Evaluation of the CSM-CROPGRO-Peanut Model in Simulating Growth and Phenological Development of Three Peanut Cultivars to Different Moisture Regimes

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Abstract

Drought is a major yield limiting factor for peanut production. Information on peanut responses to different levels of drought stresses are needed for the development of appropriate management strategies for individual agriculural area. The CSM-CROPGRO-Peanut model could help in obtaining the valuable information required, but its capability in simulating crop responses to different levels of soil moisture regime needs to be firstly established. The objective of this study was to evaluate the capability of the CSM-CROPGRO-Peanut model in simulating the responses of three peanut cultivars to three levels of soil moisture regimes. The experiments were conducted under field conditions in the dry seasons of 2004 and 2005 at the Field Crop Research Station of Khon Kaen University in northeast Thailand. A split-plot in a randomized complete block design with 4 replications was used. Three levels of soil moisture (field capacity, 2/3 available water and 1/3 available water) were assigned to main-plots, and three peanut cultivars (KK60-3, Tainan 9 and Tifton 8) were arranged in sub-plots. Data collected on growth and development of the three peanut cultivars under the three soil moisture regimes were compared with the corresponding simulated data from model simulation using the CSM-CROPGRO-Peanut model. The results showed that the model performed fairly in simulating phonological development and patterns of dry matter accumulation but performed reasonably well in predicting the final biomass and pod yields of the three peanut cultivars under the three soil moisture regimes. The model could predict the relative yield reductions from drought stress of the individual peanut cultivars quite accurately. These results indicate that the CSM-CROPGRO-Peanut model is sufficiently capable to be used in supporting the required information for determining appropriate managements of drought stress.

KEYWORDS: *Arachis hypogaea* L., crop simulation, responses to drought stress, peanut modeling