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Association mapping for common bunt resistance in wheat

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Abstract

Common bunt, caused by *Tilletia caries* and *T. foetida*, is a fungal disease of wheat worldwide. Infection, occurring via seed borne teliospores, is generally controlled by the application of seed treatments prior to sowing. Farming systems like organic agriculture with a very limited range of organic seed treatments available rely heavily on common bunt resistance genes within wheat. In the framework of the BIOBREED project an association study with 152 wheat varieties was conducted, aiming at the identification of genetic loci associated with resistance to common bunt.

The wheat lines were phenotyped for their resistance reaction for two consecutive years 2011 and 2012 at Agrologica research station in Denmark. Infection was scored as percent infected ears per wheat variety in two replications. The scorings were log-transformed to fit a disease scoring scale ranging from 1 to 9. Wheat lines were genotyped with DArT markers (JACCOUD et al. 2001), yielding 1832 polymorphic loci. The association analysis was performed for the data of each year separately as well as for the mean of the scoring of the two years.

After analysing 1832 DArT markers, 13 markers - localised on chromosomes 1A, 2A, 2B, 2D, 3B, 5B, 6A and 7B - showed significant association with common bunt resistance ($-\log10(P) > 3$). Four of the 13 linked markers resided on chromosome 2B, a chromosome which was previously reported to carry the *Bt1* gene for common bunt resistance. Further two linked markers were found on chromosome 2D, a chromosome previously reported to carry common bunt resistance gene *Bt7* (GOATES 1996).

Further comparisons of our findings with other published results are difficult since only very little is known about the chromosomal location of common bunt resistance in wheat. The present study possibly confirms the chromosomal location of two previously identified resistance genes and further identifies six loci previously not reported to be associated with resistance to common bunt in wheat.

Keywords

Organic farming, seedborne disease, *Tilletia caries*, *Triticum aestivum*

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