Opening the door for lentils: The critical role of sowing time

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INTEREST in lentils (*Lens culinaris*) as a crop has increased in recent years in northern farming systems in southern Queensland and northern New South Wales. Potential benefits to growers include the additional nitrogen supply and possible disease dilution in cereals following this winter pulse.

However, conditions in the north are very different from those in the main lentil-growing areas of South Australia and Victoria. The crop in the northern region will have to rely mainly on stored moisture, while in southern Australia, in-season rainfall is often enough to support the crop.

Warmer winters and earlier seasonal warming, compounded by insufficient stored soil water in this northern region, can induce early flowering and pod set. In this region, soil water can also affect flowering, pod set, and grain filling duration, in addition to exposure to frosts, drought, and heat stress. In most northern areas, the risk of frost is significantly less of an issue than the potential for crops to reach flowering and pod fill as temperatures increase.

Chauhan et al. (2025) recently demonstrated a link between soil water and lentil phenological development. This effect has been captured in the APSIM modelling framework. As a result, the sowing date needs to be optimised using both experimental data and crop models to ensure flowering occurs at the most suitable time in the season in the northern region.

In addition to generating new agronomic information, lentil variety selection will also be crucial in the northern region. Several promising lentil varieties are available in Australia, including PBA Bolt , PBA Jumbo2 , PBA Hallmark XT and PBA Blitz . As these varieties may respond differently to temperature, soil type, and seasonal moisture, not all varieties currently selected by growers in southern systems are ideal for northern conditions.

Based on available information, we hypothesised that combining sowing time to place flowering in the coolest part of the season with the most suitable varieties for local conditions could help improve reliability.

To test this, we have evaluated different sowing dates and some of the more promising lentil varieties under Gatton (Queensland) conditions.



Three lentil sowing date trial strips.

How the research was done

A field experiment was conducted at the Gatton Research Farm of the University of Queensland from May to September 2024. Three sowing dates (24 May, 10 June and 26 June) and four varieties (PBA Bolt, PBA Jumbo2, PBA Hallmark XT and PBA Blitz) were evaluated in a split-plot design with three replications.

Plots consisted of a main factor (three sowing dates) and a subfactor (four varieties) measuring 8 m by 1.8 m.

Plants were sown manually with a single-row hand planter at a row spacing of 45 cm and a plant density of 130 plants per square metre. The herbicide Rifle (pendimethalin) was applied at a rate of 2.5 litres per hectare (L/ha) immediately after sowing with a battery-operated knapsack sprayer delivering a spray volume of 100 l/ha.

Plots were given a light surface irrigation after sowing to ensure establishment, and then were grown under rainfed conditions.

At maturity, samples were harvested from the inner two rows of each plot (0.7 m^2), oven-dried at 70°C for 72 hours to determine biological yield, and grain was then threshed and reported as kilograms per hectare (kg/ha).

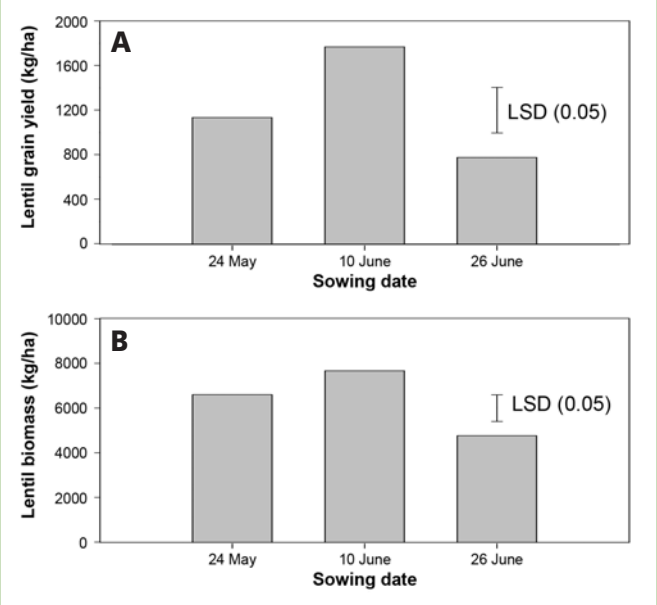
No major insect pests, weeds or diseases were recorded, and nodulation was considered satisfactory.

TABLE 1. Weather averages across lentil crop stages

Sowing date	Vegetative -Avg max (°C)	Vegetative - Avg min (°C)	Vegetative rainfall (mm)	Reproductive - Avg max (°C)	Reproductive - Avg min (°C)	Reproductive rainfall (mm)
24 May	21.0	7.5	62	21.3	7.6	7
10 June	21.5	8.0	43	22.2	9.2	6
26 June	22.3	8.8	28	23.4	10.1	4

Weather values represent averages calculated for the vegetative period (emergence to flowering) and for a ±7-day window around flowering, using data from the Gatton weather station.

FIGURE 1: Effect of sowing date on (A) lentil grain yield and (B) lentil biomass



What we found

Crops sown on 24 May and 10 June emerged in five to six days, but the 26 June sowing took almost two weeks to emerge, most likely due to soil crusting after the rain, as the seedlings were visibly slow to push through the soil surface.

The crop reached flowering at 62 days after emergence for the 24 May crop, at 61 days after emergence for the 10 June crop, and 55 days after emergence for the 26 June crop, reflecting a shortened growth period with later planting.

The time to flowering is generally longer in the southern region, allowing the crop more time to develop a closed canopy. This shift in phenology resulted in a shorter growing period before flowering for later sowing (26 June), which would have also curtailed their capacity to build biomass before reproduction.

Harvesting took place from late September to early October, depending on sowing date. PBA Blitz matured two days earlier than other varieties.

There was no significant interaction between sowing date and variety for grain yield or biomass. Grain yield was only affected by sowing dates (Figure 1A). These results indicate that the sowing date had a stronger influence on yield than the variety choice in this experiment.

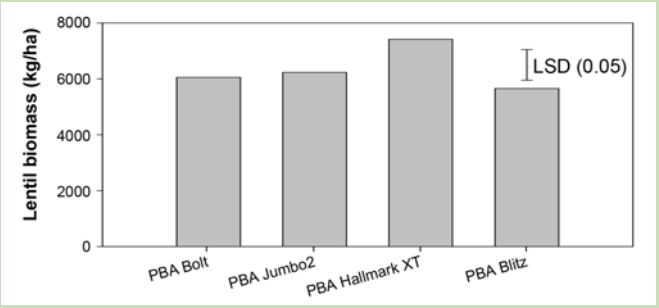
Crops sown on 24 May produced a grain yield of 1130 kg/ha when averaged across varieties, while 10 June and 26 June sown crops produced yields of 1770 kg/ha and 780 kg/ha, respectively.

This result suggests that sowing on 10 June improved grain yield by approximately 55 per cent compared with 24 May and by approximately 130 per cent compared with 26 June. Higher yields with early June sowings appeared to be related to higher biomass (Figure 1B), although this was not formally tested.

Sowing date and variety significantly influenced biological yield (biomass). The highest biological yield was recorded when lentils were sown in early June, and the lowest when they were sown in late June (Figure 1B).

When averaged across sowing dates, PBA Hallmark XT had the highest biological yield (7420 kg/ha) and PBA Blitz the lowest (5655 kg/ha) (Figure 2). The response of lentil to biomass production is similar to that of chickpea, which also shows an appreciable decline when sowings are delayed beyond June (Horn et al. 1996).

FIGURE 2: Effect of varieties on lentil biomass



To sum up

Overall, the results suggest that the best performance of lentils was observed when sown in early June. The 10 June sowing date had the highest grain yield, despite a similar amount of biomass compared with the 24 May sowing. This suggests that the early June sown crop was more efficient in converting biomass to grain than the 24 May sown crop. This information could be verified and fine-tuned in the context of long-term weather and a changing climate using the APSIM model.

Weather patterns may partly explain this response. Although the 24 May sown crop received more rainfall during the vegetative phase (Table 1), it was noted that this water did not translate into stored surface moisture at the time of flowering. The 24 May sowing flowered in late July when root-zone moisture was relatively low, likely restricting pod set and grain filling.

In contrast, the 10 June sowing flowered under moderate temperatures and with slightly better moisture in mid-August. The 26 June sowing flowered later in August, when temperatures were higher. Although this crop had some moisture earlier – a shorter growing period and potentially less accumulated biomass than the other crops – would have restricted its yield potential.

These results demonstrate that lentil production in Queensland is likely to be improved by an interaction between temperature, rainfall timing, and stored soil moisture, rather than the effect of any single factor.

The experiment's results should be treated as preliminary and will need to be confirmed across multiple seasons and locations in northern farming systems.

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Southern lentils crops are generally slower to flower allowing these crops more time to develop a closed canopy and more biomass prior to reproduction.