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Home About GRRCC Research Projects International Services

YOU ARE HERE: Research Projects » RAMP

Research Projects

- » RustMight
- » **RAMP**

YELLOW RUST IN ORGANIC FARMING (RAMP)

Introduction

Until 2009 triticale was the most common cereal on organic farms. It has been regarded as the most robust species of cereal for organic farming because of its strong resistance to disease and ability to compete with weeds. This was turned on its head in 2009 when an exotic strain of yellow rust aggressively attacked organic triticale, causing losses that were typically of the order 50-100 per cent.

- In March 2012 a new situation arose as the most widely used variety of triticale, Tulus, suddenly became susceptible to yellow rust. It had hitherto been resistant to all the examined strains of yellow rust. Nevertheless, the fields growing Tulus in March and April 2012 were completely covered by yellow rust - with the old varieties from 2009 and 2010 being even worse affected. We collected samples in March-April to see whether this was a new strain of yellow rust, but it wasn't. The agricultural advisors had no other option but to advise farmers to plough in the crop. However, in many fields where the crop had not been ploughed in, it managed to recover and produce good yields because the fungal attacks typically ceased, says Mogens Ståvring Hovmøller.

So what exactly happened? To document this, the scientists will study the interaction between the yellow rust fungus, plant resistance and environment. One hypothesis is that plant resistance can be circumvented under certain environmental conditions. This means that there is a window of opportunity for the fungus to infect where the plant is susceptible. The question is - what are these conditions? Another hypothesis is that there has been a mutation in the yellow rust fungus to a hitherto unknown resistance in the plant.

Scientists have shown that there is an effective resistance that can reduce the risk of yellow rust attacks in triticale. But the development of resistant varieties cannot be a stand-alone solution. It has to be accompanied by an effective monitoring system that can give early warning of when new strains of yellow rust are on their way, says Mogens Ståvring Hovmøller.

The project has received 8.4 million DKK from the Green Development and Demonstration Programme (GUOP) under the Ministry of Food, Agriculture and Fisheries and is a joint venture with the Knowledge Centre for Agriculture.

Tasks

- > Task 1: Influence of environmental factors on changes in susceptibility of wheat and triticale varieties
- > Task 2: Influence of pathogen genetic background on changes in susceptibility of wheat and triticale varieties

Perspectives

The outcome of this research will directly become applied in the interpretation of results of the new early-warning system for yellow rust on wheat and triticale. A robust early-warning system must be based on insight into the causes of potential changes in yellow rust susceptibility at the field scale, i.e., false 'alarms' are almost as bad as failures in catching significant pathogen changes at an early stage. Improved protocols for testing plant isolates to identify yellow rust resistance in varieties may be another significant outcome.

At the strategic level, we expect to gain knowledge about the robustness of disease resistance in triticale in general. Note that triticale is the result of crosses between two important crop species, wheat and rye. One concern is that triticale thereby provides an undesired 'stopping-stone' for pathogen evolution across existing crop species boundaries, which may accelerate the spread of plant diseases.


Funding

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Duration: 2013-2016.

COMMENTS ON CONTENT: [SEE GRØNNESTØR HANDELSREVISED 2014 04 01](#)

Project lead



The project is led by professor Mogens Ståvring Hovmøller who is also leading the Global Rust Reference Centre

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Further information

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