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Foliar, seed and in-furrow fungicides for management of wheat powdery mildew

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AIM

To investigate the efficacy of seed dressing and fertiliser applied fungicides on the time of onset, rate of development and yield impact of wheat powdery mildew

TRIAL SITE

Location: 'Glen Ruff', Moora
Rotation: 2015: Lupin, 2014: Wheat, 2013: Canola
Growing Season Rainfall (May- October 2015): 269mm

BACKGROUND SUMMARY

Powdery mildew has become more prevalent in WA wheat crops in recent years and was particularly widespread and damaging in several regions in 2015. A major concern for wheat producers is the susceptibility of several popular varieties, the time of onset of disease requiring early intervention in the cropping season and subsequent concerns over requirements for multiple foliar applications. Trial results from 2015 (Beard et al, 2016) clearly indicate that foliar fungicides can provide effective disease control and subsequent economic returns through reducing yield loss. Anecdotal reports from 2015 indicated that some systemic seed and fertiliser applied fungicides, registered in wheat for a range of fungal diseases, were delaying the onset of wheat powdery mildew. Currently none are registered for wheat powdery mildew. This paper describes results from a trial which was one of a series of trials at a range of locations, investigating the efficacy of seed dressing and fertiliser applied fungicides on the time of onset, rate of development and yield impact of wheat powdery mildew.

TRIAL DESIGN

Plot size: 20m x 7 row
Repetitions: 3
Crop type and varieties used: Corack wheat (Susceptible to powdery mildew)
Seeding date: 4th May
Treatment dates: Prosaro® 150ml/ha+0.2% BS1000, @ Z31 = (7th July), @ Z45 (27th July)

Fungicide treatments

Factor 1. Early season treatments

1. Untreated
2. Untreated
3. Prosaro® 150ml/ha at Z31 (7th July)

4. Flutriafol in-furrow (Flutriafol 250® 400mL/ha)
5. Fluquinconazole on seed (Jockey Stayer® 450mL/100kg seed)
6. Fluxapyroxad on seed (Systiva® 150mL/100kg seed)
7. Triadimenol (Baytan T® 150mL/100kg seed)
8. Triadimefon in-furrow (Triadimefon 500 Dry® 200g/ha)
9. Azoxystrobin & Metalaxyl-M in-furrow (Uniform® 400mL/ha)

Factor 2. Follow up Foliar Spray

1. Untreated
2. Foliar Fungicide applied at Z45 (Prosaro® 150ml + 0.2% BS1000)

Foliar spray (Z39)	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer
Seeding treatment	Buffer	8	4	6	Buffer	Buffer	5	9	8	Buffer	Buffer	9	3	7	Buffer	Buffer	**2**	7	6	Buffer	Buffer	3	4	**1**	Buffer	Buffer	**2**	**1**	5	Buffer
Plot		3001	3002	3003			3004	3005	3006			3007	3008	3009			3010	3011	3012			3013	3014	3015			3016	3017	3018	
Foliar spray (Z39)	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer
Seeding treatment	Buffer	7	**2**	**1**	Buffer	Buffer	6	**1**	3	Buffer	Buffer	6	4	5	Buffer	Buffer	9	8	4	Buffer	Buffer	**2**	5	7	Buffer	Buffer	3	9	8	Buffer
Plot		2001	2002	2003			2004	2005	2006			2007	2008	2009			2010	2011	2012			2013	2014	2015			2016	2017	2018	
Foliar spray (Z39)	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer	Buffer	no	no	no	Buffer	Buffer	no	no	no	Buffer	Buffer	yes	yes	yes	Buffer
Seeding treatment	Buffer	9	5	3	Buffer	Buffer	7	4	**2**	Buffer	Buffer	**1**	2	8	Buffer	Buffer	**1**	5	3	Buffer	Buffer	9	6	8	Buffer	Buffer	7	4	6	Buffer
Plot		1001	1002	1003			1004	1005	1006			1007	1008	1009			1010	1011	1012			1013	1014	1015			1016	1017	1018	

OBSERVATION/ DISCUSSION/ MEASUREMENTS

At the time of first visit (30th May), plants were at ~3 leaf stage and no foliar disease was evident. Seedling establishment showed no spatial differences, with average emergence of >100 plants / m2 in all treatments except those with triadimenol seed treatment where >20% reduction in emergence was noted.

Minimal foliar disease was evident at 7th July (~Z31) assessment, minor levels of Stagonospora nodorum (septoria nodorum blotch) (SNB) were evident in the lower canopy but severity was too low for fungicide differences to be assessed.

Trace levels of powdery mildew (PM) were evident on stems and lowest canopy leaves of untreated plots at booting (27th July) when the second foliar spray was applied. Development of PM was slow and on 15th September (~Z69) average severity in untreated controls was <1% leaf area affected on top 3 leaves, with infection primarily restricted to Flag-2 (Table 1).

PM was also present on heads and stems at low severity at this time, however the distribution of disease, particularly on heads, was patchy across the trial making differentiating between treatments difficult. At this time only the booting foliar spray provided consistent significant reduction in incidence of powdery mildew on stems and leaves.

SNB was present at low levels throughout the season, assessments at head emergence (23rd August) showed a small but significant effect of foliar treatments (Z31 and Z45) and flutriafol and Uniform in-furrow on necrotic leaf area. Assessments 3 weeks later at Z69 indicated that flutriafol in-furrow, triadimenol seed dressing and both foliar spray timings were providing a small reduction (~8-15% leaf area) in necrosis associated with SNB infection (Table 1).

With late and patchy onset of PM, yield responses to fungicides were 0-320kg/ha, with only the flutriafol in-furrow treatment having significantly greater yield than the untreated control, this response is likely due to the reduction of SNB rather than any effect on powdery mildew. Neither foliar spray timing gave significant yield response. Reduced emergence in triadimenol treated plots resulted in a 15% yield reduction (Table 2).

At two other sites (Geraldton, Dalwallinu), where powdery mildew infection commenced during stem elongation, all tested seed dressing and in-furrow fungicides had significant impact on disease severity and incidence. At the one site (Geraldton) where powdery mildew was yield limiting, in-furrow and foliar fungicide treatments gave a significant yield response.

Table 1: Effect of seed dressing, in-furrow and foliar fungicides on severity of septoria nodorum blotch and powdery mildew on top 3 leaves of Corack wheat at Moora on 9th September (Z69) 2016

	Leaf area diseased (%)	
Fungicide	Septoria nodorum blotch	Powdery mildew
Factor 1		
Untreated	33.0	0.4
Fluquinconazole (SD)	28.9	0.5
Fluxapyroxad (SD)	32.2	0.2
Triadimenol (SD)	25.8	0.4
Flutriafol (IF)	23.9	0.1
Triadimefon (IF)	31.2	0.1
Azoxystrobin+metalaxyl (IF)	30.3	0.6
Prosaro @Z30/31	23.7	0.3
p-value	0.058	0.768
Lsd (5%)	6.7	0.59
Factor 2		
Untreated	37.2	0.6
Prosaro @Z45	21.0	0.1
p-value	0.003	0.016
Lsd (5%)	4.12	0.29

Note: SD = seed dressing, IF = coated on fertiliser applied in-furrow

Table 2: Effect of seed dressing, in-furrow and foliar applied fungicides on yield and grain quality of Corack wheat at Moora in 2016

Fungicide	Yield (t/ha)	Protein (%)	Screenings (%)	Grain weight (g/1000)
Factor 1				
Untreated	4.46	11.29	1.22	50.4
Fluquinconazole (SD)	4.44	11.52	1.24	50.8
Fluxapyroxad (SD)	4.40	11.47	1.13	50.6
Triadimenol (SD)	3.84	11.68	1.18	51.9
Flutriafol (IF)	4.77	11.35	1.18	50.9
Triadimefon (IF)	4.63	11.57	1.15	50.2
Azoxystrobin+metalaxyl (IF)	4.61	11.47	1.09	50.5
Prosaro @Z30/31	4.44	11.37	1.15	50.9
p-value	<0.001	0.037	0.938	0.045
Lsd (5%)	0.18	0.22	0.23	1.59
Factor 2				
Untreated	4.45	11.51	1.16	50.4
Prosaro @Z45	4.45	11.38	1.18	51.1

p-value	0.923	0.151	0.727	0.242
Lsd (5%)	0.19	0.25	0.20	1.92

Note: SD = seed dressing, IF = coated on fertiliser applied in-furrow

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References

Ciara Beard, Geoff Thomas, Anne Smith, Andrea Hills, Elly Wainwright, Michael Macpherson, Brad Westphal, Phil Smyth and Leigh Nairn (2016) Foliar fungicide strategies for Managing Wheat Powdery mildew. 2016 GRDC Grains Research Update, Perth http://www.giwa.org.au/_literature_210420/Beard_Ciara_Powdery_mildew_paper_GRDC_Grains_Research_Updates_2016

Disclaimer: We are reporting on seed dressing / in-furrow fungicide products that are registered for this use pattern in wheat but not currently registered for powdery mildew control, these products were tested in research experiments. We do not make a recommendation for use of these products for powdery mildew control as they are currently not registered for this purpose.
Mention of trade names does not imply endorsement or preference of any company's product by Department of Agriculture and Food, Western Australia. Only registered fungicide products are recommended. When choosing fungicides, consider the range of diseases that threaten your crop. Consult product labels for registrations. Read and follow directions on fungicide labels carefully.

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