Australian Government
Australian Centre for International Agricultural Research

Crops

Mitigating the effects of stripe rust on wheat production in South Asia and eastern Africa

Overview

Wheat provides about 20% of the world's food and is second only to rice as a source of calories in the developing world. While cereal production needs to increase to meet future demand, especially in the developing world, the emergence of new pathogen races, predicted changes in climate and rising fertiliser and water costs are making this challenge even greater.

The three rusts of wheat are among the most feared plant pathogens, significantly impacting global wheat production. Crop control of rust is achieved by either fungicides or genetic resistance. Where implemented properly, the latter approach has proven the most economical and environmentally sound by far.

Of the three wheat rusts, stripe (yellow) rust (WYR; caused by *Puccinia striiformis* f sp. *tritici; Pst*) has been the most damaging worldwide for the past 40 years. WYR has caused devastating epidemics in South Asia and is a serious problem in the highlands in eastern Africa. In recent years, WYR has become more severe in many regions, extending its footprint into warmer areas where historically it had not been a problem. This sudden change is due to an unprecedented adaptation of *Pst* to warmer temperatures, a general ability to cause more disease more quickly, and/or acquisition of virulence for minor gene resistance.

KEY FACTS

ACIAR Project No. CIM/2014/081
Duration: July 2016 to June 2020 (4 years)
Target areas: Ethiopia, India, Nepal and Pakistan
Budget: A$1,680,026

Project Leader
Robert Park, The University of Sydney

Key partners
- New South Wales Department of Primary Industries
- ICAR- IIWBR Indian Institute of Wheat and Barley Research
- Pakistan Agricultural Research Council
- Nepal Agricultural Research Council
- Ethiopian Institute of Agricultural Research

ACIAR Research Program Manager
Dr Eric Huttner

Objective

The project's overall aim is to systematically reduce vulnerability to WYR of wheat in South Asia and eastern Africa by establishing, equipping and mobilising a collaborative network of key cereal improvement centres and a knowledge base in South Asia and eastern Africa that will enable ongoing research and development.

The project's specific objectives are to:

- Characterise resistance to WYR in wheat germplasm in partner countries.
- Validate minor gene combinations and refine markers.
- Undertake stripe rust pathogen surveillance.
- Build partner capacity in rust pathology and genetics.

Expected scientific results

- Knowledge of WYR resistance in South Asia and eastern Africa wheat germplasm.
- Adapted wheat germplasm carrying diverse sources of resistance to WYR.
- High throughput markers linked to important WYR resistance genes.
- Wheat stocks to monitor pathogen virulence on minor genes.

Expected outcomes

- Farmers and millers benefiting from more stable and profitable cereal production, with flow-on benefits to cereal consumers in each country.
- The inclusion of pathologists and breeders in the training programme and involvement of private sector seed companies helping to expedite the production and adoption of improved germplasm and ensure a clear pathway to these end users.
- Sustained control of cereal rust diseases through resistance breeding and post-release management helping to reduce the impact of WYR in these regions and contributing to stabilising the incomes of smallholder farmers.
- Strengthened resilience of the Australian wheat industry to potential future incursions of stripe rust.

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