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Change of Moisture Content in Yield of Cherry Treated By Environmental Parameters

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Abstract: The aim was to find the optimal way of getting the best quality of dried cherries with and without treatment. Fresh and frozen cherries were dried and the yield was analyzed after drying in the dry state, after the effect of environmental parameters, in this case temperature. Dried cherries are treated with various treatments, vitamin C, citric acid, SO_2, solution and clay (series I, II, III, IV and V) in order to show that the treatment is given the best results, in terms of drying rate and reducing weight. The percentage of moisture content is determined in the drained cherries, in order to demonstrate that they lost a little or a lot of moisture when exposed to temperature changes as external factors. Dry yield was not sticky and did not lose its color, which indicates that the drying temperature of 70°C was adequate. Testing has shown that dried cherries that were frozen have changed little of its properties, unlike fresh. Moisture content at the end of drying was approximately 16% of the initial value of moisture content.
Key words: yield, methods, cherry, moisture content, environment.

Introduction

Drying is a process in which a quantity of water is released from a product or a raw material. Drying preserve agricultural and food products from the possibility of attack microbes, deterioration and decay (Lahsani et al., 2004a, and Bimbent Bonazzi, 2008). Drying process, the products should remain with good organoleptic characteristics that are not sticky and do not get caught eventually mold. This means that after the drying process, under the influence of numerous parameters, temperature, humidity, there is no change. The drying process, the moisture content changes, a change in texture, shape, color and nutritional value (Ramos et al., 2003). The changes that can occur in a dry yield were mainly related to moisture content. The moisture content in the dry yield may be due to insufficient drying, inadequate temperature, bad treatment before drying or inadequate conditions of the premises where stored and kept dry products.

Moisture content can be determined by thermogravimetric methods, which can accurately show what percentage of moisture in the dry yield. The content of moisture can have a positive effect from the economic point of view. What is the moisture content higher yield on the dry weight and the material is more expensive, but it does not mean that the product will be better. The moisture content of the dry yield should be minimal in order to more easily stocked and transported.

There are numerous ways in which moisture content - or dry weight - the product affects the quality of the product, acting not only on maintaining the characteristics of the product, but also to his taste. On the change of return affect the quality of life parameters sredinre because they are the most important. Everything depends on the percentage of moisture content in the yield of (Mcintyre, et al., 2011).

Materials and Methods

Sour cherries are used as the material for testing the percentage of moisture. The chemical composition is expressed by the simplest and fastest is defined as the dry matter content. This term encompasses the content of all compounds that are part of the fruit and vegetables, other than water. Starting from the dry matter content of individual species and varieties, quality is defined as those varieties which have higher dry matter content (Radosavljevic, 2001). Higher dry matter content causes the higher content of certain ingredients, higher nutritional value and favorable organoleptic properties (Stevanovic, Jankovic., 2001).

Dry cherries, which are the subject of this paper, the determination of moisture content, the analysis of the pre-dried at 70° C in a convection dryer. During drying cherries were treated with and without treatment. Treatments were carried out in vitamin C, citric acid, SO_2 and bentonite clay. Cherry drying were fresh and frozen (Markovic, 2009).

Moisture content in dried cherry yield was determined by thermogravimetric method, in which there is a difference between the non-selective and selective-guided techniques. Both techniques are based on determining the difference between the initial weight of the sample and the weight after drying, but regarding

the non-selective technique determination of moisture content includes all the components of a given substance that lead to weight loss substance when heated; while at the water - selective moisture content is equal to the amount of water that is released from the substance, as a result of heating.

Cherries were dried in a convection oven, which heats air to a temperature between 103 and 107°C, which primarily leads to the evaporation of moisture from the layer at the very top of the sample. Then, the moisture is gradually formed in the sample, and leads to the spread of moisture from the deeper layers of the surface of the sample, not only water, but also the volatiles evaporated from the sample during testing. The percentage of these substances in relation to the percentage of water depends on the sampled material and are subject to large variations. Less volatile substances are ejected only in small quantities in the oven.

After drying in an oven it is important to cool the sample to room temperature, since the air in the boundary layer between hot and cold environments of the sample begins to circulate. This supports the pattern, giving the impression of a less serious nature. The difference, even when slight, is registered or poluanalitičkom analytical balance and distorts the measurement results. Further, the hot material heats the parts of the sampling mechanical scales, leading to a pressure within the measuring system, and thus to further distortion of the measurement results.

The effect is known as "temperature trends" moisture. After the measurement sampling vessel and the sample cooled, the drying process is continued, since the re-measurement can not be determined a constant weight. The sample is placed in the dryer again, this time for 30 minutes, cooled in a desiccator and then weighed. These steps are repeated until the measurement process back shows identical results three times in succession. Only after this is confirmed, it is certain that he reached a constant weight. After the last measurement procedure, mass loss is calculated based on the following formula:

$$\frac{m_1 - m_2}{m_1} \cdot 100 \qquad (1)$$

Where in
m_1 - weight of the portion of the test sample before drying in g
m_2 - mass part of the test sample after drying in g.
Moisture content is determined in%.

Results and Discussion

The research results show that the moisture content decreases proportionally depending on the weather, in the same way as the mass decreases and in drying fresh and frozen cherries when drying treated with various treatments.

Figure 1 shows the changes depending on the moisture content of the drying time, with the cherries that have been fresh all five series. It can be seen that the moisture content decreases with the length of drying time. What is the time required for drying longer, evaporation of water from the surface of the cherry will be more intense. Also, the absorption of water vapor from the surface of the cherry will be more intensive if the relative humidity is lower. By increasing the speed of air flow around the cherry, evaporated water is quickly removed. Until the transfer of moisture from the inner layers of the cherry to the outer layers is due to different humidity these layers, which are incurred as a result of moisture evaporation and drying of the surface layer (Sengun, Karapinar 2004). Speed transfer of moisture from the inner layers of the surface depends on the overall humidity cherries themselves, differences in humidity and temperature of the individual layers of the cherries. The air temperature significantly affects the drying process, demonstrated and confirmed (Doymaz, Ismail, 2011).

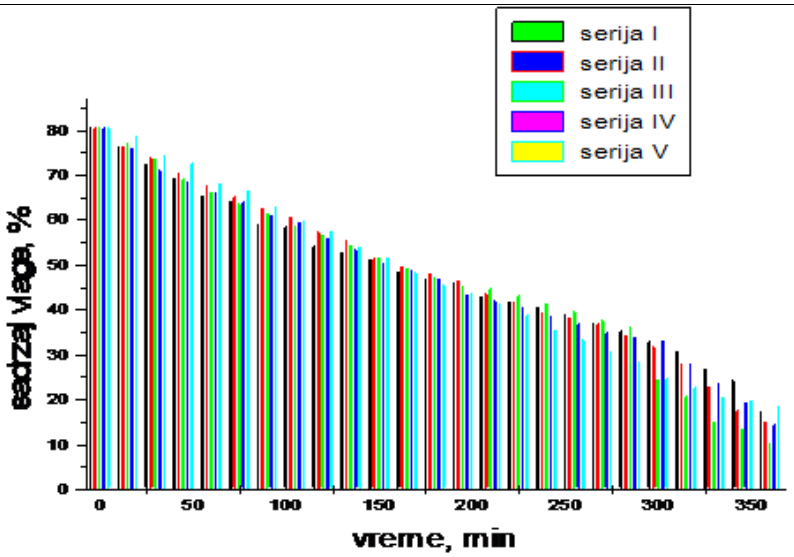

Figure 1. Diagram of moisture content during the drying time fresh cherries without treatment, treated with vitamin C, citric acid, SO_2, and clay

Based on the results obtained by drying the frozen cherries, one can say that the moisture content of freeze dried sour cherries decreased from 79.61% to 18.70%. The ratio of the loss of water is nearly 10: 1. In Figure 2 you can see changes in moisture content with the cherry that were frozen. If we compare the results with figures 1 and 2 can be seen that no major changes during the drying time or the change of moisture content, it is only time for drying frozen shorter by 45 min.To shows that the pre-drying moisture content was higher, there was a and cracking the cell walls of the fruit at the very beginning before drying.

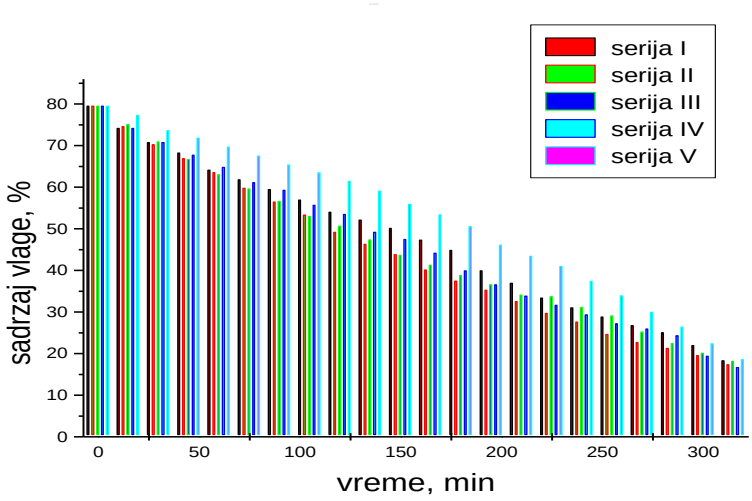

Figure 2. Change of moisture content during drying frozen cherries without treatment, treated with vitamin C, citric acid, SO_2, and clay.

Dried fresh and frozen cherries were exposed after drying temperature external conditions, were stored at room temperature (no exposure to direct sunlight), which is reached in the summer and 30°C. In such circumstances, and the humidity was increased. As the fruits dried cherries at the appropriate temperature, there has been no change in them. This means that the yield of dried cherries not caught mold, not oksidovale and were not further dried up. On such cherries, ie. yield, additional tests were performed in the laboratory of the Institute of Public Health in Vranje. Analyses were performed: ash content, moisture content.

Table 1. Moisture content in dried yield (dried cherries), after the effect of temperature parameters

Sample types	Series of treated and untreated samples	The weight of the samples after the convectors. drying	The weight of the samples after the operation temperature	The weight of the samples before determining moisture content m_1	Weight of sample after drying on 103°C m_2	Moisture content (%)
Fresh samples	Series I	56.3	17.7	5.3	3.8	28.3
	Series II	48.1	12.5	5.3	3.3	37.7
	Series III	34.4	12	5.05	4.7	6.93
	Series IV	46.2	18	5.12	4.8	6.25
	Series V	60	26.7	5.21	4.5	13.63
Frozen samples	Series I	56.2	21.4	5.14	4.9	4.67
	Series II	56.3	20	5.05	3.9	22.77
	Series III	56.1	24.6	5.03	3.8	24.45
	Series IV	54	26.5	5	4.6	8
	Series V	62.3	36.8	5.2	4.4	15.38

Sample masses m_1 of the table is taken to be about 5 g. All samples were dried in an oven at a temperature of 103°C for three hours and after that the samples were obtained by mass m_2. Before measurement uzoci standing 30 minutes at room temperature. The obtained results for the moisture content show that the moisture content varies. In some samples, the moisture content is higher and some smaller. This means that despite the drying samples Series I, II and V with the fresh sample has plenty of moisture, as well as in samples II, III and V of frozen samples.

Table 2. Group determination of moisture content in the samples

The moisture content of %				
The samples before drying cherries (fresh) Group A				
Series I	Series II	Series III	Series IV	Series V
21.3	18.93	17.56	20.05	22.04
The samples before drying cherries (frozen) Group B				
Series I	Series II	Series III	Series IV	Series V
20.91	19.83	22.41	18.58	21.48
Samples of dried cherries, after drying, 360 min. (Group A)				
Series I	Series II	Series III	Series IV	Series V
17.5	15.27	10.47	14.55	18.42
Samples of dried cherries, after drying, after 315 min. (Group B)				
Series I	Series II	Series III	Series IV	Series V
18.37	17.42	18.25	16.73	18.62
Samples of dried cherries, after drying, after the operation parameters of the environment. (Group A)				
Series I	Series II	Series III	Series IV	Series V
28.3	37.7	6.93	6.25	13.63
Samples of dried cherries, after drying, after the operation parameters of the environment. (Group B)				
Series I	Series II	Series III	Series IV	Series V
4.67	22.77	24.43	8	15.38

During the drying process could be seen that the drying of fresh cherries gives less weight after some time, as opposed to frozen, which at the same time has a greater mass. It can also be seen that the fresh dried cherries are not sticky and have a very dark color, almost blue, while frozen dried cherries have a strong red color and are sticky. The table and the diagram, you can see how to reduce weight, or how to change the moisture content of fresh and frozen dried cherries. It can be inferred from tabular data to the mass of cherries

lowers almost 10 times, ie the ratio of fresh and dry is 10: 1. Mass cherry linearly decreases with time, and the longer the drying mass and the percentage of moisture is reduced so that finally gets cherry with a moisture content of 10.47 to 18.42%. As a result of drying, it can be said that there has been no significant change in organoleptic properties, it is almost achieved retaining the natural color. Pretreatment showed that the drying of agricultural products better and more successful, (Wang et al., 2011) and it is shown in this work.

If we compare the research in Serbia with the research in terms of drying cherries in Europe, it can be concluded that the values are different. The quality of the cherry is not the same because Serbia is a country with a temperate continental climate, which means that the cherry juicier, fuller, and is obtained during the drying dry yield better quality with lower percentage of moisture content. Changes in moisture content in the yield during the drying process are shown in the graphs where the most evident changes occurring.

Conclusion

During the drying process could be seen that the drying of fresh cherries gives less weight after some time, as opposed to frozen, which at the same time has a greater mass. It can also be seen that the fresh dried cherries are not sticky and have a very dark color, almost blue, while frozen dried cherries have a strong red color and are sticky. This means that the freezing process to be influenced cherry cherry after drying fine in relation to the non-cherries were frozen. Low temperature of -25^0C destroyed the structure of the fetus, have torn membrane and make it themselves before drying cherries were different from fresh, and the result obtained and expected. The table and the diagram, you can see how to reduce weight, or how to change the moisture content of fresh and frozen dried cherries. Mass cherry linearly decreases with time, and the longer the drying mass and the percentage of moisture is reduced so that finally gets cherry with a moisture content of 10.47 to 18.42%. Each pre-treatment has its advantages and disadvantages in terms of being dried fruits of good quality except zamzrnutih that are stickier, but we can say that there has been no significant change in organoleptic properties, it is almost achieved retaining the natural color. Each pre-treatment is good in its own way in the sense that the dried fruits of good quality except zamzrnutih that are stickier.

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