

# Comparison of Different Fungicide Treatments on Powdery Mildew Wheat

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## Key Messages

- Environmental factors have led to powdery mildew being a significant problem this season.
- There are various fungicides that will provide effective treatment.

## Aim

To determine the effect of old, new, generic and brand fungicides on powdery mildew in Mace wheat.

## Background

Significant 2014 wind lodging, summer rains and the green bridge along with recent cloudy wet conditions has caused powdery mildew to be a problem this season. Wheat powdery mildew is caused by *Blumeria graminis f. sp. tritici* and is different disease from *Blumeria graminis f. sp. hordei* that causes powdery mildew in barley. Powdery mildew is windborne and survives between seasons on stubble, plant residues and volunteers. The surviving spores from the previous season release new spores when conditions in autumn become cool and wet, infecting the new crop. The disease is characterised by colonies that appear as white cottony patches on the surface of the plant. Most commonly these are present on the lower parts of the plant moving up as the growing season progresses. Powdery mildew can cause significant yield loss if it reaches the flag leaf.

Fungicide treatments were applied at growth stage 41 on the 29/08/2015. The treatments were applied at 87 L/ha.

## Trial Details

<b>Property</b>	Wattlevale, west Buntine
<b>Plot size &amp; replication</b>	2m x 10m x 3 replicates
<b>Soil type</b>	Yellow sandplain
<b>Soil pH (CaCl<sub>2</sub>)</b>	0-10cm: 5.4
<b>Sowing date</b>	15/05/2015
<b>Seeding rate</b>	80 kg/ha
<b>Paddock rotation</b>	2012: wheat, 2013: wheat, 2014: wheat
<b>Lime sand</b>	15/02/2015: 1 t/ha
<b>Fertiliser</b>	15/05/2015: 85 kg/ha K-Till Extra 15/06/2015: 90 kg/ha Urea 27/07/2015: 25 L/ha Flexi-N
<b>Herbicides</b>	15/05/2015: 1.5 L/ha Treflan, 1.5 L/ha Spray.Seed 15/06/2015: 540 mL/ha Flight
<b>Growing Season Rainfall</b>	290mm

## Treatment List:

<b>Productive/Active</b>	<b>Label Rate</b>
1. Untreated	Untreated
2. Triadimefon 500WG	250 g/ha
3. Turbulence 800WG (Tebuconazole)	156 g/ha
4. Tebuconazole 430SC	290 mL/ha
5. Octopus 800WG (Epoconazole)	78 g/ha
6. Cracker Jack 550EC (Propiconazole)	115 mL/ha
7. Cracker Jack 550EC (Propiconazole)	230 mL/ha
8. Radial (azoxystrobin 75 g/L +epoconazole 75 g/L)	420 mL/ha
9. Amistar xtra (Azoxystrobin 200 g/L Cyproconazole 80 g/L)	600 mL/ha
10. Cogito (250 g/L of Tebuconazole, 250 g/L of Propiconazole)	187 mL/ha

## Results

**Incidence** = average presence of disease on nominated leaf as a percentage infected per plot.

**Severity** = average percentage of leaf area infected on nominated leaf per plot.

**DAT** = days after treatment

**Table 1:** Comparison of treatment means. Powdery Mildew on grain head

Treatment	Application rate (/ha)	14DAT 09/09/2015	
		Incidence (%)	Severity (%)
1. Untreated	--	86.7	9.59 b
2. Triadimefon 500WG	250g	63.3	2.56 a
3. Turbulence 800WG	156g	73.3	3.41 a
4. Tebuconazole 430SC	290mL	76.7	2.19 a
5. Octopus 800WG	78g	73.3	2.22 a
6. Cracker Jack 550EC	115mL	56.7	2.15 a
7. Cracker Jack 550EC	230mL	70.0	2.89 a
8. Radial	420mL	63.3	3.15 a
9. Amistar Xtra	600mL	76.7	2.89 a
10. Cogito	187mL	66.7	1.89 a
P value		0.226	0.002
LSD		ns	3.06

ns - no statistical significance at  $p < 0.05$

Means within the same cell with a letter in common are not significantly different ( $P > 0.05$ )

**Table 2:** Comparison of treatment means. Powdery Mildew Flag leaf

Treatment	Application rate (/ha)	14DAT 12/08/2015		28DAT 26/08/2015		42DAT 09/09/2016	
		Incidence (%)	Severity (%)	Incidence (%)	Severity (%)	Incidence (%)	Severity (%)
1. Untreated	--	16.7	0.20	20.0 b	1.15 b	53.3 c	2.19 b
2. Triadimefon	250g	0.0	0.00	0.0 a	0.00 a	3.3 ab	0.07 a
3. Turbulence 800	156g	0.0	0.00	0.0 a	0.00 a	13.3 b	0.19 a
4. Tebuconazole 430	290mL	6.7	0.07	0.0 a	0.00 a	6.7 ab	0.11 a
5. Octopus 800WG	78g	0.0	0.00	3.3 a	0.04 a	6.7 ab	0.15 a
6. Cracker Jack 550	115mL	3.3	0.13	0.0 a	0.00 a	10.0 ab	0.26 a
7. Cracker Jack 550	230mL	10.0	0.37	0.0 a	0.00 a	0.0 a	0.00 a
8. Radial	420mL	3.3	0.03	16.7 b	0.26 a	6.7 ab	0.15 a
9. Amistar Xtra	600mL	0.0	0.00	0.0 a	0.00 a	6.7 ab	0.11 a
10. Cogito	187mL	0.0	0.00	0.0 a	0.00 a	6.7 ab	0.07 a
P value		0.337	0.314	<0.001	0.001	<0.001	0.005
LSD		ns	ns	9.34	0.46	10.9	0.96

ns - no statistical significance at  $p < 0.05$

Means within the same cell with a letter in common are not significantly different ( $P > 0.05$ )

**Table 3:** Comparison of treatment means. Powdery Mildew Flag -1 leaf

Treatment	Application rate (/ha)	14DAT 12/08/2015		28DAT 26/08/2015		42DAT 09/09/2016	
		Incidence (%)	Severity (%)	Incidence (%)	Severity (%)	Incidence (%)	Severity (%)
1. Untreated	--	76.7 e	3.53 b	90.0 f	7.63 d	83.3 d	15.78 d
2. Triadimefon 500WG	250g	3.3 a	0.33 a	0.0 a	0.00 a	10.0 a	0.44 a
3. Turbulence 800WG	156g	30.0 bcd	1.60 a	33.3 bcd	1.22 abc	36.7 b	1.96 ab
4. Tebuconazole 430SC	290mL	40.0 bcd	1.93 ab	56.7 de	2.19 abc	46.7 bc	2.33 abc
5. Octopus 800WG	78g	33.3 bcd	1.13 a	66.7 ef	4.26 c	63.3 cd	3.41 bc
6. Cracker Jack 550EC	115mL	43.3 cd	1.70 a	40.0 cd	3.63 bc	50.0 bc	4.96 c
7. Cracker Jack 550EC	230mL	53.3 de	1.57 a	46.7 cde	1.93 abc	50.0 bc	2.96 abc
8. Radial	420mL	20.0 abc	0.47 a	33.3 bcd	0.85 ab	43.3 bc	1.96 ab
9. Amistar Xtra	600mL	16.7 ab	0.37 a	10.0 ab	0.04 a	46.7 bc	1.48 ab
10. Cogito	187mL	23.3 abc	0.50 a	30.0 bc	1.19 abc	36.7 b	1.96 ab
P value		0.001	0.013	<0.001	0.002	0.001	<0.001
LSD		26.29	1.6	24.28	3.17	24.06	2.64

ns - no statistical significance at  $p < 0.05$

Means within the same cell with a letter in common are not significantly different ( $P > 0.05$ )

**Table 4:** Comparison of treatment means. Powdery Mildew Flag -2 leaf

Treatment	Application rate (/ha)	14DAT 12/08/2015		28DAT 26/08/2015	
		Incidence (%)	Severity (%)	Incidence (%)	Severity (%)
1. Untreated	--	83.3 c	2.33	63.3 d	4.74 e
2. Triadimefon	250g	26.7 a	0.50	20.0 a	0.44 a
3. Turbulence 800	156g	46.7 ab	2.17	43.3 bc	1.70 abc
4. Tebuconazole 430	290mL	50.0 ab	1.37	66.7 d	4.07 cde
5. Octopus 800WG	78g	63.3 bc	1.80	70.0 d	4.52 de
6. Cracker Jack 550	115mL	53.3 abc	1.60	53.3 cd	2.52 abcde
7. Cracker Jack 550	230mL	66.7 bc	1.60	56.7 cd	2.22 abcd
8. Radial	420mL	46.7 ab	1.17	43.3 bc	2.07 abcd
9. Amistar Xtra	600mL	26.7 a	0.47	30.0 ab	0.67 ab
10. Cogito	187mL	63.3 bc	1.50	56.7 cd	3.04 bcde
P value		0.039	0.429	<0.001	0.016
LSD		32.33	ns	19.89	2.47

ns - no statistical significance at  $p < 0.05$

Means within the same cell with a letter in common are not significantly different ( $P > 0.05$ )

**Table 5:** Comparison of treatment means. Powdery Mildew Flag -3 leaf

Treatment	Application rate (/ha)	14DAT 12/08/2015	
		Incidence (%)	Severity (%)
1. Untreated	--	60.0	4.17
2. Triadimefon 500WG	250g	40.0	1.47
3. Turbulence 800WG	156g	53.3	3.60
4. Tebuconazole 430SC	290mL	66.7	2.43
5. Octopus 800WG	78g	80.0	2.60
6. Cracker Jack 550EC	115mL	56.7	2.20
7. Cracker Jack 550EC	230mL	70.0	3.20
8. Radial	420mL	43.3	1.57
9. Amistar Xtra	600mL	56.7	2.47
10. Cogito	187mL	66.7	2.03
P value		0.225	0.441
LSD		ns	ns

ns - no statistical significance at  $p < 0.05$

Means within the same cell with a letter in common are not significantly different ( $P > 0.05$ )

### Comments

Effective fungicidal treatments will prevent disease progressing up the tiller (reduced incidence scores compared to untreated on upper leaves) and reduce the severity of infection on pre-treatment infected leaves (lower severity rating compared to the untreated but with similar incidence percentage). This is clearly demonstrated in the results, with the application of all fungicidal treatments providing a statistical difference in both the incidence and severity of powdery mildew infection on Flag-1 compared to the untreated, with Triadimefon, Radial, Amistar Xtra and Cogito exhibiting the best response. Flag-2 exhibited statistical significance for the severity of infection with Triadimefon, Turbulence 800, Tebuconazole 430, Cracker Jack 550 and Radial all reducing the severity; incidence of disease presence was non-significant on this leaf. There were no significant differences between treatments in the severity or incidence on the Flag (insufficient disease progression at first assessment) or Flag-3 leaves (high incidence and severity at application and leaf senescence). Progression of the disease post application up the tiller is clearly demonstrated in the untreated control, with higher incidence and severity scores lower down the tiller (Flag-3 scores are lower due to complete leaf senescence rendering it un-assessable and returning a 0 score).

The data clearly demonstrates the 4 week physiological efficacy of fungicides. The 42 DAT assessment has shown the decline in fungicide efficacy due to waning residual in the target leaves, however still exhibits significant differences between treatments. The heads have not been sufficiently protected, as demonstrated by NS for incidence and higher incidence compared to protected leaves. This is expected from a fungicide application at booting (most heads still in flag sheath) as minimal systemic activity is experienced from most fungicides away from treated leaves (not translocated acropetally) so non-contacted parts of cereals are not protected by earlier applications therefore 2-3 sprays per season may be required to protect new growth.

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