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Sorghum row direction × configuration × hybrid – Spring Ridge 2014–15

Loretta Serafin, Mark Hellyer and Peter Perfrement

NSW DPI, Tamworth

Key findings

Row direction was the only factor that affected final grain yield at this site in this season.

Sorghum sown in a north–south direction yielded 7% more than sowing east–west.

Introduction

Sorghum is an important summer crop in north-eastern NSW, in particular on the Liverpool Plains where high sorghum yields under dryland conditions around 5–7 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 lifting yields by increments. 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 [NS] versus east–west [EW]) 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 north at Terry Hie Hie, east of Moree.

Site details

Location:	**"Niluan", Spring Ridge**
Co-operator:	**Jim Russell**
Sowing date:	**28 October 2014**
Harvest date:	**9 March 2015**
Plant population:	**Target of 50,000 plants/ha**
Planter:	**Monosem precision planter**

Starting soil water

The site was cored pre-sowing to establish starting soil water. There was limited moisture at the start of the season with 133 mm of plant available water (PAW) for sorghum.

Starting nutrition

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

Table 1. *Starting soil nutrition at "Niluan", Spring Ridge*

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	177	45	699	3.6	1.34	0.435	7.6
10–30	54	19	330	3.2	1.00	0.333	7.9

Treatments

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

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, 30,900 plants/ha were established due to dry sowing conditions. However, establishment was quite uniform across all treatments with no differences detected.

The treatments also had no effect on the number of tillers or heads produced. On average, 59,600 heads/ha were produced across treatments.

Grain yield

The average grain yield across the trial was 4.76 t/ha. Neither varying row configuration nor hybrid had any effect on final grain yield at this site in this season (Table 2). However, varying row direction had a significant impact, with the north–south direction out yielding the east–west direction by 0.31 t/ha or 7% (Table 2).

Table 2. *Grain yield (corrected to 13.5 % moisture) across treatments at Spring Ridge 2014–15*

Direction	Configuration	Hybrid	Grain yield (t/ha)
East–west (4.60 t/ha)	Solid	84G22	4.42
		MR Apollo	4.98
		MR 43	5.23
	Single skip	84G22	4.03
		MR Apollo	4.08
		MR 43	4.50
	Superwide	84G22	4.58
		MR Apollo	4.80
		MR 43	4.83
North–south (4.91 t/ha)	Solid	84G22	5.25
		MR Apollo	5.36
		MR 43	4.40
	Single skip	84G22	3.85
		MR Apollo	3.80
		MR 43	4.47
	Superwide	84G22	5.41
		MR Apollo	5.64
		MR 43	6.04
			n.s.d
n.s.d = no significant difference at the P = 0.05 level			

Grain quality

Various treatments resulted in differing grain qualities. Grain protein averaged 11.05% across treatments. Hybrid grain protein levels varied from 84G22 at 11.19%, down to 11.04% and 10.92% for MR 43 and MR Apollo respectively.

There were also differences in the grain test weight associated with varying row configuration (Table 3) and hybrid selection (Table 4), but all treatments delivered grain above the receival standard (71.0 kg/hL).

Table 3. *Varying row configuration effect on grain test weight*

Configuration	Test weight (kg/hL)
Solid	79.47 b
Single skip	80.55 a
Superwide	80.74 a
Values followed by the same letter are not significantly different (P = 0.05)	

Table 4. *Varying hybrid effect on grain test weight*

Hybrid	Test weight (kg/hL)
MR 43	81.12 a
84G22	79.90 b
MR Apollo	79.74 b
Values followed by the same letter are not significantly different (P = 0.05)	

Summary

At this site, in this season, only row direction caused a significant difference in grain yield. The north–south treatment yielded 7% higher than the east–west treatment. The other treatments (varying row configuration or sorghum hybrid selection) caused no apparent differences in grain yield.

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

Varying row direction might also not always be commercially possible or desirable, depending, for example, on paddock layout and slope.

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