

Lentil time of sowing and sowing rate – Yenda 2015

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Key findings

- » Sowing time is a critical management factor in this environment.
- » Sow lentils in late April to 10 May in the south-western cropping region of southern NSW.
- » Target plant populations of 120 plants/m².
- » Commercial lentil yields of 1.2–1.5 t/ha on acidic, red-brown earths of south-western NSW are now realistic, giving growers the confidence and economic viability to introduce this pulse into their cropping rotations.

Introduction

This experiment aimed to establish agronomic guidelines for sowing time and sowing rate for current commercial lentil varieties and advanced breeding lines at Yenda. It also determined if optimum plant density and sowing time remains constant across varieties in this environment. This information will be used to confirm and update current agronomic recommendations for lentil in this region.

Site details

Soil type	Red sandy loam, pH _{Ca} 5.4 (0–10 cm) (Table 1)
Trial design	Randomised complete block design with sowing date as the main blocks and varieties as the sub-plots; three replications
Sowing	Direct-drilled using a six-row cone seeder with 300 mm row spacings, press wheels and GPS auto-steer. The site was rolled post sowing.
Inoculation	Group F peat inoculant was mixed directly into an on-board 100 L water tank then pumped through micro-tubes into each sowing furrow
Stubble management	Sown into a medium density, standing wheat stubble
Fertiliser	80 kg/ha grain legume super (N:P:K:S; 0:13.8:0:6.1) placed 30–40 mm below the seed
Plant population	Target 120 plants/m ²

Weed management	Commercial practices used with aim of weed-free trials to eliminate weed competition and weed seed set Fallow weed control: glyphosate (450 g/L) 1.5 L/ha (over summer) Incorporated by sowing: glyphosate (450 g/L) 2.0 L/ha, Stomp® (440 g/L pendimethalin) 2.0 L/ha, Avadex® (400 g/L tri-allate) 1.6 L/ha and Terbyne® (750 g/kg terbutylazine) 900 g/ha Post sowing: Select® (240 g/L clethodim) 500 mL/ha, Uptake® spraying oil 500 mL/100 L
Insect management	Targeting <i>Helicoverpa</i> sp.: Fastac Duo® (100 g/L alpha-cypermethrin) 200 mL/ha (late pod fill)

Table 1. Site soil chemical characteristics for 0–10 cm and 10–20 cm depth at Yenda in 2015.

Characteristic	Depth	
	0–10 cm	10–20 cm
pH (1:5 CaCl ₂)	5.5	5.0
Aluminium Exc. (meq/100 g)	<0.1	<0.1
Total nitrogen (%)	0.082	0.047
Sulfur (mg/kg)	8.6	6.4
Phosphorus (Colwell) (mg/kg)	47	9.4
Cation exchange capacity (CEC) (cmol(+)kg)	6.8	6.6

The 2015 growing season at Yenda was almost ideal for pulse production except for a dry and hot September–October. Growing season rainfall (April–October) was 264 mm, which is above the long-term average (231 mm). Of this, 47 mm fell in early April, allowing timely sowing. Rainfall in June, July and August was 63% above the long-term average and contributed to valuable sub-soil moisture.

However, the flowering and grain filling period of September–October experienced eight continuous weeks of no effective rainfall and wide temperature fluctuations (5 September to 31 October). The rapid change from cool temperatures to a number of consecutive hot days in the high 30 degrees in the first week of October caused crops to abort flowers and mature prematurely. This heatwave was followed by an exceptionally hot and dry October.

Treatments

Varieties	Six, small to medium seeded red lentils PBA Ace [♢] PBA Bolt [♢] PBA Jumbo2 [♢] Hurricane XT [♢] CIPAL1422 Nipper [♢]
Time of sowing	TOS 1: 29 April 2015 TOS 2: 28 May 2015 (both harvested 18 November 2015)

Results

Establishment

Measured plant densities correlated closely with target plant densities ($P < 0.001$) at both sowing times (Table 2). Only variety and sowing rate means are presented here as there was no significant variety by sowing rate interaction for any of the variables measured. There was a small but significant difference ($P < 0.02$) between some varieties for measured plant density with the large-seeded PBA Jumbo2 having the lowest plant density (Table 2).

Table 2. Mean plant density for six varieties at Yenda in 2015.

Variety	Plant density (plants/m ²)
CIPAL_1422	116.2
Nipper	107.1
PBA_Ace	111.2
PBA_Bolt	119.0
PBA_Hurricane_XT	114.6
PBA_Jumbo2	101.2

Time of sowing, density, variety and grain yield

Lentil grain yield was significantly reduced when sowing was delayed from 29 April to 28 May, falling by 50% on average (Table 3). The second sowing (28 May) performed poorly given the quick dry finish to the 2015 growing season. Like other pulses in southern NSW, the lentil sowing date is one of the most critical management factors and determinants of growth, production and profit.

Table 3. Lentil grain yield for two times of sowing at Yenda in 2015.

Sowing time	Grain yield (t/ha)
TOS 1: 29 April	1.51
TOS 2: 28 May	0.76

L.s.d. ($P < 0.05$) = 0.199 t/ha

At the first TOS (29 April) the old variety Nipper was significantly lower yielding than the current commercial varieties PBA Bolt, PBA Hurricane, PBA Ace and PBA Jumbo2 (Figure 1). Grain yields from the 28 May sowing were generally low, but PBA Bolt, PBA Ace and PBA Jumbo2 were the highest yielding varieties (Figure 1).

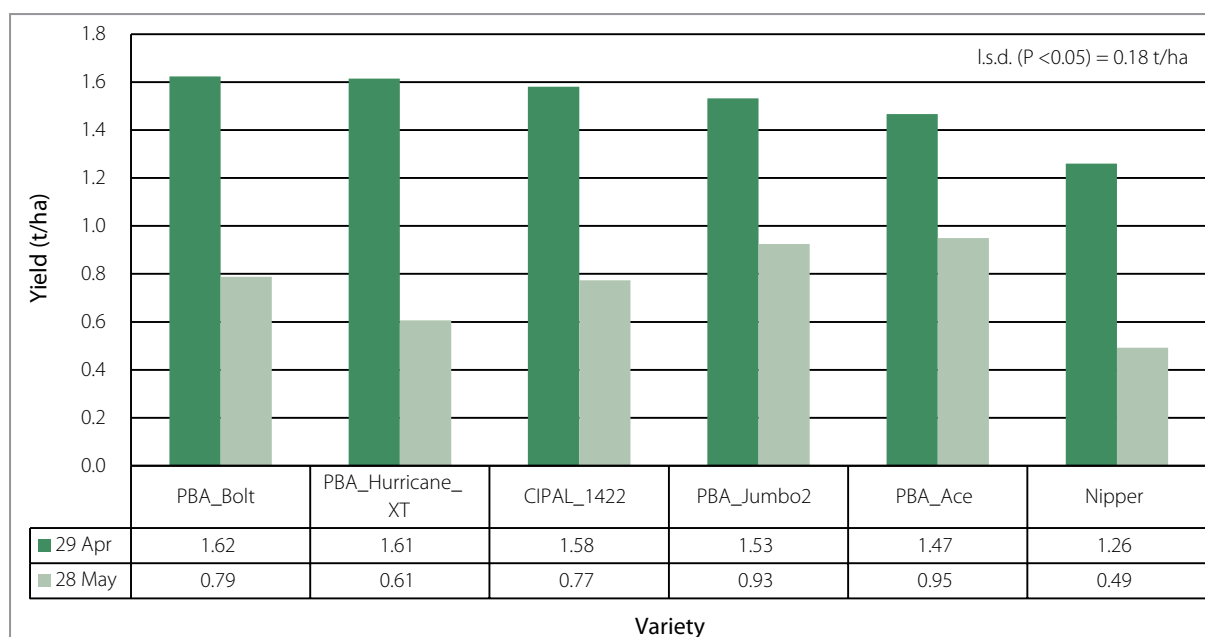


Figure 1. Grain yield of six lentil varieties at two sowing dates at Yenda in 2015.

A significant TOS and plant density interaction was observed in this experiment ($P < 0.001$). There was no significant grain yield response to increasing plant density from 48 plants/m² to 170 plants/m², but there was a trend for increasing grain yield with increasing plant density at the 28 May sowing only (Figure 2). This would indicate that late sowing and a dry spring prevents lentils from producing sufficient biomass, even with very high plant populations, to maximise or maintain yield in this environment.

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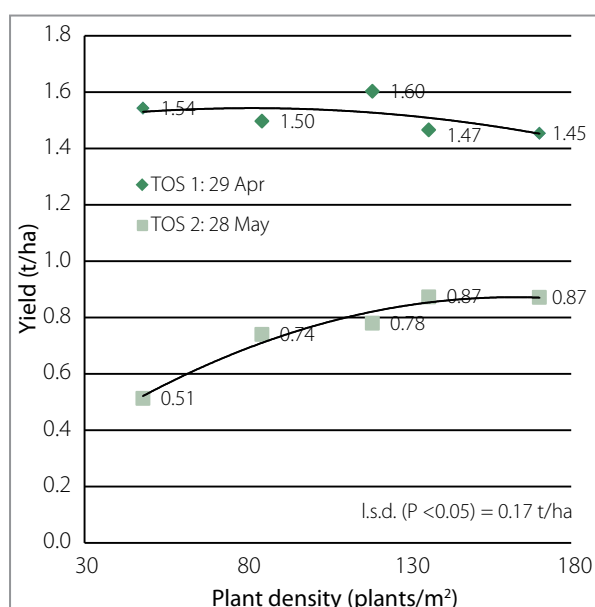


Figure 2. Lentil grain yield for various plant densities and two sowing times (29 April and 28 May) at Yenda in 2015.