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Optimization of convective drying of broccoli to maximize the content of sulforaphane

Andrea Mahn, Ivania Cofre and Alejandro Reyes Universidad de Santiago de Chile, Chile

Sulforaphane, an isothiocyanate that comes from the hydrolysis of glucoraphanin (the main glucosinolate of broccoli) is partially responsible for the cancer preventive effect of broccoli intake. The hydrolysis proceeds through the action of myrosinase, which is segregated from its substrate in the plant tissue. In the intact broccoli no reaction occurs, and therefore the natural content of sulforaphane in broccoli is negligible. Sulforaphane synthesis is stimulated by plant tissue disruption, situation that can be triggered by processing. In previous work we determined the optimal pre-processing conditions that maximize sulforaphane synthesis in broccoli florets. Currently we are searching for the optimal preservation method that minimizes sulforaphane loss during processing and storage.

We optimized a dehydration process of sulforaphane-rich broccoli using a tunnel dryer. The effect of air temperature and air flow rate on sulforaphane content was investigated through a factorial design. Drying kinetics was adjusted to the Simplified Constant Diffusivity Model and the activation energy was obtained from the Arrhenius equation. The evolution of sulforaphane content during drying was adjusted to first-order degradation kinetics, and the kinetic constant was estimated through the Arrhenius equation. Both air temperature and air flow rate significantly affected sulforaphane content of dried broccoli. The effective diffusivity fluctuated between 1.045 and 2.929 x10-9 m2/s, agreeing with values reported in literature for similar vegetables. E0 was in the range 17.876 - 20.929 KJ/mol. Finally, the optimal drying condition of sulforaphane-rich broccoli in the tunnel dryer was air temperature equal to 60°C and an air flow rate of 2m/s.

Biography

Andrea Mahn has completed her PhD at the age of 29 years from University of Chile. She is Associate Professor at Universidad de Santiago de Chile and head of the Biotechnology Engineering program. She has conducted more than 10 research projects. She has directed 2 Doctoral Theses, 4 Master Theses and more than 20 Undergraduate Theses. She has published more than 45 scientific articles in high level journals and has been serving as an editorial board member in reputed journals. She is active member of 2 Chilean Scientific Societies.

andrea.mahn@usach.cl