Dielectric and acoustic monitoring of water content and volume changes in ear corn drying bins. (S01-jones181728-Oral)

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Abstract:

Moisture content determination is critical for appropriate storage and sale of post-harvested cereal grains. The permittivity - moisture content relationship of cereal grains is variety-dependent and influenced by a number of factors. We conducted ear corn drying experiments to assess the importance of these factors and to test different monitoring strategies. We considered both aligned and randomly arranged corn during drying where measurements of permittivity, temperature, humidity, bulk volume and weight were continuously recorded. Results suggest the following potential improvements to the measurement of permittivity for drying rate and moisture content information: 1) the use of parallel plates providing greater sensitivity to measured bulk ear corn permittivity compared to both 2- and 3-rod transmission lines; 2) consideration of individual 'agent' TDR probes to monitor dielectric permittivity of individual ear corn; 3) use of ultrasonic distance sensors for monitoring bulk volume changes providing independent information on drying rate. Improvements in moisture content monitoring using these techniques should lead to increased drying efficiency.

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Presentation Information:

Presentation Date: Wednesday, November 13, 2002
Presentation Time: 2:00 pm

Keywords:

Dielectric permittivity, TDR, Acoustic depth sensor