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Effect of seeding rate on spring wheat sown mid-April—Canowindra 2014

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Key findings

- Grain yield increased by 225 kg/ha by reducing seeding rate.
- Lancer and Bolac were the highest yielding varieties.
- Longer season varieties tended to produce more tillers/m² than shorter season wheat varieties.
- The 2014 season was characterised by a dry spring.

Introduction

Research has identified that controlling summer weeds during the summer fallow period can lead to significant increases in stored plant available water and mineral nitrogen, which can then be used for the following winter crop. If seasonal conditions allow, early sowing has been identified as a potential option to convert the moisture and nitrogen into additional grain yield compared to main season and later sowings.

Therefore, the aim of this experiment was to evaluate how different spring wheat varieties respond to seeding rate from a mid-April sowing. Wheat varieties ranged from very slow- to mid-maturity types.

Site details

Location	"The Pines" Canowindra NSW
Soil type	Clay loam
Previous crop/s	Canola (2013)
Stubble management	Stubble incorporated
Harvest date	21 November
Fertiliser	20 kg P/ha + 50 kg N/ha at GS32
Fungicide	Flutriafol treated fertiliser (400 mL/ha) Prosaro (200 mL/ha) applied @ GS39
Soil pH_{Ca}	6.4
In-crop rainfall	192 mm

Treatments

Target plant density	60 plants/m² 120 plants/m² 180 plants/m²
4 wheat varieties	Bolac, EGA_Eaglehawk (very slow), Lancer (slow) and EGA_Gregory (mid).

Rainfall during the months of August, September and October was 43, 17 and 17 mm less than the long-term median rainfall (*Table 1*).

Results

Plant establishment

Plant establishment was significantly affected by seeding rate ($P<0.001$) and variety ($P<0.001$) (*Table 2*). The interaction between variety and seeding rate was not significant ($P=0.987$).

When averaged over all four varieties, plant establishment increased as the seeding rate increased. Target plant density treatments of 60, 120 and 180 plants/m² achieved densities of 63, 110 and 151 plants/m² (*Table 3*).

Lancer had approximately 13 fewer plants establish than EGA_Eaglehawk, EGA_Gregory and Lancer (*Table 4*).

Table 2: Impact of seeding rate on plant establishment, tiller number and grain yield at Canowindra in 2014.

Target plant population (plants/m²)	Plant establishment (plants/m²)	Tiller number (tillers/m²)	Grain yield (tg/ha)
60	63	509	3.92
120	110	544	3.77
180	151	605	3.70
l.s.d (P=0.05)	6.8	28	127

Tiller counts

The number of tillers was significantly affected by seeding rate ($P<0.001$) and variety ($P<0.001$). The interaction between seeding rate and variety was not significant ($P=0.566$)

Averaged across the four varieties, tillers increased as the seeding rate increased. Tiller number increased from 509, 544 to 605 tillers/m² with the respective target density of 60, 120 and 180 plants/m² (*Table 3*).

The longer season spring wheats such as Bolac and EGA_Eaglehawk established more tillers (per m²) than the shorter season varieties EGA_Gregory and Lancer (*Table 4*).

Table 1: Monthly rainfall at Canowindra, 2014.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Rainfall (mm)	24	12	36	43	28	20	51	3	24	31	83	99
Median	49	35	32	32	37	49	47	48	41	48	42	42

Table 3: Impact of variety on plant establishment, tiller number and grain yield at Canowindra in 2014.

Variety	Plant establishment (plants/m²)	Tiller number (tillers/m²)	Grain yield (t/ha)
Bolac	111	604	4.20
EGA_ Eaglehawk120	113	561	3.53
EGA_Gregory	109	529	3.27
Lancer	98	516	4.19
l.s.d (P=0.05)	7.8	32	0.15

Grain yield

Wheat grain yield was significantly affected by seeding rate (P=0.003) and variety (P<0.001). There was no significant interaction between variety and seeding rate (P=0.243) in this experiment.

Grain yield reduced as seeding rate increased, with yield penalties of 225 kg/ha by sowing the highest seeding rate (*Figure 1*).

Bolac (4.20 t/ha) and Lancer (4.19 t/ha) were the highest yielding varieties, followed by EGA_Eaglehawk (3.53 t/ha) and then EGA_Gregory (3.27 t/ha) (*Table 4*).

EGA_Gregory was sown approximately two weeks earlier than the suggested sowing time, and therefore should not be considered for mid-April sowing time.

Summary

The results from this experiment supports the long-standing central west NSW principle of sow early–sow light. This theory seems to hold for central eastern NSW as well.

If season conditions allow an early sowing opportunity, seeding rates can be reduced as the plant appears to have time to adjust tiller number, grains per head and grain size depending on seasonal conditions.

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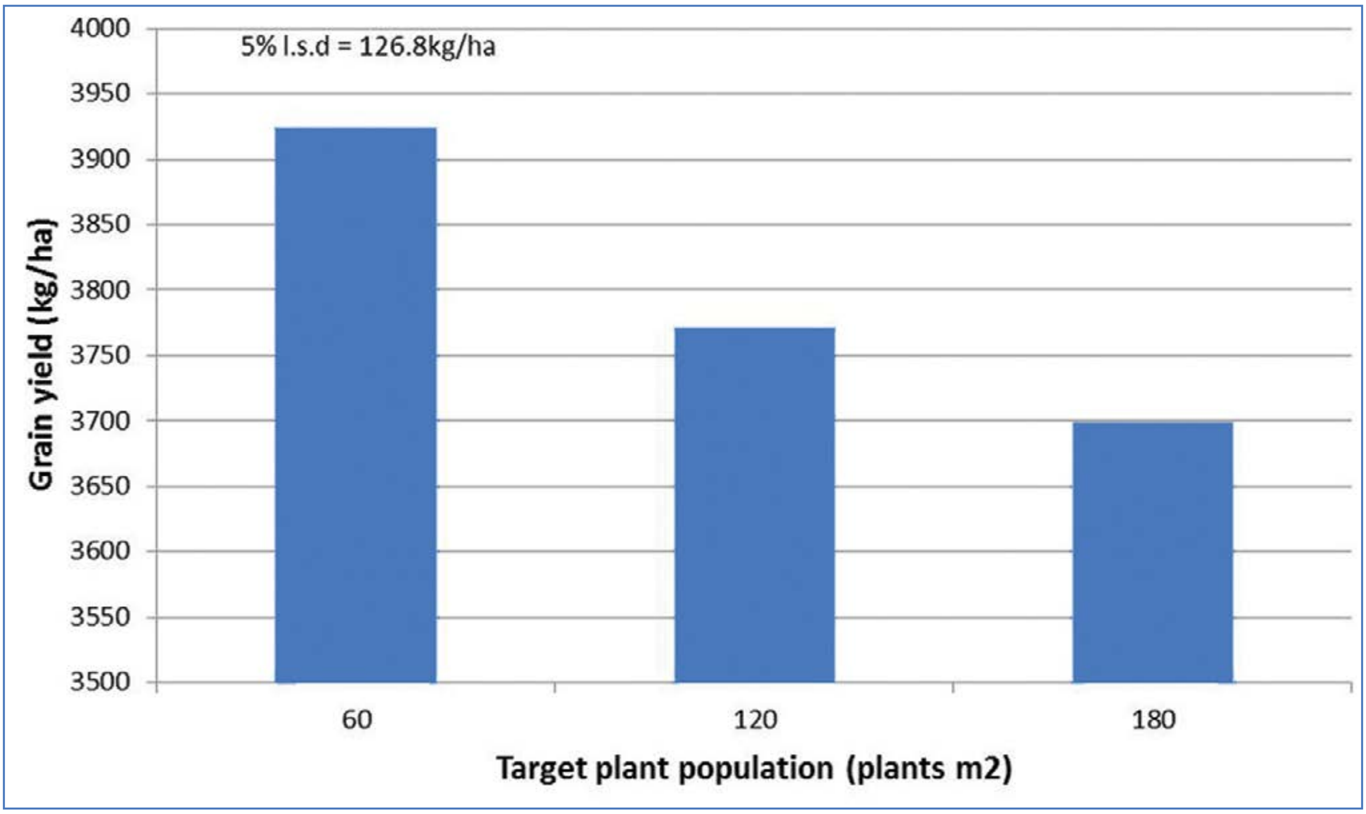

Figure 1: Average grain yield of four varieties sown at three plant populations at Canowindra 2014.