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## CHANGES IN MARKETABILITY OF MID-LATE POTATO TUBERS DURING STORAGE IN DIFFERENT CONDITIONS

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**Annotation.** In the article, the analysis of suitability for long-term storage of mid-late varieties by various technologies was presented. The total marketability of potato tubers of the researched varieties when stored in a specialized warehouse is 93.9%, and in another - 90.8%. The Teteriv variety had the highest yield of marketable tubers (more than 94%), and the Poliska rozheva variety had the lowest.

**Key words:** variety, potatoes, storage, marketability, quality.

### Introduction.

Modern potato growing is one of the most complex branches of the national economy. In the country's food balance, potato products take second place, so the people call potatoes the second bread. In the difficult conditions of military aggression, a number of negative trends in the development of the potato growing



industry in Ukraine and agriculture as a whole appeared. Due to the aggression of the Russian Federation, Ukraine will not receive 46% of the onion crop, 36% of potatoes, 35% of beets and 32% of cabbage. In total, 30% of the land will not be sown this year. Kherson region, Mykolaiv region, Donetsk region, Luhansk region - regions where the main share of grain, vegetables, and fruits were grown - will not have their usual harvests. At the same time, the area under vegetables is increasing in other regions. There is also a program where every extra piece of land should be used for planting fruits and vegetables [1, 4, 5, 8].

During the implementation of the State Program for the Development of Industrial Potato Growing for 2021-2025, an author's methodology for forecasting the economic, social and environmental consequences of its implementation was developed. The program has a realistic basis, the employees of the Ukrainian Association of Potato Producers accumulated information on the plans of potato farms for the construction of potato warehouses for 5 years. According to the list of infrastructure facilities, in the event that the state provides financial assistance in the amount of 30% of the cost of the construction of a potato warehouse, the construction of 35 potato warehouses with a total capacity of 158.6 thousand tons was started in Ukraine, but these plans were destroyed. The issue of Ukraine's food security and the most effective use of available storage capacities are at stake [1, 3].

Many Ukrainian farmers believe that the loss of 20-25% of the yield or weight of potatoes during storage is the norm. In fact, thanks to high-quality equipment, moisture and temperature control, losses can be reduced to 5-8%. That is why it is important to study the varietal characteristics of modern potato varieties during long-term storage in different conditions, to justify different types of losses [1, 2, 3, 7].

#### **Research materials and methods.**

The research was carried out in the conditions of LLC "SPA "Pearl of Podillia". Potatoes were stored in 2 warehouses (1 – specialized (artificial cooling): storage conditions 4-6°C; 2 – with supply and exhaust ventilation (without artificial cooling). Tubers of the following varieties were placed for storage: mid-late - Dzvin, Chervona ruta, Poliska Rozheva, Teteriv, Poliske dzherelo. Chemical and technological analysis was carried out according to generally accepted methods. The products were stored in nets of 20 kg and audited at the end of storage. Statistical processing of data was carried out by methods of dispersion and correlation analysis [1, 6].

#### **Results and their discussion.**

Currently in Ukraine, the harmonized standard SSTU UNECE FFV-30:2007 (Food potatoes. Guidelines for supply and quality control) is in force in Ukraine. This normative document regulates the quality and permissible deviations for potatoes of the late maturity group.

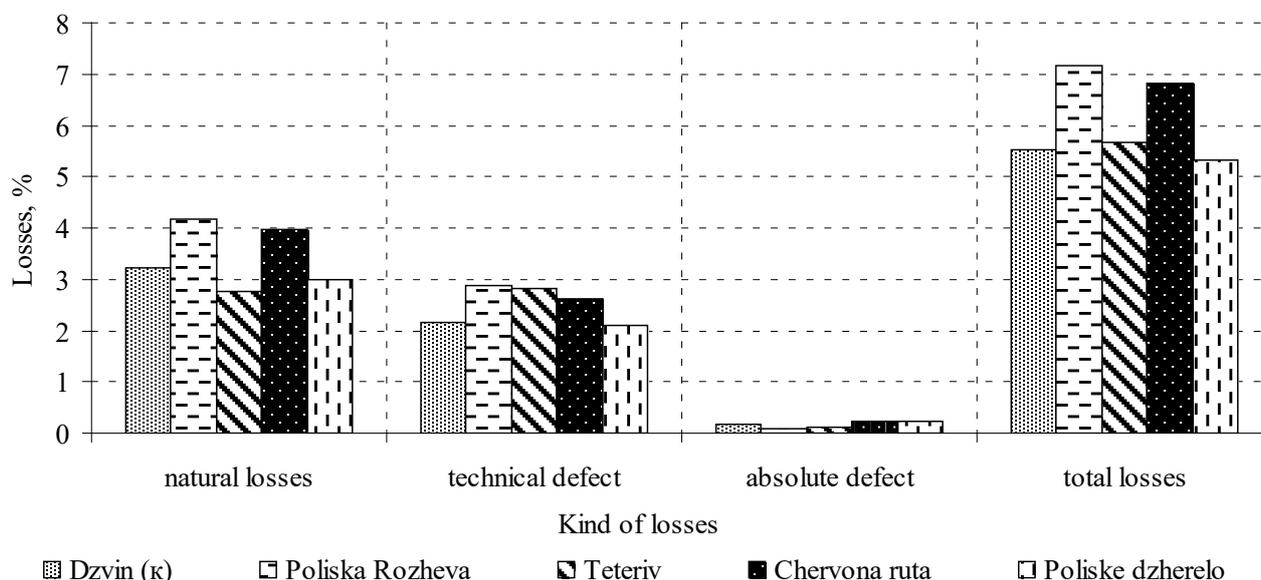
An analysis comparing the requirements laid down in this regulatory document with the requirements that were in place before and with the requirements for potatoes intended for processing (starch, alcohol, etc.) showed that there are quite large tolerances that can dramatically affect the quality of a batch of potatoes even for short-term storage.

The surface analysis revealed a number of critical details of the standard, the presence of 6% (by weight) is allowed in a batch of food potatoes, which does not



meet the minimum requirements. However, within this tolerance, the presence of a maximum of 1% (by weight) of tubers affected by dry or wet rot (which is extremely dangerous for potatoes intended for long-term storage) is allowed. In addition, the presence of 2% by weight of waste is allowed, of which a maximum of 1% is soil (sticky). The remaining 1% of the above is an organic and minimal admixture that was not allowed in the previous standard. The presence of 5% (by weight) of tubers that do not meet the above-mentioned size requirements is allowed. 2% (by weight) of potato tubers of other varieties (varieties) is allowed in each package or batch of product supplied in bulk in containers. From the above information, it can be concluded that European requirements are quite democratic and can be ambiguously interpreted.

During the study of various types of losses during long-term storage of potato tubers, depending on the variety in storage conditions with controlled temperature conditions, different amounts of various losses were found (natural losses, technical and absolute defect (Fig. 1)



**Figure 1. Different types of loss of potato tubers during storage in specialized storage (artificial cooling)**

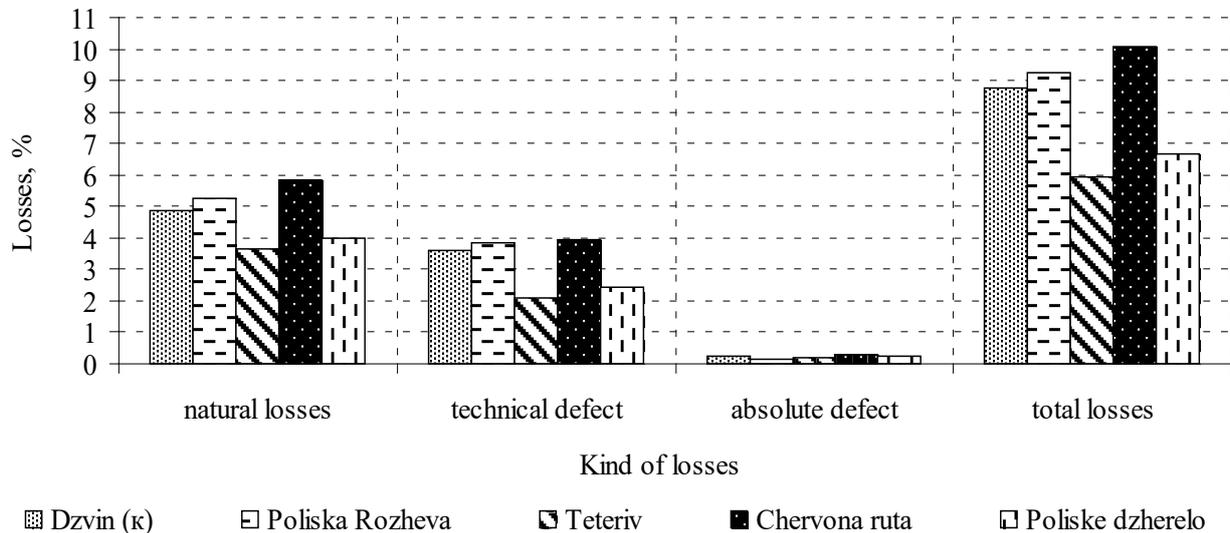
Losses of potato tubers when using controlled conditions averaged 6.08% for the studied varieties (Fig.1). It should be noted that the tubers of the varieties: Teteriv (5.68%) and Poliske dzherelo(5.20 %) were characterized by lower total losses than the control. At the same time, more significant losses were observed in the tubers of the Chervona ruta and Poliska rozheva varieties by 23, 3 and 29.5 % compared to the control (Dzvin).

The task of our research included the identification of losses during storage in a warehouse with exhaust ventilation (control is carried out by indicators of internal temperature and humidity). When studying the loss of potato tubers of the middle-late ripeness group in storage without the use of active ventilation, but only supply-exhaust, higher values of losses were observed. Thus, the average value was 8.14%



(Fig. 2), which is 25.46% higher compared to storage in a specialized storage. An increase in all types of losses was observed for all studied varieties.

In general, the structure of losses of potato tubers during storage depends on the quality of the products put into storage. The basis of these losses are natural losses, which are carried out due to physiological processes in the tubers, the greatest deviation from the average indicator has the varieties: Poliska rozheva and Chervona ruta.



**Figure 2. Different types of loss of potato tubers during storage in a warehouse with supply-exhaust**

It was found that the studied varieties were characterized by insignificant absolute losses, which is associated with careful post-harvest treatment. But along with the main studied indicators, there are additional ones, the losses of which are smaller, and the yield of products will be greater, so it is advisable to consider this issue in an economic format of one kind or another.

In the event of a technical defect, tubers that have lost their marketability during storage and cannot be used for their primary purpose without additional processing (removal of non-marketable or spoiled tuber particles), but this part of the product can be used for another purpose (processing into alcohol, etc.). The share of these losses is smaller compared to natural losses, but the consequences are more significant, since such tubers significantly reduce marketability, and therefore the economic efficiency of storage decreases. The difference in the sum of all losses is used to determine the yield of the main product, which, in terms of the studied varieties, averages 93.9% after storage in a specialized warehouse, and 90.8% in a warehouse with supply-exhaust ventilation. Once again, it should be noted that in both variants, careful post-harvest processing of products is used, with maximum removal of tubers affected by diseases and mechanically damaged. If it is put into storage with permitted deviations according to the current standard, the losses will be more significant.

### Conclusions and proposals

Summarizing the results of our research, we came to the conclusion that the



amount and structure of losses depends on a complex of factors, and most importantly on the variety and storage technology. All products after storage met the requirements of the current standard. The overall marketability of potato tubers of the researched varieties was quite high, in particular, after storage in a specialized warehouse, it is 93.9%, and in another - 90.8%. The Teteriv variety had a slightly higher yield of marketable tubers (more than 94%), and the Poliska rozheva had the lowest yield. The obtained data should be taken into account when planning the long-term storage of the studied varieties.

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