

Relationship between high temperature and formation of chalkiness and their effects on quality of rice

ABSTRACT

Occurrence of chalkiness in rice is attributed to genetic and environmental factors, especially high temperature (HT). The HT induces heat stress, which in turn compromises many grain qualities, especially transparency. Chalkiness in rice is commonly studied together with other quality traits such as amylose content, gel consistency, and protein storage. In addition to the fundamental QTLs, some other QTLs have been identified which accelerate chalkiness occurrence under HT condition. In this review, some of the relatively stable chalkiness, amylose content, and gel consistency related QTLs have been presented well. Genetically, HT effect on chalkiness is explained by the location of certain chalkiness gene in the vicinity of high-temperature responsive genes. With regard to stable QTL distribution and availability of potential material resources, there is still feasibility to find out novel stable QTLs related to chalkiness under HT condition. A better understanding of those achievements is essential to develop new rice varieties with a reduced chalky grain percentage. Therefore, we propose the pyramiding of relatively stable and nonallelic QTLs controlling low chalkiness endosperm into adaptable rice varieties as pragmatic approach to mitigate HT effect.