

Genetic resistance to fungal diseases of wheat

Project description

Septoria nodorum blotch (SNB) and yellow spot (also known as tan spot) are diseases caused by necrotrophic fungal pathogens, which use necrotrophic effectors to attack wheat lines carrying matching dominant susceptibility genes. These diseases are complex and costly for wheat growers to manage.

This project will focus on identifying and characterising these two diseases, including fine mapping for new forms of genetic resistance. Near and perfect markers will be developed for implementation by breeders into marker-assisted selection and genomic prediction models. Our researchers aim to provide wheat breeders with improved knowledge and tools to deliver wheat varieties with better disease resistance in hopes of reducing the economic impact of these diseases on growers.



Our team

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Key achievements

Recent studies of the historic and contemporary WA SNB pathogen populations found it to be clustered into six groups with contrasting properties. A newly emerged group found in 2019 collection was one of the four currently present in our wheat fields. All four temporal groups are aggressive on common Australian commercial lines. Their pathogenicity mechanisms are under investigation. Knowledge from this study will help wheat breeders on developing durable resistance to SNB and yellow spot.

Our team is continuing to make progress towards identifying and characterising new effector candidates and their corresponding receptors. We have identified an important disease component which is common to both diseases. Molecular markers have been developed to detect this pathogenicity factor which breeders can use to select for more resistant wheat lines.

Key achievements to date include our successful development of a high-quality Australian reference genomes of the pathogen (*Parastagonospora nodorum*), molecular and data-analysis skill sets for functional studies of pathogen virulence and host resistance. The establishment of effector-assisted as well as marker-assisted breeding for SNB & yellow spot resistance has contributed to a reduction in the area sown to susceptible wheat varieties and multimillion-dollar savings to industry.

