

## Optimum plant densities for faba bean cv Fiesta VF sown on raised beds

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### Abstract

The effect of plant density (20, 30, 40, 50 plants/m<sup>2</sup>) on growth and grain yield of faba bean (cv Fiesta VF) on raised beds was studied across two seasons in northern Tasmania. Higher plant density resulted in increased grain yield and plant height and greater incidence of lodging and ascochyta infection. This response varied across seasons with greater compensation for reduced density in a season with higher rainfall during grain fill. The optimum plant density was approximately 30 plants/m<sup>2</sup>. Higher densities will be limited by lack of drill capacity, additional cost of seed, increased lodging and disease problems.

### Keywords

sowing rates, plant populations

### Introduction

Faba beans have produced high yields in field trials conducted on raised beds in Tasmania. As result of this research, commercial production in Tasmania commenced in 2001-02, however there is limited information on optimal plant densities. Optimal density will also depend on cost of seed and drill capacity (1).

In some crops, such as wheat, excess vegetative growth on raised beds has been a problem and this combined with lower moisture levels in the soil profile has led to lower grain yields due to poor grain fill. It is likely that high sowing rates will exacerbate this effect and this study was undertaken to determine the optimal plant density for the cultivar Fiesta VF on raised beds.

### Methods

The faba bean cultivar Fiesta VF was sown in the last week of May in 2000 and 2001 at four target densities (20, 30, 40 and 50 plants/m<sup>2</sup>) on a grey sodosol soil at Symmons Plains, northern Tasmania. Plots were sown using a Ojyord drill modified to enable sowing on raised beds that were 15m long and 1.2m wide (1 bed). The experimental design in each year was a randomised complete block with four replicates.

Seedling emergence, plant height (2001-02 only), grain yield and seed size were measured. Plots were also scored visually for incidence of lodging (% of plants) and ascochyta infection (0-4 with 4 being high level). Grain yield is presented on a per hectare basis including the unsown furrow area between beds. To test for significant differences between years a split plot analysis of variance with year as the whole plot was conducted.

### Results and Discussion

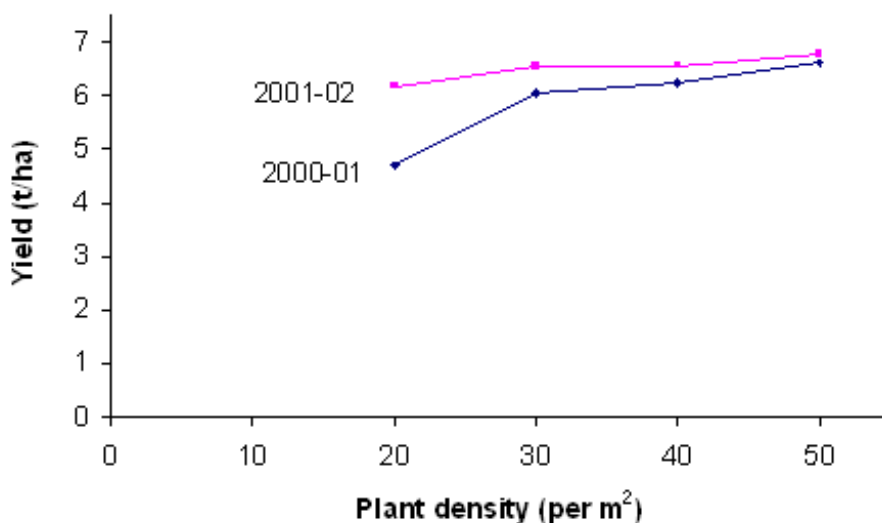
There were no significant differences in seedling emergence between years. In 2001-02 plant height at the end of flowering increased significantly with increased plant density (Table 1). Increased competition between plants at the higher densities also resulted in more rapid canopy cover. This effect is likely to have caused the significantly greater levels of ascochyta infection at the higher densities. Increased height at higher densities also resulted in a greater incidence of lodging (Table 1).

Mean grain yields of 5.9 t/ha and 6.5 t/ha were achieved in 2000-01 and 2001-02, respectively. Yields increased with plant density but the response was significantly different across the two seasons (Figure 1). In 2000-01 there was a large and significant yield increase between 20 and 30 plants/m<sup>2</sup>. Above this there was a further increase but this was only significant when comparing 30 and 50 plants/m<sup>2</sup>. In 2001-02 there

was a much smaller yield increase and this was only significant between the lowest and highest densities. It is likely that good rains in late spring/early summer in the 2001-02 season (Decile 8) allowed plants to compensate for reduced plant density.

**Table 1. Effect of plant density on emergence, ascochyta levels, mature plant height and incidence of lodging in Fiesta VF faba beans at Symmons Plains as a mean of 2000-01, 2001-02. The lsd ( $P=0.05$ ) for density main effect is presented. There was no significant year main effect.**

Plant density plants/m <sup>2</sup>	Emergence (plants/m <sup>2</sup> )	Ascochyta scores (0-4)	Plant height (cm) 2001-02 only	% Lodging pre-harvest
20	18.7	0.81	77.4	13.9
30	32.2	1.00	85.8	25.9
40	44.1	1.56	91.4	32.4
50	51.7	1.44	96.6	39.0
l.s.d.	5.0	0.49	5.2	10.3



**Fig 1. Effect of plant density on the yield (t/ha) of faba beans (cv Fiesta VF) over 2 seasons (2000-01, 2001-02). lsd ( $P=0.05$ ) = 0.47 t/ha.**

### Conclusion

In this study, the optimal plant density for faba bean cv Fiesta VF was approximately 30 plants/m<sup>2</sup> and this is in agreement with a previous study in NSW (1). With an April sowing in SA (2), there was a decrease in yield of cv Fiord with increase in density but at later sowing dates yield increased up to 40-50 plants/m<sup>2</sup>. It is likely that the colder conditions in Tasmania retard vegetative growth so that competition between plants is checked until later in the season. This results in a response to density more closely aligned to that of a later sowing in SA.

Although higher yields could be achieved at higher plant densities the risk associated with lodging and disease also increased and the cost of seed out weighs yield benefits. In addition drill capacity may limit sowing rates (2). In Tasmania there is a greater reliance on contractors and as these operate at a low ground speed compared with the mainland they generally have the capacity to sow a density of 30 plants/m<sup>2</sup>.

From the limited data available the response of faba beans to increased density on raised beds is not different to that without raised beds possibly due to the relatively early maturity of faba beans which reduces the effect of lack of soil moisture during grain fill. Given that the edge effects associated with these trials will be the same as that occurring in commercial production on raised beds, faba beans have tremendous potential.

### **Acknowledgments**

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### **References**

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