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Stripe rust pathotype 'Jackie Yr27' detected for the first time

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A single sample of stripe rust from northeast Victoria was confirmed as the first Australian pathotype with virulence for the Yr27 resistance. The gene is present in several commercial varieties and these will now be under a degree of uncertainty until we can determine the expected field responses. The evidence indicates that the new pathotype, designated the 'Jackie Yr27' pathotype, arose as a single mutation derivative from the 'Jackie' pathotype.

Several reports of unexpected stripe rust damage on Ruby wheat were received from Victoria late in 2007. Ruby carries the resistance gene Yr27 and so concerns were held that this gene may have been overcome. However, we were unable to recover a viable isolate from these collections. The concern over Ruby extended into the current season, and we have reported in each of the four recent issues of the Cereal Rust Report on stripe rust samples received from Ruby; all isolates to date have been avirulent on Ruby.

A stripe rust sample from a wheat field collected by Andrew Russell (Baker Seed Company) from Rutherglen was received on 1st October, and initial results taken on 20th October suggested that this could be a new pathotype. A repeat experiment was completed on 3rd November, and this confirmed the identity of the new pathotype. Contact with Andrew

then revealed that the sample was collected from variety Merinda, which is known to carry Yr27.

Pathotype characteristics

Greenhouse experiments with the isolate revealed features identical to the 'Jackie' pathotype, but with a susceptible reaction on the differential test variety Selkirk which carries Yr27. We have monitored stripe rust isolates on Selkirk since 1990 and among the thousands of isolates examined to date, this is the first to show a susceptible reaction in the seedling test. The pathotype is designated 134 E16 A+ J+ Yr27+, and is given the common name 'Jackie Yr27' pathotype.

There is currently just one isolate of this new pathotype, but further isolates from varieties such as Ruby are still under test. The essential features of this pathotype, in comparison with other common

pathotypes, are illustrated in Figure 1. Note that the 'Jackie Yr27' pathotype is avirulent for *Yr17* and so the latter will provide protection against this new pathotype.

In summary, the four pathotypes now present in eastern Australia are:

- 'WA' pathotype: *Yr17*, *Yr27* and *Yr Jackie* are effective in providing protection in wheats and triticales carrying these genes.
- 'WA Yr17' pathotype: *Yr27* and *Yr Jackie* remain effective.
- 'Jackie' pathotype: *Yr17*, *Yr27* remain effective.
- 'Jackie Yr27' pathotype: *Yr17* remains effective.

Note that in addition to these seedling genes, *Yr33* is effective in providing protection against all pathotypes. There is also a range of effective resistance genes operating in the adult plant growth stages (the APR genes), and these will enhance the level of protection particularly if present in varieties as gene combinations.

All four pathotypes were detected in eastern Australia in 2008. Since its first appearance in 2002, only the 'WA' pathotype has been found in Western Australia.

Varieties carrying *Yr27*

Current varieties that carry *Yr27* include GBA Combat, GBA Ruby, Merinda and Mira. Several other varieties may also carry *Yr27*, and these will be tested with the new pathotype to confirm the presence/absence of the gene. The responses of *Yr27* varieties in the field will

remain unknown until trials are conducted in 2009. Greenhouse tests on adult plants will be undertaken in an attempt to predict expected field responses, but these tests are frequently difficult to relate to field conditions. Note that variety Livingston, which carries *Yr17* and *Yr27*, should remain resistant to the 'Jackie Yr27' pathotype.

It is of interest that Andrew Russell reported that the rust sample collected from Merinda at Rutherglen was sourced from a large hotspot zone stretching up to 5 meters in diameter. Within this hotspot, leaf area damage was observed to be up to 60% on flag leaves, although appeared that the plants were offering some resistance to spore production. While this might suggest a moderately susceptible reaction for Merinda, it should be noted that reactions in hotspots are often noticeably worse than experienced in the field as a whole. At present there are no stripe rust response ratings available for *Yr27* wheats.

Rust samples for pathotype analysis

While we are hesitant to request further samples as we struggle under the load of record sample numbers for processing, it will be important to remain vigilant in observing variety responses in these later phases of the stripe rust epidemic. We have observed over many years that new pathotypes tend to emerge late in the season, perhaps as a consequence of the maximised pathogen population size at this time. Kindly send samples that might be considered unusual, dispatching them promptly as we also find that late samples often prove difficult for isolating viable rust cultures.

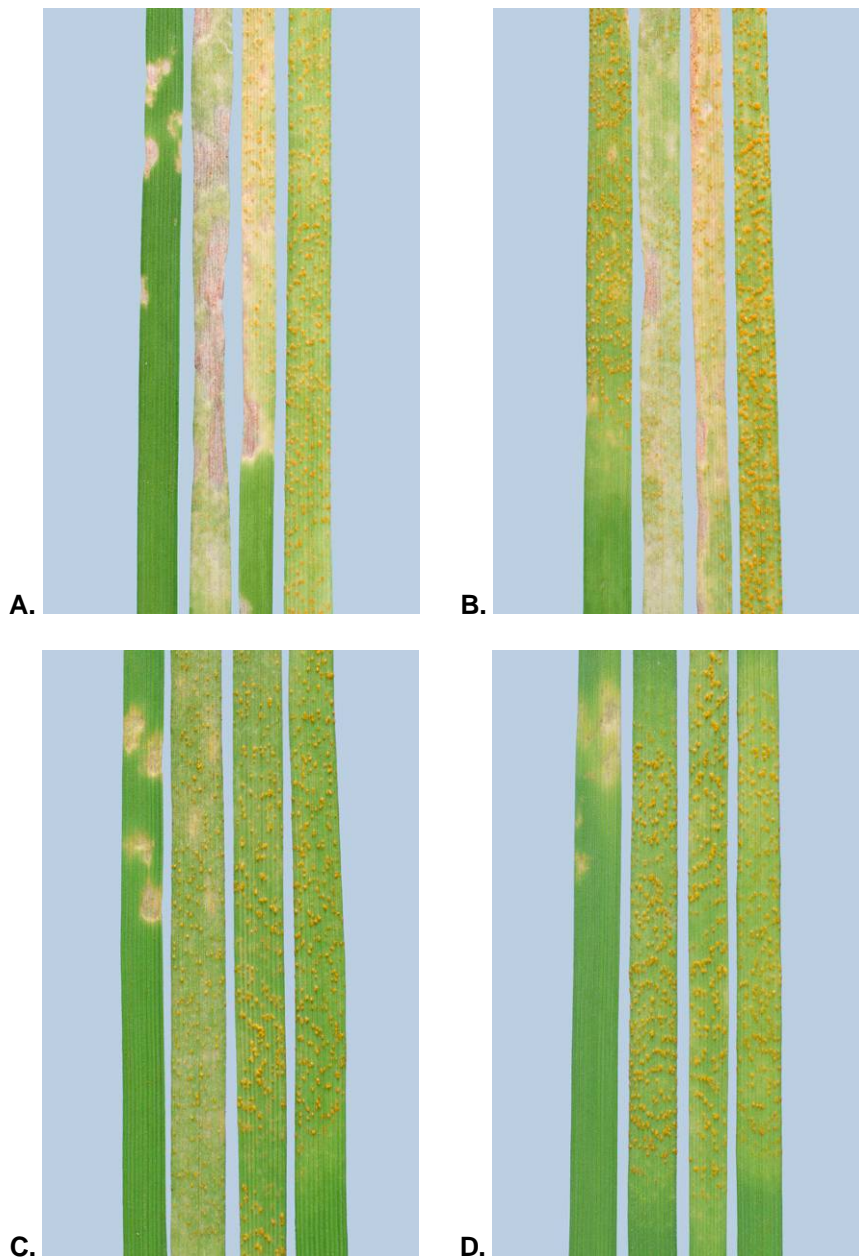


Figure 1. Four pathotypes of wheat stripe rust detected in eastern Australia in 2008 tested on seedlings of (left to right) Trident (*Yr17*), Selkirk (*Yr27*), Breakwell (*Yr Jackie*) and Avocet S.

- A. 'WA' pathotype 134 E16 A+
- B. 'WA Yr17' pathotype 134 E16 A+ Yr17+
- C. 'Jackie' pathotype 134 E16 A+ J+
- D. 'Jackie Yr27' pathotype 134 E16 A+ J+ Yr27+

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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
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