Mapping of adult plant leaf rust and stripe rust resistance in the Austrian winter wheat cultivar ‘Capo’

Lydia Matiasch1, K. Herzog1, J. Kraic2, V. Šudyová2, S. Šliková2, F. Löschenerberger2, M. Marr2, J. Lafferty2, A. Neumayer3, M. Buerstmayr1, M. Ittu3, F. Mascher3, G. Vida4, K. Flath4, H. Buerstmayr1

INTRODUCTION

The Austrian cultivar Capo possesses quantitative and durable adult plant leaf rust resistance, but does not possess any effective major Lr gene to our knowledge. Aim of this work was to clarify the genetics of the durable rust resistance of the cultivar Capo.

MATERIALS AND METHODS

Plant material

F1 derived RIL populations from the crosses: Capo/Isengrain (240 lines), Capo/Furore (201 lines), Capo/Arina (233 lines)

Resistance evaluation

Leaf rust resistance testing was done at field trials in Austria, Slovakia, Switzerland, Romania and Hungary. Lr was provoked by spreading field collected rust spores from the previous seasons. Rust severity was scored once or twice in each experiment using a percent scale. In addition the Capo/Furore population was tested for adult plant stripe rust resistance in one field test and for seedling resistance in a greenhouse test.

Genotyping and QTL mapping

The populations were genotyped with SSR, AFLP and DAfT markers. QTL analysis was done in QTL Cartographer and/or Qgene.

RESULTS AND DISCUSSION

For the QTL mapping of leaf rust resistance QTL data from 6 field experiments were informative for the Capo/Isengrain population, 11 experiments for the Capo/Arina population and 6 experiments for the Capo/Furore population. Quantitative variation for leaf rust severity was evident in all three populations. The broad sense heritability estimate for leaf rust severity across experiments was 0.8 (Capo/Furore) to 0.9 (Capo/Isengrain and Capo/Arina), indicating that this trait segregated in these populations.

In the Capo/Isengrain population the largest effect QTL was derived from the susceptible parent Isengrain, mapping to chromosome 7BL, this QTL corresponds most likely to the gene Lr14a. Capo-derived reproducible QTL for Lr resistance mapped to chromosomes 2A, 2B and 3B. QTL for stripe rust resistance were detected at 2B and 3BS. The 3BS rust resistance QTL from Capo is close to the Lr27 and Yr30 resistance loci.

Acknowledgements

This work is supported by the Austrian Science Fund FWF, Translational Research Program (TRP), project number L182-B06, with additional support from INTERREG IIIA Austria – Slovakia and the government of Lower Austria.

1) BOKU-Department IFA-Tulln, AT. 2) Research Institute of Plant Production, Párdísz, SK, 3) Saatzucht Donau, AT, 4) Research Development Inst. Fundulea, RO, 5) Agroscope Changins Wildenswil, CH, 6) Hungarian Academy of Sciences, Matróváral, HU, 7) Bundesforschungsinstitut für Kulturpflanzen, Institut für Pflanzenbau in Ackerbau und Grünland, DE.