Diversity of Starch Physico-Chemical Properties and Haplotypes of Starch-Synthesizing Genes in Thai Rice

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ABSTRACT

The physico-chemical properties of starch in the rice grain which include the apparent amylose content (AAC), the gelatinization temperature (GT) and the gel consistency (GC) are important characters of interest to breeders. We studied starch physico-chemical properties and the genotype of starch-synthesizing genes in Thai rice varieties. One hundred and sixty accessions of Oryza sativa from Thailand were evaluated for AAC, GT and GC, and were assayed using PCR-SSCP at seven loci coding for starch-synthesizing genes. The AAC varied from 1.11% to 30.07%. The GT alkali score varied from score 2 to score 7 and the GC varied from 1 to 15 cm The statistical analyses suggested an inverse correlation between AAC and GT and GC, and a correlation between GT and GC. The numbers of alleles at the GBSSI, SSSIIIa, SSSIIIb, SSSIVa, SSSIVb, RBE1 and RBE3 loci were 13, 14, 8, 8, 7, 5 and 5, respectively. The ANOVA analysis comparing the mean values of starch AAC and GC for each of the 7 genes showed significant differences ($P < 0.05$) at each of the loci except at the SSSIIIb and RBE1 loci for AAC, and at the SSSIIIa, SSSIIIb and RBE1 loci for GC. For the GT, significant differences were indicated only at the GBSSI locus.

Key words: Starch, Apparent amylose content, Gelatinization temperature, Gel consistency, Rice

INTRODUCTION

The quality of the rice grain is a major character that determines prices and demand in markets. However, different products require different types of rice with distinctive starch properties, e.g., high amylose starches are used in fried snack products to create crispness and are widely used as thickeners or strong gelling agents in the production of jellies. Sticky rice containing starches with