INTROGRESSING UNIQUE SOURCES OF GERMPLASM TO IMPROVE N USE IN TEMPERATE MAIZE

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Abstract

The vast majority of maize breeding efforts have been conducted under high N environments that primarily select for only one component of NUE, N uptake. Furthermore, these studies have employed U.S. and European genotypes, which have been selected for performance at high N. Historically, maize was grown in numerous low N tropical environments, suggesting that evaluation of adapted maize lines containing tropical germplasm may harbor useful genetic variation and novel alleles for improving NUE. The goal of this research was, first, to perform an initial evaluation of NUE and its components in a set of adapted U.S. lines with introgressed exotic germplasm and, second, to assess the genetic differences in NUE among the corresponding hybrids, in an attempt to predict the behavior of these hybrids by comparison with the inbreds. Inbreds and hybrids were grown in the field under a range of N supply (from deficient to sufficient), and nitrogen use efficiency and its components measured at maturity. There was no significant effect of N rate on NUE for the inbreds, but we were able to detect significant effects of both the N supply and the different genotypes on NUE for the hybrids. Compared to the B73 x MO17 hybrid, introgression of exotic germplasm into the B73 or MO17 parent, nearly always improved NUE of the hybrids, which was largely due to improved uptake efficiency.

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