10.7 THE EFFECT OF SOWING DATE ON CEREAL GRAIN YIELD AND QUALITY - GNARWARRE

Researcher: Dom Bolton (SFS Ltd)
Wes Arnott (SFS Ltd)

Location: Gnarwarre

Background:
Whilst there have been many studies in the past looking at the effect of sowing date on grain yield, most of this work has been conducted in more northern environments. What work has been done in southern environments has often been affected by soil waterlogging, which has significantly impacted on crop yields.

Raised beds give the opportunity to extend the sowing window due to waterlogging control giving improved trafficability through the winter months. Hence we need to identify what impact varying sowing time is likely to have on crop yields and grain quality, in order to make more informed agronomic decisions as to when we should be sowing.

Aim:
- To identify the impact of sowing time on grain yield and grain quality
- To identify different varietal responses to varying sowing time

Method:
A demonstration was established where two varieties of wheat (cv. Kellalac and cv. MacKellar) along with one barley variety (cv. Gairdner) was planted over six time intervals, ranging from 20th May 2003 to 4th August 2003.

One bed of each variety were sown with a cone seeder (1.7 metre wide) over a 60 metre length for each time interval. The full bed was harvested with a plot combine.

Fertiliser: At sowing 100 kg/ha of MAP was used with no top dressing of nitrogen.

Fungicide: 145 ml/ha Folicur at GS39

Results:

Table 89: Effect of Sowing Date on Grain Yield and Quality

Date of sowing	Variety	Yield kg/ha	Yield % Variety Average	Protein %	Protein % Variety Average	Test Wt kg/hl	Test Wt % Variety Average
4th August	Kellalac	5,227	97%	11.5	113%	75.0	96%
	MacKellar	4,495	85%	11.0	119%	66.6	90%
	Gairdner	5,100	99%	10.7	107%	64.2	97%
18th July	Kellalac	5,045	94%	10.6	105%	77.4	99%
	MacKellar	4,961	94%	10.5	113%	72.0	98%
	Gairdner	5,602	109%	10.0	100%	66.0	100%
2nd July	Kellalac	5,178	96%	9.1	90%	78.6	100%
	MacKellar	5,233	99%	8.4	91%	74.8	101%
	Gairdner	5,336	103%	9.5	95%	66.4	100%
19th June	Kellalac	5,638	105%	10.3	102%	79.0	101%
	MacKellar	5,366	101%	8.6	93%	78.0	106%
2nd June	Kellalac	5,420	101%	10.0	99%	80.0	102%
	MacKellar	5,481	103%	7.9	85%	76.2	103%
	Gairdner	5,650	109%	9.2	92%	68.0	103%
20th May	Kellalac	5,838	108%	9.3	92%	80.0	102%
	MacKellar	6,352	120%	9.2	99%	75.4	102%
	Gairdner	4,586	89%	9.9	99%	66.2	100%

Variety	Average Yield kg/ha	Average Protein %	Average Test Wt kg/hl
Kellalac	5,391	10.1	78.3
MacKellar	5,315	9.3	73.8
Gairdner	5,160	10.0	66.2

Figure 16 shows the effect of sowing date on grain yield. In each case, the relative yield expresses the yield for each sowing date as a percentage of the average yield across all sowing dates **for that variety.**

Figure 16: Effect of Planting Date on Yield

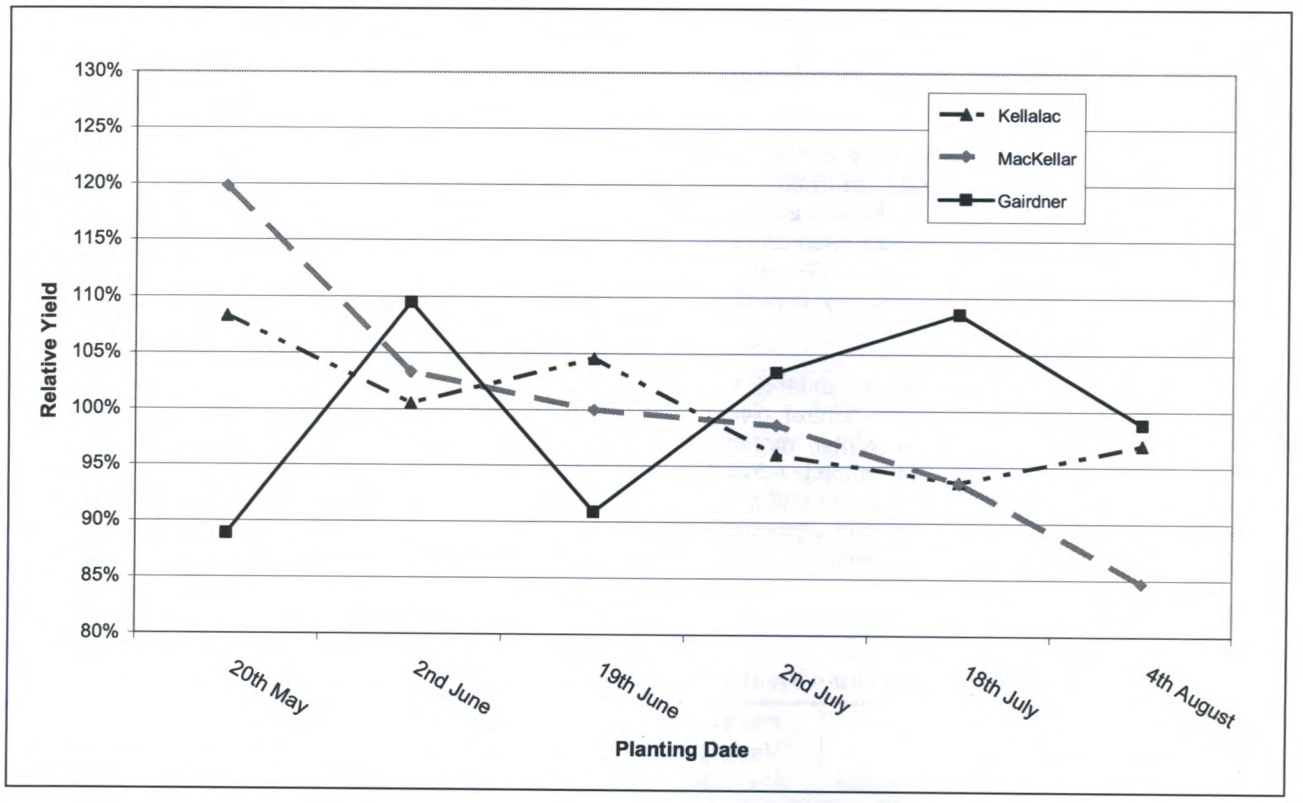

Figure 17: The Effect of Sowing Time on Grain Protein

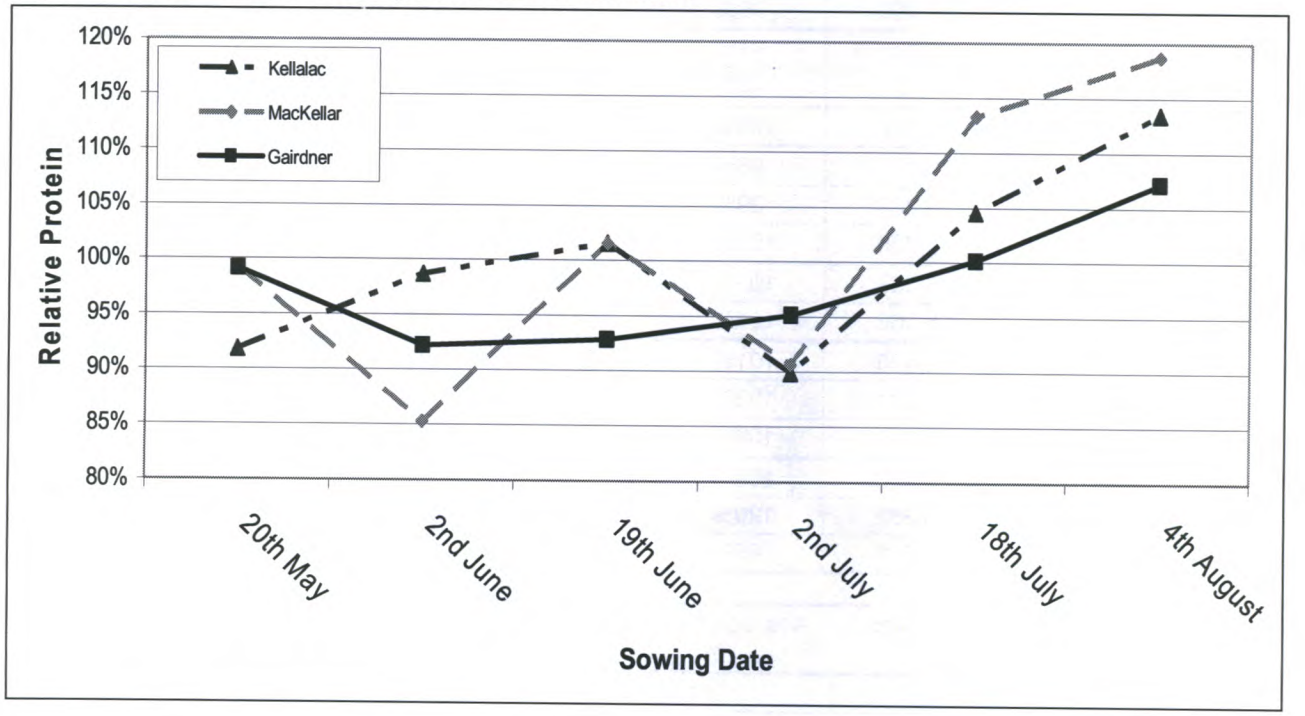

Figure 18: Effect of Sowing Date on Grain Test Weight

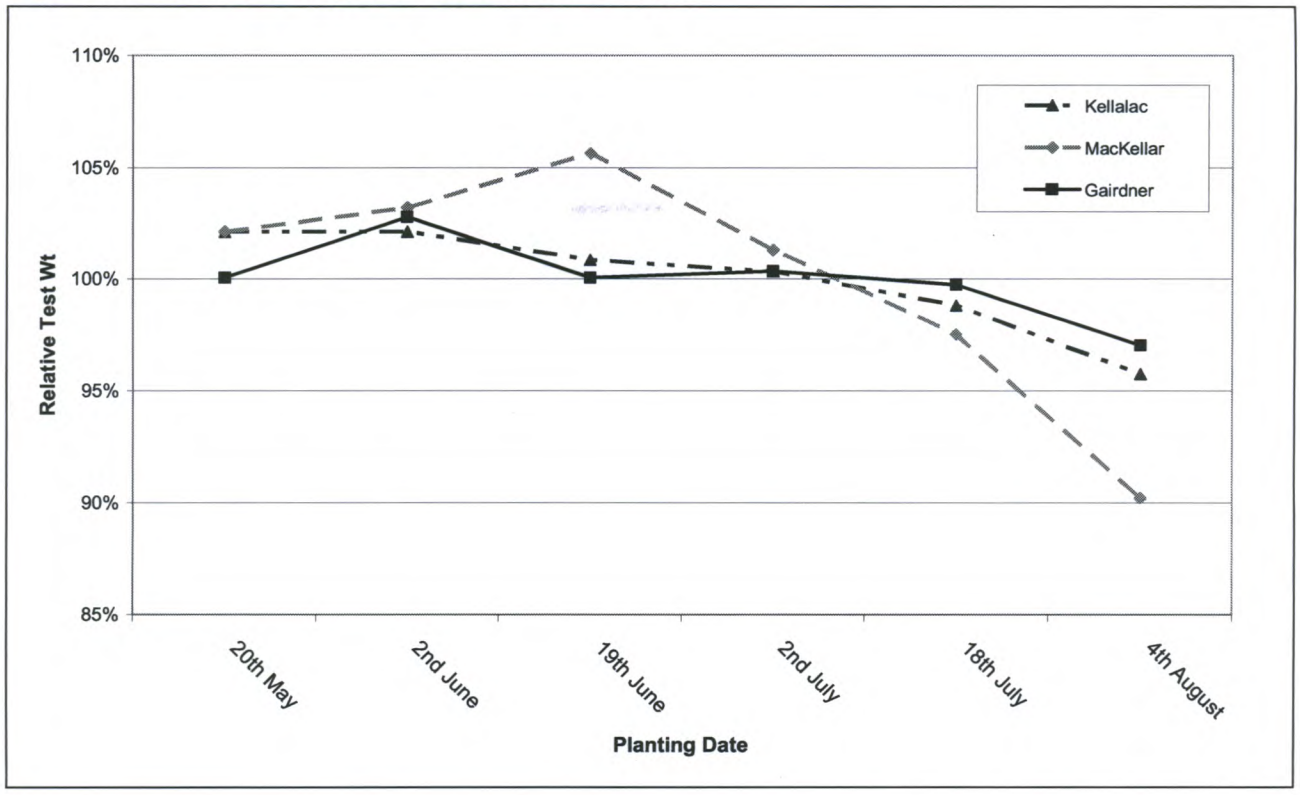

Table 90: The Correlation (R^2) Between Sowing Date and Gain Yield and Quality

Independent Variable	Variety	Decreases Yield	Increases Protein	Decreases Test Weight
Delaying sowing date	Kellalac	0.68	0.49	0.87
	MacKellar	0.89	0.50	0.62
	Gairdner	0.13	0.39	0.48

An R^2 value of 1.00 means that there is a perfect correlation between the two parameters being measured. As an example, for Kellalac, there is a 68% correlation between delaying sowing date and decreasing yield.

Discussion:

It is very important to appreciate that this demonstration trial was not replicated and we are only looking at data from 1 site and over 1 year. It does however indicate some interesting trends between sowing date and grain yield and quality.

There is a very strong trend for MacKellar (R^2 = 0.89) in terms of declining grain yields as sowing date was delayed. In fact there is a yield penalty of approximately 24 kg/ha/day for every day that sowing is delayed from 20th May. The same trend is not quite as strong for Kellalac (R^2 = 0.68) with a yield penalty of 8 kg/ha/day.

There appears to be no clear trend for Gairdner barley between sowing date and grain yield.

The effect of planting date on grain protein is less clear when viewed over the full planting date range. Past mid June however, the figures would suggest that delaying sowing date in fact increases grain protein.

For Kellalac and MacKellar there is a clear grain test weight decline as sowing is delayed. The trend is less clear for Gairdner.

Suggestions:

The data suggests that early sowing (late May) for Kellalac and MacKellar should give the best grain yield. Care must be taken however that early sowing could increase the risk of frost, particularly for the spring wheat varieties such as Kellalac. For MacKellar, which is a winter wheat type, planting date (within reason) should not alter the flowering date and therefore should not increase the frost risk. These winter wheat varieties have a vernalisation requirement, which means they need a certain period of cold temperature to cause them to switch from producing leaves to producing a grain head.

It would appear from the data that sowing date has no effect on Gairdner barley yield.

Given that grain test weight declines for Kellalac and MacKellar as sowing date is delayed, this reinforces the need for an early plant. The declining test weight would suggest that less moisture was available during grain fill for the later sowing dates, hence reducing grain size. The slight tendency for increasing protein with the later sowing dates could either be due to less nitrogen being used in supporting vegetative growth (smaller canopies with the later sowing) with more nitrogen being available during grain fill. It could also be simply reflecting the smaller grain size with the later sowings, which automatically increases the protein percentage. Further experimental work needs to be undertaken with assessments of canopy size being critical.