

8.8 Evaluation Of Dual Purpose Cereal Varieties - Epping Forest, Tas

Location: "Fairfield", Epping Forest, Tasmania

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Acknowledgments: Tom and Philip Osborne

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Growing season rainfall (Mar-Nov):

369 mm including irrigation

Summary of Findings:

Two trials were conducted to compare dry matter production and subsequent grain yield from cereal crops. In one trial four cereal crop species wheat (Mackellar), barley (Urambie), triticale (Breakwell), and oats (Bass) were compared. With a longer vegetative period, a second DM cut was able to be taken from Bass oats and consequently total DM production was significantly higher than from Mackellar which in turn produced significantly more DM than Breakwell and Urambie. Grain yield was significantly higher from Breakwell (9.4 t/ha).

In a second trial, 7 wheat varieties and breeding lines were compared. There were statistically no differences in DM production between the wheats. The CSIRO line 95102.1 and Alberic were the highest grain producers.

Background/ Objectives:

Dual purpose oats, and to a lesser extent wheat, have 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. The major limiting factor will be greater disease pressure due to the longer growing season.

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 not or less affected. Frosts at flowering are also less critical in barley and oats which is an important consideration in more frost prone regions of Tasmania.

The aim of these trials was to assess dual purpose wheat, barley, triticale and oat varieties for DM production, recovery from grazing and grain yield. A further aim was to compare dry matter and feed quality of cereals with a tetraploid annual ryegrass used for over-winter grazing prior to seed production.

Treatments and Method:

To minimise edge effects from different species two trials were conducted, one with mixed species containing buffer plots and another to compare the wheat lines.

Alternative dual purpose cereals:

Wheat: Mackellar

Barley: Urambie

Oats: Bass

Triticale: Breakwell

Ryegrass comparison: T-Rex

Wheat varieties Tennant, Mackellar, Alberic + 4

CSIRO breeding lines

There were three replicates in the multi species trial and four in the wheat variety trial, both in randomised complete block designs with buffer plots to separate the different crop species. Final plot sizes were 8m x 1.5m wide.

The trials were sown under a centre pivot on 12th April 2007 with 9:13:17:4 fertiliser at 250kg/ha and followed a tickbean crop. Due to the later than desired sowing only one dry matter cut was taken. The barley variety Urambie grew the fastest and DM cuts were taken on 20th August with the growing point just starting to elongate (GS30-31). Previous experience with triticale suggests that a less severe cut be taken and the Breakwell was also cut on this date. The Mackellar and Bass were both cut a week later on 28th August. In previous trials Bass oats has remained vegetative several weeks longer than wheat and with excess vegetative growth has lodged badly.

Consequently an additional DM cut was taken on 19th September, again prior to stem elongation. A third cut on 31st October was taken from the ryegrass. DM production data is presented on an oven dried basis.

Nitrogen (50kgN/ha) was top-dressed on 6th September and a further 50kgN applied to plots on 19th October and watered in. To cover the range of growth stages three fungicides were applied.

Results and Discussion:

With a dry season in 2006-2007 which continued into autumn 2007 there was some difficulty in finding a trial site paddock with reliable irrigation. Consequently the dual purpose trial was sown later than usual. The trial was irrigated up and despite good rains in May subsequent growth was delayed by a dry and cold winter with only 5mm in June. This combined with some grazing by deer resulted in no dry matter cuts taken in June/early July i.e. just the one cut in August/September.

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 fenced and entire plots are now cut with a mower. It was planned to graze the wheat variety trial separately but with slow growth, the surrounding paddock was not grazed and trial plots were instead mown.

Alternative dual purpose cereals

Dry matter production:

Total DM production was relatively low due to the late sowing, poor early growth and some grazing by deer (Table 8.37) Mackellar produced significantly more DM from the first cut than Bass, Breakwell, and Urambie. However, with a second cut from Bass, the total DM was significantly higher than Mackellar. As a comparison, the ryegrass produced a comparable amount of DM to Mackellar for the first cut (2.4 t/ha) but additional cuts on 19th Sep and 31st October produced 1.5 t/ha and 3.2 t/ha respectively.

Tissue samples were sent to FeedTest, Hamilton. Much of the data can be explained by maturity type with Bass having the highest crude protein (CP) and the lowest fibre (NDF) content. An exception to this was a high CP content in Urambie. The ryegrass was very low in fibre content and intermediate for CP (comparable to Mackellar). With a relatively late sowing in this trial it will be valuable to compare DM production from a Feb-March sowing when two cuts can be taken from each species.

▼ **Table 8.37: Dry matter production and grain yields (t/ha) from dual purpose cereal trial,**

Crop	1st cut DM production (t/ha)	Total DM production (t/ha)	Grain yield (t/ha)
Urambie	1.56	1.56	6.75
Mackellar	2.30	2.30	8.36
Breakwell	1.78	1.78	9.42
Bass	1.81	3.90	4.42
F prob	0.014	<0.001	<0.001
LSD (P=0.05)	0.377	0.430	0.667
CV%	10.1	9.0	4.1

Grain yield:

Breakwell triticale produced a significantly higher grain yield than Mackellar wheat which in turn was higher than Urambie barley. The lowest yield was from Bass oats. There were some grain shaking losses in the Bass (average 0.3 t/ha) and Urambie through neck break (0.5 t/ha) but these do not change the level of significance. Although yields were probably not affected, leaf rust was a consideration in the barley even with 3 fungicides.

Dual purpose wheat variety trial

Dry matter production:

Tennant produced the highest amount of DM which is in contrast to other years where it is one of the lowest (Table 8.38). DM cuts were taken slightly later this season and it is possible this allowed Tennant to catch up with the other material. Alberic has never been a high DM producer but statistically was no lower yielding than Tennant.

▼ **Table 8.38: Dry matter production and grain yields (t/ha) from dual purpose wheat trial, Epping Forest, Tasmania, 2007-08.**

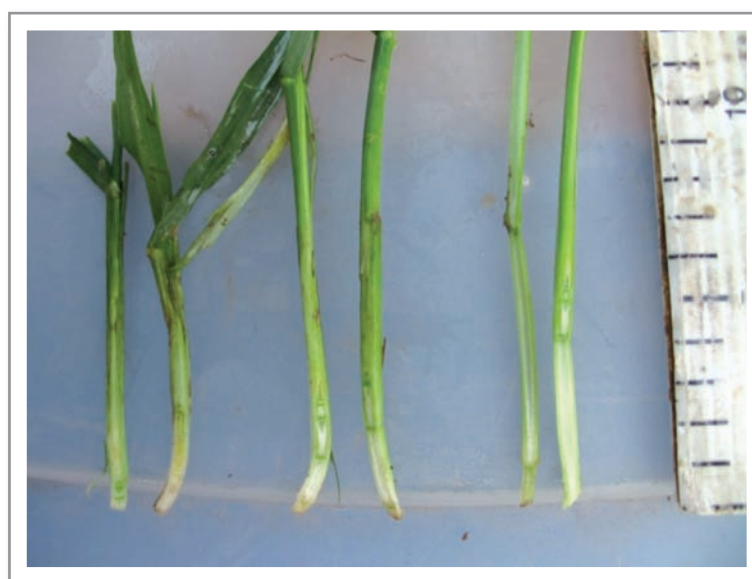
Variety/line	1 st cut DM Yield (t/ha)	% Tennant	Variety/line	Yield (t/ha)	% Tennant
Tennant	2.33	100.0	95102.1	9.67	118.0
K89.44	2.31	99.3	Alberic	9.64	117.6
Mackellar	2.27	97.6	K37.18	9.22	112.5
H123.1	2.15	92.3	H123.1	8.77	107.0
95102.1	2.13	91.7	Mackellar	8.21	100.2
K37.18	2.05	88.0	Tennant	8.20	100.0
Alberic	1.97	84.6	K89.44	8.19	99.9
F prob.	0.079			<0.001	
I.s.d. (5%)	0.267			0.661	
cv%	8.3			5	

Again, FeedTest data broadly relates to maturity type with Tennant having relatively high crude protein (CP) and lower fibre (NDF) content.

Grain production:

Even with irrigation, grain yields were reasonably high given the dry season. The CSIRO line 95102.1 continued its impressive run (see 2.1.4 Wheat Variety Trial - Epping Forest and Hagley, Tas on page 17 in this manual) closely followed by Alberic which is also a consistently high grain yielder. The earlier line H123.1 was cut a week earlier in two of the replicates and Mackellar should probably have also been cut slightly earlier as there was damage to some of the growing points.

Barley Yellow Dwarf Virus was not evident and there were no other diseases of significance apart from some minor leaf rust between fungicide applications.



▲ **Photo 8.13: Uneven grazing will lead to different rates of crop maturity. Three samples taken from an unevenly grazed triticale paddock on 20/07/07. Grazed down to 10cm (left), grazed down to 15cm (middle), ungrazed (right). Note position of embryo ear along stem.**