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MARKER-ASSISTED BACKCROSSING OF BMR6 INTO BIOMASS SORGHUM LINE

Pinto, MO[1]; Silva, MJ[2]; Barros, BA[1]; Guimarães, CT[1]; Schaffert, RE[1]; Parrella, RAC[1]; Damasceno, CMB[1]

[1] Embrapa Milho e Sorgo, Sete Lagoas, MG, Brasil
[2] Universidade Federal de Viçosa, Viçosa, MG, Brasil.

marcos.deoliveira@embrapa.br

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The *bmr6* recessive allele reduces the activity of one of the key enzymes involved in the synthesis of lignin in sorghum, resulting in lower levels of this component in the plant. Reduction of lignin content can improve the conversion efficiency of sorghum biomass to simple sugars, and make cellulosic ethanol production more economically feasible. Sorghum has known mutant lines called brown midrib (*bmr*) which can present up to 50% reduction in lignin. The objective of this work was to introgress the *bmr6* allele into a biomass sorghum line using marker-assisted backcrossing. CMSXS170_*bmr6* (donor parent) was crossed with biomass sorghum line IS23777, which was the recurrent parent in BC_1F_1 and BC_2F_1. Heterozygous individuals for the *bmr6* locus were selected using a previously published CAPS molecular marker specific to the *bmr6* allele. KASP markers distributed throughout the sorghum genome were also used in each backcross to estimate the percentage recovery of the recurrent genome. Among the 60 individuals of the BC_1F_1 progeny, 31 were selected for the presence of the *bmr6* allele. Genome recovery was estimated by 16 KASP markers and ranged from 60.7% to 84.6% with a mean of 74.2%. A progeny with 84.6% of the recurrent parent genome was selected for the second cycle of backcrossing to obtain BC_2F_1. From the 60 BC_2F_1 genotyped individuals, 26 were identified with *bmr6* allele. Based on genotyping with 22 KASP markers, the recovery of the recurrent parent genome ranged from 84.1 to 95.5% with a mean of 89.9%. The BC_2F_1 individual showing 95.5% recovery of the IS23777 genome was selected and self-fertilized for further progeny testing and confirmation of the bmr6 phenotype. These results show that molecular selection for introgression of the recessive *bmr6* allele in biomass sorghum is a faster and more efficient strategy than conventional backcrossing, and can contribute to develop better plant materials for bioenergy production.

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