PI: **Madden, Larry**
PI's E-mail: **madden.1@osu.edu**

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PROJECT 1 ABSTRACT

(1 Page Limit)

Fusarium Head Blight (FHB) continues to be a yield-limiting factor in many wheat and barley production regions of North America. Invaluable data regarding factors influencing inoculum levels and FHB development are being gathered through field experiments across multiple states. These data, representing different FHB intensity under a range of disease-influencing conditions, have been used for the development and deployment of a weather-driven, Web-based risk assessment model that is currently being used to predict economic FHB risk potential in 23 states. To refine this model and improve its accuracy, further investigations are needed to account for factors not included in the model. In addition, through this multi-state effort, investigations have been initiated to determine the influence of environmental and cultural factors on FHB development in barley and to assess the performance of the existing model on this crop. As part of a project involving researchers from ND, SD, IN, and PA, we propose to investigate the influence of crop residue, fungicide, flowering date, and cultivar resistance on the development of FHB. A similar protocol will be used at every location. It entails the planting of two susceptible wheat cultivars of different maturity and a resistant cultivar similar in maturity to one of the susceptible cultivars in plots with either 0 or 80% maize residue. Plots will be planted on a single planting date and a single application of tebuconazole fungicide (Folicur) will be made at flowering (Feekes growth stage 10.5.1) to one plot of each cultivar/residue combination in each replicate. Adjacent to the wheat plots, a cultivar of barley will be planted in replicated plots with 80% maize residue and without residue. Unfavorable weather conditions in 2005 led to low FHB intensity in Ohio. However, a significant difference in severity between plots with 0 and 80% residue, and among cultivars with different levels of resistance was still observed. Fungicide effect was not significant. Since we believe that these results will be influenced by environment and disease pressure, we will repeat this study in 2006 and again monitor environmental parameters and quantify inoculum density in the air and on wheat spikes at each location. Results from this study will indicate the effect of an integrated management approach on FHB under a range of environmental conditions and provide data from both wheat and barley epidemics for model evaluation and refinement. Our second object is to use disease and inoculum gradient to determine the importance of a within-field source of inoculum and the role of rain splash in the dispersal of *Gibberella zeae* from this source. As was done in 2005, we will again relate the number of propagules splash-dispersed to distance and direction from the source of inoculum and determine inoculum density and FHB intensity on wheat spikes relative to distance from the source of inoculum. In 2005, a year with very low background (air-borne) inoculum levels, both disease intensity and inoculum density decreased rapidly with increasing distance from the source of inoculum. The relationship among inoculum density, disease intensity, and distance from inoculum will help to elucidate the contribution of rain to inoculation under field conditions and the relative strength and importance of a local source of inoculum under conditions with different background levels of inoculum.