

2009 Field Crop Variety Evaluation

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Waikerie and MSF site, South Australian Mallee

Key messages:

It was a difficult season full of surprises and somewhat hard to draw any real conclusions as to which are the best varieties from these trials. Season began with no summer moisture but a good timely opening rain on April 24th. Lack of rain through late winter months created severe crop stress and this was added to by a very hot windy episode through September. Rain in September, October and November caused problems with reshooting, sprouting and grain quality downgrades. However the following messages still apply:

- Yitpi was generally the best performed wheat variety and Hannan the best Barley. The newly released Jaywick was the best of the Triticale.
- Correct choice of cereal varieties can have a serious impact on overall productivity and profitability of a cropping operation.
- Yield is not the only consideration when choosing a variety. For wheat the threat of rust is real. For barley the threat of net form or net blotch is growing.
- Choose your varieties for the farming system and rotation you have.

Aims:

- To evaluate newly released varieties of a range of field crops with stated and potential application in the Mallee environments at a number of locations in areas not serviced by the National Variety Trial (NVT) scheme.
- To examine the correlation of varieties in MSF and Mallee trial results.

Background:

The MSF program has, for a number of years, been testing sowing field crop variety trials at key sites in the Mallee where growers can readily view and evaluate for themselves the potential of new varieties for their situation. Previous trials have showed the effect on productivity of optimum variety selection.

About the trial:

Small Wheat, Barley and Triticale trials were set up at two sites – MSF site on Allen Buckley’s property at Waikerie and also at Peter Kroehn’s property at Waikerie as small plot (12m*1.6m) variety trials. Experiments were setup as three bay, three replicate complete randomised block designs. Yields were analysed using a Nearest Neighbour Analysis routine. Information from the wheat, barley and triticale trials included grain yield and quality data. All trials were sown 7th May 2009 with adequate DAP and zinc fertilizer (see Tables).

Assessments:

The collection of data at the trial site included:

- Grain yield
- Grain quality – whole grain protein, screenings, test weight and thousand grain weight. Grain samples from each plot were bulked to provide sufficient grain for quality testing.

Results:

Results are included in the tables at the conclusion of this article.

Table 1. Wheat grain yield analysis

Table 2. Wheat grain quality results

Table 3. Barley grain yield analysis

Table 4. Triticale grain yield analysis

Discussion:

Wheat

MSF wheat variety trials were sown at two sites within 5km: Waikerie and the MSF site.

Generally across the Mallee, season 2009 was below average rainfall. Centres across the Mallee recorded little or no rainfall for the period January to March. As a result, the cropping season opened with no sub soil moisture. The Waikerie and MSF sites both recorded 194 mm growing season rainfall. Wheat yields ranged from 0.53 to 0.78.

There were no statistically significant differences between the varieties at either site or in a genotype by environment analysis. However, the best-performed varieties across both trials in order were Yitpi, Derrimut, Pugsley, Espada and Gladius. The poorest yielding lines were Axe, Correll, Carinya, Wyalkatchem and Young. Peake, which performed well at the MSF site in 2008 but did not seem to handle the conditions in the Mallee as well in 2009. In 2008 best performed varieties in order were Peake, Espada, Axe, Derrimut, Yitpi and Young.

Waikerie and MSF sites, although only five kilometers apart and sown on the same day with the same rate of seed and fertiliser, showed a very low positive correlation for wheat variety performance ($r=0.20$; 0=no similarity, 1= exact pattern). This is likely to reflect the lack of significant differences between yields at each site. MSF site was sown into canola stubble and the Waikerie site was continuous wheat

Water Use Efficiencies were calculated for each site using the following formulae: WUE (water use efficiency) = (yield/A-O rainfall) - evaporation rate in mm)). In this instance we used an evaporation figure of 80 mm, and this is in line with the higher growing season rainfall. The WUE figures range from 4.7 to 6.8 kg grain /mm of growing season rainfall at MSF and Waikerie respectively. This indicates that plants were not able to use all water available during the growing season for grain production. Because of an almost complete drought through the first three months of 2009 the sub soil started the growing season with very low levels of available water and plants appeared to run out of moisture in about mid August. At both sites Axe, a very early variety, was in full grain in late August/early September and beginning to change colour.

Table 2 shows the grain quality results for the wheat trials – whole grain protein, screenings (<2 mm), test weight and thousand kernel weight. Grain for variety quality testing was the composite bulk of the variety from the three reps in the trials. At both sites, proteins were good, averaging better than 13 %, screenings were low, test weight figures averaged below 80 and grain weights were reasonable. Peake, which is known for high screenings levels in past years, returned below average screenings and quite high grain weights. Gladius produced the best grain weights and consistently high protein levels.

Barley

Barley trials were sown alongside the wheat trials at both sites and average yields ranged from 0.52 t/ha at MSF site to 0.60 t/ha at Waikerie . There was good statistical difference between varieties at both sites and in the gontype by environment analysis. There is reasonable positive correlation between varieties at Waikerie and MSF sites (r=0.64). The best-performed varieties across both sites were Hannan, Hindmarsh, Schooner, Fleet and SloopSA (Table 3).

In 2008 the best varieties were Hindmarsh, SloopSA, Barque and Hannan. This indicates a consistency of performance in these varieties across seasons

Water Use Efficiencies were calculated for each site and ranged from 4.5 (MSF) to Waikerie with 5.3 kg grain/mm growing season rainfall.

Triticale

Triticale yields ranged from 0.86 kg/ha (MSF site) to 0.74 t/ha (Waikerie), with very poor correlation between variety performances at both sites (R=0.29). There was no significant difference between triticale varieties at either site or in the GxE analysis. The consistent performers were Jaywick and Hawkeye with Jaywick ranking number one at both sites.

Who's Involved:

The trial is supported by:

- Caring for our Country SAMS 2 project
- DWLBC
- Growers – Allen Buckley, Peter, Brenton and Kerry Kroehn, Waikerie;
- Brett Klau, Viterra, Loxton kindly allowed Rural Solutions SA to use Viterra equipment for grain quality determination.

- SARDI

Activities, Events and Industry Participation:

- MSFP Core Sire Field Day September 2008,
- MSFP Ag. Bureau harvest report meetings (8)
- MSF Research Compendium.

Future Directions:

In 2010 it is thought to again review the value of these variety trials. The correlations with wheat results from the NVT trials are in past quite low and it is thought to continue these trials where the MSF groups place a high a priority on these trials

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Table 1. Grain yield results from Wheat variety evaluation trials at two Mallee sites, with genotype by environment (GXE) analysis. WUE (water use efficiency) = (yield/A-O rainfall-80).

	Waikerie			MSF			GXE Mean		
	Yield (t/ha)	Rank	% mean	Yield (t/ha)	Rank	% mean	Yield (t/ha)	Rank	% mean
Axe	0.778	8	100	0.234	12	44	0.506	12	77
Carinya	0.639	12	82	0.524	7	99	0.582	10	89
Catalina	0.834	2	107	0.479	9	90	0.657	7	100
Correll	0.669	11	86	0.481	8	90	0.575	11	88
Derrimut	0.904	1	116	0.631	3	119	0.768	2	117
Espada	0.793	6	102	0.594	4	112	0.694	4	106
Gladius	0.817	5	105	0.557	6	105	0.687	5	105
Peake	0.743	10	95	0.587	5	110	0.665	6	101
Pugsley	0.778	7	100	0.704	2	132	0.741	3	113
Wyalkatchem	0.768	9	98	0.457	10	86	0.613	9	93
Yitpi	0.830	3	106	0.723	1	136	0.777	1	118
Young	0.819	4	105	0.410	11	77	0.615	8	94
mean	0.781			0.532			0.656		
lsd	0.206	ns (P<0.05)	26	0.145	ns (P<0.05)	27	0.216	ns (P<0.05)	33
cv	15.5			16.1			16.0		
mean	0.781			0.532			0.656		
Sowing date	7-May			7-May					
A-O rainfall	194			194					
Fertiliser (DAP +Zn)	75			75					
WUE (kg/mm)	6.8			4.7					
Yield Correlation									
MSF									
Waikerie	0.2046								

Table 2. Grain quality results from Wheat variety evaluation trials at two MSF Mallee sites in 2009. Whole grain protein %, Screenings (<2mm), Test weight (kg/hL), and 1000 kernel weight (TKW).

Variety	Protein (%)		Scrn (%)		Test Weight (kg/hL)		TKW (g)	
	Waikerie	MSF	Waikerie	MSF	Waikerie	MSF	Waikerie	MSF
Axe	13.7	13.2	1.3	1.6	79.1	77.8	37.2	34.9
Carinya	14.2	13.7	0.9	0.8	79.7	78.5	33.2	33.9
Catalina	14.0	12.8	1.2	0.8	80.1	79.9	33.2	36.8
Correll	13.5	12.5	2.7	2.9	77.8	77.5	34.6	38.4
Derrimut	13.8	12.6	3.8	3.1	80.7	79.7	34.3	37.5
Espada	14.2	14.6	1.2	1.6	77.9	77.1	33.6	34.4
Gladius	14.4	14.5	2.2	2.2	81.5	80.4	38.5	40.2
Peake	13.8	13.4	1.7	1.6	78.2	77.0	37.5	39.3
Pugsley	13.8	13.3	2.1	2.0	79.6	78.2	31.7	34.7
Wyalkatchem	14.6	13.9	1.3	1.4	78.4	77.5	31.3	34.2
Yitpi	14.6	14.1	1.2	1.6	80.3	79.2	35.9	39.0
Young	13.6	12.8	3.7	3.3	79.7	79.1	32.0	34.1
Mean	14.0	13.5	1.9	1.9	79.4	78.5	34.4	36.4
Max	14.6	14.6	3.8	3.3	81.5	80.4	38.5	40.2
Min	13.5	12.5	0.9	0.8	77.8	77.0	31.3	33.9
correlation	0.7960		0.9453		0.9452		0.7361	

Table 3. Grain yield results from Barley variety evaluation trials at two Mallee sites, with genotype by environment (GxE) analysis. (WUE (water use efficiency) = (yield/A-O rainfall-80)).

	Yield (t/ha)	Waikerie Rank	% mean	Yield (t/ha)	MSF Rank	% mean	Yield (t/ha)	GxE Rank	% mean
Barque	0.368	9	61	0.497	7	96	0.433	7	77
Flagship	0.421	8	70	0.444	8	86	0.433	8	77
Fleet	0.670	4	112	0.499	5	96	0.585	4	104
Hannan	0.897	1	149	0.739	1	143	0.818	1	146
Hindmarsh	0.827	2	138	0.539	4	104	0.683	2	122
Maritime	0.482	6	80	0.327	9	63	0.405	9	72
Schooner	0.760	3	126	0.554	3	107	0.657	3	117
SloopSA	0.441	7	73	0.565	2	109	0.503	6	90
SloopVic	0.542	5	90	0.499	6	96	0.520	5	93
mean	0.601			0.518			0.560		
lsd	0.138	sig. (P<0.05)	23	0.149	sig. (P<0.05)	29	0.242	sig. (P<0.05)	43
cv	13.2			16.5			14.7		
mean	0.601			0.518			0.560		

Sowing date	7-May	7-May
A-O rainfall	194	194
Fertiliser (DAP +Zn)	60	60
WUE (kg/mm)	5.3	4.5

Yield Correlation

MSF
Waikerie 0.6437

Table 4. Grain yield results from Triticale variety evaluation trials at two Mallee sites, with genotype by environment (GXE) analysis. (WUE (water use efficiency) = (yield/A-O rainfall-80)).

	Waikerie			MSFP			GXE Mean		
	Yield (t/ha)	Rank	% mean	Yield (t/ha)	Rank	% mean	Yield (t/ha)	Rank	% mean
Hawkeye	0.735	4	99	0.853	4	99	0.794	3	99
Jaywick	0.864	1	116	0.999	1	116	0.932	1	116
Kosciuszko	0.678	5	91	0.861	2	100	0.769	5	96
Rufus	0.749	3	101	0.849	5	98	0.799	2	100
Speedee	0.809	2	109	0.751	6	87	0.780	4	97
Tahara	0.623	6	84	0.857	3	100	0.740	6	92
mean	0.743			0.862			0.802		
lsd	0.208	ns	28	0.138	ns	16	0.181		23
cv	15.4	(P<0.05)		8.5	(P<0.05)		11.9		
mean	0.743			0.862			0.802		
Sowing date	7-May			7-May					
A-O rainfall	194			194					
Fertiliser (DAP +Zn)	60			60					
WUE (kg/mm)	6.5			7.6					
Yield Correlation									
Waikerie									
MSF	0.29								