



The Regional Cereal Rust Research Center

The Regional Cereal Rust Research Center (RCRRC) in Turkey provides national wheat-breeding programs with strategic support – helping farmers, policy makers, and national agricultural research and extension services to effectively respond to outbreaks.

A global resource to combat wheat rust disease

Focus on early detection

Operating from Izmir in Turkey, the RCRRC offers early warning and strategic guidance to countries where rust diseases affect cereal farming. Scientists and agricultural specialists are working to better monitor, track, and combat the spread of cereal rust diseases. Early detection and well-organized reporting are key to better managing and reducing outbreaks. The RCRRC aims to provide critical support to these initiatives.

Based in the Aegean Agricultural Research Institute, the RCRRC was established in 2012 in coordination with regional countries seeking to bolster scientific efforts to tackle wheat rust diseases. Today, the RCRRC is an established regional institution engaged in a range of responses to wheat rust diseases – from cooperation on cereal rust monitoring systems, to the operation of a regional precision phenotyping platform. The RCRRC also focuses on stakeholder capacity building on rust pathology, as well as crop breeding for rust resistance.

The RCRRC's regional rust surveillance and disease monitoring, together with the identification and tracking of physiological strains of rust pathogens, have created pathways for developing and pioneering more contextualized solutions.

One of five centers in the world

The RCRRC is allied with global scientific efforts to counter wheat rust diseases, working with advanced cereal rust laboratories in Denmark, France, Canada, and the United States of America. The RCRRC additionally cooperates with national breeding and pathology programs in Central and West Asia, as well as North and Sub-Saharan Africa.

Core services

Since 2018, the RCRRC has expanded its services and is exploring new pathways to develop and pioneer diverse responses to rust diseases through a state-of-the-art bio-facility. The RCRRC provides countries with scientific expertise and services to identify new strains, and to track regional disease transmission, including:

- Regional rust surveillance and tracking of cereal rust pathogens
- Regional rust race analysis of cereal rust pathogens from a range of African countries
- Coordination of international wheat rust trap nurseries for monitoring the effectiveness of rust resistant genes, and field assessments of pathogenic variation
- Precise phenotypic and molecular screening of wheat and barley germplasms from national and international

breeding programs for resistance to different types of rust

- Advice on wheat varieties that best resist rust diseases in specific agro-climatic conditions, and introducing integrated pest management control packages to farming systems
- A regional cereal rust training platform to enhance standardization and knowledge-based regional networking in Central, West Asia and North Africa (CWANA), Sub-Saharan Africa, and the Caucasus region.

Through regional cereal rust networking, the RCRRRC facilitates and provides services in four key areas:

- Analysis of rust races in a bio-safety cereal rust laboratory (BSL-3) built according to international standards to safely receive and store both regional and global disease materials
- A precision phenotyping platform with the capacity to evaluate 60,000 lines annually from national and international breeding programs against stripe, leaf, and stem rust
- Molecular characterization of rust resistance and pathogenicity
- Capacity building and backstopping of national cereal rust laboratories among partner countries.



All RCRRRC data and findings are publicly available to partners for contingency planning and mitigation of rust epidemics, as well as to enhance breeding for more durable rust resistance.

Summary

Cereal rust diseases pose a profound threat to sustainable worldwide production. With current changes in temperature and rainfall patterns, aggressive and unprecedented strains of these diseases are newly appearing in many locations. In the past decade alone, for example, stripe rust has affected wheat harvests in Syria, Iran, Turkey, Ethiopia, Morocco, and several countries in West Asia, as well as Central and South Asia.

To effectively combat this challenge, the world's international agricultural research centers, national partners, and wheat growing countries are intensifying their cooperation to better prevent the spread of rust. These strategies include surveillance and early warning systems to track the spread of disease, together with enhanced breeding programs to continually develop new and more durable rust-resistant varieties.

The RCRRRC is located in Izmir, Turkey, at the heart of the "Wheat Belt" – a territory linking Central and West Asia with North, East, and Southern Africa. Combined, these areas produce roughly 40 percent of the world's total wheat and barley production. Turkey's Mediterranean climate provides the optimal conditions in which to evaluate regional and international plant genetic materials against races of the three cereal rusts: stripe rust, stem rust, and leaf rust.

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