

## Solar and conventional drying of residual annatto grains

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Santos DC. **Secagem solar e convencional de grãos residuais de urucum**. Campina Grande, PB, 2012. [Dissertação de Mestrado – Área de concentração: Processamento e Armazenamento de Produtos Agrícolas. Programa de Pós-Graduação em Engenharia Agrícola, Centro de Tecnologia e Recursos Naturais, Universidade Federal de Campina Grande]. Orientadores: Alexandre José de Melo Queiroz e Rossana Maria Feitosa de Figueirêdo

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Residual annatto seeds are a subproduct derived from the extraction of bixin and norbixin pigments in the food industry. The fact that most of these seeds are typically discarded demonstrates the need for making better use of these residues, through studies aimed at incorporating them into the human diet. The objective of this study was to dry residual annatto seeds and annatto seed powder using conventional means (oven-drying) and solar energy. The seeds and powder were oven dried with forced air circulation at temperatures of 40, 50, 60 and 70 °C. Two dryers were used in the solar energy method, one for daytime drying, called a solar dryer, and the other for nighttime drying, denominated a heat accumulator for nighttime drying (ACSN). The ACSN dryer is composed of two independent water circulation circuits. The solar collector circuit/reservoir was in operation in the daytime. This was interrupted during the night, whereupon the reservoir circuit/drying chamber was opened. In solar drying, samples were collected in concrete trays covered with a black plastic tarp (polyethylene). Diffusion Approximation, Two Term, Midilli, Page and Thompson mathematical models were used to represent the drying kinetics of annatto seeds and powder dried in an oven and solar and nighttime dryers, as well as by direct exposure to the sun. In conventional drying, an increase in temperature promoted reductions in drying time. Using the ACSN dryer at night avoided water absorption by the samples, promoting their drying and resulting in a product with lower water content. For samples dried at night, employing the ACSN dryer led to greater drying rates compared to the control sample, generating a product with lower water content. Solar dryers exhibited shorter drying times than those observed in conventional dryers. Diffusion Approximation, Two Term, Midilli, Page and Thompson models showed a good fit to experimental data derived from the drying kinetics of annatto seed samples and residual powder, with and without oil, using conventional and solar methods.

**Keywords.** *Bixa orellana* L., natural coloring, solar dryer, nighttime dryer

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