

Sorghum row direction × configuration × hybrid – Terry Hie Hie 2014–15

Loretta Serafin, Mark Hellyer and Peter Perfrement

NSW DPI, Tamworth

Introduction

Sorghum is an important summer crop in north-eastern NSW, where dryland sorghum yields of about 3–5 tonnes/ha on average are common. In these farming systems, where grower and advisor confidence in growing sorghum is high and a reasonable amount of other research has been conducted on general crop agronomy, the research emphasis is now focused on incrementally lifting yields. This is in contrast to research in the drier, western zone where improving confidence and reliability in crop production are the paramount research focus.

The trial outlined below was designed to compare grain yield and quality responses with variations in row direction (north–south versus east–west) across a range of row configurations (to simulate various light interception orientations) and sorghum hybrids. A second site was planted in the 2014–15 season, located further south at Spring Ridge on the Liverpool Plains.

Site details

Location: “Grattai East”, Terry Hie Hie
Co-operator: Michael Ledingham
Sowing date: 2 October 2014
Harvest date: 4 March 2015
Plant Population: Target of 50,000 plants/ha
Planter: Monosem precision planter

Starting nutrition

The site was cored just before sowing to determine starting soil nutrition (Table 1).

Table 1. Starting soil nutrition at “Grattai East”, Terry Hie Hie

Depth (cm)	Nitrate (mg/kg)	Colwell P (mg/kg)	Colwell K (mg/kg)	Sulfur (mg/kg)	Organic carbon (%)	Conductivity (dS/m)	pH (CaCl ₂)
0–10	3	21	194	2.4	0.53	0.018	5.5
10–30	3	4	94	2.2	0.32	0.027	6.0

Treatments

Row direction North–south
East–west
Hybrids MR Apollo
MR 43
84G22
Row configuration Solid on 1 m spacing
Single skip
Superwide (1.5 m spacing)

The trial was blocked by row direction, then by row configuration, and hybrids were randomised within blocks.

Results

Plant structures

Plant establishment was lower than the target population of 50,000 plants/ha. On average, 28,500 plants/ha were established. Differences were detected between the row configurations, but not between varying the row direction or hybrids (Table 2).

Key findings

Varying row direction (north–south vs east–west) had no effect in this trial in this season.

Row configuration did influence final grain yield with the solid plant out yielding the superwide and single skip treatments by 0.93–1.29 t/ha respectively.

Treatments did not affect the number of tillers produced (data not shown). However, there were differences in the number of heads produced with an average of 66,200 heads/ha produced across treatments. Differences in the number of heads produced were detected across row configurations (Table 2).

Table 2. Plant establishment and head production across configurations

Configuration	Established population (plants/ha)	Heads (number/ha)*
Solid	35,830 a	83,890 a
Single skip	24,170 b	55,190 b
Superwide	25,560 b	59,440 b
*The number of heads produced across the site was quite variable so these numbers should be treated with caution. Values followed by the same letter are not significantly different (P = 0.05)		

Grain yield

The average grain yield across the trial was 3.51 t/ha. Neither varying row direction nor hybrid affected final grain yield at this site in this season (data not shown). However, row configuration had a significant impact, with the solid plant (1.0 m) out yielding both the single skip and superwide treatments (Table 3).

Table 3. Row configuration effect on grain yield (at 13.5% moisture)

Configuration	Yield (t/ha)
Solid	4.25 a
Single skip	2.96 b
Superwide	3.32 b
Values followed by the same letter are not significantly different (P = 0.05)	

Grain quality

Hybrid selection was the only factor that significantly affected grain quality in the trial. Grain protein averaged 10.51% across treatments, but varied depending on hybrid. Hybrid 84G22 produced the highest grain protein, but also the lowest 1000 grain weight and the highest screening levels (Table 4).

There was no difference in the test weight associated with varying treatments, with an average of 77.50 kg/hL. All treatments delivered grain above the receival standard (71.0 kg/hL; data not shown).

Table 4. Grain quality across hybrids

Hybrid	Protein (%)	1000 grain weight (g/1000 seeds)	Screenings (%)
84G22	10.81 a	31.19 b	7.46 a
MR Apollo	10.33 b	34.59 a	4.81 b
MR 43	10.37 b	33.25 a	4.78 b
Values followed by the same letter are not significantly different (P = 0.05)			

Summary

At this site, in this season, only varying the sorghum row configuration resulted in any significant differences in yield. The solid plant configuration yielded between 0.93–1.29 t/ha better than the superwide or single skip treatments, respectively. Neither varying row direction nor sorghum hybrid selection caused any apparent differences in grain yield.

Variations in grain quality were detected between hybrids, but none of the impacts were sufficient to cause down-grading at a delivery site.

These are preliminary results and, as such, additional data from more sites and seasons is required to validate these preliminary findings.

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