

Corn Physiology and Yield Response to Hybrid and Seeding Rate on Claypan Soils

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ABSTRACT

Yield improvements over the past few decades have been attributed to increasing optimum plant population and not the increase of grain produced per plant. A goal in precision agriculture is to identify seeding rates that optimize yield, but that also minimize competition. Competition occurs when plants of the same species compete for vital resources needed for plant growth and fruit development. The objective of this research is to examine corn development and physiological responses of multiple hybrids at a range of seeding rates. We implemented two studies, Study 1 was a field-scale strip-trial design at multiple locations in the Central Claypan Areas of Northeast Missouri. Study 2 was a randomized complete block design placed at Bradford Research and Extension center in Columbia MO. The design of the experiments on Study 1 included four different hybrids at three different seeding rates: 74,000, 84,000, and 94,000 seeds ha⁻¹. Hybrids were chosen with maturity ratings ranging from 103-112. For Study 2 an additional four seeding rates were planted at 44,000, 54,000, 64,000, and 104,000 seed ha⁻¹. In sub plots, an intensive set of physiological and morphological measurements were taken throughout the season. Hybrids behaved in a similar trend with later maturing hybrids having higher responses for many of these measurements. A few exceptions occurred. Seeding rate differences had consistent trends for both studies. As plant population increased, yield components decreased on a per plant basis and increased on a per hectare basis. The wider range of seeding rates on Study 2 showed more significant differences between rates helping to establish how an extreme low or high seeding rate has a drastic effect on corn physiological and morphological responses. Competition can lead to greater per-plant variability for different responses some playing a vital role in grain yield, biomass, and harvest index. With greater understanding of how corn hybrids respond to increased intra-specific competition, better seeding A few exceptions occurred. rate recommendations can be made to optimize grain yield on varying soils in Mid-Missouri.