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Foam mat drying of yacon juice: Experimental analysis and computer simulation

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## FOAM MAT DRYING OF YACON JUICE: EXPERIMENTAL ANALYSIS AND COMPUTER SIMULATION

**ABSTRACT:** The foam mat drying of yacon juice (YJ) and concentrate yacon juice (CYJ) was conducted under various conditions of thickness of product (0.5, 1.0 and 1.5 cm) and air temperature (50, 60 and 70°C). After drying the resulted dry powder was removed from the metallic tray and pulverized. Layer thickness and air temperature influenced statistically ( $p > 0.5$ ) drying time, moisture content and water activity ( $A_w$ ) of the product. The shortest drying time to reach the desired  $A_w$  (0.1-0.3) corresponds to the condition of 0.5 cm and 70°C for both juices – 59 and 65 min for the YJ and CYJ, respectively. The process was modeled in terms of heat and mass transfer and then simulated by a finite element method software. The model was able to predict the process satisfactorily and the foam drying technique allowed to obtain yacon powder of good quality, which can be inserted in various food formulations.

**KEYWORDS:** Yacon, foam mat drying, mass transfer, heat transfer, modeling, simulation.

### 1. INTRODUCTION

The tuberous roots of yacon (*Smallanthus sonchifolius*) are native to the Andean mountains, where they are commonly cultivated and consumed since the pre-Inca culture period (Seminar et al. 2003; Graefe et al., 2004). The global expansion of their production and marketing initiated after studies related their consumption to the promotion of human health benefits, such as the antioxidant activity associated to the phenolic compounds (Yan et al., 1999; Takaneke et al., 2003) and the reduction of

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