California Energy Commission
Public Interest Energy Research (PIER) Program
Energy Efficiency Research Office

Innovative Drying and Nutrients Extraction Technology Saves Energy

Research Powers the Future
PIER Industrial/Agriculture/Water End-use Energy Efficiency Research Program
www.energy.ca.gov/research/iaw

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Fact Sheet

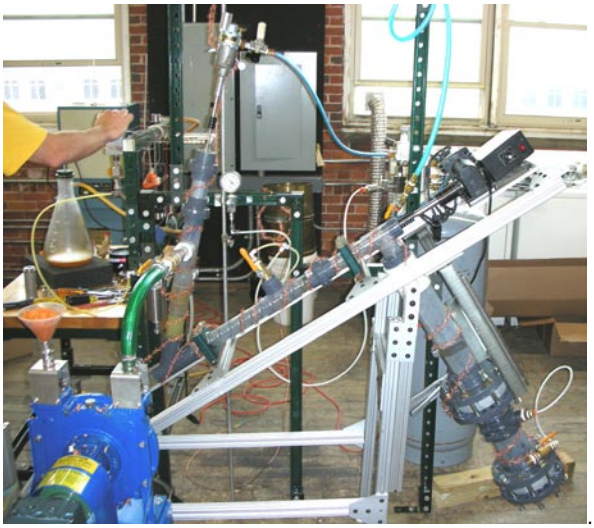
The Issue

Conventional techniques for drying fruits and vegetables use heat to remove water from materials. Current state-of-the-art technologies for extraction of lipids (fats and fat-soluble vitamins) and nutrients from fruits and vegetables require the product to be dehydrated before to the extraction process. This method evaporates the water from the products but also drives off up to 70 percent of the nutrients and a portion of the heat sensitive volatile oils. At best, the desired nutraceutical yield is less than 50 percent of "fresh product" content.

A new drying and nutrients extraction technology uses dimethyl ether to extract the water from the material. The new process does not require the addition of heat to evaporate the water during the extraction process. Dimethyl ether has a lower heat of vaporization than water and provides a significant increase in energy efficiency as compared to thermal drying methods.

Project Description

This project will evaluate whether the new drying and nutrients extraction technology allows a higher yield extraction of lipids and nutrients from fruits and vegetables as compared to conventional techniques. The research will also quantify the new technology's energy savings for the extraction process.



Prototype innovative drying and nutrients extraction system
Photo credit: Grimmway Enterprises

PIER Program Objectives and Anticipated Benefits for California

The research objectives are to:

- Provide a quantitative evaluation of the process energy efficiency.
- Perform a nutritional analysis of the dried vegetable matter and extracts using the new technology as compared to thermal drying methods.

The proposed technology is expected to use 25 percent less electricity and 5 percent less natural gas as compared to conventional methods for extracting oils and nutrients.

Project Specifics

Grant Award: PIR-09-002
Recipient: Grimmway Farms
Amount: $399,949
Term: November 1, 2010, to Dec. 31, 2013
Co-funding: $732,928 from Grimmway

For more information, please contact:

Rajesh Kapoor
California Energy Commission
PIER Program, Energy Efficiency
Research Office
Phone: (916) 327-1388
E-mail: rkapoor@energy.state.ca.us

David Roney
Grimmway Farms
Phone: (661) 854-6230
E-mail: droney@grimmway.com