



## **Prevalent races of wheat rust pathogens in Lebanon, Morocco, and Tunisia in 2023**

Plant Health Initiative WP1-OP4

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### **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 2023 rust surveys in Lebanon, Morocco, and Tunisia (WP1-OP4), 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.

### **Summary**

In 2023, the rust surveys conducted in Lebanon yielded 110 samples, comprising 42 stem rust, 28 yellow rust, and nine leaf rust samples. Similarly, 16 stem rust, eight yellow rust, and seven leaf rust samples were collected from Morocco during the rust surveys, while 28 yellow rust samples were collected from Tunisia. Unfortunately, the Tunisian samples couldn't reach the RCRRC. Because of poor sampling conditions, the recovery of yellow rust samples was not successful. Stem race analysis involved 90 isolates, including 55 isolates from the 2022 rust surveillance. Sixteen stem rust races were identified, with the TKKTF, TKTF, TTTTF, and PKTF races being predominant in both countries. No evidence of the Ug99 race with Sr31 virulence has been found. Leaf rust samples were subjected to purification and spore multiplication, and ongoing race analysis aims to determine the leaf rust race.

## Materials and Methods

The submitted samples from Tunisia did not reach to RCRRRC because of cargo issues. The yellow rust samples could not be recovered due to poor sampling and shipment.

Viable rust samples were tested for races of *Pgt* at the Regional Cereal Rust Research Center (RCRRRC) in Izmir, Türkiye, under strict quarantine procedures. Two 0.5-cm segments of each infected stem sheet were incubated in a Petri dish at 20°C *Pgt* for 3 h for rehydration of urediniospores. Fresh urediniospores were multiplied on 10-day-old seedlings of susceptible cultivar Morocco and McNair grown in a spore-free growth chamber at 18°C and 16-h light. Inoculated seedlings 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 16-h light (220 µmol/ m<sup>2</sup> 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.

In total, 90 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

Out of 93 samples, we were able to recover 43 and 47 stem rust isolates from the received samples from Lebanon and Morocco, respectively. Race analysis of leaf rust sample is underway. Stem race analysis involved 90 isolates, including 54 isolates from the 2022 rust surveillance. Sixteen stem rust races were identified, with the TKKTF, TKTTF, TTTTF, and PKTTF races being predominant in both countries. No evidence of the Ug99 race with virulence for Sr31 has been found. Leaf rust samples were subjected to purification and spore multiplication, and ongoing race analysis aims to determine the leaf rust race.

## References

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