Field Pea 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 field pea cultivars.

Summary
The effect of sowing date and sowing rate on four field pea cultivars was investigated. Results showed that the cultivars responded differently to increases in sowing rate at each sowing date. Generally, Parafield and PSL4 (Kaspa) had the highest yields, 10% greater than Snowpeak and 20% greater than Dundale. Late sowing (11 July) was particularly beneficial for conventional cultivars (Dundale and Parafield), but less so for the semi leafless, semi-dwarf cultivars (Kaspa and Snowpeak). Optimum sowing rates of Kaspa and Snowpeak appear to be higher than Dundale and Parafield (eg. 55 - 75 plants/m^2 compared with 35 - 55 plants/m^2).

Overall, results need to be treated with caution due to the relatively late start to the season and mild spring conditions that are likely to favour later sowing. The take home message is that cultivars respond differently to sowing dates and sowing rates, particularly the new semi-leafless, semi-dwarfs. Agronomic practices need to be changed to optimise the yield of new cultivars.

Background
With the development of new cultivars of field peas that have significantly different growth habits and disease resistances to older cultivars (see methods below), 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 field pea 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 field peas used in the trial.

Cultivar	Leaf type	Plant height	Grain type	Lodging resistance	Flowering time	Ascochyta blight	Downey mildew	Powdery mildew
PSL4 (Kaspa)	Semi-leafless	Semi-dwarf (T)	Dun	Excellent	Late	MR	R	S
Parafield	Conventional	Tall	Dun	Poor	Mid	MS	S	S
Snowpeak	Semi-leafless	Semi-dwarf (M)	White	Excellent	Early	S	R	S
Dundale	Conventional	Tall	Dun	Poor	Early	S	S	S

T = tall, M = medium; S = susceptible, MS = moderately susceptible, 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	**Dundale**	**Snowpeak**	**PSL4**	**Parafield**
seed weight	*15.5*	*18.2*	*19.2*	*26.5*
15	28	33	35	48
35	65	76	81	111
55	102	120	127	175
75	140	164	173	239
110	205	240	253	350

The experiment was designed as a split plot with 3 replicates (i.e. the sowing rates and cultivars 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 PSL4 (Kaspa) had the highest emergence, although this varied with sowing date and sowing rate.

Plant growth throughout the season was generally good and rainfall adequate, however late in the season there was some stunting of growth. Mild temperatures during flowering and podding were experienced. In mid September and mid October there were significant frosts that affected flowering and podding.

Grain yields were between 0.7 and 2.5 t/ha; site average = 1.9 t/ha. Generally plots sown 11 Jul produced the highest yields (or equal highest yields) and the best grain quality. There was no discoloured grain in these samples due to frost, compared with up to 30% discoloured grain from samples at earlier sowing dates. The averaged yield of Kaspa and Parafield across all treatments was similar and approximately 10% greater than Snowpeak and 20% greater than Dundale.

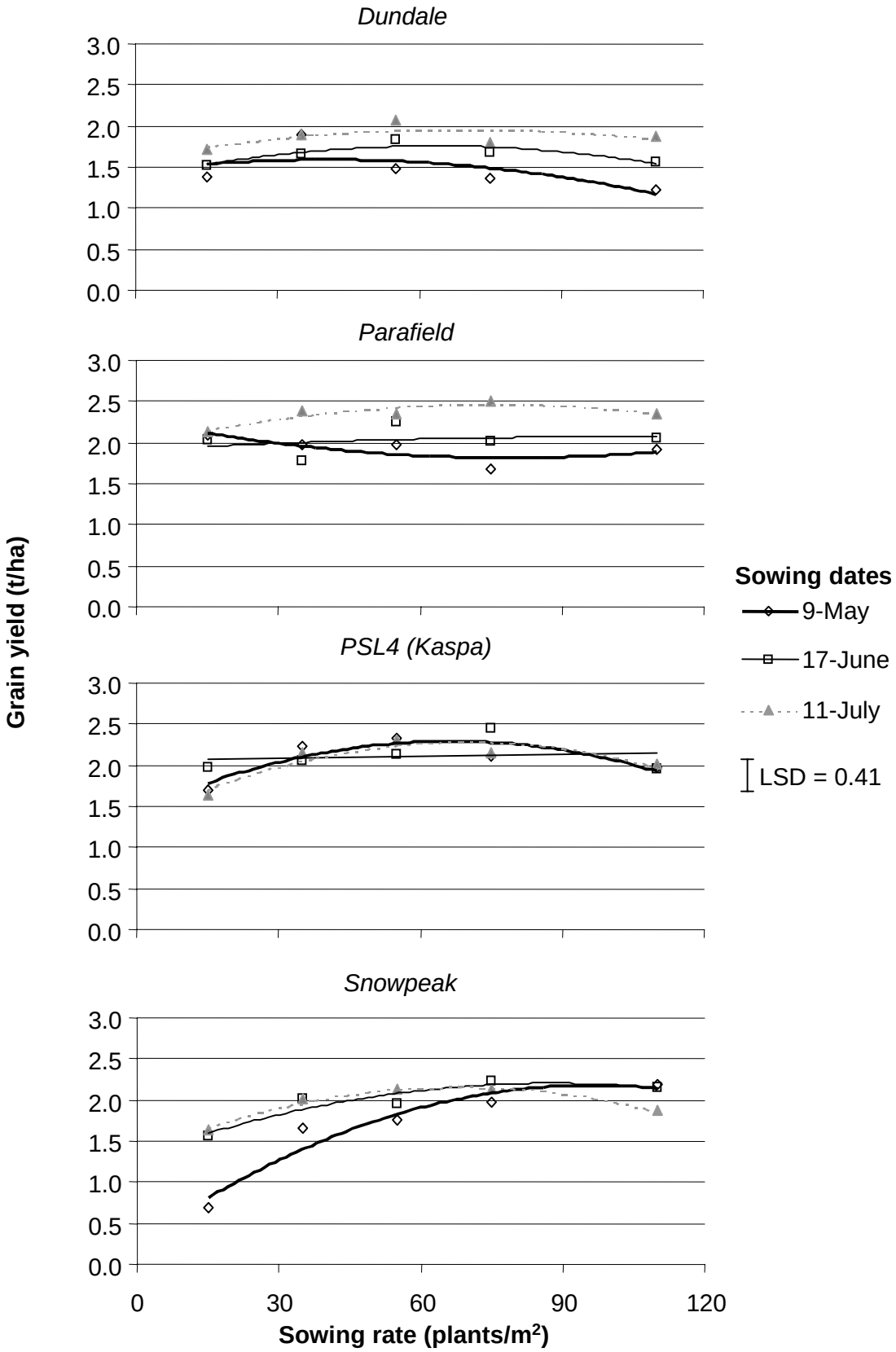
There was a significant interaction between sowing date, cultivar and sowing rate (i.e. cultivars responded differently to increases in sowing rate at each sowing date; Figure 1).
Dundale: Maximum yields (1.8-2.0 t/ha) were obtained with late sowing (11 July) at rates of 35-55 plants/m^2. At each sowing date there was only 0.2 - 0.6 t/ha difference between the highest and lowest yield achieved.

Parafield: Maximum yields (2.4-2.5 t/ha) were obtained with late sowing (11 July) at rates greater than or equal to 35 plants/ m^2. At earlier sowing dates Parafield showed almost no response to increasing sowing rates (the lowest sowing rate of 15 plants/m^2 would probably be most profitable).
PSL4 (Kaspa): Maximum yields (2.2-2.3 t/ha) were obtained at all sowing dates (eg. 9 May and 11 July - 55 - 75 plants/m^2 and 17 June - any rate).
Snowpeak: Maximum yields (2.2 t/ha) were obtained with 75 plants/m^2 for the two earlier sowing dates (9 May and 17 June) and 35-75 plants/m^2 for late sowing date (11 July). Snowpeak was more sensitive to sowing rate than other cultivars and generally the lowest sowing rate had the lowest yield.

Interpretation

- Despite consistent adequate rainfall events the total was still below average. The mild spring conditions prevented excessive drought stress during flowing and podding. The frosts resulted in a reduction of yield for the plots sown on 9 May and 17 June, but there was no effect on late sown plots (11 July).
- 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.
- Grain yield results clearly show that newer semi-leafless, semi dwarf cultivars (Kaspa, Snowpeak) need to be managed differently from the conventional types (Dundale, Parafield) to achieve optimum yields.
- In a 'normal' year with higher temperatures during spring (and less frost events) it could be expected that cultivars would need to be sown in late May or June for optimum yields. Earlier sowing may particularly become an option when disease resistant cultivars are available.
- One major surprise was the high yield of Snowpeak in the late sowing treatment as in most previous research it has been shown that sowing earlier is beneficial. This was probably related to: 1. the mild spring which enabled late sown treatments to form enough biomass to achieve comparable yields to earlier sowing dates, and 2. Frosts which killed several developing seeds and flowers.
- Kaspa and Parafield appear to be the standout cultivars, yields appear similar, but the harvestability of Kaspa is much better than Parafield.

Figure 1. The grain yield of four field pea cultivars at three sowing dates and five sowing rates.



Commercial Practice

- A change in agronomic practices will be required if you wish to optimise the yield potential of new pea cultivars, particularly semi-leafless, short to medium height semi-dwarfs. It is evident from this study that the optimum sowing rate of these types is likely to be higher than conventional types (e.g. Snowpeak and Kaspa should be sown at 55 - 75 plants/m^2 compared with 35 - 55 plants/m^2 for Dundale and Parafield; further research is needed for PSL4 (Kaspa)).
- Knowing your seed size is critical for determining seeding rates (see sowing rates table above). In this experiment, much greater quantities of Parafield were required than other cultivars to achieve the same sowing rate.
- Further research is needed on the new cultivars to determine their optimum sowing date and rate in a range of environments.

Acknowledgments

GRDC for funds to conduct trials.