



Prevalent races of wheat rust pathogens in Lebanon, Morocco, and Tunisia in 2022

Plant Health Initiative WP1-OP4

Kumarse Nazari, International Center for Agricultural Research in the Dry Areas – ICARDA, Regional Cereal Rust Research Center (RCRRC), Izmir, Türkiye, k.nazari@cgiar.org
Rola El Amil, PhD, Lebanese Agricultural Research Institute (LARI), Lebanon
Muamar, Al-jaboobi, International Center for Agricultural Research in the Dry Areas - ICARDA, Morocco, moumr@hotmail.com
Maafa Ilyass, International Center for Agricultural Research in the Dry Areas - ICARDA, Morocco, I.Maafa@cgiar.org
Seid Ahmed, PhD, International Center for Agricultural Research in the Dry Areas - ICARDA, s.a.kemal@cgiar.org
Abdel Hamid Ramdani, Institut National de la Recherche Agronomique (INRA), Morocco, ramdani.abdelhamid@gmail.com
Hafid IBRIZ, Institut National de la Recherche Agronomique (INRA), Morocco
Ibtihel SBAI, Institut National Des Grandes Cultures (INGC), Tunisia, sbaibtihel@gmail.com
Nasraoui Ramdhane, Institut National Des Grandes Cultures (INGC), Tunisia ramdhanasraoui@yahoo.fr
Bouslimi Abdsattar, Institut National Des Grandes Cultures (INGC), Tunisia, abdessatarbouslimiingc@gmail.com.

Introduction

Monitoring pathogenic variability of rust pathogens and characterization of rust races remains a major challenge particularly in resource poor countries. The frequent emergence of new wheat rust races with increased virulence factors remains a major constraint when breeding for rust resistance and genetic control is considered. During the 2022 rust surveys in Lebanon, Morocco, and Tunisia (WP1-OP2), rust samples were collected from survey sites. The collected rust samples were submitted to the Regional Cereal Rust Biocontainment Laboratory in Izmir, Turkey using the sampling kits and import permits granted by Turkish quarantine authorities.

Materials and Methods

In 2022, the RCRRC received six, three, and eight yellow rust (caused by *Puccinia striiformis* f.sp. *tritici-Pst*) samples from Lebanon, Morocco, and Tunisia, and 10 and 22 stem rust (caused by *Puccinia graminis* f. sp. *tritici-Pgt*) dried samples.

Viable rust samples were tested for races of *Pst* and *Pgt* at the Regional Cereal Rust Research Center (RCRRC) in Izmir, Turkey, under strict quarantine procedures. Two 0.5-cm segments of each infected leaf (for *Pst*) and stem sheet (for *Pgt*) were incubated in a Petri dish at 8°C (*Pst*) 20°C (*Pgt*) for 3 h for rehydration of urediniospores. Fresh urediniospores were multiplied on 10-day-old seedlings of susceptible cultivar Morocco and Avocet 'S' for *Pst* and Morocco and McNair (for *Pgt*) grown in a spore-

free growth chamber at 18°C and 16-h light. Inoculated seedlings with *Pst* samples underwent a dew period at 10°C for 24 -h dark conditions and the seedling inoculated with *Pst* samples were placed at 18°C for 16-h dark and 8-h fluorescent light and 95% relative humidity. Three days after moving the pots to growth chambers with 8-h dark at 15°C (*Pst*) and 18°C (*Pgt*) and 16-h light (220 µmol/ m² s), each pot was covered using a cellophane bag. Bulk urediniospores of each collection were collected 14 days post-inoculation from a cellophane bag using a mini cyclone spore collector connected to a gelatin capsule. Only three yellow rust samples were recovered from the Lebanese samples due to late shipments and poor sample preservation. In total, 25 stem rust samples were recovered from Lebanese and Moroccan samples. Collected spores were dried at room temperature for 24 hrs using a sealed container filled with silica gel. Dried samples were stored at -80°C deep freezer. By the time of this report, only the stem rust samples have been processed for race analysis and yellow rust samples are under spore purification and multiplication and they will be used in race analysis in early 2023.

After spore multiplication of *Pgt* samples, the single pustule isolates were inoculated on the 20 North American differential lines. Before the inoculation of stem rust samples, the samples from the deep freezer were laced in a water bath for 10 minutes at 42°C for heat shock. One milliliter of 3M Novec oil was added to each capsule, and *Pgt* spores were inoculated onto 20 North American stem rust differential lines using the standard procedures (Jin et al. 2008). Pre-inoculation, inoculation, incubation, and post-inoculation conditions were the same as above. Seedling infection types (ITs) were recorded 14 days post-inoculation using a 0 to 4 scale (Stakman et al. 1962). Race designation followed the five-letter code nomenclature described by Jin et al. (2008). To confirm virulence/avirulence on Sr24, Sr31, and Sr36, cultivars Siouxland (PI 483469, Sr24 + Sr31) and Sisson (PI 617053, Sr36 + Sr31) were also inoculated.

Results

In total, 25 stem rust samples were recovered from the *Pgt* samples from Lebanese and Moroccan samples. The race analysis confirmed the presence of stem rust races TKKTF and TKTTF in Lebanon and TKKTF, TKTTF, THTTF, and TTTTF in Morocco. Analyses of molecular marker diversity of the received rust samples in ongoing.

References

- Stakman, E. C., et al. 1962. Identification of Physiological Races of *Puccinia graminis* var. *tritici*. ARS E-617. USDA, Washington, DC.
- Y. Jin, L. J. Szabo, Z. A. Pretorius, R. P. Singh, R. Ward, and T. Fetch, Jr. *Plant Disease* 2008 92:6, 923-926