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A SUSTAINABLE DURUM WHEAT CHAIN
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EQUIPPING DURUM WHEAT WITH A MAJOR QTL FOR RESISTANCE TO FUSARIUM DISEASES TRANSFERRED FROM *THINOPYRUM ELONGATUM* AND ITS PYRAMIDING WITH VALUABLE GENES FROM *TH. PONTICUM*

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Favoured by climate changes, Fusarium head blight (FHB), a devastating disease of small-grain cereals worldwide, is increasingly spreading also in unusual environments where bread wheat (BW) and durum wheat (DW) are largely cultivated. The scarcity of efficient resistance sources within adapted germplasm is particularly alarming for DW, mainly utilized for human consumption, hence at high risk of kernel contamination with health-dangerous mycotoxins. To cope with this scenario, we looked outside the wheat primary gene pool and recently transferred an exceptionally effective FHB resistance QTL (Fhb-7EL) from the 7EL chromosome arm of the wheatgrass *Thinopyrum elongatum* onto 7DL of BW recombinant lines. The latter already possessed valuable genes (Lr19, Yp, yield-related QTL) from a *Th. ponticum* 7e1L arm segment, distally inserted onto 7DL. BW lines with the 7e1L+7EL assembly were crossed with previously developed DW-Th. *ponticum* recombinants, having small 7e1L distal segments on 7AL arms. As proved by GISH analysis, homologous pairing occurred with high frequency in the shared 7e1L region between the BW and DW recombinant chromosomes. As a result, desirable 7EL+7e1L recombinant types with $2n = 28$ were isolated in the BC1 progeny to DW, aided by PCR-based markers. Homozygous recombinant plants selected in the BC2F2 progeny were challenged by *Fusarium graminearum* spike inoculation to verify the Fhb-7EL QTL efficacy into the DW background. Infection outcomes confirmed what previously observed in BW, with around 90% reduction of disease severity vs. susceptible controls, invariably associated with presence of the Fhb-7EL QTL. Moreover, as for the BW types, the same Fhb-7EL was found to provide the novel DW recombinants also with resistance to the crown rot disease, as from seedling infection with *F. culmorum*. Through alien segment pyramiding we succeeded in equipping DW with a very effective barrier against different Fusarium diseases and other positive attributes contributing to yield security and safety.

ABSTRACT