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STUDY OF THE INFLUENCE OF PROCESSING ON THE SAFETY OF FRUIT AND VEGETABLE RAW MATERIALS BY ETHYLENE INHIBITORS

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Abstract:

The article presents the results of studies on the effect of ethylene inhibitors on the safety of fruits and vegetables. It has been established that the treatment of fruits and vegetables with a gaseous ethylene inhibitor slows down the ripening process by 1.5 times compared to conventional storage. The shelf life is extended by 2-2.5 months.

Keywords: Productivity, storage, losses, biosynthesis, ethylene, maturation hormone, quality.

Over the past 20 years, the world consumption of vegetables and fruits has been growing in an average of 5-7% per year. Uzbekistan not only meets the needs of its population, but also exports agricultural products and has great potential in this area.

More than 25 million tons of fruits and vegetables are produced in Uzbekistan every year, of which about 800 thousand tons are exported. Currently, over 160 thousand farms operate in the republic, which provide the domestic and foreign markets with high-quality fruits and vegetables. The total volume of storage facilities in the republic is 1,025 thousand tons of products, including modern refrigerating chambers for 642 thousand tons. This contributes to the uninterrupted supply of the population with the main types of agricultural products, the expansion of their exports. The transport infrastructure is developing dynamically, at the same time work is underway to provide interconnected logistics networks, foreign trade relations are expanding, ensuring the growth of the sector's export potential. At the same time, the provision of the population with vegetable products of its own production does not exceed 50-80%, fruits - 20-25%.

One of the reasons for this situation is the loss of products at all stages of their promotion to the consumer. Only during storage, losses reach 35-40%. The problem of efficient storage of the grown crop is complex and requires the solution of a number of issues, ranging from selection, pre-sowing seed preparation, observance of crop rotations and all agricultural techniques, and to timely harvesting followed by laying healthy material for storage. In addition, only 70% of the required number of storages is functioning, of which only 30% has artificial cooling, gas storage methods, pre-cooling points and refrigerators in the zones of fruit and vegetable production are insufficiently used, the production of modern equipment and devices for microclimate control has not been established, as well as means of mechanization of loading and unloading operations. The main reasons for the losses are, firstly, the loss of mass during respiration, evaporation and germination, with the loss of water and dry matter (10 to 35% of the total loss of mass). Moreover, water loss is a limiting value that is different for each type of raw material (for example, 3-4% it is in apples, grapes, spinach, lettuce, broccoli, carrots in bunches with leaves, 5-6 - in pears, cherries, peaches, strawberries , raspberries, currants, beets, peas, cucumbers, beans (in beans), 7-8 - in carrots, beets, cabbage, potatoes, peppers, tomatoes, 10% - in onions).If the maximum level is exceeded, the product becomes unmarketable.

Second, disease-related losses; their volume is difficult to predict, but in case of mass distribution it can reach 100%.

Mechanical damage can also cause serious consequences (the third group of losses), especially at the final stage of storage, when as a result of ripening, the pulp of fruits and vegetables softens and their strength decreases.

This factor has a predominant effect during transportation (especially over long distances). Deterioration of quality indicators is due to both natural causes (maturation, aging, growth activity, etc.), and the impact of external factors (environment, damage, disease), which reduce the consumer properties of products and lead to a decrease in the selling price. At the same time, total commercial losses can be comparable to losses from loss of weight and damage.

One of the main reasons for the decline in the quality and development of many diseases of fruits and vegetables during storage is the excessive accumulation of ethylene. Ethylene is a maturation hormone; it is synthesized by fruits and vegetables, activates their maturation, premature aging, the development of many physiological diseases. The basis of this technology for storing fruits and vegetables is the effective inhibition of ethylene biosynthesis and its biological action.

At present, the effect of the synthesized preparation Phytoatak based on 1-methylcyclopropene on the quality of stored products is being studied. Our comprehensive studies have confirmed that this compound effectively inhibits the biosynthesis of ethylene and protects many types of fruits and vegetables from their premature ripening, aging, damage by physiological and fungal diseases, helps to extend the shelf life and guarantees maximum preservation of the original quality not only during storage, but also at the stage of bringing it to the consumer. The mechanism of action of the active ingredient is as follows: 1-methylcyclopropene firmly binds to ethylene receptors on the cell membrane, i.e. takes its place, so ethylene is no longer able to attach to receptors and form active complexes. In this case, the action of ethylene not only secreted by fruits and vegetables (endogenous), but also of exogenous, biological and non-biological origin is prevented. The essence of the new technology is the processing of fruits and vegetables with a gaseous ethylene inhibitor Phytoatak in extremely low concentrations (0.5-1 ppm).The treatment is carried out in sealed chambers during the day using portable generators of an ethylene biosynthesis inhibitor. After processing, fruits and vegetables acquire effective protection against the negative effects of ethylene and can be stored and transported for a long time without loss of quality. Processing of any quantity of products is possible at the same time. In the concentrations used, the drug is safe for human health and the environment.

The effect of processing fruit and vegetable products with ethylene inhibitors is shown in Table 1.

Table 1

Qualitative characteristics of the effect of processing with ethylene inhibitors on prolonging the shelf life of fruit and vegetable products

Crops	Effect of treatment with ethylene inhibitors (Phytoattack, 1-methylcyclopropene)
Tomatoes	The most effective processing of fruits of blange ripeness. The ripening rate slows down by 1.5 times compared to normal storage, after 3-4 weeks of storage, the incidence of fungal diseases decreases compared to untreated fruits. When used in greenhouses, it allows for a liquid collection earlier and saves energy resources
Small-fruited cucumbers (film greenhouses)	For 10 days of storage, the product yield is 26.81% higher than in the option without processing
Apples	Reduces loss from sunburn, decay from aging, wet burns, watery core, internal browning of tissues; maximum preservation of the original quality. Storage periods are extended by 2-2.5 months
Sweet pepper	Deceleration of fruit ripening, when combined processing with storage in a modified atmosphere (MA), shelf life is extended to 2 months
Cabbage: White-headed Colored Broccoli Beijing	Slowing down the yellowing of the covering leaves, extending the shelf life up to 6-8 months color Slowing down aging, extending the shelf life up to 3 months when combined with storage in MA Reduces weight loss, softening; extends shelf life up to 2 months when combined processing with storage in MA The green color of the leaves is preserved, high commercial qualities within 3 months of storage when combined with processing with storage in MA
Sugar corn	Extends shelf life up to 30 days when combining processing with storage in MA

This technology has been mastered and has shown high efficiency in the agricultural firm "Kapchuғai mevalari" specialized in long-term storage of fruits and vegetables in refrigerated chambers. The practical development of the new technology made it possible to identify and confirm the main advantages of using the Phytoattack preparation: firstly, the losses from fungal rot and natural loss of fruits during storage in normal and controlled atmospheres, during the transportation of climacteric fruits and vegetables by road, rail and water transport, as Phytoattack controls

the biosynthesis of ethylene and its negative effect even after unloading the fruit from the chambers at the stage of bringing it to the consumer; secondly, the negative impact of stressful storage conditions of fruits weakens (untimely creation of the recommended temperature and composition of the atmosphere, significant fluctuations in these parameters), this eliminates or sharply reduces the risk of fruit damage by many diseases.

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