5.4 Row Spacing by Variety by Nitrogen Timing Demonstration in wheat – Yalla Y Poora

Location: Yalla-Y-Poora Research Site, 2006 Flats

Funding: This demonstration was funded by SFS.

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Acknowledgements: Kym Dolling and Phil McEvoy for allow SFS to conduct trials on their property. Stephen Jefferies and Russell Eastwood (AGT) and Brian Hare (Pacific Seeds) for supplying wheat seed.

Rainfall (mm) April – November : 269mm GSR, 392 Annual Amount.

Summary of Findings:
Whilst the year was dry, there appeared to be a significant yield difference between varieties, no matter what the row spacing or nitrogen treatment. When analysis was undertaken to compare row spacing, nitrogen and variety responses, there still appeared to be significant differences within one variety, suggesting the importance of row width and nitrogen placement.

When analysis was undertaken to compare the row spacing treatments, results have shown that there was no significant difference within Bolac wheat when nitrogen was applied up front at seeding or at GS32, with either a 200mm/8" or 400mm/16" row spacing. The variety QT11658 yielded poorly with frost appearing to have an influence.

Background to the trial:
This demonstrations was conducted for three significant reasons.

1. Assess the potential yield losses when increasing the seed row width for the benefits of subsequent inter-row (no-till) cropping;
2. Determine if nitrogen application efficiency can be increased in wider row spacing scenarios by applying product either up front or in crop;
3. Assess the varietal response to row spacing width to determine yield in response to nitrogen timing and row widths.

Trial Inputs:

Seeding Date: 14/6/06, approximately 100kg/ha based on seed size for Bolac, QT11658
& RAC1262, 100kg MAP/ha,
Chemical Regime: 14/6/06; Sprayseed @ 2L/ha + 1.2L/ha Triflur X, IBS.
15/9/06; Axial @ 300mls/ha + Giant @ 500mls/ha, GS33.
Nitrogen: 26/9/06; Urea @ 80kg/ha applied in either a linear of blanket manner.
Harvest: 25/1/07; each plot harvested as a whole as the edge affect was not visual.

Trial Design:
Each plot was sown to a two metre width (using the new SFS stubble seeder) with a plot length of 10 metres. Table 1 shows the treatment list for the demonstration – no randomization occurred due to seeding operation – four repeats of same treatment in one continuous line. Blanket urea application was undertaken in a way typical of how nitrogen would be spread from a farmer spreader. Linear application followed the 400mm row lines, to represent more precise application, as may occur with use of liquids and GPS.

Table 1. Row Spacing by Variety and Nitrogen Timing Method.

Rep 1-4: S1,N1,V1	**S1 = 200mm**
Rep 1-4: S2,N1,V1	**S2 = 400mm**
Rep 1-4: S1,N2,V1	**N1 = 37N @ GS00**
Rep 1-4: S2,N2,V1	**N2 = 37N @ GS32; blanket or linear**
Rep 1-4: S1,N1,V2	**V1 = Bolac**
Rep 1-4: S2,N1,V2	**V2 = QT11658**
Rep 1-4: S1,N2,V1	**V3 = RAC658**
Rep 1-4: S2,N2,V1	
Rep 1-4: S1,N1,V3	
Rep 1-4: S2,N1,V3	
Rep 1-4: S1,N2,V3	
Rep 1-4: S2,N2,V3	

Trial Results:
Head counts per square metre were taken pre harvest for each row spacing treatment. Early observations suggested that frost had played a role, especially for grain set. Bolac appeared to have more heads per square metre than other varieties (Figure 1.), but did also (along with QT11685) tend to suffer more from frost (less grain set) than RAC1262.

Head Counts pre harvest

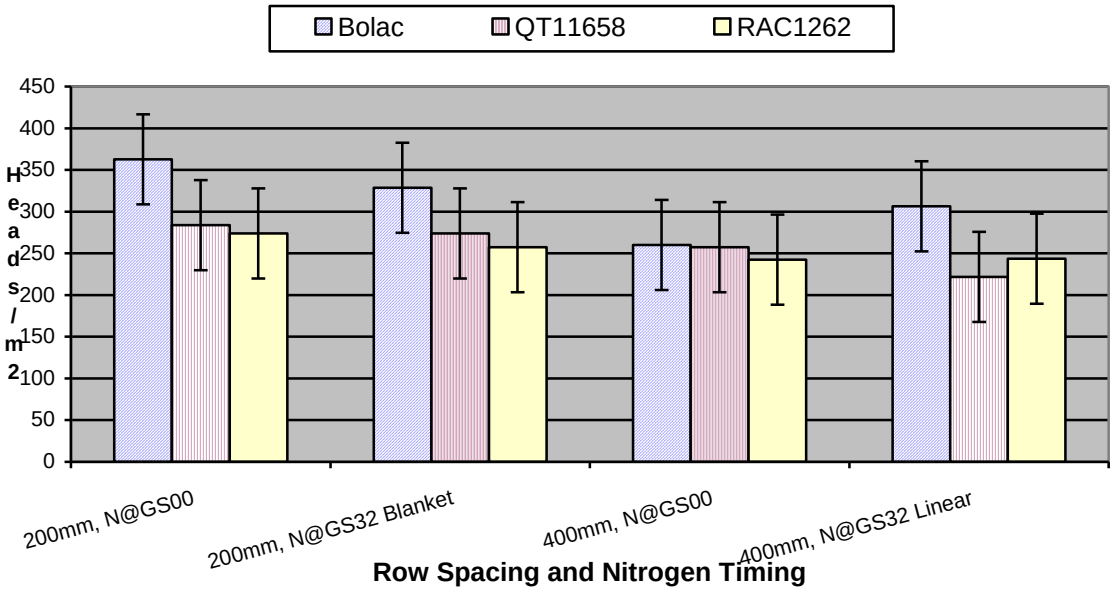

Figure 1. Head Counts for each of the Row Spacing and Nitrogen Treatments per Variety. Error bars show significant differences between treatments (P<0.05) = 54.6 plants/m2.

Although there appeared to be more heads per square metre (count conducted 9th November) within the 200mm (8") row spacing plots where nitrogen was applied up front, there was only a significant difference between varieties, with Bolac showing significantly higher head numbers.
If you compare head counts to overall yield, there was a strong correlation for the RAC line, while no strong trends for Bolac and QT, more than likely being influenced by the dry season and frost affected heads within these certain varieties.

The significant differences within the demonstration that were outstandingly obvious was the yield comparison between varieties (Figure 2.). The RAC1262 line chosen for improved tillering ability, showed the least number of heads at harvest when compared to the other two varieties. It was this variety that significantly outyielded both other lines considerably. Explaining this is difficult as tiller counts were not conducted to assess whether or not tillers were aborted during the season to compensate for the lack of moisture during the year, however, this does suggest that variety choice is an important measure for acquiring highest yield.

The placement of nitrogen in this demonstration did also show significant differences when it was applied up front in the two row spacing treatments for the RAC1262 variety. In this scenario, the nitrogen applied up front yielded significantly better in the 200mm treatment than compared to the 400mm treatment. Similarly, for the same variety, the in crop application of nitrogen at GS32 showed also that with the narrow rows, yields significantly improved. It must be noted that efficacy of nitrogen applied at GS32 in crop may need to be watched based on the lack of rainfall following its application.

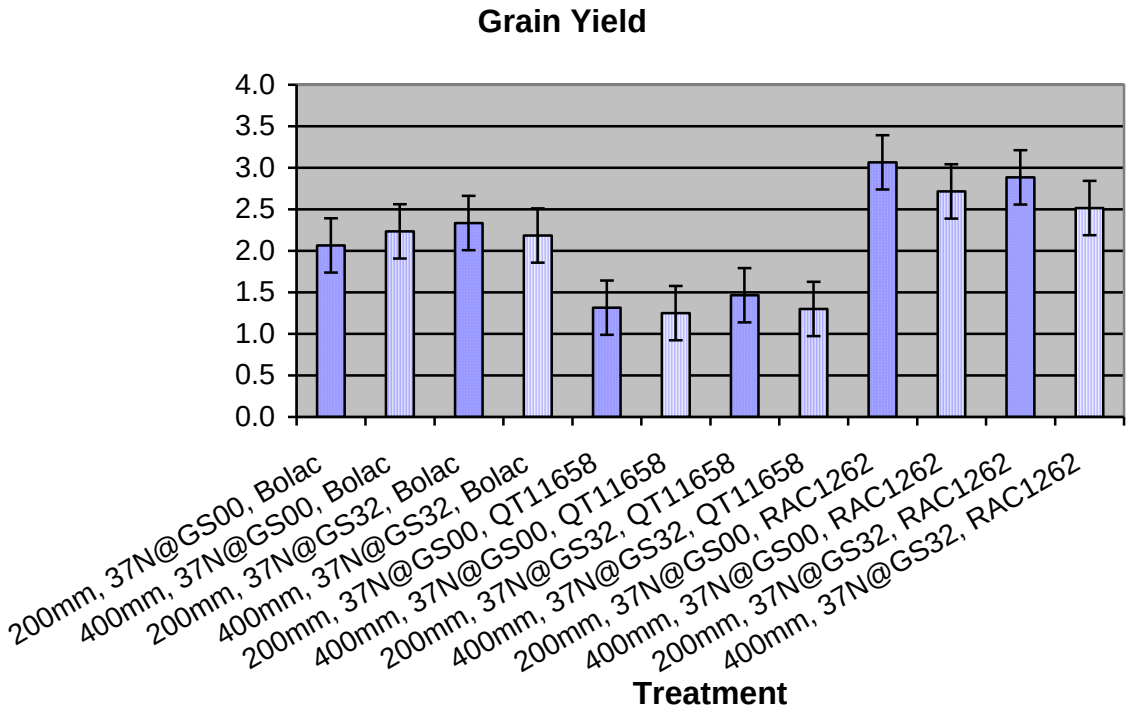

Figure 2. Yield Results, Wheat 2006, Nitrogen, Blanket and Linear Application across 200mm, & 400mm Row Spacings. LSD (P<0.05) = 327kg/ha

Original expectations were that the narrow row spacing would far out yield wider rows, based on overseas higher rainfall experience. With significant differences in the yield outcomes for the higher yielding variety RAC1262, care needs to be taken when considering wider rows for wheat for the ability to inter-row sow in subsequent seasons. To determine economic outcomes is difficult. Machinery changeover for wider row spacings, effective linear placement of nitrogen and reliance on GPS are critical, although, if wider rows are used, there is some suggestion that wider implements can be pulled without the need for additional horsepower. In general, the narrow rows appeared to yield roughly 133kg/ha better than the wider rows when averaged across all treatments. Economically in a year when grain prices were at $300/t, gives a net benefit of $40/ha.

Trial Observations:
This demonstration was sown into pea stubble without a high residue load. Ryegrass did not prove to be an issue with these plots; as it was hoped to assess the row width interaction with weed competition. In places where ryegrass was present, it did appear to be more robust in the wider row situations. It did also appear that certain varieties and the narrow row spacings suffered more from poor grain set due to the frost and dry conditions.

With some variance within the treatment results, it could be suggested that the site may not have been uniform. This demonstration will now be constructed into a larger trial for 2007, building greater capacity to also analyse both wheat and barely when compared to nitrogen timing and row spacing width.

Photographs:
The below photos show the two row spacing widths for the highest yielding treatment for their comparison.

200mm, RAC1262, 37N@GS00

400mm, RAC1262, 37N@GS00