

# Effect of plant density on irrigated soybean varieties in southern NSW, 2016–17

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## Key findings

- Grain yields were maximised for all varieties when sown at the recommended target sowing densities (30–45 plants/m<sup>2</sup>).
- Averaged across target sowing densities Djakal, N005A-80 and P176-2 yielded the highest at 3.7 t/ha, 3.8 t/ha and 3.9 t/ha respectively, while Snowy<sup>®</sup> achieved a significantly lower grain yield of 3.3 t/ha.
- Lodging was exacerbated at higher target sowing densities for all varieties, with N005A-80 demonstrating the strongest lodging resistance, supporting previous findings in this environment.
- Higher target sowing densities resulted in longer maturity times.

**Introduction** Seeding rate is an easily manipulated agronomic decision that producers can use to maximise soybean yield and economic return. An experiment was conducted at the NSW DPI Leeton Field Station to test the response of two commercial soybean varieties and two numbered lines for potential release, to four target sowing densities.

<b>Site details</b>	<b>Location</b>	Leeton Field Station, Yanco NSW
	<b>Soil type</b>	Grey, self-mulching clay (vertisol)
	<b>Fertiliser</b>	125 kg/ha legume starter (N = 13.3%, P = 14.3%, S = 9%, Zn = 0.81%)
	<b>Inoculation method</b>	Peat slurry in-furrow injection
	<b>Paddock layout</b>	Raised beds (1.83 m centres) with furrow irrigation
	<b>Sowing date</b>	5 December 2016
	<b>Harvest date</b>	4 May 2017
<b>Treatments</b>	<b>Varieties</b>	Djakal, Snowy <sup>®</sup> , N005A-80 and P176-2
	<b>Target sowing densities</b>	15, 30, 45 and 60 plants/m <sup>2</sup> All treatments achieved plant densities ±20% of their target sowing density.

**Results** **Maturity length**  
Soybean maturity (days from sowing to 95% physiological maturity) varied significantly ( $P = 0.05$ ) between both target sowing density and variety, however, no significant interaction was detected. Averaged across varieties, higher target sowing densities resulted in increased maturity lengths. Plant density targets of 15, 30, 45 and 60 plant/m<sup>2</sup> resulted in maturity lengths of 114, 115, 115 and 117 days after sowing (DAS) to physiological maturity respectively. Averaged across target sowing densities, Djakal matured the quickest followed by N005A-80, P176-2 and then Snowy<sup>®</sup> at 112, 115, 117 and 118 DAS to physiological maturity respectively.

### Lodging

Lodging in soybeans has the potential to reduce harvestability, increase harvest losses and reduce yields. Both target sowing density, variety and the interaction between them had a significant ( $P = 0.05$ ) effect on the severity of lodging at harvest (Figure 1).

Higher target sowing densities resulted in increased plant lodging at harvest for all varieties. Djakal, Snowy<sup>db</sup> and P176-2 all incurred similar levels of lodging, while N005A-80 incurred significantly ( $P = 0.05$ ) lower levels of lodging at all target sowing densities (Figure 1).

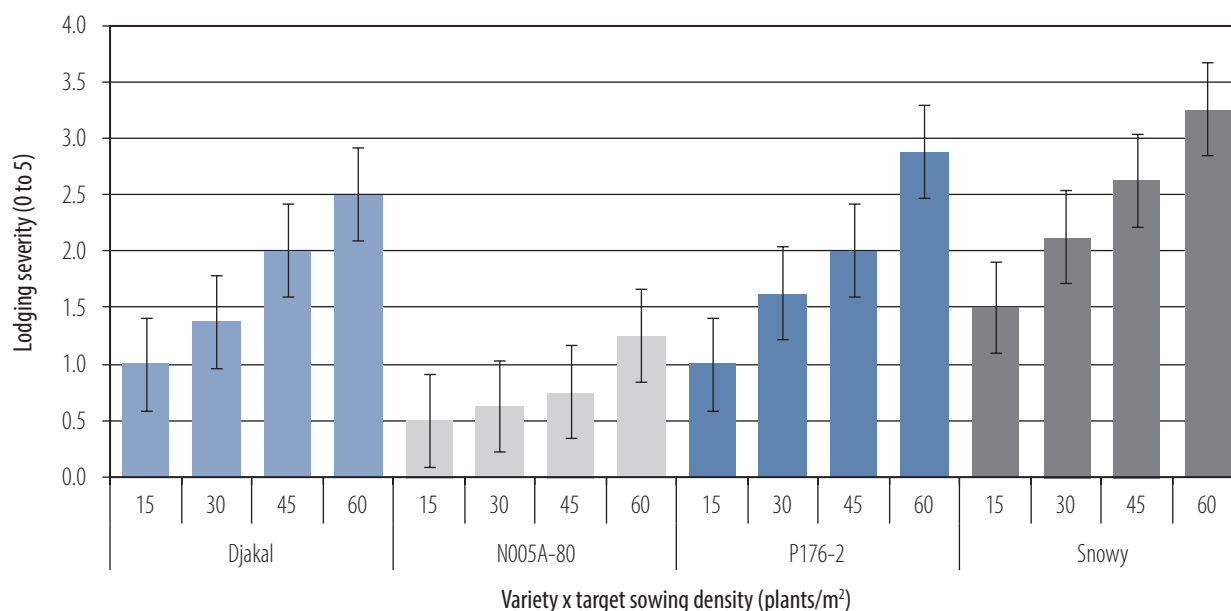


Figure 1. Effect of variety and target sowing density on the lodging severity at harvest of four soybean varieties (0 = no lodging, 5 = severe lodging). Bars denote l.s.d. ( $P = 0.05$ ) = 0.41.

### Grain yield

Target sowing density, variety and the interaction between them was found to have a significant ( $P = 0.05$ ) effect on grain yield (Figure 2). Grain yield was maximised for Djakal at 15, 30 and 45 plants/m² with a reduction occurring at 60 plants/m². Both N005A-80 and Snowy<sup>db</sup> suffered reduced grain yield at the lowest target plant density (15 plants/m²) with maximum grain yield occurring at 30, 45 and 60 plants/m². Unlike the other varieties, P176-2 achieved consistent grain yields across all four target sowing densities.

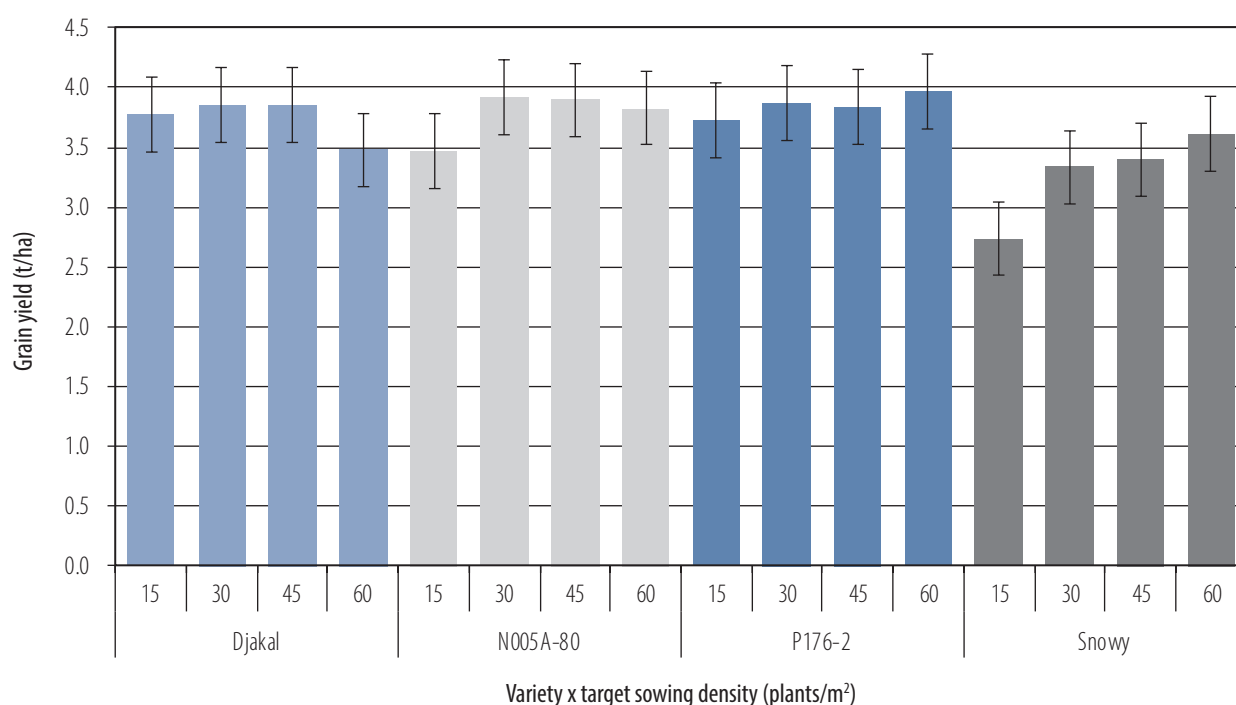


Figure 2. Effect of variety and target sowing density on grain yield of four soybean varieties. Bars denote l.s.d. ( $P = 0.05$ ) = 0.31 t/ha.

Averaged across varieties, P176-2, N005A-80 and Djakal achieved the highest grain yields at 3.9 t/ha, 3.8 t/ha and 3.7 t/ha respectively, while Snowy<sup>db</sup> yielded significantly lower at 3.3 t/ha.

### Summary

Current target sowing density recommendations for the southern NSW soybean growing regions are 35–50 plants/m<sup>2</sup>. High yields can be achieved at a less than 35 plants/m<sup>2</sup> targeted sowing density, however, this is not recommended. Targeted sowing densities above 50 plants/m<sup>2</sup> can, although not always, lead to increased lodging and, as a result, increased harvest difficulty, particularly in varieties susceptible to lodging, such as Snowy<sup>db</sup>.

### Acknowledgements

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