Researchers find rust resistance genes in wild grasses

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(PhysOrg.com) -- University of Adelaide researchers have identified new sources of stem and leaf rust resistance in wild grass relatives of wheat sourced mostly from the 'fertile crescent' of the Middle East.

The research project, supported by growers and the Australian Government through the Grains Research and Development Corporation (GRDC), has helped position the Australian grains industry to better defend against emerging rust races such as the virulent Ug99 stem rust pathogen, which scientists believe may pose a serious threat to global wheat supplies.

Project supervisor Dr Ian Dundas, of the School of Agriculture, Food and Wine at the University of Adelaide, said the project was part of a concerted global effort helping to underpin the sustainability of wheat cultivation.

"Australia is in an excellent position to combat the threat of cereal rust," Dr Dundas said. "This is one of many projects under the Australian Cereal Rust Control Program developing new sources of rust resistance for growers.

"Nearly two decades ago, the Australian Cereal Rust Control Program and GRDC recognized the danger to the economic viability of Australian wheat growers from the emergence of new strains of rust and began investing heavily in this type of research.

"In the long term, this work will assist Australia's competitive advantage in the global market place for wheat.

"Finding alternative sources of resistance is vitally important. Diversity in resistance genes and variation in sources of resistance is one of our best defences when confronting any new rust pathotypes."

The project has involved working with wheat breeding lines which contain chromosome fragments from uncultivated relatives of wheat.

"These are mostly wild grasses from the region in the Middle East where modern bread and durum wheat species originated," Dr Dundas said. "The fertile crescent is a centre of genetic diversity."

In a recent project, Dr Dundas' team has identified three new sources of stem rust resistance from the species Triticum speltoides, and two new sources of leaf rust resistance from the species Triticum searsii and Triticum tripsacoides.

Plant pre-breeding is not a fast process. Dr Dundas said there was considerable work to be done before the newly identified genes found their way into wheat varieties for Australian growers.

"Provided the resistance sources meet our expectations, we could see them in wheat varieties within the next 10 years," he said.

"An important step will be testing wheat breeding lines with the newly identified resistance genes in the field. We've been working with scientists in the United States, where they will test these lines for resistance to the Ug99 stem rust pathogen.

"This virulent form of stem rust was identified in Uganda in 1999 and has now spread into the Middle East."

The GRDC is a major investor in the fight against cereal rust and part of a world-wide collaboration of scientists working to overcome the threat of Ug99. The GRDC said immediate priorities for effective rust management were growing resistant wheat varieties, managing the `green bridge' of volunteer growth, and responding to outbreaks with strategic fungicide applications.

Detailed information about rust management can be found at www.grdc.com.au/rustlinks .

Provided by University of Adelaide