843	4	7	PM
W14262	**3628**	**81**	**2220**	**-**	**9**	
Yarra	4259	95	3642	hs 9	2	

Site mean	4506
CV%	10.28
lsd(0.05)	776.7

Disease Scale Used:

1 = R
3 = MR
5 = MS
7 = S
9 = VS

hs = hotspot
PM = powdery mildew
NFNB = net form net blotch
- = not scored due to other disease problems

Table 3: Conmurra barley variety trial 2010, quality data

Variety	1000 grain wt	>2.8mm	Screenings	Test Weight	Protein
Capstan	45.4	60.18	2.89	64.7	14.5
Scope	**50.02**	**68.38**	**0.9**	**64.02**	**13.6**
Yarra	48.72	74.83	1.67	62.88	13.6
Baudin	**43**	**71.47**	**2.15**	**64.88**	**14.5**
WI4262	42.1	69.31	3.19	62.19	13.9
NSL02-3353	**50.96**	**86.85**	**0**	**66.47**	**14**
Fleet	58.82	89.71	0	64.24	14.1
Eld-Henley	**50.18**	**84.52**	**1.16**	**65.06**	**13.6**
Buloke	46.7	63.02	2.42	64.43	13.5
SloopSA	**46.14**	**85.97**	**0.76**	**66.48**	**14.4**
Vlamingh	44.96	83.36	0.94	67.94	14.8
Hannan	**45.3**	**82.09**	**0.68**	**66.18**	**14.6**
Eld-Oxford	40.44	54.1	4.57	65.66	13.8
Roe	**45.96**	**86.35**	**0.88**	**66.01**	**14.2**
Sloop	47.52	81.95	0.54	65.98	14.5
Gairdner	**43.46**	**46.09**	**4.81**	**64.19**	**14.7**
Hindmarsh	41.54	77.13	1.08	67.25	14.5
Commander	**47.04**	**82.77**	**0.81**	**65.93**	**12.8**
Lockyer	48.98	72.27	1.44	65.47	15.1
Maritime	**46.04**	**78.22**	**1.51**	**64.35**	**14.5**
Flagship	51.84	82.87	0.82	65.07	14.5
Schooner	**44.84**	**70.45**	**1**	**64.72**	**14.8**
Torrens	43.78	50.13	1.89	72.64	16.4
Keel	**50.16**	**89.11**	**0.56**	**64.53**	**14.1**
Barque	52.58	88.74	0.23	64.01	14.5

Figure 1: Hindmarsh Barley at Conmurra

Table 4: Frances Barley Variety Trial 2010

	Sprayed		Unsprayed	
Variety	kg/ha	% site mean	kg/ha	% site mean
Barque	4297	94	4137	97
Baudin	**4758**	**105**	**4421**	**103**
Buloke	3613	79	3770	88
Capstan	**5735**	**126**	**4567**	**107**
Commander	5119	113	4250	99
Eld-Henley	**5184**	**114**	**4750**	**111**
Eld-Oxford	5609	123	5187	121
Flagship	**3554**	**78**	**3256**	**76**
Fleet	5872	129	4824	113
Gairdner	**4468**	**98**	**4718**	**110**
Hannan	4453	98	4095	96
Hindmarsh	**4236**	**93**	**3751**	**88**
Keel	4774	105	4495	105
Lockyer	**5771**	**127**	**5850**	**137**
Maritime	3315	73	2898	68
NSL02-3353	**4808**	**106**	**5698**	**133**
Roe	3916	86	3238	76
Schooner	**3835**	**84**	**4030**	**94**
Scope	4499	99	4118	96
Sloop	**3703**	**81**	**4007**	**94**
SloopSA	4144	91	3684	86
Torrens	**4193**	**92**	**3711**	**87**
Vlamingh	5019	110	5297	124
WI4262	**4981**	**110**	**3889**	**91**
Yarra	3917	86	4419	103

Table 5: Frances Barley Variety Trial 2010, Quality Data

Variety	1000 grain wt	>2.8mm	screenings	test weight	protein
Torrens	38.7	29.82	2.29	71.48	13.8
Eld-Oxford	**40.18**	**78.02**	**1.24**	**66.63**	**NA**
Roe	36.24	64.56	3.32	65.44	12.2
Sloop	**41.44**	**70.67**	**0.98**	**65.46**	**11.5**
NSL02-3353	43.54	82.36	0.25	66.34	11.3
Lockyer	**45.76**	**74.63**	**0.37**	**66.87**	**11.3**
Fleet	52.26	86.02	0	64.29	11.6
Commander	**40.04**	**70.05**	**2.7**	**64.43**	**11.5**
WI4262	40.76	78.98	0.26	65.73	11.5
Barque	**41.92**	**69.56**	**1.07**	**63.35**	**12.2**
Buloke	45.36	66.25	0.31	66.32	11.7
Vlamingh	**39.22**	**70.04**	**1.15**	**67.74**	**12.4**
Hannan	39.22	70.94	1.66	66.66	12.1
Schooner	**40.98**	**63.64**	**2.14**	**66.65**	**11.2**
Keel	40.58	70.32	2.84	64.43	11.5
Gairdner	**40.3**	**47.87**	**3.49**	**66.74**	**11.3**
SloopSA	41.5	81.77	0.52	65.29	11.5
Capstan	**40.38**	**61.83**	**2.21**	**63.4**	**11.6**
Scope	44.34	61.05	1.35	66.35	11.5
Yarra	**41.36**	**57.36**	**3.8**	**64.67**	**11.4**
Flagship	39.3	67.59	1.32	60.97	13
Eld-Henley	**41.72**	**77.71**	**0.41**	**63.39**	**11.1**
Hindmarsh	35.8	58.09	3.52	66.14	12.6
Maritime	**39.38**	**68.61**	**1.92**	**64.76**	**13.6**
Baudin	40.86	81.34	0.51	67.17	11

Table 6: Millicent Barley Variety Trial 2010, Yield and Quality Data

	Yield Data		Grain Quality Data				
Variety	kg/ha	% site mean	1000 grain wt	>2.8mm	screenings	test weight	protein
Eld-Oxford	**8782**	**127**	**47**	**85.66**	**0.32**	**65.9**	**10.3**
Eld-Henley	8623	125	54.26	93.34	0.54	64.36	11.5
NS102-3353	**8061**	**117**	**55.16**	**93.91**	**0.39**	**66.12**	**11.3**
Capstan	7875	114	52.14	88.49	0.38	66.17	11.5
Lockyer	**7795**	**113**	**53.02**	**88.88**	**0.5**	**66.65**	**11.4**
Barque	7681	111	56.68	93.66	0.54	65.32	12
Vlamingh	**7629**	**111**	**50.3**	**94.67**	**0.03**	**68.17**	**12.1**
Baudin	7491	109	50.4	93.51	0.29	67.12	12.1
WI4262	**7382**	**107**	**45.14**	**89.99**	**0.87**	**63.68**	**10.9**
Maritime	7231	105	52.54	92.47	0.38	65.46	11.5
Fleet	**7085**	**103**	**53.96**	**94.9**	**0**	**65.21**	**12.2**
Gairdner	7089	103	52.96	86.9	0.45	66.78	11.7
Roe	**6745**	**98**	**48.54**	**90.91**	**0.28**	**66.16**	**11.9**
Commander	6725	97	53.92	93.14	0.65	65.71	10.8
Yarra	**6628**	**96**	**54.46**	**93.95**	**0.25**	**65.82**	**11.3**
Flagship	6515	94	52.46	87.16	0.69	66.23	12.3
Buloke	**6415**	**93**	**54.24**	**82.86**	**0.59**	**65.13**	**11.4**
Keel	6313	91	54.14	91.9	0.61	65.92	12.3
Sloop	**6277**	**91**	**50.12**	**90.2**	**0.68**	**65.44**	**11.5**
Scope	6239	90	52.5	86.27	0.2	64.74	10.6
Schooner	**5950**	**86**	**47.26**	**90.1**	**0.51**	**65.59**	**12.3**
Hannan	5819	84	49.52	92.08	0.48	67.33	12.7
SloopSA	**5752**	**83**	**52.08**	**93.61**	**0.46**	**64.79**	**12.1**
Torrens	5664	82	46.48	62.55	1.57	74.06	14
Hindmarsh	**5551**	**80**	**45.98**	**83.91**	**1.54**	**66.8**	**12.3**

Site mean	6905
CV%	2.91
lsd(0.05)	519.2

Comments on Barley Varieties from performance in NVT trials across the State;
Provided by Rob Wheeler (Leader, New Variety Agronomy, SARDI)

Following a similar performance in 2009, the new barley variety, Oxford, dominated South Australian National Variety trials (NVT) in 2010. The long season and mild and wet spring conditions throughout much of SA last year, were ideal for the very late maturing variety Oxford to show its potential.

Oxford triumphed amid 22 commercial varieties tested at 20, SARDI managed, NVT sites across South Australia in 2010. The trials, funded by GRDC, also tested a further 20 advanced lines from barley breeding programs operating throughout Australia. Trailing Oxford across all sites were Vlamingh, Commander, Fleet and Hindmarsh each with similar average yields overall. Together with the older late season variety, Capstan, these varieties contended for top rankings within each district.

Among the trials, two located at Cooke Plains and Keith, were considered unacceptable due to variability stemming from grassy weeds and establishment issues. However the remaining trials produced an average yield of 3.86 t/ha, more than 10 percent above the average 3.63 t/ha produced in 2009, with yields ranging from 2.01 t/ha at Lameroo to 5.39 t/ha at Cummins.

Barley grain yields benefited from the wet spring conditions but grain quality was more variable, particularly influenced by time of harvest in relation to rainfall events. Across all NVT sites, average grain protein declined from 11.6 per cent in 2009 to 10.4 per cent in 2010. Average test weights also declined from 68 to 66.4 kg/hl while grain size improved, with screenings declining from 5.5 per cent to 4.2 per cent and retentions rising, from 77.2 to 81.2 per cent.

While the relatively cool and mild winter and spring conditions limited disease development, fungal diseases were still recorded at many sites. High levels of leaf rust were present throughout Yorke Peninsula and other sites while the spot and net forms of net blotch together with leaf scald were observed at several sites albeit at less damaging levels.

Oxford, produced remarkable yields when compared to older established varieties such as Keel, SloopSA and Schooner with more than a 25 percent overall advantage, but only led other newly released varieties, Vlamingh, Commander, Fleet and Hindmarsh by 11 to 12 percent. Oxford, developed by Nickersons and PlantTech is late maturing, has good resistance to leaf rust and powdery mildew, but lacks CCN resistance and is susceptible to spot form net blotch. Its combination of maturity and disease resistance was an advantage in many regions in 2010, particularly the Yorke Peninsula where many sites were affected by leaf rust. Despite these results, growers should consider the long term predicted performance of Oxford which is more modest and aligns with Commander and Fleet in most districts except behind in the Murray Mallee and Central to Upper Eyre Peninsula. With late maturity, Oxford may be an option for areas like the South East and districts where Gairdner was successful, although further evaluation is needed. Released as a feed variety, Oxford is undergoing malting quality evaluation with final results due in 2012.

Vlamingh, another later maturing variety, was the second ranked variety across all NVT sites in 2010. Vlamingh has malting accreditation, was developed by DAFWA for Western Australian and is commercialised in Eastern Australia by Viterra. Lacking CCN resistance and with intermediate levels of foliar disease resistance, in long term comparisons Vlamingh has

averaged more than 5 percent below other malt options like Commander and Buloke in SA. Vlamingh is unlikely to have a significant role in South Australia.

Only just behind Vlamingh in overall yield rankings were the group, Commander, Fleet and Hindmarsh with less than one percent separating each. 2010 cemented the position of Commander in SA, as a high yielding malting quality option with the seasonal conditions well suited to its mid maturity. Commander averaged more than 13 per cent above Schooner and SloopSA and 2 percent above Buloke performing consistently in most districts except the Mid North where its susceptibility to leaf scald could be implicated. In previous seasons, Commander has been less impressive under tight finishing conditions but this was not experienced in 2010. Commander has CCN resistance and only modest foliar disease resistance and therefore should not be grown on barley stubble. However it has excellent grain plumpness, low screenings and high retentions albeit with slightly lower test weights and grain protein which were again seen in 2010 trials. These yield and grain characteristics will ensure that Commander is one of the most profitable varieties to grow in many districts, with a greater likely-hood of achieving malt grain quality.

Just trailing Commander was the feed quality variety, Fleet, which has demonstrated wide adaptation by performed well over many seasons. Developed by the SA Barley Improvement Program, Fleet is similar to Barque in maturity, performs well across a range of soils including light sandy soils and has an excellent spectrum of disease resistances including CCN resistance. Fleet is a good option for all districts, and across several years of NVT, has produced a similar average test weight to Keel with less than half the amount of screenings. Fleet is also suitable for stubble situations and deeper sowing, by virtue of is long coleoptile.

Having been evaluated over three dry seasons, with outstanding results, the food grade variety, Hindmarsh, has been less impressive under the longer season conditions experienced in 2009 and 2010. Despite this, the recent results from both Hindmarsh and Fleet have been relatively good considering their early maturities, with their long term advantages of 15 to 17 percent over Schooner and Sloop types, maintained in 2010. Some variation in the performance of Hindmash at NVT sites in 2010 could be attributed either to its useful resistance to leaf scald, or its moderate susceptibility to leaf rust and spot form net blotch, which were present at several sites.

Growers are reminded that Hindmarsh has a short coleoptile and its establishment and yield can be compromised by deep sowing, fungicide amended seed treatments and pre-emergent herbicides that affect coleoptile length.

With its recently announced food grade classification, which will allow marketers to potentially extract premiums over feed grades, Hindmarsh remains a good feed variety option for most districts although its short height and lower yield may preclude it from drier areas such as Central and Upper Eyre Peninsula.

While the yield gap between the malting varieties, Buloke and Flagship widened in 2010 presumably in part due to the mid to late maturity of Buloke, both maintain a clear yield advantage over Schooner and Sloop types. Over the longer term, there is little separating these varieties with Flagship offering CCN resistance and much better spot form net blotch resistance, while Buloke lacks CCN resistance but has better leaf scald resistance and slightly higher yield potential. Both varieties have excellent malting quality suited to export markets with Flagship generally higher in screenings and Buloke lower in test weight than Schooner. Greater boron toxicity symptoms, leaf necrosis and susceptibility to sprouting have curbed interest in Flagship on farm, but market demand is strong and rewards are high for those who persist with Flagship. Notwithstanding, Flagship should be harvested without delay once the crop is mature and and while enabling earlier harvest, windrowing may exacerbate the sprouting risk with this variety.

The recently released imidazolinone tolerant feed variety, Scope performed very similarly to Buloke, across all districts in 2010. These varieties are agronomically similar in all respects and despite the limited evaluation of Scope within NVT, current results confirm it to have a similar adaptation to Buloke in SA. Marketed by AWB Seeds, grower interest in Scope will be high, since it offers an option for troublesome grass control using an appropriate BASF Clearfield herbicide. Herbicide use registration is currently being sought with an outcome expected prior to 2011 seeding.

Keel and Maritime, with their relatively early maturity were not expected to perform well in 2010. However Maritime produced good results, despite the presence and its susceptibility to net form net blotch, while Keel was well down, averaging 12 per cent below Hindmarsh. except on Central Eyre Peninsula, where the absence of leaf rust enabled it to yield to potential.

Acknowledgements

Trials were conducted by the SARDI New Variety Agronomy group with comments about varieties by Rob Wheeler, SARDI

Funded by GRDC

GRDC Grains Research & Development Corporation

Government of South Australia

SARDI RESEARCH AND DEVELOPMENT INSTITUTE