Predicting Potential Kernel Numbers in Maize under Assimilate-Limited and Pollen-Limited Conditions. (A03-lizaso102726-Oral)

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Abstract:

Accurate prediction of kernel number is required to improve yield forecasting by maize simulation models. Most maize models use functions of photosynthetic rate, growth rate, or intercepted photosynthetic active radiation (IPAR) around silking to predict kernel number. These functions are based on the well-documented principle that the source of assimilates around silking limits kernel set per plant. This principle assumes that the number of fertilized ovaries is in excess of the number of kernels that can be supported by available assimilates. Under some growing conditions, however, asynchrony in male and female flower development or limited pollen shed also may constrain kernel set. We developed a new routine for CERES-Maize to simulate kernel set. The routine calculates potential kernel set in parallel for both assimilate-limited and pollen-limited conditions. Assimilate-limited conditions are simulated using a double-curve function of daily IPAR averaged for a thermal time window from 250 growing degree-days (GDD) before to 100 GDD after silking. Pollen-limited conditions are simulated with functions describing field distributions of pollen shed and silk appearance. Kernel set is estimated daily from the pollen rate using the relationship by Bassetti and Westgate (1994). on in kernel number per plant observed across a range of crop management and environmental conditions.

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