Agricultural & Biological ENGINEERING

Thesis Defense

Speaker: Salah Issa

Title: Evaluating Hybrid-Maize Model in Rainfed Conditions in Northwestern Indiana

Major Professor(s): Indrajeet Chaubey and Sylvie Brouder

Date: Thursday, November 08, 2012

Time: 8:30 AM

Location: Lilly 2-425

Abstract:

Scientists face an unprecedented challenge of increasing food production by 100% within the next fifty years to meet demand while responding to the undetermined effect and impact of climate change. To respond to these challenges, scientists are turning to models to assist them in mapping out the complex interactions between environmental conditions, management strategies and crop genotype. The overall goals of this study are to evaluate HM model in wet rainfed conditions representative of northern Indiana and compare its performance to DSSAT CERES-Maize. The specific objectives are to: 1) model performance for simulating early growth, stover and grain yield; 2) Quantify the impact of wet stress grain filling temperatures and management bias on yield gaps between predicted and actual yields; and 3) compare HM and DSSAT optimal conditions predictions to grain yield contest winners in Indiana. Weather, soil and management inputs were carefully gathered to ensure accuracy in model input data. The HM model was found to be a good predictor of grain yield (n-RMSE=18%), a fair predictor of stover (n-RMSE=23%) but significantly over-predicted early growth (RMSE=1.19 Mg ha^{-1}). In contrast, the DSSAT was found to be a good predictor of grain yield (n-RMSE=18%) and an excellent predictor of stover yield (n-RMSE=9%) and early growth (RMSE=0.31 Mg ha^{-1}). Wet stress was significantly correlated to yield gaps in HM for growth (V6) and stover yield. However, overall wet stress was not correlated with grain yield gaps for both models. Both HM and DSSAT-M grain yield were significantly correlated with average grain filling temperatures.

Application:

This research provides further direction for improving Hybrid-Maize model biomass and yield predictions