Lentil Sowing Dates and Rates

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The aim of this trial was to determine the optimum sowing date(s) and sowing rate(s) for new lentil cultivars.

Summary
The effect of sowing date and sowing rate on four lentil cultivars was investigated. Results showed that cultivars responded similarly to increases in sowing rate at each sowing date. Across all treatments Digger, Nugget and Cassab averaged similar yields (0.98 - 1.04 t/ha), approximately 10% greater than Northfield (0.86t/ha). Earlier sowing was generally optimum (May 9 or June 17) with sowing rates of greater than or equal to 120 plants/m^2 for May 9 and 60-90 plants/m^2 for June 17.

The take home message is that lentils need to be sown prior to mid June, preferable late May to achieve optimum yields. Sowing rates equivalent to the current recommendations of 120 plants/m^2 appear adequate for cultivars used in this trial.

Background
Lentils are a relatively new crop and with the development of new cultivars that have different growth habits and disease resistances to older cultivars, agronomic management will need to be altered to optimise the grain yield benefits of these new cultivars. This trial investigated the interaction between sowing date and sowing rate on the growth and yield of new lentil cultivars. Information from these trials will eventually form part of an agronomic package that will accompany the release of a new cultivar.

Methods
Treatments and experimental design
Sowing dates:
9 May (sown dry), 17 June, 11 July.

Cultivars:
Table 1. Cultivar descriptions of lentils used in the trial.

Cultivar	Grain type	Maturity	Lodging resistance	Botrytis grey mould	Ascochyta blight	
					Foliage	Seed
Digger	Red	Medium	MR	MR	MR	MS
Northfield	Red	Medium	MR	S	MR	R
Nugget	Red	Medium	MR	MR/MS	MR	MS
Cassab	Red	Medium	MR	MR	MR	MS

S = susceptible, MS = moderately susceptible, MR = moderately resistant, R = resistant

Sowing rates:

Table 2. Seed weight (g/100 seeds) of cultivars used and quantity of seed (kg/ha) required to achieve targeted plant densities (plants/m^2).

plants/m^2	**Digger**	**Northfield**	**Nugget**	**Cassab**
seed weight	*4.65*	*3.35*	*4.15*	*3.50*
60	33	24	30	25
90	50	36	45	38
120	67	48	60	50
150	84	60	75	63
250	140	101	125	105

The experiment was designed as a split plot with 3 replicates (i.e. the cultivars and sowing rates were randomized within each replicate of the sowing time).

Paddock management

Grain legume mix with 2% zinc at 80 kg/ha was applied with seed at sowing. Post sowing pre-emergent herbicides were used for broadleaf weed control and post-emergent herbicides for grass control. Trials were sprayed for insect pests when required.

Measurements:

Several weather, soil and plant measurements were recorded, however this report focuses mainly on grain yield and to a lesser extent emergence. Details regarding other measurements can be provided upon request.

Results

The seed sown 9 May and 17 June emerged at similar dates (late June/early July) due to the dry start to the year. Approximately 20% and 10% more seed emerged from the 17 June and 11 July sowing dates, respectively, than the 9 May sowing date. Generally, Digger and Nugget had the highest emergence, although this varied with sowing date and sowing rate.

Plant growth throughout the season was generally good and rainfall adequate. No frost damage was noted in any plots. No disease was noted throughout the growing season. Plants appeared stunted at the end of the season.

Grain yields were between 0.6 and 1.2 t/ha; site average = 1.0 t/ha. Across all treatments the average yield of Nugget, Digger and Cassab were similar, approximately 15% greater than Northfield (Table 3).

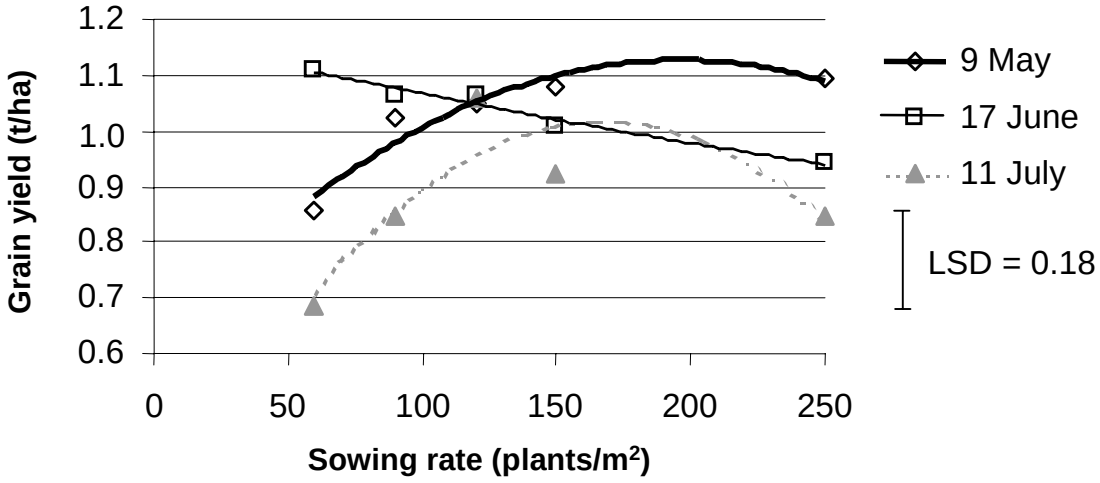
Table 3. Average grain yield of lentil cultivars across all sowing dates and sowing rates.

Cultivar	**Grain yield (t/ha)**
Digger	1.02
Northfield	0.86
Nugget	1.04
Cassab	0.98

LSD = 0.09, $P < 0.05$

There was no significant interaction between sowing date, cultivar and sowing rate, but there was an interaction between sowing rate and sowing date (i.e. cultivars responded similarly, but there were differences in the effect of increasing sowing rates at each sowing date; Figure 1). At the 9 May and 11 July sowing dates increased sowing rates improved grain yield, except the 250 plants/m^2 sowing rate for 11 July which had lower yield. At the 17 June sowing date increasing sowing rate, decreased grain yield (Figure 1).

Figure 1. The effect of sowing rate and sowing date on grain yield.



Interpretation

- Stunting of growth at the end of the season was probably due to the lack of subsoil moisture (from low rainfall over previous years and prior to sowing) and more importantly toxic boron and salt concentrations in the subsoil which will also prevent plants from accessing all the water that is available.
- The currently recommended sowing rate of 120 plants/m^2 appeared adequate for all cultivars at all sowing dates. It may not have produced the highest yield, but generally the yield in this treatment was not significantly different from the highest yielding treatment.
- Even though spring conditions were mild, earlier sowing was beneficial. The average yield for the May and June sowing dates was 15% greater than the July sowing date. In a 'normal' year with higher temperatures during spring it could be expected that this difference would be even greater. Earlier sowing may particularly become an option when disease resistant cultivars are available.
- There is no clear reason for the negative response to sowing rate seen at the June sowing. However, the excellent emergence and optimum growing conditions experienced by this treatment was likely to favour lower sowing rates as they were able to produce enough biomass to achieve good yields.

Commercial Practice

- Current agronomic practices in lentils in terms of sowing rate and sowing date appear adequate. However, in the future some practices may need to change to optimise the yield potential of cultivars, particularly those with improved disease resistance or different growth habits.
- Knowing your seed size is critical for determining seeding rates (see sowing rates table above). In this experiment, approximately 20 kg/ha more seed of Digger would need to be sown than Northfield to achieve 120 plants/m^2.
- Research needs to continue on the new cultivars to determine their optimum sowing dates and rates in a range of environments so that an agronomic package can be produced with the new cultivar.

Acknowledgements

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