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## **Meshfree-Based Numerical Prediction of Plant Tissue Shrinkage during Drying as Influenced by Porosity**

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### **Abstract**

Food products based on dried plant materials are of higher demand in the consumer market, leading to continual improvements towards better products and processing techniques. Since plant materials are porous structures, which undergo extreme deformations during drying, material porosity has a higher influence on the level of shrinkage and the deformation characteristics of the dry plant tissue. Numerical modelling can be used as a tool in order to investigate the fundamentals of the complex mechanisms that drive plant material deformations during drying. This work numerically investigates the influence of porosity to the plant food tissue shrinkage during drying. The work involves a recently developed meshfree-based modelling technique, which involves Smoothed Particle Hydrodynamics (SPH) and Discrete Element Method (DEM). The technique has a higher potential of modelling large deformations of multiphase problem domains, compared to the conventional grid-based modelling techniques. Numerical simulations on porous apple tissues imply that the tissue shrinkage is negatively influenced by the tissue porosity and localised cell wall shrinkage is also restricted.

**Keywords:** *food drying; Porosity; Plant tissue; Meshfree methods; SPH*



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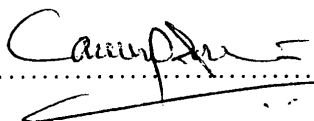
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