ISSN NO: 2770-4491
Date of Publication:05-10-2021

Research Pre-Treatment Technology and Ir Convective Drying of Pumpkin

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Abstract. The methods of primary processing of pumpkin before its final drying have been studied. Based on the analysis, a cascade drying method was selected. It is given technology of pumpkin powders.

Keywords: Pumpkin, drying, cascade, vitamins, carbohydrates, infrared rays, solid matter, powder.

Global trends in nutrition are associated with the creation of an assortment of products that improve health with daily consumption as part of the diet and are called "preventive". The need to consume products with health-improving properties is closely related not only to the deterioration of the ecological state in Uzbekistan, but also to traditional technologies for processing products, which do not always contribute to the preservation of the full volume of nutrients in them.

The increasing internationalization of tastes and consumer demand for healthy eating are setting new demands on food innovation. In agriculture, food production and food safety are top priorities. In this regard, special attention is paid to the improvement of combined drying devices and technologies for high-quality drying of vegetables and fruits in such developed countries as the USA, France, Turkey, Germany, Ukraine, Russia. It is important to process new raw materials, expand the range of products, ensure environmental friendliness, and create effective waste-free technologies.

In the world practice, research is being carried out to improve the technology of drying food products using a stream of hot air, infrared (IR), as well as drying equipment. The requirements for the quality of the finished product require the drying process in energy-efficient devices, while maintaining the healing properties and biological value of vegetables. The power supply for drying vegetables using ultra high frequency (UHF) can significantly save energy by increasing the productivity of the technological process, maximizing the biological value of food and products.

Given that the initial treatment speeds up the drying process, we plan to implement this method using infrared (IR), ultrahigh frequency (IR) and infrared-ultrahigh frequency (IR-IR) rays. The two-stage drying process is called cascade drying. The essence of the primary treatment is a short-term treatment with a strong energy flow, 15-20 times more than is required in the chosen method. Short-term processing is carried out in multistage, increasing, continuous and decreasing modes, respectively.

During the drying process, various methods of exposure to moisture should be studied, which should be evaporated at the lowest possible temperature, in the shortest possible time and with the lowest energy consumption. The most common methods of short-term primary exposure to raw materials in the IR, IR and

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IR-IR ranges, their effect on the moisture content of the product, evaporation under the influence of hot air and IR rays, the search for optimal pumpkin drying mode and constructive recommendations for its implementation.

The dry product yield depends on the number of solid substances in the original product. Butsolid substancesis primarily a structure, consisting of minerals and cell. Dissolved or chemically combined proteins, carbohydrates, amino acids, minerals, vitamins, etc. Remain in the dried substance.

Cascade drying

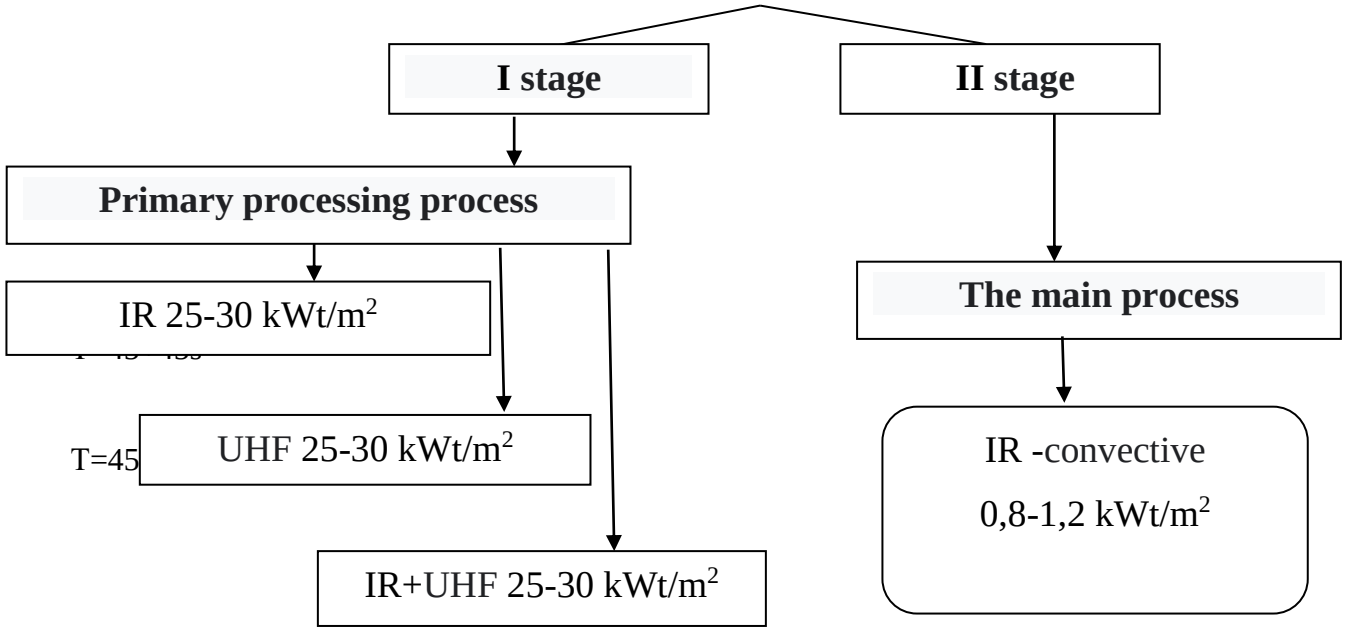

Fig. 1. Cascadedrying.

In fig. 1 shows an analysis of the mass fraction of residual moisture in a sample without pretreatment for all three types of pretreatment and convective drying.

Drying continued until the mass fraction of residual moisture did not meet the standard requirements, the initial treatment lasted 90 s - 45 s - 60 s - 45 s in a pulsed mode, the main process is IR convective drying.

The quality of the drying object is influenced by the technological preparation operations: the shape of the cut and the time of the initial heat treatment.

The pumpkin was taken as a melon production object. Preparing it for drying, it is cut into pieces of different shapes: a column, a circle, a cube and a feather. The shape and size of the parts have a good effect on the drying speed as well as the efficiency of the dryer. As the thickness of the pieces of food decreases, the dehydration time decreases, and the recovery time of the dried product during processing in the kitchen increases [1].

If the product is cut into small pieces, the solidification on the surface will be negligible. Intensification of the drying process improves the quality of the dried product and reduces the loss of vitamins and other valuable nutrients. However, the thickness of the pieces can be reduced to a certain size (2 mm), because if you cut them even thinner, a large number of pieces of vegetables are formed.

It is preferable that the dried products are cut into cubes and flakes, since such product mixes well in mixtures, is well dosed in soft packages in vending machines and has a beautiful appearance.

The number of small particles in the crushed raw material should not exceed 5-8%. The proliferation of small parts degrades the drying conditions and leads to excessive losses, as the yield of the dried standard product decreases and the consumption of raw materials increases. It is also impossible to have unevenly cut, glued or incompletely cut pieces of width and thickness, since the correct drying regime is violated, the product dries unevenly, resulting in excessive labor costs for sorting and additional drying of large pieces

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that do not dry well. in the dryer. The cut surface should be smooth, smooth, which will lead to less destruction of untreated tissue and less loss of vitamin C.

Currently, among scientists and specialists in the field of drying agricultural products, there are various conflicting opinions about the effectiveness of the use of heat treatment before drying.

On the one hand, steam blanching or hot water treatment is the main condition for eliminating lipid hydrolysis and oxidation, which reduces the color, taste, odor, activity of vitamins, the rate of reduction, mainly oxidative enzymes - oxidase during decomposition and drying and subsequent storage. On the other hand, it is clear from multistage researches that blanching is not necessary.

A negative factor in the heat treatment of raw materials is the partial washing out of dissolved substances (sugars, minerals, acids, etc.) before drying and the loss of water-soluble vitamins.

During the blanching process, pasteurized starch and gelled pectin enter the intercellular space and close the pores, making it difficult to lose moisture during drying. There is also a loss of colorants during the initial heat treatment, which negatively affects the quality of the finished product [2-5].

Research has shown that blanching is not required if infrared heating is used in the primary processing. Volumetric and deep infrared heating creates a sufficiently high temperature (70–80 ^{0}C) inside the product particles during the first stage of drying. This temperature itself has a blanching effect. As the drying time decreases, the core temperature of the food also decreases and dries to the desired state.

The caps are brought to the enterprise, accepted, and the average sample per batch is taken. On the sorting machine it is divided into varieties, on the sorting machine it is sorted by size (Fig. 2). Then the raw materials unsuitable for production are checked on an inspection conveyor and washed in the washing machine. Slicing is cut on a machine (2-4 pieces, depending on the order) and the initial heat treatment in 5-10% NaOH solution is carried out in a blanching machine at a temperature of 80-90 ^{0}C for 1-3 minutes.

Then it is sent to an infrared convection dryer. The drying process is carried out in a drying apparatus. The design of the dryer differs from other drying devices in that the spiral, IR lamps, fans (suction and drive), sieves inside the insulated pipe are important.

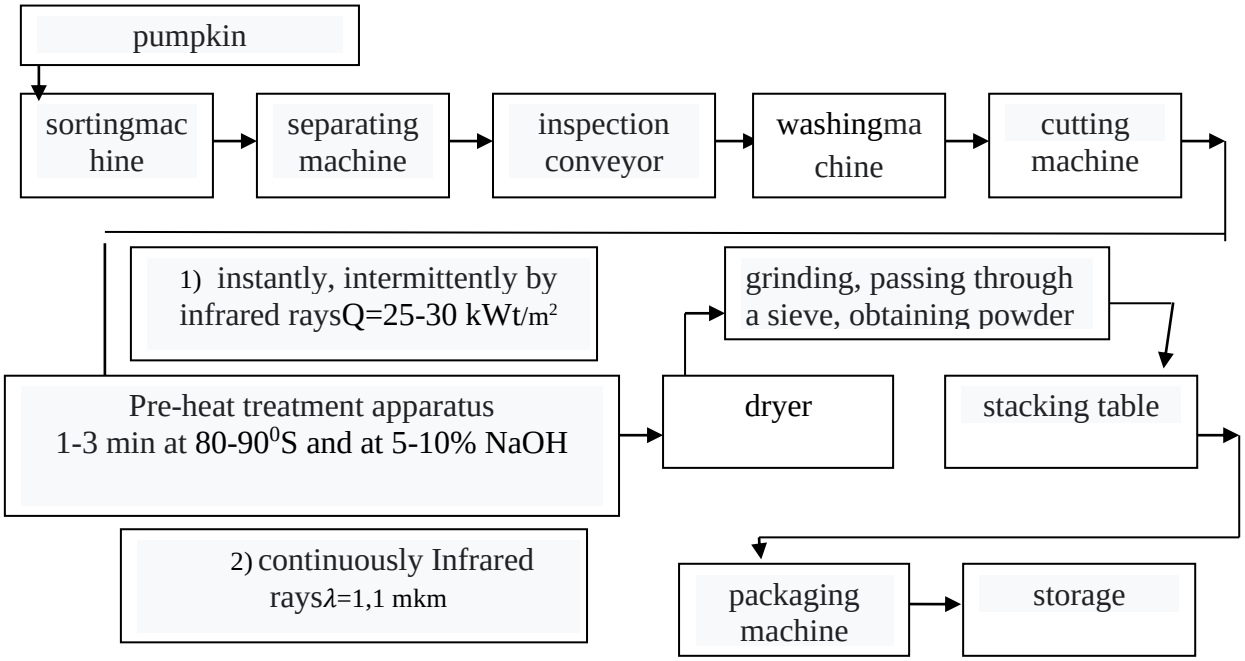

Fig. 2. Technological scheme.

This apparatus, firstly, is pulsed for a short time, continuously intermittent IR rays with a heat flux density Q = 25-30 kW / m^2 (to destroy the cell structure), and secondly, the material is continuously irradiated with infrared lamps at l = 1, is processed at a wavelength of 1 μm (to remove moisture from the material) [6-9]. Then it is crushed, sieved and ground into powder. The finished product is separated on the

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table for placement (non-standard) and packed into cartons or boxes using a packing machine and sent to the storage.

Conclusions.

Methods of primary processing of pumpkin before its final drying have been studied and, based on the analysis; the method of infrared convective drying has been selected.

The technology of processing pumpkin and making powder from it is described.

List Of Used Literature

1. SafarovZh.E., SultanovaSh.A., Zhumaev B.M., AkhmedovSh.I. Redistribution of bioactive substances in drying processes. // International Agricultural Journal. Moscow, 2016. No. 5. -P.51-52.
2. Belik V.F. Melons and gourds. 2nd ed., Rev. and add. - M .: Kolos, 1975 .-271p.
3. Gorlov I.F. New in the production of food products of increased biological value // Storage and processing of agricultural raw materials. - 2005. - No. 3. - P. 57-58.
4. Dzhuraev Kh.F., ChorievA.Zh., Artikov A.A. On the issue of moisture distribution during drying of lamellar, colloidal-capillary-porous products, on the example of thinly sliced melon // Storage and processing of agricultural raw materials, -Moscow, 2002, No. 7. - P. 70-72.
5. ChorievA.Zh. Improvement of the melon drying process based on modeling and optimization of unconventional heat supply: Dis…. Cand. tech. sciences. - Tashkent: TChTI, 2005 .- 134 p.
6. ChorievA.Zh., DzhuraevKh.F., Artikov A.A. other. Intensification of the heat and mass transfer process in the complex processing of agricultural products // Storage and processing of agricultural raw materials, Moscow, 2003, No. 11. –P.47-48.
7. ZhuraevKh.F., Dodaev K.O., ChorievA.Zh. Melon’s processing technology // Storage and processing of agricultural raw materials. - Moscow, 2001. - No. 9. - P. 52.
8. ZhuraevKh.F., Dodaev K.O., Babayarov R.A., ChorievA.Zh. Features of processing of melons and gourds. //Magazine. Food industry. -Moscow, 2002. -№11. -FROM. 40-41.
9. O.B. Samadov, Sh.K. Tukhtaev, A. Zh. Choriev, K.O. Dodaev, M. Ch. Tultabaev. Investigation of changes in pumpkin moisture during infrared convective drying // Bulletin of the Kazakh University of Technology and Business. Kazakhstan, No. 4, 2019.-p.47-51.