Development of rapid analytical methods to select suitable rice varieties for cracker production

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Abstract - This study was conducted to develop rapid analytical methods to select suitable rice varieties with high stickiness for cracker production. Rice with low amylose is stickier than rice with high amylose. The study was designed to determine the two most important factors amylose and amylopectin. It was conducted to locally bred rice varieties AT 306, AT 405 and Samba. Amylose content was quantitatively determined using Juliano method. The amylopectin content was determined using a color card. It was developed by the reaction of several concentrations of pure amylopectin with 0.2% iodine to form respective colors. The particle size distribution of rice flour was analyzed. For this purpose, 100g of milled rice flour was placed on the sieve shaker and was operated for 12 minutes. The weight of flour retained on each sieve was weighed to identify passing through and retained on percentages. The results revealed that the amylose percentage of AT 306, AT 405 and samba were 19.6%, 12.2% and 25.87% respectively. The percentage of rice flour with larger particle size ($>300\mu m$) for Samba was above 95%, and for AT 306 and AT 405 it was 77%.

Index terms - Amylopectin, Amylose, Particle size distribution, Rice crackers, Rice varieties, Stickiness

I. INTRODUCTION

Rice is a monocot and one of the most important cereals in the world. More than half of the world's population consumes rice. Because of Asia's favorable hot and humid climate, about 90% of the world's rice is grown and consumed in Asia, where it contributes about 50 to 80% of dietary energy (Juliano, 1993) [2]. There are two major rice varieties as Japonica and Indica rice varieties. Japonica rice is generally known to be stickier, short and roundish than the Indica type as it contains low amylose content of 0-20%. Indica rice on the other hand has higher amylose content which makes the cooked rice harder and less sticky. They are long, slender, and flat and have an amylose content of 23-31%.

Rice is the staple food of Sri Lankans. Sri Lanka is self sufficient in rice. But there is a major fluctuation of the rice utilization pattern. So it is important if rice can be diversified into other fields, mainly because the Sri Lankan population likes the taste of rice. A good example is production of rice crackers. Normally biscuits are produced using wheat flour. They contain gluten which helps to maintain the consistency and the integrity of the product. But rice lacks gluten. So the major problem faced when producing rice crackers is the loss of integrity and formation of cracks on the product.

Stickiness becomes a major parameter when producing rice crackers with high quality. The major rice variety in Sri Lanka is Indica variety. They are high in amylose and low in stickiness. So specially bred rice is used for rice cracker production. But the stickiness of these rice varieties varies depending on the batch. So the major objective of this study is to develop rapid analytical methods to select suitable rice varieties for rice cracker production and minimize the wastage of rice.

II. METHODOLOGY

2.1 Quantitative determination of amylose:

Initially 40mg of purified potato amylose was weighed into a beaker. Then 1ml of 95% ethanol and 9ml of 1N NaOH was added and the mixture was heated in a boiling water bath for 15 minutes. The solution was cooled to room temperature and topped up to 100 ml with distilled water. Then 1ml, 2ml, 3ml, 4ml and 5 ml of above prepared solutions were transferred to 5 volumetric flasks. A series of standard solutions were prepared by adding 0.2ml, 0.4ml, 0.6ml, 0.8ml and 1ml of 1N Acetic acid solution respectively. Finally 2ml of 0.2% Iodine solution was added to all flasks. The absorbance was measured at 620 nm using the UV – VIS spectrophotometer (Serial no A 109347) and the