Review of functional markers for improving cooking, eating and the nutritional qualities of rice

ABSTRACT

After yield, quality is one of the most important aspects of rice breeding. Preference for rice quality varies among cultures and regions; therefore, rice breeders have to tailor the quality according to the preferences of local consumers. Rice quality assessment requires routine chemical analysis procedures. The advancement of molecular marker technology has revolutionized the strategy in breeding programs. The availability of rice genome sequences and the use of forward and reverse genetics approaches facilitate gene discovery and the deciphering of gene functions. A well-characterized gene is the basis for the development of functional markers, which play an important role in plant genotyping and, in particular, marker-assisted breeding. In addition, functional markers offer advantages that counteract the limitations of random DNA markers. Some functional markers have been applied in marker-assisted breeding programs and have successfully improved rice quality to meet local consumers' preferences. Although functional markers offer a plethora of advantages over random genetic markers, the development and application of functional markers should be conducted with care. The decreasing cost of sequencing will enable more functional markers for rice quality improvement to be developed, and application of these markers in rice quality breeding programs is highly anticipated.

Keyword: Quantitative trait loci (QTL); DNA markers; Rice quality; Marker-assisted breeding (MAB); Micronutrients; Sequencing technology