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RESEARCHES CONCERNING THE CONSERVATION OF ROOT VEGETABLE SPECIES IN REFRIGERATION DEPOSITS WITH NORMAL ATMOSPHERE AND IN DITCHES

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Abstract

Carrot and parsley are part of the root group with average storage resistance. Losses recorded during storage in the two species revealed their storage capacity under different storage conditions. These quantitative losses are due both to the existing climatic conditions and to the morphological particularities and chemical composition of the species.

Key words: carrot, parsley, quantitative losses, storage, preservation.

INTRODUCTION

Carrot and parsley, the late varieties, are part of the group of vegetables with medium resistance to perishability, which allows them to be stored in winter for 5 - 6 months under certain storage conditions.

From a morphological point of view, their tissues are made up of large cells with thin cell walls and large intercellular spaces. In carrots, the periderm is very thin and this is one of the main causes of their sensitivity to mechanical injuries, an essential aspect for harvesting and handling operations. The periderm of the parsley is a little thicker but porous and has a large number of lenticels.

Due to these morphological characteristics, the two species easily lose water through transpiration, lose their turgescence, which must be taken into account when harvesting and storing.

Another aspect to be considered for storage is the reduced cicatrisation capacity of the wounds.

For long-term preservation, the late varieties grown in the field are suitable, and the roots of the extra and quality I are accepted.

Extra-quality roots must be of regular shape and color, with smooth aspect, without cracks and without green or red coloration when packed, and the leaves must be cut 1 to 2 cm above the package.

For roots of quality I are accepted slight defects of shape, color, small scarring wounds, with a maximum of 2 - 3% of soil load.

In order to achieve a good quality production, specific technological measures should be applied, especially those related to the preparation of the land for the establishment of culture. In this regard, particular attention is paid to the type of soil and the ploughing operations to look at the appropriate depth, shredding and soil fertilization.

High-quality crops are grown on medium- or mild, neutral, fertile, deep-textured land. In these conditions of cultivation, smooth, smooth roots of dimensions included in the quality classes of extra and I.

For good storage capacity, special attention must be paid to harvesting, conditioning, handling and transport operations

MATERIAL AND METHOD

The study included the late Uriaș de Berlicum and the late root of Zaharat parsley, cultivated under the pedo-climatic conditions of Oradea, obtained from the production of 2017.

The technological flow operations are the following: harvesting, packing preparation, conditioning, transport, storage, conditioning of the plant material after the storage period and its qualitative study.

The harvest was done at the optimum time when the roots had optimal storage characteristics. Thus, this moment coincides with the stage of mature roots, with the fully formed periderm, but without the beginning of wooding. Harvesting took place in a no precipitation climatic condition after the dew rose.

The conditioning operations refer to the removal of the leaves by cutting above the package and sorting. The sorting was done according to three qualities: extra, I and II. Inappropriate specimens have also been removed: roots of inadequate size, branched, damaged, cut, attacked by diseases or pests.

Packaging was done in P-type crates, both for carrots and for parsley. The P-type crate has an average capacity of 25 kg for roots. At parsley, the harvested leaves were tied in small bundles to be marketed.

Only roots of extra quality and I were used for storage. The storage was done on the same day as the harvest.

Storage was done in two ways: in a normal atmospheric deposit and in ditches by the stratification method.

In the normal atmospheric deposit, the following parameters were ensured during storage: temperature of 0 - 10 °C, relative air humidity of 90 - 95% and optimal ventilation regime of 100 mc/t/h. Quantities of 100 kg of carrot roots and 100 kg of parsley roots were studied.

Keeping the roots in the ditches was done as follows: ditches with a depth of 30 cm were made. On the bottom of the ditch, soil mixed with sand (70% soil + 30% sand) with a thickness of approximately 5 cm was

distributed over which the roots were evenly distributed horizontally. A new layer of soil was placed over the rows of roots, followed by a new row of roots, so three rows of roots could be stacked up to the ground. The last layer is from the earth mix. Above the soil level, vegetal remains (straws and leaves) were distributed over the ditches, and as the temperature declined, it was covered with earth. This method of storage does not allow ventilation of products, the exchange of air has been done naturally.

RESULTS AND DISSCUSIONS

The results of the resistance determinations of carrot and parsley roots stored in the normal atmospheric deposit after six months of storage are shown in Table 1 and Table 2.

Table no. 1

Data on loss of carrot after six months of storage in the normal atmospheric deposit (Oradea, 2017)

Sample	**Variety**	**Weight loss %**	**Loss due to alteration %**
1	Uriaș de Berlicum	1.3	0.8
2	Uriaș de Berlicum	1.2	0.9
3	Uriaș de Berlicum	1.3	0.9
4	Uriaș de Berlicum	1.4	0.9
Average		1.3	0.87

Table no. 2

Data on loss of parsley after six months of storage in the normal atmospheric deposit (Oradea, 2017)

Sample	**Variety**	**Weight loss %**	**Loss due to alteration %**
1	Zaharat	1.6	0.9
2	Zaharat	1.8	1.0

3	Zaharat	1.8	1.1
4	Zaharat	1.7	1.0
Average		1.72	1.0

The determinations made on the losses recorded in the roots of carrot and parsley during storage in ditches by stratification method are presented in Tables 3 and 4.

Table no. 3

Data on the loss of carrot after six months of storage in ditches (Oradea, 2017)

Sample	**Variety**	**Weight loss %**	**Loss due to alteration %**
1	Uriaș de Berlicum	1.7	2.0
2	Uriaș de Berlicum	1.8	1.9
3	Uriaș de Berlicum	1.6	2.1
4	Uriaș de Berlicum	1.7	1.9
Average		1.7	1.97

Table no. 4

Data on the loss of parsley after six months of storage in ditches (Oradea, 2017)

Sample	**Variety**	**Weight loss %**	**Loss due to alteration %**
1	Zaharat	1.9	2.3
2	Zaharat	2.1	2.4
3	Zaharat	2.3	2.4
4	Zaharat	2.1	2.5
Average		2.1	2.4

After the six months of storage and preservation, losses were expressed as percentages. Both weight loss and loss due to alteration phenomena were analyzed.

The analysis of the obtained data reveals higher losses due to the alteration phenomena in 2.4% Zaharat parsley, preserved in ditches by stratification method and 2.1% weight loss due to physiological causes.

For Uriaș de Berlicum carrot variety, a lower loss was recorded compared to parsley, even though they have been stored and preserved under the same conditions.

The losses recorded for the two species are slightly higher than those mentioned in the literature. These values can be attributed to the climatic conditions existing in the study year, characterized by abundant precipitation in the first period of preservation, followed by a drought-free period.

For products stored in the deposit, the largest weight loss was recorded in the parsley variety of 1,72% and 1% loss by alteration.

These differences in losses for stored products can be explained by the morphological differences and the chemical composition between the two species.

CONCLUSIONS

From the analysis of the results obtained on the storage capacity and the recorded losses to the two root species, which have been stored and preserved by different methods, the following are revealed:

1. The largest loss was recorded in both species kept in ditches by the method stratification. In the case of Zaharat parsley variety, the losses were more significant compared to the Uriaș de Berlicum carrot variety. These losses are due to the climatic conditions existing in the year of the study which were not favorable in the first part of the preservation period, due to abundant precipitation that favored the alteration phenomena, followed by a dry, with no -precipitation period.
2. Roots stored in normal atmospheric storage have the lowest losses, both in weight and due to alteration phenomena. However, even with this variant, there were higher losses in Zaharat parsley-type. These differentiated values can be explained by the morphological differences and the chemical composition of the two species.
3. The two late varieties studied have good storage capacity and the recorded losses can be reduced especially if climatic factors can be controlled (temperature, humidity, ventilation).
4. Another factor that influences the percentage of losses in the roots stored in the depositsis the microflora present on the products. Its

reduction can be done by performing conditioning operations with greater responsibility, and these losses would be greatly diminished.

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