Volume 1, Issue 8, November 2023
ISSN (E): 2938-3781

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Web of Agriculture: Journal of Agriculture and Biological Sciences
webofjournals.com/index.php/8

Effect of Initial Cooling of Fruit and Vegetable Products on Storage

To‘rakeldiyev Javlonbek Ravshanbek o‘g‘li
Master Student of Group M 24-22
Fergana Polytechnic Institute

Abstract:
One of the most effective technological measures to reduce losses in storage of fruits and vegetables is their initial cooling. One of the most effective technological measures to reduce losses in storage of fruits and vegetables is their initial cooling. The essence of this method is to immediately cool the fruits and vegetables to the optimum temperature for transportation and storage after harvesting.

Keywords: storage, fruit and vegetable products, agro-industrial complex, storage losses, product quality.

Introduction

An important link in the agro-industrial complex is the system of procurement of agricultural products, designed to timely receive, store and deliver agricultural products to the consumer. However, due to the imperfection of the procurement system, every year significant volumes of fruits and vegetables do not reach the consumer.

Storage is a stage of circulation of goods, which must take place under conditions that ensure minimal changes in its quantity and quality. This issue is currently acquiring enormous economic importance, since the loss of products during their transportation and storage causes significant losses. For example, annual losses of fruits and vegetables throughout the country amount to up to 40% of the gross harvest.

The high quality of vegetables and fruits sold is largely ensured by storage technology. When choosing the most appropriate methods for storing fruits and vegetables, many factors are taken into account - economic efficiency, timing, availability of material and technical base

For the highest quality food storage throughout the year, the following are necessary: the most effective methods of food storage; properly equipped food storage facilities.

For different goods, the storage problem is solved differently, since each of them requires storage in a certain mode, depending on its composition, properties and the intensity of the processes occurring in it.

A promising way of long-term storage of agricultural products is their storage with pre-cooling.

The technology provides for cooling vegetables in a short time after harvesting in the field, as well as at the raw material sites of procurement and processing enterprises; pre-cooling and short-term storage modes, methods of loading, stacking, unloading products, and quality control are regulated. Achieving the required cooling temperature within 12-14 hours makes it possible to preserve freshly harvested products during transportation.

During storage, not only temperature plays a significant role, but also the period during which it is reached. After five to eight days, fruits and vegetables should reach storage

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ISSN (E): 2938-3781
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temperature. Any too late storage or intermediate storage at higher temperatures reduces the safety of the goods. The rule of thumb for long-term storage is that a day of late or extended refrigeration can cost a week of storage.

A universal technology for step-by-step cooling of products with an air system has been created, which allows reducing losses from spoilage and weight loss up to 5 times during the period of accumulation of raw materials and during their transportation; it was successfully tested in peasant farms of the Fergana region, the Republic of Uzbekistan.

Pre-cooling temperature indicators set for various crops are shown in Table No. 1.

Table No. 1 Temperature required for pre-cooling of fruits and vegetables

Culture	Pre-cooling indicators, °C	Shelf life
Cherries	2	Extends shelf life to 26-90 days
Apricots	3-4	Extends shelf life by 15 days
Peaches	4	
Plums, apples	5-8	-
Grape	4	As a result, losses from spoilage are reduced by 4 times and the yield of standard products is increased (using the example of the Husaini variety)

Pre-cooling of fruits and vegetables can be carried out in various ways. The methods depend on the specifics of further use and volumes of raw materials. These may be low-density refrigeration chambers for short-term storage before sale. Often there are conveyor installations and cooling tunnels equipped with air blowing devices that provide a flow speed of 0.5-7 m/s. In the USA, cooling is used in an air flow caused by a pressure difference. The product is placed in a special way into a chamber with slight excess pressure. Air enters the stack through its lower plane. Air is taken from above. A stack 2-2.5 m high completely occupies the volume of the room. The pressure difference makes it possible for cold air to penetrate directly to the fruit, even in the presence of cushioning material. The costs of constructing such installations are higher than with the intensive air supply method. ear, but less likely to cause uneven cooling. In Europe, forced ventilation through an ice-salt mixture is used to cool and somewhat humidify the air. Cooled air is supplied through special air ducts to a storage chamber or refrigerated car to quickly lower the temperature of the product. At a cooling air temperature of -2°C, the cargo is cooled to 4°C in 10-12 hours. Mobile devices have been developed that allow products to be cooled using hydroirrigation directly in the refrigerator during its delivery from the field to the refrigerator. In this case, it is necessary to add antiseptics to the water.

Solutions of sorbic acid and chlorine water can be used as antiseptics.

Thus, the use of pre-cooling coupled with antiseptics for long-term storage of fruits and vegetables increases the shelf life from 6 to 8 months, depending on the product.

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ISSN (E): 2938-3781

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