DEVELOPMENT OF PROGRESSIVE TECHNOLOGY OF DRYING FRUITS FOR OBTAINING DOMESTIC ENVIRONMENTALLY-PURE DRIED FRUITS

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ABSTRACT

Attention to the problem of nutrition is constantly increasing as from various segments of the population, and from scientific research. At present, modern society is trying to adhere to a healthy lifestyle, eat balanced foods, which contain the most essential substances that support the normal functioning of the body. In this regard, to compensate for the deficiency of vitamins, micro-and macro-elements in the period of exacerbation of chronic diseases, as well as in the winter period, it is advisable to bring into the diet products, the raw materials of which are dried fruits.

In this paper, we consider the progressive technology of drying fruits for the production of domestic ecologically pure dried fruits. According to the proposed method, the infrared technology of dehydration allows you to save vitamins and other biologically active substances for 85-90% of the original product. Depending on the feedstock, the volume of the dried product decreases by 3-4 times, and the weight by 5-9 times, which is a positive factor if it is necessary to store and transport. All these factors lead to the conclusion that the use of IR technology allows the production of dried products of a quality that cannot be achieved with other known drying methods.

It was established that the product developed by sensory and physical and chemical indicators corresponds to consumer preferences and technical documentation for this type of product.

Key words: drying of fruits, dried fruits, infrared dehydration, vitamins, micro and macronutrients, raisins, sultana raisins, dried apricots.

INTRODUCTION

The modern concept of healthy eating suggests that one of the main parameters that a daily diet should satisfy is diversity and balance. During the period of exacerbation of chronic diseases (spring and autumn), as well as during the winter period, the pharmaceutical industry offers a wide range of chemically synthesized multicomponent vitamin and mineral complexes to compensate for the lack of vitamins, micro and macronutrients. Such complexes are significantly different from the native forms, and are characterized by insufficient digestibility by the body [1,2].

In this regard, it is advisable to refer to the traditional and effective way of filling the deficiency of vitamins, macro- and microelements in the body - dried fruits. They are fruits and berries dried naturally or industrially up to a certain moisture content, approximately 20%. It should be noted that modern technologies of industrial drying make it possible to preserve a large part of biologically active substances in dry fruits, while their amount will be higher than in fresh raw materials due to the removal of moisture from the fruit [3].

It should also be noted that the ultimate goal of agricultural producers is not the ever-increasing production volumes, but its realization at the most favorable price. In this regard, issues of post-harvest processing of fruits and vegetables, their sorting, packaging, extension of the implementation period are of particular importance - all this allows you to significantly increase the competitiveness of products and get more income.

The most widely known type of dried fruit is raisins. This is a product with a peculiar, pronounced taste and aroma, which is the quintessence of all the beneficial and nutritional properties of grapes. Raisins can be used in the preparation of meat dishes, omelets, puddings, pastries, compotes, jelly, dairy dishes. In addition, grape juice and jelly are obtained from grapes, oil from grapes seeds (they contain about 20% of oil by weight) used in food, and in many national cuisines grape leaves are also used.

World grape production is about 65 million tons; about half of this volume is used for the production of wines and juices, 30% - for the production of raisins, 15% - is sold fresh [4].

Another, no less popular type of dried fruit are dried apricots. They are sometimes called “fruits of health” because it is difficult to find any other fruit that combines the same beneficial properties for humans. In addition, apricots attract not only their nutritional value, but also great taste, aroma and appearance.

Unfortunately, fresh apricots have extremely short shelf life (only 1-2 weeks at zero temperature). Therefore, only about 20% of the world production of apricots is consumed fresh, and, as a rule, these fruits are harvested immature in order to increase the shelf life. But being harvested as hard and immature, apricots do not ripen completely and never acquire the flavor in comparison with fruits that fully matured on a tree under the rays of the sun [5].

About 50% of apricots grown in the world are canned, 10% are frozen, and from 20% they produce wonderful dried fruits.

There are many ways to store fruits and vegetables, berries and grapes. The main ones are: drying, freezing and refrigerated storage.

Today there are several industrial drying technologies: convective, conductive, sublimation, high-frequency, modern environmentally friendly infrared technology [6].

To expand the range of dairy products various fillers, which have a complex of taste, medical, dietary and nutritional properties are used.

The existing technology of natural drying (in the shade) raisin in Central Asia occurs within 20-30 days with a yield of finished products of 22-25% and moisture + 18%. The Central Asian industrial technology for obtaining raisin from grapes is produced within 8-12 days with the output of finished products up to 25% and moisture + 18%. When drying fruit, chemical reagents are used: (caustic soda, sulfurous anhydride and sulfuric acid) for blanching. The disadvantage of this method of using chemical reagents (caustic soda, sulfuric acid) while not following the technology of chemical reagents, adversely affects the human body when using dried fruits [7].

In this regard, research aimed at justifying and developing industrial advanced technology of drying fruits to obtain domestic environmentally friendly dried fruits, as a source of biologically active substances, are relevant.

MATERIALS AND METHODS

Laboratory studies were carried out in educational and scientific laboratories of the Department of Food Engineering, at the scientific and laboratory base of the testing laboratory of LLP “Nutritest” (Almaty) using all standard and common methods [8,9].

At various stages of this work, the objects of study were: Varieties of dried fruit and berry raw materials, such as: dried dried apricots, prunes, raisins. The quality indicators of dried fruits were determined by the combination of physicochemical, organoleptic and microbiological indicators.

RESULTS AND DISCUSSION

This work is devoted to the development of the technology of drying fruits for the production of domestic environmentally friendly dried fruits by the method of infrared irradiation, as well as the study of the quality of the finished product.

Infrared drying deserves special attention, since this technology of dehydration allows you to save vitamins and other biologically active substances for 85-90% of the original product. During the subsequent short soaking, the dried product restores all its natural properties: color, natural aroma, shape, taste, and does not contain preservatives, because the high density of infrared radiation destroys harmful microflora in the product, so that it can last for about a year without special packaging, under conditions that prevent the formation of condensate. In the sealed container this dry product can be stored for up to 2 years without appreciable loss of its properties. Depending on the feedstock, the volume of the dried product decreases by 3-4 times, and the weight by 5-9 times, which is a positive factor if it is necessary to store and transport. All these factors allow us to conclude that the use of IR technology allows the production of dried products of a quality that cannot be achieved with other known drying methods [10].

Competitiveness and advantage of fruit and fruit products produced according to the developed technology, is to obtain environmentally friendly products without the use of chemical preservatives and reagents when drying domestic dried fruit. One of the main advantages of dried fruits of the south of Kazakhstan is high sugar content and aroma. In the summer, solar insolation of air - from + 35-45 ° C in the shade, and fruit grown in a dry, hot climate accumulate sucrose and fructose as much as possible. In the dried fruits produced in Turkey and Greece, located near the Black Sea due to the high humidity of the air, the sugar content in the dried fruits is much less, and they are inferior in taste to our products.

Fig. 1. Dried fruits obtained by the proposed technology of infrared drying

An experimental drying was carried out on the drying unit SD-4 of the Department "Food Engineering" of the M.Auezov SKSU. Dried fruits in the form of raisins and dried apricots and prunes were obtained by experimental experiments (Fig. 1).

The method of drying the grapes was carried out on the innovative patent of the Republic of Kazakhstan for the number 20923. After washing, the grapes are allowed to drain; they are sorted, inspected before the shock freezing of the grapes to 0.5 kg. They put the bunches of grapes in gauze bags, store the refrigerating chamber in trays at + 6 ÷ 10 ° C for 10 hours and then put it in the chamber (at -25 ° C) for 3-5 seconds. With transient freezes, a “mesh” of microscopic cracks forms on the skin of the berries, and the moisture evaporates evenly when dried. This prevents the process of increasing the vapor pressure of the liquid under the skin of the berries and the appearance of large cracks, bursting through which the juice flows. Then blanching is carried out in hot water (+95 - + 98 ° C) for 3-5 seconds. When blanching in hot water from the surface of the berries, the wax purine layer is washed off and disinfected from pathogens. Gauze bags of grapes are placed in the trays of an infrared dryer.

Infrared drying of grapes is performed in two stages. Regime parameters of air heating compose (+65 - + 45 ° C) inside of the chamber. At the first stage, the heating temperature inside the berries is maintained at + 60 ° C, outside 50 ° C, removal of moisture 50-70% for 24 hours. Air velocity interval is 0.4 s. At the second stage, the temperature of air heating is (+45 - + 40 ° C) for 96 hours [11].

A complete biochemical analysis of the quality of dried fruit was also carried out by independent experts of LLP “Nutri-Test” at Nutrition Academy of the Ministry of Health of Kazakhstan (Table 1).

The use of progressive technology of infrared drying of fruits will allow obtaining dried fruits with high consumer and taste qualities. So, sucrose is maximally preserved in the resulting products, the mass fraction of which in the sultana raisins is 5.17% with an energy value of 308 kcal / 100g, the mass fraction of sucrose in raisin with a bone is 4.75% with an energy value of 313kkal / 100g. Fructose and vitamins (such as C, A, E, B, PP, B1, B5), fiber, pectin, microelements (iron, potassium, magnesium, selenium, calcium, iodine) and gustatory nutritional values are at the level of 85-90% from feedstock [12].

Table 1 - Biochemical properties of sultana raisins and raisins (with a stone)

Quality indicators	Sultana raisins	Raisins (with a stone)
Mass fraction of sucrose,%	5.17	4.75
Moisture content,%	21.4	20.39
Mass fraction of ash,%	2.16	1.86
Nutritional value per 100 g in mg		
Proteins	2.86	2.26
Fats	0.54	0.49
Carbohydrates	73.0	75.0
Energy value, kcal per 100 g		
	308	313

CONCLUSION

The developed method of drying fruits allows to increase the yield of the finished product up to 30-32% or more, to improve the appearance of raisins, dried apricots and prunes

by preserving the integrity of the berries, reducing the drying time of dried fruits to 96 hours instead of 10-30 days with the output of the finished product by 20- 25%.

The introduction of the developed drying technology based on the author's invention of the Republic of Kazakhstan No. 20923 "Method of drying grapes" will reduce the drying time by 2 times, increase the yield of the finished product to 30-32% with a residual moisture of 16-18%, improve the appearance of the finished product with preservation of taste inherent in the (natural product) fresh fruit.

Market prices today selling price of imported dried fruits: dried apricots 1600-3000 tg / kg; raisins from 1200-2000 tg / kg; The estimated selling price of domestic dried fruit is reduced: dried apricots to 600-800 tg / kg; raisins to 700-900 tg / kg. Domestic dried fruits will be 2-3 times cheaper than imported dried fruits and will be a branded product Made in Kazakhstan.

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