



55 – REZOS BRANDS case study





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A4.L12.T5 Study Cases (web)

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Hippocrates farm project



Hippocrates Farm, of REZOS BRANDS, is an aspiring entrepreneurship agrifood project.

The company has adopted the vertical business model: “from the Farm to Fork”, which includes cultivation, harvesting, research, process, packaging, warehouse storing, marketing, distribution.

REZOS BRANDS has invested in organic cultivation of superfoods (sea buckthorn, echinacea, mountain tea sideritis scardica, pilot cultivations etc) at our own farm located at the center of the protected area of **Natura 2000** network under the name Antichasia Ori-Meteora, by adopting the principles of Precision Agriculture in order to monitor our organic cultivation, analyze our highest nutritional value crops & optimize the functionality of our products.



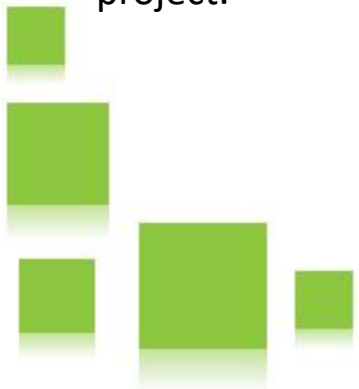
Hippocrates farm osmotic dehydrated products



- ✓ We use the innovative **osmotic dehydration technology** and we develop **functional foods & juices**
- ✓ **Result:** Our full line of Osmotic products
 - Osmotic Sea Buckthorn,
 - Osmotic Sea Buckthorn Juice
 - Chocolate covered osmotic sea buckthorn
- ✓ **Achievement** : REZOS BRANDS' project "Hippocrates Farm" was awarded the 1st place as innovative SME in Europe at "Functional Food" category, between 640 projects under H2020-INNOSUP "KATANA" project.



The Hippocrates Farm logo, featuring a circular emblem with a classical figure's head and the text 'HIPPOCRATES FARM' around the perimeter.	The KATANA logo, consisting of a stylized green 'K' inside a circle, with the text 'KATANA' and 'SETTING EDGE TECH IN AGRIBUSINESS' below it.	The flag of the European Union, featuring twelve yellow stars in a circle on a blue background.
<p>This project is funded by KATANA (Emerging industries as key enablers for the adoption of advanced technologies in the agrifood sector, Horizon 2020 project No. 691478), under the funding framework of the European Commission".</p>		



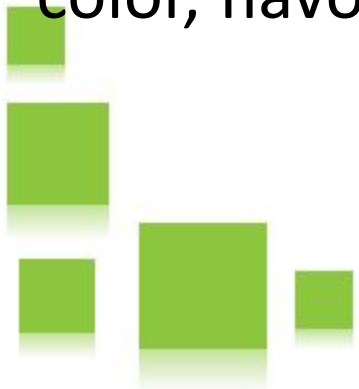
Why use osmotic dehydration



The main cause of **perishability** of fruits and vegetables are their high-water content.

To increase the shelf life of these fruits and vegetables many methods or combination of methods had been tried.

Osmotic dehydration is one of the best and suitable method to increase the shelf life of fruits and vegetables. This process is preferred over others due to their vitamin and minerals, color, flavor and taste retention property.

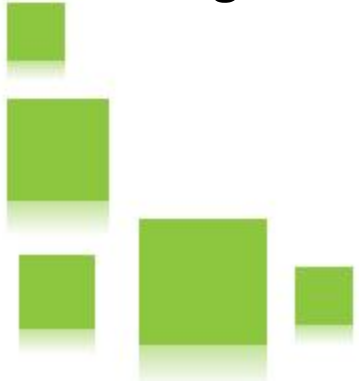
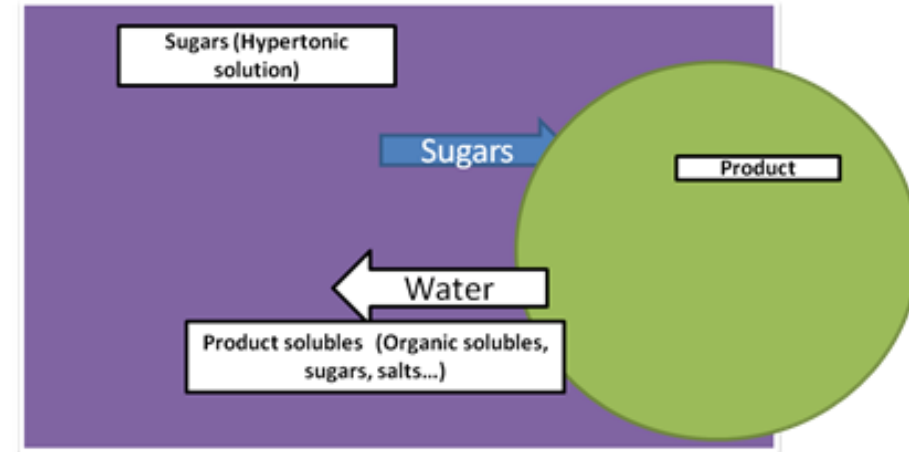


What is osmotic dehydration (1/2)



Osmotic dehydration (OD) is an operation used for the partial removal of water from plant tissues by immersion in a hypertonic solution, sugar and/or salt solution, to reduce the moisture content of foods. Research applications of osmotic dehydration to food processing in technology and in component transfer mechanisms are being carried out in several countries. This technique is a partial dehydration process to give the product a quality improvement over the conventional drying process.

Osmotic concentration is the process of water removal from fruits and vegetables, because the cell membranes are semi-permeable and allow water to pass through them more rapidly than sugar.



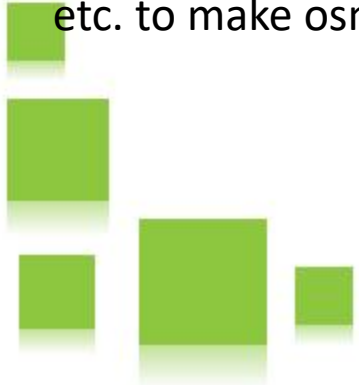
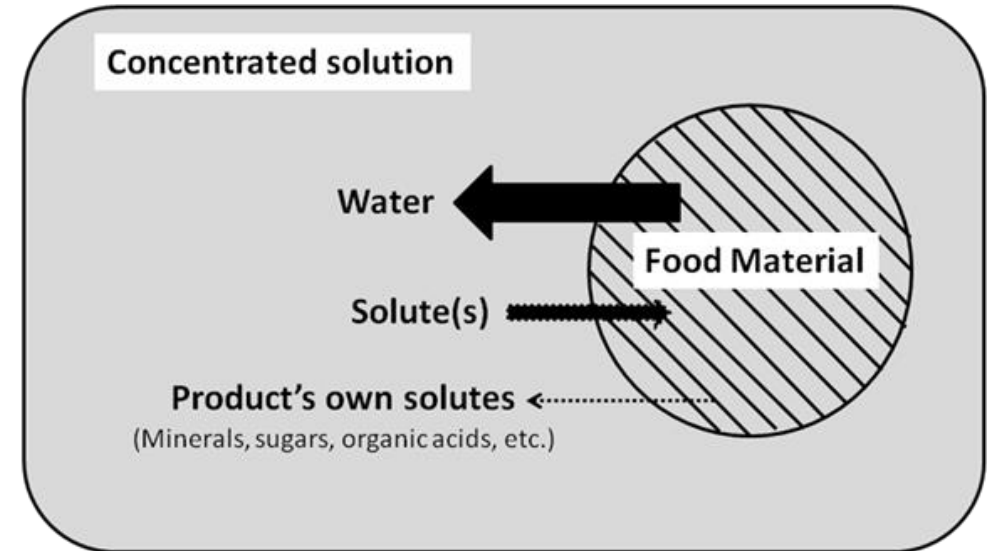
What is osmotic dehydration (2/2)



In osmotic dehydration, foods are immersed or soaked in a saline or sugar solution. This results in three types of counter mass transfer phenomenon.

- important water out flow from product to solution,
- a solute transfer from the osmotic solution to the food tissue,
- leaching out of the food tissue's own solutes (sugars, organic acids, minerals, vitamins) into the osmotic solution.

During osmosis small quantity of fruit acid is removed along with water. It is a dynamic process, in which water and acid are removed at first and then move slowly, while sugar penetration is very slight at first but increases with the time. Therefore, the characteristics of the product can be varied by controlling temperature, sugar syrup concentration, concentration of osmosis solution, time of osmosis etc. to make osmotic concentration process faster.



Osmotic Process Parameters (1/2)



- **Pretreatments**

Any pretreatment such as blanching or freezing prior to osmotic water removal was detrimental to the product quality. Dipping in 1 percent citric acid solution prior to drying or osmotic dehydration was used to prevent enzymatic browning of fruits. Immersion of product in alkaline or acid solutions of oleate esters prior to drying of fruits affected the prevention of discoloration

- **Immersion time**

Keeping the concentration of the solution constant, the increase of the immersion time resulted in the increase of water loss, but the rate of increase was decreased. Studies on the optimization of duration of osmosis process indicated that mass exchange took place at the maximum rate within the first two hrs of the osmotic treatment

- **Temperature of the osmotic solution**

The temperature of osmotic solution markedly affected the rate of osmosis. Although the rate increased with temperature, it was limited up to 60 °C as higher temperature destroyed the cell membranes.

- **Osmotic agents**

Several studies were conducted to find out the effect of different osmotic agents on the osmotic dehydration process. The most used osmotic agents were sucrose, glucose for fruits and NaCl for vegetables.



Osmotic Process Parameters (2/2)



- **Concentration of osmotic solution**

Water loss and sugar gain increased linearly with the increase of sugar concentration and temperature. The rate of sugar diffusion was a function of sugar concentration and temperature. Concentration of solution is a key factor in the osmotic dehydration process. It was also reported that higher concentration, faster is the rate of osmosis. But it is suggested that, it is not worthwhile using higher concentration for osmosis process for more than 50 per cent of weight reduction because of decrease in osmotic rate with time.

- **Agitation / Circulation**

When fruits are agitated in syrup, the rate of osmosis will be faster due to reduced mass transfer resistance at the surface by avoiding localized dilution process. But it may cause damage to the sample.

- **Fruit pieces to osmotic solution ratio**

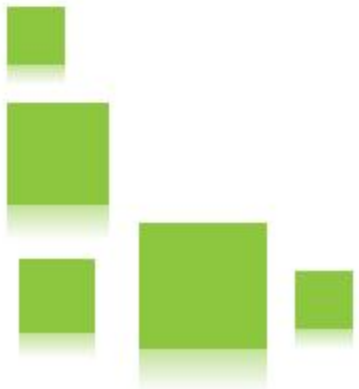
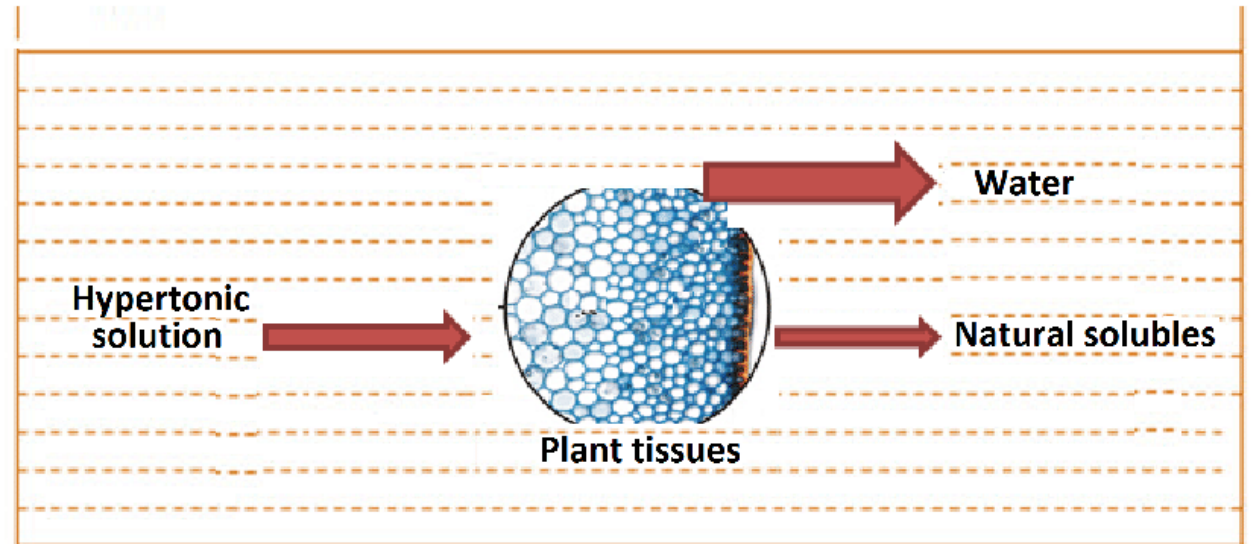
With an increase in solution to sample ratio, the rate of osmosis increases up to a certain extent. However, it is essential to use an optimum ratio since large ratios offer practical difficulties in handling the syrup fruit mixture for processing. A ratio of 1:2 or 1:3 is optimum for practical purposes.



Kinetic of Osmotic Dehydration

The kinetic of osmotic dehydration is determined by estimating the rate of water removal and solid gain.

Generally higher rates of water removal take place within first hour of osmosis due the large driving force between the dilute fruit sap and osmotic solution



Packaging & Storage of OD Products

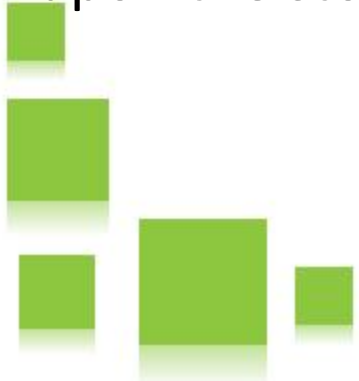


Packaging:

In order to prevent absorption of moisture from atmosphere and to prevent spoilage due to contamination, good quality, food grade and airtight containers can be used to store osmotically dried foods. Aluminum foil, laminated polypropylene pouches are suggested as ideal packing materials

Storage:

The storage stability of osmotically dehydrated products varies from six months to one year. There are osmotically dehydrated fruit products can be preserved up to one year or more depending upon the storage conditions and packaging materials used.



Advantages of Osmotic Dehydration (1/2)



1. It minimizes the effect of temperature on food quality and preserves the wholeness of the food, as no high temperature/phase change is required in the process.
2. Mild heat treatment favours colour and flavour retention resulting in the product having superior organoleptic characteristics. It is more when sugar syrup is used as osmotic agent.
3. IT increases resistance to heat treatment
4. The process is quite simple, economical (energy requirement is 2-3 times less as compared to the conventional drying.)
5. It prevents the enzymatic browning and inhibits activities of polyphenol oxidases.
6. It improves the texture and rehydration properties

Advantages of Osmotic Dehydration (2/2)



7. Acid removal and sugar uptake by fruits modifies the composition and improves the taste and acceptability which is called candying effect
8. The process could prove to be good for production of the ready to eat foods such as raisins etc.
9. The process reduces volume of the products thereby saving in the cost of processing, storage and transport
10. Constant immersion of product in osmotic agents avoids the O₂ exposure, the product retains better color
11. It protects against the structural collapse of the product during subsequent drying. It helps to retain the shape of the dehydrated products



1st European Innovation Award in Functional food



Hippocrates Farm on the top of European Innovation



"This project is funded by KATANA (Emerging industries as key enablers for the adoption of advanced technologies in the agrifood sector, Horizon 2020 project No. 691478), under the funding framework of the European Commission"

Rezos Brands was awarded the 1st European Innovation Award in Functional Food for its Hippocrates Farm project by the EU-funded business accelerator KATANA. Hippocrates Farm was rated as the most innovative agrifood project out of 640 projects from all over the European Continent and it is about the development of innovative functional snacks, derived from organic, Greek Sea Buckthorn of exceptional quality.



Innovative Functional food based on Meteora's Sea buckthorn



'National Winner' at European Business Awards in Customer & Management Engagement Category



1st European Innovation Award in Functional Food to Rezos Brands for the Hippocrates Farm project



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Hippocrates Farm, a mythical farm with products from Mother Nature.

The Osmotic Super Fruits Hippocrates Farm products are produced using low temperature osmotic dehydration, a process that naturally preserves: the fruits' original structure, taste, color, aromas, vitamins and all their valuable elements, without the use of sugar and preservatives.

70% DARK CHOCOLATE
WITH OSMOTIC SEA
BUCKTHORN

Osmotic Super Fruits



HIPPOCRATES FARM
OSMOTIC BLUEBERRIES



HIPPOCRATES FARM
OSMOTIC ARONIA



Organic Own Grown Sea Buckthorn



ORGANIC SEA BUCKTHORN
FROM HIPPOCRATES FARM
IN METEORA



Osmotic Super Fruits covered with dark chocolate



OSMOTIC SEA BUCKTHORN
COVERED WITH DARK
CHOCOLATE



HIPPOCRATES FARM
GOJI BERRIES COVERED
WITH DARK CHOCOLATE

Osmotic Juice



HIPPOCRATES FARM
OSMOTIC SEA BUCKTHORN
JUICE



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