

Wide Row Spacing in Wheat

Aim: To establish wheat yield variation through wide row spacing and seeding rate in the low rainfall zone.

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Company: Liebe Group

Farmer: Grant Hudson

Location: Goodlands



Background: Grant Hudson's Satellite Site is characteristic of the red country that predominates much of the Goodlands area. As a satellite site for the Soil Health Project, subsoil alkalinity was identified as a possible constraint to production in 2003. 2004 saw summer rain followed by a good start to the season and a dry finish.

Trial Details:

Plot size and replication	Paddock scale demonstration. 20" row spacing and 10" row spacing + 2mx2m half seed rate 20" row spacing
Soil type	Loamy clay – alkaline at depth.
Sowing date	19 th May 2004
Conditions at sowing	Dry surface, moist at depth
Machinery	DBS bar
Seeding rate	45-50 kg/ha Arrino
Fertiliser	Basal fertiliser = 65 kg/ha Agflow zinc & 40 L/ha Flexi N. 40 L/ha Flexi N at early tillering.
Herbicides and Insecticides	800 mL/ha roundup pre-seeding & 350 mL/ha of ester for late radish control.
Paddock History	2003 = wheat, 2002 = wheat, 2001 = wheat.

Results:

Results show yield variations with differing row spacings and plant densities. Summer rain was followed by a good start to the season, and a dry finish. Yield results have been obtained through hand harvest cuts; these have a tendency to show higher than actual yield. Harvester yield monitor results showed no significant differences in yield with the differing row spacings, possibly due to a high grass weed burden in the paddock. Hand cuts were purposely taken in areas not affected by weeds.

Table 1: Actual yield vs. potential yield and water use efficiency based on growing season rainfall (French-Schultz equation).

Row Spacing	Yield (T/ha) (Hand cut)	Rainfall (mm, 28th March - 30th October)	Potential Yield (T/ha)**	Water Use Efficiency (kg/ha/mm)	Actual vs Potential yield French-Schultz equation (%)
20" row	1.80	217*	2.14	16.82	84
20" row ½ seed rate	1.97	217*	2.14	18.41	92
10" row	1.45	217*	2.14	13.55	68

* - Indicates that a percentage of stored soil water from a summer storm was added onto growing season rainfall.

** - 110mm deducted for evaporation – French-Schultz approach

Yield was affected by row spacing and plant density (Table 2). The harvest index is low, indicating a possible haying-off effect. The plants did not efficiently turn biomass resources into grain.

Table 2: Grain yield, protein and harvest index for the treatments.

Treatment	Grain Yield (T/ha)	Protein (%)	Harvest Index (%)	Hectolitre weight (kg)	Screenings (%)	Moisture (%)
20" row	1.8	12.6	35.57	81.14	0.86	9.8
20" row ½ seed rate	1.97	na	34.4	na	na	Na
10" row	1.45	14.7	32.8		0.78	9.8

Biomass at anthesis (Table 3) shows that there was significantly more dry biomass produced (12.1%) with the 20" row spacing compared to 10" row spacing.

Table 3: Biomass at anthesis.

Treatment	Biomass at anthesis (t/ha)
20" row	7.4
10" row	6.5

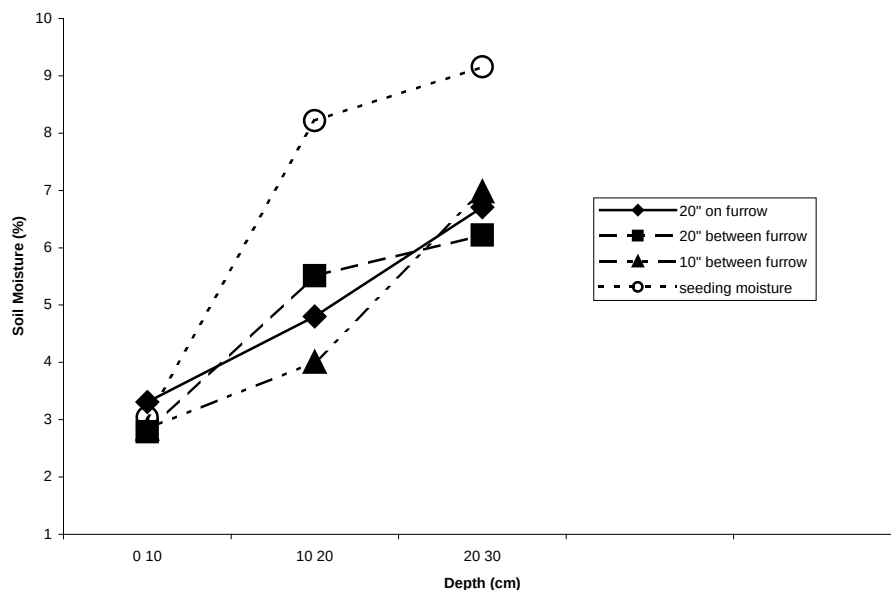


Figure 1: Gravimetric moisture at seeding and anthesis to depth

Figure 1 clearly shows the difference in moisture present at anthesis with the differing row spacings and ‘on’ and ‘between’ the furrow of the wide row wheat. Visually at anthesis the plants planted in the wider rows were showing less signs of water stress compared with the 10" spacing. Soil moisture results however seem to be unreliable at depths below 30cm in this soil type.

pH measurements show a consistent increasingly alkaline trend with increasing depth. Below 60cm the pH increases to 7.67 – 8.28, which may be hostile for root water and nutrient uptake. Wide rows may allow roots access to available water between the rows, resulting in less stress during dry periods.

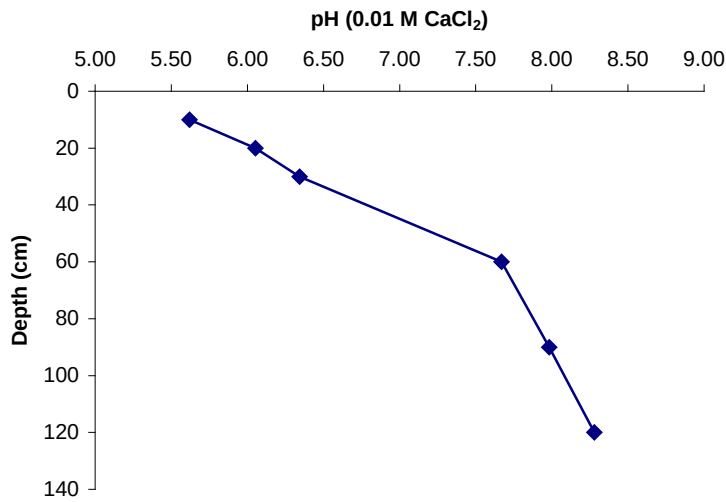


Figure 2: pH for Grant Hudson down to 120 cm.

Summary:

- The wide row treatments were closer to achieving potential yield according to the French-Schultz equation.
- There was a significant difference in protein level between the 10" and 20" row spacings.
- The wide row wheat was visually much more susceptible to weed competition and volunteer wheat between the rows and this may have been increased due to the paddock crop history.
- Subsoil alkalinity is a possible constraint to roots accessing soil water at depth.
- This trial was not replicated and hence a number of factors may have influenced results. However it shows the potential for further work in this area.