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Title: Comparing models to Neumann and Dirichlet conditions in grape seed drying

Author: Gracielle Johann, Maraísa L Menezes, Nehemias C Pereira, Edson A Silva

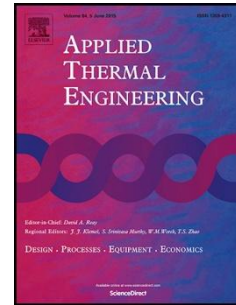
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Comparing models to Neumann and Dirichlet conditions in grape seed drying

Article Type: Research Paper

Keywords: convective drying; grape seed; experimental and numerical analysis; mass transfer coefficient; mass transfer efficiency

Corresponding Author: Mrs. Gracielle Johann, M.D.

Corresponding Author's Institution: State University of Maringá

First Author: Gracielle Johann, M.D.

Order of Authors: Gracielle Johann, M.D.; Maraisa L Menezes ; Nehemias C Pereira ; Edson A Silva

Highlights

- Experimental kinetic convective drying of grape seed.
- Numerical analysis of convective drying of grape seed.
- Two different boundary conditions were tested.
- The mass transfer efficiency was determined.

Abstract: This study aim at presenting the experimentally isotherms equilibrium and drying kinetics thin layer of *Vitis vinifera* grape seeds. The paper also proposes two numerical approaches to diffusion problem solving, in spherical coordinates, applied to grape seeds drying and mass transfer efficiency calculation. The diffusion equations were solved by the method of the lines, after the discretization space by means of finite differences. Two boundary conditions in the grain surface were considered: equilibrium condition and convective condition. The numerical procedure was conducted simultaneously with the estimation of mass transfer coefficient and effective mass diffusivity. In both cases, the numerical results compared with data obtained experimentally, is appropriately presented to describe the kinetics of seeds drying. However, the results indicated that the statistical model solution with the use of convective boundary condition produced better results than those obtained when considering the equilibrium condition at the surface. The largest global average error was 5.99%, when equilibrium boundary condition was applied, and 4.51%, when the convective boundary condition was applied.

Nomenclature

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