

Early Wheat Stripe Rust in 2024 – Pilot testing of web-based App for Early Warning System

Cereal Rust Report 2024, Volume 21 Issue 1

30th July 2024

Dr Mumta Chhetri, Professor Robert Park, Dr Michelle Demers, Mr Matthew Williams and Ms Margerita Pietilainen

The first report of wheat stripe rust for the 2024 season was received on May 30th from Hagley, Tasmania. Subsequent samples were noted in Greenethorpe, NSW on June 17th, and Wagga Wagga, NSW on July 4th, with further reports from Griffith and various locations across southern and central NSW by the end of June via Twitter. This initial detection is approximately one week later than the severe 2022 stripe rust epidemic onset, with the long-term average first detection date for eastern Australia being the fourth week of July. The early onset of stripe rusts this year suggests increased disease pressure and early over-summering. The widespread occurrence raises the potential for rapid disease build-up if conditions remain favorable. Historically, the most severe epidemics have occurred in years with early detections, ranging from May 16th (1984 and 2008) to October 5th (1994), with an average first detection date of July 23rd. Since its initial detection in eastern Australia in 1979, stripe rust has persisted every summer, surviving on living plants from one cropping cycle to the next, known as the “green bridge.” An abundance of susceptible plants over the non-cropping summer months typically causes cereal rust pathogen populations to increase.

We are currently processing the 27 stripe rust samples received mainly from NSW. The first sample is being pathotyped as ‘239’ from Hagley, Tasmania. The other pathotype as 198 Ma+ from Greenethorpe, NSW. Our recent analysis of the 198 derivatives identified two notable variants. In 2022, we discovered a 198 + *Yr1D* variant in a sample from Tullooona, NSW, which was not identified in the 2023 season. This variant is virulent on an uncharacterized ASR gene not targeted by the 198 standard pathotype. In 2023, we identified another 198 Ma+ variant in two samples from Murrarni, NSW, and Sherlock, SA. The 198 variants like the standard isolate remain vulnerable to various wheat varieties, including DS Bennett, LPB Trojan, and Emu Rock, as well as durum wheat varieties like DBA Artemis and EGA Bellaroi. Additionally, it impacts triticale varieties such as Astute and Bison due to its virulence on gene *YrB* and 198 Ma+ variant affects

Maritime barley.

Over the past three seasons, there has been a clear trend in pathotype dynamics **Figure 1**. Pathotype 198 initially dominated but decreased significantly from 77.8% in 2020 to 9.1% in 2023. Conversely, pathotype 239 increased from 10.1% in 2020 to 49.5% in 2023, becoming the dominant pathotype. Pathotype 238, first detected in 2021, increased in frequency last year to 36.4% of all pathotype identifications and slightly decreased to 31.3% in 2023. It will be interesting to see how it behaves in the 2024 season.

The frequency graph from 2020 to 2023 highlights the evolving prevalence of different pathotypes, providing valuable insights into stripe rust dynamics and aiding in the development of effective management strategies.

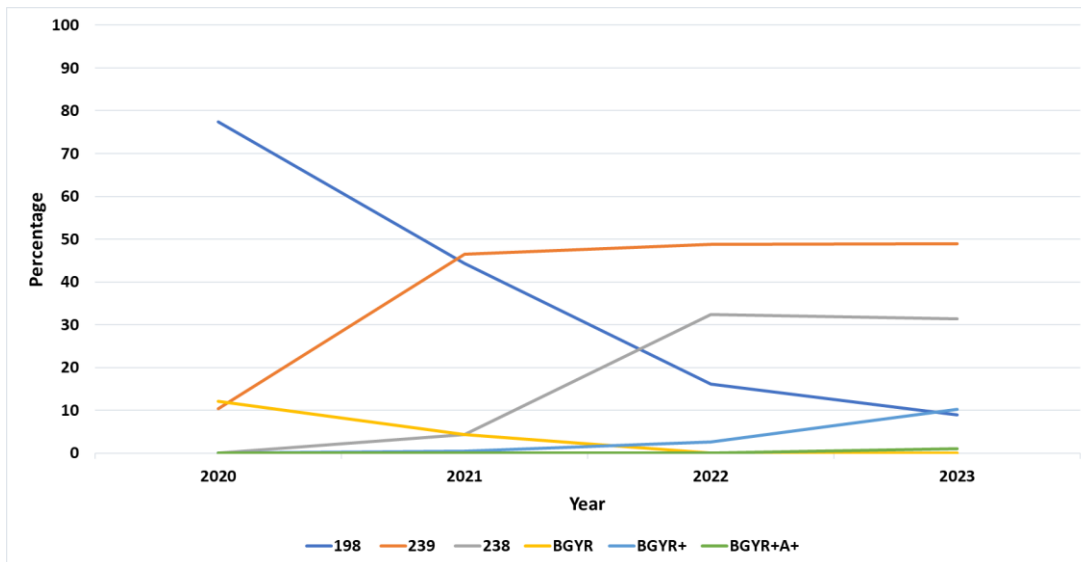


Figure 1: Frequency of Wheat stripe Rust in Eastern Australia from 2020 to 2023
 **BGYR+A+, BGYR+, BGYR variants of Barley grass stripe Rust, **238, 239 and 198 are variants of wheat stripe rust

The response of cereal varieties to rust, detailed in Cereal Rust Report 20 (3), is shaped by current pathotypes. Comprehensive nationwide surveys of rust pathogen virulence are essential for understanding, predicting for breeding resistance, particularly as rusts migrate from west to east across Australia.

We have developed a web-based tool, Cereal RustTrack: USyd, for early rust detection in the field, which is currently under pilot testing. This tool aims to generate distribution maps of rust pathogens to enhance our early warning system. Your assistance in refining this tool into a robust digital platform for early warning is greatly appreciated. Link and instruction are provided below for testing the web-based tool.

- I. To allow a respondent to begin this survey, follow the steps below:
 - i. Go to this web address: <https://redcap.sydney.edu.au/surveys/>
 - ii. Enter this code: **JRX8HYXY4**

This code is permanent and will never change. Bookmark this address for easy access to the survey at any time.

OR

- II. Scan the QR code below using a device with a QR code reader app to be taken directly to the survey in a web browser:



The nationwide airborne disease surveillance network is newly available; it is run by BioScout, sponsored by the GRDC, and is free to access. BioScout has developed an automated near real-time detection system that tracks several disease-causing spores in the air, including rust, and reports findings daily. The network consists of 60 locations across all growing regions (Figure 2). Please note that the detection of rust is general in nature, and we cannot distinguish the specific type at this time. You can access the network at www.bioscout.com.au/grdc or use the QR code in Figure 2 below.

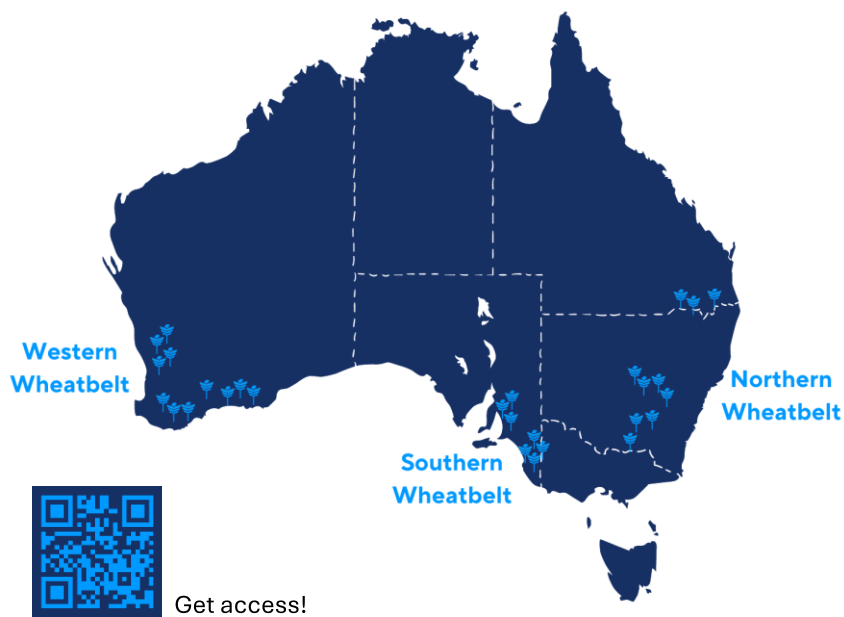


Figure 2: Location of the disease surveillance network across Australia.

Regional Summaries

Northern Region: Rust spores have been present in the air across most sites, though in small amounts (Figure 3). There was a brief spike of airborne rust spores in Warwick, QLD, on June 30th. However, airborne spore loads dropped off the next day and have remained relatively low since then, indicating no major rust outbreaks in the regions covered by the network thus far.

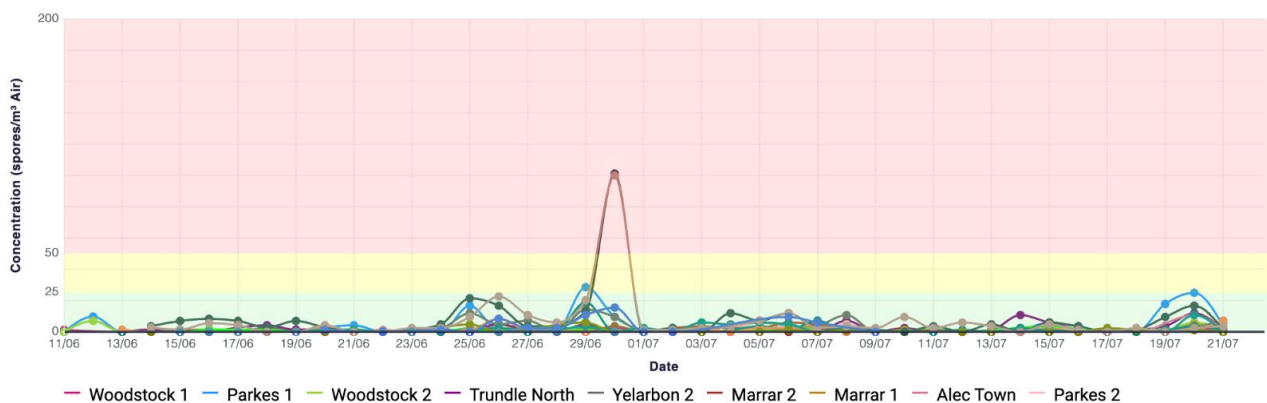


Figure 3: Concentration of rust spores (spores/m³ air) across the Northern growing region from June 11th – July 22nd. Please refer to the online network for a full list of colours corresponding to each location.

Southern Region: While rust spores have been consistently detected across the network, airborne quantities remain low (Figure 4). This indicates that there are no major rust outbreaks in the regions covered by the network thus far.

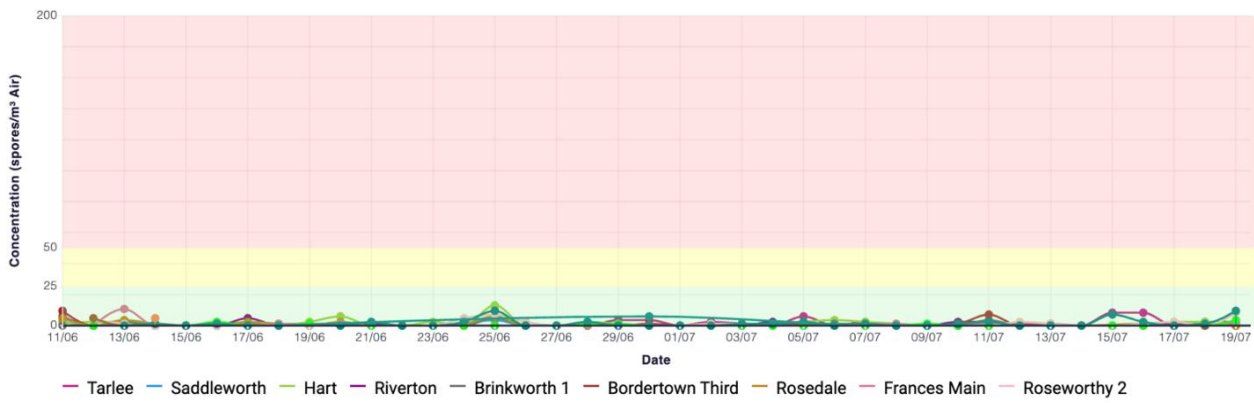


Figure 4: Concentration of rust spores (spores/m³ air) across the Southern growing region from June 11th – July 19th. Note: not all unit locations are shown in the x-axis. Please refer to the online network for a full list of colours corresponding to each location.

Western Region: Like the other regions, things have been relatively quiet across the network (Figure 5). We detected a spike in airborne spore concentrations near Scaddan, WA on July 15th. However, airborne spores dropped off almost immediately and have remained relatively low since then, indicating no major rust outbreaks are occurring in the regions covered by the network.

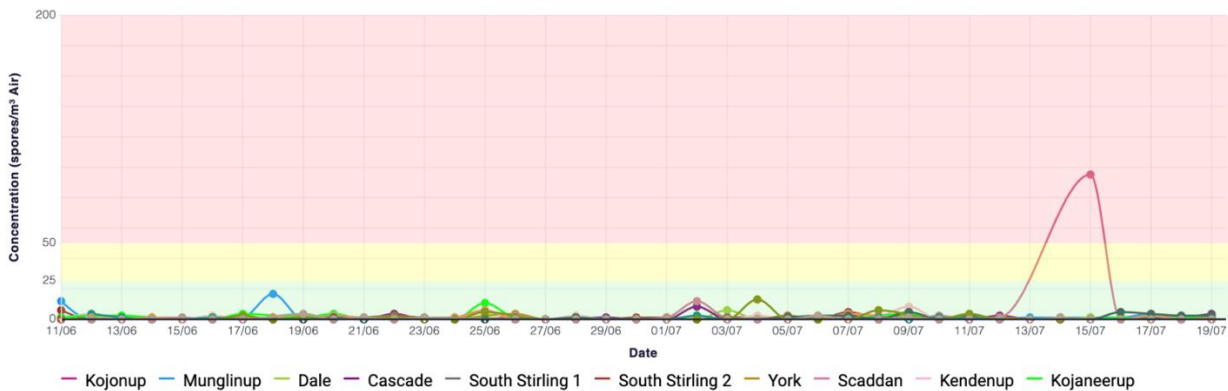


Figure 5: Concentration of rust spores (spores/m³ air) across the Western growing region from June 11th – July 19th. Please refer to the online network for a full list of colours corresponding to each location.

Using both the University of Sydney’s Cereal RustTrack: USyd and the Bioscout’s airborne disease surveillance network will enable farmers to make informed decisions in rust management in the field.

We urge you to send freshly collected cereal rust samples, packaged in paper only, to the **Australian Cereal Rust Survey at the University of Sydney, 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, Brad Baxter, Steven Simpfendorfer, Grant Hollaway, Hari Dadu, Tara Garrard, Manisha Shankar and Geoff Thomas.

General Enquiries

Dr Mumta Chhetri
Mr Matthew Williams

Plant Breeding Institute
Private Bag 4011
Narellan NSW 2567

T 02 9351 8808
F 02 9351 8875

Rusted Plant Samples

Can be mailed in paper envelopes.
Do not use plastic wrapping or plastic lined packages. Please include the nearest postcode of your sample's location, the date of collection, the 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.

