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STUDY OF THE INFLUENCE OF THE MAIN INDICATORS OF RASPBERRY ON THE VACUUM SUBLIMATION DRYING PROCESS

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Abstract

This article focuses on the current state of modern drying methods and the practical importance of organizing drying in industry, as well as analytical data on the theoretical basis of drying, the main properties of raspberries and their dependence on drying. Recommendations on the selection criteria of raw materials for drying have also been given.

Keywords: raspberry, property, indicator, drying technology, chemical composition, mineral substances, dependence on drying.

Introduction

Drying is one of the common folk methods of canning. It is considered a complex mass exchange process and is one of the processing methods that allows effective preservation of products made from plant raw materials [1]. The main thing in drying products is to preserve their properties and increase their quality. Sublimation drying is the only viable method for obtaining dry form for most thermolabile biological materials. The reason is that in this case, the quality of the product is maximum, regeneration is easy when moistening it, and the original properties of the dried product, such as smell, taste, color, nutritional and biological value, are preserved. In the process of sublimation drying, the moisture in the material is in the form of ice, and then this ice turns directly into vapor, instead of turning into a liquid state. Today, improving the sublimation drying process of not only fruits and vegetables, but also berries, including raspberries, is becoming one of the urgent issues [2].

THEORETICAL BASIS

Raspberries have high taste, medicinal and healing properties, and the fruit is mainly eaten fresh. Due to the presence of salicylic acid in dried raspberries, it is used as a



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treatment for colds. The energy value of 100 grams of dried raspberries is 241 kcal. If raspberry is dried at a temperature of $30\div50^{\circ}$ C, its beneficial properties and nutrients are preserved [6].

Its composition consists of 85% water, and it contains the following vitamins and minerals [7]:

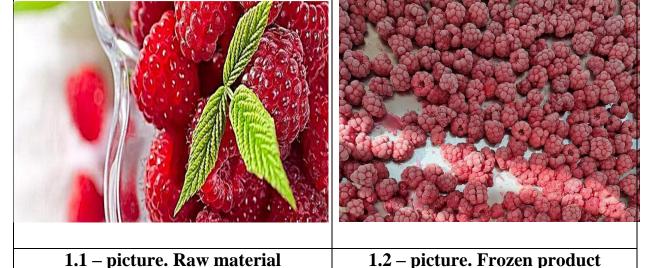
Table 1

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N⁰	Vitamins	Minerals		
1	C - 44 %	Manganese - 34 %		
2	K - 10 %	Magnesium - 5 %		
3	B9 - 5 %	Iron - 4 %		
4	E - 4 %	Copper - 4 %		
5	B6 - 3 %	Zinc - 3 %		

ANALYSIS AND RESULTS. In order to achieve an effective result in the process of sublimation drying of raspberries, the work was carried out in the following order:

The first stage is the preparation of raw materials for drying. It is recommended to choose a freshly selected product for sublimation drying of raspberries. After 24 hours, raspberries may have lost their vitamins, darken or have a sour taste. Before putting the product in the refrigerator, it is necessary to check the fruits and remove all crushed products.

The second stage - the raspberry selected as a research object was placed on drying lists and placed in a laboratory freezer called Arctico and frozen to a temperature of -40° C. The process depends on the ambient temperature and lasts up to 8 hours. The higher the ambient temperature is above 25° C, the lower the freezing rate.





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The third stage - after the product has been frozen to the specified temperature, it is removed from the freezing chamber and placed in the drying chamber, and the temperature inside the chamber is brought to -10° C. To bring the temperature inside the chamber to negative level, the freeze knob on the electrical panel was turned and the indicator reading was set to 10 and the temperature was raised according to the table below.

Table)

N⁰	Time (hour)	Temperature indicator (⁰ C)	Vacuum (MPa)
1	2	-10	0.1
2	2	-5	0.1
3	4	0	0.1

CONCLUSION

Based on the results of the research, it can be concluded that by freezing the product in these parameters, it is possible to preserve its useful properties. Also, during the experiment, it was confirmed that the use of the sublimation method for drying raspberries has the following advantages:

- keeping raspberry color, appearance and even aroma;
- possibility of long storage;
- production is environmentally friendly, no chemicals are used.

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