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Authors: [Thribhuvan R \(/browse?type=author&value=Thribhuvan+R\)](#)

Advisor: [K. K. Vinod \(/browse?type=author&value=K.+K.+Vinod\)](#)

Title: Identification and validation of meta-QTLs for drought tolerance in cultivated and wild rice germplasm

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**Abstract:** A study was undertaken to evaluate 92 rice genotypes from eastern India for reproductive stage drought responses under rainfed upland conditions at Hazaribag, Jharkhand. The study revealed significant variation among genotypes when challenge with a severe reproductive stage drought. The drought responses varied from susceptibility to tolerance. There were few genotypes showing avoidance mechanism, by completing their crop duration before the onset of severe stress. A QTL meta-analysis was also performed to assemble most congruent QTLs from a large set of drought related QTLs collected from previous reports. Fifty-one mQTLs were identified that were related to traits such as grain yield, biomass and heading date, and located on chromosomes 1, 3, 4 and 9. The markers linked to mQTLs were paneled to genotype the same germplasm set used for field evaluation. The marker alleles showed increased prevalence throughout the population. The marker based diversity of germplasm revealed two subpopulations, POP1 and POP2 in which POP1 contains predominantly of cultivated types and POP 2 consisted predominantly of wild and weedy rice. Molecular analysis of variance revealed that both population were in Hardy-Weinberg equilibrium with significant differentiation among themselves, while each population carried enough genetic diversity within individuals. The marker trait association for traits related to drought stress indicated that four robust associations. Association of marker RM11943 to grain yield, HvSSR9\_19 to panicle length, RM324 to total filled grains per panicle and RM220 to heading date. These markers could be further employed for breeding for drought stress in rice. The potential carriers for drought response mQTLs were also identified such as Anjali, Sadabahar, Dular, Vandana, Shabhagidhan and wild and weedy rice 91 such as ON10, ON32, WR07, WR35 etc. They can be used as donors in future breeding program or can be recognized as potential cultivars for rainfed ecology in eastern region. 92

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