

**PI: Adhikari, Tika**

**PI's E-mail: tika.adhikari@ndsu.edu**

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**Research Area: EEDF**

**Duration of Award: 1 Year**

**Project Title: Effects of Growth Stage, Host Resistance, and Weather on DON and FHB Development.**

### **PROJECT 1 ABSTRACT**

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Fusarium head blight (FHB) or Scab, caused by *Fusarium graminearum*, is a destructive disease of wheat and barley. Host resistance has been considered the most practical and effective means of control. Although few partially resistant wheat cultivars are available to the growers, but breeding has been hampered by a lack of effective resistance genes and source of complete resistance to FHB. In addition, reduced kernel density and discoloration of harvested grains are associated with deoxynivalinol (DON) accumulation, thus preventing grains from being marketable. The Etiology, Epidemiology and Disease Forecasting research area of the U.S. Wheat & Barley Scab Initiative supports research efforts in 2007 addressing one or more of the following priorities to reduce DON level in wheat and barley grains through (i) development and deployment of disease prediction systems, and (ii) quantification of factors that contribute to severe epidemics, and factors associated with the high levels of mycotoxin in grain without visual symptoms of disease.

The cooperative epidemiology effort between IN, OH, ND, PA, and SD has successfully developed models that help wheat growers and their advisors estimate the risk of severe FHB epidemics. The current generations of models predict the risk of FHB epidemics based on the patterns in temperature and humidity observed 7-days prior to flowering. The models also account for variation in risk resulting from local inoculum sources and differing levels of variety resistance. The models also are deployed independently in North Dakota, using its own NDAWN weather stations to obtain better weather information for the disease forecast. These combined deployment efforts have positioned the prediction models as an important part of the integrated management strategy for FHB in many regions. Specific objectives of this project are to: (i). investigate the role weather factors on fungal infection and DON accumulation, and (ii) improve the pre-harvest estimates of DON based on visual disease assessments (by accounting for variation of disease within a given field).

Experiments will include three locally adapted cultivars with different levels of resistance to FHB to be sown on two planting dates in replicated plots and these plots will be inoculated at early anthesis, middle anthesis or left un-inoculated. Using multiple planting dates will allow us to account for different environments within a single season. By considering varieties with different levels of disease resistance and growth stages of inoculation, we will provide valuable insights into how these variables influence the fungal infection and DON accumulation.