

Biochemical Changes Associated with Germinating Rice Grains and Germination Improvement

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Abstract: To determine biochemical changes during the germination of rice grains (*Oryza sativa* L. subsp. *indica* var. Mottaikaruppan) and to improve germination rate using gibberellic acid and surfactants [sodium dodecyl sulfate (SDS) (1.0 g/L) and Triton-X-100 (1.0 mL/L)], whole rice grains soaked in distilled water for 12 h at 30°C were germinated in the dark at 30°C for five days. The highest germination rate (77.1%) was obtained on the 5th day. An increase in the content of reducing sugars from 7.3 to 58.1 mg/g DM (dry matter) was observed from the 1st day of germination. Free amino acids and soluble protein contents increased to 3.69 and 5.29 mg/g DM, respectively on the 5th day of germination. Total protein content decreased from 100.5 to 91.0 g/kg DM during germination. Increases in amylolytic (1.1 to 190.0 U/g DM) and proteolytic (0 to 0.12 U/g DM) activities were observed during germination. Effects of different concentrations of gibberellic acid on the germination of rice grains were evaluated and 0.1 g/L was found to promote germination. When effects of gibberellic acid (0.1 g/L) and surfactants were evaluated individually and together, higher germination rate was observed in the control experiment (grains germinated in distilled water), whereas gibberellic acid and surfactants decreased the germination rate. Therefore, the flour obtained from the grains germinated for four days using distilled water to obtain high content of soluble materials and enzyme activities can be used in preparation of bakery items.

Key words: germination; whole rice grains; biochemical changes; amylase activity; protease activity