

Consistency of QTL for dollar spot resistance between greenhouse and field inoculations, multiple locations, and different population sizes in creeping bentgrass

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Introduction Dollar spot caused by *Sclerotinia homoeocarpa* F. T. Bennett is the most economically important turf disease in North America. Previous work indicated differences among cultivars in their susceptibility to dollar spot (Bonos *et al.*, 2003). Studies have indicated that dollar spot resistance might be quantitatively inherited (Bonos *et al.*, 2003) but the number, location and effect of genomic regions conferring resistance is still not known. Therefore the objective of this research is to understand the effect of population size, inoculation assays, and field locations on QTL for dollar spot resistance in creeping bentgrass.

Materials and methods A full-sib genetic mapping population consisting of 697 progeny was developed from a cross between the out-crossing clones named 372 and 549. A dense linkage map with fourteen linkage groups has been constructed using various markers. Ninety-three of the RFLP markers are from sequenced probes from cDNA libraries, constructed from leaf tissue of clones 372 and 549.

Results The linkage map covers 1144 cM with 227 RFLPs, 177 RAPDs, and 73 AFLPs. One major QTL on linkage group 7 is consistent over multiple ratings as the disease progressed and also across locations and experiments in WI. Greenhouse inoculation, rating methods, and field location-specific QTL with minor effect were also detected on various linkage groups. Effect of population size (94-697) on the significance of the QTLs was also examined.

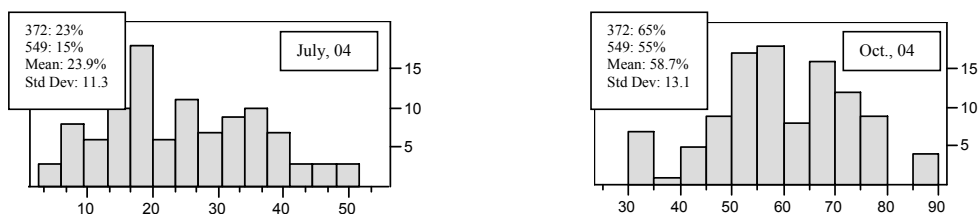


Figure 1 Frequency distribution of disease severity (%) at south central WI field plot inoculated with one virulent isolate at different rating dates (July and October, 2004).

Conclusions Continuous frequency distribution for dollar spot resistance among the progeny indicated the quantitative nature of resistance. Transgressive segregation was detected which suggests contribution of resistance alleles from both parents. The consistency of the major QTL on linkage group 7 across locations and disease progress indicated that it is stable over environments, while the minor QTLs were influenced by inoculation assay, rating methods and also rating time during the disease progress. Markers tightly linked to the QTL which are stable under environmental factors can be applied for MAS in future dollar spot resistant creeping bentgrass-breeding programs.

Reference

Bonos, S. A., Casler M. D., and Meyer W. A. 2003. Inheritance of dollar spot resistance in creeping bentgrass. *Crop Sci.* 43:2189-2196.