

Validation of Molecular Markers for the Analysis of Genetic Diversity of Amylose Content and Gel Consistency among Representative Rice Varieties in Sri Lanka

H.K.D.H. Fernando, T.J.C. Kajenthini¹, S.P. Rebeira²,
T.C. Bamunuarachchige³, and H.A.M. Wickramasinghe^{1*},

Postgraduate Institute of Agriculture,
University of Peradeniya,
Peradeniya

ABSTRACT: Starch is the major storage compound in almost all cereals including rice (*Oryza sativa* L.) and is used as a primary source of energy for humans. Furthermore, it is the main determinant of the eating and cooking quality (ECQ) of rice as amylose content (AC) and gel consistency (GC) are two parameters that significantly contribute to the ECQ. These parameters are mainly controlled by a major gene designated as Waxy or Wx, other minor genes such as ADP-glucose pyrophosphorylase isomerase (AGPiso) and environmental factors. The Waxy gene that encodes for the granule bound starch synthase (GBSS) enzyme which synthesizes amylose. The AGPiso (AGPase) gene, codes the protein glucose-1-phosphate adenylyltransferase which plays a role in starch synthesis by catalyzing the synthesizing of activated glycosyl donor, ADP-glucose. In this study, an attempt was taken to demonstrate the correlation of AC and GC to three simple sequence repeat/ short tandem repeat (SSR/STS) molecular markers, AGPiso (linked to AGPiso gene), GBSS1 and WX (linked to Waxy gene) using 31 representative Sri Lankan rice varieties. Among the tested rice varieties, the AC and GC varied from 14.8 to 27.7%; and 3.4 to 9.0 cm, respectively. All three markers gave multiple alleles (2-5 alleles), however, these markers did not show a significant association to the AC and GC of the tested rice varieties. Further analysis of the genetic variation of Suduru Samba and Kalu Heenati will be useful as they clustered separately from the rest of the tested varieties based on the polymorphism for markers AGPiso, GBSS1 and WX.

Keywords: Amylose content, gel consistency, molecular markers, rice eating and cooking quality

¹ Department of Agricultural Biology, Faculty of Agriculture, University of Peradeniya, Peradeniya

² Department of Grain Quality, Rice Research and Development Institute, Bathalegoda, Sri Lanka

³ Department of Biological Sciences, Faculty of Applied Science, Rajarata University of Sri Lanka, Mihinthale

* Corresponding author: Mangalikaw@pdn.ac.lk