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Relationship between particle size and quantity of rice flour to be incorporated into rice/wheat bread

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Over the last decades, a tendency to adapt bread as a regular food has become increasingly apparent in our country. Incorporation of rice flour into bread manufacturing process is a viable option, because rice is the staple food crop in Sri Lanka.

Rice flour, obtained from pin mill, plate grinder, turbo rotor mill and cyclone separator was used to determine flour particle distribution profiles. Thereafter, a relationship was developed between quantity of rice flour to be incorporated into bread dough and particle size of rice flour.

Results revealed that improved particle size distribution profile can be obtained from cyclone separator comparatively pin mill, plate grinder and turbo rotor mill. Reason for this phenomenon is pneumatic separation by the cyclone separator. Therefore, cyclone separation is always capable of separating fine rice flour particles with a particular weight. During the plate grinding process it is possible to obtain only the roasted form of rice flour, due to friction between two grinding plates. However, improved profiles can be obtained from heat treated rice flour than from raw rice flour obtained from pin mill and turbo rotor mill, in terms of passing through. In the case of cyclone separation process, particle size distribution profiles obtained from raw rice flour and heat treated rice flour were not significantly different from each other. Reason for this phenomenon is that, it is extremely difficult to breakdown fine rice flour homogenously to 75 µm with a mere physical force like a heat treatment at 150 ^{o}C for 5 minutes.

Regression analysis revealed that there was a strong negative relationship between particle size and percentage of rice flour incorporated into bread dough. When particle size of rice flour dropped from from 300 µm, 250 µm to 75 µm, the corresponding amount of rice flour to be incorporated into bread dough increased (30%, 40% and 50% respectively).

Keywords: bread, rice flour, cyclone separator