

Ultrastructure of Ilpumbyeo (일품벼), an Excellent Quality Japonica Rice (Low-Amylose) and its Mutant Goami 2 (고아미2호), a High Dietary Fiber Rice (High-Amylose) : Scanning, Transmission and High Voltage Electron Microscopy

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Abstract

As in many other Asian countries, cultivated rice (*Oryza sativa*L) is the major agricultural crop in Korea, and its cereal has been the principal food for its people since ancient times. Lately, the per capita consumption of rice, however, has steadily decreased since the introduction of fast-food products, which incorporate the use of wheat and maize, in the late 1970s. On the contrary, the hypoallergenic property of rice and its traditional nutritional value received increasing interest, which led Korea's rice-breeding program to develop new rice varieties suitable for incorporation into a variety of processed "healthy" food products.

Recently, a new rice variety, Goami 2 (G2) was developed by mutation breeding via N-methyl-N-nitrosourea (MNU) treatment of Ilpumbyeo (IP), a high-quality japonica rice, at the National Institute of Crop Science, RDA. Preliminary studies indicated that G2 had unsuitable properties for traditional cooked rice due primarily to its high amylase content, but it had promising qualities, from a nutritional point of view, as it contains unusually higher amounts of dietary fiber, protein and lipid. On the basis of these data, a series of studies has been initiated on the comparison of various aspects of chemical, physicochemical and ultrastructural characteristics of IP and G2 to elucidate the factors involved in directing the quality of cooked rice and to exploit the possible utilization of G2 in other processed food products.

Ultrastructural analysis of rice endosperm cells, fractured whole rice grains, isolated starch granules, and cooked-and amylolytic enzyme-treated rice grains from IP and G2, with scanning, transmission and high voltage electron microscopy, revealed striking differences that could be the major factors in determining the quality of cooked rice. The details of these studies will be discussed in the present lecture.