Faba bean agronomy
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KEY MESSAGES
- All varieties averaged yields of over 4.5 t/ha in 2016.
- Lower sowing densities provided the greatest economic benefit in the 2016 season.
- Disease levels were higher in an earlier sowing date, but did not cause a significant yield penalty.

INTRODUCTION AND BACKGROUND

The 2016 season proved a challenging one for faba beans, with significant disease pressure existing due to the large rainfall events, wet conditions and limited opportunities to apply fungicides on time. The faba bean trials run at the Westmere site experienced a further disease pressure due to the previous season's bulk areas which had been sown to faba beans. Stubble and volunteer plants from these areas meant disease was prevalent and spread rapidly. This disease pressure provided interesting results both agronomically and economically. High disease levels in faba bean crops in the Western District in 2016 meant this trial was invaluable and shed some light on best management practice in terms of sowing rate and date in conjunction with appropriate fungicide application to make significant profit margins.

Previously this trial was set up as two separate trials, however in 2016 these two trials have been combined to determine the ideal plant population when sowing earlier or sowing later in terms of managing canopy size and disease pressure.

METHODOLOGY

The trial was set up at the Westmere site as a three-way factorial to investigate the effects of variety, time of sowing and plant population. Two varieties were chosen: PBA Zahra and Samira (which are currently the top yielding varieties available commercially), on two timings of April 22 and May 20 and these were sown with target plant densities of 20 pl/m2, 30 pl/m2, 40 pl/m2 and 50 pl/m2.

Disease scores were taken throughout the month of September to monitor the spread of disease across the different sowing dates and plant populations.

All weeds, disease and pests were controlled as per the district standard in a timely manner.

RESULTS

Time of Sowing

Plants sown on 22 April grew to nearly 0.5 m larger height when compared across all plant populations and both varieties and established with 16% more plants/m2 than the 20th May sowing date, which was also statistically significant (p<0.05). There were also significant (p<0.05) differences in canopy disease levels when comparing the two sowing dates.

Disease levels in the lower canopy during September and early October averaged 94% from the 22nd April sowing date compared to 40% infection from the 20th May sowing (see figure 1). This disease source would provide the inoculum for further infection on the new growth higher up the canopy. Three fungicide applications during flowering at intervals no greater than 20 days apart gave good protection higher in the canopy and when this was combined with the later time of sowing, we can see in figure 2 that disease levels were significantly (p<0.05) reduced from 12% infection to 8%.
Variety

There was so significant difference between the two varieties in terms of which yielded higher, however the results did show that Samira tended to establish at a higher rate than Zahra and that across both sowing dates and plant populations Samira had significantly (p<0.05) less upper canopy disease compared to Zahra during flowering in September.

Table 1. Disease levels between varieties when compared both sowing dates and sowing rates

<table>
<thead>
<tr>
<th>Variety</th>
<th>9-Sep Upper canopy disease (%)</th>
<th>22-Sep Upper canopy disease (%)</th>
<th>Yield (t/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Samira</td>
<td>7.9 a</td>
<td>10 b</td>
<td>5.24 Not sig</td>
</tr>
<tr>
<td>PBA Zahra</td>
<td>11.6 a</td>
<td>14.3 a</td>
<td>5.03 Not sig</td>
</tr>
</tbody>
</table>

Means followed by same letter do not significantly differ (p<0.05)

Plant Population

Although the desired plant populations at establishment were 20 pl/m², 30 pl/m², 40 pl/m² and 50 pl/m², all plots established at approximately 10 plants more per square meter than was intended. All results discussed in this report will state plant populations at their actual establishment rather than the intended. Plant populations of 40, 50 and 60 pl/m² sown in both April and May had a significantly higher yield result than those at 30pl/m² that were sown in May. The best yield results for lower plant populations were from those sown in April, and these were not significantly different from the highest yield results.

Figure 3. Percentage disease in the lower and upper canopy of faba beans during flowering across different seeding rates and either May (dark purple) or April (light purple) sowing.

Means followed by same letter do not significantly differ (p<0.05)
The other measurement that we got was that the lower plant populations had statistically ($p<0.05$) less disease than the higher plant populations both in the upper and lower canopy assessments during flowering in September. This is likely to be helped by better air flow between the plants and less leaf wetness.

**Combination of factors**

When the effect of all factors were combined, the results showed yields to be consistently high through the trial. The highest yield came from April sown Samira at 40 pl/m² at 5.72 t/ha. Samira sown in May at 50 and 60 pl/m² also showed a significantly higher yield, as did May sown Zahra at 50 pl/m².

![Graph showing yield t/ha vs. Variety and Plant Population](image)

**Figure 4.** Effect of Variety, Time of Sowing and Plant Population on yield of faba beans sown at Westmere, 2016.

There was also a trend between the level of disease and the yield result in the treatments when all factors were considered.

![Graph showing trend between yield increasing as disease level decreases](image)

**Figure 5.** Trend between yield increasing as disease level decreases in faba beans sown at Westmere, 2016.

There was no significant difference between the disease levels within the varieties. The susceptibility of the two varieties to diseases experienced in the Western district can be found in table 2.

**Table 2.** Disease reactions of faba bean varieties 2016.

<table>
<thead>
<tr>
<th>Variety</th>
<th>Ascochyta Blight Pathogen Type 1</th>
<th>Ascochyta Blight Pathogen Type 2</th>
<th>Chocolate Spot</th>
<th>Cercospora</th>
<th>Rust</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBA Zahra</td>
<td>R</td>
<td>MRMS§</td>
<td>MS+</td>
<td>S+</td>
<td>MS</td>
</tr>
<tr>
<td>PBA Samira</td>
<td>R</td>
<td>R</td>
<td>MS</td>
<td>S</td>
<td>MS</td>
</tr>
</tbody>
</table>

*Resistant
§Moderately Resistant to Moderately Susceptible
+Moderately Susceptible
Susceptible
DISCUSSION

The area sown to faba beans has grown in the western districts significantly over the last three to four seasons. Traditional thinking suggests sowing faba beans in our rainfall environment in May as best practice, but this trial was set up to challenge that thinking. An earlier sowing date results in a larger canopy as can be seen by higher establishment in the April sown beans, however higher establishment often means a larger canopy, which can result in more disease. The results have shown this to be true as the earlier sown beans all had significantly larger disease burdens in their lower canopies than May sown beans. This disease did not significantly impact upon yield in earlier and higher sowing densities.

There was a significant disease burden at the site during the season; three fungicides were applied during the season as per normal practice. As can be seen from the results here, early control of disease is crucial. While there was still a strong yield result in the trial, earlier on there was some loss of flowers on lower bean stems in the earlier time of sowing. If earlier times of sowing are to become a practice of the future, operators need to ensure that they are right on time with fungicide applications to minimise bud loss and increase yield potential.

A cost analysis was run across the various seeding rates required for these plant populations. The results showed that when using new certified seed the lowest plant population and hence seeding rate created the largest margin, less the cost of the seed. However, if you were to save your own seed, including testing and cleaning, the results followed a similar trend although the margin was slightly higher. This is an interesting result, and shows that while a higher seeding rate may tend to give a higher yield result, at the end of the day in a season such as 2016, lower plant populations still yielded strongly and so were a far more viable option financially. 2016 was a unique season, so how accurately this result would translate into a season with a lower GSR and drier conditions is hard to say.

CONCLUSION

This trial has provided some valuable and informative results throughout the season. While the highest yields were experienced from both April and May sowing dates, the greatest economic benefits were to be found when faba beans were sown earlier and sown at a lower density in the 2016 season.

ACKNOWLEDGEMENTS

Thank you to Jason Brand of DEDTJR for presenting on this trial at Agrifocus during the year, and to the SFS trials team and technical officers for their monitoring and management of this trial throughout the season.

REFERENCES