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# IMPROVING FUSARIUM HEAD BLIGHT RESISTANCE IN DURUM WHEAT

Barbara Steiner[1], Sebastian Michel[1], Marco Maccaferri[2], Roberto Tuberosa[2], Marc Lemmens[1], Hermann Buerstmayr[1]

[1] *University of Natural Resources and Life Sciences, Vienna (BOKU), Department of Agrobiotechnology (IFA-Tulln), 3430 Tulln, Austria*
[2] *Department of Agricultural and Food Sciences, University of Bologna, Bologna, Italy*

Fusarium head blight (FHB) is one of the most destructive diseases of durum wheat. Growing resistant varieties is admittedly the most promising approach for controlling this fungal disease. FHB resistance breeding in durum is however hampered by the limited variation in the elite gene pool and difficulties in efficiently combining the numerous often small-effect resistance QTL in the same breeding line. We evaluated an international collection of 228 genotyped durum wheat cultivars for FHB resistance over three years to investigate the genetic architecture and potential of genomic-assisted resistance breeding. Moreover, we introgressed resistance alleles from wild and cultivated relatives (*T. aestivum, T. dicoccoides, T. dicoccum*), developed multi-parental populations (750 lines) and phenotyped these pre-breeding lines over two years. Although a lack of highly resistant lines was evident for both collections, broad variation was found, including many moderately resistant pre-breeding lines. Plant height strongly influenced FHB resistance levels and led to co-localization of plant height and resistance QTL. Notwithstanding, a major QTL on chromosome 3B was identified in the elite durum gene pool independent of plant height. Interestingly, the QTL was positioned in the same chromosomal interval as reported for the hexaploid resistance QTL *Fhb1*, though haplotype analysis suggested a different genetic control. Comparison between phenotypic and genomic selection for FHB resistance in the elite germplasm revealed a superior prediction ability of the former, nevertheless in silico selection experiments resulted in higher selection responses when using genomic breeding values for early generation selection. An earlier identification of the most promising lines and crossing parents was furthermore feasible with a genomic selection index, which suggested a much faster short-term population improvement than previously possible in durum. In the long-term, exotic germplasm can broaden the genetic base for FHB resistance beyond the capabilities of elite material for achieving higher levels of resistance.