Department of Primary Industries
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NSW research results

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Effect of plant density on irrigated soybeans in southern NSW

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Key findings

- Averaged across sowing densities Djakal, N005A-80 and P176-2 yielded the highest with 3.7 t/ha, 3.8 t/ha and 3.9 t/ha respectively, while Snowy$^{\phi}$ achieved a significantly lower grain yield of 3.2 t/ha.
- Grain yield of Djakal and N005A-80 did not vary significantly between target sowing densities. Both varieties maintained high yields even at the lowest target sowing density (15 plants/m^2).
- Lodging was exacerbated at higher sowing densities for all varieties except P176-2, which was consistently low across all sowing densities.
- The length of time to maturity did not vary significantly between target sowing densities for Snowy$^{\phi}$, N005A-80 or P176-2. However, Djakal's maturity length was extended by 4 days at the 60 plants/m^2 sowing density when compared with the three lower target plant densities.

Introduction

Seeding rate is an agronomic decision that producers can use to maximise soybean yields and economic returns. This 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.

Site details

Location	Leeton Field Station, Yanco NSW
Soil type	Grey, self-mulching clay (vertosol)
Fertiliser	125 kg/ha legume starter (N=13.3%, P=14.3%, S=9%, Zn=0.81%)
Inoculation method	Peat slurry in-furrow injection
Paddock layout	Raised beds (1.83 m centres) with furrow irrigation
Sowing date	3 December 2015
Harvest date	19 April 2016

Treatments

Varieties

Djakal, Snowy$^{\phi}$, N005A-80 and P176-2

Target sowing densities

15, 30, 45 and 60 plants/m^2

Results

Maturity length

Target sowing density did not have a significant effect on maturity length; however, significant differences in maturity length between varieties were identified. Djakal reached physiological maturity first, 115 days after sowing (DAS), followed by N005A-80 (118 DAS), P176-2 (119 DAS) and Snowy$^{\phi}$ (121 DAS).

Lodging

Lodging in soybeans has the potential to reduce harvestability, increase harvest losses and reduce yields. Both target sowing density and variety had a significant ($P = 0.01$) effect on the severity of lodging.

Lower target sowing densities of Djakal, Snowy$^{\phi}$ and N005A-80 resulted in reduced lodging severity (Figure 1). For Djakal, Snowy and N005A-80, 15 and 30 plants/m^2 densities resulted in significantly lower lodging than the 60 plants/m^2 density. The lodging severity of P176-2 remained consistent across all target sowing densities.

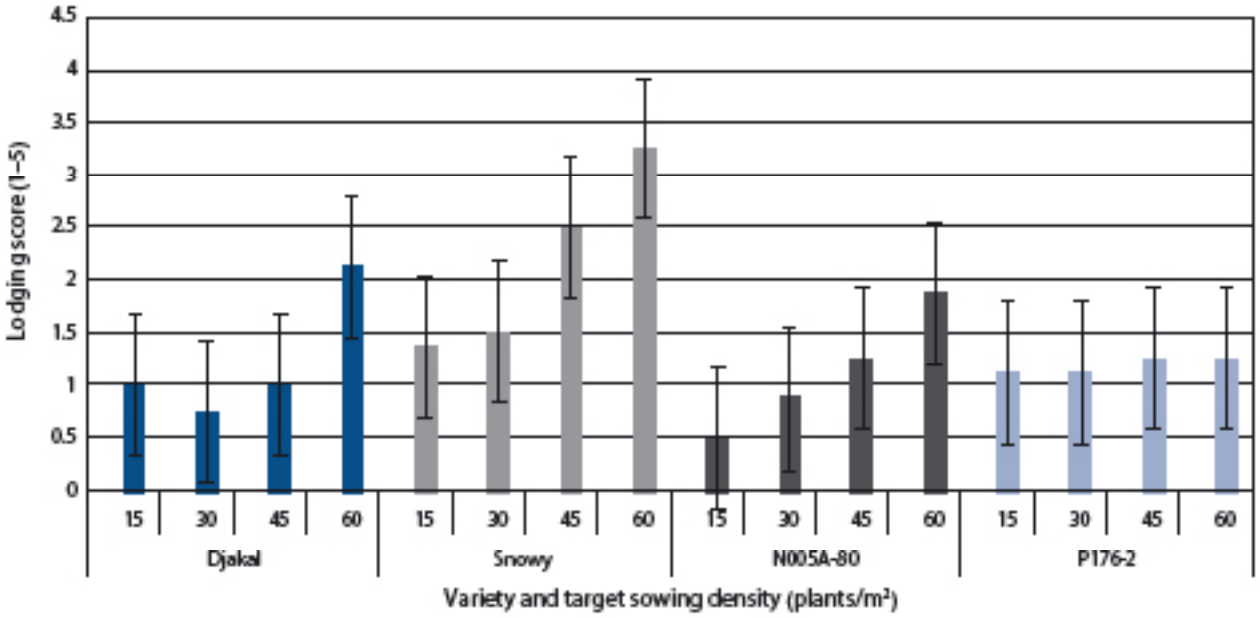

Figure 1. Effect of variety and target sowing density on lodging of four soybean varieties. Bars denote l.s.d. ($P = 0.05$) = 0.67 (1 = minimal lodging, 5 = severe lodging).

Grain yield

Both target sowing density and variety were found to have a significant ($P = 0.01$) effect on grain yield. Grain yield was maximised for Snowy(ϕ) and P176-2 at the 45 plants/m² density, while Djakal and N005A-80 achieved consistent grain yields across all target sowing densities (Figure 2).

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(ϕ) was significantly lower yielding at 3.2 t/ha.

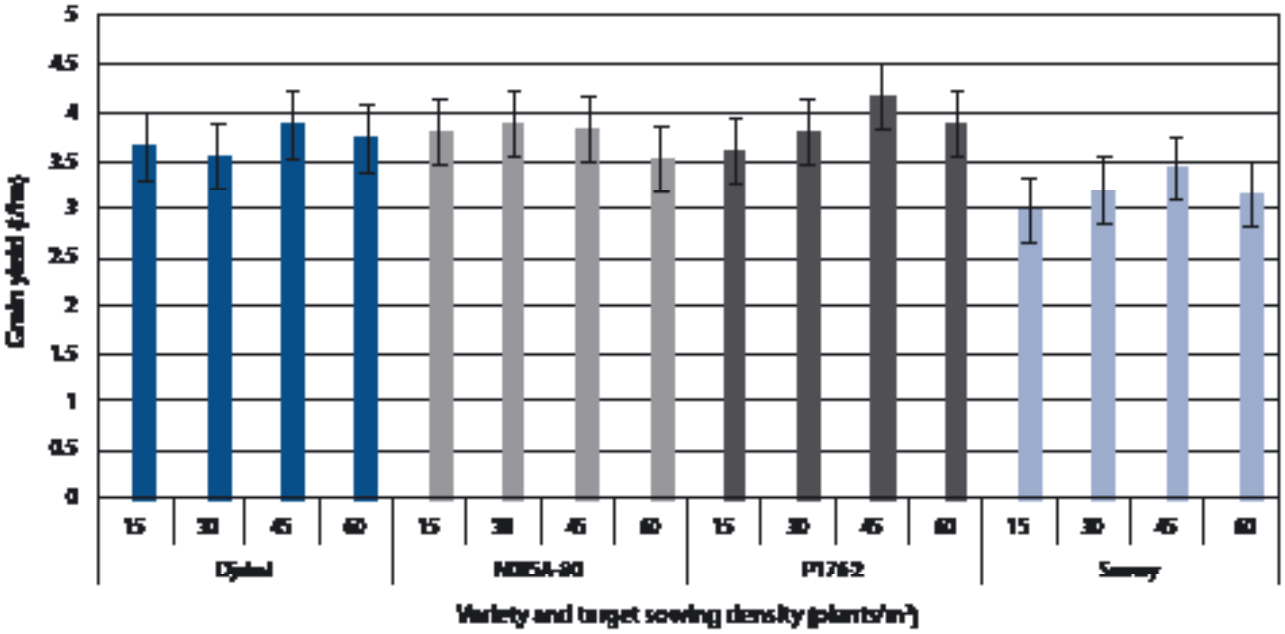

Figure 2. Effect of variety and target sowing density on grain yield of four soybean varieties. Bars denote l.s.d. ($P = 0.05$) = 0.34 t/ha.

Summary Current target sowing density recommendations for the southern NSW soybean growing regions are 35–50 plants/m^2. High yields can be achieved at a targeted sowing density below 35 plants/m^2, however, this is not recommended. Targeted sowing densities above 50 plants/m^2 can lead to increased lodging and, as a result, increased harvest difficulty, particularly in varieties susceptible to lodging, such as Snowy(b).

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