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P301: Wheat, Barley, Rye, Oat, and related

Cloning And Function Validation Of A NB-ARC-LRR-Type Candidate Gene For The Greenbug Aphid Resistance Locus *Gb3* In Wheat

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The greenbug, *Schizaphis graminum*, is one of the most important aphid pests of small grain crops in many parts of the world. A single dominant gene, *Gb3* originated from *Aegilops tauschii* has shown consistent and durable resistance against prevailing greenbug biotypes in wheat fields. A fine genetic map was developed for *Gb3*, which is located in the recombination-rich, telomeric bin of wheat chromosome arm 7DL. Markers closely linked with *Gb3* were used to screen *Ae. tauschii* and 'Chinese Spring' 7DL-specific BAC libraries to initiate chromosome walking. Three clones spanning the *Gb3* locus were selected from the 7DL-specific BAC library and fully sequenced. Annotation of a total 373 kb DNA sequences identified a candidate gene for *Gb3* which encodes a NB-ARC-LRR type R protein. Resistant and susceptible *Ae. tauschii* accessions and wheat lines were sequenced in this candidate gene region and the full length cDNA sequences were also obtained to confirm the intron-exon splicing sites. The candidate gene consisted of three exons with a total length of 5,049 bp. Quantitative RT-PCR analysis revealed higher level transcription of this candidate gene in resistant lines than in susceptible lines before and after infestation of the greenbug. Barley stripe mosaic virus (BSMV)-based virus-induced gene silencing (VIGS) will be employed to validate functions of the candidate gene. Four different regions of the *Gb3* candidate gene will be cloned into BSMV VIGS vector for silencing. Aphid bioassay of VIGS-treated plants and genetic transformation of the candidate gene are underway.