Ohio Agricultural Research and Development Center

SEEDS

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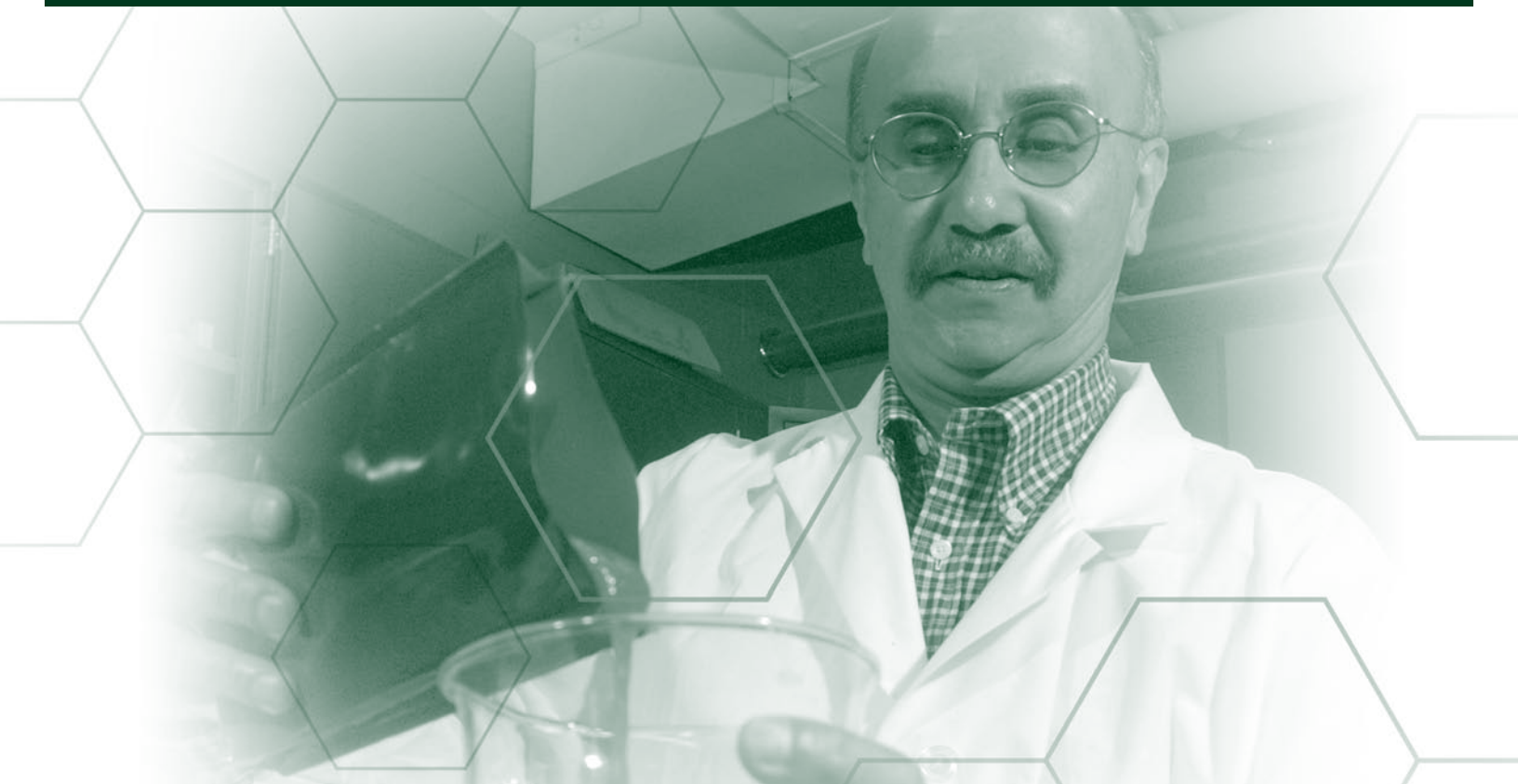

Supplying Food: A Critical Issue for Long-Term Space Missions

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Food, as everyone knows, is necessary to sustain human life, earth notwithstanding! As the United States looks toward longer space missions, food supply becomes a critical issue, particularly if a three- to five-year mission to Mars is to be undertaken. While the military currently produces food with a long shelf life, individuals participating in a long space mission have different nutritional needs.

Foods for space travel must be of the highest quality in order to combat the effects of long-term space flight. Once astronauts are in space, no other options are available, and there is no way to get additional supplies. Nutrition, food supply, storage, and the cost of added weight are all important and are just a few of the problems that must be overcome prior to undertaking lengthy travel in space.

Scientists in the College of Food, Agricultural, and Environmental Sciences specializing in the area of food processing and packaging may have a solution. These scientists have developed a flexible multilayer laminated package with an internal polypropylene layer and built-in electrodes. Placing the package into a custom-made heat appliance allows these electrodes to hook up with electrical contacts, producing electricity that flows through the food and heats it directly from the current.

The heating process, known as ohmic or joule heating, is not new to food scientists, but the application is. Ohmic heating results in higher-quality food than conventional heating because the current heats the food internally instead of relying on heat penetrating from the outside of the package. The food retains a fresher flavor and texture than traditionally processed food. The packaging and the process have been tested on foods supplied by NASA's Johnson Space Center.

What may be the best part of this food packaging is the ability it may have to be reused to accommodate one of the results of eating—waste. The food package has the potential to be used to collect waste, then be resealed, and the contents sterilized using the same process as heating the food.

Initial results of this research are very encouraging, although continued work is needed to ensure that it works under zero-gravity.

OBJECTIVES

Objectives of this research include development of an easily stored, easily warmed, reusable food packaging and heating system that may:

- Be used for producing sterile high-quality food with a three- to five-year shelf-life for space applications.
- Be used to reheat foods in transit.
- Be reused in post-food consumption, to contain and sterilize waste or food that is grown in transit.

CHALLENGES

Many processed foods have limited shelf-life and are unsuitable for long space missions. During long space travel, highly nutritional foods that are easy to prepare and store and are appealing are necessary components to sustain human life. Before lengthy space travel can even be considered, it is absolutely essential that appropriate nutrition be developed and made available for space travelers.

ACHIEVEMENTS

Ohio State University scientists have developed a food-processing and packaging technique that may prove to be the answer to providing high-quality, nutritional meals that are easy to prepare during long space travel. An added bonus to the packaging system is the possibility of recycling the empty food packages to store and sterilize waste, or sterilize foods that are grown during the trip, another exceedingly important consideration for long-term space travel.

THE FUTURE

This research is exciting and holds a great deal of promise for meeting the nutritional needs of people on long-term space missions in addition to providing a solution to the problem of waste. The outcome of this research may have unexplored potential for use by the earthbound as well. Currently, researchers are refining and optimizing the package, conducting additional sterilization tests, and producing smaller versions of the heating system. This work has been funded by NASA in the form of a $575,558 grant.

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