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DIETARY VALUE AND SAFETY OF CARROTS IN THE DIET FOOD**Voitsekhivskiy V. / Войцехівський В.***Ph.D., associate professor / к. с.-г. н., доц.**National university of life and environmental sciences of Ukraine, Kiev***Konakh V. / Конач В.***PhD., assistant professor / к. мед. н.**Bogomolets National Medical University, Kiev***Voitsekhivska O. / Войцехівська О.***Ph.D., associate professor / к. б. н., доц.**Taras Shevchenko National University of Kyiv, Kiev***Vaskivska S. / Васківська С.***head of department / завідувач відділу**Ukrainian Institute for Plant Varieties Examination, Kiev*

Abstract. In article a detailed analysis of the biochemical composition of fresh carrots are presented. Changes in valuable components of the biochemical composition of carrots after prolonged storage have been analyzed. after 180 days of storage reduced the solids content by 25-28%, the amount of sugars - 30-32, vitamin C - 48-50, β -carotene - 40-42 and nitrates - 22-26%, which reduces the calorie content of the product by 25-30%.

Keywords: carrots, chemical composition, storage.

Carrots are an important crop in the vegetable industry of Ukraine, and its share among other vegetable crops by area of sowing is 7-8%. This culture is in demand among the population due to its taste, nutrition, diet, medicinal and culinary properties. Carrot root is an excellent raw material for the processing industry because it retains valuable technological and nutritional properties for a long time. In recent years, the production of vegetables has been declining, the actual level of their consumption by the population from the physiological norm is 55-65 % [3].

Nutrition is a major physiological need for humans. Balanced nutrition is needed for the construction and constant renewal of cells and tissues, energy input to replenish the energy expenditure of the body and the substances from which enzymes, hormones and many other regulators of metabolic processes are formed. The harmonious metabolism, normal structure and function of all cells, tissues and organs are directly dependent on the balance of the diet. In order to maintain health and efficiency, a person must constantly consume various natural and nutritious foods. Vegetables belong to this group and are a major source of vitamins and amino acids, macro and microelements, carbohydrates, proteins, natural dietary fibers, enzymes, volatile substances, aromatic compounds, etc. Raw carrots have a low calorie and glycemic index (30-35) and is therefore a good product for people with carbohydrate metabolism and diabetes [7, 12, 13].

Carrot roots are formed by biologically active carotenoids – plant pigments that exhibit high antioxidant, anticancer, cardioprotective, angioprotective, radioprotective, photo-protective and immunomodulatory properties in humans. They are synthesized in many products of plant origin, but the most accessible source is colored vegetables (yellow and orange), which provide β - and α -carotene, dark green – lutein. Carrots are the leader in carotenoid accumulation. Carrot β -carotene

improves lung function and improves vision. Carrot roots also contain other valuable nutrients: C, E, K, B₁, B₂, B₃, B₆, PP, biotin (table) [3, 4, 8, 9].

Dietary fiber is a necessary component of a person's diet. By resistance to bacterial fermentation, the fiber is divided into those that are subject to partial and complete fermentation, and those that are not fermented. The first group includes pectin, gum, mucus, the second - cellulose and hemicellulose, the third - lignin. Vegetables are an important source of the first group of dietary fiber. These compounds normalize the functioning of the intestine, promoting the development of beneficial microflora and slowing the absorption of fast carbohydrates. Pectic substances of various nature have a mild detoxifying effect. According to various authors, the deficiency of these compounds in the diet of modern youth is – 65-70 % [3, 10, 11].

Fresh and processed carrots are a component of prophylactic and dietary nutrition for various diseases, including diabetes, hypertension, gastritis, digestive disorders [3].

The purpose of the study was to evaluate changes in the biological value of carrot roots after prolonged storage.

Table

Chemical composition of fresh carrots

Content of valuable nutrients in 100 g of raw carrots			
	vitamins	macroelements	microelements
Water – 86-90 g			
Protein - 1,1-1,4 g	Vitamin A - 9,0 МГ	Fe - 0,7 mg	Al - 323 МКГ
Amino acids are essential – 312 mg	Vitamin B ₁ - 0,06 МГ	K - 200 mg	B - 200 МКГ
Amino acids are replaceable - 595 mg	Vitamin B ₂ - 0,07 МГ	Ca - 27 mg	Va - 99 МКГ
Monosugars - 3,4-5,9 g	Vitamin B ₃ - 0,3 МГ	Mg - 38 mg	I - 5 МКГ
Saccharose - 2,1-2,5 g	Vitamin B ₆ - 0,1 МГ	Na - 21 mg	Mn - 200 МКГ
Organic acids - 0,22-0,28 g	Vitamin B ₉ - 9,0 МКГ	S - 6 mg	Cu - 80 МКГ
Cellulose – 2,4 г	Vitamin C - 5,0 МГ	P - 55 mg	Mo - 20 МКГ
Calorie content - 30 ккал	Vitamin E - 0,2 МГ		F - 55 МКГ
	Vitamin H - 0,6 МКГ		Cr - 3 МКГ
	Vitamin PP - 1,0 МГ		Zn - 400 МКГ

Conditions and methods of research. The experiments were carried out at the department of technology of storage, processing and standardization of plant production after name B.V.Lesika NULES of Ukraine and UIPVE of Ukraine. Quality products were laid accordingly SSTU ЕЭК ООН FFV-10:2007 Carrot. Supply and quality control guidelines, and stored in containers in specialized storage for 6 months according to SSTU ISO 2166-2002 Carrot. In the carrot samples before and after storage were determined by the content of: dry matter (DM), total sugars (TS), sucrose (S), monosugar (MS), vitamin C, β-carotene and nitrates (N). Research conducted by conventional methods [1, 2, 4, 5].

Results of the studies and their discussion. During long-term storage in the roots of carrots are physiological and biochemical processes that result in changes in all components of the biochemical composition. After 180 days of storage of carrots in a specialized store, the reduction of dry matter (DM) averages 25-28% (figure).

The reduction of total hydrocarbons content in root crops during the studied storage period is on average 30-32 %. Reduction of sucrose is 28-32 %, and of monosugar – 29-31 %. It should be noted that this trend decreases the calorie content and glycemic index of the product. The biological value of carrots is determined by the content of β -carotene and vitamin C. These compounds that are involved in root metabolism undergo alteration and inactivation. The decrease in the concentration of ascorbic acid is almost 48-50 %. The content of β -carotene is reduced by 40-42 %.

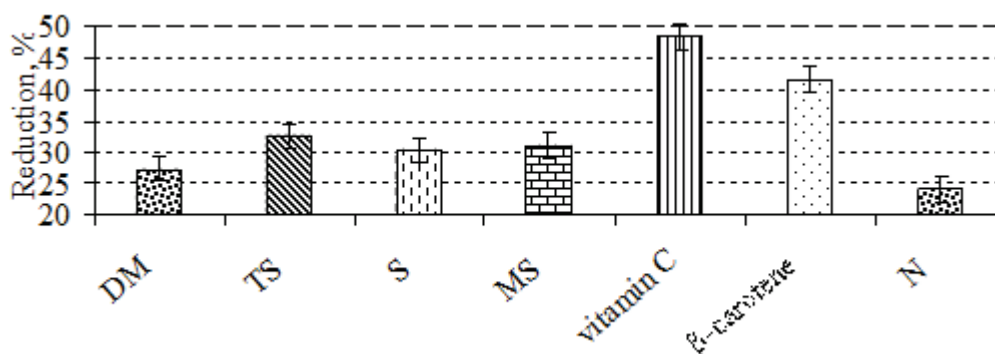


Figure. Reducing the content of valuable nutrients in carrots after prolonged storage

An indicator that characterizes the safety of carrots is the content of nitrates. This index did not exceed the maximum permissible values when storing. In plant organisms, nitrates are involved in metabolic processes, converted into amino acids and proteins. After storage Nitrate reduction is 22-26 %, which has a positive effect on product safety.

Conclusions. During the storage of carrots decrease in all studied components of the biochemical composition: carbohydrates – 30-32%, vitamin C – 48-50, β -carotene – 40-42% and nitrates – 22-26%. At the end of storage, the caloric and glycemic index of the product is reduced by 25-30%. After long-term storage, carrot roots are a quality and technological raw material for processing. The data obtained should be taken into account when using carrots for processing, and when drawing up menus for diet and preventive nutrition.

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