

### **1.1.3 WHEAT VARIETY TRIALS**

#### **Longford and Campbell Town Tasmania**

**Locations:** “Munden Vale”, Longford, and “Riccarton”, Campbell Town, Tasmania

**Funding Organization:** HRZ wheat breeding program (GRDC)

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**Growing season rainfall (April-Nov):** Campbell Town: 208 mm  
**(April- Dec):** Longford: 485 mm including 170 mm irrigation

#### **Summary:**

Wheat varieties were evaluated at Campbell Town (dryland) and Longford (irrigated). At Campbell Town frost damage at ear emergence and flowering was the factor most influencing yield. All the later maturing lines avoided some of this damage and were the highest yielding. Grain yields at the Longford site were exceptionally high (average of 10.2 t/ha). The CSIRO line 95102.1 was particularly impressive yielding 12.0t/ha. Two other CSIRO lines also yielded very well and the good run of these lines continues. The best performing “named” varieties were Mackellar and Alberic, the latter also yielded well at Campbell Town being late flowering. An additional 50 kg/ha topdressed nitrogen tended to increase yields of all lines at Longford and this effect was close to significant. The very high yields at Longford, both in the trial and commercial crop illustrate the potential for high input crops with irrigation and provide some light in an otherwise very ordinary season.

#### **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. Of note is Mackellar, the first commercial wheat variety with Barley Yellow Dwarf Virus (BYDV) resistance. Four European wheat varieties from PGG Wrightson/Grainsearch 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 were sown at Campbell Town and a subset (13) of these at Longford with irrigation. Most breeding lines are from CSIRO but two are from Crop and Food Institute, New Zealand. The PGG Wrightsons material was bred in Europe.

Main entries and their origin are listed below:

Tennant, Brennan, Mackellar	CSIRO/HRZ	Wedgetail	NSW
Amarok, Teesdale, Alberic,	PGG Wrightsons	Kellalac	Vic
Frelon	/Grainsearch		
HRZ03.0003	New Zealand/HRZ	Sentinel	Longreach/AWB

Trial designs were randomised complete blocks with 4 replicates. To provide information on crop management, two replicates in the Longford trial received an additional top-dressing of nitrogen. The dry conditions at Campbell Town precluded topdressing of N and in the absence of disease, fungicides were not applied. The trials were harvested for grain on 18<sup>th</sup> January (Campbell Town) and 24<sup>th</sup> January 2006 (Longford).

	<b>Campbell Town</b>	<b>Longford</b>
Sowing date	22 May	19 May
Basal fertiliser	200kg/ha 9:13:14:4	250kg/ha 9:13:14:4
Topdressing	-	50 or 100kg N/ha
Fungicides	-	GS32-33, GS45-53

### Results and Discussion:

Yields at Campbell Town were low as a result of the dry growing season (Decile 1) and severe frost damage (Table 1). The timing of the most severe frost (16th October) was such that all the later maturing lines with developing ears still partially protected in the leaf sheath avoided at least some of the damage and yielded over 2 t/ha. In contrast the earlier maturing lines were at ear emergence, scored high for frost damage and all yielded poorly, i.e. less than 1.6 t/ha. Results from this trial are therefore compromised and should be interpreted with caution.

**Table 1. Wheat grain yields (t/ha), Campbell Town, 2006-07.**

Variety/Line	Yield (t/ha)	% Tennant
FRELON	2.75	109.6
ALBERIC	2.60	103.5
<b>TENNANT</b>	2.51	100.0
K37.18	2.38	94.7
H267.3	2.32	92.4
97261.123	2.24	89.4
95192.14	2.21	88.0
H150.2	2.08	82.8
95102.1	2.05	81.7
K89.44	1.88	74.8
MACKELLAR	1.77	70.4
BRENNAN	1.72	68.3
TEESDALE	1.66	66.0
HRZ03.0003	1.59	63.2
AMAROK	1.53	61.0
H123.1	1.51	60.3
KELLALAC	1.49	59.3
WEDGETAIL	1.30	51.8
SENTINEL	1.06	42.2
<i>l.s.d. (5%)</i>	0.260	
<i>cv%</i>	10.1	

In contrast yields at the Longford site were exceptionally high with an average of 10.2 t/ha (Table 2). Such high yields demonstrate the potential returns from high input irrigated crops (with little or no frost damage). The surrounding commercial crop of Teesdale yielded just under 10 t/ha, which is comparable with trial yields, given that the trial was probably located in a better part of the paddock. Variety averages across the two sites are not provided as rankings at the sites were so different that average values will be misleading. Eleven new numbered lines grown at Campbell Town with yields ranging from 80% to 56% of Tennant are not presented as they provide little useful information in the context of this report.

**Table 2. Wheat grain yields (t/ha) with 50 and 100 kg topdressed N/ha, Longford 2006-07.**

Variety/Line	Yield 50kg N topdress	Yield 100kg N topdress	% diff 100/50 kgN topdress	Average yield (t/ha)	% Tennant
95102.1	11.74	12.21	104.0	11.98	123.3
K89.44	10.84	11.69	107.9	11.26	116.0
K37.18	10.76	11.43	106.3	11.09	114.2
MACKELLAR	10.37	11.14	107.4	10.75	110.7
ALBERIC	10.33	11.05	107.0	10.69	110.1
HRZ03.0003	10.27	10.73	104.5	10.50	108.1
TEESDALE	9.94	10.61	106.7	10.27	105.7
97549	9.62	10.04	104.5	9.83	101.2
<b>TENNANT</b>	9.71	9.71	100.0	9.71	100.0
AMAROK	9.28	10.01	107.9	9.64	99.3
BRENNAN	8.66	9.85	113.7	9.26	95.3
KELLALAC	8.21	9.53	116.0	8.87	91.3
H123.1	8.60	8.89	103.4	8.74	90.0
<i>l.s.d. (5%)</i>		<i>0.800</i>		<i>0.470</i>	
<i>cv%</i>		<i>3.2</i>		<i>3.2</i>	

The standout performer at Longford was the CSIRO line 95102.1 with a yield of 12.0 t/ha, being 23% higher than Tennant. This line was the highest yielding in each of the four replicates and has consistently yielded in the top few lines across 4 years of evaluation, in both dual purpose and grain-only trials. Given that this line is not late maturing and consequently did not avoid frost damage, 95102.1 also yielded surprisingly well at the Campbell Town site and in the dual purpose trial in 2006-07. Multiplication of this line has commenced but release will not occur until 2009 at the earliest. Two other CSIRO lines, K89.44 and K37.18 have also yielded consistently well over several years of trials. Being later maturing, K37.18 was able to avoid some of the frost damage at Campbell Town.

Mackellar performed reasonably well in 2006-07 after several years of average yields in grain-only trials. It was the highest ranked “named” line at Longford and was not as severely affected by frosts at Campbell Town as other material of similar early to intermediate flowering time.

Alberic yielded very well at both sites, not being significantly different to the yield of Mackellar at Longford. It benefited from much later maturity at Campbell Town. Being comparable to Tennant in flowering date with a higher yield potential (at Longford) could see this variety being grown under irrigation. Firstly however commercialisation arrangements need to be initiated. Alberic has an erect canopy and stiff straw with good disease resistance but was perhaps slightly disappointing in not out-yielding Mackellar under optimal

conditions. 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.

Teesdale was average in yield at Longford and below average at Campbell Town unlike 2005-2006 when it was one of the highest yielders. Amarok was below average in performance; the lower leaves at Longford senesced earlier than other material.

The earlier flowering lines ie HRZ03.0003 and to a lesser degree H123.1 and Brennan showed minor amounts of frost damage at Longford. Frosts in November were not damaging and it is likely that the October frosts affected the earlier flowering lines. With high yields under optimal conditions there may have been potential to grow this line under irrigation. However late in the season severe stem risk was found on this line at Longford which will preclude possible release in Australia. Both NZ lines were hit by frost damage at Campbell Town.

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. At Longford it was observed that Brennan produced a large amount of chaff and this may be a further limit to resource efficiency. The performance of H123.1 was disappointing given good yield rankings in previous seasons. At Longford, it suffered a small amount of frost damage (less than 5%) but scored consistently high for this at Campbell Town. At the latter site it was relatively short and it is possible that the frost “settled” more on shorter plots. Conversely, Frelon was the tallest variety at Campbell Town and the surprisingly high yield compared with other seasons may relate to cold air damage away from taller plots - the vagaries of frost damage!

A number of new CSIRO lines performed reasonably well but will require further evaluation, hopefully in a frost-free season. Sentinel, although yielding poorly, was only in its first year of trialing and will also require further evaluation.

At Longford the soil N level at GS30-31 to a depth of 60cm was certainly not high (64 kg N/ha) and by harvest only 37 kg N/ha. The high grain yields suggest that the reasonably good soil structure and soil organic matter enhanced mineralisation. The lack of winter waterlogging may also have allowed greater root exploration. The crop was out of poppies but not a high input vegetable crop.

Combined with irrigation nearly all lines tended to benefit from the additional 50kg of N at Longford but this effect was not quite significant ( $P=0.09$ ). The exception, perhaps not surprisingly, was Tennant with its relatively stable yield. The response of Tennant however was not statistically significant different to the other lines.

There was little data gathered on rust resistance, in particular stripe and leaf rust, due to two fungicides applied at Longford (to realise full yield potential) and the lack of disease at Campbell Town.

The severe frost damage at Campbell Town limits the value of data from this site for variety selection. Given the generally low commercial yields in 2006-07 the results from the Longford trial and surrounding crop are inspiring and show the potential for high input crops. Application of water and other inputs are obviously critical as well as the absence of frost damage.

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