

Southern Irrigated Wheat Varieties Achieving Target Yields - Hillston 2015

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Introduction

For consistently producing high yielding irrigated wheat, varietal choice has been identified as one of the key factors, with lodging resistance one of the main varietal characteristic that growers look for on irrigation. Agronomic practices such as nitrogen management are also important in achieving high yields.

In its second year, this trial at Hillston is a satellite site of the ‘Southern Irrigated Cereal and Canola Varieties Achieving Target Yields’ project. It aims to test the suitability, in terms of lodging resistance, grain yield and quality, of current commercially available wheat varieties under high yielding irrigated conditions specific to Southern NSW. A hail storm which occurred mid-November impacted on the final yield and lodging results of this trial.

Site Details

Location:	Hillston, NSW		
Soil type:	Grey clay loam		
Sowing dates:	TOS 1: 6 th May;	TOS 2: 25 th May	
Available N at sowing:	115 kg/ha (0-60 cm)		
0-10cm nutrients:	38 mg/kg Colwell P		
Previous crop:	Maize		
Rainfall:	91mm January–March + 252mm April–October		
In-crop irrigations:	1 st irrigation 20 th September (1.8 ML) and 2 nd irrigation 15 th October (1.2 ML)		
Fungicides:	18 th August, 500ml Tilt		
Starter fertiliser:	150 kg/ha MAP		
Harvest date:	25 th November 2015		

Treatments

12 wheat varieties	1. EGA_Bellaroi	7. Spitfire	
	2. Chara	8. Suntop	
	3. Crusader	9. Trojan	
	4. Emu Rock	10. Wallup	
	5. Lancer	11. Wedgetail	
	6. Merinda	12. 280913 (durum)	
2 times of sowing (TOS)	TOS 1 6.05.2015		
	TOS 2 25.05.2015		
2 nitrogen treatments	Sowing	1 st Node	Booting
	1. Early N (EN) 100kg N/ha	70kg N/ha	30kg N/ha
	2. Late N (N) 0kg N/ha	100kg N/ha	100kg N/ha

Results

Measurements taken from all plots included plant counts, Normalised Digital Vegetation Index (NDVI), lodging scores and grain yield. Tiller and head counts were also taken on Emu Rock and Lancer plots.

Plant counts were taken on all varieties on the 3rd June for time of sowing 1 and on the 6th July for all varieties in time of sowing 2. The average plant count for TOS 1 was 113 plants/m², which was significantly lower than for TOS 2 with 173 plants/m². The varieties which had the lowest plant populations were Lancer and Emu Rock with 121 plants/m² and the variety with the highest plant population was Suntop with 173 plants/m² (figure 1). Applying all nitrogen post-sowing resulted in a significantly higher plant population of 154 plants/m² compared to where all nitrogen was applied up front, where the plant population was 132 plants/m².

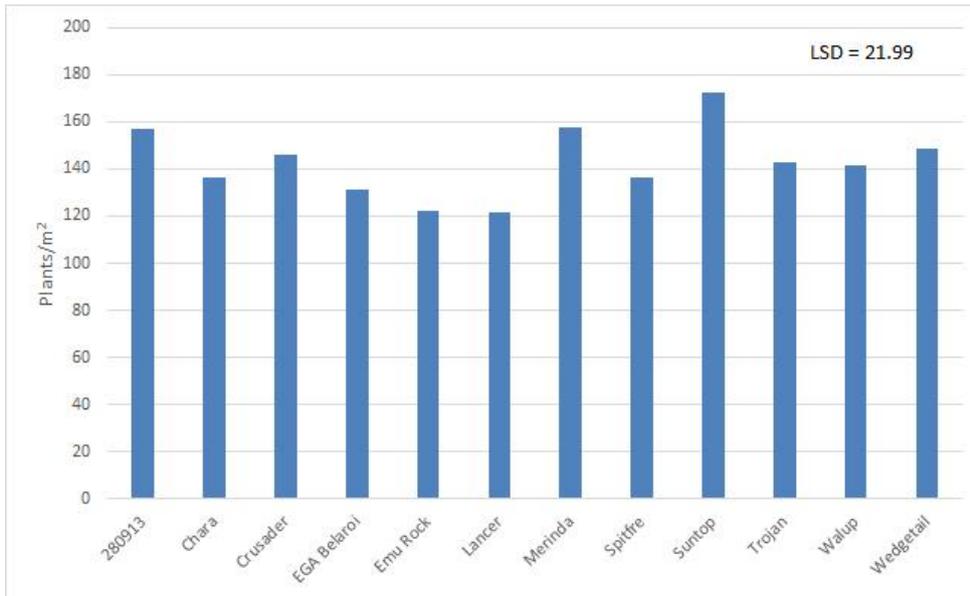


Figure 1: Average plant population (plants/m²) for each variety across sowing times and nitrogen treatments.

Crop vigour was measured at heading/flowering using a hand held NDVI. Values for TOS 1 ranged from 0.8 for Crusader up to 0.87 for Lancer and Emu Rock. For TOS 2 values ranged from 0.74 for Crusader up to 0.81 for EGA_Bellaroi (figure2). The average NDVI value was 0.85 for TOS 1 and 0.78 for TOS 2.

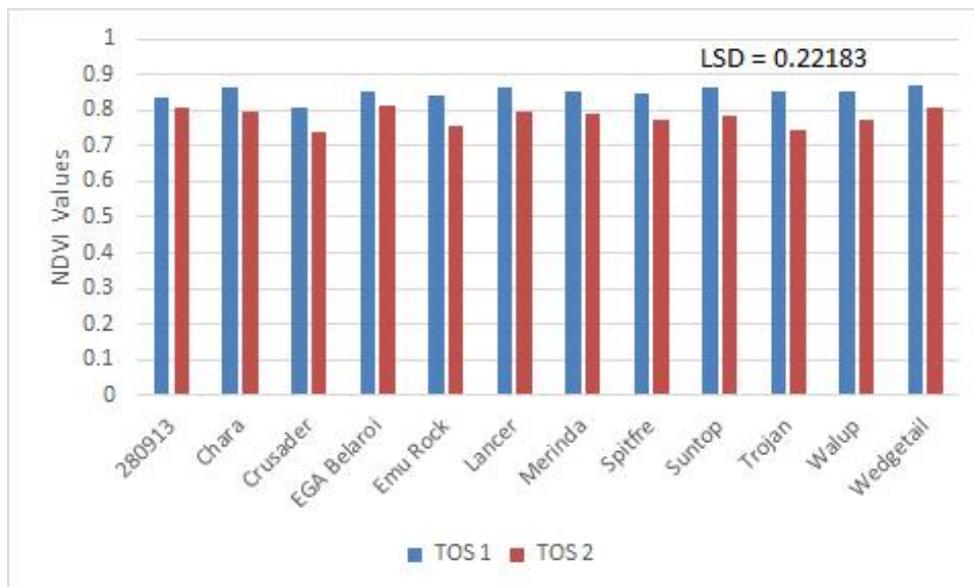


Figure 2: Average NDVI for each variety by time of sowing

Four lodging assessments were taken from mid-September until harvest, 25th November. Lodging was scored on a scale of 0 to 9, with 0 indicating no lodging and 9 flat on the ground.

The first two assessments had no lodging evident. Lodging was first observed when assessed on 29th October. At this timing applying nitrogen post sowing had a significantly higher degree of lodging compared to where all the nitrogen was applied up front. The variety Spitfire recorded a significantly higher degree of lodging than all other varieties, with the variety Trojan having the least amount of lodging.

A hail storm impacted on the degree of lodging at harvest. At harvest TOS 2 had a significantly higher degree of lodging than TOS 1. The varieties EGA_Bellaroi and Spitfire had the greatest degree of lodging, whilst Emu Rock had the least amount of lodging across sowing times.

There were significant interactions between TOS and variety for lodging recorded late October and at harvest (figure 3). At harvest all varieties, with the exception of Wedgetail, lodged more at TOS 2 than for TOS 1.

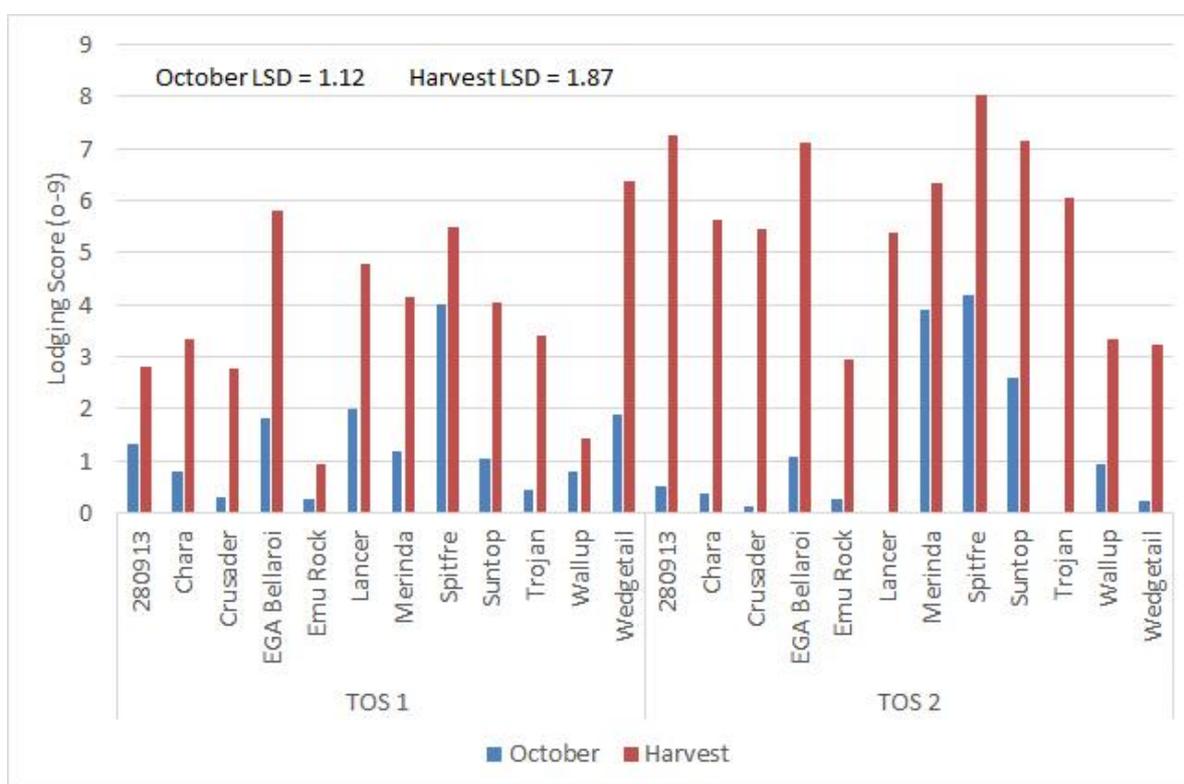


Figure 3: Average lodging scores taken 29th October and at harvest for each variety and TOS

As mentioned previously, yields in the trial were affected by a hail storm which occurred just before harvest. It was estimated yields were reduced by 30% by the storm. Overall across sowing times and fertiliser treatments the durum variety 280913 was the highest yielding variety, yielding 6.65 t/ha. This was closely followed by Merinda yielding 6.64 t/ha.

Grain yield averaged 5.72 t/ha for TOS 1 and 5.85 t/ha for TOS 2 (Figure 4). For TOS 1, yields ranged from 4.23 t/ha for Crusader to 7.11 t/ha for Merinda. For TOS 2, the yields ranged from 4.90 t/ha for Crusader to 7.14 t/ha for 280913.

Sowing date impacted on the performance of some varieties in this trial, with longer season varieties such as, Chara, Lancer, Merinda and Wedgetail yielding higher at TOS1 than TOS 2. The quicker maturing varieties such as Crusader, Emu Rock and Wallup yielded higher at TOS 2.

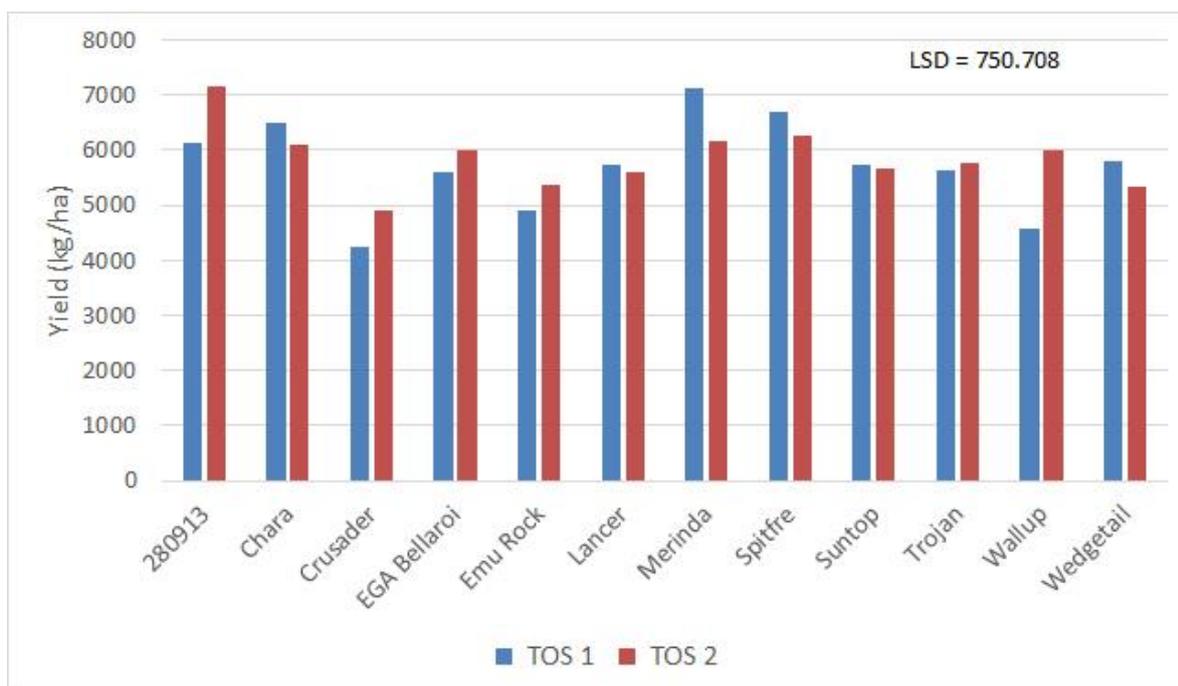


Figure 4: Average grain yield for each TOS

Overall across sowing time and fertiliser treatment, grain protein ranged from 12.66% for the variety Suntop to 15.74% for the durum variety EGA_Bellaroi. Grain Protein was significantly higher where nitrogen was applied post sowing, as opposed to where all the nitrogen was pre-drilled before sowing.

For TOS 1 and TOS 2 EGA_Bellaroi had the highest grain protein, with 15.99% and 15.50% respectively, and Suntop the lowest grain protein, with 12.68% and 12.65% respectively, (figure 5).

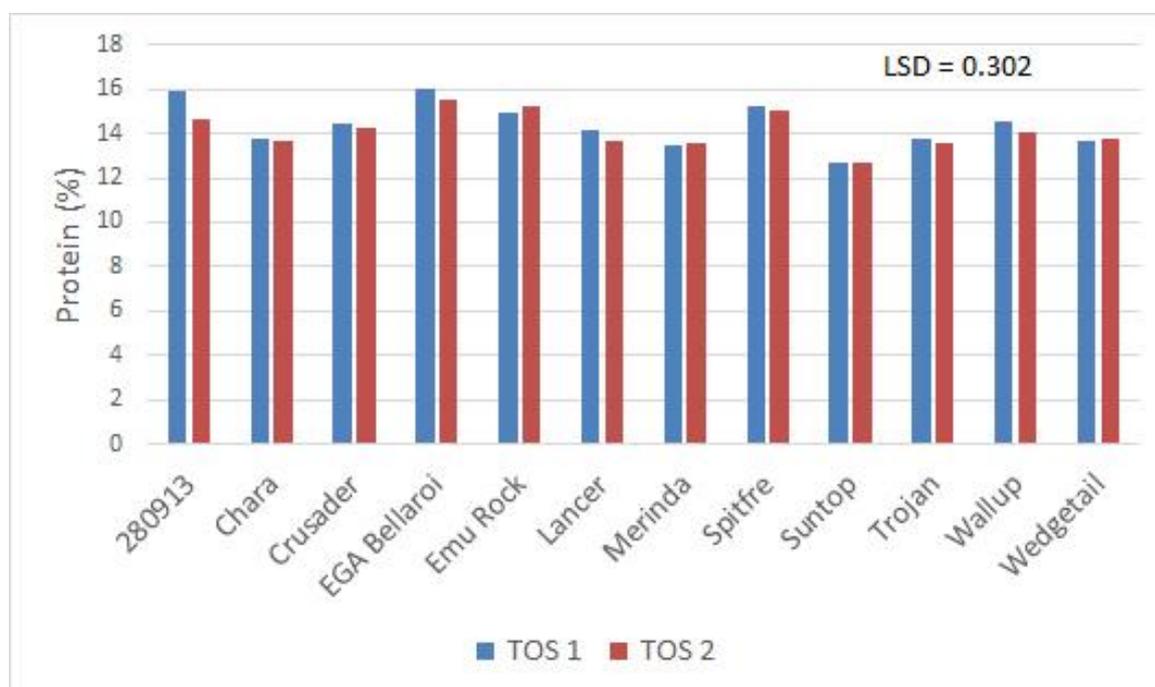


Figure 5: Average grain protein for each variety at each TOS

TOS had a significant effect on screenings, with TOS 2 (4.65%) having a significantly higher level of screenings than TOS 1 (3.06%). There was also a significant effect of variety on screenings. The durum variety 280913 had the lowest screenings (2.01%) overall, with Trojan having the highest screenings (4.95%) overall. Where all nitrogen was pre-drilled at sowing, screenings were significantly higher than where all nitrogen was applied post sowing.

For TOS 1 Wallup had the lowest screenings with 1.59% and Wedgetail the highest screenings with 4.86%. For TOS 2 the durum variety 280913 had the lowest screenings with 1.96% and Chara had the highest screenings with 7.02%, (figure 6).

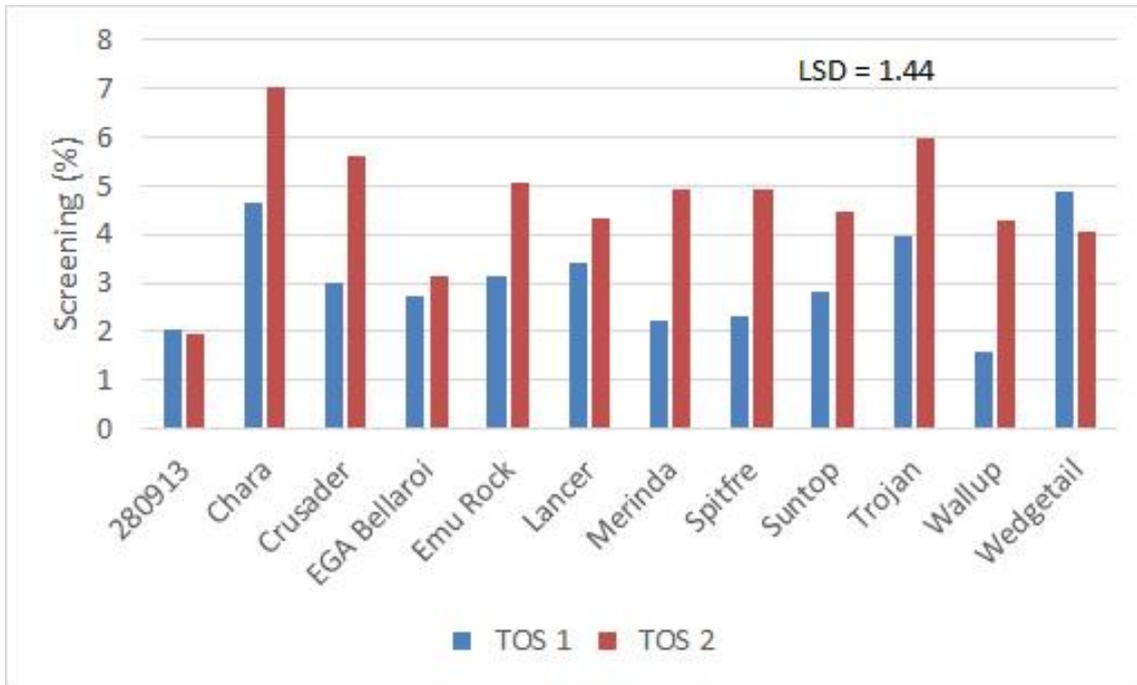


Figure 6: Average screenings for each variety at each TOS

Summary

This trial again showed that variety choice is one of the key factors for producing high yielding irrigated wheat. Despite the hail storm in November, the durum variety 280913 proved to be a promising variety for irrigation, out yielding all other varieties in this trial. Other varieties to perform well last season were Chara, Spitfire and Merinda. Although the degree of lodging at harvest was affected by the hail storm, the variety Emu Rock showed good lodging resistance across sowing times.

Matching sowing time with varietal maturity showed to be an important factor in achieving high yields. Longer season varieties such as Chara, Lancer, Merinda and Wedgetail were higher yielding at TOS 1, whilst the quicker maturing varieties like Crusader, Emu Rock and Wallup were higher yielding at TOS 2.

The other important treatment in this trial was nitrogen application timing. Applying all nitrogen post sowing, as opposed to all up front, produced significantly higher protein and lower screenings.

Acknowledgements

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