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Project Title: Contribution of Local Inoculum Sources to Regional Atmospheric Populations of G. zeae.

PROJECT 1 ABSTRACT

(1 Page Limit)

Gibberella zeae (*Fusarium graminearum*) is the principal causal agent of Fusarium head blight (FHB) of wheat and barley in the United States. Ascospores of *G. zeae* are transported through the atmosphere to susceptible host plants. Epidemics of FHB may be initiated by regional atmospheric sources of inoculum of *G. zeae* transported in the planetary boundary layer (PBL) of the atmosphere, but little is known about the contribution of local inoculum sources to regional atmospheric populations of the pathogen and how far inoculum may travel from its source. We hypothesized that (1) regional atmospheric populations of *G. zeae* in the PBL originate from multiple inoculum sources across great geographic distances and (2) the regional movement of *G. zeae* can be accurately predicted by mathematical models of spore transport. In this one-year USWBSI project, we propose to test our hypotheses by conducting a series of experiments with unmanned aerial vehicles (UAVs) above a clonal inoculum source of *Gibberella zeae* in Virginia. The ultimate goals of our research efforts are to determine where inoculum for FHB comes from and how far it travels. The specific objectives of the proposed research are (1) to determine the contribution of a local inoculum source of *G. zeae* to regional atmospheric populations of the pathogen and (2) to forecast the regional movement of *G. zeae* from a local inoculum source using a mathematical model that predicts spore transport. This project will develop new tools necessary for studying regional atmospheric populations of *G. zeae* and assist in predicting the distribution and spread of *G. zeae* across broad geographical regions. Under the EEDF heading of 'Pathogen Biology and Ecology', we will (1) elucidate the contribution of a local inoculum source of *G. zeae* to the temporal and spatial development of regional FHB epidemics and (2) test and implement a long-distance transport model for disease forecasting/risk assessment. We are the first to use UAVs to study the regional movement of *G. zeae*, and we have already collected and published data which demonstrates that our system has been tested, calibrated, and is capable of fulfilling the proposed objectives. The proposed efforts in research and outreach will aid in developing and/or excluding strategies for managing FHB and will help refine forecasting/risk assessment models for regional FHB epidemics.