

### 2.1.7 Wheat variety evaluation - Nile & Burnie, Tas

#### Location:

“Waddymore”, Nile and “Lochaven”, Burnie, Tasmania.

#### Funding:

This was a HRZ wheat breeding program with GRDC funding.

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#### Background/Aim:

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. Mackellar was the first commercial wheat variety with Barley Yellow Dwarf Virus (BYDV) resistance and several new potentially BYDV resistant lines from CSIRO were evaluated for the first time. In response to perceived concerns with red wheat in dairy rations a number of white wheat entries were re-evaluated. Seven varieties and lines from Europe and New Zealand were also tested, following good performances from some of this material in previous years in Tasmania.

With new races of rust appearing, it is important that information on response to disease is gathered. There have also been some differences in disease susceptibility in Tasmania compared with other parts of Australia.

The aim of these trials was to compare existing wheat varieties, and evaluate new breeding material. The performance of varieties and advanced lines was also evaluated under higher input conditions at Burnie.

#### Take home messages:

- Fifty-six wheat lines and varieties were sown at Nile and a subset of these at Burnie. Waterlogging was a constraint at both sites particularly Nile.
- Revenue was the stand-out variety across both trials and this continues on from previous high yields in Tasmania in six years of grain-only and dual purpose trials.
- Several new CSIRO lines have continued to yield well and some new material may be resistant to BYDV.
- The mainland white wheats (Naparoo, Eaglehawk, Bolac, Sentinel and Ruby) as a group were lower yielding. With irrigation and an extended finish to the season these early varieties could not be expected to match the mid-longer season material.
- Despite being early flowering, Preston and Beaufort yielded relatively well.

#### Trial information:

Fifty-six wheat lines and varieties were sown at Nile and a subset at Burnie. Most of the breeding lines were from CSIRO but also two from Crop and Food Institute, New Zealand. To avoid accidental introduction of Wheat Streak Mosaic Virus no new wheat material was brought into Tasmanian wheat trials for 2 years. However with the detection of this virus on several commercial seed lots of Tennant in 2007, new varieties and breeding lines were introduced in 2008. As the disease has not yet been visually sighted in-crop, seed for trials was sourced from Victoria where the incidence of WSMV has been negligible compared with NSW.

Main entries, their origin/breeding program and seed licensee are listed below:

Tennant, Brennan, Mackellar	CSIRO/HRZ Wheat	AWB Seeds
Preston	CSIRO/HRZ Wheat	AWB Seeds
Revenue	CSIRO/HRZ Wheat	GrainSearch
Teesdale, Alberic	Europe ex PGGWrightsons	GrainSearch
Beaufort	France/LongReach	GrainSearch
Kellalac	Vic DPI	-
Sentinel	France/LongReach	AWB Seeds
EGA Eaglehawk	NSW DPI	PlantTech
GBA Ruby	GBA	PlantTech
Naparoo	Uni of Sydney	AGT Seeds
Bolac	AGT Seeds	ABB Grain

Both trial designs were a randomised complete block. There were 4 replicates at Nile with sown plot lengths of 10m and 3 replicates at Burnie with 15m plots. Further site and trial details are provided below:

	Nile	Burnie
Previous crop	onions - 17 June	potatoes - 21 May
Sowing date		
Basal fertiliser	250kg/ha 9:13:14:4	250kg/ha 9:13:14:4
Nitrogen	Foliar application 50 kgN/ha topdressed	Foliar application 2 x 46kgN/ha topdressed
Harvest date	20-21 Jan	27 Jan

At Burnie three fungicides were applied, the last application being an earwash for fusarium. A plant growth regulator (1.2L 750A Cycocel) was added with the first fungicide. Numbered CSIRO lines grown at Nile, that only produced low yields or were disease susceptible are not presented as they will not be released and provide little useful information in the context of this report.

**Growing season rainfall:** Nile -678 mm including 150 mm irrigation (Nov-Dec)  
Burnie -875 mm including 120 mm irrigation (Oct-Dec)

## Results and discussion:

*The season:* Winter rainfall was very high with waterlogged conditions at both sites for much of the Winter. Rainfall was particularly high in August (161 mm at Nile and 198 mm at Burnie). Total rainfall over the Winter period at the nearby weather stations at Launceston airport and Burnie was ranked in Decile 10 and Decile 8 respectively. The waterlogged conditions continued into Spring at Nile when plants were reaching maximum growth rates. On a positive note, the overcast conditions resulted in little chance of frost damage at flowering. Both trials were irrigated over November and December.

The un-seasonally high rainfall and residual soil moisture from the previous onion crop resulted in waterlogging damage to sections of the trial at Nile. To avoid confounding of the results with waterlogging damage, sections of plots or in some cases whole plots were not harvested. Thus yields appear reasonably high but the important factor is the ranking of varieties. While it is useful to also gauge waterlogging tolerance of varieties, this is very variable in a paddock and best left to dedicated waterlogging screening trials in tanks or specially prepared, level ground. With the high yield potential at Burnie, greater yields were expected but waterlogging was a major constraint, even on the relatively free draining krasnozem (ferrosol) soil.

Across both trials Revenue was the stand-out performer and appears to have set a new plateau in wheat yield potential across a range of agronomic conditions in Tasmania - early sowing (March), late sowing (June) and after cutting in dual purpose trials. These consistent performances suggest the yield potential of Revenue is quite robust across different environments. Only in 2008-09 with high BYDV pressure have the yields of Revenue not been ranked in the top few varieties (but still above average). The high yield potential under irrigation and good conditions is demonstrated by a yield of 12.0 t/ha in 2006-07.

**Table 1.** Wheat grain yields (t/ha) and as percentage of the site average at Nile and Burnie, Tasmania, 2009-10.

Variety/Line	Grain type	Nile		Burnie	
		Yield (t/ha)	%site av	Yield (t/ha)	%site av
98049	red	7.20	119.9		
Revenue	red	7.06	117.5	7.78	110.8
Alberic	red	6.85	114.0	7.17	102.1
H267.3	red	6.73	111.9		
98048.34	red	6.71	111.6		
9274	red	6.65	110.7		
9712	red	6.48	107.9		
98090.45	red	6.46	107.5		
Beaufort	red	6.46	107.4	7.05	100.4
170	red	6.45	107.3	7.29	103.8
H150.2	white	6.44	107.1	7.27	103.5
V 311	red	6.38	106.1		
K37.18	red	6.32	105.2	7.81	111.3
Preston	white	6.30	104.7	7.48	106.5
H123.1	red	6.24	103.8		
CFR00.732.24	red	6.21	103.3		
V 226 H.5	red	6.10	101.5		
Tennant	red	6.09	101.3	6.30	89.8
Teesdale	red	6.03	100.3		
Mackellar	red	6.00	99.8	7.68	109.4
T404.149	red	5.97	99.4		
Brennan	white	5.88	97.9	6.57	93.6
K89.44	red	5.82	96.8		
Kellalac	white	5.75	95.7		
CFR1010.3	white	5.72	95.2		
Bolac	white	5.56	92.5	7.01	99.8
Naparoo	white	5.54	92.1	7.25	103.3
Eaglehawk	white	4.84	80.5	6.77	96.4
Ruby	white	4.53	75.4	5.35	76.2
Sentinel	white	4.38	72.9	6.56	93.5
<b>I.s.d. (5%)</b>		<b>0.898</b>		<b>0.602</b>	
<b>cv%</b>		<b>10.6</b>		<b>5.1</b>	

The CSIRO line, K37.18 and the French variety, Alberic also yielded well in 2009-10. Both have been consistent performers over 5 years, but generally over-shadowed by Revenue. K37.18 is of short stature with good standing ability and disease resistance. Although not as late as Tennant it is several days later than other advanced CSIRO material. Alberic is comparable to Tennant in flowering date with much higher grain yield potential. It has an erect canopy and stiff straw with good disease resistance, but its slow growth reduces potential as a dual purpose crop.

Alberic was perhaps slightly disappointing in not out-yielding Mackellar at Burnie (but not significantly different). The free draining nature of krasnozem soils, which is beneficial in reducing waterlogging, can be limiting towards the end of the season with low rainfall and this resulted in a sharper finish to the season at Burnie. The irrigation at Nile assisted the latest maturing varieties, Alberic and Tennant, hence the better ranking at this site. However even under optimal conditions Tennant continues to be at best an average yielder in grain-only trials. Its strength is that being later flowering it can be sown early and therefore be used to spread frost risk, but new late CSIRO material will see Tennant superseded.

With the more rapid finish at Burnie some of the earlier varieties such as Preston, Naparoo and Bolac tended to rank better at this site compared with Nile. Preston, a NZ line, has yielded very well over 4 seasons and is white grained. Multiplication of this variety has commenced. Preston is somewhat of an anomaly, being high yielding and of milling quality. It is a spring type and, as shown in the dual purpose trial at Cressy, not suitable for very early sowing. However, the CSIRO white grain line H150.2 has a winter habit and has performed well for both dry matter and grain production. In addition it has produced high yields in grain-only trials over the last 5 years and shown good disease resistance.

The mainland white wheats (Naparoo, Eaglehawk, Bolac, Sentinel and Ruby) as a group were lower yielding. This may partly relate to a faster development and more waterlogging damage over late winter. However, with an extended finish to the season with irrigation, these varieties could not be expected to match the mid-longer season material. Naparoo and Bolac, being slightly later, tended to out-yield the very early material -Eaglehawk, Sentinel and Ruby. With a tougher finish all of these varieties would yield higher.

Lodging under good conditions may also be an issue with some of these varieties. By harvest Naparoo, Eaglehawk and Bolac were quite tall at Burnie and some of the plots

of Naparoo, in particular, lodged extensively. This is only the second year of trialling most of these white wheats and further trials are required before making more comprehensive recommendations.

Although early flowering, Beaufort responded to the irrigation at Nile with good yields. This variety has yielded well in SW Victoria over several years and appears to be very adaptable. Early flowering will limit its potential in more frost prone areas but it appears to be a good option where sowing has been delayed.

The CSIRO lines 170 and V311 have yielded well in two years of trialling and, interestingly, 170 has also performed very well in NZ field trials in 2009-10. Other CSIRO material to produce good yields were 98049, 98048.34, 9274 and 9712, all in their first year of trialling. An important potential bonus of these lines is resistance to BYDV and they are currently being tested. H267.3 is a very late flowering line and was hence favoured by the irrigation at Nile.

Brennan and Kellalac continued a run of below average yield results. Brennan is a very leafy variety and perhaps suffers from poorer water use efficiency. There was a minor incidence of Stripe Rust in Kellalac at Nile. All of the new CSIRO material was resistant to Stripe Rust.

#### Summary:

Revenue was the stand-out performer in the variety trials and appears to have set a new plateau in wheat yield potential across a range of agronomic conditions in Tasmania - early sowing (March), late sowing (June) and after cutting in dual purpose trials. These consistent performances suggest the yield potential of Revenue is quite robust across different environments. Only in 2008-09 with high BYDV pressure have the yields of Revenue not been ranked in the top few varieties (but still above average). The high yield potential under irrigation and good conditions is demonstrated by a yield of 12.0 t/ha in 2006-07. Seed of Revenue is available commercially in 2010.

A number of lines and varieties have yielded well for 5 or 6 years. With the release of Revenue and re-adjusting of the yield bar, unless they possess characteristics of importance (eg later flowering, white grain, better stem strength), some of these will be culled from further testing. Some of the mainland white wheat varieties will also be dropped.

To provide information on dryland cropping, the main wheat variety trial in 2010-11 will not be irrigated. New varieties with resistance to BYDV to replace Mackellar are a priority and potential resistant lines are currently being tested. New varieties from overseas will also be evaluated in 2009-10.

Some of the waterlogging problems at the Nile site were caused by a relatively wet soil profile (after onion crop) going into Winter. In these situations an early cereal sowing may be prudent to remove some of the excess soil moisture prior to Winter. This was well demonstrated at the Cressy site in 2009-10.

