# Combined approaches toward mapping and cloning of powdery mildew resistance gene **QPm.tut-4A** introgressed to bread wheat from *T. militinae*

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### Introduction

Powdery mildew caused by *Blumeria graminis* is one of the major diseases of wheat causing cross of the introgressive line 8.1 and cv Tähti (Jakobson *et al.*, 2006). Unfortunately, no substantial yield and quality losses. Recently, locus *QPm.tut-4*A conferring non-race-specific resistance to powdery mildew was introgressed to hexaploid wheat cv. Tähti from tetraploid *Triticum militinae*. The locus was mapped to the distal end of the wheat 4AL chromosomal arm, between markers Rga3.1.1 and Xwmc232 in the mapping population derived from the

natural recombination within the region was observed among 1200 haplotypes tested. In an attempt to clone the QPm.tut-4A gene, we combined several approaches to overcome the limitation and saturate the region with markers.

#### **QPm-tut-4A** region ~ 10 cM





marker verification

#### **Colinearity assays**



saturation of the gene region map

**Colinearity studies using Barley, rice, Brachypodium** and Sorghum genomes and genome zipper established using 454 survey sequence of chromosome 4A (Hernandez et al. 2011).

**Physical mapping of BAC derived markers** markers saturation of the gene/ region map **Radiation hybrid panel** Gamma irradiated seeds Radiation hybrid seed panel 4AL<sup>T.m.</sup> 863 lines High frequency of random chromosome deletions **Increase the mapping resolution** and circumventing the lack of recombination, 48 mutant lines in the gene region identified

## **QPm-tut-4A** region narrowed down to 0.3 cM

01M1



New mapping population derived from the resistant introgressive line 8.1 and susceptible cv Chinese Spring comprising 1017 lines, restoration of recombination in the QPm-tut-4A region, direct link to the physical map of the Chinese Spring 4AL chromosomal arm

## REFERENCES

Jakobson I., Peusha H., Timofejeva I., Jarve K - Theor. Appl. Genet. 112: 760–769, 2006. Hernandez P., Martis M., Dorado G., et al., Plant J. DOI: 10.1111/j.1365-313X.2011.04808.x

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