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Physico-chemical Properties and Digestibility of Pulse Starch after Four Different Treatments

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In these studies, we found that the average starch particle size of Adzuki beans, and tebou var. and kintoki var. kidney beans was approximately 30-40 μm . In addition, these particles were globular with a C-type crystal structure. Heating enhanced the solubility and swelling power of the three kinds of isolated bean starch. No differences were noticed in the solubilities of the starches, and the swelling power of the Adzuki bean starch was higher than that of tebou var. and kintoki var. starch. The swelling power was also substantially altered by the various treatments. We found that the three different defatted starches had an A-type X-ray diffraction pattern and a higher solubility compared to the respective untreated starches. All three types of hot water-treated starch gave a similar X-ray diffraction pattern, but their solubility and swelling power were low compared to the untreated starch. Heat-moisture-treated starch gave an approximate A-type X-ray diffraction pattern, and the swelling power was even lower. In contrast, the starch that underwent the freeze-thawing treatment gave an amorphous X-ray diffraction pattern and had a much higher solubility at 50°C than any of the other samples. The resistant starch (RS) content for isolated starch from the three kinds of beans was approximately 1%. Although the RS content of defatted or hot water-treated starch did not differ from that of untreated starch, the RS content of the heat-moisture-treated starch increased to between 2.5 and 4.2%. Furthermore, the RS content of the starch exposed to the freeze-thawing treatment was the highest: approximately 4% for Adzuki bean, 9% for tebou var. and 8%

for kintoki var. starch.

Key words: Adzuki bean, kidney bean, starch, resistant starch, dietary fiber

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