5.3 Comparison of dual purpose wheat varieties for grazing and grain production - Cressy, Tas

Location:
"Coy Farm", Cressy, Tasmania

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Background/Aim:
Dual purpose wheat has been traditionally grown in many areas of Tasmania. In the mid 1980's wheat varieties such as Isis and Macquarie proved to be very susceptible to stripe rust and area declined significantly to almost nil. With the release of new winter wheat varieties from CSIRO, Canberra and private breeding companies there has been renewed interest in growing wheat for both grazing and grain. This use has particular potential where the crop can be watered up in a dry summer/autumn.

Over the past 10 years of trials with dual purpose cereals in Tasmania "red" grained wheat varieties have consistently out-yielded "white" varieties. However with the recent perceived problem with red wheat varieties there has been considerable interest in growing dual purpose white varieties.

The aim of this trial was to compare the new white wheat lines, Preston and H150.2, with Mackellar, Tennant and the new red wheat release, Revenue for dry matter (DM) production and quality, recovery from cutting and grain yield.

Take home messages:

- A replicated trial was conducted to compare dry matter production and subsequent grain yield of five wheat varieties: Revenue, Mackellar, Tennant and white grain lines, Preston and H150.2.
- Revenue produced a significantly higher grain yield than Mackellar although this was not significantly different to H150.1 and Tennant. In addition Revenue tends to have higher dry matter production than Mackellar. In this trial the latter may have been more susceptible to the waterlogging.
- The white grained CSIRO line H150.2 continues to produce high grain yields in Tasmania and has now also demonstrated potential as a dual purpose crop. It will be suitable for an earlier dual purpose sowing as it is later flowering than both Mackellar and Revenue.
- Preston showed good early vigour but it will flower too early for more typical dual purpose sowings times in Tasmania eg March.

Varieties/lines:

Variety	Characteristics
Mackellar	Most commonly grown dual purpose wheat but some grower resistance due to red grain. The only Barley Yellow Dwarf Virus resistant variety
Tennant	Older red grained variety. For early sowing eg before mid March the later flowering h abit is big advantage to minimise frost risk at flowering
Revenue	New red grained release with high yield potential. Previously 95102.1
Preston	New high rainfall white grain variety selected by CSIRO and originally from NZ
H150.2	White grained CSIRO line which has performed consistently well in Tasmania

Trial information:
There were four replicates in a randomised complete block design. The trial was sown on 22nd April with 9:13:17:4 fertiliser at 250kg/ha and followed a potato crop. It was planned to graze the trial with lambs and the trial was fenced in preparation for grazing. However with the very high winter rainfall and boggy ground surrounding the trial it was not possible to bring animals into the trial area. Consequently grazing was simulated by mowing. The wet conditions made use of a lawn mower difficult and plots were instead cut with a walk-behind finger mower with the larger tyres providing greater flotation. All plots were cut to the same height for the first mowing but in the second mowing cutting height was dependant on plant development and growth stage. The majority of herbage (80%) was raked off plots to remove shading effects. The main disadvantage of the finger mower is not being able to collect the forage as it is cut. Consequently prior to mowing, samples were cut at ground level by hand (2 x 0.3m2 quadrats) on 24th July and 19th August to determine DM production. DM data is presented on an oven dried basis.

To reduce waterlogging damage, nitrogen was initially applied as a foliar spray (12kgN/ha) on 17th July. Two additional 50kgN/ha topdressings were subsequently applied as urea. To cover the range of growth stages, three fungicides were applied across the trial (11th September, 20th October and 11th November). The trial was harvested on 11th January. Harvested plot sizes were 8m x 1.5m wide.

Growing season rainfall (Mar-Nov): 589 mm

Results and discussion:

The season: Establishment was good but winter rainfall was very high, particularly in August and total rainfall over the winter period at the nearby Cressy Research Station was the highest on record. The waterlogged conditions continued into spring when plants were reaching maximum growth rates. After early-mid December there was little further rainfall resulting in a sharp finish to the growing season.

Barley Yellow Dwarf Virus was not evident (4 insecticide applications) and rusts were controlled. There was a small amount of sharp eyespot.

Dry matter production: Preston showed good early vigour and this is reflected in the first DM cuts taken on 24th July (Table 1) with this variety producing significantly greater DM. Preston is a NZ spring wheat and not being restricted by need for vernalisation (cold period) before going reproductive, produces lots of early growth. Tennant, Mackellar and H150.2 produced the least DM with Revenue intermediate.

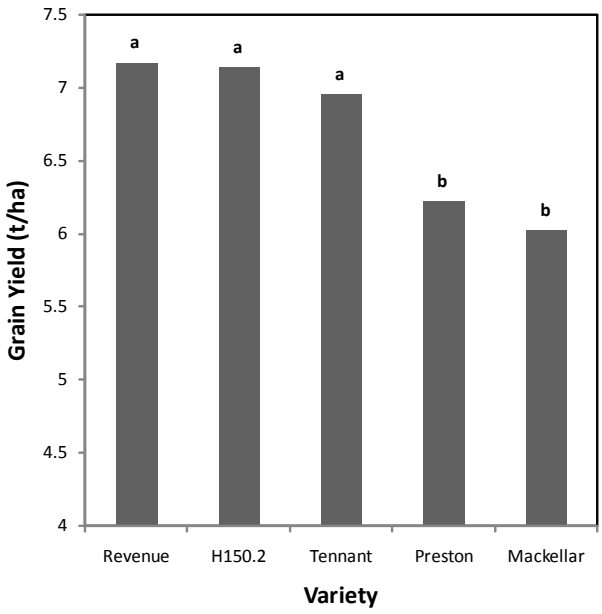
With the second cut on 19th August there was a reversal in rankings with Tennant, the variety with the strongest vernalisation requirement producing the highest DM. The CSIRO line H150.2 is later flowering than current wheat varieties except Tennant and also yielded well. At the time of the second cut both lines were commencing their rapid growth phase after meeting vernalisation (cold period) requirements. The new red variety Revenue produced a similar amount of DM to Mackellar. In contrast to the first cut, Preston produced the least forage.

Grain yield: Revenue, H150.2 and Tennant produced a significantly higher grain yield than Preston and Mackellar (Figure 1). Revenue has performed very well in six years of trialling and apart from the BYDV-infected site at Symmons Plains in 2008-09 has been ranked in the few varieties in each trial. In 2008-09 the BYDV resistant variety Mackellar performed the best of all varieties but it is apparent that without BYDV infection, as at Cressy in 2009-10, this variety cannot match more recent releases. Mackellar generally outperforms Tennant for grain yield. Tennant was a greener colour over winter and it is possible that is more waterlogging tolerant than Mackellar.

Table 1. Dry matter (DM) production (t/ha) from dual purpose cereal trial, Cressy, Tasmania, 2009-10.

Variety	1st cut 31st Jul DM (t/ha)		2nd cut 19th Aug DM (t/ha)	
Preston	1.46	a	1.29	d
Revenue	1.20	b	2.23	bc
Tennant	0.90	c	2.63	a
Mackellar	0.89	c	1.99	c
H150.2	0.88	c	2.35	b
l.s.d. (P=0.05)	**0.227**		**0.251**	
cv%	**13.8**		**4.3**	

Figure 1. Grain yield (t/ha) from dual purpose wheat variety trial, Cressy, Tasmania, 2009-10. (l.s.d. = 0.60 t/ha)



The new white grain variety Preston has yielded well in grain-only trials. As it is a spring type in this trial it flowered at the end of October compared with the other wheat varieties which flowered from 9th to 14th November. It is clearly unsuited to more typical dual purpose sowings times in Tasmania eg March as it will flower too early.

The white grain line H150.2 continues to produce high grain yields in Tasmania. An earlier dual purpose sowing will not be an issue as it is later flowering than both Mackellar and Revenue (but flowers 2-3 days earlier than Tennant).

Summary:
Revenue continues to perform well as a dual purpose crop with high grain and dry matter production. Seed will be available for commercial planting in 2010. The white grained CSIRO line H150.2 has consistently produced high grain yields in Tasmania over 5 years of trials and has now also demonstrated potential as an early sown dual purpose crop.

It could be argued that with the exceptionally wet conditions the lower yields were acceptable. However in un-grazed plots, grain yields from Revenue were significantly higher (see SFS report: "The effect of grazing on grain yield of early sown wheat and comparison with traditional (May) sowing"). Given that in previous years there has generally been no detrimental effect from grazing/cutting this suggests an interaction between grazing and waterlogging i.e. the prolonged waterlogging created an additional stress on top of cutting to the detriment of crop recovery and grain yield.

Figure 2. Grazing cuts - Raised beds.