

STUDY OF CHANGES IN MOISTURE IN LAYERS OF MELON SEEDS DURING THE DRYING PROCESS

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Abstract. The objects were the melon varieties Olakhamma and Gulyabi Khorezm. Experimental studies were conducted on the treatment of seeds of these varieties with IR rays in a pulsed mode, in solutions with an initial and sugar concentration of syrup of 5%, 10% and 15% and drying by the IR convective method. Graphs of changes in melon pulp moisture over time were obtained.

Keywords: melon, pulp, sugar syrup, moisture, time, temperature, heat, pre-treatment, IR convective drying.

Introduction. In our republic, an average of 10 million tons of fruits and vegetables are grown annually. A certain part of the product is dried for preservation.

Despite the availability of sufficient raw materials, the dried products produced cannot satisfy the demand for export to Europe. This is due to the lack of effective drying equipment and resource- and energy-saving technologies.

Melon is a valuable food product. Fresh fruits are mainly eaten as a very nutritious delicacy. Melon (*Cucumis melo* L.) belongs to the *Cucumis* L. species, which belongs to the pumpkin family. Melon is a round cucumber with deviations in the form of a spindle, cylinder and ovoid. The surface is segmented, green and dark green, yellow, with a net - partial or dense, not rough. The texture is crisp, sluggish, juicy and sweet. Sugar content from 9 to 18%.

The chemical composition of melon includes the following components as a percentage of raw weight:

dry matter - from 9.5 to 15.6%;

fructose - from 0.75 to 2.02%;

glucose - from 1.1 to 2.8%;

sucrose - from 4 to 8%; ash - from 0.59 to 0.71%;

organic acids - from 8 to 56 mg%;

pectin substances - from 0.19 to 0.38%;

fiber - from 0.2 to 0.3%;

starch - from 0.06 to 0.11%.

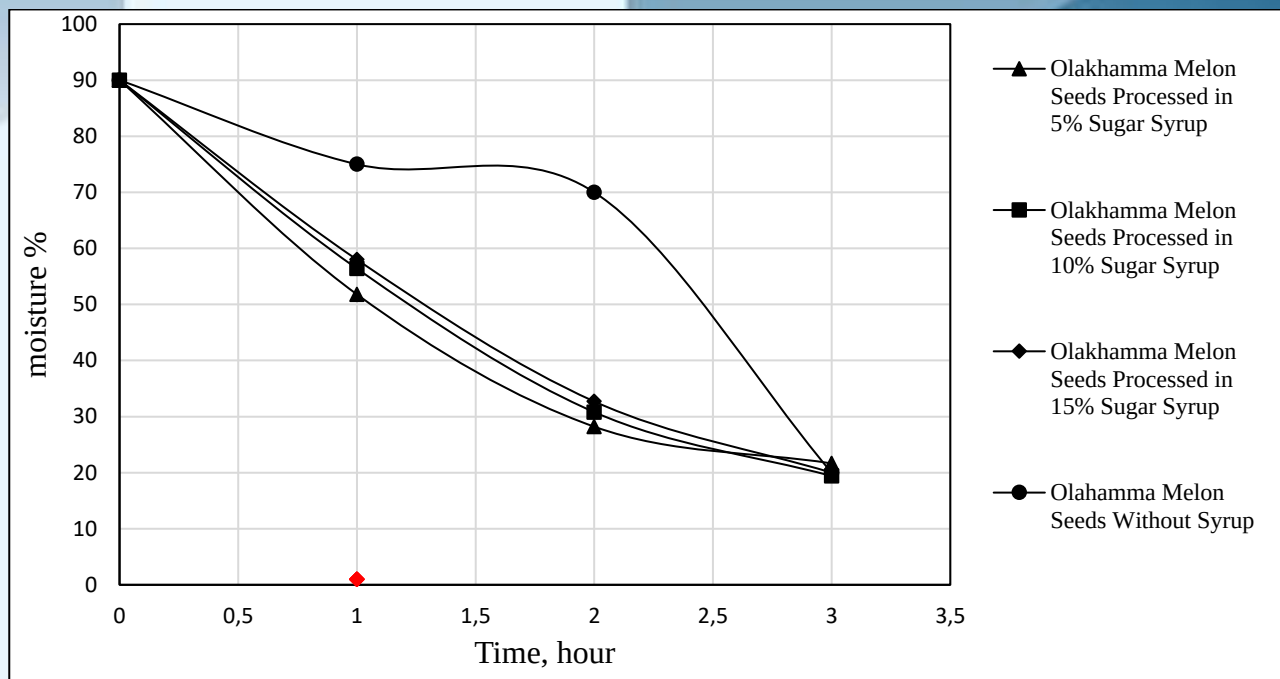
The problems of drying melon in sliced form, moistening the product and its heat treatment have been solved. The thermal mode of raw material processing and the features of the initial technological processes taking into account the thermal conductivity of capillaries, the integrity of which is violated under drying conditions, have been considered. A method for drying melon has been proposed. They were subjected to preliminary heat treatment using IR rays and dried in an IR convection dryer at a temperature of 60-70°C for 4-8 hours [1,2]. Studies have been conducted on changes in the moisture content of melon and pumpkin seeds over time and its effect on product quality [3,4].

Research methodology and physicochemical methods.

Analysis and results. The temperature in the drying chamber was 60°C, the samples were dried without syrup, i.e. without pre-treatment, and processed with 5%, 10% and 15% sugar syrup. The temperature of the sugar syrup was set at 60°C, and the change in the moisture content of the samples over time was studied.

The melon varieties Olakhamma and Gulyabi Khorezm were selected as drying objects. The melon variety Olakhamma is considered a colloidal material, and the Gulyabi Khorezm variety is a colloidal-capillary material, and the change in moisture content in these materials is based on certain patterns.

Experiment 1. The initial moisture content of the Olakhamma melon kernel was 89%. With IR convective drying, the moisture content of the melon seeds decreased by 51.8% in the first hour when treated in a 5% sugar syrup solution, by 56.4% with 10%, by 58% with 15%, and by 75% without syrup, i.e. without pre-treatment (Figure 1).



$y = 7,9125x^2 - 46,603x + 90,123$ $R^2 = 0,9999$	$y = 5,55x^2 - 40,39x + 90,31$ $R^2 = 0,9993$	$y = 4,825x^2 - 38,005x + 90,295$ $R^2 = 0,9994$	$y = -8,75x^2 + 4,75x + 87,25$ $R^2 = 0,9454$
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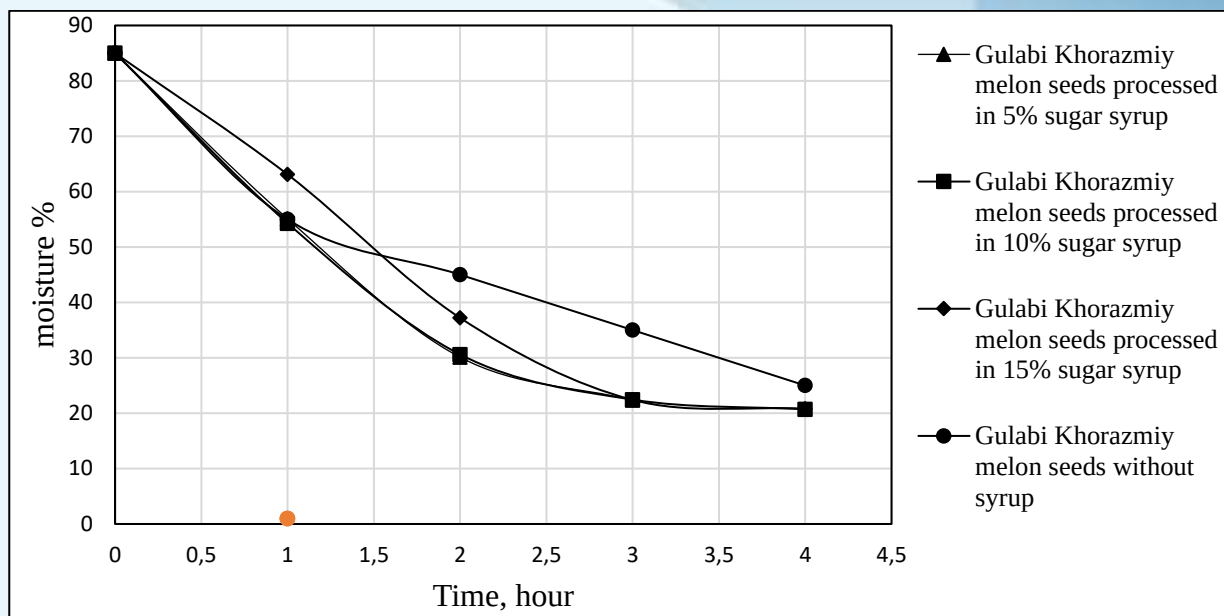
Figure 1. Change in moisture content in the core of the Olakhamma melon variety over time. Temperature in the drying chamber 60°C, temperature of sugar syrup 60°C.

Similarly, in 2 hours, the 5% solution became 28.2% cheaper, the 10% solution became 30.8% cheaper, the 15% solution became 32.7% cheaper, and the solution without syrup, i.e. without preliminary treatment, became 70% cheaper. When continuing the experiments for the 3rd hour, the residual moisture decreased from 5% to 21.7%, from 10% to 19.4%, from 15% to 20%, and without syrup, i.e. without preliminary treatment, the residual moisture decreased to 20%.

The results show that without syrup, i.e. without pre-treatment, the moisture from the melon seeds evaporated rapidly during the 1st and 2nd hours, and slowly during the 3rd hour, and the residual moisture of the dried melon standard was 20-24% for all dried samples.

Experiment 2. The initial moisture content of the melon kernel of the Gulyabi Khorezmiysky variety was 85%.

With IR convective drying, the moisture content of the melon seeds decreased to 55.1% in the first hour when treated in a 5% sugar syrup solution, to 54.3% at 10%, to 63.1% at 15%, and to 55% without syrup, i.e. without preliminary treatment (Figure 2).



$y = 5,5375x^2 - 37,908x + 85,617$ $R^2 = 0,9968$	$y = 5,2464x^2 - 37,031x + 85,193$ $R^2 = 0,9985$	$y = 3,6929x^2 - 31,681x + 86,906$ $R^2 = 0,9896$	$y = 2,8571x^2 - 25,429x + 82,714$ $R^2 = 0,9784$
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Figure 2. Changes in moisture content in the core of the Gulyabi Khorezmiysky melon variety over time. Temperature in the drying chamber 60°C, temperature of sugar syrup 60°C.

Similarly, in 2 hours, 5% syrup decreased by 30.1%, 10% syrup decreased by 30.6%, 15% syrup decreased by 37.2%, and syrup without pretreatment decreased by 45%. At the 3rd hour, the residual moisture decreased to 22.3% at 5%, 22.4% at 10%, 22.4% at 15%, and 35% without syrup, i.e. without pretreatment. When the experiments were continued for 4 hours, the residual moisture decreased to 22.3% at 5%, to 20.7% at 10%, to 20.8% at 15%, and to 25% without syrup, i.e. without pretreatment, the residual moisture decreased to 25%.

The results show that the moisture contained in the melon seeds treated with 5, 10 and 15% sugar syrup evaporated rapidly from the cells during the 1st and 2nd

hours and slowly during the 3rd and 4th hours. The dried sample treated with only 5% sugar syrup dried in 3 hours. The residual moisture content of dried melons set by the standard is 20-24%, which corresponds to the samples dried after treatment with 10% and 15% sugar syrup. The residual moisture content of the melon kernel obtained without syrup, i.e. without pre-treatment, is 20-24%, which is the standard residual moisture content of dried melons after 5 hours.

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