



# Improving tools for pearl millet marker-assisted breeding—it's a struggle



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Pearl millet [*Pennisetum glaucum* (L.) R. Br.,  $2n=2x=14$ ;  $1C = 2.36$  pg], is a highly cross-pollinated C4 diploid grass. It is the staple cereal of crop-livestock production systems of the world's hottest, driest cultivated regions. It was among the first cereals with a marker-assisted breeding product adopted by developing country farmers. However, its marker-assisted breeding tool kit is poor, restricting further application. This project will strengthen the pearl millet marker-assisted breeding tool kit with EST-SSR & SNP markers, & RIL sets. >200 EST-SSR primer pairs mined from large libraries of short ESTs (from 454 sequencing of root and leaf cDNA libraries) were tested for amplification and ability to detect polymorphism using parents of 3 recently finished RIL populations. Mapping polymorphic SSRs with good amplification characteristics is underway. So far we have more than doubled the number of mapped SSRs in each of these 3 RIL populations. This transfer of SSR-based skeleton linkage maps from earlier F2:4 progeny sets to "finished" RIL populations has confirmed anticipated difficulties in developing highly inbred populations in this normally wind-pollinated species—slower than theoretical advance to homozygosity, severe segregation distortion and unacceptably high out-crossing rates during inbreeding — as a result of pearl millet pollen robustness combined with inadvertent selection for seedling vigor & required-for selfed seed set, resulting in loss of >20% of progenies during generation advance by "enforced selfing" due to either "non-paternal" alleles or inbreeding depression.



Control and stressed plants (at 40% net transpiration ratio)

## Pearl millet comparative maps with new *Xipes* series EST-SSR markers

A = ICMB 841-P3 x 863B-P2; B = H 77/833-2 x PRLT 2/89-33; C = 81B-P6 x ICMP 451-P8

