Diffusion Mechanism of Aroma Compound (2-Acetyl-1-Pyrroline) in Rice During Storage

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Abstract : Aromatic rice has become popular and continues to command higher price than ordinary rice because of its distinctive scent that makes it special. Freshly harvested aromatic rice exhibits strong aromatic scent but decreases with time and conditions during storage. Of the many volatile compounds in aromatic rice, 2-acetyl-1-pyrroline (2AP) is a major compound that gives rice its popcorn-like aroma. The diffusion mechanism of 2AP in rice was investigated. Semi-empirical models explaining 2AP diffusion as affected by temperature and duration were developed. Storage time and temperature affected 2AP loss via diffusion. The amount of 2AP in rice decreased with time. Free 2AP, being volatile, is lost due to diffusion. Storage experiment indicated rapid 2AP loss during the first five weeks and subsequently leveled off afterwards; attaining level of starch bound 2AP. Decline of 2AP during storage followed exponential equation and exhibited four stages; i.e. the initial, second, third and final stage. Free 2AP is easily lost while bound 2AP is left, only to be released upon exposure to high temperature such as cooking. Both free and bound 2AP is found in endosperm while free 2AP is in the bran. Around 63-67% of total 2AP was lost in brown and milled rice of MS 6 paddy kept at ambient. Samples stored at higher temperature (27°C) recorded higher 2AP loss than those kept at lower temperature (15°C). The study should be able to guide processors in understanding and controlling parameters in storage to produce high quality rice.

Keywords : 2-acetyl-1-pyrroline, aromatic rice, diffusion mechanism, storage

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