VALIDATION OF THE COTTON MODEL IN THE TEXAS HIGH PLAINS

Don Wanjura
USDA-ARS
Cropping Systems Research Laboratory
Lubbock, TX

Abstract

Process based crop simulation models are useful analytical tools for evaluating the relationship between particular production inputs and crop responses. The Agricultural Research Service is developing a cotton model using the objective-oriented programming language C++ and special emphasis is being placed on maintaining independence between personnel and data bases used in model development from that of model validation. The purpose is to provide a framework for objective evaluation that is unbiased by common data being used in both modeling activities. The intent is to provide a model whose capabilities have been accurately evaluated so that subsequent application by users can proceed based on documented rigorous and fair testing. Model validation work in Texas during 1998 included assembly and formatting of validation data sets from the Texas area and preliminary calibration and validation runs with the cotton model. Programming errors were identified and corrected, a sequence for calibrating plant parameters was setup, and a level of acceptable differences between simulated and observed plant parameters was established. The sequence for calibrating plant factors is first square, first bloom, number of main stem nodes, plant height, leaf area, fruiting, and yield. The levels of acceptable deviation between predicted and observed plant factors have been chosen as within 2 days for the first square and bloom events and within 15% for all other plant factors. From a compilation of 33 data sets, two groups of data sets were identified to represent multiple water levels during the growing season at the same location and another group that included data sets from different years and locations. After sequentially optimizing the calibration factors for each plant parameter, the initial simulations with the two data groups indicate that the model is correctly predicting plant factors on a relative basis. We are now starting to make comparisons between predicted and observed factors from which the accuracy of the current version of the model can be determined.

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