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# Disease Management in faba beans (2023)

## Growing faba beans in the High Rainfall Zone (HRZ)

### Background

Levels of disease, particularly the wet weather disease Chocolate spot (*Botrytis fabae*) were extreme in 2022 with a number of crops completely defoliated by the disease. Poor spraying conditions preventing timely spraying combined with high leaf moisture and humidity created the perfect storm for disease infection. Whilst better fungicide strategies and more resistant varieties retained some potential, yields were sharply down in many paddocks around the country compared to the record of 2021.

Despite this extreme disease pressure in 2022, faba beans still have the potential to fulfil important fertility and a break crop role in HRZ farming systems, particularly where markets are more readily available for the grain.

### Prevalent diseases

Over the last decade the most prevalent disease has been Chocolate spot caused by the pathogen *Botrytis fabae*. This disease is particularly prevalent after crop canopy closure, in line with an increase in humidity (quoted as >70%). The disease has a temperature range of approximately 15 – 28°C with more rapid spread with warmer temperature within this range. Infection can occur on many parts of the plant including flowers, leaves, stems and pods. When planning a disease control strategy be aware of higher risk scenarios such as variety susceptibility; for example, PBA Bendoc is particularly susceptible or proximity to badly infected stubbles from the season before.

Since 2020 we have seen increasing levels of bean rust in our research caused by the pathogen *Uromyces vicia-fabae.* This has been particularly prevalent in the second half of the season in green leaf tissue that has not been affected by Chocolate spot. What has been noticeable in our development work is that, whilst SDHIs give good control of Chocolate spot, it is not a given that they give good control of bean rust.

### Historical response to disease management 2015 – 2022

The extreme nature of 2022 can be observed in untreated yields recorded at FAR Australia's Crop Technology Centres 2015 – 2022. The following graph (Figure 1) illustrates the yield response to chlorothalonil, and the best treatment in the trials over the last eight years compared to the untreated control. The first thing to note is that half of those years have given very good responses to fungicides, and the remaining four years have illustrated that dry weather in spring can be a very good fungicide.

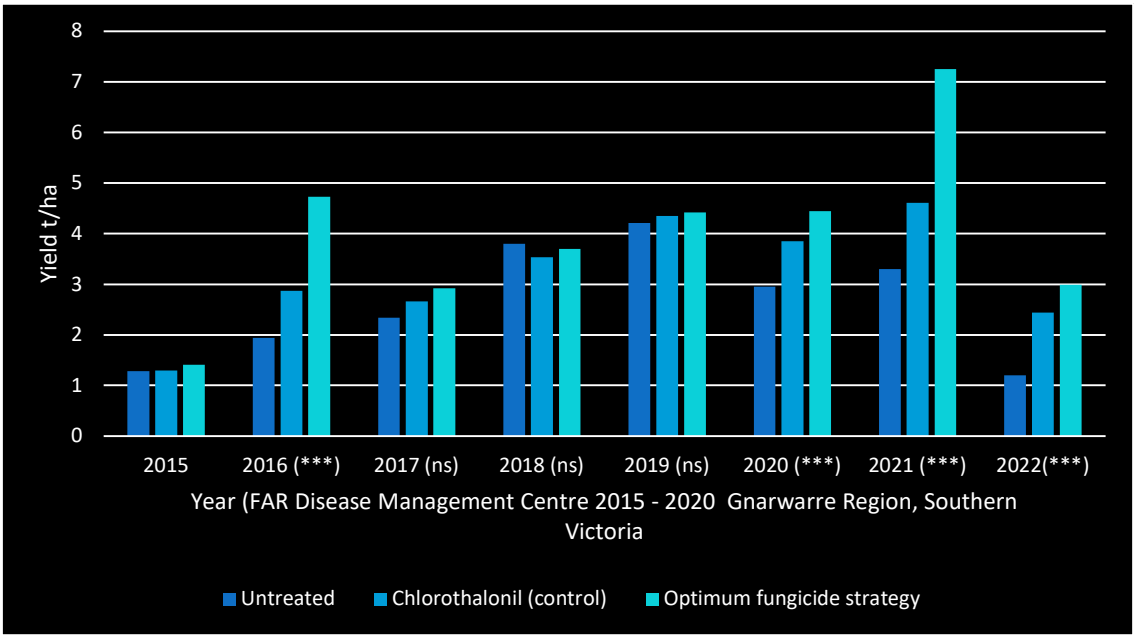



**Figure 1.** Yield response (t/ha) to fungicide (chlorothalonil control & best treatment in trial) in faba beans 2015 – 2022 – Gnarwarre, Southern Victoria HRZ.

*** - Statistically significant

## Disease management strategies - physiology, pathology & agrichemicals combined

Disease management strategies in faba beans bring together a knowledge of the pathogen, (principally Chocolate spot and more recently bean rust in our trials), the plant which is indeterminant in its growth, and agrichemical fungicides which broadly speaking protect what plant tissue they contact.

Whilst we know a reasonable amount about the disease and the conditions for infection, we probably know less about exactly which parts of the plant are most important to protect from disease in comparison to wheat and barley. The “critical period” for faba bean development when seed number and yield formation is being determined is the period just after flowering (1-3 weeks) (Fakir 1997; Biswas et al. 2005; Mondal 2007). In recent FAR Australia research carried out under the Ag VIC leadership (GRDC investment - AGVIC DJP2105-006RTX) we have looked at fungicide timing in relation to plant and disease development. At present the evidence suggests that mid flowering (14 days after first flower) /early pod set are the most important fungicide timings, with additional timings before and after dependent either on the season or specific pathogen issues e.g. severe Cescospora requiring earlier application. The importance of these key timings has been shown in trials where two spray approaches with newer SDHI based chemistry (e.g Aviator Xpro®, Miravis® Star) have been used.

## Strategies for management of disease in faba beans

Historically, the old protectant fungicide chlorothalonil has formed the backbone of disease management strategies in faba beans, and indeed in many other grain legumes. It should be noted that not all formulations have a label that enables the crop residues to be grazed, and this is extremely important in mixed farming systems where grazing crop residues is an important feature of

post-harvest management. Over the last decade newer fungicide chemistry has been approved for use in faba beans, including Group 11 QoI (strobilurin chemistry) such as Veritas based on tebuconazole (Group 3) and azoxystrobin (Group 11). In addition, Group 7 SDHI chemistry is now being used, for example Aviator Xpro based on prothioconazole (Group 3) and bixafen (Group 7) or Miravis®Star based on Fludioxonil (Group 12) and Pydiflumetofen (Group 7).
In seasons with higher disease pressure and higher yield potential, this newer chemistry has given large productivity gains. FAR Australia development work with industry has revealed the step forward that can be secured with this newer chemistry compared to older protectant chemistry only (Figure 1).

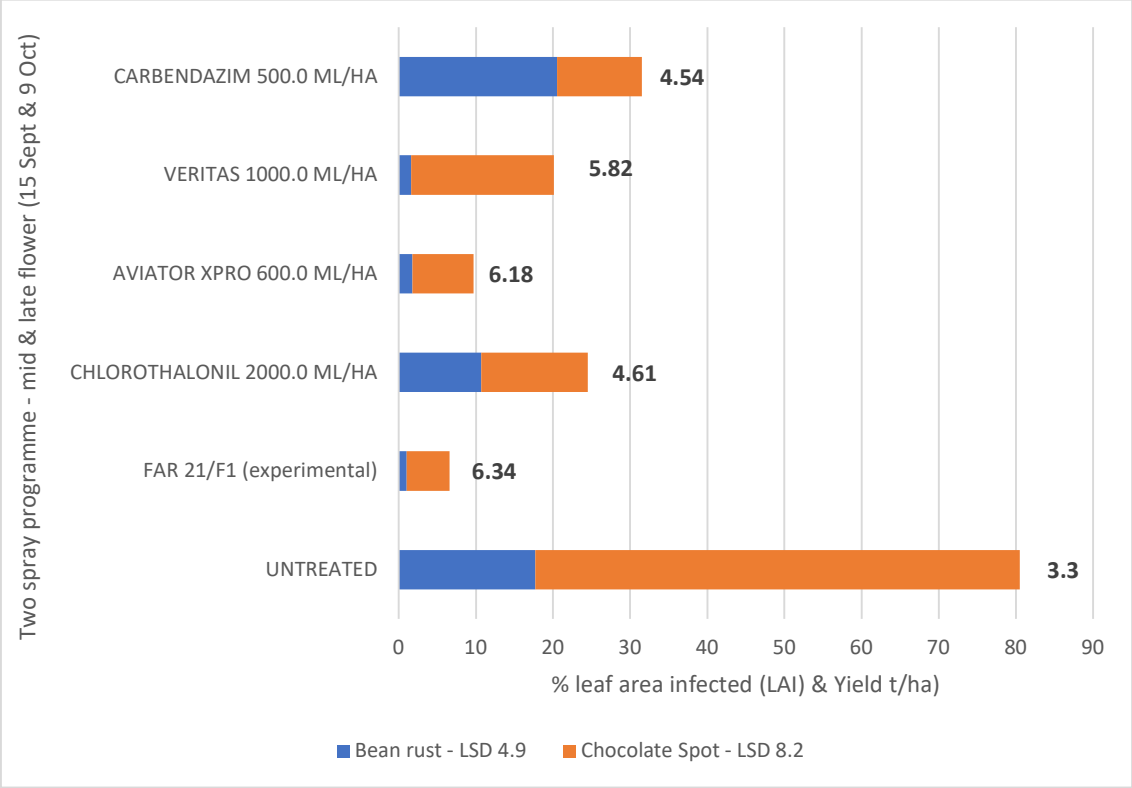


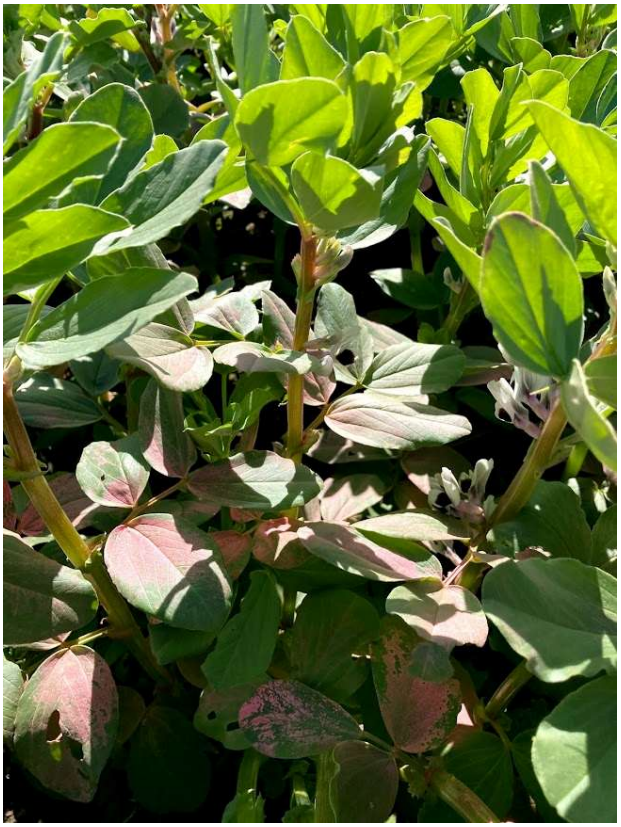

**Figure 1:** Bean Rust (BR) and Chocolate Spot (CS) Severity (%LAI), 4 November, 51 DA-A; 27 DA-B, GS80 (ripening) – FAR Australia Crop Technology Centre (Grain Legumes), Gnarwarre, Victoria (HRZ) 2021.
*FAR Australia would like to acknowledge BASF for commissioning this development trial.*

So where cultivar susceptibility and early signs of disease illustrate fungicide benefit will be economic.

- ***Consider newer chemistry being applied at the key timings of mid flower and early pod set, ideally now more than 3 weeks apart.***
- ***Remember new growth occurring after the previous spray application will not be protected by the fungicide directly, hence direct protection of the canopy at these two key timings is an important and critical part of the strategy (Photo 1 below).***
- ***For spray applications outside of this window consider incorporating protectant chemistry such as Chlorothalonil & carbendazim for Chocolate spot or for Cescospera early then tebuconazole.***

- ***Later spray timings outside of the two-core timing (mid flowering and early pod set) should be considered where conditions for infection persist into pod set and seed fill, however remember drier more average springs usually mean that two sprays is sufficient to achieve good economic returns.***

**Photo 1 –** Using fluorescent spray paints (low coverage) enables one to clearly identify how much new growth there has been since the last fungicide was applied.



## Fungicide resistance

The widespread use of protectant fungicides such as Chlorothalonil and Mancozeb in grain legumes over the years has resulted in few instances of fungicide resistance in these crops. This is because this older chemistry kills the pathogen by more than one mode of action, and as a result it is referred to as **multisite chemistry**. Multisite chemistry is at very low risk of pathogen resistance development compared to newer SDHI and QoI chemistry.

As we move to more efficacious products such as SDHIs and QoIs we lose this protection as newer chemistry is based on a single mode of action. In Canada there is fungicide resistance to QoIs in some grain legume crops (Ascochyta species) which developed almost twenty years ago. Therefore, when we use this newer chemistry, it would be good practice to continue the use of this multisite chemistry, alternated and sequenced with newer chemistry in order to give at least some protection against resistant biotypes developing.