3.6.2 The effect of sowing date on yield and grain quality of wheat - Inverleigh, Vic

Location:
Inverleigh Research Site.

Funding:
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Background/Aim:
It has been identified that early sowing is critical to achieving high yields in the winter wheat variety Mackellar. Delaying sowing past the 1st week in June has been shown to significantly reduce yields in most years for Mackellar. The effect of delayed sowing for the newer wheat varieties needs further clarification. Hence the aim of the trial is to assess the effect of sowing date on grain yield and quality for some recently released commercial lines along with some experimental lines that could be commercially available within the next 2 years.

An evaluation on the effect of grazing on grain yield and quality is also incorporated into the trial.

Trial design:
A replicated (4 reps) and randomized block design was used for the trial. Plot length was approximately 12 metres, however harvest yields were adjusted for variations in plot length and a missing row.

Weed control:
Appropriate herbicides were used to minimize weed problems in the trial. Weed pressure was insignificant.

Take home messages:
The results of the trial should be considered in light of the extremely dry year, with approximately 250 mm of rain falling between 1st May and the 30th November.

- Yield was reduced by 2.76 T/ha, as sowing was delayed from the 6th May to the 4th July. Average yield declined from 5.02 t/ha to 2.26 t/ha. The cost of delayed sowing was approximately $828 per hectare or $14.03 per ha/day. Hence in order to maximize yield, particularly with the winter wheat varieties that have a vernalization requirement, sowing must take place before mid May.
- Grain protein % generally increased as sowing was delayed. This was a reflection of the decrease in yield as sowing was delayed.
- Grain test weight was relatively unaffected for the 1st 3 times of sowings, however markedly declined with the last time of sowing.
- Grain screenings significantly increased with the latest time of sowing.
- The effect of grazing was to reduce grain yield by approximately 0.5 /ha (averaged across Amarok and S95102.1). In order for grazing of winter wheat to be viable in times of relatively high grain prices, sowing should occur before the start of May in order to maximize forage yield and to minimize the impact on grain yield.
- There are 2 wheat varieties which stood out in the trial, namely SQP 95102.1 and Beaufort. SQP 95102.1 is more suited to an early sowing and will produce exceptionally high yields, whilst Beaufort is better suited to a later planting with a tougher finish to the season.

Rainfall:

Avg. Annual:	483.3mm, Sheoaks 1991-2008
Avg. G.S.R.:	390.4mm, Sheoaks 1991-2008
2008 Total:	401.4mm, Inverleigh Research Site
2008 G.S.R.:	April – November = 260.2mm
	(Inverleigh Research Site; 130mm below average)

The trial involved 5 varieties, namely:

CS98048:
a winter wheat dual purpose variety out of the CSIRO/Ausgrainz programme. This variety will not be commercialized due to leaf rust susceptibility

CS95102.1:
A winter wheat dual purpose variety out of the CSIRO/Ausgrainz programme. This variety will be commercialized with the name of "SQP 95102.1". Commercial quantities of seed will be available in 2010. This variety has shown exceptional yield in previous trials and has better grain characteristics than Mackellar. It possesses better early seedling vigour and has shown good grazing potential with an early sowing.

Amarok:
A feed wheat variety out of the GrainSearch programme. A strong variety with good grazing potential.

Mackellar:
The first winter wheat variety released that carries barley yellow dwarf virus resistance. This variety has yielded well in many trials and sets the benchmark for other varieties to be compared against. The variety can exhibit grain screening problems in a tight seasonal finish.

Beaufort:
A new feed variety being commercialized by GrainSearch. Beaufort has given some excellent yields in past trials. It is particularly adapted to tougher years, being significantly quicker to flower than the winter wheat types.

Time of sowing:
There were 4 time of sowings:

- 6th May 2008 (TOS 1)
- 21st May 2008 (TOS 2)
- 10th June 2008 (TOS 3)
- 4th July 2008 (TOS 4)

Fertiliser:
100 kg/ha MAP at sowing followed up with 50 kg/ha N at approximately GS30 for TOS 1 and 40 kg/ha for each of the other sowing dates. The N timings were TOS 1 (7/8), TOS 2 (26/8), TOS 3 & 4 (8/9)

Sowing rate:
Aimed to establish 250 plants per square metre.

Simulated grazing
Replicate 1 of TOS 1 was cut with a lawn mower to a height of 10cm to simulate lax grazing. This was undertaken on 4th August when the winter wheat lines were approximately GS30. Beaufort was too late to "graze" and yield is likely to have been affected by the cutting with many growing points having been removed. Consequently only the 4 winter wheat lines (other than Beaufort) have been evaluated in terms of the impact of "grazing". Note that this evaluation only applies to 1 replicate and cannot be statistically analysed.

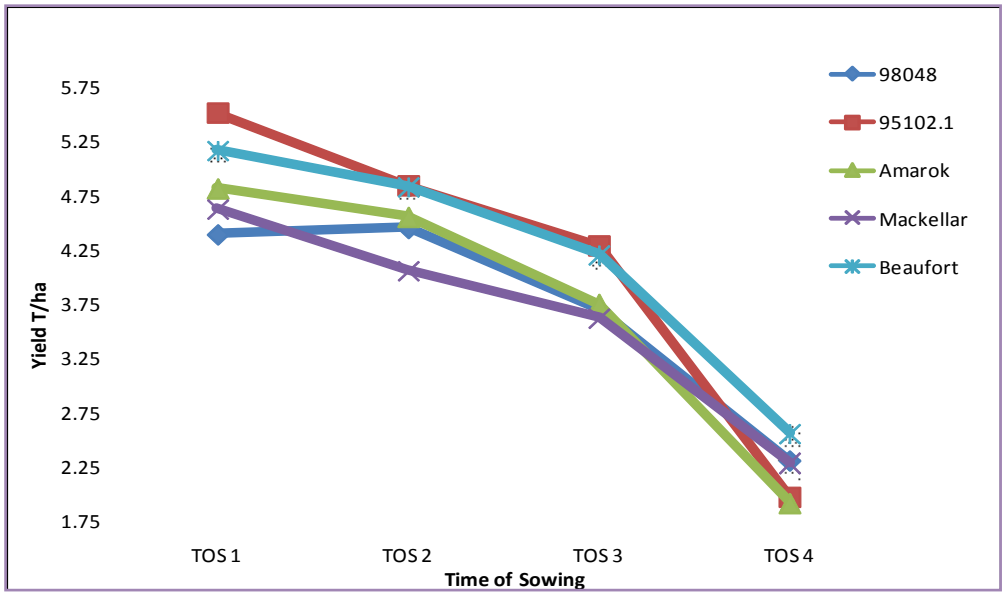
Above: SQP 95102.1 TOS 1

A) Grain Yield

Table 1: Effect of Time of Sowing on Grain Yield

Time of sowing	6/5/08	21/5/08	10/6/08	4/7/08
Average Varietal Yield t/ha	5.02	4.59	3.96	2.26

P=0.05, LSD=0.26 t/ha



Graph 1: Grain yield vs time of sowing

B) Grain Quality

The effect of delayed sowing on grain quality averaged across all varieties is given in Table 2.

Table 2: The effect of delayed sowing on grain quality averaged across all varieties

Time of Sowing	6/5/08 TOS 1	21/5/08 TOS 2	10/6/08 TOS 3	4/7/08 TOS 4	LSD P=0.05
Grain Protein %	9.14	9.52	9.70	11.20	0.53
Test Weight kg/hl	74.75	72.60	75.87	69.78	0.53
Screenings %	9.45	11.55	9.15	14.40	0.72

Grain protein, test weight and screenings remained relatively unchanged for TOS 1 through TOS 3. There was however a marked increase in grain protein, decrease in grain test weight and increase in grain screenings with the late TOS 4.

Results and discussion:
As sowing was delayed there was a significant reduction in average varietal yield as shown in Table 1.

If grain is valued at $300 per tonne, then a delayed sowing from the 6th May to the 4th July cost an average of $828 per hectare, or $14.03 per hectare per day of delay.

The effect of Time of sowing is represented in Graph 1 for each of the varieties. All varieties showed a similar effect for yield as time of sowing was delayed.

C) The Effect of Grazing

As mentioned, the 1st replicate of TOS 1 was "grazed" to assess the impact of grazing on grain yield. Note that this is only 1 replicate so the results cannot be statistically analyzed.

Table 3: The effect of "grazing" on grain yield

Variety	TOS 1 Ungrazed Yield T/ha	TOS 1 Grazed Yield T/ha	Grain Yield Reduction %
CS98048	4.24	4.22	0.45
CS95102.1	5.36	4.74	11.61
Amarok	4.66	4.25	8.64
Mackellar	4.39	4.20	4.37
Beaufort	5.04	4.17	17.30

All varieties were adversely impacted by grazing in terms of grain yield, some more than others. I suspect the reason why CS98048 and Mackellar were less affected by grazing, was that both varieties had high levels of leaf rust and the effect of grazing was to reduce the inocculum pressure. Beaufort was severely affected, mainly because it was too advanced to graze and some growing points were removed with the grazing.

The very dry seasonal conditions also did not assist with the recovery of the plants following grazing.

If we simply look at the effect of grazing on 95102.1 (SQP 95102.1) and Amarok, the average yield reduction from grazing was approximately 0.51 t/ha. The amount of dry matter recovered from grazing was; Amarok 716 kg/ha and 95102.1 (SQP 95102.1) 780 kg/ha. This value of the grazing dry matter would not be sufficient to offset the loss in grain yield ie 0.51 t/ha @ $300 per tonne = $153 per hectare.