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Innovative Technologies on Ensuring Safety of Fruit and Vegetable Productions in Transit by Railway

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ABSTRACT: The Paper Presents Long-Term Studies Showing That The Basis For Safeguarding The Quality Of Fruits And Vegetables During Transportation By Rail Put Its Biochemical Structure And Microbial Contamination Which Plays A Major Role During The Transport. Offers Innovative Technologies That Provide Quality Safety In Stations For Loading And Unloading.

KEYWORDS: Fruit and vegetable, refrigerator car, vibrostand, quality of production, safety.

I.INTRODUCTION

Uzbekistan has competitive advantages before other producers of the fresh fruit and vegetable production, being expressed in the high content of sugars, vitamins, mineral salts and others. However in recent years Uzbekistan uses these advantages not rather effectively. As showed researches, from the total amount of made production for export only 2,2-2,5% of all volume of made production are taken out.

89-90% fall to the share of railway transport in transportation fruit and vegetable production for export on the average. Participation of the motor transport in these transportations makes 11-10%. The motor transport of the republic transports fruits and vegetables on border areas of neighboring states. On a long distance of transportation fruit and vegetable production carry out vehicles of the recipient. During mass harvesting to the republic there arrive refrigerator cars from regions of Russia and Kazakhstan which will organize loading of vehicles and take out freight to the republics. Domestic cars aren't allowed to these transportations because of big wear and discrepancy owing to the specified reasons, to the international norms on exhaust gases. More than 90 percent of vehicles, from among the international automobile transport intended for implementation, aren't allowed on the European markets as the ecology and traffic safety (1200 units doesn't meet the requirements. MAZ, KAMAZ, 1988-1991 of release with the EURO-0 engine, about 600 units - with the EURO-1 engine), 91 units of cars with engines of the increased quality: 8 units with the EURO-3 engine and 83 units with the EURO-2 engine. In the countries of the European Union with toughening of ecological requirements to vehicles since 2004 the ecological standard of Euro - 4 is entered. Since 2006 Russia doesn't allow on the territory vehicles with the EURO-0 engine.

Having the most advantageous and convenient geographical position in Central Asia, national haulers yield the position in the market of the international automobile transport. So, the national hauler can transport export freight from Namangan only to border with Kazakhstan (Gishtkuprik), further freight for high payment is taken away by a foreign carrier.

Into the range of exported perishable freights enter: melon cultures, onions, tomatoes, cabbage, grapes, etc. fruits and vegetables. For transportation of these freights covered cars, ARV cars, refrigerator sections from the 4th and the 5th cars and refrigerator the container by rail are used.

Mass loading of perishable freights on State Joint-Stock Railway Company " Uzbekistan Railways " is carried out at such stations as: Altyaryk, Kakir, Furkat, Margelan (Regional Railway Junction (RRJ) Kokand); Keles, Chukursay, Urtaaul, Yangiyul, Tashkent – commodity, Syr-Darya (RRJ Tashkent); Zarafshan, Dzhabay, Samarkand (RRJ Bukhara), etc.

The bulk of the FRUIT AND VEGETABLE COMPLEX is shipped by clients from stations of the Tashkent area: Yangi Yul, Keles, Rakhimov and others. The reason of the created situation is the low speed of advance of trains on the territory of the republic, because of the small size of traffic volumes and big idle times thereof under accumulation.



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Besides, cars with fresh and vegetable production from areas of Fergana Valley go to stations of the Tashkent area in refrigerator cars because of refusal of Leninabad area of Tajikistan to pass through the territory cars with this freight. Freight transfer with automobile on railway transport is carried out, mainly, in the evening when ambient temperature is reduced in comparison with day level. For the purpose of preservation of constancy of a refrigerating chain, the car when unloading is put in dense to a car door by the face party in public.

Transportation of freight is carried out from farmer farms of areas, the average distance of transportation thus makes 45-65 km. However production transportation from areas of Fergana Valley is much higher and is equal 200-250 km. Following from Fergana Valley, freights follow through the city of Angren where at station Ablyk is available a terminal complex where bulk carriers, oil freights and cars are processed. There are no capacities for short-term storage and processing of fresh fruits and vegetables. Distinctive feature of transportation of freight is that fact that various types of cars participate in transportation not allowing to use equipment when performing cargo operations. When performing cargo operations manually, to fruits are put a set of mechanical damages which have an effect on process of transportations, reducing quality of delivered production.

Private firms and the population are engaged in shipment of fruits and vegetables that practically, results in lack of reliable information about quality of the delivered freight, about its price around consumption. Along with it, loading of fruits and vegetables is carried out without determination of its initial quality and transported on distances, exceeds the capabilities of opportunities of production on transportability that leads to considerable losses. It, quite often, becomes a cause of failure of the sender to be engaged in this business that reduces volumes of export of this production domestic-owned firms and individuals.

In the last two years there were some changes in transportation of fruits and vegetables in the international message. So, transportation in the European part of Russia is made to station Iletsk (interstate butt station, Russia), and in East – to the Mint station. At these stations delivery and freight acceptance, customs inspection and the corresponding registration of freight in customs services of Russia is made. Further freight is delivered to the consumer by transport of Russia.

Recently senders fumigate the room of the car and freight with sulphurous gas that allows reducing percentage of microorganisms in the cargo room of the car, which reduce freight losses when transporting. However by researches of scientists it is proved that this gas nevertheless gets into fruits and vegetables at its breath.

By results of long-term supervision NILE of transportations of perishable freights of Tashkent Institute of Railway Engineering it was revealed that the main reason for damage at melons and water-melons is emergence of decay due to excess of nitrate content, presence on a surface of fruits of bacteria, staphylococcus, fungi and the elementary different groups.







The research, executed at institute in 2009-2011, made the first attempt to use ultraviolet irradiation for reduction of a microbiological seeding of the surface of the fruit and vegetables. Here experiment with use of the vibrostand emitting movement of the car as a part of the train was made. In a consequence results of experiment were checked in operational conditions skilled transportations are carried out.

For the purpose of establishment of extent of influence microbiological factors on melon cultures during their transportation, before carrying out the real experiment all melons and the water-melons involved in experiment, were divided into two parts. A half of all production was noted as "control". After that, from all party the melon and water-melons took bacteriological crops. Results of the analyses taken from fruits, allowed establishing extent of influence of microflora and the bacterial structure being both in fruits, and on its surface, on production damage when transporting.

Processing of products of ultraviolet rays (PUR) it was carried out just before the beginning of dynamic modeling of process of transportation. Lay in the stationary refrigerator on the vibrostand, with observance of height of loading "control" from all party of fruits it was subjected to processing of ultraviolet rays within one hour. Throughout carrying out all experiment, lasting thirty days, both with control, and with other (not being exposed processing) parts of party of fruits withdrawal of samples of melons and water-melons for the analysis of background indicators was carried out.

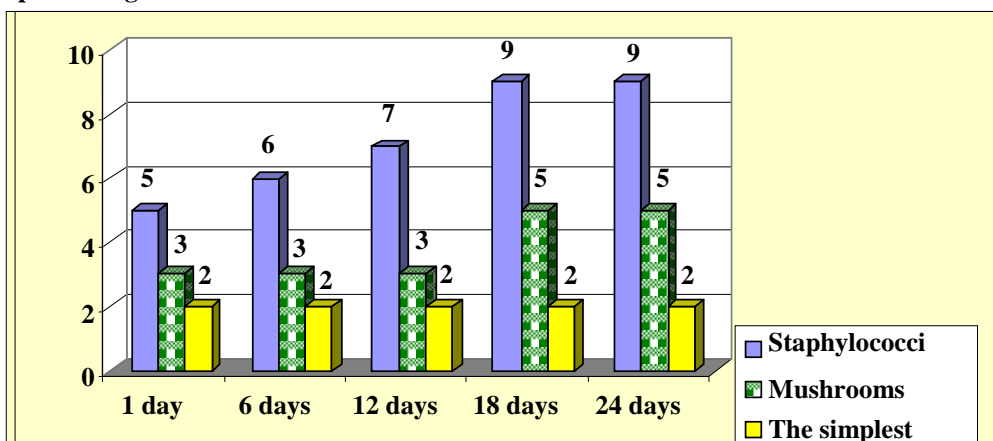
Among the microorganisms sowed from a surface of products, they prevail staphylococcus on a surface of melons make 50% from all quantity of microorganisms, and on a surface of water-melons - 40%, and the big inoculation was noted from a surface of melons. On a surface of water-melons the ratio staphylococcus's and mushrooms was identical. Besides, in water-melons and melons the protozoa which quantity both in water-melons and in melons makes 20% from all revealed microorganisms (fig. 1) were identified.

Figure. 1. Ratio of pathogenic microorganisms on a surface of products and in their pulp, for the first day of transportation

	Surface (peel)	Pulp
Melons	Staphylococcus's -  Mushrooms -  The simplest - 	Staphylococcus's -are absent Mushrooms - are absent The simplest – are absent
Water-melons	Staphylococcus's -  Mushrooms -  The simplest - 	Staphylococcus's -are absent Mushrooms - are absent The simplest – are absent

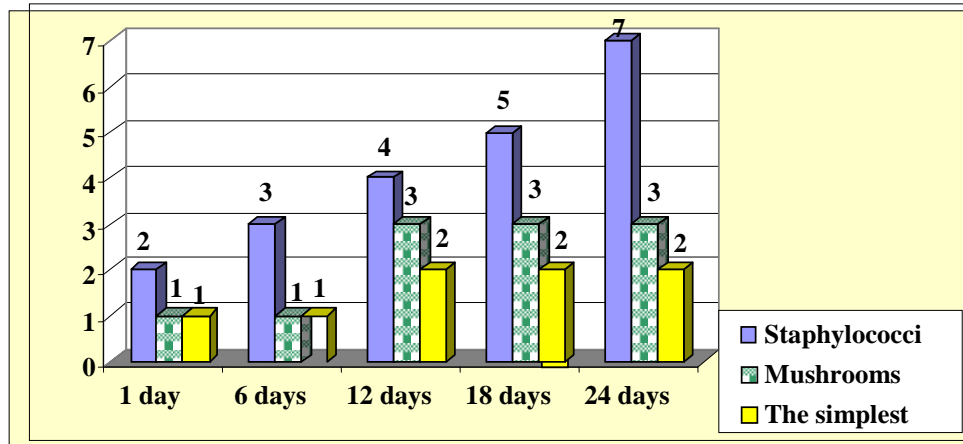
Results of analyses carried out for the 12th days of experiment showed the following: on samples out of a control consignment were brought staphylococcus's in quantity equal to that was revealed on prototypes without processing of ultraviolet rays just before loading. At prototypes of the fruits which haven't undergone processing, for the 12th days it was noted not only growth of bacteria on a surface, but also in production were removed staphylococcus's in places where fruits had the mechanical damages received at loading of melons and water-melons.

A). Increase in quantity of pathogenic microorganisms by views of surfaces of the melons which were not exposed to processing of PUR



The obtained experimental data were checked in operational conditions. Data of skilled transportations differed from the experimental a little.

Results of research allowed establishing change of a microbiological dissemination and biochemical structure in the course of transportation and damage size thus. These data gave the chance to predict damage size depending on initial quality (a microbiological dissemination and biochemical structure). Forecasting of losses of freight at an initial stage of transportation process is of great importance. She gives the chance to choose depending on quality the recipient of production depending on transportation terms, thereby reducing production losses on delivery them to the consumer.

B). Increase in quantity of pathogenic microorganisms by views of surfaces of melons to being exposed 60th minute PUR

For modification and addition in appropriate section "Fruits and vegetables" NILE of transportations of perishable freights of Tashkent institute of railway engineering for many years carries out contractual overhead and innovative scopes of research to Rules of transportation of goods. By results of the innovative project "2012-2014" research materials for inclusion in the addition and change project in developed Uzbek Rules of transportation of goods p.1 in the section "Transportation of Fruit and Vegetable Production by Rail" will be offered.

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