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PROJECT 3 ABSTRACT

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The overall project goal is to create better models for predicting Fusarium head blight (FHB). The objectives are to (i) identify periods within weather time series that are significantly different between FHB epidemics and non-epidemics, (ii) create variables summarizing those identified periods, (iii) use the summary variables in new logistic regression models for predicting FHB epidemics, (iv) compare the predictive performances of new models with the performances of the currently deployed models, and (v) replace the current models with the newer versions after they have been field-tested. The expected outcome is a more accurate FHB predictive system available on the Fusarium Head Blight Prediction Center (FHBPC) website. Towards this end, we have an existing data matrix of 865 observations of FHB epidemics and non-epidemics, linked to hourly weather time series (dew point, temperature, dew point depression, atmospheric pressure, relative humidity and vapor pressure deficit) spanning the September of year prior to anthesis through 60 days post-anthesis. Continued collaboration with the Integrated Management Coordinated Project (IM-CP) will further expand the data matrix so that as many growing conditions as possible are covered. We propose using an approach called functional data analysis to determine periods within each time series that are significantly different between epidemics and non-epidemics. These identified periods will be summarized (e.g. mean, number of hours above a threshold), and the resulting summary variables used as inputs to logistic regression models for predicting FHB epidemics. Logistic regression models are more amenable to scaling up for deployment on the FHBPC site. The new models will be compared against the current models in terms of predictive performance on the set of 865 observations, and field-tested during the 2017 growing season. We expect new models will be ready for use on the public site in time for the 2018 growing season. Growers, crop consultants, farm managers and other stakeholder interest groups will have more accurate forecasts of FHB epidemics, which will better inform the decisions they have to make related to FHB disease control and mitigation.