

CORN HYBRID RESPONSES TO NITROGEN FERTILIZER RATES

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Efficient use of nitrogen (N) fertilizer is becoming increasingly important in modern corn (*Zea mays* L.) production due to rising nitrogen fertilizer prices and growing concerns about NO₃⁻ contamination of ground and surface waters. Interest has arisen in whether nitrogen management can be improved by choosing hybrids that respond better to nitrogen. In order to see if hybrids respond differently to varying rates of N fertilizer, we grew nine hybrids at five N rates for three years at Urbana, Illinois. Yields, economically optimum nitrogen rates (EONR) and nitrogen use efficiencies were analyzed for each hybrid. Averaged across years, two hybrids, Burrus 583Bt and Burrus 795B, showed greater yield responses to N than the other hybrids. Averaged across years, EONR values also differed significantly among hybrids, ranging from 132 kg N/ha to 206 kg N/ha. We addressed aspects of N use efficiency at the EONR using three calculated parameters: yield efficiency (yield increase from N fertilizer divided by N rate); nitrogen uptake efficiency (increase in estimated plant N content from N fertilizer divided by N rate); and nitrogen utilization efficiency, which is yield efficiency divided by N uptake efficiency. Averaged across two years, nitrogen utilization efficiency was the only parameter that differed significantly among hybrids, ranging from 78 to 101 kg grain/kg N. Yield efficiencies were significant among hybrids in 2005, ranging from 23 to 56 kg grain/kg N. While hybrids thus differed in their response to nitrogen, those with highest yields tended to have lower yield efficiencies, and thus, lower nitrogen use efficiencies, indicating that N use efficiency by itself may have limited economic value as a hybrid trait.

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