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Novel approach using passive UHF RFID for grain moisture detection

Abstract

This paper proposes a novel method to detect moisture hotspots and irregularities in rice grain storage using low-cost passive UHF RFID technology. Experiments were designed with a UHF RFID handheld reader to test rice moisture levels of 12%, 16%, 20% and 24%. Two containers were used in the study where Container A was filled with grains with a 12% moisture level and container B is inserted into Container A and contained 2 kg rice samples of varying moisture contents. The RFID reader was positioned outside the container to measure the received signal strength indicator (RSSI) from the RFID tags placed within the containers. The attenuation of the signal is analyzed to obtain a correlation between moisture content (MC) and RSSI values. Results show a positive correlation between the RSSI and MC of rice which can be used to identify inconsistencies in moisture distribution in stored grain. An empirical model has been proposed which can be used to estimate RSSI values given the moisture content or vice versa for RFID operating at 915 MHz.

Keywords

Moisture Content (MC); Rice; RSSI; UHF RFID tag