

# Early sown wheat – opportunities and risks.

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## Key messages

- Highest grain yields are not always achieved at the earliest sowing opportunity.
- Current commercial varieties have good adaption for yield in WA but are more exposed to the risk of frost and other grain quality issues when sown early.
- Very early sowing opportunities, pre-Anzac Day, need a more suitable variety for the WA environment.

## Aims

To determine grain yield and quality responses of long season wheat varieties sown mid-April compared to the more conventional sowing times.

## Method

A series of three trials were located at Dandaragan, Katanning (at the Great Southern Agriculture Research Institute, GSARI) and Gibson (at the Esperance Downs Research Station, EDRS). The trials examined 12 wheat and 12 barley varieties at three sowing dates. Barley results are not included in this paper but can be viewed on the DAFWA website (<https://agric.wa.gov.au/n/4581>). Wheat varieties included Mace<sup>a</sup>, Magenta<sup>a</sup>, Trojan<sup>a</sup>, Harper<sup>a</sup>, Yitpi, Calingiri, Zen<sup>a</sup>, Bremer<sup>a</sup>, a winter wheat Whistler<sup>a</sup>, newly released Cutlass<sup>a</sup> and two potential mid to long season varieties.

The sowing dates were similar at all three sites with Dandaragan sown April 16, May 7 and May 27; Katanning sown April 15, May 6 and May 27 and Gibson sown April 16, May 8 and May 27. These dates will be collectively referred to as mid-April, early May and late May.

All trials were sown into canola stubble and the fungicide Prosaro® was applied as recommended for controlling powdery mildew and yellow spot/septoria compendium.

Heading and flowering dates were recorded at each location by routinely recording the Zadok score every Monday, Wednesday and Friday.

## Results

Many areas in the wheatbelt of WA received good levels of summer rain in 2015, including the sites at Dandaragan and Gibson (Table 1). Rainfall continued into April providing the opportunity to sow mid-April into good levels of moisture at Gibson and drying topsoils at Dandaragan and Katanning. Excellent plant establishment was achieved at Gibson resulting in an average of 173 plants/m<sup>2</sup> across all sowing times. Dandaragan had a drying topsoil with all sowing resulting in an average establishment of 115 plants/m<sup>2</sup>, while Katanning had some non-wetting and seeding issues resulting in an average of 95 plants/m<sup>2</sup>. Issues at Katanning led to only 50% of the seed to germinate in mid-April while the remainder germinated just prior to the second time of sowing.

**Table 1: Monthly rainfall (mm) recorded at Dandaragan (PPD station), Katanning (DAFWA station) and Gibson (DAFWA station) in 2015.**

	Jan	Feb	March	April	May	June	July	August	Sept	Oct	Summer (Ja-Mar)	GSR
Dandaragan	4.7	28.6	28.0	20.3	38.5	68.0	94.6	83.9	32.2	12.4	61.3	349.9
Katanning	1.6	1.6	18.8	58.2	29.6	68.6	56.6	40.0	18.8	12.8	22.0	284.6
Gibson	2.4	2.4	61.4	31.6	52.2	63.0	62.4	78.8	46.8	17.2	66.2	352.0

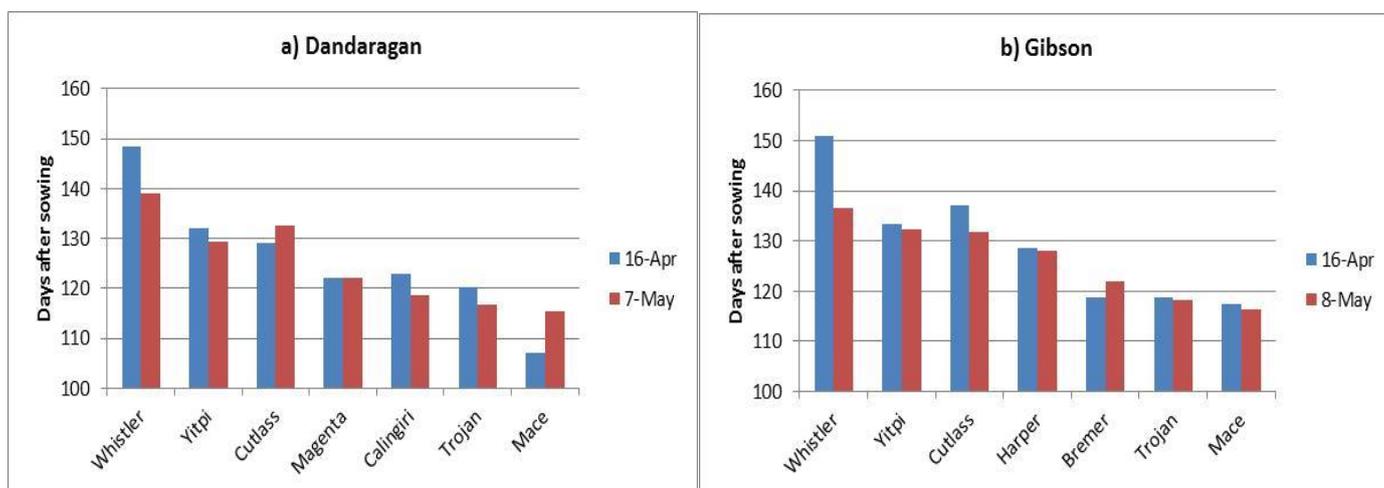
Temperatures below 2°C were recorded at Katanning on 26 July, 24 and 25 August, 3, 6, 16 and 20 September and 5 October. Mace<sup>a</sup> sown mid-April had ears emerging by late July and other varieties sown late May were still flowering when the last frost occurred, making it very difficult to avoid frost in 2015. Frost damage was observed at the Katanning site but detailed measurements are yet to be completed.

At the Dandaragan NVT wheat site, a tiny tag temperature logger also recorded some frost events and periods of temperature above 30°C during grain fill. The site was in close proximity to the Wheat Agronomy trial but frost damage was not clearly observed. No frost events were recorded at Gibson.

### Flowering observations

Although Dandaragan and Gibson are at the northern and southern parts of the wheatbelt, the time taken to reach flowering after sowing is fairly similar for most of the varieties apart from Mace<sup>a</sup> sown mid-April at Dandaragan (Figure 1a and b). Mace<sup>a</sup> flowered 10 days earlier at this site compared to Gibson. The spread of flowering between varieties range from just over 40 days between Mace<sup>a</sup> and the winter wheat Whistler<sup>a</sup> when sown mid-April at Dandaragan, compared to 2 days between Mace<sup>a</sup> and Trojan<sup>a</sup> sown mid-April and early May at Gibson.

Zen<sup>a</sup>, the new longer season ANW had very similar flowering dates to Calingiri (data not shown). The new APW variety Cutlass<sup>a</sup> appears to have a similar maturity compared to Yitpi.



**Figure 1: Flowering (50%) taken as days after sowing of seven varieties sown mid-April and early May at a) Dandaragan and b) Gibson in 2015.**

### Grain yield

The average grain yield ranged from over 5.5t/ha for the early May sowings at Dandaragan and Gibson to less than 2t/ha at Katanning sown late May (Figure 2). Most varieties obtained their highest yields at the early May sowing time or the yields were not significantly different between mid-April and early May sowings. The exception was Whistler<sup>a</sup> at Katanning which obtained the highest yield sown mid-April.

Although Mace<sup>a</sup> was one of the lowest yielding varieties when sown mid-April at Dandaragan, Yitpi was the only variety that achieved a significantly higher yield. Overall yields increased by 1.5t/ha by delaying the sowing time until early May (Figure 2a). This yield response to sowing time was also observed at the RSCN trial at Yuna (<https://agric.wa.gov.au/n/4552>), with the exception of Forrest<sup>a</sup>, a late maturing spring wheat which was included in the trial. The reason for this response was not adequately measured in the trials. Visual observations at Dandaragan did not suggest that biomass for the mid-April sowings was lacking in comparison to early May sowings. Ear numbers were recorded to be lower for the mid-April compared to the early May sowings at an average of 341/m<sup>2</sup> to 400/m<sup>2</sup> respectively.

Mace<sup>a</sup> was consistently the lowest yielding variety at Dandaragan, although it is important to note that it was not significantly different from most of the varieties examined in the trial series.

At Katanning where frost was an issue, Mace<sup>a</sup> was also consistently the lowest yielding variety at all three sowing times, however Whistler<sup>a</sup>, Yitpi, Cutlass<sup>a</sup> and Magenta<sup>a</sup> yielded significantly higher when sown mid-April (Figure 2b). Cutlass<sup>a</sup> and Magenta<sup>a</sup> again yielded significantly higher than Mace<sup>a</sup> when sown early May but the difference between the varieties when sown late May was not significant.

Figure 2c shows a different variety by sowing time interaction compared to the two northern sites (Figures 2a & 2b). At Gibson, Mace<sup>a</sup> is consistently one of the highest yielding varieties at all three sowing times. The longer maturing varieties Whistler<sup>a</sup>, Yitpi, Harper<sup>a</sup> and Magenta<sup>a</sup> are consistently lower yielding even at the earlier sowing dates. Cutlass<sup>a</sup> is competitive with Mace<sup>a</sup> only at the May sowing times. This response has been observed in past time of sowing trials at Esperance. Samples have been taken for yield component analysis but are unfortunately not available at the time this paper was due.

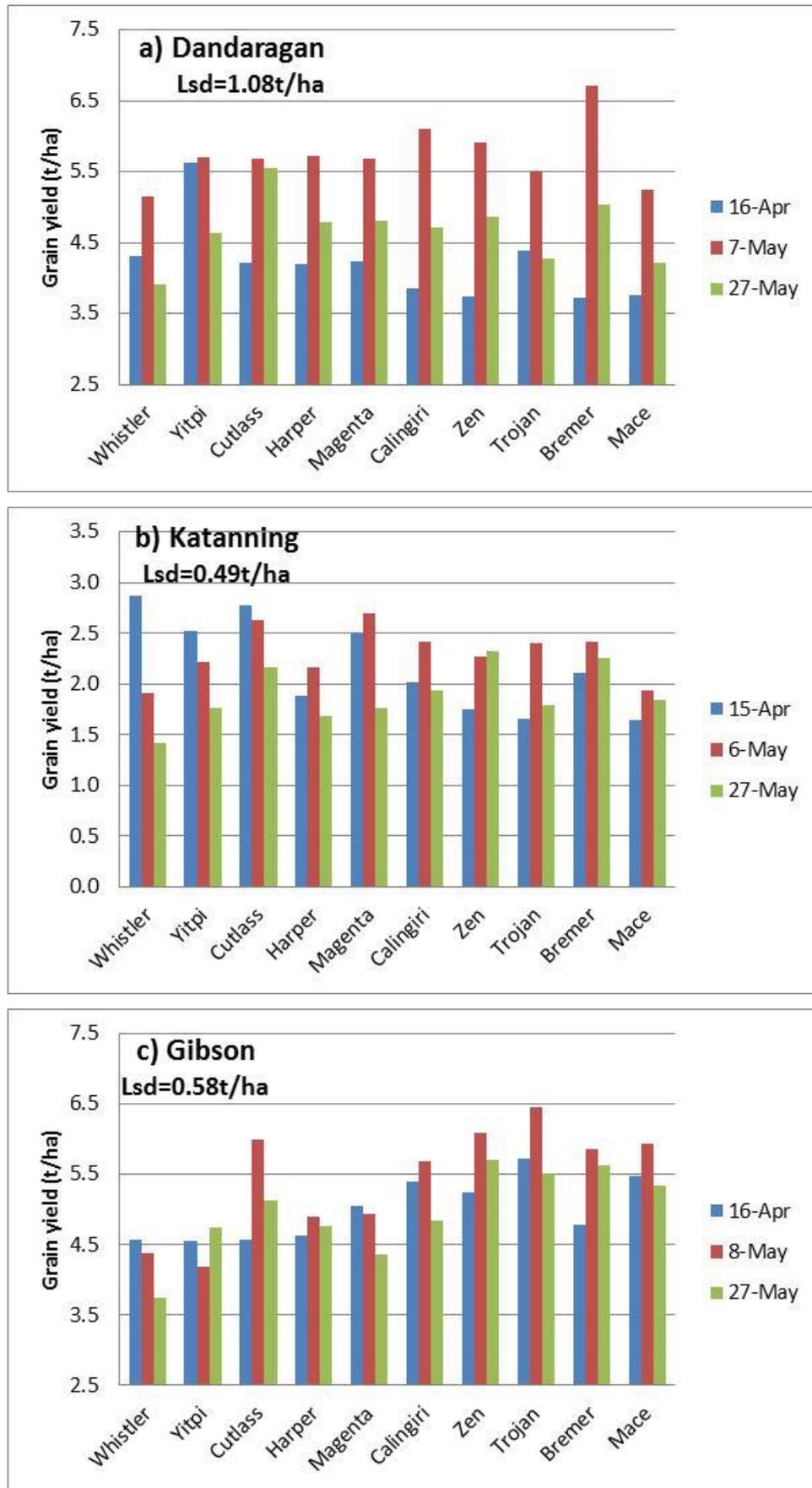


Figure 2: Grain yield (t/ha) response of wheat varieties to sowing time at a) Dandaragan, b) Katanning and c) Gibson in 2015. Varieties arranged in order of maturity. Frost damage occurred at Katanning and Dandaragan experienced some low temperature events.

## *Grain quality*

Limited grain quality analysis from Dandaragan and Katanning has indicated that mid-April sowings can have issues with staining of grain and frost distorted grains. At Dandaragan, Cutlass<sup>a</sup>, Mace<sup>a</sup>, Magenta<sup>a</sup>, Yitpi and Zen<sup>a</sup> had stained grain above the maximum limit of 25 but below 75 which would result in a downgrade to UH or GP depending on protein levels. While at Katanning at the mid-April sowing, all varieties would have been downgraded due to frost distorted grains, including the longer maturing winter wheat Whistler<sup>a</sup>.

Small grain screenings were an issue in 2015 across WA. Data so far indicates a typical response of increased screenings with delayed sowing.

Mid-April sowings can also expose grain to conditions which may result in lower falling numbers. Unfortunately the data was not available at the time of publication.

## **Conclusion**

Traditionally sowing wheat in Western Australia was not recommended until after Anzac Day. A date based on the yield performance and maturities of commercially available wheat varieties in the 1990s. Since then growers have seen the release of Mace, a high yielding and very adaptable variety which at 67% dominates the area sown to wheat in WA in 2015 (Data courtesy of CBH group). And growers are now set up and keen to take advantage of any summer rainfall, but there is limited information on which wheat varieties to grow with a very early sowing opportunity.

Research carried out by James Hunt et al. 2014 suggested that the faster maturing winter wheat Whistler<sup>a</sup> appears adapted to WA and when sown in mid-April was able to yield as well as or better than Mace<sup>a</sup> planted in late May (Crop Updates 2015). Results from Dandaragan and Katanning do support this suggestion but this research also suggests there are commercial varieties currently available in WA which can yield similar or higher and have a superior quality classification compared to Whistler<sup>a</sup>. However these varieties can still be at the risk of frost and grain quality problems associated with very early sowings.

The research continues to highlight the need for a variety which is more suitable for early sowing opportunities in WA. Work will continue to seek information as to why Mace<sup>a</sup> and other short to mid-season maturing varieties are so successful even when sown mid-April compared to the longer maturing varieties in at the Gibson site and if this is unique to the area.

## **Key words**

Early sowing, flowering date, wheat varieties

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