2.5 Pulse

2.5.1 Faba bean variety trial - Dunkeld, Vic

Location:
Dunkeld Research Site.

Authors:
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Funding:
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Background/Aim:
Faba beans are the pulse crop best suited to long season, high rainfall areas where waterlogging can be a problem. They have good early vigour, produce high biomass and have high biological N fixation. Recent advances in developing disease resistant varieties, combined with improved management packages, have reduced the risk of producing Faba beans. Faba beans are widely evaluated and grown throughout South Australia and the Wimmera, but there is limited production in the Western Districts of Victoria where they might be expected to be well adapted. This trial aims to identify the current Faba bean varieties that are best suited to the Western Districts, and to assist in selection of future varieties for the region.

Take home messages:
- The highest yielding Faba bean variety was Manafest yielding 4.40t/ha, followed by Farah with 4.14t/ha. Fiesta VF and Nura yielded about 4.00t/ha and were not significantly different to Fiesta VF.
- The Broad bean varieties Aquadulce and PBA Kareema yielded significantly less than all faba bean varieties. The Broad beans are very late to fill pods and mature and very hot and dry weather conditions occurred during this critical stage in development for the broad beans, whereas the faba bean varieties were more advanced so less affected.
- A significant level of chocolate spot developed in the trial following high rainfall during late winter and spring. The Broad bean varieties were more resistant than the Faba bean varieties, and there was also some variation in resistance among the breeding lines.

Trial information:
Trial design consisted of a replicated randomised block design with 4 replications. Plots were treated with a single fungicide spray to enable host resistance to foliar fungal diseases to be expressed. Plots were 12 metres long and 1.45m wide. There were excellent conditions for growth until late spring when there were very high temperatures and below average rainfall.

Rainfall:

Avg. Annual:	597.8mm, Hamilton Airport 1991-2009
Avg. G.S.R.	466.5mm, Hamilton Airport 1991-2009
2009 Total:	562.4mm, Hamilton Airport 2009
2009 G.S.R.	April – October = 447.2mm[1]
	(Hamilton Airport; 41.6mm below average)

For the purposes of this trial, any rainfall after 20th November has not been included in GSR due to the extremely hot weather preceding this effectively ending the growing season.

[1] Yield Potential: 1/3 of Dec 2008(109mm), Jan 2009 (4.6mm) & Feb (0.4mm) with monthly totals above 20mm + ½ March (29mm) rainfall when total above 20mm + ((April – November 20th rainfall) – 124mm*) x 20kg/mm/ha. In total December-March adjusted rainfall to stored soil water = 50.8mm, plus April-November 20th = 447.2mm, minus evaporation factor of 124mm* => 374mm. Therefore, for Dunkeld, the Faba Bean Variety Trial water limited yield should be 7.48t/ha, or 374mm x 20kg/mm/ha.
*Kirkagaard 2009, Evaporation intercept adjustment for a clay loam.

Treatments:
4 faba bean varieties, 2 broad bean varieties and 10 faba bean breeding lines.

Sowing rate:
Faba beans 24 seeds/sq m, Broad beans 12 seeds/sq m.

Sowing date: 6th May 2009

Fertiliser:
100kg/ha MAP at sowing.

Herbicides:
- 6 May: PSPE: Simazine @ 1.5l/ha + Diuron @ 0.5l/ha.
- 16 July: Select @ 250ml/ha + Hasten @ 1%

Fungicides:
22 Oct Bravo @ 1.8l/ha

Plot size:
Dimensions 12m x 1.45m x 4 reps.

Measurements:
Grain yield and chocolate spot.

Paddock History:
2006: Pasture
2007: Canola
2008: Wheat

Diseases:
Chocolate spot developed during flowering and podding

Results and discussion

Overall the yields achieved in this trial demonstrated that faba beans can be grown very successfully in the Dunkeld region, despite the very sharp finish to the season. The highest yielding variety, Manafest, produced 4.4t/ha, while Fiesta, Farah and Nura produced around 4.0t/ha, with no significant difference between the three varieties (Table 1). The yields of the broad bean varieties were significantly lower than the faba bean varieties and this can be attributed to the very sharp finish to the season which coincided with the critical pod filling period for the broad beans. Faba beans generally complete their growth cycle before broad beans and so they were less affected by the adverse conditions in late spring. Similar results were obtained in the 2009 faba bean breeding trial at Bool Lagoon in the South East of SA where broad beans yielded 50% of faba beans, whereas in most years broad beans yield more than faba beans at this site. Broad beans require a long, cool finish to the season to produce high yields and develop large, uniform sized seed.

A number of the most advanced lines in the breeding program were included in the trial and most yielded more than Fiesta, Farah and Nura. These lines have also produced very good yields throughout the more traditional faba bean

productions areas of SA and Vic in recent years and several are under consideration for release. A single year's data at one site is not sufficient to determine which of these lines might be the best for the Western Districts of Vic, but the overall result is very promising with good indications that significant yield improvements can be achieved.

Table 1: Grain yields (t/ha) and chocolate spot scores for faba bean and broad been varieties and breeding lines at Dunkeld in 2009.

Variety	Yield (t/ha)	Chocolate spot*
Faba bean varieties		
Farah	4.14	4.9
Fiesta VF	3.94	5.4
Manafest	4.40	5.1
Nura	4.01	4.8
Faba bean breeding lines		
AF04064	4.70	5.4
AF05023	4.65	4.9
AF05073	4.55	4.9
AF03109	4.46	6.1
AF05060	4.42	5.6
AF03029	4.29	4.5
AF05095	4.27	4.6
AF03063	4.11	6.5
AF01006-1	4.04	4.8
AF01008-1	3.69	5.0
Broad bean varieties		
PBA Kareema	2.18	3.6
Aquadulce	2.04	3.8
LSD (P=.05)	**0.60**	**0.61**
CV	**10.5**	**10.2**
Grand mean	**3.99**	**5.0**

*Chocolate spot scores – rated on a scale of 1 – 9, lower values indicate more resistant.

The trial was managed with a minimalist approach to disease control so that some disease would develop, and variation in resistance between lines could therefore be identified. The major disease that was evident in late spring was chocolate spot and this resulted in significant defoliation in some lines. The two broad bean varieties expressed less severe symptoms of chocolate spot than the other entries in the trial, while there was little difference between the 4 faba bean varieties (Table 1). Commercial faba bean and broad bean crops grown in this high disease risk region should budget on at least 3 fungicide sprays to achieve good disease control, with an early spray to control Ascochyta blight and Cercospora leaf spot and follow-up sprays for chocolate spot during flowering and pod fill. The exact balance between fungicides for the three diseases will depend on the genetic resistance of each particular variety.

The trial has demonstrated that current faba bean varieties can be grown in the region, but which variety should be grown? The Western District is a high disease risk region so any variety should have a good overall level of disease resistance. Manafest produced the highest yield of the 4 faba bean varieties, but it is very susceptible to Ascochyta blight which can lead to severe seed staining if wet conditions occur during pod development and so would not be recommended (and seed is no longer available). Fiesta has produced very good yields over a wide range of environments for more than a decade, but it is more susceptible to Ascochyta blight than Farah and Nura and so requires a more stringent fungicide program to control the disease. There was little difference between Farah and Nura for yield and resistance to chocolate spot and on the basis of this single trial it would appear that both varieties would be suitable to grow in the Western Districts. Broad beans have been grown successfully in the southern Wimmera and Western Districts, but the results for 2009 demonstrate that there can be a risk if there is a tight finish to the season. In selecting between the two varieties, PBA Kareema has more uniform seed and also better resistance to Ascochyta blight than Aquadulce.

Summary:

Faba beans are probably the pulse crop with the best potential to be included in cropping programs in the Western Districts of Victoria. Further trials are required to confirm the most appropriate variety to grow and also to establish whether the environment is suitable for the reliable production of broad beans. Many breeding lines show considerable promise and further testing is required to determine the most suitable for release as commercial varieties for the region.