



UNIVERSIDAD  
POLITÉCNICA  
DE CARTAGENA



OTRI

Oficina de Transferencia de  
Resultados de Investigación  
UPCT - Universidad Politécnica de Cartagena

## DESCRIPCIÓN DE LA TECNOLOGÍA/TECHNOLOGY DESCRIPTION

### Título / Title

Freeze-dried fruit and vegetables useful for agrifood purposes

### Resumen / Abstract

Lyophilization (freeze-drying) consist in freezing food below  $-30^{\circ}\text{C}$  and later removing the ice formed by sublimation in a chamber with controlled temperature under vacuum, and the water vapor produced being removed by condensation at temperatures around  $-60^{\circ}\text{C}$ . Different lyophilized products derived from vegetables have been developed that can be used to improved existing foods, to create new ones, or to extract compounds of interest in a food matrix almost free from water. The know-how on liophylization and the problems during the process have been acquired by using pilot equipment. The optimization of the process can be also addressed by calculating the curves of weight loss during drying and the electrical consumption. Quality and safety parameters in fresh and lyophilized product can be also determined compared with the fresh produce. Our main product are freeze-dried samples obtained from a near isogenic line collection of melon derived by classical plant breeding from the 'Piel de sapo' parental line. This collection rendered products with different taste, flavor, color, etc.

### Descripción y características fundamentales / Description and special features

Lyophilized (freeze-dried) products are food with a long shelf life under storage temperatures above the regular used for food freezing. The manufacture of lyophilized products requires knowledge about the optimum conditions of processing in each vegetable including the right format for any of them. Usually, liophylization, a non-thermal treatment, preserves most of the nutrients and aroma compounds from the original vegetable, particularly when compared with other treatments. The product must to be freezing at around  $-30^{\circ}\text{C}$  at the beginning in the same equipment or in other freezer. After that, ice is sublimed in a refrigerated chamber under vacuum and applying a little heat in order to favor water vapor release from the food matrix and then eliminating vapor by condensation at  $-60^{\circ}\text{C}$ . Vacuum is a critical step of the process in order to avoid melting ice.

Optimization of freeze-drying requires a pilot plant and knowledge on the curves of water loss from the product, though this information is not easy to find in vegetables. In our lab we got experience in many fruit and vegetables (melon, tomato, cucumber, orange, potato, arazá, strawberry, artichoke, etc). The Group has a pilot freeze-dryer with heated trays able to condense up to 18 kg ice. With this equipment the weight loss of the products can be modeled in order to select the optimum conditions of the process and to know the electrical consumption of the operation.

We are interested in contacting companies able to support our research or in optimizing liophylization conditions to be used later to develop new products for the agrifood chain. One of our proposals consists of using lyophilized derived from a collection of near isogenic lines of melon with samples available. These products from melon are not available in the market. These processed products from melon are unavailable in the marketplace, though melon is the second vegetable of importance in Spain and one of the more important crop in the Mediterranean area and other countries (Brazil, Costa Rica, Australia, etc.). Within the lyophilized samples from the collections it is possible to find different flavor, taste and color that can help to develop new food products based on melon pulp for different markets, or to improve existing products. Quality parameters from all the products produced can be determined compared with quality of fresh product in our laboratories.

### Ventajas competitivas / Competitive advantages

The lyophilized product can be stored at  $-18^{\circ}\text{C}$  for long periods of time, keeping most of the flavor and taste. The lyophilized can be added as natural food aroma. Lyophilized samples are less sensitive to thawing problems and reduce the cost of transportation because of the lack of water. Technology for liophylization and for storage different kind of vegetable products under vacuum or with modified atmosphere packaging is available in our group.

<b>Aspectos innovadores / Innovative aspects</b>	
<ul style="list-style-type: none"> <li>- Unavailability of lyophilized products derived from melons and other vegetables in the market.</li> <li>- New lyophilized products derived from a collection of near isogenic lines of melons useful for specific purposes in the food industry.</li> </ul>	
<b>Estado de la propiedad industrial e intelectual / Current state of intellectual property</b>	
Patente solicitada / Patent applied Patente concedida / Patent granted Software registrado / Copyright protected	Derechos exclusivos / exclusive rights Secreto industrial / secret know how <input type="checkbox"/> Otros
Comments: The genetic material proponed to obtain melon lyophilized products (collection of near isogenic lines) have been developed and is owned by IRTA (Barcelona, Spain). The know-how of liophylization of these lines and other vegetable products have been developed by UPCT.	
<b>Palabras clave / Keywords</b>	
Freeze-dried, fruit and vegetables	
<b>Disciplinas científicas en las que se encuadra la tecnología / Scientific domains</b>	
Tecnologías de la Información y las Telecomunic. Fabric. industrial, tecnolog. materiales y transporte Otras tecnologías industriales Energía Ciencias físicas y exactas Ciencias biológicas	Agricultura y recursos marinos <input checked="" type="checkbox"/> Industria de la Agroalimentación Medidas y estándares Medioambiente y prevención de riesgos Socioeconomía
<b>Grado de desarrollo de la tecnología / Current stage of development of the technology</b>	
<ul style="list-style-type: none"> <li>• Etapa de desarrollo actual:           <ul style="list-style-type: none"> <li>Ensayo en planta piloto Prototipo</li> <li><input checked="" type="checkbox"/> Laboratorio Falta más desarrollo para su explotación</li> </ul> </li> <li>• Coste de desarrollo aproximado:</li> </ul>	
<b>Tipo de colaboración solicitada / Type of collaboration sought</b>	
Cooperación técnica / Technical cooperation Acuerdo de joint venture / Joint venture agreement Acuerdo de fabricación / Manufacturing agreement Acuerdo comercial con asistencia técnica / Commercial agreement with technical assistance Acuerdo de licencia / License agreement	
Comments: Lyophilized samples are available to show companies interested, including samples from the collection of near isogenic lines of melon. Experience and new ideas about how to use lyophilized products are also in our mind in order to develop new food products or to improve existing ones. Some of the lyophilized products are not so far in the market. The lyophilized products can be used for desserts, additives, snacks, juice and beverages, ice cream, yoghourts, minimally processed products -cold soups-, etc.	
<b>Información adicional / Additional information</b>	
	
<b>Datos de Contacto / Contact Person</b>	
Responsible of the Technological Offer: Juan Pablo Fernández Trujillo e-mail: <a href="mailto:juanp.fdez@upct.es">juanp.fdez@upct.es</a> Address: Paseo Alfonso XIII, 48 C.P.: 30203 Phone: +34 968 325436 Fax: +34 968 325433	