

Global surveillance and detection of novel cereal rust virulence

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Rust diseases, caused by *Puccinia spp.*, are among the most important causes of yield loss of cereal crops in the US and worldwide. Global surveillance of cereal rusts is an important mitigation strategy to ensure the timely deployment of control measures in vulnerable cereal production areas. The FDWSRU plays a critical role in such efforts, receiving samples of exotic cereal rusts collected by cooperators at institutes in East and North Africa, Europe, and South and Central Asia. Viable rust samples are received, recovered, increased, and archived in the FDWSRU BL-3 facility. A preliminary race analysis is also performed by testing on selected differential lines. Increased rust cultures are shipped to the CDL in St Paul, MN for in-depth phenotypic and genotypic analyses. Analyses derived from these rust cultures have enabled us to monitor the evolution and spread of highly virulent races of the wheat stem rust pathogen, and to identify hot spots around the world where diverse virulence combinations are generated and sustained through sexual cycles of the pathogen. Establishment of sentinel plots will enable us to identify new and highly virulent races promptly as they emerge, providing early warning for potential vulnerability. The new virulent races are being used to identify new sources of resistance for development of durable resistance in cereal crops.