VETCH AGRONOMY AND DISEASE MANAGEMENT

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TAKE HOME MESSAGES

- Higher biomass production was observed when vetch was sown in April compared to May.
- The drier spring resulted in conditions not conducive for disease development, so there were low to no disease observations.
- Some of the fungicides used in this trial were used in an off-label manner. Consult your agronomist or Agriculture Victoria about off-label chemical use.

BACKGROUND

Botrytis grey mould (BGM) and ascochyta blight are important diseases of vetch affecting yield and quality in both hay and grain crops during most seasons across the Wimmera and Mallee regions of Victoria.

These diseases require leaf wetness or humidity to infect plants. BGM is more aggressive than ascochyta blight and when the ideal environment is present (wet conditions during mild to warm temperatures) it can spread rapidly throughout a crop. Both diseases are stubble-borne and carry over between seasons on infected residue or in the soil. In Victoria, the Ascochyta blight pathogen, *Ascochyta viciae,* only infects vetch, but the BGM pathogens also infect lentil (*Botrytis cinerea*) and faba bean (*B. fabae)*. BGM is more likely to carry over between seasons.

The combination of early sowing, early canopy closure and high biomass make vetch canopies an ideal environment for these diseases. The current recommendations for disease control in vetch are to select more resistant varieties, follow a three to four-year break between crops that are affected by the disease, and apply a foliar fungicide before canopy closure. Fungicide applied after canopy closure is less effective because of decreased coverage on plant material. These diseases are also more difficult to control once they are established in crop.

Minimal research has been conducted on managing disease in vetch, so several experiments were conducted to assess the efficacy of several different fungicide options for use in vetch.

Some of the chemicals used in this trial are not registered for use in certain crops and were tested for experimental purposes only. Always read the label and adhere to directions when using fungicides.

AIM

To determine the effect of time of sowing and variety on disease management, biomass production and grain yield in vetch.

PADDOCK DETAILS

Location:	Pyramid Hill and Karyrie
Crop year rainfall (Nov-Oct):	Pyramid Hill – 218mm, Karyrie – 418mm
GSR (Apr-Oct):	Pyramid Hill – 158mm, Karyrie – 197mm
Soil type:	Clay loam
Paddock history:	Pyramid Hill – 2018 barley, 2017 canola Karyrie – 2018 barley, 2017 lentil

TRIAL DETAILS

Crop type:	Vetch
Treatments:	See Table 1
Target plant density:	50 plants/m^2
Seeding equipment:	Knife points, press wheels, 30cm row spacing
Sowing date:	See Table 2 and Table 3
Replicates:	Four
Harvest date:	Pyramid Hill 12 November 2019, Karyrie 14 November 2019

TRIAL INPUTS

Nutrition, weeds and insects were managed as per best practice.

METHOD

Replicated field experiments were sown at Pyramid Hill and Karyrie in a randomised split plot design. Each experiment had two times of sowing, two varieties and six fungicide treatments (Table 1). Except for the untreated and no disease control plots, all fungicide applications occurred just before canopy closure. There were two controls in the experiment: 'untreated plots' where no treatments were applied, and the 'no disease' plots where fungicides were applied periodically to prevent disease development. These experiments relied on natural disease occurrence and did not have any disease added.

Both experimental sites were assessed for establishment, crop biomass, disease severity (where applicable) and grain yield.

Table 1. Vetch disease management trial treatments.

Fungicide Treatment	Fungicide Rate (mL/ha)	Fungicide Trade Name
Untreated	0	n/a
Prothioconazole + Tebuconazole[A]	700	Prosaro®
Carbendazim	500	Spin Flo®
Tebuconazole + Azoxystrobin	1000	Veritas®
Bixafen + Prothioconazole[A]	600	Aviator® Xpro®
No Disease[B]		

A. Note: Some of the fungicides used in this trial were used in an off-label manner. Off-label use can be a high risk activity so before using a chemical off-label, please consult your agronomist or go to http://agriculture.vic.gov.au/agriculture/farm-management/chemicals.

B. The no disease treatment was an experimental control treatment that had several fungicides applied to ensure no disease would be present.

RESULTS AND INTERPRETATION

Karyrie trial

There was minimal disease development at Karyrie during 2019 (Table 2). Disease symptoms were observed after several days of misty rainfall during September, however this was followed by windy warm conditions that dried the canopy and halted disease development. Due to the low disease severity it was not possible to compare fungicide treatments. However, there were significant differences in grain yield and disease severity between varieties and by sowing time, and sowing time affected biomass production (Table 2).

Significant summer rainfall in the Birchip area resulted in above average biomass production and grain yields. These higher yields at a time when hay and grain prices are high, combined with low disease pressure, should result in greater profitability from vetch crops. The effects of sowing time and variety, though significant, are small compared to previous BCG experiments. This is likely due to the combination of good summer rainfall, an early break, and a drier spring, resulting in low disease pressure.

There was a 0.51t/ha biomass advantage by sowing in mid-April compared to mid-May. This resulted in a higher disease score, although overall disease scores were low (Table 2). Early sowing was associated with higher grain yield for the variety Timok compared to Morava (Table 2). Overall, Timok had a higher grain yield than Morava. Below average spring rainfall was most likely responsible for the varietal affects in grain yield, with Morava being later maturing than Timok.

Table 2. Time of sowing, variety biomass, botrytis grey mould score and grain yield at Karyrie.

	Biomass (t/ha)		Botrytis grey mould Score (1-9)			Grain Yield (t/ha)	
Sowing Date	**16 Apr**	**14 May**		**16 Apr**	**14 May**	**16 Apr**	**14 May**
Variety							
Morava			2.31			2.41	2.50
Timok	7.29	6.78	1.27	2.31	1.27	2.95	2.77
Sig. diff.							
Variety (V)	**NS (P=0.734)**			**<0.001**		**<0.001**	
Sowing Date (TOS)	**0.034**			**<0.001**		**NS (P=0.347)**	
Fungicide treatment (T)	**NS (P =0.646)**			**NS (P=0.183)**		**0.006**	
TOS x V	**NS (P =0.657)**			**NS (P=0.279)**		**0.006**	
V x T	**NS (P =0.112)**			**NS (P=0.798)**		**NS (P=0.179)**	
TOS x T	**NS (P =0.963)**			**NS (P=0.928)**		**NS (P=0.164)**	
TOS x V x T	**NS (P =0.514)**			**NS (P=0.587)**		**NS (P=0.400)**	
LSD (P=0.05)							
Variety (V)	**NS**			**0.457**		**-**	
Sowing Date (TOS)	**0.464**			**0.457**		**-**	
Fungicide treatment (T)	**NS**			**NS**		**0.168**	
TOS x V	**NS**			**NS**		**0.137**	
V x T	**NS**			**NS**		**NS**	
TOS x T	**NS**			**NS**		**NS**	
TOS x V x T	**NS**			**NS**		**NS**	

There was a significant difference (P=0.006) in grain yield as a result of fungicide application (Figure 1). The greatest grain yield difference was 0.33t/ha between Bixafen + Prothioconazole and the untreated plots (Figure 1). However, there was no significant difference in grain yield between the Bixafen + Prothioconazole, Tebuconazole + Azoxystrobin, and the Carbendazim treatments. These differences in grain yield, due to fungicide application, do not appear to be related to disease which is interesting but commonly observed in other crops.

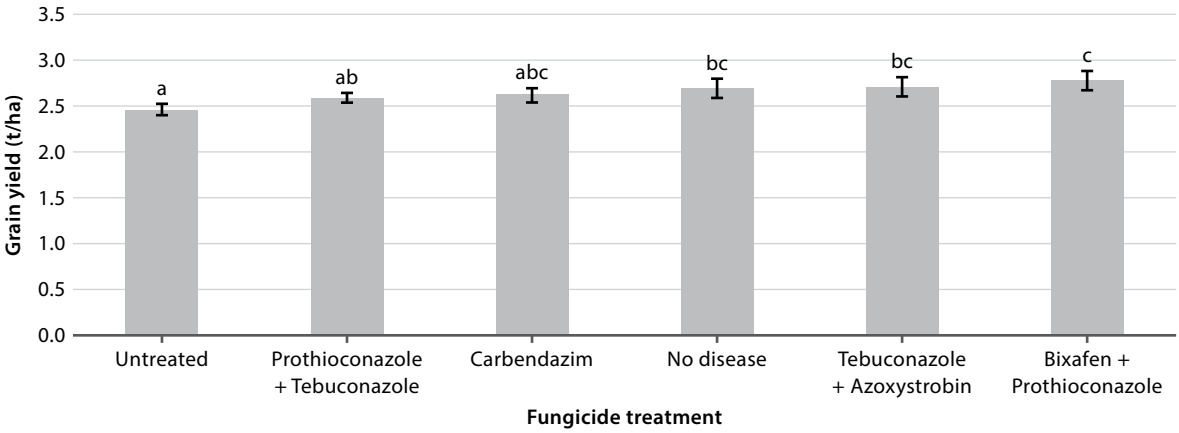

Figure 1. Grain yield for each fungicide treatment (P=0.006) applied at canopy closure as an average across both varieties (Timok and Morava) in the vetch disease management trial at Karyrie. Letters indicate significant difference. Error bars indicate standard error of the mean.

Pyramid Hill trial

No disease was observed at Pyramid Hill. Although it was a drier than average season, biomass production was still 3.7-4.3t/ha and highlighted a similar trend to the results at Karyrie with a 0.48 t/ha advantage with sowing in April compared to May (Table 3). There was also a variety effect at Pyramid Hill, where Timok had greater biomass than Popany (Table 3).

Grain yield was complicated at Pyramid Hill where a significant (P=0.017) three-way interaction was observed between time of sowing, variety and fungicide treatment (Table 4). Overall, the grain yields were low with all yielding less than 1t/ha and results should be used with caution. The trends indicated a higher grain yield from Timok compared to Popany and the May sowing date gave a greater grain yield than April.

Table 3. Pyramid Hill biomass production (t/ha) – vetch disease management trial.

		Biomass (t/ha)	
Variety	**Sowing Date**	**12 Apr**	**14 May**
Popany	3.70	4.22	3.74
Timok	4.27		
Si.g diff.			
Variety (V)		**<0.001**	
Sowing Date (TOS)		**<0.001**	
Fungicide treatment (T)		**NS (P=0.240)**	
TOS x V		**NS (P=0.135)**	
V x T		**NS (P=0.104)**	
TOS x T		**NS (P=0.858)**	
TOS x V x T		**NS (P=0.867)**	
LSD (P=0.05)			
Variety (V)		**0.189**	
Sowing Date (TOS)		**0.189**	
Fungicide treatment (T)		**NS**	
TOS x V		**NS**	
V x T		**NS**	
TOS x T		**NS**	
TOS x V x T		**NS**	

Table 4. Pyramid Hill grain yield at the vetch disease management trial conducted during 2019.

	Grain Yield (t/ha)			
Variety	**Popany**		**Timok**	
Time of Sowing	**12 Apr**	**14 May**	**12 Apr**	**14 May**
Fungicide Treatment				
Untreated	0.07	0.19	0.42	0.73
Bixafen + Prothioconazole	0.08	0.18	0.42	0.59
Carbendazim	0.09	0.20	0.36	0.85
Prothioconazole + Tebuconazole	0.09	0.17	0.41	0.87
No disease	0.10	0.19	0.49	0.68
Tebuconazole + Azoxystrobin	0.11	0.17	0.43	0.81
Sig. diff.				
Variety (V)	**<0.001**			
Sowing Date (TOS)	**<0.001**			
Fungicide treatment (T)	**NS (P=0.158)**			
TOS x V	**<0.001**			
V x T	**NS (P=0.329**			
TOS x T	**0.034**			
TOS x V x T	**0.017**			
LSD (P=0.05)				
Variety (V)	**0.033**			
Sowing Date (TOS)	**0.033**			
Fungicide treatment (T)	**NS**			
TOS x V	**0.047**			
V x T	**NS**			
TOS x T	**0.081**			
TOS x V x T	**0.115**			

COMMERCIAL PRACTICE

Results from this year's experiments were inconclusive for disease management. The drier spring resulted in conditions not conducive for disease development so there were low to no disease observations. However, the results did highlight a sowing time effect at both sites, with a higher biomass production observed when vetch was sown in April compared to May. Biomass production was greater at Karyrie compared to Pyramid Hill, but with low disease levels at both sites and high hay prices, profitability of vetch crops should be good. Grain yields were lower than expected after a drier than average spring and finish to the season.

Although disease levels at Karyrie were low, the trial results show no significant difference in grain yields between the use of lower-cost carbendazim and premium fungicides. It will be interesting to see what happens in a year conducive to disease development. The current recommendations for disease control in vetch are: select more resistant varieties, follow a three to four-year break between crops that are affected by the disease, and apply a foliar fungicide before canopy closure.

These experiments show no change to the recommendations is warranted. As canopy closure occurs early in the season – when it is difficult to predict seasonal conditions and disease risk – a preventative foliar fungicide just before canopy closure would be a low risk strategy. Cutting hay earlier to avoid warmer temperatures or grazing to open up the canopy might also reduce the risk of disease, but these measures are yet to be validated in field experiments.

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