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STUDY OF INFRARED LIGHT DRYING PROCESSES OF FRUITS AND VEGETABLES

ИЗУЧЕНИЕ ПРОЦЕССОВ СУШКИ ФРУКТОВ И ОВОЩЕЙ ИНФРАКРАСНЫМ СВЕТОМ

MEVA VA SABZAVOTLARNING INFRAQIZIL NURLARNI QURITISH JARAYONLARINI O‘RGANISH

Kholdorov Muhammadkarim
Doctoral student of Fergana State University

Abstarct

This article will tell about the samples taken as an experiment. Today, there are several types of dried fruits and vegetables, and the quality of dried products varies. The drying method and all the samples obtained in this article are dried in an infrared drying device. The difference between samples obtained using this device and samples dried by other means is that the fruits are a microbiologist that is useful to the human body.

Аннотация

В этой статье мы расскажем об образцах, взятых в качестве эксперимента. На сегодняшний день существует несколько видов сушеных фруктов и овощей, и качество сушеных продуктов варьируется. Метод сушки и все образцы, полученные в данной статье, высушиваются в инфракрасном сушильном аппарате. Отличие образцов, полученных с помощью этого прибора, от образцов, высушенных другими способами, заключается в том, что плоды являются полезными для организма человека микробиологами

Annatatsiya

Ushbu maqolada tajriba tariqasida olingan namunalar haqida ma'lum qilinadi. Xozirgi vaqtda meva va sabzavotlarni quritishning bir qancha turlari mavjud bo`lib, quritilgan mahsulotlar sifati xam turlicha bo`ladi. Ushbu maqoladagi quritish usuli va olingan barcha namunalar infraqizil quritish qurilmasida quritilgan. Ushbu qurilma yordamida olingan namunalar va boshqa usullar bilan quritilgan namunalar o‘rtasidagi farq shundaki, mevalar inson organizmi uchun foydali bo‘lgan mikrobiologik moddalarni saqlab qoladi. Shu bilan birga chang, zararli zambrug`larning mevaga kirib borishiga va uning xususiyatlarini o‘zgartirishiga yo‘l qo‘ymaydi.

Key words: *drying process, functional ceramics, quartz tube, heat power, heat transfer, convection.*

Ключевые слова: *процесс сушки, функциональная керамика, кварцевая трубка, тепловая мощность, теплообмен, конвекция.*

Kalit so‘zlar*: quritish jarayoni, funktsional keramika, kvarts trubkasi, issiqlik quvvati, issiqlik uzatish, konveksiya.*

INTRODUCTION

Currently, as a result of the rapid development of science and technology, many improved devices are being developed in household conditions and in the agricultural industry. As a result, the human factor is reduced and most of the work is done technically. This, in turn, creates convenience for people and encourages them to save time and money.

Such technical progress has a positive effect on the food industry. Today, in the food industry as well, due to the increasing demands of consumers and the labor market, the demand for the introduction of innovative technologies is increasing.

In particular, in recent years, drying equipment using infrared rays has been widely used not only in large industrial zones, but also in small family enterprises and cluster and farmer associations. Therefore, the positive aspects of drying in this way are that the product retains its original natural quality well and the consumption index is high. Due to this, the demand for such devices is increasing today. As a result, manufacturers continue scientific research on further improvement of these devices.

In particular, the technical and economic characteristics of the infrared drying devices of various designs recommended for drying the fruit and vegetable drying device described in this

article, the biological effect of infrared radiation on fruit and vegetable products and living organisms have been thoroughly analyzed. Until now, the scientific articles on drying have mainly focused on the optimization of the technical characteristics of drying devices and the physical processes observed in the construction of products, the physical mechanisms of the interaction of infrared rays with products, as well as the process of the interaction of the radiation spectrum. not studied.

RESULTS AND DISCUSSION

In dryers recommended for drying fruits and vegetables, infrared radiation is obtained by heating the ceramic material with the help of electric coils. For this, a glass tube made of quartz is selected, a spiral is placed inside it, and a specially prepared ceramic material is placed on the surface of the tube. The ceramic material emits infrared radiation when heated by a spiral electric current. The chemical composition of effective ceramic materials used to generate radiation should be selected in such a way that the infrared radiation spectrum of such materials should fully correspond to the region of the absorption spectrum of water molecules.

Figure 1. Drying process and obtained products in an infrared radiation device based on functional ceramics

The main task of the device is to reduce the humidity of agricultural products without causing mechanical damage to the appearance of the product, without changing the composition of the product.

The temperature and relative humidity in the working area of the device are monitored at 3 points (distances of 300, 400 and 500 mm) of the working area, depending on the type of the sample, so that the temperature and relative humidity of the air do not damage the fruits and vegetables of the sample being dried. The appearance and sampling process of the functional ceramic coated glass radiator:

Figure 2. Front view of the infrared radiation device based on functional ceramics

The temperature in the working zone of the device was between 50 ^{0}C and 65 ^{0}C, and the relative humidity was 40-45%. In the monitoring, infrared thermometer devices in the form of a gun "Victor 303 B (IR thermometer)" were used with the help of a thermocouple sensor that simultaneously determines the temperature and relative humidity of the air "Operation manual for temp. & humidity meter".

Focusing on the monitoring results, it shows that the temperature of the working zone of the device is around 55 ^{0}C, and this temperature does not adversely affect the product quality index or structural changes. In addition, the feature of emitting infrared rays during drying of the product prevents the formation of mold, which means that the sterilization process occurs naturally.

At the same time, drying the product with the help of sunlight, light and ultraviolet rays, which have a higher frequency and energy than infrared rays, remove water molecules from the composition of the product and also have a positive effect on chain bonding. Decomposition of organic hydrocarbon molecules in which the product is present, disruption of the structure of the product molecule, which changes the biological composition of the product and, simply put, loses its natural state.

When the product is dried under the influence of infrared radiation, it interacts only with water molecules and displaces them from the composition of the product. Organic hydrocarbon molecules of the main component are not affected by infrared radiation. Therefore, they retain their original molecular structure and the natural biological composition of the product remains unchanged. This is because infrared rays have a lower frequency and energy than ultraviolet rays. Therefore, they are not enough to break down the constituent molecules.

Information about fruits, vegetables and agricultural products dried in an infrared drying device

No	Product name	The height of the product in the container (cm)	Build time (hour)	Operating temperature of the device °C	Tension Volt	Weight before drying kg	Weight after drying kg	Lost weight kg
1	Onion	4	12	68.4	210	4.035 gr	345 gr	3690 gr
2	Dill	4	3.5	63	210	-	-	-
3	Cherry	3.5	36	65	213	3,400 gr	815 gr	2585 gr
4	Apple (2.2 mm thick)	4	10	61	205	3400 gr	520 gr	2880 gr
5	Pear (2.2 mm thick)	3.8	14	58	210	3520 gr	546 gr	2974 gr
6	Banana (2.5 mm thick)	3.6		62	217	6000	820 gr	5180 gr

CONCLUSION

The temperature is stable when drying fruits, vegetables and agricultural products under the influence of infrared rays based on functional ceramics. Due to the absorption of radiation on the surface of the product, it dries evenly and is not mechanically damaged. At the same time, the preservation of microbiological useful substances contained in the products dried in the infrared drying device, their environmental cleanliness, are significantly different from the products dried in a natural way. In addition, the product's short manufacturing time allows it to preserve the available vitamins and dry it quickly and in large quantities.

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