0203-BL-094 Engineering Improved Fusarium Resistance in Hexaploid and Durum Wheat.

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PROJECT ABSTRACT
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The goal of the proposed work is to use genetic transformation to create new sources of hexaploid and durum wheat germplasm with host plant resistance to scab. Transgene loci, by their very nature, carry molecular markers and thus can be readily introgressed into Midwest varieties adapted for growth in regions most severely affected by scab. Thus far, we have generated 20 lines of hexaploid wheat in which one of six different candidate anti-*Fusarium* (AF) gene constructs exhibit detectable expression. Two of these have shown increased Type II resistance in greenhouse tests. The proposed research for 2002 will test new transgenic plants containing modified versions of these two genes with sequence changes expected to improve their expression in wheat. To increase its efficacy, the transgene construct that encodes a DON acetyltransferase will be combined with a construct that encodes a DON efflux pump. These same constructs will be introduced for the first time into durum wheat. Transgenic plants containing different AF proteins will be combined by genetic crosses to test whether their different modes of action will interact to provide better or more durable resistance. New gene constructs encoding proteins that screen ribosomes from the action of the trichothecene mycotoxins will be evaluated for their ability to increase wheat's scab resistance. Homozygotes of the highest expressors for each construct will be tested for Type II resistance. Lines already shown to have improved Type II resistance will be evaluated in field trials at the St. Paul scab nursery. A new maize promoter with floret-specific expression will be evaluated in transgenic wheat.