Project Abstract

Project Title:	Developing Fusarium Head Blight-resistant North American Winter Barleys	
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The overall goals of this project are to enhance and increase the number of winter barley varieties developed by public breeding programs across the U.S. that possess increased resistance to head blight disease caused by *Fusarium graminarum*. The specific objectives of this project are to: 1) coordinate a North American Barley Scab Evaluation Nursery (NABSEN) for winter barley, in which North American winter barley breeders submit their best lines for testing, 2) identify lines in the Ohio breeding program exhibiting Fusarium Head Blight (FHB) resistance in the forms of low DON accumulation and low disease incidence, and 3) utilize modern breeding technologies to efficiently and rapidly introgress those resistances into elite lines for varietal release to farmers. The expected outcomes from carrying out these objectives are: 1) increased numbers of elite high-yielding barley varieties released from public breeding programs that possess improved FHB resistance; 2) reduced DON and other fusarium toxin levels in the U.S. grain supply; and 3) identified genetic components of resistance which are heritable and can be associated with molecular markers, such that resistance can be predicted through the use of DNA fingerprinting technologies in future populations. The approaches that will be used include 1) testing four to six lines from each U.S. public winter barley breeding program at multiple testing sites that provide the selection pressure needed to elicit and discriminate resistant and susceptible reactions to *F. graminarum*, 2) screening all advanced material emerging from our own breeding program for resistance to FHB through utilizing a nursery in which lines are subject to *F. graminarum* inoculation and overhead mist irrigation, 3) crossing resistant lines to elite or other resistant lines emerging from our program and cycling the subsequent populations through multiple generations per year in the greenhouse, and 4) utilizing modern molecular marker technologies to test for and identify regions of the genome associated with resistance. This project is of mutual interest with those of stakeholders and end users, which include U.S. farmers, millers, maltsters, and other consumers of grain products, because the most effective means to combat the FHB disease is through combining genetic resistance with cultural practices that reduce disease. By providing the marketplace with elite high-yielding varieties possessing FHB resistance, we help maintain the competitive edge of stakeholders and end users, which is in the mutual best interest of all.