Evaluating the CROPGRO-Soybean Model for Predictions of Phenology, Growth, Photosynthesis, and Yield by Comparison to Elevated Temperature and CO2 Experiments. (C02-boote111728-Poster)

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Abstract:

It is important to evaluate crop growth models such as CROPGRO-soybean for ability to correctly predict response to global climate change factors. Model-simulated growth responses were compared to observed growth and phenology of 'Bragg' soybean grown throughout its life cycle in temperature and CO2 treatments in sunlit, controlled-environment chambers. The model's temperature function for progress to anthesis was acceptable. However, post-flower development was most rapid at 28/18 C, and was slower at higher temperatures; thus, the Topt1 and Topt2 for post-flowering development was decreased in the model. Observed rate of node expression was rapid at 36/26 to 44/34 C, so we increased the Topt1, Topt2, and Tmax for node expression in the model. The model predicted reasonably well the time patterns of photosynthesis and leaf area growth, although it somewhat under-predicted crop dry matter accumulation. CROPGRO predicted well the different time courses of pod and seed dry matter accumulation caused by elevated temperature, including the slower and delayed growth at elevated temperature. It predicted well the effect of elevated temperature to decrease seed yield and harvest index which fell to zero at 39 C mean temperature. Model predictions were not calibrated to chamber data, but response was primarily attributed to the single seed growth rate function versus temperature.

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