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Effect of Storage Methods and Periods on the Nutritional Properties of Watermelon

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Abstract: the article presents the results of research on changes in fruit quality and chemical composition when fruits of watermelon varieties and hybrids are stored in a combined method (in the open field and in a naturally ventilated warehouse). Also in the article, the advantages of this storage method are explained from a scientific point of view.

Key words: aromatic substances, field, naturally ventilated warehouse, drip irrigation, fruit quality, variety, hybrid.

Introduction

The sharp increase in the number of people on the globe, the sudden change in climate and the increase in the demand for food products as a result of the global economic crisis require the introduction of new, resource-efficient technologies that meet the demands of the present time for the intensive development of agriculture in our republic as well as in all countries.

One of the main branches of agricultural production of the Republic of Uzbekistan is policing. Watermelon is the most widespread and cultivated plant among melons crops.

Watermelon fruits are rich in vitamins, mineral salts, fibers, easily digestible sugars, flavoring and aromatic substances. Therefore, doctors recommend to eat 88 kg to 100 kg of vegetables and fruit products per person per year, including at least 5 kg of watermelon.

Watermelon fruits help to increase the vitality and activity of the body. Therefore, the issue of maintaining fruit quality for a long time remains relevant. Long-term research shows that product quality depends on cultivation technology, harvesting method, storage conditions and other factors. Harvesting is often done in violation of standards.

Solving the problem of maintaining the quality of watermelon during storage and processing can be done through the coordinated work of producers, scientific and engineering structures.

Materials and methods

The crop is not always removed from the field on the day of harvest. Therefore, studies were conducted to determine the changes in food quality and fruit quality of watermelons that were not taken out of the field on the day of harvest, as well as the changes in the fruit after 30 days of storage in a combined method.

The experiments were conducted at the experimental field of Tashkent State Agrarian University and at the private enterprise for processing and storage of rice products of RedPak LLC located in Mirzaabad

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district of Syrdarya region. Experiments 3 days + 27 days in naturally ventilated warehouse, 5 days in the field + 25 days in naturally ventilated warehouse, 10 days in the field + 20 days in naturally ventilated warehouse, 15 days in the field + 15 days in naturally ventilated warehouse, 20 days in the field + 10 days in naturally ventilated warehouse variants were carried out in four repetitions. During storage, natural weight loss and fruit quality were taken into account. The amount of major chemicals in watermelon fruits was determined before and after storage. Tasting evaluation was conducted by the tasting committee on a five-point scale.

"Shirin", "Sharq Ne'mati" varieties and "Dolbi F_1" hybrid fruits of watermelon grown under mulch under mulch were used for the research.

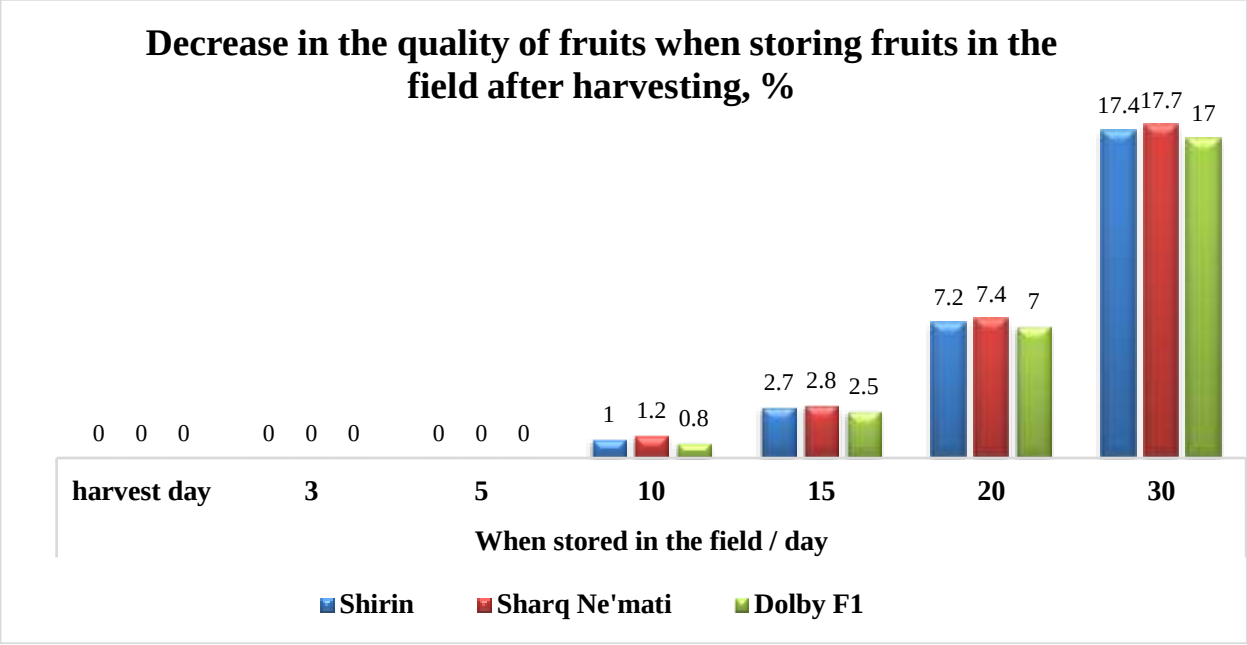
Storage of watermelon fruits in the field and in a naturally ventilated warehouse was carried out from July 30 to August 30, depending on the studied option.

In field experiments, the air temperature in July is +38...+45°C during the day, +28...+30°C at night, +32...+37°C during the day in August, +21...+26° at night S was warm. The air temperature in the naturally ventilated warehouse is +34...+37°C during the day in July, +22...+26°C at night, +30...+22°C during the day in August, +21...+16 at night °C was hot.

Research results

According to the results of the research, it was noted that the quality of watermelon fruits left in the field for 3-5 days did not change in the researched hybrids and varieties. After 10 days, this quality indicator increased by 1.0% in the "Shirin" variety, by 1.2% in the "Sharq Ne'mati" variety, by 0.8% in the "Dolby F_1" hybrid, and by 2.7% in the "Shirin" variety after 15 days, 2.8% in "Sharq Ne'mati" variety, 2.5% in "Dolby F_1" hybrid, and 7.2% in "Shirin" variety after 20 days, 7.4% in "Sharq Ne'mati" variety, "Dolby F_1" hybrid decreased by 7%. As the fruits remained in the field, the quality decreased by 17-17.4% on the 30th day (Graph1)

Graph 1



The greatest loss when stored for 30 days in the combined (open field and naturally ventilated warehouse) method (12.6% in the variety "Sharq Ne'mati", 12.4% in the variety "Shirin" and 12% in the hybrid "Dollby F_1") was 20 days in the field + naturally ventilated was found in the option of storage for 10 days, which is 2.5-2.6 times more than the control (for 30 days from the time of harvesting). When watermelon fruits were stored in the field for 3 days + 27 days, it was found that the quality of fruits decreased by 4.0-4.3% in hybrids and varieties (Table 1).

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Watermelon fruits left in the field for 30 days and stored in a naturally ventilated warehouse for 30 days differed in quality by 12.3-12.7%. These indicators depend on intensive respiration of fruits. With further storage, the weight loss stabilized and after 10 days, the weight loss index (for the example of the "Shirin" variety) was 0.14-0.18% in the warehouse and 0.62-0.86% in the field (during the day). When analyzed within days, the greatest weight loss of fruits was recorded on the first day of storage in all studied options. If we analyze the results obtained when the variety "Shirin" was stored in the combined method, the weight loss index in the naturally ventilated warehouse was 0.45%, and when it was stored in the field, it was 1.04%. The amount of nitrates in the fruit pulp (the inner part of the watermelon) did not exceed the maximum permissible level and met the medical-biological standards and sanitary-hygiene requirements.

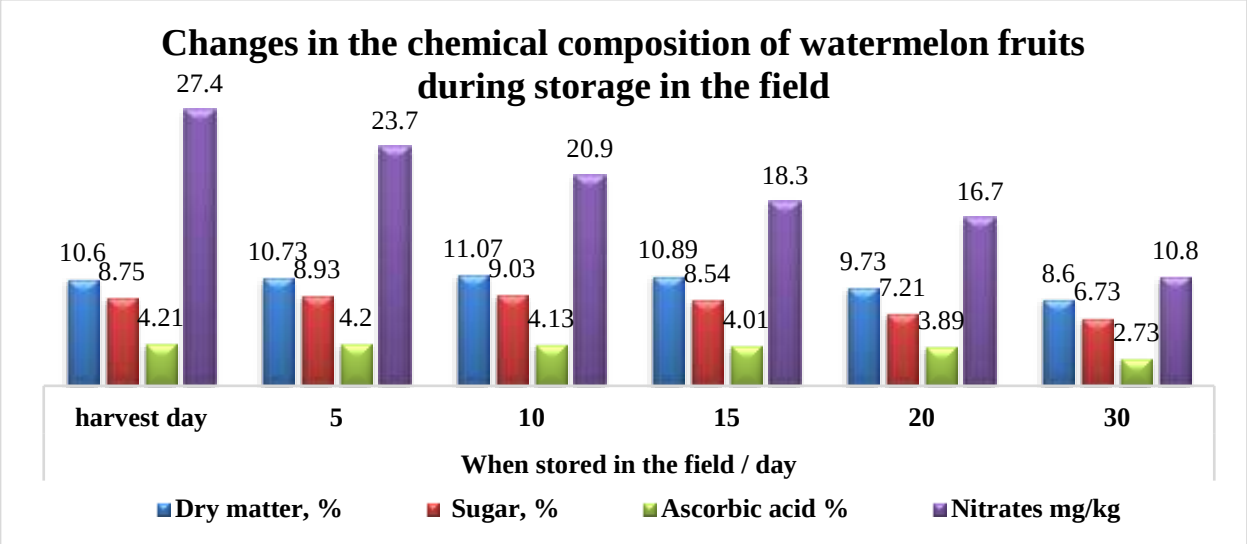
Table 1

Change in fruit quality when stored in the combined method, %

Options	Decrease in quality indicators, %		
	Shirin	Sharq Ne'mati	Dolby F_1
30 days in a naturally ventilated warehouse (control)	4,7	4,9	4,3
3 days in the field + 27 days in the warehouse	4,2	4,3	4,0
5 days in the field + 25 days in the warehouse	5,8	6,0	5,3
10 days in the field + 20 days in the warehouse	7,4	7,5	7,0
15 days in the field + 15 days in the warehouse	8,3	8,5	7,9
20 days in the field + 10 days in the warehouse	12,4	12,6	12,0

The composition and amount of chemical substances play an important role in evaluating the quality of fruits. During the first 10 days of storage of watermelon fruits in the field, the amount of dry matter and sugar in them increased, and with subsequent storage, these indicators decreased. The dry matter content of fruits stored in the field for 30 days decreased by 2%, and the sugar content decreased by 2.02%. A decrease in ascorbic acid and nitrates was also noted. Thus, at the end of storage, the amount of ascorbic acid decreased by 1.5 times, and the amount of nitrates decreased by 2.5 times (Graph 2).

Graph 2



In our research, we observed that the amount of dry matter in the combined storage method varied depending on the option. The lowest dry matter (10.03%) was recorded when stored in the field for 30 days. During 20 days in the field + 10 days in storage, the dry matter content of fruits increased by 1.5% compared to storage and 0.93% compared to the control. In other studied options, the dry matter content varied between 10.63-11.46%. During storage, sugar and ascorbic acid content decreased slightly compared to the control. The amount of nitrates decreased significantly in all variants - up to 12.9-14.7%, which is 1-1.92 times less than the control. These nitrates are a metabolic product, which supports the current idea that they are used to create organic matter (Table 2).

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Table 2

Changes in the chemical composition of watermelon fruits during combined storage (Shirin variety)

Options	Indicators			
	Dry matter %	Sugar %	Ascorbic acid %	Nitrates mg/kg
The date of harvest is under control %	10,60	8,75	4,21	27,4
5 days in the field + 25 days in the warehouse	10,63	8,32	3,64	13,1
10 days in the field + 20 days in the warehouse	11,32	8,57	3,71	14,1
15 days in the field + 15 days in the warehouse	11,46	8,73	3,66	12,9
20 days in the field + 10 days in the warehouse	11,53	8,54	3,81	14,7

Watermelon fruits met the medical-biological requirements and sanitary quality standards both in the field and in the combined method.

Conclusion

Today, there are many ways to extend the shelf life of quality products. When using the method of storing watermelon in the field and in a naturally ventilated warehouse, it is not economically beneficial to store the fruits of hybrids and varieties of watermelon in the field for more than 15 days, after 20 days the quality is 7.0-7.4%, and after 30 days it is 17.0-17.7% it became known that the quality has decreased. Based on the above, if it is not possible to export the harvested watermelon on the day of harvesting, the harvested fruits can be stored in the field, but not more than 15 days.

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