

10.1.2 EVALUATION OF DUAL PURPOSE CEREAL VARIETIES (CAMPBELL TOWN, TAS)

Abstract:

Dual purpose wheat, triticale and oat varieties were compared for dry matter production, recovery from grazing and grain yield. BYDV infection was prevalent and resistant varieties from CSIRO, Canberra performed relatively well in terms of grain yields. In general later maturing material produced the highest grain yields including Alberic, a soon to be released variety. Grain yields also tended to be inversely proportional to dry matter production. LH49E2, a CSIRO bred wheat line, continued to produce high grain yields.

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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, Plant Industry, Canberra and private breeding companies 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. The major limiting factor will be greater disease pressure due to the longer growing season. The aim of this trial was to assess dual purpose wheat, triticale and oat varieties for dry matter production, recovery from grazing and grain yield.

Location: "Riccarton", Campbell Town, Tasmania

Growing season rainfall (Feb-Nov): 366 mm

Methodology:

Varieties Included:

| | | |
|-----------|--|--------------------------------------|
| Wheat | Tennant, Brennan, Mackellar + breeding lines | HRZ Wheats, Canberra |
| | Alberic, Teesdale, Amarok | Wrightson Seeds / GrainSearch |
| Triticale | Jackie, Breakwell | University of Sydney / Waratah Seeds |
| | Monstress | Wrightson Seeds |
| Oats | Bass | TIAR |

Sowing date: 26th February 2004

Harvest date: Dry matter cut - 19th June 2004
Grain - 14th January 2005

Fertiliser:
basal - 150kg/ha 9:13:17,
topdressing - 75kg N/ha (27th Aug)

Weed Control: 80ml/ha Kamba,
1.0l/ha 2,4-D (9th July)

Disease control: 500ml Bumper (26th Oct)

Unfortunately cattle broke down the fence around the trial prior to a second dry matter cut.



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Results and Discussion:

Establishment was generally patchy due to not being able to sow deep enough into moisture. Germination was consequently very staggered and occurred over two months. Rainfall in June was higher than average but after this rainfall was minimal until a timely 40mm in late spring. Competition from *Vulpia* was a problem and there was an interaction with seed source. BYDV also became apparent early in spring and symptoms appeared to be worse where silver grass competition was greater, presumably due to greater stress on the plants' moisture resources.

Dry matter production: Data is presented in Table 1 on an oven dried basis. The triticale and oat varieties produced significantly higher dry matter (DM) than the wheat varieties. Of the wheat varieties, several of the newer CSIRO lines and the earlier maturing varieties, Marombi and Brennan, were most productive. (Brennan has consistently produced higher DM over three years of trials.) The later maturing wheats were slower to establish and tended to produce the least dry matter. Mackellar and Teesdale ranked at the bottom but are not late maturing types. However due to the staggered germination and *Vulpia* there was considerable variation across plots and consequently there was statistically no significant difference between the bottom 8 wheat varieties. In previous years both Mackellar and Teesdale have produced above average DM yields.

In past trials after taking quadrat dry matter 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 the decision was made to cut all of the plots in 2004 with a mower. To be consistent all plots were cut to 5cm height. This proved to be too low for the triticale varieties and poorer recovery was evident compared with the oats and all the wheat germplasm.

When cattle broke into the trial area they weren't shy about eating most of the dry matter on offer. Again the triticale showed poor recovery but Marombi wheat was almost equally deficient in this area. Interestingly some of the previously uncut Mackellar plots (placed in the trial to compare grain yields from cut and uncut plots) were also slow to recover. This unintentional grazing was not late for Tasmania (around Aug 10) suggesting that with an early grazing, plant growth stage is retarded or at least the growing point is at a lower height.

Grain production: Yields were not high due to the silver grass competition but more importantly BYDV which was severe in some lines. Three of the top five yielding wheat lines were BYDV resistant (LH49E2, LM50M16 and Mackellar).

LH49E2 has been a consistent performer in both grain only and dual purpose wheat trials. It is relatively late maturing but has still yielded well with a dry finish (ie also topped grain yields in Riccarton dual purpose in 2003-2004 and 2nd highest in 2002/03). With a later flowering date, frost risk is in theory lowered with this line but in practice there is still a reasonable chance of a frost in mid November. The slower growth habit has consistently produced lower DM production compared with other varieties.

The grain yields of K89.44 and Alberic were relatively high considering their BYDV susceptibility but due to the variation in the trial they were statistically only significantly higher than the bottom 6 varieties (and of the wheats, only higher than Brennan and Marombi).

Interestingly, BYDV symptoms appeared to vary with time between varieties. Nearly all of the susceptible material showed a steady worsening of symptoms. This was particularly evident in Marombi and to a lesser extent Brennan. However, in the Bass oats and triticale, symptoms were moderate to severe in early October but by the end of the season ranged from much reduced to almost non-existent. In a few wheat plots the symptoms eased in mid November and then increased again in December, presumably due to the rainfall and greater moisture availability in early November. Alberic was particularly consistent in this characteristic across all replicates. This suggests some degree of tolerance. There is no data from France, the country of origin of Alberic, to support this but it may not have been a selection criterion. The BYDV resistant material was generally not totally free of BYDV but symptoms were minor and did not persist.

The grain yield of Brennan for the second consecutive year in dual purpose trials was disappointing. As with Marombi the earlier maturity was a disadvantage. The grain yield of Marombi was extremely low due to poor recovery from grazing (significantly less tillers and ears) and severe BYDV infection. The low yields of Bass oats and the triticale varieties can be attributed to preferential grazing and in the case of the triticale, poor recovery.

Of note is the significant inverse correlation between dry matter production and grain yield ie those varieties with highest dry matter production tended to produce lower grain yields and vice versa. This is probably related to the maturity with the slower maturing types producing less dry matter but being favoured by the November rainfall in grain production.

Stripe rust was detected on several varieties in July but interestingly did not recur after mowing and grazing. The fungicide applied in October was precautionary.

Table 1: Dual Purpose Cereal Trial - Dry Matter Production and Grain Yields from Campbell Town

| Dry matter production | | |
|-----------------------|-----------------|----------|
| Variety | DM Yield (t/ha) | %Tennant |
| Jackie | 1.92 | 218.5 |
| Monstress | 1.89 | 215.5 |
| Breakwell | 1.86 | 212.2 |
| Bass | 1.74 | 198.4 |
| 95192.14 | 1.26 | 143.7 |
| 95102.1 | 1.18 | 134.1 |
| Brennan | 1.12 | 127.4 |
| Marombi | 1.05 | 119.3 |
| K89.44 | 0.98 | 112.1 |
| Amarok | 0.88 | 100.6 |
| Tennant | 0.88 | 100.0 |
| LH 49E2 | 0.80 | 91.3 |
| Alberic | 0.80 | 91.1 |
| LH 50M16 | 0.79 | 90.3 |
| Teesdale | 0.78 | 88.5 |
| Mackellar | 0.70 | 80.2 |
| LSD | 0.30 | |
| CV | 18.3% | |

| Grain yields | | |
|--------------|--------------|----------|
| Variety | Yield (t/ha) | %Tennant |
| LH 49E2 | 5.97 | 130.3 |
| K89.44 | 5.44 | 118.7 |
| Alberic | 5.42 | 118.3 |
| LH 50m16 | 5.31 | 116.0 |
| Mackellar | 4.97 | 108.7 |
| Teesdale | 4.97 | 108.6 |
| 95102.1 | 4.84 | 105.6 |
| 95192.14 | 4.76 | 104.0 |
| Amarok | 4.68 | 102.2 |
| Tennant | 4.58 | 100.0 |
| Brennan | 4.13 | 90.3 |
| Bass | 3.78 | 82.6 |
| Monstress | 3.49 | 76.2 |
| Jackie | 3.23 | 70.5 |
| Marombi | 2.80 | 61.1 |
| Breakwell | 2.74 | 59.8 |
| LSD | 1.02 | |
| CV | 16.2% | |

Conclusions:

- BYDV resistance and tolerance in wheat and other species grown for grazing and grain will probably be beneficial in most years due to the extended aphid pressure and was particularly apparent in 2004-05.
- LH49E2 continued its good performance. In this trial it was the only line to significantly out yield Tennant. Yields of this line from grain-only trials over the last 3 years are almost as impressive (see wheat varieties evaluation data). Being BYDV resistant is an advantage and despite being late maturing LH49E2 has shown good yields with a dry finish. It has not been an outstanding yielder on the mainland and susceptibility to leaf rust is a concern whereas this has not shown up in Tasmania (yet). Depending on adoption rates and the economics of release it may be grown in Tasmania only.
- Grain yields of Marombi were very low due to poor recovery from grazing and BYDV susceptibility. If being grown as a dual purpose variety it should be grazed less intensively and/or for less duration than other varieties.
- There was a strong inverse correlation between grain yield and dry matter production. The top grain yielding varieties in particular LH49E2, K89.44 and Alberic also performed well in grain only trials. This was the first year of evaluating K89.44 and Alberic and both look very promising.
- In future trials, triticale varieties will only be mown to a height above 5cm. This may not be a consistent trial practice but commercially care would need to be taken to avoid over-grazing triticale. The trial in 2005/06 will be watered up under a centre pivot irrigation to avoid variation in establishment. If silver grass is a problem Monza/Atlantis will be used.
- Provided disease pressure does not become an issue, dual purpose wheats are an attractive option particularly where an initial irrigation is possible.

Further Information:

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