

Research Note

Association Between Alleles of the *Waxy* Gene and Traits of Grain Quality in Philippine Seed Board Rice Varieties

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The association between alleles of the *Waxy* gene, defined by the number of CT repeats on exon 1, and traits of grain quality was carried out using 47 Philippine Seed Board rice varieties. The major alleles of the *Waxy* gene in the set of 47 were (CT)₁₀, (CT)₁₁, (CT)₁₇ and (CT)₂₀. Varieties were divided into four clusters based on the metric of each trait of grain quality. (CT)₁₀ (27-32% amylose content (AC)) and (CT)₁₁ (22-30% AC) were mainly in clusters 3 and 4 (hard texture), and (CT)₁₇ (20-24% AC) and (CT)₂₀ (18-27% AC) were exclusively in grain quality cluster 1 (soft texture) and 2 (medium texture). (CT)_n associated negatively with AC in this set. Only six (CT)₁₁ and one (CT)₁₀ rices were in cluster 4 (high-AC low-GT) and had high RVA consistency (final viscosity – trough viscosity) > 200 RVU. (CT)₁₇ seemed to be the preferred source of low-intermediate AC in the Philippine rice breeding program, followed by (CT)₂₀.

Key Words: apparent amylose content, cooked rice hardness, cluster, CT polymorphism, gelatinization temperature, PSB Rc varieties, RVA, *Waxy* gene

Abbreviations: AC – apparent amylose content, CT – cytosine and thymine, DNA – deoxyribonucleic acid, GBSS I – granule-bound starch synthase I, GQNPC – Grain Quality, Nutrition and Postharvest Centre, GT – gelatinization temperature, IRRI – International Rice Research Institute, PhilRice – Philippine Rice Research Institute, PSB Rc – Philippine Seed Board rice, RVA – Rapid Visco Analyser, RVU – Rapid Visco units

INTRODUCTION

Philippine Seed Board rice (PSB Rc) varieties were classified by Roferos et al. (2006) into four clusters based on physicochemical properties, cooked rice hardness (measured by the Instron Food Tester Model 1140 with extrusion cell) and characteristics of the Rapid Visco Analyser (RVA) curve. Cluster 1 (soft cooked rices) consisted mainly of varieties with both intermediate apparent amylose content (AC) and gelatinization temperature (GT) as well as rices with both low AC and low GT. Cluster 2 (medium cooked rices) consisted of rices either with high AC and intermediate GT or with intermediate AC and low GT. And clusters 3 and 4 (hard cooked rices) consisted solely of rices with high AC and low GT. Varieties in cluster 4 had

higher (>200 RVU) RVA consistency (final viscosity – trough viscosity) than cluster 3.

A polymorphic dinucleotide repeat of cytosine and thymine (CT)_n in the 5'-untranslated region of the *Waxy* gene encoding the granule-bound starch synthase I (GBSS I) has been employed in several grain quality laboratories for classification of AC (Bergman et al. 2001; Jayamani et al. 2007). In these laboratories, the association between the number of CT repeats and AC holds very well. The AC in rice associates strongly with the texture of the cooked rice and with the amount the rice paste hardens as it cools from 95 °C to 50 °C in the Amylograph or the RVA (Juliano and Villareal 1993; Bao et al. 2006a). Because these parameters form the definition of the clusters found for a set of 47 PSB Rc varieties (Roferos et al. 2006), the association between