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한국 재래 조의 전분특성

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Characterization of Starches Separated from Native Korean Foxtail Millet

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Objectives

Starches based on physicochemical properties was examined to ascertain the differences of waxy and non-waxy starches purified from native Korean foxtail millet.

Materials and Methods

Starch isolation : Five *S. italica* cultivars were ground and sieved with a 100 mesh sifter. After sieving, powders were extracted with 100 and 85% MeOH. Starches were also extracted with SDS three times. Finally the starches were washed with 85% MeOH and distilled water. Amylose content of isolated starches was determined in triplicate by using the method of Juliano (1971). Purified starch granules were sputter coated with gold and examined with a scanning electron microscope(JSM-56000LV; JEOL) at 10 or 20kV. DSC of starches was measured as described by Nakamura et al. (2000). X-ray diffraction pattern of starches was obtained with copper, nickel foil-filtered, Ká radiation using a diffractometer RINT2000 (Japan) at 50 kV and 27 mA. Finally, starch granule size was analyzed with a particle size analyzer (CILAS 1064, France).

Results

Thermal properties of five isolated starches showed that onset temperature was different due to the relative amounts of amylose. Peak temperature was also altered by amylose content. Waxy-starches showed purple-red colors in Andong and Bongsung cultivars. Kernel colors was characterized to ascertain indirectly the relative ratio of amylose and amylopectin. Scanning electron microscopy observations showed that five isolated starches formed similar sizes of polygonal granules with sharp or rough edges. X-ray pattern of five starches showed typically A-type.Further study including degree of crystallinity and polymerization of amyloectin was requested to fully understand the thermal properties of starches.

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Table 1. Thermal properties of starches from different *S. italica* cultivars

Cultivars	To	Tp	Tc	△ H gel(J/g)	PHI	R
Andong	68.8 b	73.6 b	79.5 a	8.22	1.71	10.7
Juchun	66.4 d	71.0 b	74.8 c	1.22	0.27	8.4
Silrim	66.7 c	71.1 b	74.7 c	0.99	0.23	8.0
Bongsung	69.6 a	74.2 a	74.1 d	0.44	0.10	4.5
Bonghwa	65.9 e	71.0 b	75.8 b	1.05	0.21	9.9

Means with the same letters are not significantly different(P <0.05).

To, onset temperature; Tp, peak temperature; Tc, conclusion temperature; R, gelatinization range(Tc-To); △ H *gel*, enthalpy of gelatinization(dwb, based on starch weight); PHI, peak height index Hgel/(Tp-To).

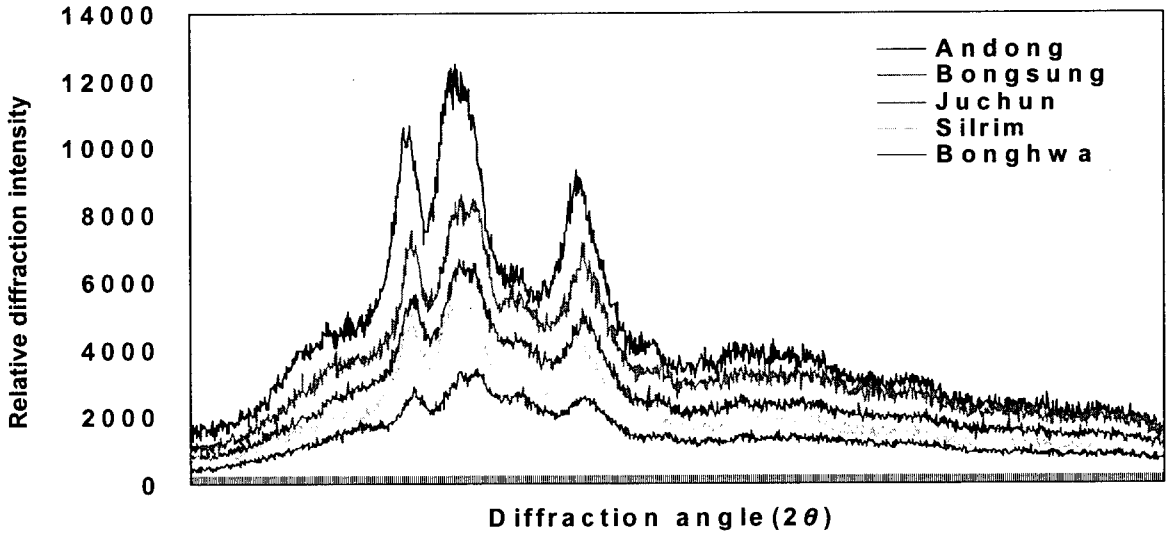

Figure. X-ray spectra of the five foxtail millet starches.

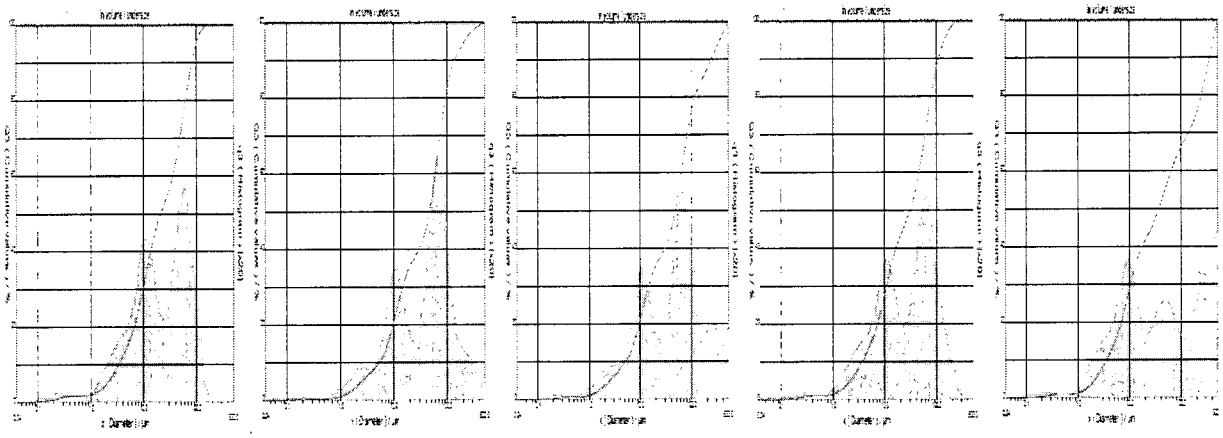

Figure. Particle size analysis of the starches separated from five *S. italica* cultivars. Andong, Juchun, Silrim, Bongsung, Bonghwa (From the left). Starch granule size at D50% is 17.8, 46.6, 47.3, 28.0, and 25.2 ìm, when it was ultrasonic for 20 min., respectively.