

2.1.4 Wheat Variety Trial - Epping Forest and Hagley, Tas

Locations:

"Fairfield", Epping Forest;
"Summer Hill Farms", Hagley, Tasmania.

Author:

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HRZ wheat breeding program (GRDC).

Acknowledgments:

Tom and Philip Osborne, James and Peter Clutterbuck.

Researchers:

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Growing season rainfall:

(April-Nov): Epping Forest: 235 mm

(April- Dec): Hagley: 488 mm plus 109 mm irrigation

Summary:

Wheat varieties were evaluated at Epping Forest (dryland) and Hagley (irrigated) and average yields were 4.1 and 8.3 t/ha respectively. The CSIRO line 95102.1 was again a consistent performer with very high rankings at both sites and has been high yielding across 5 years of evaluation, in both dual purpose and grain-only trials. Tenders are currently being called for and multiplication of this line has commenced. Alberic also yielded well and commercialisation arrangements need to be initiated, particularly for growing under irrigation and high yield potential sites.

Overall the performance of the European and NZ lines was reasonably good but less than that of the better CSIRO lines. New lines from overseas will be evaluated in 2008-09 however it is unlikely these varieties will provide the instant panacea that many believe to be the case. A number of CSIRO lines performed reasonably well and will be further evaluated.

Background:

With the release of new varieties, greater awareness of potential yields and improved management practices, there has been a large increase in the area sown to wheat in Tasmania. In particular the CSIRO/HRZ wheat varieties have shown adaptation to the Tasmanian environment and have dominated recent plantings. Six European wheat varieties are also being tested following good performances in previous years in Tasmania and in New Zealand. With new races of rust appearing it is important that information on response is gathered. There have also been some differences in disease susceptibility in Tasmania compared other parts of Australia.

The aim of these trials was to compare existing wheat varieties under dryland and irrigated conditions, evaluate new breeding material and continue to assess the disease responses of all germplasm.

Method:

Over 30 lines and varieties have been sown at Epping Forest and a subset (10) of these at Hagley with irrigation. Breakwell triticale and Gairdner barley are also being grown for comparison under irrigation at Hagley. Most of the breeding lines are from CSIRO but 3 are from Crop and Food Institute, New Zealand. The 4 ex PGG Wrightsons varieties and Sentinel and Wheat T were bred in Europe.

Main entries and their origin are listed below:

- Tennant, Brennan, Mackellar - CSIRO/HRZ/ AWB Seeds
- Amarok, Teesdale, Alberic, Frelon - ex PGG Wrightsons /GrainSearch
- Wheat T - Diamond Agric Products
- HRZ03.0003, CFR03.1010.3, CFR02.193 - New Zealand/HRZ
- Wedgetail - NSW
- Kellalac - Vic
- Sentinel - AWB Seeds

As a comparison, Breakwell triticale was also included in the trial design at Hagley.

Trial designs were randomised complete blocks with 4 replicates. To provide information on crop management, two replicates in the Hagley trial received an additional top-dressing of nitrogen. The trials were harvested for grain on 11th and 25th January (Epping Forest) and 16th January 2008 (Hagley).

▼ Table 2.9: Trial inputs

	Epping Forest	Hagley
Sowing date	25 May 07	26 May 2007
Basal fertiliser	250kg/ha 9:13:17:4	250kg/ha 9:13:17:4
Topdressing	50 kgN/ha	50 or 100kg N/ha
Fungicides	GS32	GS32-33, GS39-45

Results:

There was a promising break to the season and the Hagley site received 155mm in May (luckily most of this was after sowing). As in 2006-07 however rainfall over the season was low with Decile 2 rainfall over winter and spring. While there was useful rainfall in late October/early November in most areas, the Central and Southern Midlands received very little. Even in the Northern Midlands there was considerably less than in SW Victoria. The one big difference compared with 2006-07 was the absence of significant frosts at flowering. Most of the rain in December was too late to be of use for grain-fill.

Grain yields at the two sites reflect the growing season rainfall (Table 2.10). Yields at Epping Forest were relatively low as a result of the dry growing season. In contrast yields at the Hagley site were much higher with an average of 8.3 t/ha. However the free draining nature of krasnozems soils which is beneficial in avoiding waterlogging, can be limiting in a dry season, even with irrigation.

Soil N levels were reasonably high at Hagley (120kg/ha to 60 cm depth) before sowing but this may have been boosted by mineralisation prior to the sampling. Even with two N topdressings, tillering was less than optimal and yield potential was restricted.

The response to the second 50kg of N at Hagley on two replicates was surprisingly not significant ($P=0.60$) but examination of the data shows that was due to variation between replicates (this variation was also blocked by the replicates). Consequently yield data from all 4 replicates was pooled.

There was little data gathered on rust resistance, in particular stripe and leaf rust, due to two fungicides applied at Hagley (to realise full yield potential) and a lack of disease at Epping Forest.

With the low rainfall at Epping Forest it was the earlier varieties that appeared to yield relatively well. Both H123.1 and Brennan ranked much higher at Epping Forest than Hagley. However, even at the former site statistically there was no significant difference in yield between Brennan, Tennant, Mackellar and Teesdale. With irrigation at Hagley the mid and later maturing varieties did relatively better.

There was only 9% difference in yield at Hagley between the highest and lowest yielding wheat varieties with even older varieties such as Kellalac performing well. It was only due to the uniformity of the site that statistically significant yield differences between varieties could be differentiated. The Breakwell triticale was however significantly different and yielded 10% lower than Kellalac. Tiller numbers appeared to be restricted, presumably by a lower than optimal soil N level.

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▼ Table 2.10: Wheat grain yields (t/ha) at Epping Forest and Hagley, 2007-08.

Variety/Line	Epping Forest		Hagley	
	Yield (t/ha)	% Tennant	Yield (t/ha)	% Tennant
95029.12	4.66	120.6		
95102.1	4.63	119.7	8.86	107.2
97549	4.58	118.5		
8.31.6	4.56	117.9		
H123.1	4.48	115.9	8.22	99.5
96013.88	4.44	114.7		
97671	4.43	114.5		
95192.14	4.38	113.2		
K89.44	4.30	111.3	8.31	100.6
CFR03.1010.3	4.22	109.1		
K37.18	4.21	108.8	8.96	108.5
H230.3	4.16	107.6		
Brennan	4.14	107.0	8.09	97.9
97261.123	4.14	107.0		
97436.174	4.13	106.7		
HRZ03.0003	4.13	106.7		
H150.2	4.11	106.3		
Wheat T	4.08	105.5		
Amarok	4.07	105.4		
Alberic	3.99	103.3	8.66	104.8
96192.169	3.99	103.2		
Tennant	3.87	100.0	8.26	100.0
CFR02.193	3.84	99.4		
Frelon	3.80	98.3		
Mackellar	3.76	97.1	8.28	100.3
H229.3	3.73	96.5		
Teesdale	3.66	94.5	8.42	101.9
Wedgetail	3.58	92.4		
Kellalac	3.48	90.0	8.12	98.3
Sentinel	3.30	85.2		
Breakwell triticale			7.30	88.4
F prob	<0.001		<0.001	
LSD (5%)	0.739		0.413	
CV %	10.7		3.4	

The highest yielding wheat overall was again 95102.1 with very high rankings at both sites and in the dual purpose site (reported elsewhere). This line from CSIRO has been consistently high yielding across 5 years of evaluation, in both dual purpose and grain-only trials. In the 2006-07 irrigated site 95102.1 achieved a yield of 12t/ha but also has a stable yield with high rankings at sites with lower yield potential. Tenders for this line are currently being called for and multiplication has commenced but was affected by drought conditions in 2007-08 and release will not occur until 2010. Depending on the successful tender it is anticipated that seed multiplication will commence in Tasmania in 2008-09 (or earlier?).

The CSIRO line K37.18 and the French variety Alberic continued to do yield well in 2007-08. K37.18 is of short stature with good standing ability and disease resistance and has also yielded consistently well over several years of trials. Although not as late as Tennant and Alberic, it is several days later than other advanced material and may be a replacement for Tennant.

Alberic is comparable to Tennant in flowering date with a higher yield potential. It has an erect canopy and stiff straw with good disease resistance but was perhaps slightly disappointing in not out-yielding Mackellar under optimal conditions at Hagley in 2006-07. Never-the-less the consistent performances of this variety suggest it should be released, particularly for growing of under irrigation and high yield potential sites. Its slow growth however reduces appeal as a dual purpose option. Tennant continues to be an average yielder even under optimal conditions. Its strength is that being later flowering it can be used to spread frost risk but if either Alberic or K37.18 are released it will be superseded.

Mackellar had an ordinary year and apart from an excellent yield under irrigation in 2006-07 has had several years of average yields in grain-only trials. This is in contrast to the first three years when comparative yields were outstanding. Mackellar, with BYDV resistance, tends to perform relatively well in seasons where this disease is prevalent. Sentinel yielded poorly for the second season –it apparently performs much better under conditions with higher yield potential.

The 3 NZ lines performed reasonably well at Epping Forest but could not match the better performing CSIRO lines. HRZ03.0003 produced high yields under irrigation in 2006-07 but late in the season severe stem rust was found on this line which will preclude possible release in Australia.

Overall the performance of the European and NZ lines was reasonably good but less than that of the better CSIRO lines. New lines from overseas will be evaluated in 2008-09 however it is unlikely these varieties will provide the instant panacea that many believe to be the case. A number of CSIRO lines performed reasonably well and will be further evaluated.