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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 and to understand the conditions that lead to detoxification of DON by the plant. Our first hypothesis is that infection during the very 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. The total DON present in grain at harvest results from production by *F. graminearum*, loss due to physical forces, microbial degradation and also detoxification of DON by the plant to DON-glucoside (DON-GLUC). It is notable that the very late infections we will study under our first objective occur just prior to plant senescence possibly affording the plant little if any time to detoxify DON to DON-GLUC. Therefore, these infected, but asymptomatic kernels may contain significant levels of DON. Based on research reported in the literature and our own observations we hypothesize that moisture at both at flowering and during the grain fill period promotes the formation of DON-GLUC. Recent studies show that DON-GLUC accumulates at higher levels in plants resistant to FHB than in more susceptible ones. We hypothesize that we will see an increase in DON-GLUC over the growing season and that resistant cultivars will have more DON-GLUC than susceptible ones. **Objective 1:** To evaluate whether very late infection results in asymptomatic grain with high levels, > 2 ppm, DON. **Objective 2:** To monitor the formation of DON-GLUC in wheat from anthesis to harvest in resistant and susceptible cultivars and to determine if high moisture during grain fill promotes formation of DON-GLUC.