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Comparison between Different Methods to Determine Sorption Isotherms of *Capsicum* Species from South America

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Abstract

Capsicum species are typically consumed as fresh vegetables or as food ingredients. Because of their sensitivity to storage, most fresh peppers are dried to produce a wide range of convenient food products with extended shelf life. The increasing consumer demand for high quality processed foods requires the analysis and optimisation of various processes in the food industry such as drying, mixing, packaging and storage. Since the moisture sorption isotherm predicts product stability, the proper quality during processing can be maintained by understanding the sorption behaviour of the foodstuff. Numerous methods have been reported in the literature for the measurement of the equilibrium relationship between moisture content and relative humidity at constant temperature. However, each method shows various degrees of applicability and accuracy. The aim of the present study was to produce sorption isotherms of *Capsicum* species based on variability in fruit shape and size. Also, this work was undertaken to compare the equilibrium moisture content data obtained by three different methods. The sorption isotherms of *Capsicum* varieties were measured using three methods, namely the gravimetric static, the hygrometric and a third method employing a dynamic, gravimetric instrument developed at the department of Agricultural Engineering, University of Hohenheim. For the first method the sample was equilibrated over saturated salt solutions and its mass was periodically measured. The second was to measure the relative humidity above a specimen of known moisture content. The third was a recently designed gravimetric method where the sample was placed in a climatic chamber and exposed to stepwise changes in relative humidity while its mass was continuously measured. The sorption methods were evaluated in terms of accuracy and precision. Moisture sorption isotherms of peppers were obtained in duplicate at a temperature of 25°C. The hygrometric method indicated an uncertainty at high moisture contents whereas the salts method showed an inability to maintain high values of relative humidity. However, the comparison between the gravimetric methods showed consistent results for intermediate values of relative humidity. By employing a newly constructed experimental apparatus an innovative technique for determining sorption isotherms now appears to be promising.

Keywords: *Capsicum* species, equilibrium moisture content, sorption methods