Breeding of a target genotype variety based on identified chalkiness marker-QTL associations in rice (*Oryza sativa* L.)

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ABSTRACT. The aim of this study was to breed a target genotype variety based on the identified chalkiness marker-QTL (quantitative trait locus) associations in rice. First, a permanent mapping population of rice that consisted of 525 recombinant inbred lines (RILs), which were derived from Zhenshan 97/Minghui 63, was used to identify QTLs with additive effects for rice quantitative traits and percentage of grain chalkiness (PGC). Subsequently, based on the identified QTLs in rice, the molecular marker 68923-PGC was selected to screen the low chalkiness rice line. Then, using the integration of molecular marker breeding and traditional breeding, we analyzed the genotype and phenotype of inbred lines from 525 RILs; we identified one rice variety with particularly high yields, good taste, and broad adaptability. The new variety was temporarily named
RIL10, which was a high quality, high yield, and broadly adaptable variety, and it is predominantly a feature that has contributed to its geographical adaptability, which would be planted from 35°E to 18°E in China in China, where 2/3 of rice production occurs. RIL10 was a marker-assisted selection breeding achievement for producing a high quality, high yield, and broadly adaptable rice variety.

**Key words:** Rice; Breeding by design; Chalkiness; QTLs; Molecular marker; Target genotype variety