Seedling resistance to stem rust races in Pakistani wheat landraces

CIMMYT MR
International Maize and Wheat Improvement Center

M.U. Rehman[1], S. Gale[2], M. Rouse[2], Y. Jin[2], Y. Rauf[1], A.R. Rattu[3], J.I. Mirza[4], R.Ward[1] and M. Imtiaz[1]

[1]International Maize and Wheat Improvement Center (CIMMYT) Pakistan Office, CSI Building, NARC, Park Road, Islamabad 44000, Pakistan; [2]USDA-ARS, Cereal Disease Laboratory, University of Minnesota, St. Paul, MN, USA; [3]Pakistan Agricultural Research Council (PARC), Islamabad, Pakistan; [4]Crop Diseases Research Institute, Murree, Pakistan
*Corresponding author: **m.imtiaz@cgiar.org**

Knowledge about the genetic diversity for rust resistance in wheat germplasm is necessary to improve the efficiency of breeding and deploy diverse resistance genes, particularly to control the occurrence and spread of the virulent stem rust (*Puccinia graminis*; *Pgt*) race TTKSK (Ug99) and its variants. This poster reports the level of genetic resistance to stem rust in a set of landraces acquired from the Plant Genetic Resources Institute (PGRI), Islamabad, which holds a good collection of wheat germplasm from all over the country.

Materials and methods

100 wheat land race accessions were tested for seedling resistance at the Cereal Disease Laboratory, the University of Minnesota (CDL-MN), using 8 North American *Pgt* races (QFCSC, QTHJC, MCCFC, RCRSC, RKQQC, TMPKC, TTTTF and QCCSM), and 1 race each from Yemen (TRTTF), Pakistan (RRTTF), and East Africa (TTKSK; Ug99). We sowed 5 to 6 untreated seeds of each accession at 1 cm depth in pots along with the susceptible control McNair701 at CDL-MN during 2013. At 7-9 days after sowing, seedlings were inoculated using gelatin capsules containing urediniospores of stem rust isolates. All management practices and the standard protocol were followed as reported by Pretorius et al. (2012). Plants were scored 14 days after inoculation using the 0-4 scale of Stakman (1962).

Results and discussion

Six landraces were resistant to the Ug99 race TTKSK, 11 to the Pakistani race RRTTF, and 9 to race TRTTF (Figure 1). Out of the six TTKSK resistant landraces, only three (10976, 11026 and 11032) were also resistant to other races. Among the North American races, two (QTHJC and TTTTF) were most virulent, with only eight and nine landraces showing resistance, respectively. On the other hand RKQQC, QFCSC, QCCSM and RCRSC were the least virulent races among the North American *Pgt* races. Our screening identified seven landraces (10760, 10800, 10976, 11409, 11422, 11441 and 11446) that showed resistance to most of the tested stem rust races. Further investigation is required to discern race-specific resistance and associated resistance genes. We are also collecting passport data for the landraces.

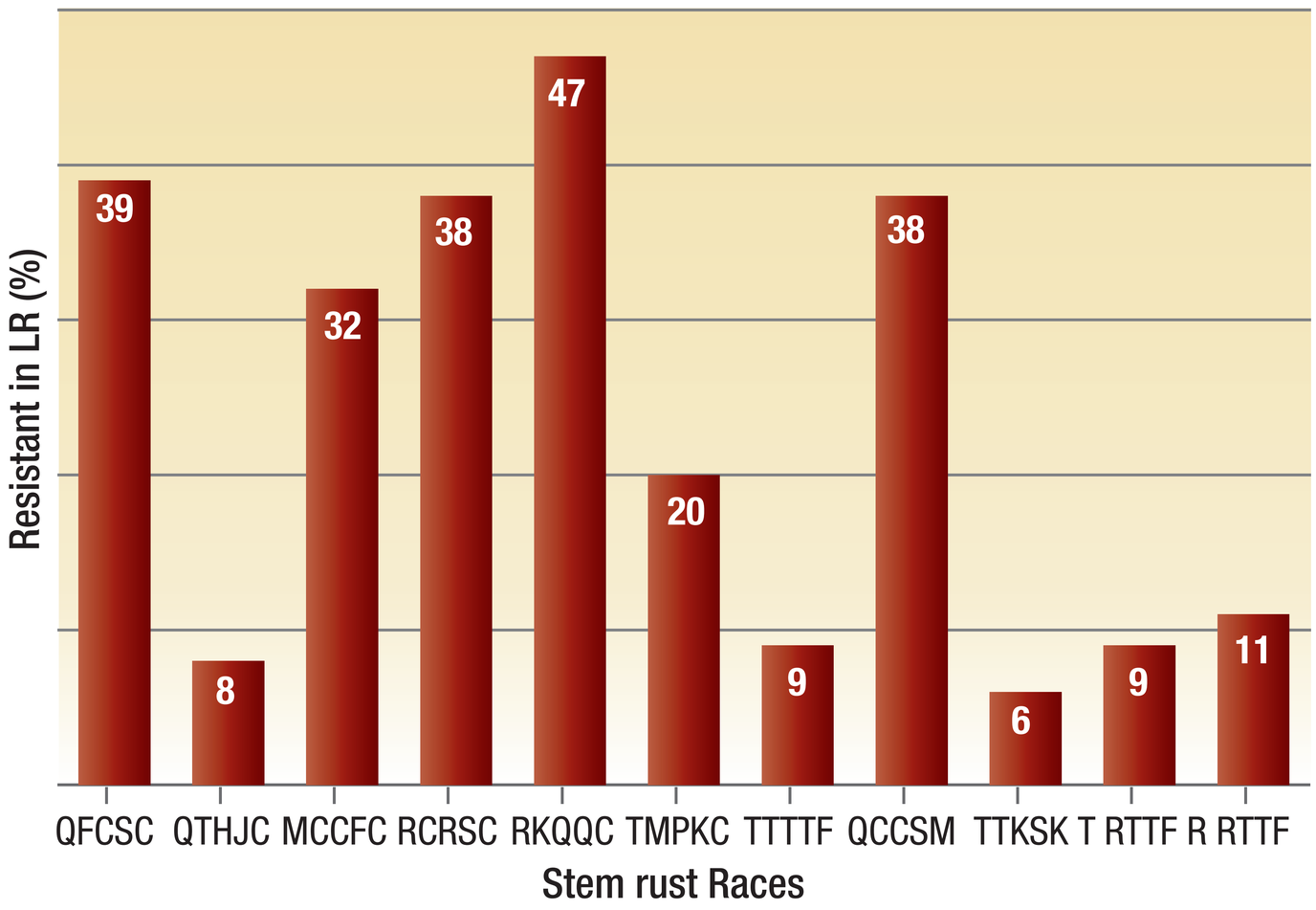

Figure 1. Resistance to Pgt races in the landraces tested.

References

Masood, M.S., M. Asghar, and R. Anwar. 2004. Genetic diversity in Wheat landraces from Pakistan based on polymorphism for high molecular weight glutenin subunits (HMW-GS). *Pak J Bot* 36(4): 835-843.

Pretorius Z. A. Y. Jin, C. M. Bender, L. Herselman, and R. Prins. 2012. Seedling resistance to stem rust race Ug99 and marker analysis for Sr2, Sr24 and Sr31 in South African wheat cultivars and lines. *Euphytica* 186: 15–23.

Rouse, M. N., R. Wanyera, P. Njau, and Y. Jin. 2011. Sources of resistance to stem rust race Ug99 in spring wheat germplasm. *Plant Dis* 95: 762-766.

Stakman, E.C., D.M. Stewart, and W.Q. Loegering. 1962. Identification of physiologic races of *Puccinia graminis* var. tritici. USDA-ARS Bull. E-617 Rev.

WPEP

USDA