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New insight into processing of cooked rice through intrinsic measurement of modulus, adhesion and cohesion at the level of individual grains

Lu Yu, M Fitzgerald, R G Gilbert, J R Stokes, T Witt and **M S Turner**
The University of Queensland, Australia

The textural and flavor qualities of packaged pre-cooked rice (PPC) are often considered inferior compared to freshly cooked rice. Our aim is to determine specifically the origin of any physicochemical differences that arise during processing of PPC that ultimately affects quality. To achieve this, it has been necessary to develop techniques to measure the mechanical and surface properties of individual rice grains due to the insensitivity of the commonly used texture profile analysis. Single grains were compressed within the elastic limit, i.e. to a non-destructive small strain deformation. We found wide distributions of modulus and adhesion, whereby the significant differences of their mean are affected by thermal sterilization time and the addition of oil before sterilization. In addition, cohesion in bulk of PPC was measured with a ring-shear tester designed to measure flow properties. Rinsing before thermal sterilization affects the moisture, but not the modulus, adhesion or cohesion of bulk. In conclusion, measuring intrinsic mechanical properties at the individual grain level paves the way towards rational design and evaluation of processing and ingredient variables on the quality of cooked rice. Keeping the thermal processing time to a minimum produces PPC more similar to freshly cooked rice and the addition of oil facilitates the flow ability during handling by reducing grain-grain adhesion.

Biography

Lu Yu is currently pursuing her PhD in the Industry Transformation Training Centre at the University of Queensland, Australia. She received her Bachelor of Science in Nutritional Sciences and Master of Science in Food Technology and Biotechnology at the Technical University Munich, Germany in 2013.

l.yu@uq.edu.au

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