

“Understanding Drought Tolerance to Best Breed for It: How Far Do We Go?”

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As both the occurrence of drought and its intensity are inherently unpredictable, screening and selection for drought tolerance under rain-fed conditions is always an unreplicable experiment. There are as many optimal phenotypes as there are different kinds of water stresses. As such, how far we should go to understand the genetic basis of drought tolerance instead of “just” breeding for crop adaptation and vigour is a reasonable question. Based on the results from a set of 44 water-stressed environments and 12 well-watered trials across 6 maize biparental populations, this presentation will demonstrate the value of identifying QTLs for secondary traits, and the challenge of going to the genes. This challenge is exacerbated by the clustering of drought genes at key genomic regions, and the genetic plasticity of the plant to adjust to unfavourable conditions. A significant genetic variance of the plant’s response to drought is expressed through epistatic effects. The value of “mapping as you go” vs constructing your “ideal genotype” vs genome-wide selection for drought tolerance will also be discussed.