

## **Experimental and numerical study of wheat and rice doughs**

### **ABSTRACT**

Physicochemical, morphological, rheological characteristics and finite element modelling of wheat flour, rice flour, starch and gluten were studied in this work. The physicochemical analysis of rice flour exhibited almost similar characteristics to wheat flour without gluten present. Rice flour and rice starch contained higher value of carbohydrate and fibres compared to wheat flour and wheat starch. Likewise, rice flour and rice starch interacted strongly with water and oil due to higher value of water absorption, water solubility and oil absorption indices compared to wheat flour and wheat starch. SEM images showed that rice starch had uniform size, smaller polyhedral shape and were closely intact between granules, whereas wheat starch consisted of large and small granules that were sphere and irregular in shapes. Compression tests conducted on all the doughs showed viscoelastic behaviour and permanent set. Stress-strain curve of rice starch-gluten dough are shown to be higher than wheat starch-gluten dough. Oscillation tests conducted on all doughs showed larger storage than loss modulus, indicating more elastic than viscous behaviour of the doughs. Finally, finite element model using 'chess' geometry for starch and gluten was able to simulate deformation of starch-gluten dough.

**Keyword:** Rice starch; Rheology; Viscoelastic; Finite element method