SOILBORNE PATHOGEN IDENTIFICATION AND MANAGEMENT STRATEGIES PROJECTS

Year: 2020 - 2023

Funding Provider: Grains Research and development Corporation (GRDC)

Lead Organisation: Liebe Group

Collaborators: Grower Group Allience and Farmlink

PROJECT FUNDERS

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

REPORTS AND LINKS

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Aim: This project is aimed at providing growers with knowledge and experience in diagnosing soilborne pathogen infection from symptom expression on plant roots. It will also provide them with knowledge of management of these pathogens and demonstrate some management options in field situations and deliver extension activities nationally.

Project Information: Soilborne diseases remain an important constraint to grain crop production in Australia. For example, Murray and Brennan (2009) estimated that soil-borne diseases are estimated to cost grain growers over $370 million each year.

In the Western and Southern Regions, the propensity for cereal-dominant rotations and no-till has led to an increase in PredictaB detections of certain soilborne pathogens. In 2018, the main diseases detected in these regions were rhizoctonia root rot, crown rot, root lesion nematodes (RLN), and an increased risk of cereal cyst nematode (CCN) and take-all. In the Northern Region, while there are opportunities for diverse crop rotations, crown rot and RLN are still significant issues. Irrespective of the disease, any pathogen that affects the roots, ultimately limits the uptake of water and nutrients and is therefore an important contributor to the yield gap.

Despite the significance of the issue, diagnosing plant diseases and particularly soilborne pathogens can be difficult. Currently, the presence or absence of soil-borne pathogens can be ascertained through diagnostic services (eg. PredictaB), through the observation of root symptoms, and to a lesser extent, above-ground crop symptoms. Unfortunately, it has become apparent that growers frequently rely on above-ground crop symptoms to diagnose crop issues.

Above-ground symptoms for soilborne disease diagnosis can be problematic and incorrect for several reasons. Firstly, several of the observable crop symptoms can be similar between different pathogens and even other crop issues. Secondly, the change in farming practices towards earlier sowing has changed how some in-crop symptoms of soilborne diseases are expressed. This has been the case for the expression of rhizoctonia root rot.

Crown root infection is more difficult for growers to diagnose as there is no typical bare-patch and variation between a crown root infected crop and a healthy crop isn't as easily discernible. Thirdly, some pathogens co-exist and impact cereals in a complex interaction that may increase the complexity of visual identification above and below crop. Reliance on a single method of identification increases the likelihood of incorrect management strategies implemented, and a holistic approach to identification with all available tools is ideal.

As soilborne disease management is reliant on correct identification of the causal pathogen, it is important that growers and advisors are supplied with the knowledge to be able to achieve this. The purpose of this investment is to extend to growers and advisors the different methods for correctly identifying soilborne pathogens.

It will incorporate extension activities to assist symptom identification on the roots, promote the use of diagnostic services for pathogens that are difficult to identify by the naked-eye or may be present in a pathogen complex, and demonstrate management options available to reduce soilborne pathogen inoculum and impact.