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PROJECT 1 ABSTRACT

(1 Page Limit)

Development of symptomatic wheat head blight caused by *Fusarium graminearum* is usually highly correlated with accumulation of the mycotoxin deoxynivalenol (DON) in wheat kernels. Although healthy appearing wheat grain is usually free of DON reports exist documenting healthy or only minimally damaged wheat containing DON). Wheat millers in the mid-Atlantic region encountered apparently healthy wheat from the 2003 crop year with DON levels ranging from 2 to 5 ppm. Most of the flour milled from this material contains DON at levels that exceed the current FDA guidance to industry levels of 1 ppm in finished flour products. This situation presents significant challenges for buyers and millers of wheat and an understanding of when this is likely to occur would allow appropriate preemptive action and use of contaminated grain. Our long-term goal is to understand the environmental conditions and cellular mechanisms that favor development of significant levels of deoxynivalenol in wheat grain that is apparently healthy or shows only low levels of disease. We hypothesize that translocation of DON in the wheat head to locations away from infected tissue and thus devoid of the fungus provides one possible explanation for the occurrence of asymptomatic kernels containing DON. Our second hypothesis is that infection during the late growth stages of a wheat crop may result in insufficient time for kernels to develop typical symptoms of head blight but sufficient time for DON production. Therefore, these infected, but asymptomatic kernels may contain significant levels of DON. In addition, certain environmental conditions may be more conducive to this scenario than others. Our proposed experiments will address the environmental factor of temperature and use manipulation of rainfall at anthesis and during grain fill to vary the time of infection. We also hypothesize that certain environmental conditions such as cooler temperatures will be more conducive to this occurrence than others. Two objectives are proposed to address these hypotheses. **Objective 1:** To evaluate the role of air temperature and timing of infection on development of asymptomatic kernels containing >2ppm DON. **Objective 2:** To determine if translocation of DON within the wheat head from infected to uninfected spikelets can result in DON levels >2 ppm in healthy kernels and to see if certain cultivars favor translocation and DON accumulation at sites distant from the fungus.