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“Nature of the genetic variation in an elite maize breeding cross”

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ABSTRACT: Maize (*Zea mays* L.) breeders through selection have had profound impacts on the maize genome. We will examine one aspect of this intense selection pressure, the extent and nature of genetic variation present in an elite maize breeding cross. Specifically genetic variation is examined with regards to genotype-by-environment interactions (GxE), magnitude of the estimates and the underlying grain yield QTLs. Using two elite Iodent sister-lines that are 64% identical-by-descent, 128 recombinant inbred lines (RILs) were generated and evaluated as hybrids in 24 trials encompassing four years, three locations, and three planting densities. In summary we found extensive linkage disequilibrium, reduced genetic variation in the more commonly occurring GxE patterns, and genetic variation due to larger effect epistatic interactions and smaller single effect QTLs specific to the GxE pattern. Consequences of the nature of this genetic variation will be discussed in relation to modern maize breeding programs.