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Stripe Rust Issues at Mid Spring

New pathotype identified, variety responses, spike infection, late season fungicides

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Record September rainfall across most of eastern Australia has allowed winter cereal crops to be well placed for excellent flowering, and with sufficient subsoil moisture to provide ideal conditions for grain fill. The cool temperatures have also allowed optimal crop development, although frost has caused some damage in certain situations across southern regions. Recent heavy rain may even see significant water logging damage and associated crop loss. With these ideal moisture and temperature conditions, stripe rust has continued to be a threat to realizing the benefits of an above average season. In contrast, Western Australia has remained largely below average with dry conditions persisting for much of the winter cropping season.

'Yr17-27' Pathotype

An isolate collected from a crop of Livingston near Wellington (NSW) in late September has been identified as 134 E16 A+Yr17+Yr27+. This pathotype combines virulence for *Yr17* and *Yr27*, and is likely to be a single mutation derivative from the 'WA Yr17' pathotype that has been recovered frequently this season. The co-operator was contacted immediately and information indicates that hot spots in the Livingston field were evident at heading and a fungicide application was considered warranted.

Livingston is the only variety carrying *Yr17* and *Yr27* although all varieties considered vulnerable to the 'WA Yr17' and 'Jackie Yr27' pathotypes can be expected to be equally vulnerable to the new 'Yr17-27' pathotype. Although data is not available that will allow a precise assessment of Livingston's response to this pathotype, growers are advised to monitor crops and consider spray applications as appropriate. It will also be of value to dispatch stripe rust samples from Livingston for pathotype assessment, and note the extent of foliar damage at the time of sample collection.

Pathotype Identifications

Pathotypes identified at mid October are listed in Table 1. Although just 40% of samples received to date have been processed and reported, there appears to be:

- a significant increase in the recovery of the 'WA Yr17' pathotype.
- a resurgence in frequency of the 'WA' pathotype, compared to previous years.
- a surprising decline in the once dominant 'Jackie' pathotype.

These are only preliminary trends and further clarity will emerge as samples are processed. BGYR affecting weedy barley grass has also been observed and confirmed in southern NSW and Victoria.

Variety Responses – Stripe Rust

Enquiries have generally continued to affirm the expected responses of major varieties to stripe rust during the 2010 season. Some revisions can be expected and these will be communicated after

consultation with state pathology colleagues in December.

Some specific comment on major varieties in southern regions of eastern Australia:

Lincoln, Bolac These varieties are believed to carry *Yr4* and other adult plant resistances, and have been resistant under field conditions of heavy inoculum pressure. However leaf damage can occur and this can be quite extensive although the resistant reaction does prevent the pathogen from multiplying further. A low level of susceptible plants in Lincoln should not be cause to consider spray intervention.

Pathotype 64 E0 A- was recovered at very low frequency from Lincoln in late 2009. Two isolates from Lincoln in 2010 (southern NSW) have been confirmed as 64 E0 A-. This pathotype is currently under test in an isolated field nursery at PBI Cobbitty, and information to date suggests that both Lincoln and Bolac are remaining moderately resistant.

Gregory, Strzelecki These varieties have generally performed very well, with earlier season fungicides being helpful in reducing disease pressure. Both varieties have a leaf tip dieback condition that is associated with a rust resistance gene (see below). In addition, both varieties can take a yellow appearance in the flag at and/or after flowering. Both leaf tip and leaf yellowing are not disease related and would not be expected to respond to fungicide application.

Variety Responses – Physiological Symptoms

The following physiological symptoms are appearing in certain varieties. Note again that these are not diseases that will respond to fungicide control.

Leaf tip death As noted for Gregory and Strzelecki, there is a condition known as leaf tip necrosis that is expressed in wheat varieties that also carry the rust resistance genes *Yr18-Lr34*. Among varieties expected to show leaf tip necrosis associated with these genes are Livingston, Merinda, Sunvale, Wedgetail.

False black chaff A black discolouration of the glumes and stem associated with the deposition of melanoid pigments has been commonly observed in the current season (Figure 2). The condition is termed ‘false black chaff’ (also ‘melanism’ or ‘pseudo black chaff’) to distinguish it from ‘black chaff’ which may be caused by plant pathogens (see Cereal Rust Report Volume 6, Issue 7, 22 October 2008). False black chaff is a physiological condition that is completely associated with the *Sr2* stem rust resistance. The expression varies between varieties carrying *Sr2* and is generally more noticeable in warm to hot and humid conditions in the post flowering phase.

Stripe Rust Spike Infection

The combination of heavy inoculum pressure and opening glumes at flowering provides an opportunity for stripe rust infection of the spike. Symptom development, including bleaching of the spike and heavy rust development inside the floret (Figure 2), becomes evident from early grain fill. Spike infection can be expected to cause shriveling of grain in affected florets and hence high screenings may occur under severe infection. Varieties may vary in vulnerability to spike infection, although those susceptible to foliar infection are generally also vulnerable to spike infection. Triticale and wheat can be equally affected by spike infection.

Control of spike infection is generally aimed at reducing the inoculum load in the canopy, either by resistant variety choice or foliar fungicides. However crops may still be seriously infected from inoculum in the environment, despite good control of foliar infection. Fungicide sprays directed specifically at control of spike infection are generally not expected to be viable. The following issues create uncertainty for fungicide control of spike infections:

- Although the triazoles have some systemic movement in leaves, the chemicals are not expected to translocate from the leaf to the spike.
- Specific “ear wash” fungicide application has some difficulties
    - Fungicide applied at flowering may interfere with successful pollination.
    - Fungicide applied after flowering is not expected to provide significant curative treatment to established infection.

Late season fungicide application

The anticipated extended grain fill period for much of south eastern Australia will raise thoughts of implementing post flowering foliar fungicides. Some points to consider in arriving at decisions to implement this strategy:

- Varieties ranked from R to MR-MS would not be expected to show economic response to late season foliar sprays.
- Varieties in the MS category are difficult at this stage of development. If stripe rust has been well controlled, then a late onset of disease after flowering may show some yield penalty but it is likely to be very small. Add to this the crop damage expected from a late boom spray application and the decision to spray would seem to be more unlikely.
- Varieties in the susceptible or very susceptible category that have been controlled throughout the season and which

are positioned for high yield potential are candidates.
- If spraying is envisaged, give careful consideration for the length of protection that might be required and select the product accordingly. Take due caution with fungicide label instructions, and in particular the withholding period prior to harvest.

Table 1 Stripe rust pathotypes identified across Australian wheat growing regions. Current to mid October 2010.

Pathotype	Region						Total
	QLD	n NSW	s NSW	VIC	SA	WA	
'WA' pt 134 E16 A+	5	10	12	4	-	2	33
'WA Yr17' pt 134 E16 A+ Yr17+	3	27	63	7	-	-	100
'Jackie' pt 134 E16 A+ J+	-	9	29	6	3	-	47
'Tobruk' pt 134 E16 A+J+T+	-	2	13	1	-	-	16
'Jackie Yr27' pt 134 E16 A+J+Yr27+	-	-	-	1	-	-	1
'Yr17-27' pt 134 E16 A+Yr17+Yr27+	-	1	-	-	-	-	1
BGYR	-	3	5	-	-	-	8
Total identifications	8	52	122	19	3	2	206
Total samples	48	110	312	64	20	3	557

Figure 1
Leaf tip and yellow foliage of EGA Gregory growing in a short nursery row, in contrast to the greener leaves of a later maturing variety in the foreground.

Figure 2 Symptoms of false black chaff (left) and stripe rust spike infection (right). Close up of an infected floret showing spores attached to, but not infecting, the developing grain.

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RUSTED PLANT SAMPLES
can be mailed in paper envelopes;
do not use plastic wrapping or plastic lined packages.
Direct samples to:

Australian Cereal Rust Survey
Plant Breeding Institute
Private Bag 4011, Narellan NSW 2567

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