Improving Malting Of A Local Variety Of Rice (*Mottaikkaruppan*) And Analysis Of Biochemical Changes Occurring During Malting

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Malting improves the nutritional value of seeds. The aim of this study was to improve the malting technique of rice grains and to determine the biochemical changes during malting of dehusked unpolished rice grain (*Mottaikaruppan*). Whole rice grains steeped in distilled water (12 hours, 30°C) were germinated in a moistened cloth bag kept in dark at 30°C for 6 days while spraying with distilled water to maintain the grains in a moistened condition. Grains dried at 35°C (sun drying) were used to prepare the malted rice flour (moisture content 9.2-11.1%). Germination (77.1%) was significantly ($p<0.05$) increased on 5th day of germination. A significant increase ($p<0.05$) in reducing sugar (7.3 to 58.1mg/gDM; DM-Dry Matter) was observed from the 1st day of germination. A significant decline ($p<0.05$) in free amino acid content (1.2 to 1.0mg/gDM) and soluble protein (7.2 to 3.9mg/gDM) were observed up to 2nd day of malting which increased significantly ($p<0.05$) to 3.69 and 5.29mg/gDM respectively on the 5th day of germination. Total protein content decreased significantly ($p<0.05$) from 10.1 to 9.1g/100gDM during malting. Significant increases ($p<0.05$) in amylolytic (1.1 to 190U/gDM) and proteolytic (0 to 0.021U/gDM) activities were observed during malting. To improve germination, effects of gibberellic acid and surfactants (Sodium dodecyl sulfate (SDS) & Triton-X-100) were evaluated individually and together. Germination in the presence of SDS (1.0gL^{-1}), Triton-X-100 (1.0mLL^{-1}), gibberellic acid (0.1gL^{-1}), SDS (1.0gL^{-1}) & gibberellic acid (0.1gL^{-1}), Triton-X-100 (1.0mLL^{-1}) & gibberellic acid (0.1gL^{-1}) and distilled water were 36.8, 42.5, 72.9, 43.5, 50.9 and 76.0 respectively. A significant decrease ($p<0.05$) in the percentage of germination was observed in presence of both of the surfactants when they were used individually and in combination with gibberellic acid than in the presence of gibberellic acid alone. It was anticipated that if endogenous malt amylase activity is increased, the germination could also be enhanced. The optimum pH for the activity of endogenous α-amylase is 5.0. Therefore the grains were steeped in 0.01M acetate buffer (pH 5.0) containing 0.1gL^{-1} $Na_2S_2O_5$ & 0.1gL^{-1} gibberellic acid and germinated for 4 days and using distilled water containing 0.1gL^{-1} $Na_2S_2O_5$ & 0.1gL^{-1} gibberellic acid as the control. Germination percentages of test (74.5%) and control (74.3%) did not significantly differ ($p>0.05$). A significantly higher ($p<0.05$) percentage of moisture content of germinated rice grains was observed in the test (50.4%) than in the control (49.0%). Higher amounts of reducing sugar (861.7mg/gDM), soluble protein (3.4mg/gDM) and total protein (91.8mg/gDM) were observed in control than those in the test, but they did not differ significantly ($p>0.05$). However, the amylolytic (133.43U/gDM) and proteolytic (0.06U/gDM) activities were significantly higher ($p<0.05$) in the control than in the test. Dextrose equivalent (DE) of the control (3.39%) is significantly ($p<0.05$) higher than in the test (3.17%). Therefore the whole rice grain should be steeped in distilled water (12hours, 30°C) and germinated for 4 days to obtain high content of reducing sugar, total sugar, free amino acid, soluble protein and amylolytic & proteolytic activities for the use in food industries.