The Impact of Packaging Materials on paddy (AT362) Quality Preservation and shelf-life extension: An IOT-Enabled Study

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Abstract

This study investigates the efficacy of various packaging materials for paddy preservation, integrating IoT technology for internal environmental monitoring. NodeMCU boards were utilized to monitor internal environmental conditions, with wires extending from the NodeMCU to the packaging materials containing paddy. Over two months, manual assessments of seed qualities were conducted. Initial assessments and monthly measurements provided data for analysis. Python scripting and SPSS software were employed for data analysis. ANOVA tests were conducted to examine differences among the packaging materials and across different time intervals for variable parameters. For the material factor, the p-value exceeded 0.05, indicating a lack of significant differences among the packaging materials. However, for the time factor, the p-value was below 0.05, signifying statistical significance. This detailed examination revealed significant changes over time, providing a nuanced understanding of how these variables evolve during the course of the study. The significance level was maintained at 0.05 throughout the analyses, ensuring robust and reliable results. These detailed findings highlight the nuanced changes in properties with respect to packaging materials. Tin, while ensuring a stable humidity environment, showed unexpected consequences on insect multiplication. Polypropylene and jute bags, closely mirroring external conditions, demonstrated distinctive effects on bulk density and other physical properties. The study's results provide valuable insights for selecting packaging materials for paddy preservation, offering a comprehensive approach to understanding the dynamic changes in the internal environment of paddy packaging.

Keywords: Analysis, Environmental monitoring, IoT technology, Packaging materials, Paddy preservation, Python scripting