

Tuan Quoc Le 2015: Effects of Microwave Heating Conditions on Physico-Chemical Properties of Rice Comparing with Conventionally Aged Rice.
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The effects of microwave heating treatments (MWH) under different conditions and methods on accelerated aged rice were investigated. High microwave power (MWP) heating with single pass heating resulted in sample with high moisture diffusivity. The moisture movement varied with exposure time (ET) and forms of rice under MWH resulting in fluctuations of accelerated aged rice properties. Paddy (PD) under MWH was more extended in aging properties than white rice (WR) at low initial moisture content (14% d.b). The intermittent MWH with cycled heating or heating round (HR) including the tempering was useful in enhancing HRY and accelerated aged rice. The rice with 3HR was noticeably improved in HRY when compared to counterparts. Among three chosen factors (MWP, HR and ET), the HR remarkably influenced HRY and other aging properties. When microwave-treated rice grains subjected to different storage time (ST), it appeared that the MWH caused changes in aging properties to be more retarded or extended depending on MWH conditions and storage time in comparison with conventionally stored rice. The role of individual factor during storage according to aging properties was as in order: ST, HR, MWP, and ET. The physicochemical properties of rice flour were still affected by MWH during storage of grains. 3HR resulted in sample with a decreased hardness of gels when compared to counterparts.

Further investigations on physicochemical and chemical properties provided some evidences for such changes. For protein, different HRs possibly caused the denaturation of protein with different degrees, which were explained by altered solubilities of different protein fractions and their SH contents. The different distributions of protein fractions and non-homogeneous heating of MWH could be a plausible explanation for such changes. For starch, changes in proportion of amorphous and crystalline in starch were taken place differently between different HRs, which was explained by pasting properties, DSC, and FTIR technique. The single HR (1HR) by MWH destroyed cristallinity of starch while 2HR to 3HR could alter such architecture to another level, in which 3HR had a higher portion of crystalline compared to counterparts. The starch was more strengthen as in case of low protein flour but not for whole flour and pure starch. Both starch and non starches (different fractions of protein) are vital for accelerating and natural aging process in which changes in macromolecules and major storage proteins may be largely accounted for.

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