

PEAR FRUIT STORAGE TECHNOLOGIES BASED ON CHITOSAN PREPARATIONS AND ITS DERIVATIVES

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Annotation: The study provides information on the use of chitosan. Chitosan is known to have a unique biological activity that can induce resistance to viral diseases in plants, inhibit viral infections in animals and prevent the development of fugue infections in an infected culture of microorganisms. A new environmentally friendly polymer chitosan and its compositions with organic acids, which increase the shelf life of apple fruits by type, and the mechanisms of action of biological products on shelf life are also being investigated.

Keywords: chitosan, acetic acid, succinic acid, glycyrrhizin, antibacterial effect, antimicrobial effect, controlled atmosphere, controlled gas environment.

The importance of the development of organic agriculture and the production of organic food products of the Republic of Uzbekistan is emphasized in the Decree of the President of the Republic of Uzbekistan No. PF-5995 dated May 18, 2020 "On additional measures to ensure compliance of quality and safety indicators of agricultural products with international standards" [1]. Chitosan is a natural polymer of the XXI century. The unique properties of chitin and chitosan attract the attention of a large number of specialists of various specialties. The role of polymers in our lives is universally recognized, and all areas of their application in everyday life, industrial production, science, medicine, and culture are difficult to even list. If before the XX century, man used polymers of natural origin – starch, cellulose (wood, cotton, flax), natural polyamides (silk), natural polymer resins based on isoprene – rubber, gutta-percha, then the development of organic synthesis chemistry in the XX century led to

the appearance in various fields of human activity of a huge variety of polymers of synthetic origin - plastics, synthetic fibers, etc. The technological breakthrough that has taken place has not only radically changed our lives, but also created a lot of problems related to human health and environmental protection [2]. In the process of storing fruits and vegetables, various technologies are used in the world experience. For example, the following technologies are used to create a gaseous environment and long-term storage of fruits in a controlled atmosphere: ULO (Ultra Low Oxygen) – storage in a chamber with a very low oxygen content (less than 1-1.5%); RCA (Rapid Controlled Atmosphere) - technology for rapid reduction of oxygen concentration; ILOS (Initial Low Oxygen Stress) - ultrafast reduction of oxygen levels in the chamber in a short time; LECA (Low Ethylene Controlled Atmosphere) – technology for reducing ethylene levels in the chamber; DCA (Dynamic Controlled Atmosphere) - dynamically controlled atmosphere; CO₂ shock treatment - carbon dioxide shock treatment technology by increasing the concentration of carbon dioxide to 30% [3].

The chitosan complex (concentrations of 0.1% and 0.2%) with succinic acid with concentrations of 0.15 and 0.25% at a ratio of 1:1 also showed high fungistatic activity during storage of pear varieties. The use of supramolecular chitosan complexes (concentrations of 0.1% and 0.2%) with glycyrrhizin, with a concentration of 0.01% in ethanol at a ratio of 1:1, prevented the development of spoilage and slowed down the process of ripening and decay of fruits. At the same time, the hardness of the fruits was maintained without any negative effect on the organoleptic properties of the pear fruits.

The coating of pear fruits with the above preparations is a kind of barrier film for the penetration of O₂ and CO₂, thereby slowing down the breathing of the fetus, which in turn reduces weight loss, also reduces the loss of vitamin C contained in the fruits. Chitosan preparations with glycyrrhizin provide a protective antimicrobial barrier against pathogens in pear fruits. In processed pear fruits, the level of respiration and ethylene production decreases, while the pears retain their original color. The

preservation of the green color is due to the absence of the oxidation process of the chlorophyll enzyme and, as a result, the preservation of chlorophyll in the peel [4].

Sulfur oxide (SO₂) – has a strong pungent odor, dissolves well in water. Fruits, dried fruits and fresh grapes are treated with sulfur dioxide to increase the shelf life. During the treatment with sulfur oxide, the chemical composition of the cell juice changes, some vitamins and trace elements are destroyed. Since sulfur oxide is a gas, after the end of processing, sulfurous acid salts may remain on the surface of the fruit while the gas itself evaporates. In asthmatics, sulfites can cause severe allergies, when ingested, sulfites destroy vitamin B1, which causes a nervous breakdown with prolonged exposure [5]. Thus, the use of technology in the storage of pear varieties of chitosan-based preparations with acetic, succinic and glycyrrhizic acid reduces the labor intensity and increases the efficiency of this method by 35-45% compared with traditional methods. It was found that chitosan preparations reduce the loss from rotting, reduce the respiratory rate of pear fruits, and also slow them down due to ethylene oxidation, preserve taste qualities. In addition, storing pear fruits with chitosan preparations allows you to control physiological disorders and fungal diseases.

Moreover, the positive effect of post-harvest treatments of pear fruits on the preservation of their quality during storage was revealed, which increased the yield of healthy products by 1.5-2.0 times compared with the control. Storing fruits in an ozone environment turned out to be more effective and made it possible to extend the shelf life by 1-1.5 months.

Literature

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