

QTL MAPPING FOR PHOSPHORUS EFFICIENCY IN SORGHUM

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The sorghum (*Sorghum bicolor* L. Moench) crop has significantly expanded in Brazil in recent years. However, low pH, aluminum (Al) toxicity, low phosphorus (P) availability and low fertility are limiting factors for further sorghum expansion into large areas of the Brazilian Cerrado. Phosphate fertilization has been used to increase available P in the soil thus mitigating P deficiency on tropical regions. However, rock phosphate is a non-renewable natural resource which is being rapidly exhausted, increasing production costs. Thus, the development of cultivars that are more productive under stress is vital for agricultural sustainability in tropical regions. The present study aimed at identifying quantitative trait loci (QTL) for grain yield for sorghum cultivated under low P availability in the soil. For this purpose, a mapping population of 396 recombinant inbred lines (RILs) derived from a cross between contrasting parents for P efficiency, BR007 and SC283, was phenotyped for grain yield under low P availability in the field at the Embrapa Maize and Sorghum research station (Sete Lagoas, Minas Gerais, Brazil). Genotyping was undertaken by sequencing (GBS, genotyping-by-sequencing). Mixed models were fitted to a group of experiments, each disposed as an incomplete block design, to obtain best linear unbiased estimators (BLUEs) for grain yield with the GenStat software. QTL mapping was done with the OneQTL package implemented in R. Heritability was estimated as 0.54 and the coefficient of variation was 34%, indicating potential for QTL identification. We identified single QTL on chromosomes 1, 7, 8, 9 and 10, two each on chromosomes 3 and 4, and three QTL on chromosome 6. QTL on chromosomes 3 (2.63 Mb) and 7 (2.55 Mb) co-localized with *SbPSTOL1* genes previously implicated in controlling root traits. Therefore, our data suggests that these QTL can be used to increase sorghum grain yield under low P conditions. Molecular markers for these QTL have potential use in breeding strategies aimed at developing sorghum cultivars with superior performance under P stress.

Key-words: *Sorghum bicolor*; grain yield; phosphorus stress

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