

5.4 Evaluation of alternative dual purpose cereals for grazing and grain production - Cressy, Tas

Location:

"Coy Farm", Cressy, Tasmania

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Background/Aim:

With the release of winter wheat varieties from CSIRO, Plant Industry, Canberra and introduction of overseas varieties there is again the opportunity to grow wheat for both grazing and grain. This use has particular potential where the crop can be watered up in a dry summer/autumn. While the focus has been on winter wheats for dual purpose cropping, alternative cereal crops should also be considered particularly in light of the potential of Wheat Streak Mosaic Virus to severely impact on wheat grain yields. Triticale, barley, and oats are either resistant or less affected. Frosts at flowering are less also critical in barley and oats, an important consideration in more frost prone regions of Tasmania. A new grazing barley variety from NSW, Urambie, was evaluated as well as three barley varieties from Europe. With a new stripe rust strain and the loss of resistance in Breakwell an alternative long season triticale, Endeavour, was trialled.

The aim of this trial was to compare early sown dual purpose wheat, barley, triticale and oat varieties for dry matter (DM) production, feed quality, recovery from grazing and grain yield

Take home messages:

- A replicated trial was conducted to compare dry matter production and subsequent grain yield of 7 cereal varieties: wheat (Revenue), barley (Urambie, Oxford and 2 French lines), triticale (Endeavour), and oats (Bass).
- Grain yield was highest (5.8 t/ha) from Revenue and lowest from Bass. Dry matter production was greatest from the barley lines as with the later sowing there was insufficient time for the other cereals to catch up.
- New barley germplasm from France is late flowering and has considerable potential for early sowing in the more frost prone areas of Tasmania. Both lines appear to possess some waterlogging tolerance.

Varieties/lines:

Wheat: Revenue

Barley: Urambie, Oxford (England), Barley E, Barley Z (France)

Oats: Bass

Triticale: Endeavour

Trial information:

For most lines there were four replicates in a randomised complete block design. However due to area restrictions the barley lines: Oxford, Barley E, Barley Z were not fully replicated (2 replicates only). The trial was sown on 22nd April with 9:13:17:4 basal fertiliser applied at 250kg/ha and followed a potato crop.

In past trials, after taking quadrat DM cuts, sheep and cattle have been used to remove the remaining growth. However with animals being introduced from paddocks of wheat it was found that the triticale and oats were preferentially grazed. Consequently trials are now fenced off and plots cut with a mower.

Due to the wet conditions and relatively poor growth the first dry matter cut (with lawn mower at 5cm above ground level) was delayed until 31st July. The wet soil conditions worsened in August and consequently for the second cut, plots were instead cut with a walk-behind finger mower with the larger tyres providing greater flotation. Cutting height was dependant on plant development and growth stage. The majority of herbage 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, 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 large range of growth stages, four fungicides were applied across the trial (11th, 29th September, 20th October and 11th November). Barley plots were harvested on 5th January and the rest of the trial on 11th January. Harvested plot sizes were 8m x 1.5m wide.

Growing season rainfall (Mar-Nov): 589 mm

Results and discussion:

The season: Soaking rains in April ensured good soil moisture and subsequent establishment of the crop. After a dry May, winter rainfall was very high with waterlogging commencing in June. Rainfall was particularly high 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. On a positive note, the overcast conditions resulted in little chance of frost damage at flowering. After early-mid December there was little further rainfall resulting in a sharp finish to the growing season and an early harvest.

Barley Yellow Dwarf Virus was not evident (4 insecticide applications) and there were no other diseases of significance apart from some minor scald and leaf rust on the barley which appeared between fungicide applications and a small amount of sharp eyespot in Revenue wheat.

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

Crop	1st cut (mow) 31 st Jul DM (t/ha)		2nd cut (hand) 19 th Aug DM (t/ha)	
Oxford	1.66	a	1.20	b
Bass	1.20	b	0.99	b
Urambie	1.16	b	1.21	b
Endeavour	1.06	b	1.06	b
Revenue	1.05	b	1.08	b
Barley E	0.77	c	2.10	a
Barley Z	0.69	c	1.61	ab
l.s.d. (P=0.05)	0.181		0.642	
cv%	10.7		21.5	

Dry matter production: The dry matter removed by mowing and subsequent recovery (measured in quadrat cuts) is presented in Table 1. DM production was relatively low due to the later than planned sowing and waterlogged conditions. Mowing results are a reflection of growth habit with the more erect types tending to cut more DM. Oxford barley, being relatively erect and faster developing produced significantly higher dry matter from the first cut. In contrast the more prostrate lines, Barley E and Z and to a lesser degree, Endeavour triticale, produced the lowest DM yields from the first cut.

In contrast the highest DM from quadrat cuts taken prior to the second mowing (finger mower) tended to be produced from both French barley lines. This may be due to better recovery after the first mowing or this material commencing its phase of rapid growth after meeting its vernalisation (cold period) requirement. The French barley lines also handled the waterlogging better than the other barley material (Oxford and Urambie -general yellowing) and Bass oats (extensive purple leaf tipping).

The relatively recovery of Bass oats in the waterlogged conditions of this trial was surprising. Under wet conditions it was expected that the barley varieties would struggle and oats and triticale perform relatively better. Even canola in an adjacent trial was less affected by waterlogging than Bass oats. In previous trials, with the late maturity of Bass, an additional DM cut has been possible and without this, lodging at harvest has been a problem. However in 2009-10 the recovery of Bass after cutting was relatively poor, no additional cut was taken and height at harvest was relatively short. Fodder tissue samples are still being processed and analysed for crude protein, energy, fibre and digestibility.

Grain yield: Revenue wheat produced a significantly higher grain yield than Endeavour triticale and Barley Z which in turn were higher yielding than the other barley lines (Oxford, Urambie and Barley E). In common with recent dual purpose trials in Tasmania, the lowest grain yield was from Bass oats (Figure 1).

Barley Z produced the highest grain yield of the 4 barley lines and is a 2 row type. The other French line, Barley E, is a 6 row barley for feed but in one of the plots showed severe head loss and this will restrict its potential. Unlike the 2 French lines which recovered well from cutting and showed good height at harvest, both Urambie and Oxford were of short stature at harvest and this could be an issue in rocky paddocks.

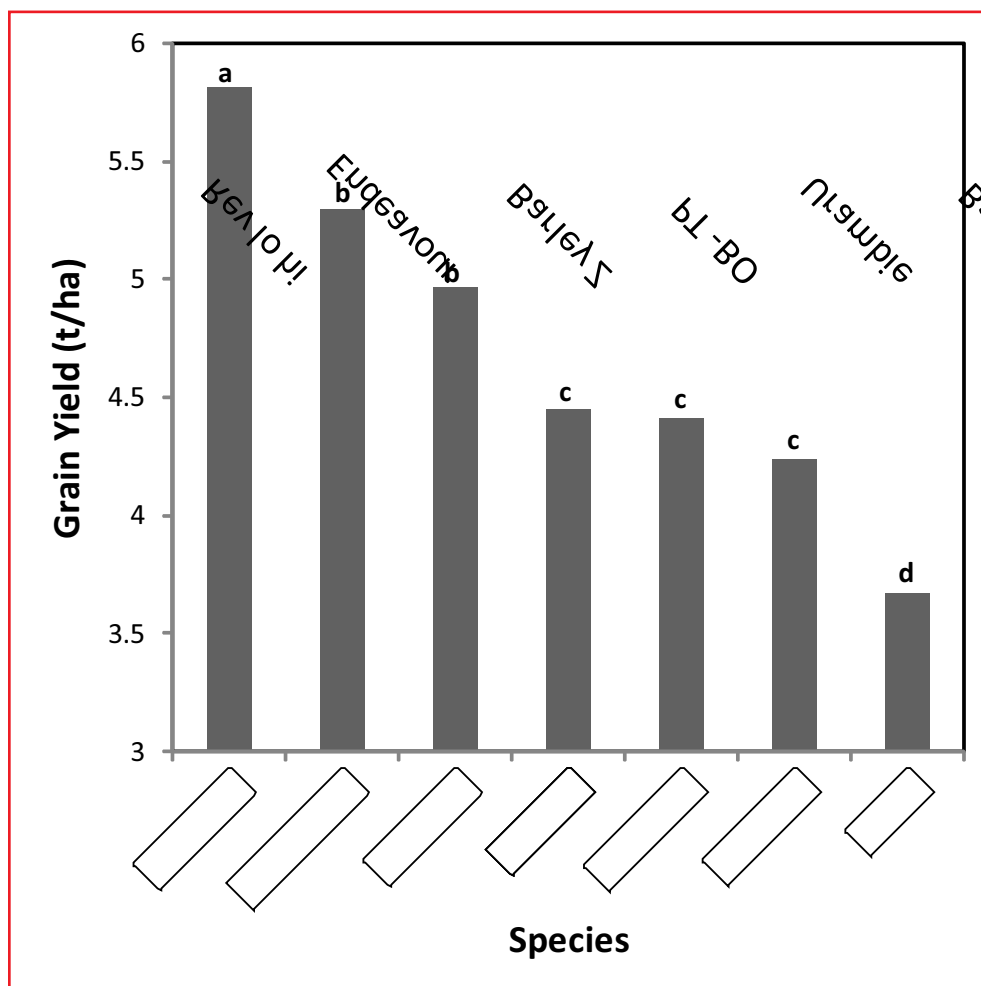


Figure 1. Grain yields (t/ha) from dual purpose cereal trial, Cressy, Tasmania, 2009-10.
(l.s.d. = 0.41 t/ha)

Summary:

From a grain perspective, Revenue wheat showed the most potential as a dual purpose crop with the highest grain yield. DM production was generally not as high as that of the barley material but this may be a reflection of the later than planned sowing date. With rapid early growth the barley germplasm was able to produce more DM and unlike previous dual purpose trials there was insufficient time for the other cereals to catch up.

Further evaluation of European barley germplasm in dual purpose trials is warranted. The 2 French lines recovered well from cutting and of the four barley lines, Barley Z produced the highest grain yield. The French lines will also be screened for waterlogging tolerance in TIAR trials. Oxford, with high initial dry matter and a comparable grain yield to Urambie, shows potential for April sowing. However with an earlier sowing eg March, varieties with a strong vernalisation or winter habit are required and Oxford would flower too early.

The relatively poor performance of Bass oats in the waterlogged conditions of this trial was surprising. While lower grain yields have been recorded in all previous trials the dry matter production was also relatively low. The waterlogging effects may relate to soil type as in a forage trial also conducted on a "Cressy shale" (dermosol) soil type the three oat varieties were all severely affected by waterlogging compared with other species.

There has also been success in some trials on the mainland in grazing winter canola varieties from Europe with good recovery and little or no reduction in grain yield. With the States stringent GM tolerance levels, bringing new winter canola varieties into Tasmania is very costly. Nevertheless 2 high yielding winter canola lines from Germany have been recently brought into the State and will be evaluated in 2010-11.