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DRYING SWEET BELL PEPPERS IN A DRYING UNIT USING HEAT PIPES

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Annotatsion

The article presents the drying of sweet bell peppers in a drying unit using heat pipes, as well as an analysis of the influence of the main factors on drying such as temperature, drying time and the thickness of the sweet bell pepper layer. Changes in product moisture during drying were determined, and the drying rate of sweet bell peppers was studied. The optimal drying regime for sweet bell peppers in a heat pipe dryer was determined.

Keywords

drying, factor, experiment, heat pipes, sweet bell pepper, thickness, temperature, speed, humidity.

Introduction

Many countries around the world are engaged in the cultivation of fruits and vegetables. This is particularly common among farmers and individual households. Therefore, the challenge is to process fruits and vegetables, i.e., localize agricultural production. Mini factories for processing and preserving fruits and vegetables through canning, drying, and packaging, aimed at developing small and medium-sized businesses. To grow the business, it's necessary to reduce product costs while minimizing fruit and vegetable losses. Reduce energy and transportation costs for fruits and vegetables to large processing plants. Taking into account the above, this leads to a reduction in overall distribution costs. Therefore, studying and analyzing agribusiness infrastructure, Ensuring the long service life of the equipment of such mini-factories is one of the tasks in achieving the goal of producing high-quality, competitive products on the world market. [1; Ps.112., 3; pp.43-50., 4; pp. 116., 7; pp.248., 10; pp.105-113., 16; pp. 116–121., 20; pp.243., 22; 88-91b., 24; 201-202 b.] In the food industry, drying fruits and vegetables is considered one of the most important and complex processes in mass transfer. Dried fruits and vegetables from Central Asia are in high demand on the global market due to their high-quality properties. the level of vitamin preservation, color, shelf life, saturation with fructose and sucrose, medicinal properties [5; Ps. 36-46.,8; 012170.,21; 107-111 b.].

2. Purpose of the study.

The purpose of the study is to determine the kinetics of the drying regime of fruits and vegetables in a drying unit using heat pipes, using sweet Bulgarian cheese as an example. pepper and determination of influencing factors such as product layer thickness, air temperature, drying time, air speed and humidity of the object under study.

3. Methods and Materials

In agribusiness today, approximately 20-30% of produce is lost during the growing, storage, processing, and delivery process, significantly impacting entrepreneurs' overall income. In connection with these problems, we conducted research on the possibility of extending the shelf life of fruits and vegetables for more than 1-2 years and, along with this, conducted a study on improving the quality, environmental friendliness and ensuring natural storage conditions for dried fruits and vegetables. [9; p.348-349., 19; p.333-336.]

Drying technology plays a vital role in the long-term storage of fruits and vegetables. Drying is an advanced process that depends on many factors. For example, product moisture level, dimensions, dry matter content, temperature, air speed, and more. Taking this into account, we've developed an improved laboratory model. Energy-efficient solar-powered drying equipment using heat pipes for drying fruits and vegetables. A number of scientific studies have been conducted on the drying process of fruits and vegetables. Energy-efficient solar-powered drying equipment using heat pipes for drying fruits and vegetables. A number of scientific studies have been conducted on the drying process of fruits and vegetables. which are substantiated in the scientific experimental work on drying sweet bell peppers. [2; Ps. 151-166, 6; Ps.63-67, 11; p.98-109, 12; p.138-141, 13; p.63-66, 14; p.681-687, 15; p.461-467, 17; 452-467, 18; p.80-83, 23; p.80-84.]

4. Results and Discussion

The results of the scientific study showed that initial moisture content, layer thickness, temperature, and biological lattice play a significant role in drying sweet bell peppers. When drying sweet bell peppers, the results obtained in a drying unit using heat pipes are shown in Figure 1 and Figure 2.

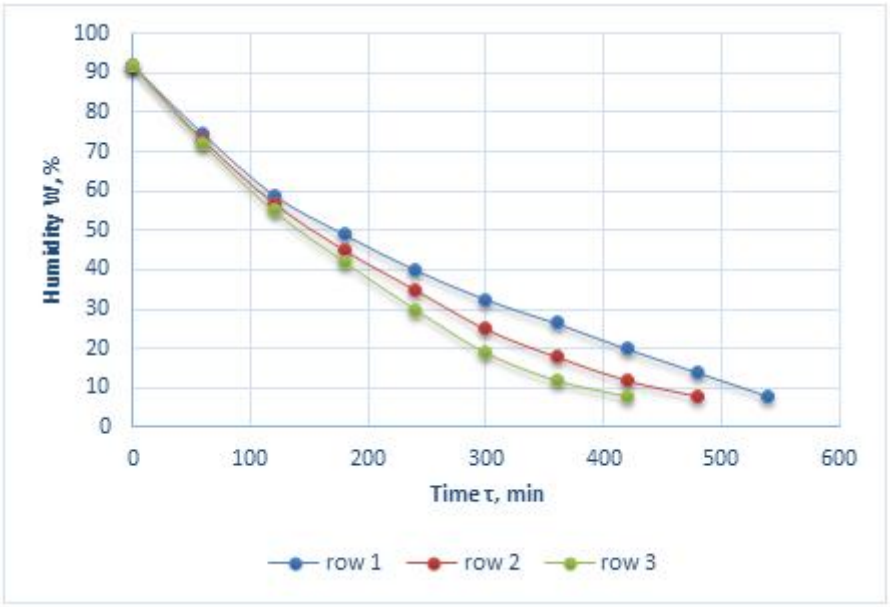

Figure 1. Moisture content curves for sliced sweet bell peppers. At a temperature of 55-65°C, layer thickness is 3-5 mm. (1 - air speed υ = 2 m/s, 2 - air speed υ = 2.5 m/s, 3 - air speed υ = 3 m/s.)

Based on laboratory experiments, the curves shown in Figure 1 were obtained during the drying process of sweet bell peppers in a drying unit using heat pipes by the convective method. At 92% humidity, a drying chamber temperature of 55-60°C, a layer thickness of 3-5 mm, and an air speed of 2 m/s, drying lasted 8 hours. The final humidity reached 12%. At an air speed of 2.5 m/s. The drying process lasted 6.8 hours and the final moisture content of the product reached 12%, and at an air speed of 3 m/s the drying process lasted 6 hours and the final moisture content of the dried sweet bell pepper reached 12%.

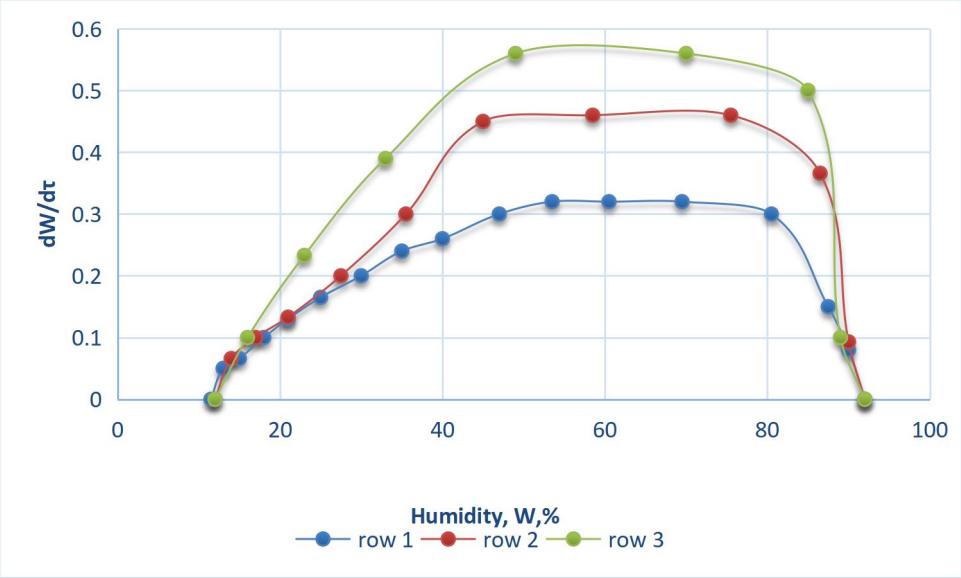

Figure 2. Drying rate curves for sliced bell peppers.

Figure 2 shows the drying rate of bell peppers at a temperature of 55-65°C, layer thickness of 3-5 mm, where 1 is the air velocity at υ=2 m/s, 2 - air speed at υ = 2.5 m/s, 3 - air speed at υ = 3 m/s. This shows that the drying rate of sweet bell peppers complies with the laws of drying kinetics.

5. Conclusions.

Based on theoretical and experimental scientific research, the optimal drying mode has been determined: the temperature in the drying chamber for sweet bell peppers is 55-650C, the product layer thickness is 3-5 mm, the air speed is 3 m/s, The entire drying process lasted 6 hours, and the equilibrium moisture content of the sweet bell peppers was 12%.

When drying sweet bell peppers, the dried product is maintained at 0.5 hours at room temperature. The product's moisture content is then measured, and it should be 10-15%. If these targets are met, the dried product can be packaged and sold. To intensify the drying process of fruits and vegetables, it is recommended to pre-treat them with infrared rays, ultra-high-frequency currents, ultrasound and electromagnetic pulses before drying, which can then reduce the drying time.

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