

Author: [ADVANCED](#)Volume Page Keyword: 

[TOP](#) > [Available Issues](#) > [Table of Contents](#) > [Abstract](#)

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[\[PDF \(787K\)\]](#) [\[References\]](#)

Effects of Variations in Starch Synthase on Starch Properties and Eating Quality of Rice

[Takayuki Umemoto](#)¹⁾²⁾, [Tetsuya Horibata](#)³⁾, [Noriaki Aoki](#)¹⁾, [Mayu Hiratsuka](#)²⁾, [Masahiro Yano](#)⁴⁾ and [Naoyoshi Inouchi](#)³⁾

- 1) National Institute of Crop Science
- 2) Graduate School of Life and Environmental Sciences, University of Tsukuba
- 3) Faculty of Life Science and Biotechnology, Fukuyama University
- 4) National Institute of Agrobiological Sciences

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Abstract: We evaluated the effects of functional variation in three starch synthases in rice (*Oryza sativa* L.)-granule-bound starch synthase I (GBSSI, *wx*), starch synthase I (SSI, *SSI*), and starch synthase IIa (SSIIa, *alk*)-between *indica* cultivar Kasalath and *japonica* cultivar Nipponbare on starch properties and eating quality. We used three near-isogenic lines-NIL(*Wx*^a), NIL(*SSI*^k), and NIL(*Alk*)-containing chromosomal segments of Kasalath on a Nipponbare genetic background. The *Wx*^a allele explained most of the difference in amylose content between the two cultivars, and decreased the peak viscosity and breakdown to less than half of those of Nipponbare. These changes reduced the quality of cooked rice both just after cooking and after storage at 5°C. The variation in *SSIIa* also affected the eating quality after storage of cooked rice at 5°C : NIL(*Alk*) became harder and less sticky than Nipponbare, although the rices were comparable just after cooking. Differential scanning calorimetry revealed faster retrogradation of the once-gelatinized starch in NIL(*Alk*). The variation in *SSI* alleles hardly affected these properties.

Keywords: [Amylopectin](#), [Amylose](#), [Cooked rice quality](#), [Near-isogenic line](#), [Rice \(*Oryza sativa* L.\)](#), [Starch properties](#), [Starch synthase](#)

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