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RESEARCHES IN THE DRYING FIELD OF PEACHES

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Abstract: This article presents an analysis of peach culture, describes the current situation and future development trends. The main varieties and the benefits of peach consumption are described, both fresh and dehydrated. Drying is proposed as an efficient storage alternative, with the description of the kinetics for different technological parameters of the dehydration process.

INTRODUCTION

In Republic of Moldova peaches now occupies third place after apple and plum, depending on the surface and production volume. According to the national statistical office of the total area of the fruit plantations 122.3 thousand hectares, of which 7.1 thousand hectares belong to the peach crop. Figure 1.

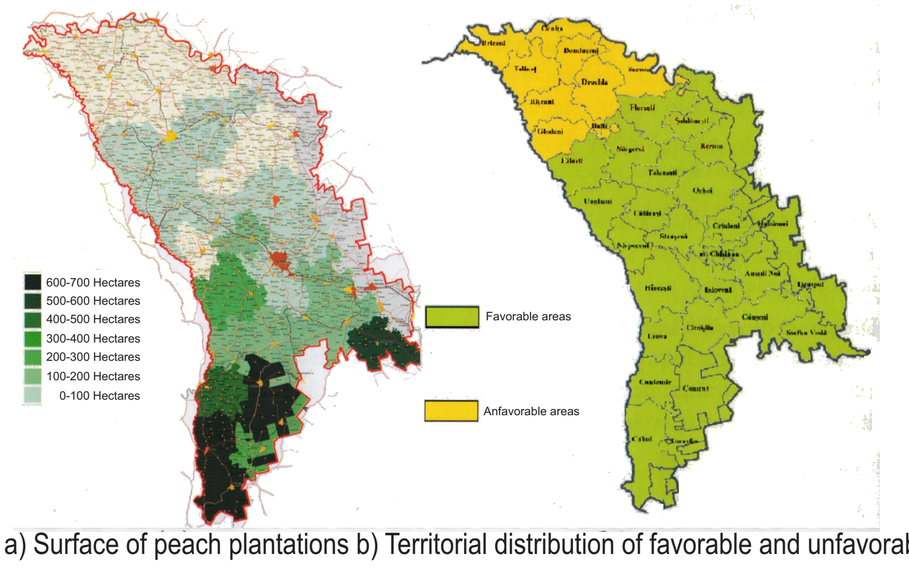
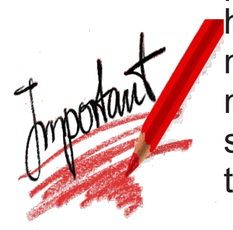


Figure 1. a) Surface of peach plantations b) Territorial distribution of favorable and unfavorable areas

Peaches as raw material

Peaches are highly appreciated thanks to their excellent taste, which is determined, by a fine pulp and pleasant aroma. The high food value of peaches is due to a complex and equilibrated composition consisting of 87.5% **water**, 12.49% of total **dry substances** and (10.54 %) soluble dry substances. **Sugar** content is 8.4 g.100-1 g of product as well as a treatable acidity of 0.5% (pH=4).

The chemical composition is generally represented by: **proteins**: (0.9 g .100-1g of product); **lipids**; (0.30 g.100-1g of product); **carbohydrate**: (9.90g.100-1g of product); **minerals**: **K**(190 mg.100-1g), **P**(20mg.100-1g) **Mg**(9 mg.100-1g) and **Ca** (6 mg.100-1g of product).
Peaches contain as well a variety of **vitamins** such as:
A (326 IU), **C** (6.6 mg.100-1g), **K** (2.60 mg.100-1g), **E** (0.70 mg.100-1g), **B3** (0.8 mg.100-1g), **B5** (0.20 mg.100-1g), **B8** (6.10 mg.100-1g), **Betaine** (0.3 mg.100-1g of product).



Being a seasonal product there are important quantities of peaches that remains unvalued as those have both short harvest and storing period. One of the most efficient methods to preserve their value is drying. This processing method has many conveniences like reduced storing spaces, increased preservation terms and further more the obtaining of a new product bringing health benefits.

Dry peaches are low in calories and reach in sugars; they are a good source of carbohydrates, phytonutrients, antioxidants, carotenoids that are of great importance for the healthy eyes, flavonoids that protects against cancer and heart diseases. Besides those listed there are others health benefits like stimulating immune system, normalizing the intestinal transit, stimulating gastric juice secretion, as well as helping in different diseases treatment like gastritis, anemia, high blood pressure, asthma and bronchitis, renal lithiasis, etc.

Materials and methods

To study the drying process, peach varieties served as raw material: Springcrest, Cardinal and Redhaven with firmness (Kg.f/cm2), dry substances (%) and Humidity (%): Springcrest 1,22; 10,65; 8 9 , 6 5 ; Cardinal 1,07; 10,52; 89,48 and Redhaven 0,88; 11,33 and 88,67.

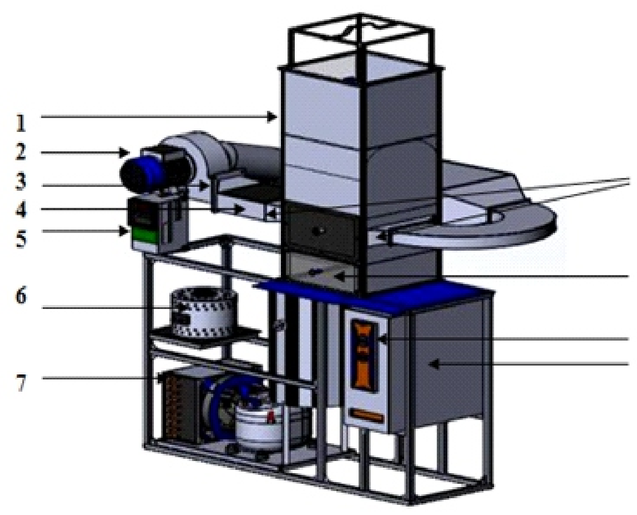


Figure 2. Experimental drying installation
1 – drying chamber, 2 – electric motor, 3 – fan, 4 – electric resistors (heater), 5 – frequency converter, 6 – temperature controller, 7 – auxiliary device, 8 – temperature and humidity sensors, 9 – switches, 10 – electronic scale, 11 – control block SHF, 12 – electronic device for monitoring and recording of input and output data

Processed by convective method and different thermal agent temperatures, peaches drying curves shows a standard form, displaying stable moisture per time diminution (Figure 3). From initial 89.5% to final 18.0% humidity drop duration depends on the drying agent temperature.

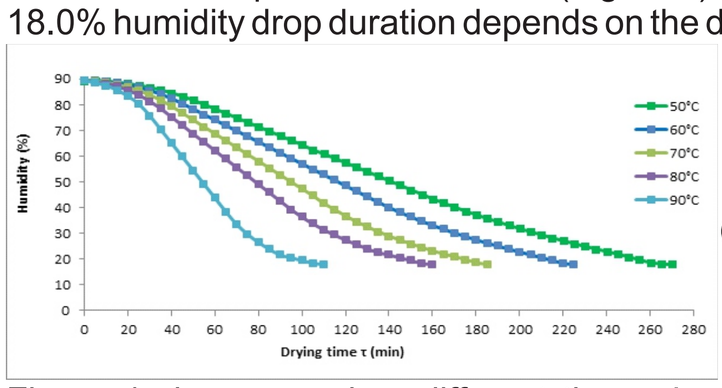


Figure 3.
Springcrest peaches different thermal agent temperatures drying curves
(Thermal agent velocity 2.0 m. s-1, thermal agent relative humidity 60.0%, slices thickness 3.10-3m)

Figure 4 shows peaches different thermal agent temperatures drying velocity curves. Their form also corresponds to the classic one, described in technical references.

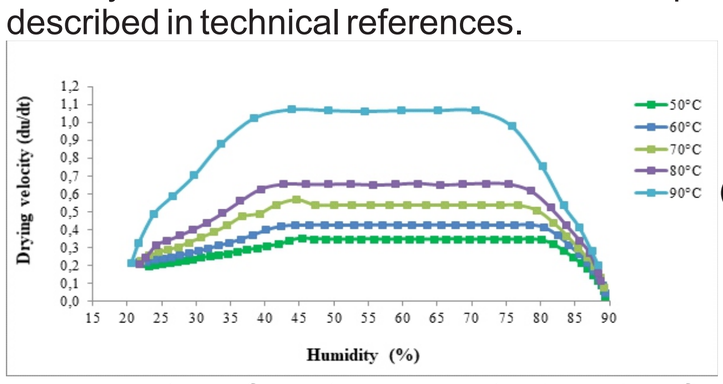


Figure 4.
Springcrest peaches different thermal agent temperatures drying velocity curves
(Thermal agent velocity 2.0 m. s-1, thermal agent relative humidity 60.0%, slices thickness 3.10-3m)

The mass transfer in the product is largely influenced by the humidity and temperature gradients, as well as by the thickness of the product layer that the humidity needs to pass.

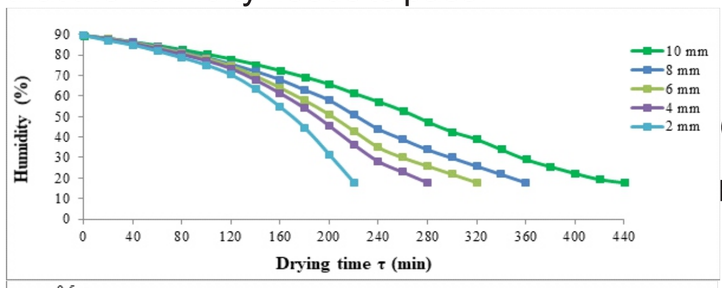


Figure 5.
Springcrest peaches different slices thickness drying curves
(Thermal agent velocity 2.0 m. s-1, thermal agent relative humidity 65.0%, thermal agent temperature 60°C)

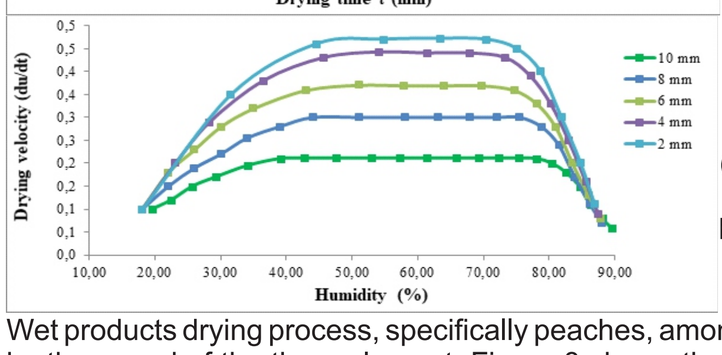


Figure 6.
Springcrest peaches different slices thickness drying velocity curves
(Thermal agent velocity 2.0 m. s-1, thermal agent relative humidity 65.0%, thermal agent temperature 60°C)

Wet products drying process, specifically peaches, among others are greatly influenced by the speed of the thermal agent. Figure 8 shows the drying curves and in Figure 9 curves of the drying speed of peaches.

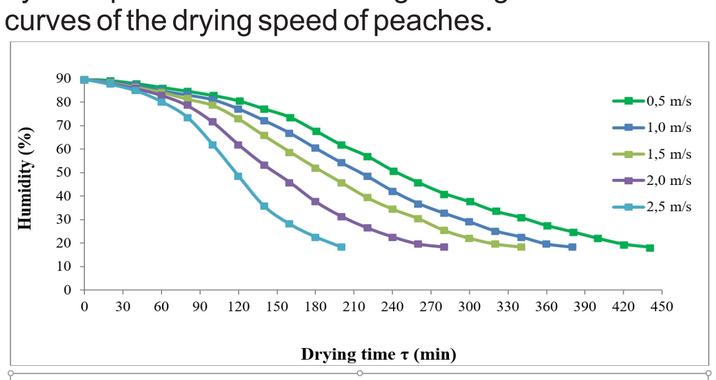


Figure 7.
Peaches different thermal agent velocities drying curves
(Thermal agent relative humidity 65.0%, thermal agent temperature 60°C, slices thickness 3.10-3m)

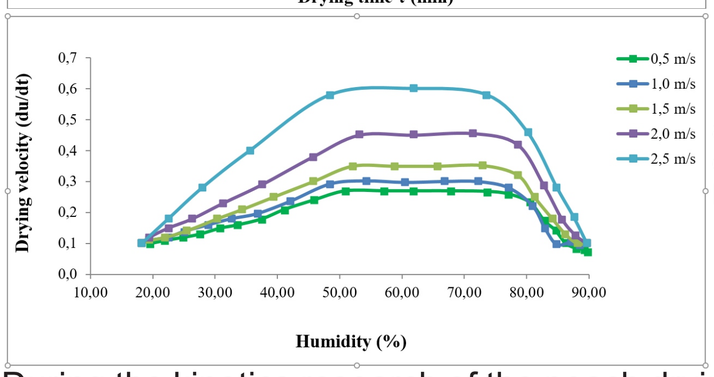


Figure 8.
Peaches different thermal agent velocities drying velocity curves (Thermal agent relative humidity 65.0%, thermal agent temperature 60°C, slices thickness 3.10-3m)

During the kinetics research of the peach drying process, such varieties as Springcrest, Cardinal and Redhaven were studied.

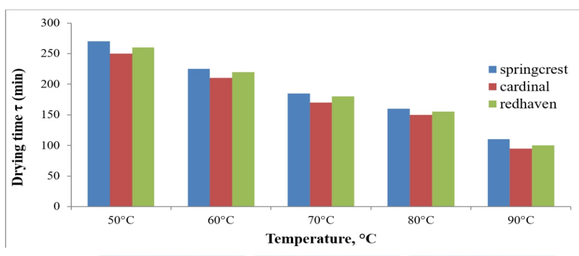


Figure 11.
Correlation between peaches variety and drying time
(τ = f (variety))

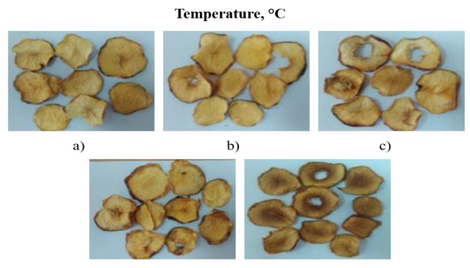


Figure 12.
Springcrest peaches aspect dried using: thermal agent 2.0 m/s velocity and 60.0% relative humidity: a) 50°C; b) 60°C; c) 70°C; d) 80°C; e) 90°C temperature