



## Quality Indicators of Carrots Intended for Storage

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**Abstract:** The article provides valuable information about the quality indicators of carrot vegetables intended for storage with an in-depth analysis. Also, the article describes the biochemical indicators of carrot roots intended for storage and processing.

**Keywords:** carrot, root fruit, biochemical indicators, quality indicators, storage, is processing.

### Introduction

Carrots are a vegetable crop with a high nutritional value, containing on average 9 percent carbohydrates, up to 1 percent nitrogenous substances and minerals. For example, carrots are the most valuable vegetable in terms of active provitamin (3-carotene) content.

The composition of the dry matter of carrots is mainly carbohydrates (80%). They are: glucose, fructose and sucrose; consists of polysaccharides: starch, fiber, hemicelluloses, pectin substances. Sugar is the main source of energy and flavor in many fruits and vegetables.

Carrot root contains 3-7.5% sucrose and fructose, 0.3-0.4% mannitol and 1.5-6.6% starch. Fructose makes up about half the amount of reducing sugars.

The sweet taste of the vegetable is softened by organic acids, flavoring substances, and essential oils and glycosides mask it.

During the storage of root fruits, during plant respiration, sugars are broken down and their amount decreases, the amount of sugar increases due to the hydrolysis of starch, pectin substances, hemicellulose, polyphenols and other substances. The dynamics of changes of sugars in the stored product depends on how much they are used for respiration or hydrolysis of polysaccharides. In addition, the amount of sugar can be relatively increased due to water evaporation and the increase in the concentration of dry matter.

### Materials and Methods

In conducting research "Методика опытного дела в овощеводстве и бахчеводстве" OST 4671-78 B.J. Azimov, B.B. Azimov's "Methodology of conducting experiments in vegetable growing, rice growing and potato growing", (2002) "Методика Государственного сортоиспытания сельскохозяйственных культур: вып. IV Картофель, овощные и бахчевые культуры", V.F.Belik, "Методика физиологических исследований в овощеводстве и бахчеводстве" (1992) J.S. Sattarov's "Практикум по агрохимии", "Методика агрохимических анализов". The statistical analysis of the data was carried out using the Microsoft Excel program based on the dispersion method B.A. Dospekhov (1985).

### Results and Discussion

In the Khorezm region, 6 varieties of carrots intended for storage and processing were distinguished, and their organoleptic and biochemical indicators were studied. It was observed that the main

advantage of these varieties is: stable productivity, perfect ripening, resistance to pathogenic microflora, early ripening and no loss of quality during storage.

**Table 1 Quality indicators of carrot roots intended for storage in Khorezm region**

Varieties	Temperature, °C	Storageable, %
Shantane 2461	0 - +2 °C	86,5
	+3 - +4 °C	77,8
Nantskaya 4	0 - +2 °C	91,3
	+3 - +4 °C	81,8
Yellow Mirzai 304 (control)	0 - +2 °C	82,3
	+3 - +4 °C	75,4
Red Mirzai 228	0 - +2 °C	83,5
	+3 - +4 °C	76,4
Nurli 70	0 - +2 °C	78,2
	+3 - +4 °C	67,7
Ziynatli	0 - +2 °C	72,5
	+3 - +4 °C	61,9

The following varieties with high shelf life were distinguished from the studied varieties: Shantane 2461 with a shelf life of 86.5%, Nantskaya 4 with 91.3%, Red Mirzai 228 with 83.5, Nurli 70 with 78.2, and Ziynatli with an air temperature of 0 +2 oS. 72.5% of the variety has a degree of preservation.

Consumer benefits, safety, taste and other commercial and technological properties of carrot roots are mainly related to its biochemical composition. The biochemical composition of the studied carrot varieties in 2020-2021 is presented in Table 2.

**Table 2 Biochemical indicators of carrot roots intended for storage and processing in mg per 100 g of substance, (2020-2021)**

Biochemical indicators	Varieties					
	Shantane 2461	Nantskaya 4	Yellow Mirzai 304	Red Mirzai 228	Nurli 70	Ziynatli
Dry matter	13,0	15,0	10,0	12,0	13,0	12,0
Pectin substance	0,71	0,76	0,71	0,8	0,51	0,77
Protopectin	0,41	0,71	0,21	0,29	0,28	0,29
Total sugar content	8,4	7,9	6,5	9,0	8,0	6,7
Monosaccharides	5,1	3,6	3,9	3,3	3,0	3,9
Disaccharides	3,3	4,3	2,6	6,7	5,0	2,8
Vitamin C, mg%	7,6	8,0	6,2	6,8	5,5	6,2
P-carotene, mg%	9,9	8,1	5,8	4,9	3,7	6,2

As can be seen from Table 2, the dry matter content of the studied carrot varieties ranges from 10.0% to 15.0%. 228 and Ziynatli varieties accounted for 12.0%. These indicators mean 2-5% more than the control option.

The main part of organic substances is represented by sugars. It was observed that the largest amount of sugar was 8.0% in Nurli 70 varieties, 8.4% in Shantane 2461 varieties, and 9.0% in Red Mirzai 228 varieties.

It was found that the amount of pectin contained in carrot roots was 0.76% in Nantskaya 4, 0.77% in Ziynatli, and 0.8% in Red Mirzai 228.

The highest amount of vitamin C is observed in varieties Shantane 2461 (7.6 mg), Nantskaya 4 (8.0 mg), Red Mirzai 228 (6.8 mg). Also, the content of P-carotene was dominated by the following varieties of carrots - Shantane 2461 (9.9 mg), Nantskaya 4 (8.1 mg) and Ziynatli (6.2 m).

It was found that the content of dry matter, sugar, pectin, vitamin C and P-carotene in the roots of carrots - Nantskaya 4, Shantane-2461, red Mirzai 228, Ziynatli varieties were the most preferred for

long-term storage, so these varieties were directed to further research .

The quality indicators of carrot roots are determined by the GOST 1721-85 standard. The transverse size of the largest diameter carrot should not exceed 2.5-6.0 cm.

**Table 3 Biochemical composition of carrot roots stored in relation to their size (2020-2021)**

Varieties	The size of the root	The composition of 100 g of the product	
		Dry matter, mg	Vitamin C, mg
Shantane 2461	Big	9,8	4,3
	Medium	10,2	5,6
	Small	12,1	6,8
Nantskaya 4	Big	9,0	8,1
	Medium	13,0	8,7
	Small	14,1	9,0
Yellow Mirzai 304 (control)	Big	10,1	4,7
	Medium	10,6	6,9
	Small	12,1	8,1
Red Mirzai 228	Big	5,1	6,3
	Medium	7,6	8,8
	Small	10,1	9,4
Nurli 70	Big	11,3	5,6
	Medium	12,4	6,3
	Small	12,7	6,9
Ziynatli	Big	11,7	6,2
	Medium	12,4	7,0
	Small	12,3	7,6

Based on the results of the technological analysis, it was found that there is a difference in the size of the roots of the carrot varieties coming to the warehouse.

In our research, carrots were separated according to the diameters of the roots.

1. Small roots (diameter 2.5 - 3.5 cm);
2. Medium-sized roots (diameter 3.5-5 cm);
3. Large roots (diameter 5-6 cm).

Studies have shown that the highest content of dry matter and vitamin C is characteristic of small-sized carrot roots, the results are presented in Table 3. According to the data in the table, the highest values of dry matter and vitamin C in small-sized roots were observed in Nantskaya 4 (14.1 mg) and Ziynatli (12.3 mg) varieties.

In the process of storage of carrot roots, it was found that medium and large size roots can be stored and their nutritional value is high. It was found that the amount of dry matter and vitamin C in carrot large roots was higher in Ziynatli variety (11.7 mg), Shantane 2461 variety (9.8 mg) and Nantskaya 4 variety (9.0 mg).

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