Genetic Mapping of Common Bunt Resistance Gene Bt5

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Abstract

The variety 'Hohenheimer' has been found to have one (Gaines and Smith 1933) or maybe two (Kanterbay 1982) resistance genes toward common bunt (*Tilletia caries*), located at chromosome 1B (Schaller and Briggs 1955, Schmidt *et al* 1969). One gene has been named Bt5 (Metzger 1970).

'Hohenheimer' (CItr 11458) is supposed to be the Bt5 differential line. Seed delivered by USDA to Idaho Uni was genotyped (TG26k) and phenotyped using 3 races of common bunt and revealed that this accession does not have Bt5. Another "Hohenheimer" delivered by BOKU and used in previous studies as differential line (Borgen *et al* 2023) do have phenotyping pattern fitting with Bt5. This call for a critical evaluation of the use of lines denominated 'Hohenheimer' in bunt research.

1561 varieties and breeding lines being part of the International Common Bunt Consortium (ICBC) mapping panel were phenotyped with multiple races and resistance genes were postulated based on this and the pedigrees.

A GWAS using the MLM method (GAPIT 3.1) was performed against the a Bt5 gene postulate using 24145 markers from the TG25K/TG26K SNP array, giving a significant signal at chromosome 1B.

Fine-mapping based on detection of recombination events in Parent1/Parent2/offspring triplets and also haplotype comparisons among lines postulated to have Bt5, located Bt5 at chromosome 1B in a very large 120 Mbp interval 163,225,664 -283,930,031 bp across the centromere.

Markers developed to track the Bt5 haplotype has a 90% hitrate and a 7% false positive rate in the ICBC panel.

References

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