Management strategies for Septoria tritici blotch (STB) in wheat in the medium and low rainfall zones of Southern Australia: Fungicide timing

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In seasons where STB is a risk, growers will require information on if and when (optimal timing) to apply fungicides. Information on the relative economics of different timings of intervention with fungicides in different environments will assist growers to make informed decisions about fungicide strategies to manage STB.

Aim

To observe the effect of fungicide application timing in controlling Septoria tritici blotch in wheat in the MRZ and LRZ of the Southern Australia.

Methods

Three experiments were conducted to determine the optimal fungicide timing for STB control during 2021. One experiment each was conducted in MRZ and LRZ regions of Vic and MRZ region of SA. Six fungicide treatments were applied to the susceptible variety Scepter and consisted of either single or combinations of seed and foliar applied fungicide, minimum disease or an untreated control (UTC). Each treatment was conducted in six replications and arranged in a completely randomized block design. Plots were visually assessed for disease severity and analysed as described in the variety selection trial.

Trial details

Locations:

Location	Rainfall zone	Soil type	Growing season rainfall (mm)
Longerenong (VIC)	MRZ	Clay	262
Hart (SA)	MRZ	Clay loam	231
Watchupga (VIC)	LRZ	Sandy clay	172

Treatments:

1. Seed treatment
2. Foliar applied fungicide at Z31
3. Foliar applied fungicide at Z31 + Z39
4. Seed + Foliar applied fungicide at Z39 - Minimum disease
5. Foliar applied fungicide at Z39
6. Untreated control - No disease control with 1 Kg STB infected wheat stubble or inoculated with spore inoculum at a concentration of >10,000 spores/mL

Varieties: Scepter (S)
Trial design: Randomized complete block design
Replicates: 6

Sowing and harvest details:

Location	Rainfall zone	Sowing date	Sowing rate (plants/m^2)	Harvest date	Trial average yield (t/ha)
Longerenong (VIC)	MRZ	29th April 2021	150	21st December 2021	5.5
Hart (SA)	MRZ	1st June 2021	150	29th November 2021	2
Watchupga (VIC)	LRZ	7th May 2021	150	29th November 2021	3

Trial inputs: UREA and MAP applied and managed as per best practice and kept weed and pest free.

Chemical applications:

Treatments/Fungicide application timing	Product	Fungicide active (gai/L)#	Rate
Seed treatment	Jockey Stayer®	Fluquinconazole 167g/L	300 mL/100 Kg seed
Foliar at Z31	Elatus Ace® at Z31	Benzovindiflupyr 40g/L + Propiconazole 250 g/L	500 mL/ha
Foliar at Z31 + Z39	Elatus Ace® at Z31 and Opus 125® at Z39[a]	Benzovindiflupyr 40g/L + Propiconazole 250 g/L and Epoxiconazole 125 g/L	500 + 500 mL/ha
Seed treatment + Foliar at Z39	Jockey Stayer® and Opus 125® at Z39	Fluquinconazole 167g/L and Epoxiconazole 125 g/L	300 mL/100 Kg seed + 500 mL/ha
Foliar at Z39	Opus 125® at Z39	Epoxiconazole 125 g/L	500 mL/ha
Untreated control	No disease control with STB infected wheat stubble or inoculated with spore inoculum at a concentration of >10,000 spores/mL		

[#] gai = grams active ingredient
[a]Opus 125® is not registered for Septoria tritici blotch control and is used for trial purpose only

Results

Fungicide applications demonstrated effective suppression of STB development but in neither the LRZ or MRZ regions of Victoria and South Australia were found economical as there was no significant improvement in grain yield. Therefore, only in seasons more conducive to STB would benefits from fungicide control be expected.

Dual application of foliar sprays at Z31 and Z39 provided the greatest reduction in STB severity at ripening and according to AUDPC at all locations (Tables 1, 3 & 4). Single application of a foliar spray at Z31 showed statistically similar reduction as dual application at Z31 and Z39 treatment according to AUDPC in both the MRZ and LRZ regions of Victoria, while at Hart, SA single application of foliar spray at Z31 was as effective as dual foliar application at Z31 and Z39 and even showed greater reduction in STB severity compared to minimum disease (seed + foliar spray at Z39) treatment. Either seed treatment or foliar application at Z39 alone provided least effective reduction in STB severity at all locations.

Although fungicide application reduced STB severity significantly, no yield or quality benefit was observed with any of the fungicide treatments at any of the locations (Tables 1 - 4). Data on quality from Watchupga trial was not shown as treatments showed no significant difference.

Table 1: Septoria tritici blotch severity (% leaf area affected) and grain yield of wheat variety Scepter (S) in response to seed and foliar fungicide applications at different timings at Longerenong (MRZ), Victoria during 2021

Treatments	Severity (% LAA)			AUDPC*	Grain yield (t/ha)
	29-July, Z31[#]	31-Aug, Z37	25-Oct, Z73[##]		
Seed	1[a]	13[a]	34[c]	1138[b]	6.0
Foliar at Z31	2[b]	13[a]	17[b]	720[a]	6.1
Foliar at Z31 + Z39	2[b]	13[a]	1[a]	538[a]	6.2
Seed + Foliar at Z39	1[a]	11[a]	3[a]	601[a]	6.2
Foliar at Z39	2[b]	23[b]	3[a]	976[b]	6.1
Untreated control	2[b]	23[b]	52[d]	1809[c]	6.1
P	0.00	<0.001	<0.001	<0.001	0.47
LSD (0.05)	0.8	2.0	8.9	216.2	*ns*

*Means with one letter in common are not significant; *AUDPC: Area under disease progress curve*
[#]Average of single plot assessments; [##] Average of the top three leaves of ten tillers per plot

Table 2: Grain quality of wheat variety Scepter (S) infected with STB in response to seed and foliar fungicide applications at different timings at Longerenong, Victoria during 2021

Treatments	Protein (%)	Screenings (%) <2.2mm	Retention (%) >2.5mm	1000GW
Seed	11	5.0	92.5	44.3
Foliar at Z31	11	3.4	93.5	45.8
Foliar at Z31 + Z39	12	4.0	93.1	45.3
Seed + Foliar at Z39	12	3.9	93.5	45.1
Foliar at Z39	12	3.3	93.9	44.3
Untreated control	11	4.1	92.9	44.8
P	0.42	0.52	0.20	0.93
LSD (0.05)	*ns*	*ns*	*ns*	*ns*

Table 3: Septoria tritici blotch severity (% leaf area affected) and grain yield of wheat variety Scepter (S) in response to seed and foliar fungicide applications at different timings at Watchupga (LRZ), Victoria during 2021

Treatments	Severity (% LAA)			AUDPC*	Grain yield (t/ha)
	28-July, Z31[#]	2-Sep, Z37	6-Oct, Z73[##]		
Seed	0^{a}	5^{b}	3^{c}	286^{c}	2.4
Foliar at Z31	1^{b}	4^{ab}	3^{bc}	229^{b}	2.4
Foliar at Z31 + Z39	1^{b}	4^{ab}	1^{a}	201^{b}	2.5
Seed + Foliar at Z39	0^{a}	3^{a}	1^{a}	132^{a}	2.6
Foliar at Z39	1^{b}	9^{c}	2^{b}	391^{d}	2.5
Untreated control	1^{b}	10^{c}	4^{d}	438^{d}	2.5
P	<0.001	<0.001	<0.001	<0.001	0.88
LSD (0.05)	0.2	1.8	0.8	49.4	*ns*

*Means with one letter in common are not significant; *AUDPC: Area under disease progress curve*
[#]Average of single plot assessments; [##] Average of the top three leaves of ten tillers per plot

Table 4: Septoria tritici blotch severity (% leaf area affected), grain yield and quality of wheat variety Scepter (S) in response to seed and foliar fungicide applications at different timings at Hart, SA during 2021

Treatments	28 Sep Z71[#]	Grain yield (t/ha)	Screenings (%)	Protein %	Test weight (Kg/hL)
Seed	10^{b}	1.9	5.3	11	77.3
Foliar at Z31	3^{a}	1.9	4.5	11	77.5
Foliar at Z31 + Z39	2^{a}	1.9	4.7	11	77.4
Seed + Foliar at Z39	8^{b}	1.9	4.8	11	77.1
Foliar at Z39	10^{b}	1.7	6.6	12	76.4
Untreated control	10^{b}	1.9	5.3	11	77.2
P	<0.001	0.92	0.47	0.49	0.70
LSD	3.65	*ns*	*ns*	*ns*	*ns*

[#] Average of ten tillers per plot

Conclusion

Fungicide applications were found effective in suppressing STB development in both the MRZ and LRZ trials, but in neither trial was there a significant improvement in grain yield following fungicide control. Therefore, only in seasons more conducive to STB would benefits from fungicide control be expected.

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