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Effect of fertiliser application and row spacing on grain yield of lupins—Merriwagga 2013

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Introduction

Previous trials at Merriwagga and Wagga Wagga have shown reduced establishment in lupins following the application of starter fertiliser. This reduction in establishment has been more pronounced at wider row spacings due to the crowding effect of seeds and increased concentration of fertiliser in the seeding row (seed and fertiliser were sown apart).

The aim of this experiment was to measure the effect of fertiliser application and row spacing on establishment and grain yield of six lupin varieties (three Albus and three angustifolius).

Site details

Soil type	red sandy loam
Available N	96.6 kg/ha (0–90 cm)
Previous crop	wheat (2012 and 2011)
Sowing date	29 April 2013
Soil moisture	approximately 40 cm of moist soil
In-crop rainfall	186.5 mm
Starter fertiliser	60 kg/ha Superfect
Harvest date	7 November 2013

Treatments

6 lupin varieties	Albus: Rosetta, Kiev Mutant and Luxor Angustifolius: Jenabillup, Mandelup and WALAN2333
3 row spacings	25 cm, 50 cm and 75 cm
2 fertiliser rates	0 and 60 kg/ha Granulock 15

Results

Establishment

Lupin establishment was significantly (P<0.001) higher at the 25 cm row spacing (52 plants/m^2) compared to the 50 cm row spacing (39 plants/m^2) and the 75 cm row spacing (33 plants/m^2) despite the same sowing rate. The application of 60 kg/ha Superfect resulted in a significant reduction in establishment at the 25 cm row spacing (55 plants/m^2 without fertiliser and 49 plants/m^2 with fertiliser added), but had no significant effect at the 50 cm and 75 cm row spacings.

Grain yield

The Albus lupin varieties were significantly (P<0.001) higher yielding than the angustifolius lupin varieties (*Figure 1*).

There was a significant (p=0.017) interaction between variety and row spacing. The Albus lupin varieties Kiev Mutant and Rosetta had significantly lower grain yield at the 75 cm row spacing than the 50 cm row spacing whilst Luxor showed no significant yield decline with wider spacing. There was no effect of row spacing on the other varieties (*Figure 2*).

There was a significant interaction (p=0.049) between variety and fertiliser application. Jenabillup and WALAN2333 both had increased grain yield as a result of the application of fertiliser; however, there was no statistical effect of fertiliser on the grain yield of Mandelup or the Albus varieties (*Figure 3*).

Key findings

- Albus lupin varieties were higher yielding than angustifolius lupin varieties.
- The application of 60 kg/ha of Superfect resulted in a significant grain yield increase for two of the three angustifolius lupin varieties but it had no effect on grain yield of Albus lupin varieties.
- Kiev Mutant and Rosetta had significantly lower grain yield at the 75 cm row spacing than the 50 cm row spacing. Row spacing had no effect on the other four varieties.

Summary

In past trials, the application of fertiliser to lupins has generally resulted in a reduction in establishment, however, this experiment showed only a small negative effect at the 25 cm row spacing. This suggests other factors such as soil moisture, rainfall and soil type, may be interacting with the treatments from year to year.

Kiev Mutant, Luxor and Rosetta were higher yielding in this experiment. These Albus varieties were more vigorous and may have tapped into deeper soil moisture. They also matured later than the angustifolius varieties, which allowed them to benefit from the rain that fell in September. There is a general trend for Albus lupins to yield higher than angustifolius lupins at this site over previous seasons. Mandelup performed unexpectedly poorly, which may be due to it flowering earlier than the other varieties in a period of frost and moisture stress in August.

There was a positive response to fertiliser application for two of the three angustifolius lupin varieties. This response to fertiliser application had not been observed in other similar VSAP trials. More commonly in other trials, fertiliser has had no positive impact on yield across all varieties.

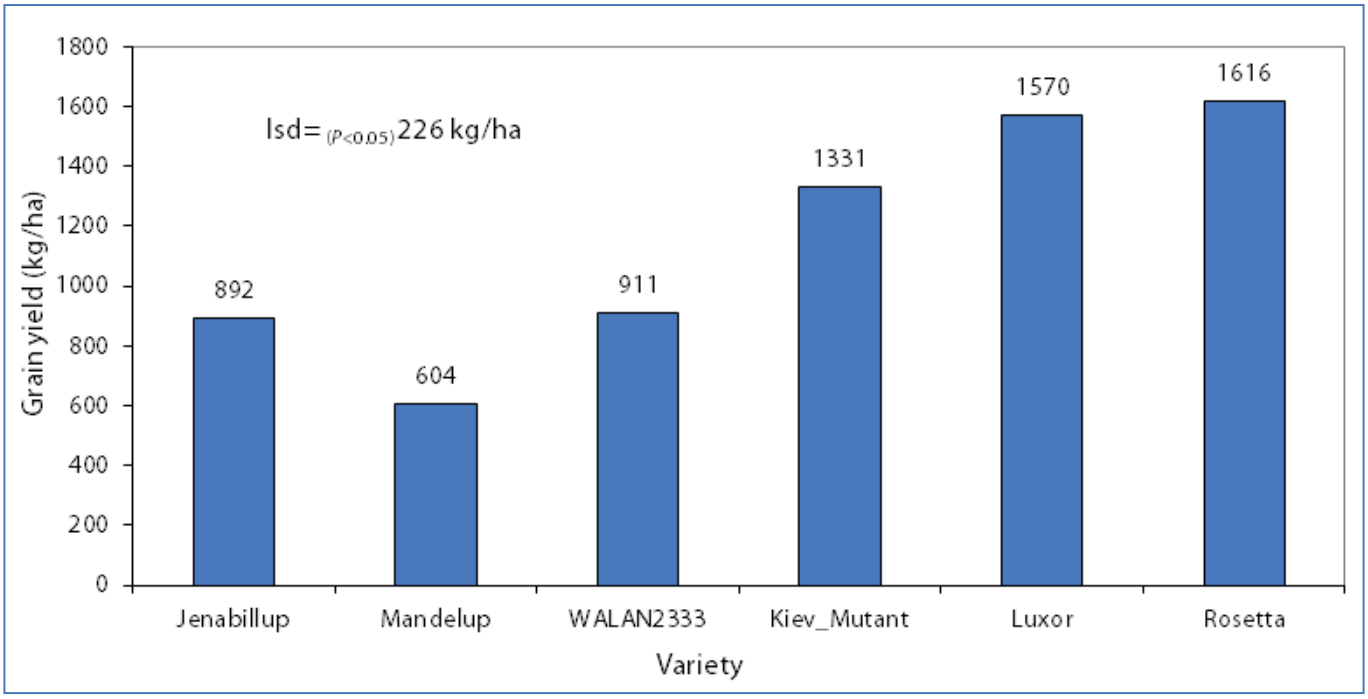

Figure 1: Grain yield of six lupin varieties averaged across three row spacings and two fertiliser treatments at Merriwagga 2013.

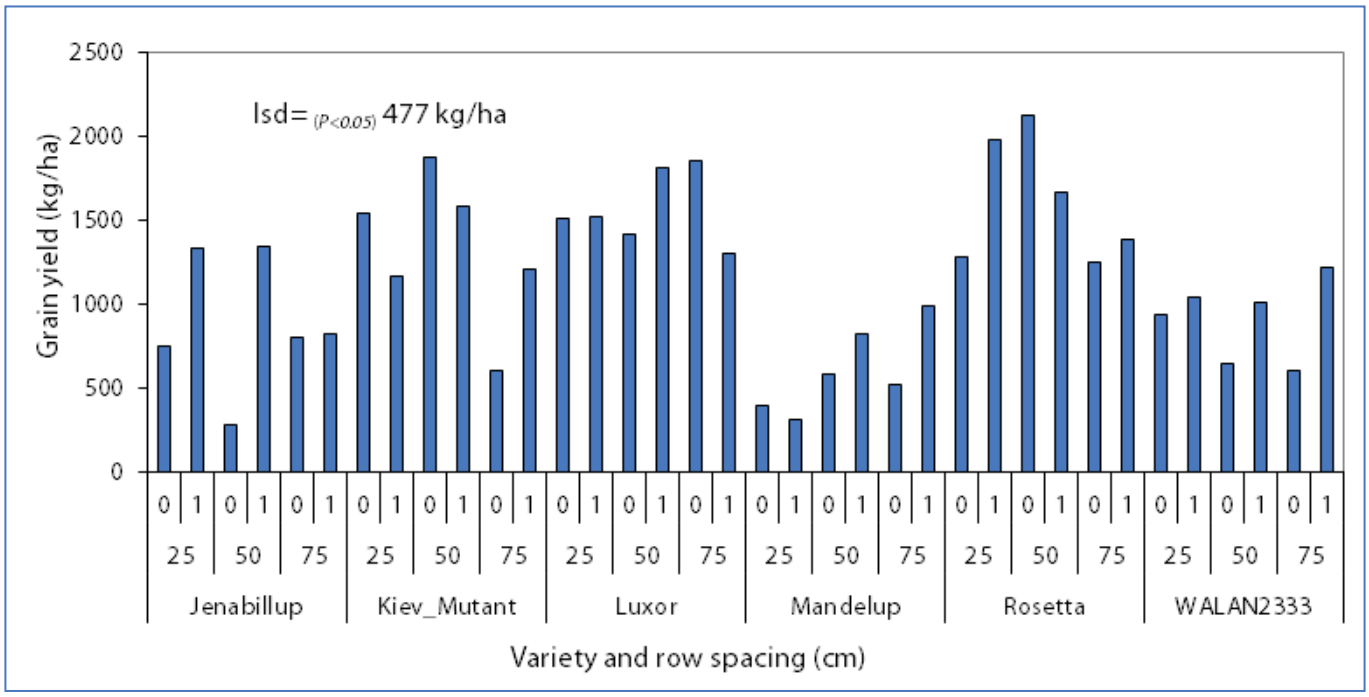

Figure 2: Grain yield of lupin variety and row spacing interactions averaged across all fertiliser treatments at Merriwagga 2013 (0=nil treatment, 1=60 kg/ha Granulock 15 applied).

Acknowledgements

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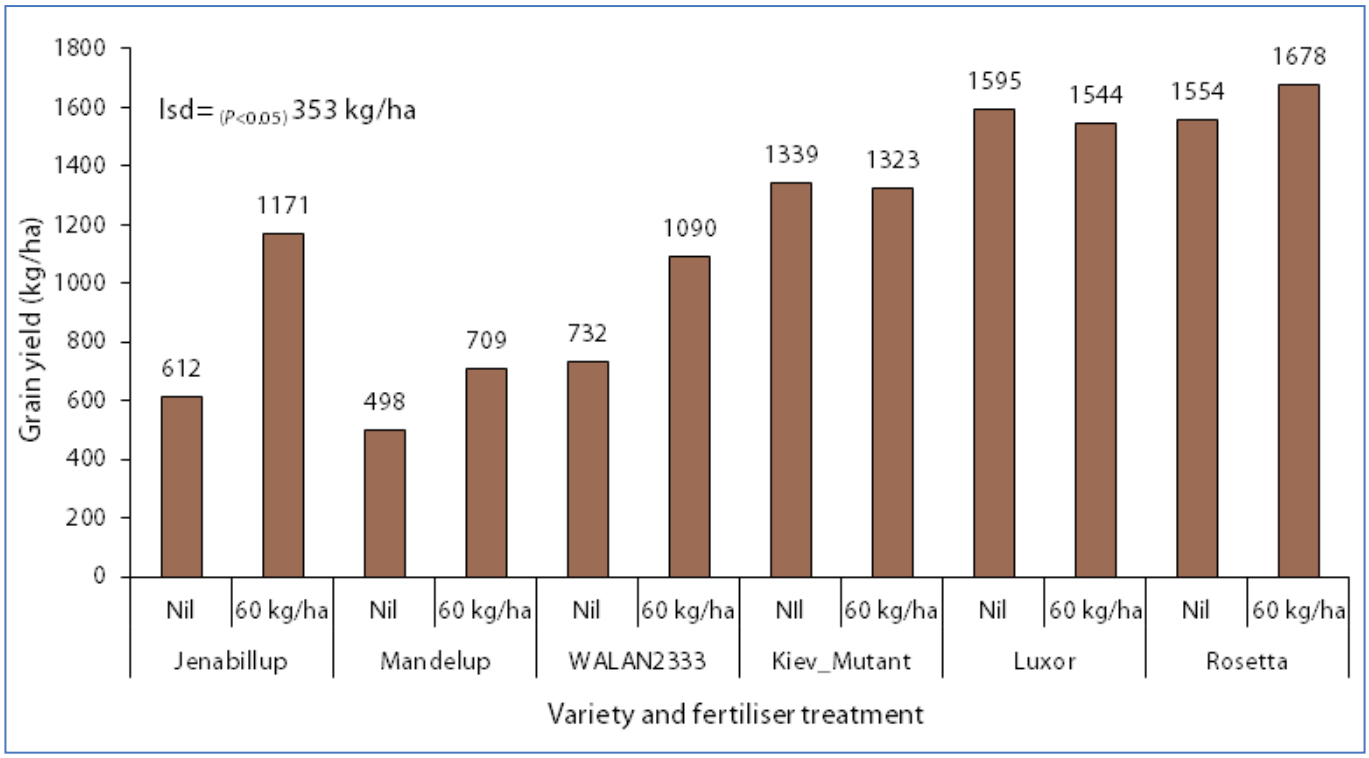

Figure 3: Grain yield of lupin variety and fertiliser interactions averaged across all row spacings in an experiment at Merriwagga 2013.