ISSN: 2230-9926

Available online at http://www.journalijdr.com

IJDR

International Journal of Development Research
Vol. 08, Issue, 03, pp.19443-19445, March, 2018

ORIGINAL RESEARCH ARTICLE

OPEN ACCESS

INFLUENCE OF TEMPERATURE AND GEOMETRY ON PEACH DRYING KINETICS

***Luciano Rossi Bilesky, Andressa Bianchi and Daniela Stuchi**

FATEC – Fatec Capão Bonito - R. Amantino de Oliveira Ramos, 60 - Terras de Embiruçu 18304-755 Capão, Bonito/SP. Brazil

ARTICLE INFO

Article History:

Received 11th December, 2017
Received in revised form
06th January, 2018
Accepted 25th February, 2018
Published online 30th March, 2018

Key Words:

Prunus pérsica,
convective,
ranges, parts.

ABSTRACT

The peach (*Prunus pérsica*) much appreciated worldwide due to its organoleptic characteristics, being a highly perishable fruit must be processed quickly after harvest. An alternative well-known for preserving food and little explored in peach fruit is dehydration. This study aimed to compare the peach dehydration kinetics using two variables: temperature and geometry of the fruit. The geometry was used, whole fruit, fruit in two parts in shell, resulting in two shelled, resulting in 4 parts with bark and fruit into 4 parts shelled, totaling 80 samples with 4 replicates for each combination of the experiment, drying It was held in the 60°C temperature ranges, 70°C, 80°C and 90°C. After a period of 24 hours in an oven, it is noted that the higher the temperature the greater the rate of dehydration of the samples and the lower the moisture content of the final therebetween. Since the geometry, as is the fragmented fruit was higher dewatering rate, however, it is found that the fruit peel influence over the water outlet of the employed fraction.

Citation: Luciano Rossi Bilesky, Andressa Bianchi and Daniela Stuchi, 2018. "Influence of temperature and geometry on peach drying kinetics", *International Journal of Development Research*, 8, (03), 19443-19445.

INTRODUCTION

Peach (Prunus pers.) fruit from Asia, consumed worldwide, is highly appreciated because of organoleptic characteristics, *in natura*, or industrialized in the form of wine, juice, pastries, cakes, jellies and yogurt (Cruz, *et al.,* 2012). Being a highly perishable fruit must be processed quickly after a harvest, due to an important water activity and metabolism. It has shelf life of a few days at room temperature, and is very susceptible to mechanical damage. It has expressive production concentrated in regions of temperate climate, for that reason the brazilian production is concentrated in the southern states of the country, standing out Rio Grande do Sul largest national producer, followed by São Paulo, Santa Catarina, Paraná and Minas Gerais due to These natural conditions. (Pereira *et al., 2005*). The city of Guapiara in state of São Paulo interior, has its economy focused on crafts and family farming, where one of the crops that stands out is peach. However in the harvest season, part of the production is lost due to the great supply and lack of commercialization, with this there is a great search for techniques of conservation of the raw material that can add value to the product and improve its flow, thus avoiding its loss. This panorama refers to "Family Agroindustry", where small producers process their products, whether in cooperativism or not, adding value to their raw material for a better commercialization. However, studies are needed to develop low-cost processing techniques that can be applied on the farm itself. A well known alternative to food conservation and little explored in peach fruits is dehydration (Romano, *et al.,* 2013). According to Fellows (2006), dehy dration or drying is defined as the reduction of most water present in a food by evaporation by exposure to heat under controlled conditions. Its main objective is to reduce water activity, inhibiting microbial growth and inactivating enzymes, thus increasing the shelf life of the product. Among the various advantages of drying food, we can mention a reduction in its weight and consequently a reduction in the cost of transportation and storage, creating unfavorable conditions for microbial growth, not to mention that some dehydrated foods retain their nutritional characteristics intact and can be used the whole year a fruit that is seasonal (Sanjinez-Argandona, *et al.,* 2011). Considering the aspects mentioned above, this work aimed to compare the kinetics of peach dehydration using two variables: temperature and fruit geometry.

****Corresponding author:* Luciano Rossi Bilesky,**
FATEC – Fatec Capão Bonito - R. Amantino de Oliveira Ramos, 60 - Terras de Embiruçu 18304-755, Capão, Bonito/SP. Brazil.

MATERIALS AND METHODS

The study was conducted with peaches of the Sulina variety donated by producers of the cooperative COOPERORG, in the municipality of Guapiara-SP. The drying was carried out in the temperature ranges of 60°C, 70°C, 80°C and 90°C. The geometry used was whole fruit, fruit in two parts with bark, fruit in two parts without bark, fruit in 4 parts with bark and fruit in 4 parts without bark. A total of 80 samples, 4 replicates were prepared for each combination of the experiment, preparing them in the sequence: reception, selection, washing and sanitizing, ginning, peeling and drying. Reception consists of storing in place and proper temperature until processing. The fruits were selected manually, using the criteria of uniform size and shape, color, texture and samples free of diseases or lesions for selection. For the hygienization the fruits were washed in running water removing the impurities and immersed in sodium hypochlorite at 10mg/L for 30 minutes as shown in Figure 1. Samples were prepared with knife-assisted geometry.

RESULTS AND DISCUSSION

In the ANOVA test, a p-value of 0.000 was found for both the Drying Temperature factor and the Peach Geometry factor, with the two variables being significant at a 5% level of significance. Figure 2 shows the graph of the main effects of the averages of the moisture content resulting from the peach dehydration with different drying temperatures and geometries, where the Temperature factor represents the temperatures used in the experiment with the following levels: 1-60°C , 2-70°C, 3-80°C and 4-90°C. And the Geometry factor, represents the different fractions of the fruit, being the level 1 whole peach with bark and 4 holes, 2 halves with bark, 3 halves without bark, 4-four parts with bark and 5- four parts without bark . It is observed that after a period of 24 hours in the greenhouse, that the higher the temperature, the higher the dehydration rate and the lower the percentage of the final humidity of the samples, this is due to the greater transfer of thermal energy and, consequently, a higher rate of evaporation (FELLOWS, 2006).

Figure 1 – i - Hypochlorite hygiene; ii - stove used; iii - fruit arrangement for drying.

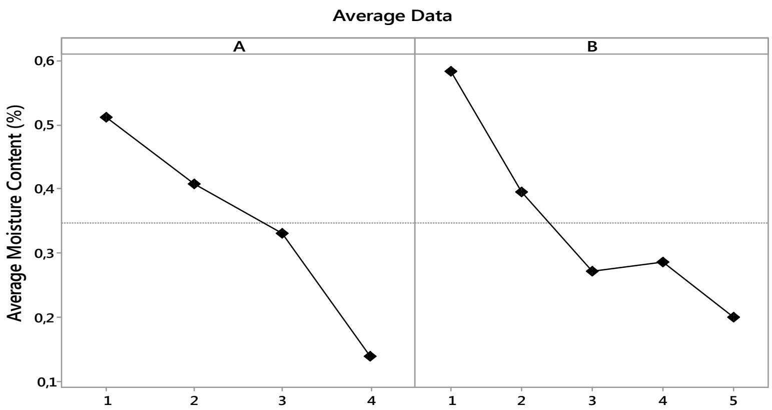

Figure 2: Main averages graph. The temperature; B - Geometry

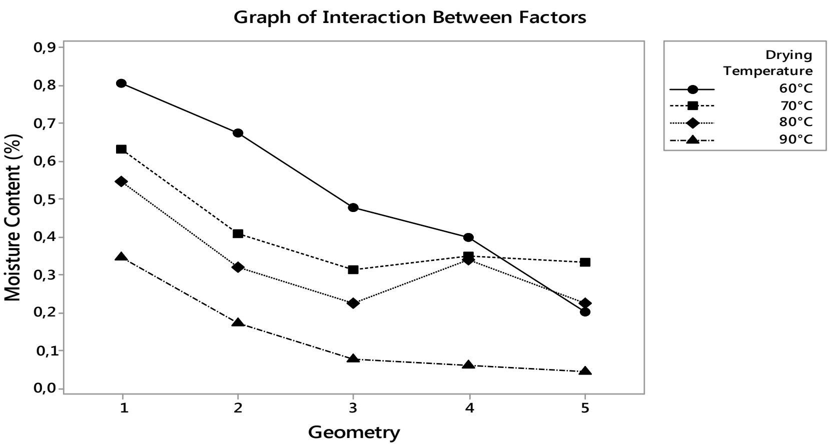

Figure 3. Graph of Interaction Between Factors.

As for geometry, the more fragmented the fruit was the dehydration rate, due to the increase of the contact area with the external environment, facilitating the exit of water from the fruit by capillarity. It is verified that the fruit bark influences more in the water outlet than the fraction used, this is explicit in levels 3 and 4, where 3 (two parts without bark) has a final moisture of 27.28% and level 4 (Four parts without shell) has final humidity of 28.67% after 24h of drying. In the interaction graph between factors, Figure 3 shows that the curves follow parallel from level 1 to 3, which indicates that up to this point there is no interaction between the variables temperature and geometry. Already in level 4 (four parts with bark) there is interaction between the factor temperature and geometry.

Conclusion

It has been found that the higher the greenhouse temperature, the greater the dehydration rate of the peach. Peach geometry divided into four parts and without skin was the one that presented the highest rate of dehydration because the area of exposure to heat was increased. The studies are validated only for the study of kinetic dehydration, subsequent quality studies may indicate the required moisture content and the potential application of the method.

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