



Apple Fruit Storage Technology

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ABSTRACT

This article discusses the effect of preparations based on ethylene on the safety of apple fruits. Ethylene-producing drugs have been found to reduce the activity of the peroxidase enzyme.

Keywords:

storage, preservation, storage factors, concentration, ethylene, modification atmosphere

There are several technologies for storing fruits. Currently, in the world practice, the main technology for storing fruits is a controlled atmosphere with an ultra-low oxygen content.

- natural cooling,
- artificial cooling,
- modified atmosphere with an oxygen content of 13-19% (the composition of the atmosphere depends on the variety genotype, film properties, etc.),
- standard controlled atmosphere with an oxygen content of 1.5-2.5%,
- controlled atmosphere with ultra-low oxygen content of 0.8-1.2%,
- dynamic controlled atmosphere with an oxygen content of 0.4-0.6%.

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In Uzbekistan, by far the most common storage technology is artificial cooling; advanced farms are mastering controlled atmosphere and controlled atmosphere with ultra-low oxygen content.

The main reason for the development of diseases and the decline in the quality of fruits and vegetables is the excessive accumulation of ethylene inside fruits and in the environment. Ethylene is synthesized by fruits (endogenous) or comes from the environment (exogenous). Even at extremely low concentrations, this gas activates the ripening, overripeness and aging of fruits and vegetables, which leads to a loss of quality and the development of many physiological and fungal diseases.

Ethylene inhibition is most effective in a dynamic, controlled atmosphere. However, this technology imposes a number of special

requirements on the tightness of the chambers, equipment that ensures the creation and maintenance of the specified atmospheric parameters, the qualifications of technical personnel, the quality and physiological uniformity of fruits, which increases the cost of its use.

Ethylene inhibitor - compound 1-methylcyclopropene (1-MCP), post-harvest treatment of which can significantly slow down the ripening and aging processes, reduce losses and preserve fruit quality. The drug has been registered and approved for practical use.

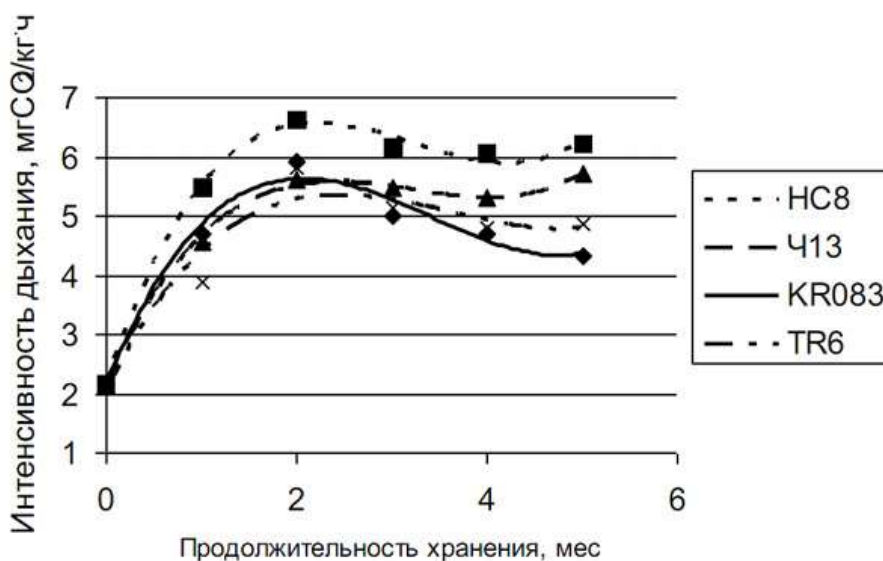
The mechanism of action of the ethylene inhibitor is that the molecules of the active substance 1-MCP, after processing the fruits, are firmly attached to the ethylene receptors on the cell membrane, i.e. take his place. Therefore, ethylene can no longer attach to receptors and form active complexes that accelerate the ripening and aging of fruits.

The shelf life of fruits and vegetables and their quality depend on such factors as: the

temperature of the atmosphere in the storage chamber, the temperature of the fruit, the content of oxygen and carbon dioxide (CO₂) in the chamber, as well as inside the fruit, the content of ethylene (C₂H₄) in the atmosphere of the chamber and inside fruit, relative humidity in the chamber.

During the storage of fruits in their tissues, an oxidative process occurs, which is called respiration. Oxygen is used and carbon dioxide is released. Carbohydrates, fats and proteins are used for oxidation. About a third of carbohydrates are spent on breathing during the storage period.

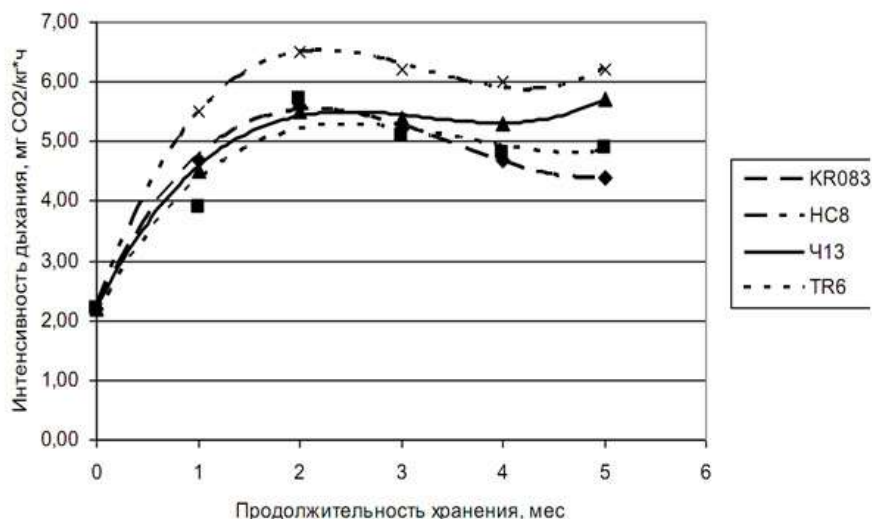
In fruits treated with ethylene inhibitors, there is a jump in respiration rate. But during storage, the process fades. Then by the 5th month it increases. The maximum increase in the intensity of respiration is observed in apples treated with the drug at a concentration of 10%. The weakest reaction to the rise in the intensity of breathing gives the drug at a concentration of 5%.



Picture 1. Changes in the intensity of respiration in Crepsion apples

To determine the resistance of fruits to external conditions, an indicator of enzyme activity is used. The intensity of phenol oxidase increases during storage. The drug based on

ethylene inhibitors reduces the activity of the enzyme. Preparations based on ethylene producers have a lesser effect.



Picture 1. Changes in the intensity of respiration in Golden Delicious apples

The activity of peroxidase in response to ethyleneproducers increases, which leads to an acceleration of respiration. Then the process fades and becomes stable for 4 months. After the intensity of breathing increases again. At the same time, in fruits treated with ethylene-based preparations, the lowest activity of peroxidase and respiration activity is noted.

Thus, for long-term storage, it is advisable to treat fruits with ethylene-based preparations. It is they who maximally reduce the intensity of respiration and the activity of enzymes. This allows you to slow down the biochemical processes in apples and extend the shelf life.

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