# STUDY OF PROCESS CONDITIONS FOR STARCH PRODUCTION FROM LOCAL RICE VARIETIES

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# Abstract

Rice is the staple diet of Sri Lankans and mainly consumed as steamed rice. In addition to this pre gelatinized milled rice flour is used by some food industries, for the production of rice noodles, instant hoppers and string hoppers. However, the value addition to rice flour in Sri Lanka is at a minimum level. Therefore, the major objective in the research was to bring value addition to raw rice flour.

In starch manufacturing process, it is necessary to remove protein as it can affect starch properties. Alkaline steeping method and enzymatic method were used in this study to remove protein in rice flour. Two rice types, white raw rice and red raw rice were used as a source of starch production. Initial protein percentage in white raw rice and red raw rice were 9.034% and 10.42% respectively. In alkaline steeping method, milled rice flour was treated with 0.1%, - 0.5% (w/v) NaOH for 1-5 hr. About 89 % of protein can be removed from white raw rice flour by treating with 0.5% NaOH for 5 hrs at 30°C and at a mixing speed of 200 rpm. When red raw rice was treated under the above conditions, 86 % of protein can be removed.

In enzymatic method, rice flour slurry was treated with 0.1%- 0.5% (w/w, dry flour basis) protease enzyme at 55°C and at a pH 6.5 for 1-5 hrs. After the treatment, sample washing was done in two ways. One part of the sample was washed with water and the other part was washed with 0.1% NaOH. Up to 76% of protein in white raw rice and 68 % of protein in red raw 'rice can be removed by treating with 0.5% protease for 5 hours followed by washing with water. When treated with 0.5 % protease for 5 hrs followed 'by washing with 0.1% NaOH, 86 % of protein in white raw rice and 85 % of protein in red raw rice can be removed.

In alkaline treatment method, the temperature and mixing speed were changed to determine the effects of protein removal in white raw rice. While keeping other conditions constant, treatment temperature was increased to 55°C. According to the

results, significant reduction of rice protein was observed at 55 °C than at 30°C for each NaOH concentration. When the shaking speed of the slurry was 150 rpm while the other conditions were constant, protein removal was slightly lower as compared to a shaking speed of 200 rpm.

The change of viscosity with increasing temperature was compared in untreated white raw rice, white raw rice treated with 0.1% NaOH for 0.5 hrs, 0.5% NaOH for 5 hrs and 0.5% protease enzyme for 5 hrs. The results show that the viscosity increased with decreased residual protein content in each rice sample. Furthermore, rice starch with low protein gelatinizes at low temperature. This property is useful achieving high viscosity at low temperature in the production of starch based thickening agents.

As a conclusion, the maximum percentage of protein can be removed from white rice when treated with 0.5% NaOH at 55°C at a shaking speed of 200 rpm. Alkaline method is low cost and more efficient compared to enzymatic method. However, high pH values (pH values> 10) in the alkaline medium may decrease the quality of starch. Furthermore, alkaline method gives out high alkaline effluents which can contribute to environmental pollution. These effects can be overcome by performing a combined method of enzymatic treatment followed by alkaline washing (0.1% NaOH) while maintaining an efficient conversion percentage.