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Cereal Disease Guide - 2009

This AgNote provides grain growers with extensive information on the resistance of wheat, barley and oat varieties to foliar and soil borne-diseases.

Season 2008 in Summary

Conditions were favourable during the winter of 2008 for the spread of stripe rust in wheat, and the stubble-borne diseases yellow leaf spot in wheat and the spot form of net blotch in barley. However, dry conditions in the spring helped reduce the progress of these foliar diseases. The soil-borne disease crown rot was favoured by the dry spring, and was common in Wimmera/Mallee cereal crops. There were also reports of cereal cyst nematode causing problems in crops of the southern Mallee.

Leaf and Stem Diseases: Wheat

Most foliar diseases are effectively managed by growing resistant varieties. However, the resistance required in a variety varies with the production region. The suggested minimum resistance levels for different production regions are listed below. If a variety does not meet the minimum resistance level, then additional cultural practices will be required to manage a particular disease.

Wheat: Suggested minimum levels of disease resistance

Production region annual rainfall	Rust			Yellow leaf spot	<i>Septoria tritici</i>
	Stem	Stripe	Leaf		
Low < 350 mm	S	MS	MS	S	S
Medium 350-500	MS	MR-MS	MS	S	MS
High > 500 mm	MR	MR	MR	S	MS

Stripe, stem and leaf rust are important diseases of wheat that growers must prepare to manage during 2009. A wet summer/autumn in the lead up to the 2009 season will favour the build up of rust on volunteers, and early sown grazing crops.

Stripe rust was present in wheat and triticale crops across Victoria during 2008, with the “Jackie” pathotype dominant in

Victoria and eastern Australia. However, a new pathotype “Jackie Yr27”, was confirmed during 2008.

There are now four pathotypes of wheat stripe rust that occur in Victoria. They are the “WA” (present since 2003), the “WA Yr17”, the “Jackie” and now the “Jackie Yr27” pathotypes.

The “WA Yr17” pathotype is similar to the “WA” pathotype, except it has the additional ability to attack wheat varieties with the “Yr17” (or VPM) resistance gene. The “Jackie” pathotype is similar to the “WA” pathotype, but it has the ability to also attack some triticale varieties. Finally, the “Jackie Yr27” pathotype (confirmed 2008) is similar to the “Jackie” pathotype, but has the additional ability to attack wheat varieties with the Yr27 resistance gene.

In the “wheat disease reaction” table the reaction of cultivars to the “WA” and “Jackie” pathotypes are given as the default, because the reaction of wheat to these two strains is similar. For wheats varieties with the Yr17 resistance gene (indicated with the superscript Yr17) the reaction to the “WA Yr17” pathotype is provided, but these varieties will be more resistant toward the other three pathotypes.

Due to a lack of data it is not possible to give an expected reaction of cultivars with the Yr27 gene (indicated with the superscript Yr27) toward the “Jacky Yr27” pathotype. Growers should note that if this strain is present these cultivars are likely to be more susceptible. A number of wheat varieties have effective adult plant resistance (APR) but are susceptible to rust as young plants. These varieties will typically need protection from stripe rust until the onset of adult plant resistance. In general, cultivars rated as MR-MS or lower may need additional protection from stripe rust.

Stripe rust is difficult to manage in susceptible and very susceptible varieties; therefore these varieties should be avoided if possible. These varieties also produce high numbers of spores which add to further infection, and increase the chance of resistance genes being overcome (broken down) by changes in the rust.

The management of stripe rust is complex, and growers will need to be prepared with an integrated management plan for 2009. Such a plan would start with variety selection, and

include cultural practices such as the removal of volunteer wheat in the lead up to sowing, the use of seed or fertiliser fungicide treatments with activity against stripe rust, controlling rust outbreaks in early sown grazing crops, and monitoring crops with a view to foliar fungicide applications if required.

Stem rust was not observed during 2008. However, given favourable spring conditions stem rust can be severe in susceptible varieties, especially in years that have favoured rust carry over on volunteers. Minimise stem rust build up by controlling the 'green bridge' and avoiding susceptible varieties. All crops, especially those susceptible to stem rust in high risk areas, should be monitored with a view to fungicide application if required.

Leaf rust was only observed in the Western District on susceptible varieties. Leaf rust can be an important disease in Victoria if susceptible varieties are grown.

Recommendations for rust control in 2009

- Grow varieties with adequate resistance to the three rusts, and note any changes in virulence.
- Control volunteer wheat plants over summer and in autumn.
- Use seed or fertiliser fungicide treatments in high risk areas, and on susceptible varieties for rust suppression.
- Actively monitor all wheat and triticale crops with a view to timely fungicide application to control rust if necessary.

Yellow leaf spot was observed during 2008, most often in crops sown early into wheat stubble. In most cases where yellow leaf spot was observed in young crops, the disease did not progress due to the dry spring. Since yellow leaf spot is a stubble-borne disease it is not recommended to sow susceptible varieties into wheat stubbles. **Note** that stubble from 2007 and 2008 may still be an important source of inoculum in 2009.

Recommendations for control in 2009

- Do not sow wheat into infected wheat stubbles.
- Avoid susceptible varieties and/or delay sowing.
- Foliar fungicide treatments are available if required.

Bunt and Smut

Seed treatments are cheap and effective, and cereal seed should be treated **every year** with a seed dressing to control bunt and smut. Without treatment, bunt and smut can increase rapidly, resulting in crop loss and unsaleable grain. **Note** that fertiliser treatments do not control bunt and smut, therefore seed treatments still need to be applied. New clean seed should be sourced if a seed lot is infected.

Leaf and Stem Diseases: Barley

The most effective means of controlling foliar disease in barley is to grow resistant varieties. The suggested level of resistance to the important foliar diseases in each region is

shown below. If a variety does not meet the minimum resistance level, additional management practices will be required.

Barley: Suggested minimum levels of disease resistance

Production region annual rainfall	Scald	Net blotch			Rust	
		Spot form	Net form	Powdery mildew	Leaf	Barley grass
Low < 350 mm	S	S	MS	S	S	S
Medium 350-500 mm	MS	S	MS	MS	S	S
High > 500 mm	MR	MS	MR	MR	MS	MS

Scald was uncommon during 2008, but it can quickly become a problem in wet years, especially when susceptible varieties are sown early.

Recommendations for scald control in 2009

- Treat seed or fertiliser to suppress early scald infection.
- Do not sow barley into infected stubbles and avoid early sowing.
- Grow resistant varieties, noting changes in resistance.
- Use foliar fungicides to provide some protection.

The spot form of net blotch was common in barley crops during 2008, but its impact on yield was low due to the dry spring. Often high levels of infection on young plants have a limited effect on yield if the disease does not progress during the growing season.

There is likely to be inoculum carry over into 2009 on infected stubbles. This may be of concern when susceptible varieties are grown. **Note** that due to the dry conditions this disease will also survive on stubbles from 2007.

Recommendations for control in 2009

- Do not sow barley into infected barley stubbles.
- Avoid growing susceptible varieties.
- Foliar fungicides can give some protection.

Net form of net blotch can be a devastating disease (worse than the spot form) if susceptible varieties are grown.

Recommendations for control in 2009

- Avoid growing susceptible varieties.
- Use foliar fungicides to provide some protection.

Leaf rust occurred in barley crops in parts of the Western District during 2008, and may have reduced yield in some cases. Leaf rust survives the summer on volunteer barley plants.

Recommendations for control in 2009

- Control volunteer barley, especially following a wet summer.

- Avoid susceptible varieties.
- Use foliar fungicides to provide some protection.

Root and Crown Diseases

During 2008 crown rot was the most important soil-borne disease of wheat in Victoria. In the Wimmera and Mallee approximately 60% of wheat crops had crown rot. The average yield loss in infected crops was 3%, with some crops losing more than 20% of their yield. Take-all was also common during 2008, it occurred in about half of the wheat crops. Average yield losses due to take-all were 3% in affected crops, with up to 10% in some situations. There were also reports of cereal cyst and root lesion nematode causing concern in the Wimmera and southern Mallee.

Most cereal root and crown diseases (take-all, crown rot, cereal cyst and root lesion nematode) can be controlled with a one or two year break from susceptible hosts. However, experience during 2002 showed that this length of break was ineffective in dry soil, and that a two or three year break should be given after a dry season. It is also important that break crops are kept free of grass weeds to be effective.

Growers can use the Predicta B soil test to check their paddocks for cereal root and crown diseases prior to sowing. Contact your local agronomist for soil testing. For more information on root and crown diseases see the Agricultural Note "Cereal Root Diseases – 2009" (AG 0562).

Interpreting Resistance Classifications

Below is an explanation of the resistance ratings used in this guide for **foliar diseases**, and how they should be interpreted.

- R** Resistant, the disease will not multiply or cause any damage on this variety.
- MR** Moderately Resistant, the disease may be visible and will multiply slightly, but it will not cause significant loss.
- MS** Moderately Susceptible, the disease may cause losses up to 15% or more in very severe cases.
- S** Susceptible, the disease can be severe on this variety and losses of 15-50% can occur.
- VS** Very Susceptible, this variety should not be grown in areas where a disease is likely to be a problem. Losses greater than 50% are possible, and the build up of inoculum will create problems for other growers.

Below is an explanation of the resistance ratings used in this guide for **nematode diseases**, and how they should be interpreted.

- R** Resistant, nematode numbers will decrease when this variety is grown.
- MR** Moderately Resistant, nematode numbers will decrease when this variety is grown, but to a lesser extent than a resistant variety.

- MS** Moderately Susceptible, nematode numbers will slightly increase when this variety is grown.
- S** Susceptible, nematode numbers will increase greatly in the presence of this variety.
- VS** Very Susceptible, a large increase in nematode numbers can occur when this variety is grown and this will cause problems to a following intolerant crop.

These classifications are only a guide, and yield losses will depend on the environment and seasonal conditions.

Triticale stripe rust reactions

The widespread occurrence of the "Jackie" pathotype of stripe rust means growers need to take note of the resistance reaction of their triticale variety to stripe rust. The reactions, to triticale varieties, are shown below.

Reaction of triticale varieties to the "Jackie" stripe rust

Cultivar	Reaction	Cultivar	Reaction
Abacus	MS	Jaywick	MR
Bogong	MR*	Kosciuszko	S-VS
Breakwell	S	Rufus	MR
Canobolas	MR-MS*	Speedee	S
Endeavour	R	Tahara	MR
Everest	MS	Tickit	MR
Hawkeye	MR	Tobruk	MR
Jackie	VS	Treat	MR

* These ratings are less reliable and should be treated with caution

Further References

Detailed information on each of the cereal diseases can be obtained from the DPI Information Note Series: www.dpi.vic.gov.au/notes Click on Crops & Pastures > Cereals

Cereal Root Diseases – 2009 (AG 0562)

Wallwork, H (2000) Cereal Leaf and Stem Diseases

Wallwork, H (2000) Cereal Root and Crown Diseases

Wallwork, H (2009) Cereal Seed Treatments 2009

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Wheat Disease Reactions

Variety	Rust			Cereal Cyst Nematode		Yellow leaf spot	Septoria tritici	Root lesion nematode (<i>Pratylenchus</i>)				Crown rot	Common root rot	Black tip*	Flag smut
	Stem	Stripe	Leaf	Res	Tol			<i>P. neglectus</i>		<i>P. thornei</i>					
BREAD WHEAT															
Annuello	R	MS-S	MR	R	I	MS-S	S	MS-S	MI	S	-	S	-	MR-MS*	MR
Axe	MS	MR	MR	S	-	S	MS	S	-	S	-	S	MS-S	MS-S	S
Bolac	MR-MS	R-MR	MS	S	I	MS-S	MS	S	-	MS	-	S	S	MR-MS	R-MR
Bullet	MR*	MS-S	MR-MS	MR	-	MR-MS	S	-	-	-	I	S	S-VS	MR-MS	S
Camm	S	MS-S ^{Yr17}	S	S	MI	S	S	MS	-	MS*	-	S	MS-S	MS*	MR
Carinya	MR	MR-MS ^{Yr17}	MR	S	-	S	MS	S	-	MS-S	-	S	MS-S	S	MS
Catalina	MR	MR-MS	MR	R	-	MS-S	MS-S	S	-	MS	-	S	MR-MS	MS	R-MR
Chara	MR-MS	MS-S	MS	R	MI	MS-S	MS-S	S	MT	MR	MT	S	S	MS	MR
Clearfield JNZ	MR	MS	MS	S	I	S	MS	MS-S	MI	S	-	S	MS-S	S	R-MR
Correll	MR-MS	MR-MS	MS	MR	-	S-VS	MS	S	-	MS	-	S	MS-S	MR-MS	R
Crusader	R-MR	MR-MS ^{Yr17}	MR	MS	-	MR	MS-S	S	-	S	MT-MI	S*	MR-MS	MR	MR-MS*
Dakota	MR	MR-MS	MR-MS	R	-	S	S	S	-	S	MI*	S	S*	-	MS*-
Derrimut	R-MR	MS ^{Yr17}	R	R	-	MS-S	MS-S	S	-	MS-S	-	S	S	S	R
EGA Gregory	MR-MS	R-MR	MR	S	-	MS-S*	MS*	-	-	MS-S*	MR	S	-	MS*	R
EGA Wedgetail	MR-MS	MR-MS	MS	S	-	MS-S	MR	-	-	-	-	S	-	MS*	MR-MS
Espada	MR	MR-MS ^{Yr17}	MR	MS	-	MS	MS-S	MS	-	S	-	S	MS-S	MS-S	MS
Frame	MS	MR-MS	MS	MR	MT	S-VS	MS	MS-S	MT	S	MI	S	S	MS	MR
GBA Ruby	MS	R-MR ^{Yr27#}	MR	S	-	MR-MS	MR-MS	-	-	-	-	S	MS	MS	S
Gladius	MR	MR-MS ^{Yr17}	MS	MS	-	MS	S	MS-S	-	MS-S	-	S	MS	MR*	R-MR
Guardian	MR	MS	MS	R	-	MS-S	MS	S	-	MS	MT-MI	S	MS	MR-MS	S
H46	MR-MS	VS ^{Yr17}	R	S	MI	MR-MS	VS	MS	-	MS-S	-	S	MS-S	MR-MS	R-MR
Janz	MR	MR-MS	MS	S	I	S	MS	MS-S	MI	S	MI	MS-S	MS-S	S	R
Kellalac	MS-S	MR-MS	S-VS	MR	MI	S	MS	-	-	S	MT	-	-	-	R
Lincoln	MR	R-MR	R-MR	S	-	MR-MS	MS-S	-	-	-	I	S-VS	MS*	MR-MS	R
Livingston	MR	R	R-MR	S	-	MS-S	-	S	-	MR	-	S	MS-S	-	R*
Meering	S	MS	MS	S	I	S	S	S	-	S	MI	S	MS-S	S*	R
Merinda	R-MR	R-MR ^{Yr27#}	MR	S	-	S	S-VS*	S	-	MR	-	MS-S	MS-S	MR*	MS-S
Mitre	R-MR	MS-S	MS	R	MI	S	MS-S	S	-	S	-	S	S	S-VS*	MR
Peake	MR-MS	MR-MS	R	R	-	MS-S*	S*	S	-	MS	-	S	S	MS-S	MR-MS
Pugsley	MS	S ^{Yr17}	MR	MS	MI	S	MS	S	MT	-	-	S	MS	MS	MR
Rosella	MR	MR-MS	MS	S	I	MS-S	MS	MS	I	S	-	VS	S	S	S
Sentinel	R	R-MR	R-MR	S	-	MR-MS	MS-S	S	-	MS	MT-MI	MS-S	-	R-MR	MS-S
Ventura	R#	MS ^{Yr17}	MR-MS	S	-	MS-S	MS	MS-S	-	MR	-	MS	MS-S	MR	MR
Waagan	MS	MR ^{Yr27#}	MR-MS	S	-	MS*	MS	S	-	S	-	S	S	-	MS
Wyalkatchem	MS	MS-S	R	S	MI	MR-MS	MR-MS	MR	MT-T	S*	-	S	S	MS	S
Yitpi	S	MR-MS	MS	MR	MT	S-VS	MS	MR-MS	MT	S	-	S	MS	MS	MR
Young	MR	MS ^{Yr17}	MR-MS	R	-	MR-MS	MS*	S	-	MS	-	S	MS-S	MR*	MS

Varieties marked may no longer be resistant due to the occurrence of new races making these varieties susceptible. * These ratings are less reliable and should be treated with caution.

R = Resistant MR = Moderately resistant MS = Moderately susceptible S = Susceptible VS = Very susceptible

T = Tolerant MT = Moderately tolerant MI = Moderately intolerant I = Intolerant (In the presence of the nematode tolerant varieties lose little yield, whereas intolerant varieties can lose significant yield).

Yr17 Has the stripe rust resistance gene Yr17 which is effective against the "WA", "Jackie" and "Jackie Yr27" pathotypes, but ineffective against the "WA Yr17" pathotype for which the expected field rating is shown. Yr27# These lines have effective resistance against the "WA", "WA Yr17" and "Jackie" pathotypes, but will be more susceptible to the to the "Jackie Yr27" pathotype. The degree of susceptibility is, however, unknown.

Wheat Disease Reactions (continued)

Variety	Rust			Cereal Cyst Nematode		Yellow leaf spot	Septoria tritici	Root lesion nematode (<i>Pratylenchus</i>)				Crown rot	Common root rot	Black tip*	Flag smut
	Stem	Stripe	Leaf	Res	Tol			<i>P. neglectus</i>		<i>P. thornei</i>					
								Res	Tol	Res	Tol				
BISCUIT WHEAT															
Barham	MR	MS-S ^{Yr17}	MR	MR	-	MS-S	MS-S	MR	-	MS	-	S	MS-S	MS	MR-MS
Bowie	S*	S ^{Yr17}	MR#	MR	MT	S	MS	MR	MT	MS	MI	S	S	MR-MS	MS
Yenda	R	MS-S ^{Yr17}	R	S	-	MR	MS-S	MR*	MT-T*	S	-	S	MS-S	-	MR

Variety	Rust			Cereal Cyst Nematode		Yellow leaf spot	Septoria tritici	Root lesion nematode (<i>Pratylenchus</i>)				Crown rot	BYDV ¹	Black tip*	Flag smut
	Stem	Stripe	Leaf	Res	Tol			<i>P. neglectus</i>		<i>P. thornei</i>					
								Res	Tol	Res	Tol				
DURUM WHEAT															
Hyperno	R	MR	R	MS	-	-	-	MR-MS	-	-	-	VS	-	MR	-
Kalka	MR	MR	MR	MS	MT	MR	MS	MR-MS	-	R*	-	VS	-	-	R
Saintly	MR	MR	R	MS	-	-	-	MR-MS	-	-	-	VS	-	MR*	-
FEED WHEAT															
Beaufort	-	R*	R-MR	-	-	MS-S*	MR*	-	-	-	-	MS-S*	-	-	R-MR
Brennan	MS-S	R	R	-	-	MS	MR	-	-	-	-	-	-	-	R
Mackellar	MR	R	S	-	-	MS	MR	-	-	-	-	-	R	-	MS*
Tennant	R	MR	MS-S	-	-	MR	R	-	-	-	-	-	-	-	MS

BYDV¹ = Barley Yellow Dwarf Virus

R = Resistant MR = Moderately resistant MS = Moderately susceptible S = Susceptible VS = Very susceptible

T = Tolerant MT = Moderately tolerant MI = Moderately intolerant I = Intolerant (in the presence of the nematode tolerant varieties lose little yield, whereas intolerant varieties can lose significant yield).

Varieties marked may no longer be resistant due to the occurrence of new races making these varieties susceptible.

* These ratings are less reliable and should be treated with caution.

Yr17 Has the stripe rust resistance gene Yr17 which is effective against the "WA", "Jackie" and "Jackie Yr27" pathotypes, but ineffective against the "WA Yr17" pathotype for which the expected field rating is shown. Yr27# These lines have effective resistance against the "WA", "WA Yr17" and "Jackie" pathotypes, but will be more susceptible to the to the "Jackie Yr27" pathotype. The degree of susceptibility is, however, unknown.

Barley Disease Reactions

Variety	Scald	Spot form net blotch	Net form net blotch	Powdery mildew	Leaf rust	BYDV ¹	Cereal Cyst Nematode		Root lesion nematode (<i>Pratylenchus</i>)				Barley grass Stipe Rust
							Resistance	Tolerance	<i>P. neglectus</i>		<i>P. thornei</i>		
									Resistance	Tolerance	Resistance	Tolerance	
MALTING BARLEY													
Baudin	S-VS	S	MS	S-VS	VS	MR	S	T	-	-	-	-	R
Buloke	MS	MS-S	MR	MR	MS-S	S*	S	T	-	-	-	-	R
Commander	S	MS-S	MR-MS	MR-MS	S	S	R	T	-	-	-	T-MT	R
Flagship	MS	MS	MR-MS	MR-MS	MS-S	S	R	T	R	-	MR-MS	T	R
Gairdner	S-VS	S-VS	MR-MS	MR	MS-S	MR	S	T	MR	MT	MR-MS	I	R
Schooner	MS	MS-S	MR-MS	S-VS	S-VS	S	S	T	MR-MS	MT	R	MT	R
Sloop	S	S	MR-MS	S-VS	S-VS	S	S	T	MS	T	MR	T	R
SloopSA	S	S	MR	S-VS	S	S	R	T	MS	MT	R	-	R
SloopVic	S	MS-S	MR	MR-MS	MS	S	R	T	MS	MT	R	-	R
Vlamingh	MR-MS	MS-S	MR	S	S	MS	S	T	-	-	-	-	R
FEED BARLEY													
Barque	VS	MR	MS	MR-MS	MS-S	S	R	T	R-MR	MT	MR	MT	MR
Capstan	S	MS-S	MR-MS	MR	MS-S	S	R	T	MR	T	-	-	MR
Fleet	MR-MS	MR-MS	MR-MS	MR-MS	MS	S	R	T	-	-	-	MT	R
Hindmarsh	MR	S	MR-MS	MS	MS	S	R	T	-	-	-	-	R
Keel	MS	MR	MR#	MS	VS	S	R	T	MR	T	MR	-	MS
Maritime	S	MS	MR	S	MS	S	R	T	MR	T	-	-	S
Tantangara	MR-MS	S-VS	MS	VS	MR-MS	S	S	T	-	-	-	T-MT	S
Yarra	S-VS	MS-S	MR-MS	S-VS	R	S	R	T	-	-	-	-	R

BYDV¹ = Barley Yellow Dwarf Virus

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