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Limiting the loss in mass of stored paddy through hermetic storage conditions

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Paddy is commonly stored in poly-sacks for the convenience in handling, transportation and storage. Adoption of improper storage techniques and materials promote the growth of insects and micro organisms which contribute to 4 – 6% of mass loss. The Hermetic storage system in which the micro atmosphere has been modified by sealing the container hermitically, is an alternative to fumigation storage under tropical conditions. This results in a reduction of O₂ levels and an increase in CO₂ content in few weeks, due to retarded respiration rates in grain, insects and fungi present. Insects may die due to the low O₂ and high CO₂ levels. A study was done to investigate the effects of hermetic storage compared to common poly-sack storage on paddy mass. Two kg of cleaned paddy Bg 358 with a moisture content of 12 ± 1% were stored in poly-sacks (polypropylene of Danier 1850) and in hermetic conditions (IRRI super bags) for 9 months. After 4½ and 9 months of storage, the paddy was tested in triplicate, for O₂ content, CO₂ content, moisture content (MC), thousand grain mass (TGM), true density (TD), grain length (L), width (W) and milling yield/brown rice% (BR), and the results were compared with initial samples before storage. The O₂ content in IRRI-super bags dropped to 13.7 % and 12.3 % and the CO₂ levels rose to 2.4% and 2.7% after 4½ and 9 months respectively. The hygroscopic nature of paddy had increased through respiration of grains and moisture exchange with surrounding air during storage. The high MC in poly-sacks was mostly due to the free flow of moisture into the storage sack. This was restricted in hermetic storage by sealing for gas and moisture. Due to the low O₂ content which retards the respiration in hermetic sacks, the MC at 9 months was insignificant compared to that at 4½ months under hermetic conditions. The extra reduction in TGM (mass loss) found in samples stored in poly-sacks compared to those in hermetic storage may be due to metabolic activity which is favoured by the free flow of O₂ into the poly-sack. The initial average true density (1.25 g cm⁻³) was significantly higher (p < 0.05) than that of the two storage methods at 4½ month. Lowest TD reported at 9 months was due to decaying of rice kernel and the accelerated metabolic activity through higher MC and O₂ levels in poly-sacks than in hermetic storage. The length of milled grain expanded significantly by 5.3% compared to the initial length after 9 months of poly-sack storage. Milling yields of hermetically stored paddy remained as initial BR and found to be superior to that in poly-sacks. Invasion of grains by the living organisms in poly-sacks have lowered the BR compared to hermetically stored paddy. However, these differences in levels of O₂, CO₂ and MC between storage methods indicate the importance of having hermetic storage conditions to create a favourable storage environment which could reduce the loss of paddy mass.