

Foliar, seed and in-furrow fungicides for management of wheat leaf diseases

Geoff Thomas, Ciara Beard, Andrea Hills
Plant Pathologists, Department of Agriculture and Food WA

Purpose:	Assess potential efficacy and benefits from fungicides applied from seeding through to flowering in management of stubble borne diseases of wheat
Location:	'Kayanaba', Dandaragan
Rotation:	Wheat 2014

BACKGROUND SUMMARY

In recent seasons, combinations of early sowing opportunities with short-mid season maturity varieties has seen significant foliar disease pressure from yellow spot (YS) and/or stagonospora (septoria) nodorum blotch (SNB) both at tillering-stem extension and at heading growth stages and growers are tending to apply foliar fungicides earlier than ever before. This is particularly the case in crops sown into wheat stubbles. Some rhizoctonia fungicides used at seeding, are registered to suppress yellow spot. This trial is one of a series (other trials at Eradu, Cunderdin, Esperance) investigating the value of at-seeding fungicides in terms of replacing early foliar fungicides or supplementing later foliar applications.

TRIAL DESIGN

Plot size: 20m x 7 row

Repetitions: 3

Crop type and varieties used: Wheat (SNB, YS): Mace (MSS, MRMS), Justica (MS, S)

Seeding rates and dates: 26 May

Treatment rates and dates:

Sowing	24-May	Untreated Systiva seed dressing (150ml / 100kg seed) Uniform' in-furrow (400ml/ha) applied on Agras fertiliser (150 kg/ha)	
Fungicide			
T1	29-Jul	Z30-31 (J), Z31 (M)	250ml Tilt
T2	25-Aug	Z39 (J), Z49(M)	150ml Prosaro + wetter
T3 (Mace)	2-Sep	Z49 (J), Z55(M)	150ml Prosaro + wetter
T3 (Justica)	9-Sep	Z55-59(J), Z65 (M)	150ml Prosaro + wetter
Rating			
Emergence	16-Jun	Z11-13	
T1	23-Jul	Z30 (J), Z30-31(M) Z32/33(J),	Foliar (%LAA) + root (0-5)
T2	12-Aug	Z33/37(M)	Foliar (%LAA)
T3	10-Sep	Z55/59 (J), Z65(M)	Foliar (%LAA + %LAN)
T4	1-Oct	Z73 (J), Z81(M)	Foliar (%LAN)

RESULTS/STATISTICS

The trial was sown into a drying soil profile with minimal rainfall for 3 weeks after sowing. There was over 250mm rain for the growing season, however less than 50mm fell post flag leaf emergence, significantly limiting disease development at later growth stages and consequently response to later fungicide application (Table 1).

Table 1: Rainfall (mm) following spraying dates, for growing season or subsequent 2 weeks (using BOM Chelsea weather station rainfall records)

	Season	2 weeks
Sowing	257	3
>Z31	168	89
>Z39	45	17
>Z55 (M)	30	14
>Z55 (J)	28	12

As indicated by the PredictaB test, rhizoctonia root disease risk was 'below detection' and neither in-furrow nor seed dressing fungicide had any effect on root disease expression or on plant emergence (Table 3).

Other PredictaB results indicate the presence of Takeall inoculum at a low risk level (Table 2). This disease was evident in several plots, with symptoms exacerbated by the warm and dry finish. No variety or fungicide treatment differences were evident in expression of this disease.

Table 2: PredictaB bulk soil test (trial area)

Pathogen	Test result	Risk category
CCN (eggs /g soil)	0	Below detection
Take-all (wheat + oat strains) (pg DNA/g Sample)	5	Low
R. solani AG8 (pg DNA/g Sample*)	0	Below detection
F. pseudograminearum (pg DNA/g Sample*)	0	Below detection
Pratylenchus neglectus (nematodes /g soil)	0	Below detection
Pratylenchus penetrans (nematodes /g soil)	0	Below detection
Pratylenchus teres (nematodes / g soil)	0	Below detection

Table 3: Effect of seed dressing and in-furrow fungicide on emergence and root disease index of Mace and Justica wheat grown on wheat stubble grown at Dandaragan (WMG) in 2015

Fungicide treatment	Emergence (pl/m ²)	Root disease (0-5)
Untreated control	114.1	0.12
Systiva seed dressing + Prosaro 150ml/ha @Z39	113.3	0.15
Uniform In-furrow + Prosaro 150ml/ha @Z39	118.8	0.15
Justica	123.1	0.21
Mace	107.1	0.07
P (Fung)	ns	ns
P (Variety)	<0.001	ns
Isd (Fung)	ns	ns
Isd (Var)	6.8	ns

Foliar disease (YS/SNB) was slow to develop at the site with <1% leaf area affected at mid-tillering. By late tillering / stem extension foliar disease was evident at low but increasing levels but with no significant at-seeding fungicide responses (Table 4). While both YS and SNB were present, SNB was the dominant disease, >75% of infected leaf area. Disease development is driven by rain events, during the stem extension period disease was supported by good rainfall, nearly 90mm fell in 7 rain events in the two weeks after the Z31 spray. Disease assessments at flag leaf and head emergence show significant response to Z31 and Z39 foliar fungicide applications, with both application times being effective. This impact of fungicide on disease was reflected in overall leaf necrosis, with loss of green leaf area being delayed slightly by foliar fungicides (Table 5).

Throughout the season, disease expression was greater in Justica than in Mace. Collection of yield and quality results for this trial were compromised and so meaningful comparisons between treatments cannot be provided. Across the available data, Mace (4.1 t/ha) out-yielded Justica (3.7 t/ha).

Table 4: Effect of seed dressing, in-furrow and foliar fungicide on leaf area affected by yellow spot and Stagonospora nodorum blotch in Mace and Justica wheat grown on wheat stubble at Dandaragan (WMG) in 2015
(L1 = youngest fully expanded leaf = flag leaf 10 Sep, L1-3 = average severity L1+2+3)

Variety	Fungicide treatment	% Leaf area affected (L1-3)		
		23-Jul Z30/31	12-Aug Z32/37	10-Sep Z55/65
All variety	Untreated control	6.5	19.0	12.5
All variety	Systiva + Prosaro @Z39	7.3	15.8	11.2
All variety	Uniform In-furrow + Prosaro @Z39	2.3	15.6	10.4
All variety	Propiconazole @ Z31 + Prosaro @Z39		15.6	7.8
All variety	Prosaro @Z39			8.5
All variety	Propiconazole @ Z31 + Prosaro @Z55			8.1
All variety	Prosaro @Z39 + Z55			10.8
All variety	Full control (Uniform + Z31, Z39, Z55)		9.1	6.9
Justica	All treatments	7.4	18.7	11.4
Mace	All treatments	3.3	11.3	8.1
p (Fung)		0.115	0.007	0.035
p (Var)		0.004	0.007	<.001
p (Fung x Var)		ns	ns	0.038
lsd (Fung)		5.39	4.17	3.42
lsd (Var)		2.21	4.82	0.85
lsd (Fung x Var)		5.35	8.22	3.76

Table 5: Effect of seed dressing, in-furrow and foliar fungicide on necrotic leaf area in Mace and Justica wheat grown on wheat stubble at Dandaragan (WMG) in 2015 (L1 = flag leaf, L1-3 = average severity L1+2+3)

Variety	Fungicide treatment	% Leaf area necrotic (L1-3)	
		10-Sep Z55/65	1 Oct Z73/81
All variety	Untreated control	31.5	58.2
All variety	Systiva + Prosaro @Z39	29.6	51.9
All variety	Uniform In-furrow + Prosaro @Z39	28.7	47.0
All variety	Propiconazole @ Z31 + Prosaro @Z39	23.1	41.8
All variety	Prosaro @Z39	20.0	43.8
All variety	Propiconazole @ Z31 + Prosaro @Z55	23.7	44.0
All variety	Prosaro @Z39 + Z55	21.7	40.8
All variety	Full control (Uniform + Z31, Z39, Z55)	21.9	38.5
Justica	All treatments	28.5	46.3
Mace	All treatments	22.5	45.1
p (Fung)		0.002	0.016
p (Var)		0.001	0.396
p (Fung x Var)		ns	ns
lsd (Fung)		5.21	9.59
lsd (Var)		3.25	2.77
lsd (Fung x Var)		8.32	10.88

OBSERVATION/ DISCUSSION/ MEASUREMENTS

- Fungicide seed treatment or in-furrow did not affect germination or emergence
- Root disease levels were too low for fungicide responses to be evident
- Foliar assessments at Z25 & Z30 indicate low levels of necrotrophic disease, both yellow spot (YS) and Stagonospora nodorum (SNB) present with SNB dominant, with no significant impact of at-seeding fungicides on disease expression.
- Foliar fungicide applications at Z31 and Z39 significantly reduced foliar disease severity (YS and SNB) at flag leaf and head emergence
- Warm dry spring conditions limited fungicide response to late fungicide (Z55) application
- Yield and quality results were not available.

PEER REVIEW/REVIEW

Ciara Beard (DAFWA)

ACKNOWLEDGEMENTS/ THANKS

Andrew and Charles Roberts, and West Midlands Group for trial site.
DAFWA Geraldton RSU (Steve Cosh, Trevor Bell) for trial management
DAFWA and GRDC for funding support (DAW00229)