

Fungicide insensitivity (resistance) in leaf rust of barley and leaf rust of wheat

Cereal Rust Report 2022, Volume 19 Issue 3

3 November 2022

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We have convincing evidence from tests under controlled conditions of insensitivity (resistance) to several DMI fungicides in the leaf rust pathogens of wheat and barley. It is now critical to see if these findings constitute field failure. We would appreciate hearing of the success or otherwise of fungicide applications to barley or wheat crops for leaf rust control. We would also appreciate receiving rust samples for pathotype analysis, and in situations where insensitivity is suspected, for fungicide testing. Please send freshly collected samples in paper only to the Australian Cereal Rust Survey, at University of Sydney, Australian Rust Survey, Reply Paid 88076, Narellan NSW 2567.

The use of fungicides in Australian broadacre farming since the early 1980s has been followed by the emergence of insensitivity in a number of fungal pathogens of cereal crops, especially to the DMI fungicides. This has been well documented in for example septoria tritici blotch, wheat powdery mildew, barley powdery mildew, and net form of net blotch and in blackleg in canola.

In contrast, apart from reports from Brazil of a decline in the field performance of DMIs against the Asian soybean rust pathogen, few if any agronomically significant cases of fungicide insensitivity in a rust pathogen are known.

We have screened more than 800 rust isolates of wheat (stem rust, leaf rust, stripe rust), barley (leaf rust) and oat (crown rust, stem rust) for sensitivity to the DMI fungicide tebuconazole in recent years. The tests are conducted by applying precise amounts of increasing concentrations of tebuconazole to rust-susceptible wheat, barley or oat seedlings using a de Vries spray booth. The seedlings are left for 24 hours, then infected with different rust isolates to assess sensitivity to the chemical. Nine treatments are used: water; 0.03x Low Field Rate (LFR, where LFR is 145mL/ha); 1.0x LFR; 1.5x LFR; 1.0x High Field Rate (HFR, where HFR is 290 mL/ha); 2x HFR; 10x HFR; 20x HFR; 25x HFR.

These controlled environment tests have so far detected insensitivity in two rust pathogens, the leaf rust pathogen of barley (*Puccinia hordei*) and the leaf rust pathogen of wheat (*P. triticina*). In both cases, the insensitivity was shown to be against not only tebuconazole, but also triadimefon, propiconazole, and prothioconazole. Given that the insensitivity is pathotype specific, identifying the pathotype (which takes about 3 weeks) allows us to predict fungicide sensitivity with great confidence. More details are provided below on both cases.

Leaf rust of barley (*Puccinia hordei*)

Our tests found that insensitivity occurs in a clonal lineage of pathotypes that trace back to an exotic incursion into WA that was first detected in 2001, and which are now the most commonly isolated pathotypes in all Australian barley growing regions. Isolates within this lineage, including the original 2001 isolate, were able to grow and sporulate at rates of tebuconazole of

more than 10 times the recommended high field rate of 290mL/ha. Our tests confirmed curative action of chemical applied up to 4 days after infection in normal (sensitive isolates), but not after 7 days. As would be expected, no kickback (curative) action was observed with insensitive isolates. These pathotypes occur across all barley growing regions of Australia.

Leaf rust of wheat (*Puccinia triticina*)

Our studies revealed insensitivity to the 4 DMI fungicides in a single pathotype of *P. triticina*, viz. 93-3,4,7,10,12 +Lr37. This pathotype was first found in October 2020 from a leaf rusted crop near Forbes NSW. It became more widespread in NSW in 2021 and was also detected in Qld and Victoria but has remained at low levels. Seedling tests have shown that while this pathotype shows reduced infection at high rates of tebuconazole, it can grow and sporulate on leaves treated at rates up to 25 times the recommended high field application of 290mL/ha.

The success of our rust surveys depends entirely on the samples received for analysis- hence as always, growers and other stakeholders are encouraged to monitor crops closely for rust in the coming season, and to forward freshly collected samples in paper only to the Australian Cereal Rust Survey, at University of Sydney, Australian Rust Survey, Reply Paid 88076, Narellan NSW 2567.

We cannot stress enough how important it is not to post samples in plastic of any kind – rust fungi do not like this!

Acknowledgements: The national cereal rust surveillance program at the University of Sydney's Plant Breeding Institute acknowledges all cooperators who forward wheat, barley, oat, triticale and cereal rye rust samples. We especially acknowledge Drs Lisle Snyman, Andrew Milgate, Steven Simpfendorfer, Grant Hollaway, Tara Garrard/Hugh Wallwork, Manisha Shankar and Geoff Thomas.

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Rusted Plant Samples

Can be mailed in paper envelopes.
Do not use plastic wrapping or plastic lined packages. If possible, include the latitude and longitude of the sample location, date of collection, cultivar, and your full contact details.

Direct rust samples to:

University of Sydney
Australian Rust Survey
Reply Paid 88076
Narellan NSW 2567

The Australian Cereal Rust Control Program is supported by growers through the Grains Research & Development Corporation.

