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A Non-Gravimetric Approach to Tracing Changes in Water Activity during Convective Cobed Maize Drying

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Abstract

Maize (*Zea mays* L) plays an important role in ensuring food security in Kenya. It is also significant for its starch and oil, which are used in adhesives, medicines, soaps, cosmetics and several other consumer products. Climate change, however, is putting a strain on its production and preservation. Yield losses due to aflatoxins are on the rise and natural drying is no longer an attractive option. Early harvest schemes have been recommended as a preventive strategy against the opportunistic agents of spoilage and waste, but these require provision of drying facilities customised to handle maize on the cob. Importing finished technology helps, but only a little and the development of home-grown capacity to design and fabricate drying solutions is the way to go. Moisture isotherms that describe the correlation between the moisture content and the equilibrium relative humidity at the surface (also called water activity) of hygroscopic materials, are developed gravimetrically using salts under primarily static air conditions. Tracking time related weight changes in products with long-term drying is tedious and prone to error even when automated systems are employed. An innovative in-process/dynamic water activity profiler that uses off-the-shelf temperature and humidity instrumentation was used to monitor the drying of dehusked maize ears at temperatures settings of 38°C, 45°C and 55°C, with air supply in the range 7–14 $m^3 h^{-1}$. Good consistency was observed comparing results with the traditional gravimetric drying curve analysis. The innovation has broad applicability and is an invaluable resource for technicians seeking to develop forced-air drying solutions for bulky products.

Keywords: Cobbed maize drying, water activity profiling

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