EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
UIF = 8.1 | SJIF = 5.685 www.in-academy.uz

IMPROVING INFRARED DRYING OF AGRICULTURAL PRODUCTS

Ungarov Azizbek Abdumo'min o'g'li
Xudayberdiev Rustamjon Xasanovich
Gulistan State University
https://www.doi.org/10.5281/zenodo.10443903

ARTICLE INFO

Received: 22th December 2023
Accepted: 29th December 2023
Online: 30th December 2023

KEY WORDS

Drying process, fruits and vegetables, economy, energy and resources, factors, gas phase.

ABSTRACT

Today, on a world scale, improving the scientific basis of innovative models of resource-saving techniques, technologies and management systems that preserve the chemical composition, physico-chemical properties, structure, biologically active substances and taste of fruits and vegetables during drying, new methods of calculating the drying process and mathematical development of models, study of heat and mass exchange processes in a wet body and carrying out scientific research on the calculation of structural dimensions of the apparatus is an urgent problem.

INTRODUCTION: In recent years, in the Syrdarya region of our republic, attention has been paid to the development of high-quality products, in particular, new types of energy-saving technologies at agricultural processing enterprises. In the Strategy of Actions for the further development of the Republic of Uzbekistan, the tasks of "...reducing the consumption of energy and resources in the economy, widely introducing energy-saving technologies into production..." are defined. In this regard, among other things, during the drying process of plant products, scientific research aimed at preserving the necessary components of the product, saving time and energy, and creating effective drying methods and technologies is of great importance.

No. PF-5388 of the President of the Republic of Uzbekistan dated March 29, 2018 "On additional measures for the rapid development of fruit and vegetable growing in the Republic of Uzbekistan", No. PQ-3680 dated April 26, 2018 "On measures to further ensure food security of the country", No. 24 dated January 12, 2018 "On measures to create effective mechanisms for applying scientific and innovative development and technologies to production" No. PQ-2716 of January 6, 2017 "On additional measures to develop the organization of storage and deep processing facilities for fruit and vegetable products in 2017-2018", dated February 7, 2017 To a certain extent, this study serves the implementation of the tasks defined in the decree and decisions of PF-4947 No. does.

MAIN PART, RESULTS: Factors affecting the drying process include temperature, material moisture, air concentration and pressure. The factors that increase the drying speed are as follows: a) raising the process temperature; b) drying - lowering the pressure in the space

EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
UIF = 8.1 | SJIF = 5.685 www.in-academy.uz

above the lying material; c) reducing the moisture content of the heat conductor; g) increasing the speed of heat transfer over the material; d) material mixing during the process.

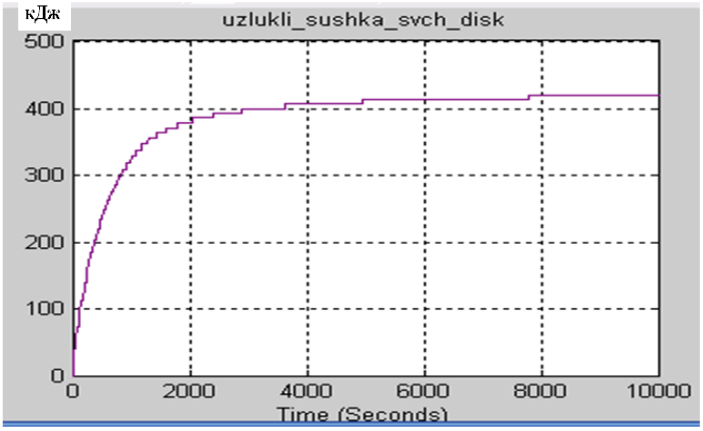


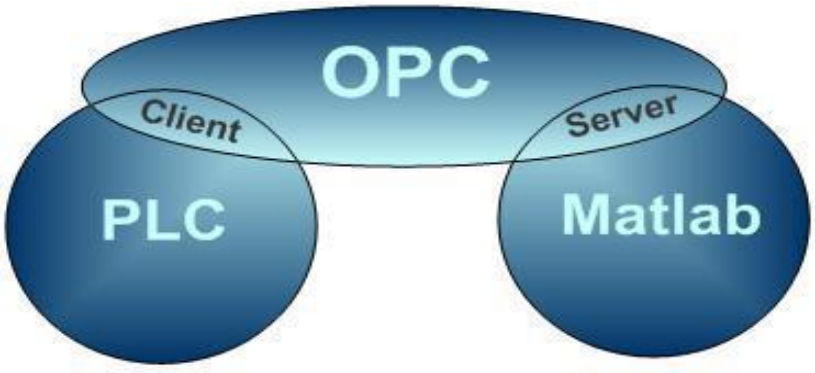
Figure 1. A step curve showing the work done to dry the material (kDj).

During the experiments, the values of the main input parameters for the drying of capillary-porous plant materials were determined, and the parameters of the selected equipment were selected in accordance with the parameters of the standard device. The energy capacity of O'YuCH was 0.9 kW, the volume of the apparatus was 0.0204 m3, the drying material with dimensions of 5x10x50 mm was placed on the rotating plate of the chamber.

The drying parameters of the material being dried are as follows: weight -0.2 kg, initial humidity - 86%, initial temperature - 30 oC.

It corresponds to the average summer air temperature of Tashkent city.

The material to be dried was divided into parallelepiped-shaped pieces of 5-10-50 mm, placed in the drying chamber, and 1.3 l/sec of air containing 2% moisture was supplied. The difference between the temperature of the material being dried and the equilibrium temperature was chosen as a characteristic force for calculating the drying process of the material based on the conditions of the moisture content in the gas phase. The mass transfer coefficient was formulated based on the results of the studies of other researchers discussed in the previous chapters.



Despite the fact that many researchers came to the conclusion that the sorption process for most sorbents (including polymers) cannot be explained only by the adsorption mechanism, the absorption process still does not have sufficient theoretical foundations. In many cases, low-temperature substances interact with substances in the form of vapors. At this time, along with the adsorption processes, the partial dissolution of the sorbent can also occur.

Mathematical and computer expressions were developed for each of the 4 factors influencing the driving force of the drying process. Balance indicators were determined based on the sorption-desorption and evaporation properties of the materials during the drying of plant products.

Mathematical and computer models of the drying process were developed at the level of the material being dried, at the level of the gas phase and the hierarchy of the heater. Mathematical and computer models of the calculation of the interphase mass exchange coefficient in the two-phase system during the drying of materials were proposed.

CONCLUSION: The method of analyzing the drying apparatus and process using infrared rays has been developed. It is recommended to create a computer model of the drying process by studying the drying apparatus into hierarchical steps and quasi-elements and optimal calculation of the whole process and the object.

The adequacy of the mathematical-computer model of the drying process of polys plant products was determined by experimenting with samples of different types and sizes in different regimes. Based on this, a method of finding the mass transfer coefficient between the gas and solid phase was created, taking into account the sorption-desorption characteristics of the material, using the inverse solution method in mathematics.

Mathematical-computer models representing the processes of material and gas phase quasi-elements in hierarchical stages of the drying process and the balance between them have been created. It was found that taking the temperature of the product as the driving force in the calculation of the drying process facilitates mathematical expressions and modeling work.

References:

1. Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 on the Strategy of Actions for further development of the Republic of Uzbekistan.
2. Decree of the President of the Republic of Uzbekistan dated April 26, 2018 No. PQ-3680 "On measures to further ensure food security of the country".
3. Egamberdiyev, P. L., Raxmatullayev, R., Ungarov, A., & Jo'lbekov, I. (2023). UZUMNI MUZLATIB ISHLOV BERISHNI SUSLADAGI QAND TARKIBIGA TA'SIRINI O'RGANISH. Евразийский журнал технологий и инноваций, 1(6 Part 2), 127-129.
4. Ungarov, A., & To'raqulova, O. (2023). QISHLOQ XO 'JALIGI MAXSULOTLARINI INFRA QIZIL NURLARI YORDAMIDA QURITISHNI TAKOMILLASHTIRISH. Евразийский журнал технологий и инноваций, 1(10), 38-40.
5. Ungarov, A., & Ergashov, A. (2023). QISHLOQ XO 'JALIGI MAHSULOTLARINI QURITISH DAVRIDA ENERGIYA TEJAMKOR TEXNOLOGIYALAR YORDAMIDA QURITGICHLARNING ISH UNUMDORLIGINI OSHIRISH. Евразийский журнал медицинских и естественных наук, 3(1 Part 1), 24-27.
6. Jo'lbekov, Ibrohim, et al. "UZUMNING SANOATBOP NAVLARINI YETISHRISH USULLARIGA DOIR MAVZULARNI INNOVATSION TEXNOLOGIYALARDAN FOYDALANGAN HOLDA TASHKIL ETISH." Евразийский журнал технологий и инноваций 1.6 (2023): 89-93.
7. Khujakulov, Fayzi, et al. "The Dependence of Grape Feeding on the Productivity Indicator and Harvest Quality of Rizamat and Large Dry Varieties." Journal of Advanced Zoology 44.S2 (2023): 1970-1977.

8. To‘xtamishev, Sayitkul Saydullaevich. "MEVA O ‘SIMLIKLARINING INDIVIDUAL RIVOJLANISHI." RESEARCH AND EDUCATION 2.4 (2023): 51-56.
9. Tukhtamishev S., Khudayberdiev R., A’zamov A. STUDY OF THE CHEMICAL COMPOSITION OF MELON PEEL //International Bulletin of Applied Science and Technology. – 2023. – T. 3. – №. 12. – C. 105-107.
10. Tukhtamishev S. WEIGHT-DIMENSIONAL AND VOLUMERIAN INDICATORS AND PHYSICAL AND MATHEMATICAL PROPERTIES CHARACTERISTIC FOR CENTRAL ASIAN VARIETIES OF MELONS //Journal of Agriculture & Horticulture. – 2023. – T. 3. – №. 11. – C. 9-12.
11. Qabulov I., Yuldosheva D. DETERMINATION OF IMPURITY AND MOISTURE OF RECEIVED COTTON AND CONTROL OF THE QUALITY OF COTTON STORED AT THE PREPARATION POINT //International Bulletin of Applied Science and Technology. – 2023. – T. 3. – №. 6. – C. 745-748.
12. Ergashov A., Maxmudov I. KECH PISHAR OLMA HOSILINI TURLI OMBORLARDA SAQLASHNING O ‘ZIGA XOS XUSUSIYATLARI //Евразийский журнал академических исследований. – 2023. – T. 3. – №. 2 Part 2. – C. 108-112.
13. Maxmudov I., Yuldosheva D. QISHLOQ XO ‘JALIGI MAHSULOTLARNI QURITISHNING ZAMONAVIY USULLAR SAMARADORLIGINI TAHLIL QILISH //Евразийский журнал технологий и инноваций. – 2023. – T. 1. – №. 6 Part 2. – C. 110-113.
14. Egamberdiyev, P. L., Xojaqulov, F., Jo‘lbekov, I., Maxmudov, I., & Qabulov, I. (2023). INTENSIV BOG ‘DORCHILIKNING ASOSIY ILMIY RIVOJLANISH ISTIQBOLLARI. Евразийский журнал технологий и инноваций, 1(6 Part 2), 105-109.
15. Tokhtakoziev A., Bababekov U. A STUDY OF THE WORKING PROCESS OF A TWO-TRACK HARROW //Journal of Agriculture & Horticulture. – 2023. – T. 3. – №. 10. – C. 64-68.
16. Bababekov U. J. et al. Justification of the width of the tooth spacing and the distance between the rows of teeth of the ripper for the harrower //BIO Web of Conferences. – EDP Sciences, 2023. – T. 71. – C. 01057.
17. Qurbanov, E., Ungarov, A., Zafarova, N., & Kholmatova, O. (2023). DEVELOPMENT OF SELECTION AND GROWING TECHNOLOGY OF NUT VARIETIES FOR SIRDARYA REGION. International Bulletin of Applied Science and Technology, 3(6), 447-450.