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Cercospora leaf spot: Is its bark worse than its faba bean bite?

By Rohan Kimber and Jenny Davidson (SARDI), Jeff Paull and Eileen Scott (University of Adelaide)

In 2007, a disease survey of faba bean crops in the major growing districts of southern Australia aimed at identifying the incidence and severity of the major diseases of faba bean during late winter. The survey focused on cercospora leaf spot, its significance to industry and its frequency of occurrence compared to the major diseases, ascochyta leaf spot and chocolate spot.

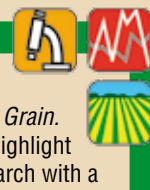
The timing of the survey (commencing late winter) was ideally suited to assess the incidence of ascochyta and cercospora leaf spot. Crops sampled were identified by district consultants and aimed to be representative of the broad spectrum of

cropping circumstances, encompassing short-term and long-term rotations of faba beans, and varied approaches to disease management.

Approximately 100 crops were included covering the main faba bean growing districts of SA (South-East, Lower-Mid North, Yorke Peninsula and Eyre Peninsula) and Victoria (Wimmera).

Each crop was inspected, sample plants removed and location details recorded. ...ii ▷

Consultants' Corner



Consultants' Corner is a new initiative by *Australian Grain*. This series of articles will highlight current GRDC-funded research with a particular focus on the commercial implications of adopting cutting-edge research.

THE MAIN POINTS

- Cercospora leaf spot was the most prevalent disease found in faba beans during a winter disease survey in 2007.
- Misdiagnosis of the disease is common in most districts resulting in ineffective fungicides being applied and potentially reducing profit margins.
- Preliminary results suggest short and medium-term rotations of faba bean crops appear to be at most risk from soil-borne disease carry-over, particularly on farms with extensive cropping of faba beans.
- Bark is worse than its bite – though the emergence of cercospora leaf spot in crops is a problem, its impact on yield appears less dramatic than established diseases such as ascochyta and chocolate spot.
- A single application of an effective fungicide soon after emergence is warranted for control of cercospora leaf spot in high-risk situations.

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<i>...CERCOSPORA LEAF SPOT

Sample plants were assessed for ascochyta leaf spot, cercospora leaf spot and chocolate spot. To enable comparative correlations to incidence and severity of disease, information about the management practices of those paddocks is now being sought.

The results presented here are preliminary, but provide valuable insight into cercospora leaf spot as an emerging disease of faba beans.

Preliminary results of the survey

Until recently ascochyta has typically been the most prevalent disease in faba beans during late winter and early spring. But crops inspected in 2007 showed that cercospora leaf spot was the most prevalent disease in all districts with the exception of the Lower to Mid-North district of SA. In this district, a similar incidence of



SARDI researcher Rohan Kimber, assessing disease levels in a cercospora trial.
(PHOTO: SARDI)

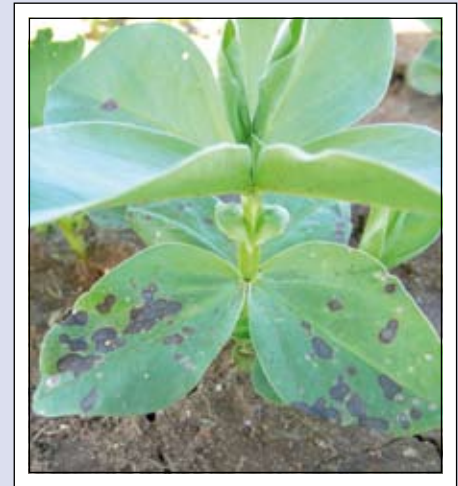
cercospora leaf spot was observed compared to ascochyta but disease levels were less severe (see Table 1).

The main findings

- Misdiagnosis of cercospora leaf spot for symptoms of ascochyta leaf spot was common. This often resulted in ineffective fungicides being applied (for example, mancozeb).
- The incidence (percentage of crops showing infection) of cercospora leaf spot (irrespective of severity) across all growing districts inspected was 85 per cent, compared to 31 per cent for ascochyta and five per cent chocolate spot. But the cold temperatures at the time of the survey were less favourable for chocolate spot and a lower incidence was expected.
- Low levels of ascochyta were observed on the Yorke and Eyre Peninsulas and in the South-East. Further information on paddock history and cultivar selection may indicate the reason, but speculatively it may reflect either resistant cultivar selection (cvs. Farah or Nura) or possibly slightly later sowing dates that avoided early-season ascospore showers.
- Of the infected crops sampled 52 per cent showed a high level of severity of cercospora leaf spot.

Data showing the link between severity of cercospora and the management and rotation history of faba beans in the paddocks assessed is currently being analysed.

Initial results indicate the prevalence and severity of cercospora leaf spot in crops is strongly linked to the rotation his-



Cercospora leaf spot on a faba bean seedling seven weeks after sowing.
(PHOTO: SARDI)

tory of faba beans in that paddock. Long term plantings of faba beans on close rotation (three to five years) seems to pose the greatest risk of high disease establishment due to soil-borne disease carry-over.

SEVERITY OF DISEASE

From an epidemiological perspective, even low to medium severity of ascochyta or chocolate spot in late winter may lead to significant epidemics in susceptible cultivars if conditions remain favourable to disease development.

The survey showed that many crops in the Lower to Mid-North district (29–56 per cent), the Eyre Peninsula (14 per cent) and the Wimmera in Victoria (10–20 per cent) showed medium to high severity of ascochyta and therefore, would have priority as the most important disease requiring fungicide applications for control.

This also applies to crops showing any level of chocolate spot in winter. At the time of the survey, many consultants and growers were already responding to this priority. But the dry conditions during spring probably meant many crops were less likely to be affected by significant development of disease.

In contrast, it is unlikely low to medium levels of cercospora leaf spot at the same stage of the growing season would result in a significant yield penalty. Our experience suggests only high levels of cercospora are likely to be significant enough to result in a potential impact on yield and management must be targeted early in the season. But paddocks showing low or medium levels of cercospora in 2007 are likely to require further disease control if faba beans are planted back in that paddock on a short rotation sequence.

TABLE 1: Summary of incidence (percentage of crops with disease) and severity (percentage of crops within a category) of three major diseases of faba bean over five major growing districts

District	Disease	% crops with disease	Severity (%) *		
			Low	Medium	High
Lower to Mid-North SA	Cercospora	85	27	27	32
	Ascochyta	90	5	29	56
	Chocolate Spot	12	0	7	5
Yorke Peninsula	Cercospora	80	27	7	47
	Ascochyta	0	0	0	0
	Chocolate Spot	0	0	0	0
Eyre Peninsula	Cercospora	71	14	0	57
	Ascochyta	14	0	14	0
	Chocolate Spot	14	0	14	0
South-East	Cercospora	94	12	12	71
	Ascochyta	6	6	0	0
	Chocolate Spot	0	0	0	0
Wimmera-Victoria	Cercospora	95	25	15	55
	Ascochyta	45	15	10	20
	Chocolate Spot	0	0	0	0

* Severity category (% infection): Cercospora, low = <30%, medium = 30<60%, high = 60+%; Ascochyta, low = <15%, medium = 15<30%, high = 30+%; Chocolate Spot, low = <5%, medium = 5<20%, high = 20+%.



Cercospora lesion on stems often exhibit sporulation on the surface (centre) but penetration by the fungus into tissue is relatively superficial. (PHOTO: SARDI)

Our research has shown all current commercial cultivars are susceptible to cercospora leaf spot. Paddocks on short and medium-term rotations of faba bean are at most risk from soil-borne disease carry-over, particularly on farms with extensive cropping of faba beans. Survival of the pathogen appears to be within the soil profile and infects seedlings early in the growing season (five to eight weeks after sowing (WAS)). Severity steadily develops over the course of the season if conditions remain favourable.

Early disease establishment is the most critical time for targeted control of the disease.

Control options

Field trials conducted over the past three years have shown tebuconazole, carbendazim and chlorothalonil having efficacy against cercospora leaf spot.

Mancozeb, the most commonly used fungicide in commercial crops, is not effective in control of cercospora leaf spot. Control of cercospora in trial plots (in 2005) resulted in a seven per cent yield increase over plots exhibiting high disease levels. Strategically targeted treatments showed that early applications (five to seven WAS) of tebuconazole or carbendazim significantly reduced disease establishment. In situations of high disease, this offers an economically justified option for control. This justification is strengthened if it replaces an ineffective fungicide (for example, mancozeb) applied as a result of misdiagnosis of disease.

But a caution is issued on the 'over-use' of carbendazim, particularly if applications to control of chocolate spot later in the season are scheduled.

DISTINGUISHING BETWEEN DISEASES

Distinguishing between diseases of faba beans on the basis of symptoms can be difficult – but development of each disease can be used to assist in accurate diagnosis.

THE COMMERCIAL VIEW...

By Wayne Hawthorne, Pulse Australia

Cercospora leaf spot has been around for some time – in fact I first observed it in ascochyta-resistant breeding lines that became the variety Ascot. But the disease has now spread more widely around southern Australia and poses an increasing threat to beans.

As beans are being included more frequently in cropping rotations, cercospora is showing up more often and as we become familiar with its symptoms and accurate with diagnosis, the industry is recognising its full impact. Last season was a particularly bad one for cercospora during winter.

The main issue with cercospora in the past has been its misdiagnosis due to the fact it expresses disease symptoms very similar to that of ascochyta early, and of chocolate spot later. Now that ascochyta-resistant varieties are being grown, cercospora is being identified with more certainty and growers are able to act.

The main fungicide used for control of ascochyta is not effective on cercospora, so growers have often treated symptoms with products like mancozeb only to see little control of the disease. Carbendazim has been more recently used effectively for early cercospora control, but it has also been heavily relied on later in the season for chocolate spot control – so alternative fungicides for rotation are desperately needed.

The Australian Pesticides and Veterinary Medicines Authority (APVMA) has now issued permit number 10173 for the use of tebuconazole for control of cercospora in faba beans and broad beans. The permit holder is Pulse Australia which gained the permit in collaboration with the GRDC-funded 'minor use' project AKC00001. The permit expires on March 31, 2011. An important condition of use is that no more than three applications may be made per crop.

This is good news for the control of cercospora in beans as we now have a chemical from a different fungicide group with good efficacy. This ensures growers can rotate between fungicide groups and preserve the life of their chemicals. Having tebuconazole available for use at early stages of cercospora infestation is a distinct advantage.

For more information on the permit and conditions, visit the APVMA website at www.apvma.gov.au or contact Wayne Hawthorne on (08) 8764 7455 or visit the GRDC website at www.grdc.com.au and search for 'AKC00001 minor use'.



Pulse Australia's Wayne Hawthorne addressing growers on disease control strategies. (PHOTO: SARDI)

Some general observations to aid in identifying the major diseases are:

- If there is no history, or long-term rotation, of faba beans in the paddock it is unlikely cercospora levels will be significant unless immediately adjacent 'risk' paddocks.
- In 'risk' paddocks, cercospora will appear early (five to eight weeks after sowing) and typically has an even distribution across the crop.
- If a cultivar with good resistance to ascochyta (such as, Farah or Nura) is being grown, it may help eliminate ascochyta as the probable dominant disease.
- Cercospora lesions typically infect leaves on the lower 60 per cent of a plant early in the growing season. Ascochyta lesions are often indiscriminate in their location on foliage. Chocolate spot is rarely seen early in the season in southern Australia.

- Lesions of cercospora on stems are less severe (superficial and do not girdle stems) than ascochyta lesions, which can cause stem breakage.
- In instances of high disease pressure, the main damage from cercospora infection is premature defoliation, beginning with lowest leaves and extending to the upper canopy later in the season. Ascochyta causes stem breakage and deterioration of foliage rather than systematic leaf drop.

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