

IMPROVING THE EFFICIENCY OF INITIAL COOLING AND STORAGE OF GRAPE VARIETIES BASED ON "COLD CHAIN" TECHNOLOGY

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Annotation. This indicator, which is one of the physical indicators of Khoraki grape varieties, is an important indicator for their long-term storage in refrigerated warehouses. After all, this indicator is a factor that determines not only the characteristics of the product, but also the organoleptic characteristics, temperature and relative humidity.

Key words: grape, cell, dynamics, export, initial, systems, cellulose, plastic.

Introduction. Today, in addition to the cultivation of fruit and vegetable products, it is important to deliver them to the consumer while maintaining their quality. In particular, table grape products are prone to rapid loss of quality in the post-harvest period, due to their high respiratory intensity. Therefore, the use of the "Cold Chain" system, based on controlling the temperature of the product from harvest to delivery to the consumer, remains one of the pressing issues.

Agricultural products grown in our republic are exported to many countries of the world. In particular, the increase in export volumes in the viticulture sector requires the organization of product storage, packaging, transportation and logistics processes based on modern technologies. One of the most important stages in grape storage is the initial cooling process, and this technological process directly affects the organoleptic characteristics, moisture balance and shelf life of the product.

Although the area of grape cultivation and the total yield are increasing year by year around the world, the issue of reducing post-harvest losses still remains relevant. Therefore, it is of great scientific and practical importance to scientifically substantiate the processes of initial cooling of grapes before storage in refrigerated warehouses, to improve technologies that reduce energy consumption and ensure long-term preservation of product quality.

This research study investigated the use of the "Cold Chain" system in the initial cooling process of table grape varieties grown in the Andijan and Fergana regions, the dynamics of product temperature decrease, and its impact on quality indicators during storage.

In this regard, the Resolution of the President of the Republic of Uzbekistan No. PF-5853 dated October 23, 2019 "On Approval of the Strategy for the Development of Agriculture of the Republic of Uzbekistan for 2020-2030" sets out measures to further improve the fruit and vegetable growing and viticulture sector [1].

Research methods and materials.

One of the tasks of the scientific research conducted by us was to study the impact of picking, packaging and storage in modern refrigerated warehouses of grape varieties grown in the Andijan and Fergana regions of our Republic, such as Mercedes, Nimrang, Andijansky black, Khusayne white, Rizamat, on their quality indicators. The figure below shows the containers used in the process of storing grapes.

One of the tasks of the scientific research conducted is that many researchers around the world have conducted scientific research in the field of grape storage technology. These studies are mainly devoted to the selection of grape storage environments, packaging and optimal varieties for storage. In addition, a number of scientific research and research works have been conducted in our department on the technology of storing grapes in various ways. However,

scientific research on the influence of agrobiological and technological properties of grapes on their storage properties is insufficient. Therefore, it is important to study the dependence of agrobiological and technological properties of grapes on their storage properties, as well as to scientifically substantiate the optimal technological parameters in the storage process.

Research results and their discussion The initial cooling process of the product in storage warehouses is carried out in a special cooling chamber. If we send the product directly to the cold storage chamber, sweating and excess moisture are observed in the product.

As can be seen from this table, the duration of the initial cooling process directly depends on the temperature of the grapes brought from the field. The longest time taken to cool from 34°C to 2°C was observed for the Mercedes variety, which was 490 minutes, while the shortest time was observed for the Andijansky Black variety, which was 455 minutes. Also, 480 minutes were recorded for the Nimrang variety, 472 minutes for the Rizamat variety, 460 minutes for the Husayne belyy variety, and 468 minutes for the Kishmish Sogdiana variety.

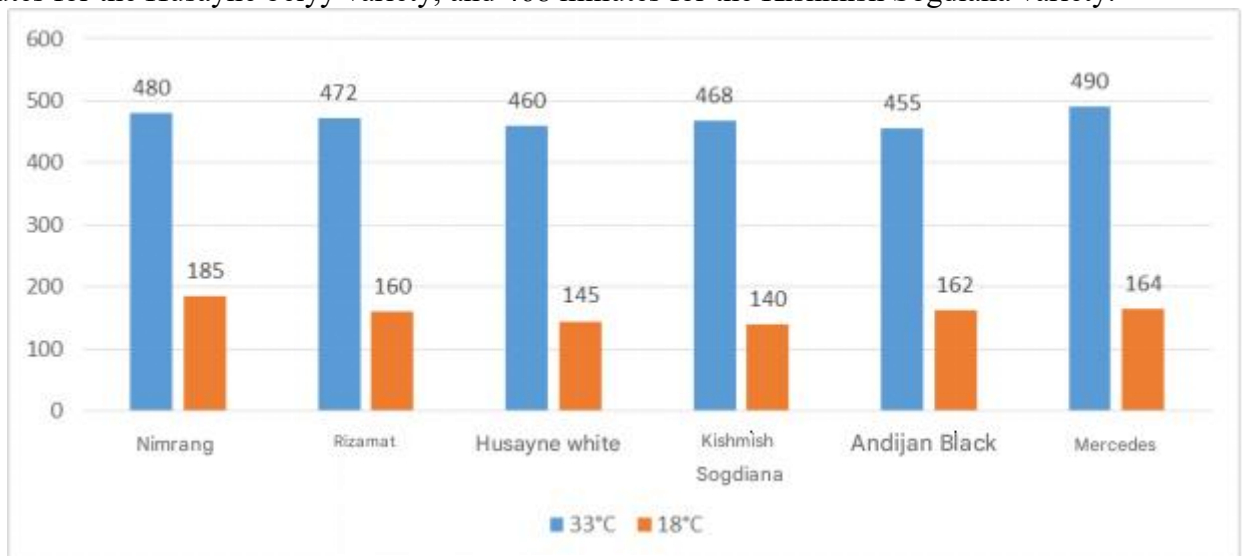


Figure 1.1. Time taken to lower the temperature by 2°C during the initial cooling of grapes, min.

In the initial cooling chambers, a cold air flow is created and circulated inside and around the box to the maximum extent. In this case, there are special slots in the box for air circulation, and the boxes, placed on wooden pallets, are placed in the chambers along the direction of the cold air flow. When the product temperature equals the temperature of the cold storage chamber, they are transferred to the cold storage chamber.

Conclusion. During the grape harvest, the air temperature is usually 30-35°C during the day, and 15-20°C at night. In turn, the temperature of the grapes is almost the same as the air temperature. Since the main storage temperature of the grapes is 0.5-2°C, the energy and time spent on lowering the temperature from 30-35°C to 2°C during the initial cooling process is 2.5 times less than when lowering it at a temperature of 15-20°C. Also, starting from a high temperature during cooling of grapes has a negative effect on their mechanical properties and a decrease in shelf life. As a result of the research, it was found that organizing the initial cooling process before storing table grape varieties based on the “Cold Chain” system is an important factor in maintaining product quality. Initial cooling slows down the physiological processes in the grapes, preventing moisture loss and microbiological deterioration. As a result, the organoleptic characteristics, appearance and shelf life of the product are maintained at a high level.



The results of the experiment showed that the initial temperature of the grapes directly affects the duration of cooling and energy consumption. In particular, a significant reduction in time and energy consumption was observed during the initial cooling process of grapes harvested at night or in cool weather. At the same time, it was found that abrupt cooling of the product at high temperatures can negatively affect the mechanical and technological properties of the grapes.

Also, the uniform distribution of cold air flow between the boxes, the use of packaging with special ventilation slots, and placing the product on wooden pallets increased the efficiency of initial cooling. During the study, it was observed that the cooling dynamics of grape varieties such as Mercedes, Nimrang, Rizamat, Khusayne beliy and Andizhansky black differed from each other. In general, the full use of the “Cold Chain” system in grape storage helps to maintain the quality of export-oriented products, reduce natural losses during storage, and increase economic efficiency. The widespread introduction of this technology into production practice is of great importance in increasing the competitiveness of the viticulture industry.

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