

Chocolate Spot management in faba beans – Kojonup 2021



Department of
Primary Industries and
Regional Development

Stacey Power, Research Scientist, Department of Primary Industries and Regional Development Western Australia

Key Messages

- Foliar fungicide application on West Australian faba bean crops can be safely delayed until flowering begins, even if chocolate spot is present at low levels earlier in the season

Aim/s

Demonstrate the effectiveness of different fungicide timing options on chocolate spot management and evaluate a new spray decision support tool.

Background

Research conducted by SARDI in South Australia shows that the causal agent of chocolate spot, *Botrytis fabae*, needs temperatures between 15-25° and humidity >75% for spores to be released and infection of new plants successful. Based on this information, South Australian Research and Development Institute (SARDI) are developing a warning system based on canopy temperature and humidity. When these conditions are met for a period of 12 consecutive hours, a 'red alert' is sent, and there is a 48-hour window to get a foliar fungicide on the crop to prevent infection from occurring. This could give farmers the information that they need to make informed spray decisions, including the confidence to leave a crop unsprayed.

Current recommended practice in WA is for farmers to monitor their crop for signs of chocolate spot with a view to begin spraying fungicide as the canopy closes and flowering begins through to early pod fill. In eastern states, it is common practice for farmers to spray faba bean crops with at least four foliar fungicides, from mid-winter onwards. The early sprays are often done to control diseases other than chocolate spot, such as ascochyta. Although ascochyta is less common in WA than other states, some farmers here have duplicated this practice, at times resulting in unnecessary fungicide applications.

We aim to compare the current recommended WA fungicide spray strategy with the more regular fungicide applications common in other states, and with a spray timing based on canopy humidity and temperature to determine if this could be a useful decision support tool by West Australian growers.

Trial Details

Trial Location	Rocky Glen East Road, Muradup
Soil type	Sandy loam
Sowing date	30 April 2021
Sowing rate	194kg/ha PBA Bendoc
Fertiliser	At seeding: 220kg/ha Single Superphosphate (0N, 9.1P, 0K, 20Ca, 10.5s)
Herbicides & Insecticides	Pre-seeding: 700g/ha terbuthylazine (875g/kg) + 700g/ha simazine (900g/kg) + 700g/ha diuron (900g/kg) At seeding: 1.1kg/ha carbetamide (900g/kg) + 180g/ha flumioxazin (500g/kg) + 80mL/ha bifenthrin (250g/L) + 2.5L/ha glyphosate (570g/L) 25 May: 750mL/ha imazamox (33g/L) & imazapyr (15g/L) 18 June: 330mL/ha clethodim (360g/L) + 100g/ha butoxydim (250g/kg) + 1% MSO + 100mL/ha haloxyfop (520g/L) 14 Sep: 100mL/ha sulfoxaflor (500g/kg) + 80mL/ha alpha cypermethrin (100g/L)
Harvest Date	18 Dec

Table 1: Soil Composition

Depth (cm)	pH (CaCl ₂)	Col P (mg/kg)	Col K (mg/kg)	S (mg/kg)	N (NO ₃) (mg/kg)	N (NH ₄) (mg/kg)	EC (ds/m)	OC (%)
0-10	5.2	38	95	8.9	21	4	0.060	1.21
10-20	5.0	15	54	6.7	7	<1	0.044	0.58
20-30	5.0	8	61	10.7	5	<1	0.035	0.45

Table 2: 2021 rainfall (mm) data from BOM Riverdale site (10635).

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Apr-Nov	Annual
2021	14	46	19	78	99	60	129	54	71	55	26	6	545	656
Average	15	14	21	30	65	84	85	71	50	34	22	14	441	505

Table 3: Trial treatments

1	Nil fungicides
2	Recommended procedure: 2 x sprays, from flowering onwards
3	Regular spray: 4 x sprays, from early July onwards
4	Alert: 1 x spray based off humidity/temperature sensor

Foliar fungicides that were applied at Muradup in 2021.

Date	Treatments sprayed	Rate mL/ha	Active ingredients
2-Jul	Regular spray plots	500	procymidone (500g/L)
22-Jul	Regular spray plots	600	prothioconazole (1250g/L) + bixafen (75g/L)
12-Aug	Regular spray plots & recommended procedure plots	500	carbendazim (500g/L)
3-Sep	Regular spray plots & recommended procedure plots	1000	fludioxonil (150g/L) + pydiflumetofen (100g/L)
14-Sep	Alert plots	500	carbendazim (500g/L)

Red alerts were received on 10 and 11 September.

Table 4: Chocolate spot rating scale that was used to assess plots at Muradup in 2021.

Rating	Description
0	No infection
10	Very small specks
30	Few small discrete lesions
50	Some coalesced lesion with some defoliation
70	Large coalesced, sporulating lesions, 50% defoliation and some dead plant
90	Extensive lesions on leaves, stems and pods, severe defoliation, heavy sporulation, stem girdling, blackening and death of more than 80% of plants

Results

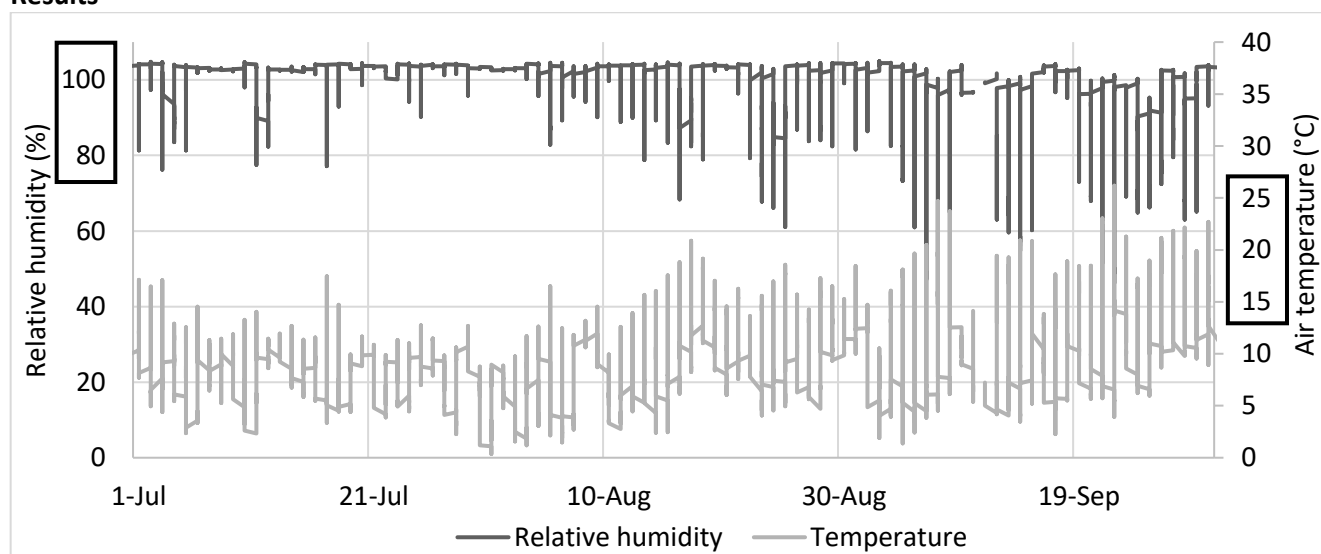


Figure One: Relative humidity (%) and air temperature (°C) as measured at canopy height in Muradup from 1 July through to 30 September, the period when foliar fungicide sprays were active on various treatments in this trial. The highlighted ranges on either axis represent the conditions that must be met to trigger an alert.

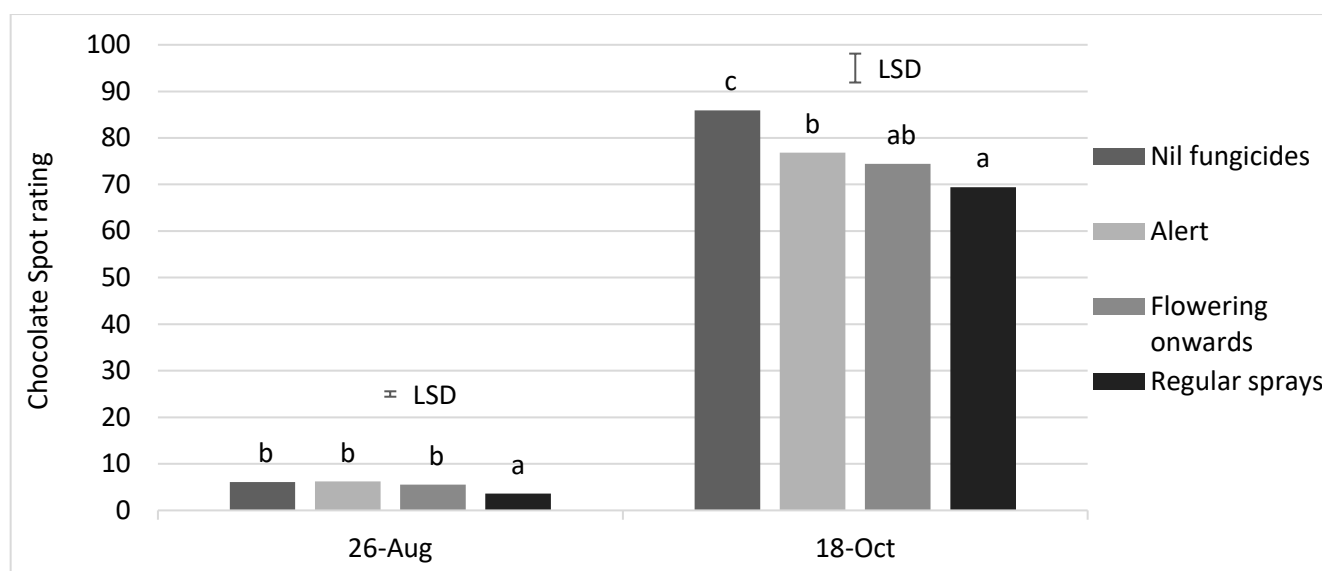


Figure Two: Chocolate spot ratings at Muradup from 26 August and 18 October 2021. 26 August $p < 0.001$. 18 October $p < 0.001$. Treatments with a common letter are not significantly different from each other.

Chocolate spot in this trial was rated repeatedly throughout the 2021 season using the scale in Table 4, with the final two ratings presented in Figure Two. The first signs of disease in the trial were seen in in June. Disease levels were very low at that time, with small specks seen on some leaves. Chocolate spot remained at very low levels until late-August, when an increase in disease incidence and severity was noted to have occurred over a two-week period. By that time the regular spray treatment had received three foliar fungicides, the recommended procedure had received one foliar fungicide and the other treatments had not been sprayed. The disease levels at this time are presented in Figure Two and show that the regular spray plots had significantly less disease than all other treatments at that time, although overall disease levels were still low.

Red alerts, following 12-hour periods of exceeding the threshold temperature and humidity, were received on the 10th and 11th September and the alert treatment was sprayed with a fungicide on 14th September. Four weeks later the final disease rating of the season was performed on 18 October (Figure Two) following all fungicide applications (see Table 3 for full details). Disease levels had increased markedly by this time across all treatments. The regular spray plots had significantly less disease than the alert treatment, and the recommended procedure was in between. The regular spray plots showed discrete lesions on leaves compared to the nil plots which had larger lesions and defoliation of some plants.

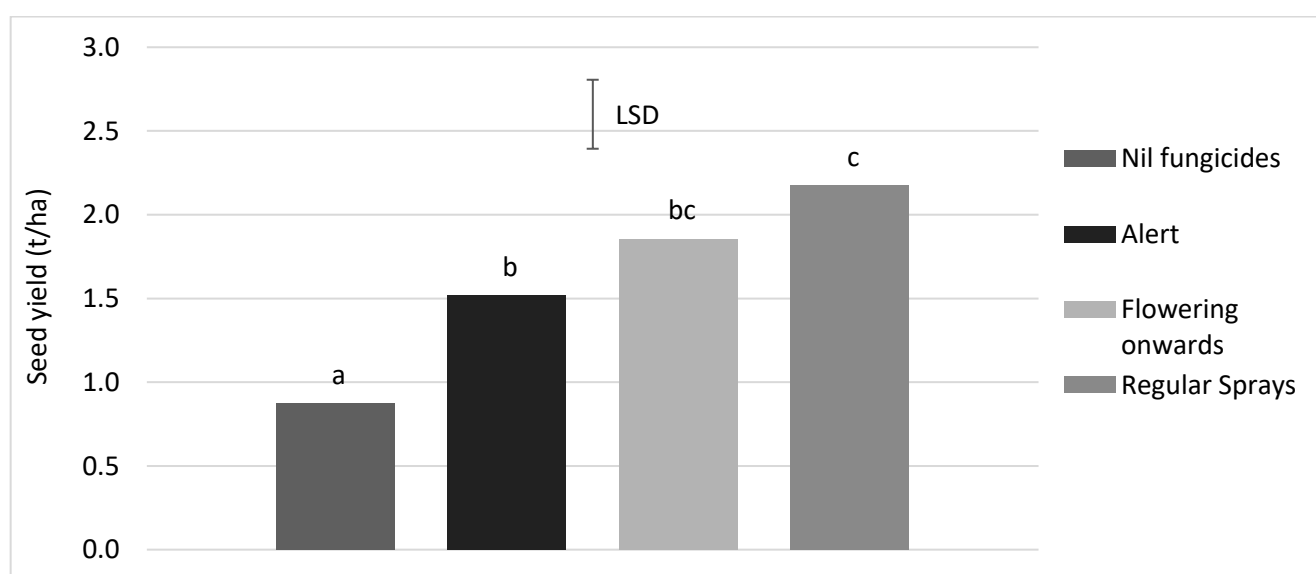


Figure Three: Seed yield at Kojonup in 2021. $p < 0.001$. Treatments with a common letter are not significantly different from each other.

Yield across this trial averaged 1.6t/ha, which was quite good considering disease severity was quite significant by the end of the season. There was a clear yield advantage when using any of the foliar fungicide strategies compared to nil fungicide. The alert treatments yielded almost double the nil fungicide treatment. This shows the impact that one, strategically timed, fungicide application can have in a faba bean crop.

From early-July through until the end of August long periods of relative humidity higher than 100% within the crop canopy were measured (Figure One). During periods of such high humidity the *Botrytis* fungus can release spores at low temperatures, although it will occur more slowly than it would at the ideal temperature of 15-25°C. Thus, weather conditions in 2021 were ideal for the development of chocolate spot even without reaching the 15-25° temperature range to trigger the alert system. This can help explain why more alerts from the system being tested were not received and hence, why disease in the alert plots was not as well controlled and yield not as high as the plots that received regular foliar fungicides in 2021. The alert system is still being developed and appropriate parameters refined. Based on our results in WA in 2021 and from other states where very high humidity over long periods of time has led to high disease levels at lower temperatures than expected, modifications to the alert system will be made by SARDI. We are confident that these modifications will enable alerts to successfully guide spray decisions even in seasons of unusually high rainfall and humidity such as 2021.

It is also reassuring to note that, although the regular spray treatment had lower disease severity than the WA recommended practice treatment did early in the season, by the end of the season the disease severity and seed yield between these two treatments was the same. This reaffirms our recommended practice for West Australian faba bean crops to begin receiving foliar fungicide applications from flowering onwards and that fungicides applied earlier than this may be unnecessary in our environment.

Comments

This trial confirms our recommendation that faba bean crops in WA can safely be sprayed from flowering onwards, even if chocolate spot is present at very low levels early in the season.

Acknowledgements

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Contact: Stacey Power, Stacey.power@dpiird.wa.gov.au, 0472 847 815