

## **MARPLE Diagnostics: A Pioneering Step in Wheat Rust Management**

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Wheat rusts have been associated with crop failures and famine throughout history. In the last decade, new yellow rust variants have emerged in many locations that are adapted to warmer temperatures, have expanded their ability to infect different wheat varieties and are more aggressive than those previously characterised causing a serious threat to global wheat production. To address this, we set out to improve the speed and resolution of current surveillance and diagnostic systems by developing a new, portable, genomics-based, point-of-care approach for wheat rust diagnostics. This new method termed Mobile And Real-time PLant disEase (MARPLE) diagnostics, utilizes the nanopore sequencer and is specifically tailored for identifying individual strains of the wheat yellow and stem rust pathogens. It enables rapid identification of both newly emergent strains and those with specific properties such as fungicide resistance, generating results within just 48 hours of field sampling. All the components needed to execute the MARPLE diagnostics method are also contained within a single hardcase, providing a truly portable system that can be conducted anywhere irrespective of access to resources. This new strategy has the potential to revolutionise wheat rust diagnostics, changing how emergent threats are identified and tracked into the future.