



## THE SCIENTIFIC AND PRACTICAL SIGNIFICANCE OF ORGANIC POWDERS MADE FROM ROOT CROPS IN THE FOOD INDUSTRY

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### Abstract

The article describes the beneficial properties of carrot (*Daucus carota*) and ginger (*Zingiber officinale* Rose) root for the human's health, the technology for making organic powder from them, the use of prepared organic powder as a biologically active substance in food and confectionery industry, the criteria for making bread and bakery products. The study was aimed to develop cake supplemented by carrot powder and to evaluate its quality parameters. Four samples were prepared to contain different proportions of carrot and ginger powders ( 15/5, 20/5, 30/5, 50/5 % w/w) in combination with wheat flour. The nutritional and sensory properties of bread and bakery products were also evaluated. The bread and bakery products supplemented with 20/5% (w/w) carrot and ginger powder had significantly, improved the nutritional quality compared to control one (without carrot powder). The main sensory scores of highly acceptable carrot powder cake S2 (80:20). The nutritional and sensory analysis suggested that the cake formulated by 20% (w/w) carrot powder was comparatively more acceptable than other formulations ( 0, 15, 30, 50% w/w).

**Keywords.** Ginger, organic powder, glycosides, virus, bullet blender, sensory evaluation, zinc, medical, chemically synthesized products, biologically active compounds (BAC).

### Introduction

In recent years, more than 90 laws, 88 decrees and 265 resolutions has adopted on the development of the agricultural sector by the President of Republic of Uzbekistan. In particular, the Resolution of the President of the Republic of Uzbekistan "On Additional Measures for Deep Processing of Agricultural Products and Further Development of the Food Industry" PD-4406, the Decree "On the Development Strategy of New Uzbekistan for 2022-2026" , a number of priorities are set out in the development strategy formula, including an increase in agricultural income by 5%, the





widespread introduction of processing technology in industry; tasks such as creating a product base and the widespread introduction of innovative technologies in their fields. In accordance with the decrees and resolutions on the development of the field, 32.2% of agricultural production of fruits and vegetables and 8.7% of Gross Domestic Product (GDP) were provided [1,2].

In the following years, enrichment of food with artificially synthesized products may lead an increase in stress, unhealthy lifestyle. It is important to eliminate these factors and ensure good health, to nourish the body cells with natural products for longevity; more than 600 substances necessary for the human body must be replenished at the expense of natural foods [10].

The human diet has changed radically, and the amount of natural and healing products in the diet has been relatively reduced. They are being replaced by artificially prepared and chemically synthesized products. As a result, in all countries, including our country, the consumption of such emotionally satisfying foods, consumption of semi-finished products, obesity due to overeating, atherosclerosis, diabetes, high blood pressure, heart attack, stroke and other diseases of civilization are increasing [13].

When chemical and technical processing of agricultural products, vitamins, amino acids, phospholipids, micronutrients and various biologically active compounds are released or decomposed and denatured. Epidemiological analysis shows that the reduction in morbidity and mortality is due to regular consumption of natural products [7].

Medicines derived from plant sources play an important role among the drugs used in various diseases. The relevance of the use of such drugs is very important in recent decades, as there is a sharp increase in toxicoallergic diseases in the treatment with synthetic drugs. Recent research shows that medicinal plants have optimal ratios of a complex of biologically active substances with medicinal properties, which are evolutionarily and genetically closer to the human body than synthetic means. Herbal preparations with therapeutic and regulatory effects affect metabolic processes in the body, increase its protective properties and phagocytic activity of leukocytes. [25,26,27]. Herbal medicines fully meet modern medical and biological requirements, as they are highly effective in therapeutic doses, have a wide range of therapeutic properties, have no side effects, make them a symptomatic, prophylactic and long-term treatment for all age groups.

Consumption of thousands of newly synthesized pharmaceutical drugs and fruits grown using chemicals and pollution of the environment leads to several diseases of the organism. To do this, it is important to consume natural products throughout daily



life. Vitamins and minerals that are important for the human body are found mainly in natural fruit and vegetable products, which are consumed directly and in the form of processed products for daily needs.

Carrot root is a powerful source of bioactivity and is important in strengthening the human body with its richness in vitamins, organic acids, minerals, macro and micronutrients [9,12]. Carrot is an economically important crop that has become increasingly popular recently due to increased awareness of its nutritional value. Among 39 fruits and vegetables carrots have been ranked 10th in nutritional value. The storage organ (root) of the carrot is the part of the plant that is most often consumed. They are consumed uncooked in salads, steamed or boiled as vegetables and may also be cooked with other vegetables in the preparation of soups and stews. Besides being food, carrot has therapeutic importance as it enhances resistance to blood and eye diseases. Carrots do not supply a significant amount of calories to the human diet, but do supply nutrition in the form of photochemical, particularly carotenoids. The greatest nutritional interest in carrots stems from their photochemical content, but research has also focused on carrots as a source of dietary fiber. Nutrient content of carrots can vary with cultivar, season, environmental conditions, and maturity [13].

The characteristic value of ginger differs from other root and vegetable species in that it is composed of carbohydrates such as fructose, glucose, various amino acids, including omega-3, omega-6, vitamins: E, K, S, B<sub>3</sub>, B<sub>5</sub>, B<sub>6</sub>, glycosides, minerals: iron, magnesium, phosphorus, potassium, zinc, copper and manganese, most importantly the presence of the element germanium. Ginger plant extract has an important practical role in medicine in the treatment of various diseases, especially in the prevention and treatment of viral diseases such as colds, influenza, covid-19 from acute respiratory diseases, as well as enhancing the immune properties of the organism. It is known from scientific sources that the root of the ginger plant plays an important role in the prevention and treatment of acute covid-19 viral diseases that occurred in European countries in 2019-2020 [5].

Abu Ali Ibn Sina used the root of the ginger plant as a mood-boosting, invigorating, anti-vomiting and anti-diarrhea medicine. Ginger root extract has analgesic, invigorating and antibacterial properties. He recommended consumption when muscles, muscle ache, sprains, tissue damage. Its root is very useful, improves blood circulation, provides effective assistance in the process of weight loss. It lowers blood pressure along with diluting the blood [23].



## Materials and Methods

The application of organic powder in the form of biologically active compounds (BAC) from vegetables in the food and confectionery industry is one of the current issues. For this purpose, a number of innovative research works on the preparation of organic powder from root products are being conducted at the Namangan Institute of Engineering and Technology. Research has been conducted on the preparation of organic powder from carrot and ginger root and the use of the prepared powder in the food industry in 2021-2022.

The studies used three repetitions, four different variants of carrot Red Mirzoyi and Yellow Mirzoyi and ginger root. To make organic powder grown carrots and ginger roots were sorted and cleaned [4]. Then, at the 85 C° roots were blanched in boiling water. Blanched products were cut into 1 cm thick fan shapes according to the methodology and dried in a drying oven at a temperature of 70-80 °S for 4-5 hours. [14,15]. The dried product was crushed in a bullet blender and divided into fractions. Various products were prepared by adding the obtained powder as BAC in the production of bread and bakery products in the food industry. [20]. Samples were prepared in four variants by adding 15, 20, 30, 50% carrot powder to wheat flour to make a cake. The chemical composition of the flour used was as follows: water 14%, protein 10.6%, carbohydrate 73%, cellulose 0.2%, ash 0.5%. A relatively low nutritional value was found when the cake was prepared by adding 15% carrot powder and 5% ginger powder. In the S<sub>3</sub> and S<sub>4</sub> variants, the viscosity increased due to the increased amount of carrot powder, and the inside of the cakes did not cook well.

## Results and Discussions

In the variant (S<sub>2</sub>) with the addition of 20% carrot and 5% ginger powder to the cake, the nutritional quality was significantly improved, and the quality was found to be higher compared to the control (without organic powder). The cake prepared in the S<sub>2</sub> (80:20) ratio was sensory evaluated to have a better taste than other samples. (Table 1, Figure 1)

Table 1. Cakes with carrot powder (optional)

Product type	S <sub>0</sub>	S <sub>1</sub>	S <sub>2</sub>	S <sub>3</sub>	S <sub>4</sub>
Wheat flour	100	85	80	70	50
Sugar	7	7	7	7	7
Vegetable oil	7	7	7	7	7
Carrot powder	0	15	20	30	50
Ginger powder	0	5	5	5	5
Other compounds	15-20	15-20	15-20	15-20	15-20





**A**

product made by  
adding 20% carrot and  
5% ginger powder

**B**

product made by  
adding 30% carrot and  
5% ginger powder

**C**

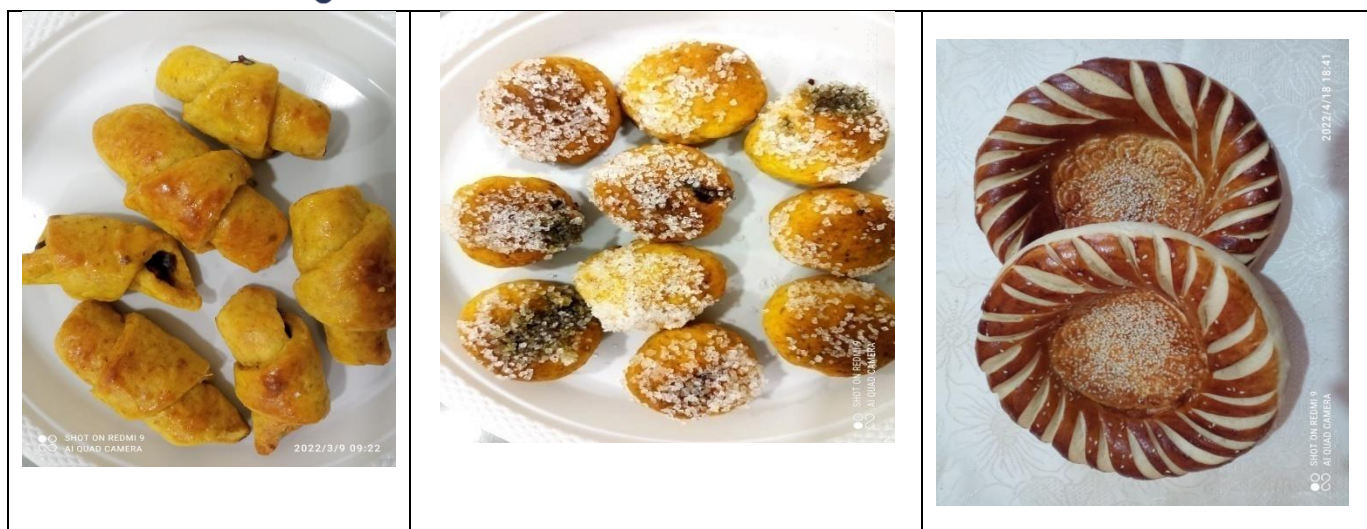
product made by  
adding 50% carrot and  
5% ginger powder

**Fig. 1. Samples of cakes made with the addition of BAC**

In the laboratory, samples of bread from other types of bread and bakery products, Bundt cake, biscuits of different shapes with the same composition were prepared. Experiments show that the optimal ratio of organic powder (carrots, ginger) in bread products is 15% -5%. In biscuits and cakes, the addition of 20% carrot powder and 5% ginger powder was found to be acceptable in terms of appearance, nutritional and other parameters (Tab. 2, Fig. 2).

**Table 2. Standards for the use of organic powder as BAC in the preparation of bread and bakery products**

Product type	Composition of compounds %					
	Wheat flour	Sugar	Vegetable oil	BAC		Other compounds
				Carrot powder	Ginger powder	
Bread	55	0	7	15	5	15-20
Hole cake	55	0	7	15	5	15-20
Biscuits	45	7	7	20	5	15-20
Cakes	45	7	7	20	5	15-20



**Fig. 2 Samples of bread and bakery products prepared with the addition of organic powder**

## Conclusions and Recommendations

The use of organic powder as a biologically active substance in the manufacture of bread and bakery industry may increase the body's resistance to viruses. The supply of vitamins and minerals necessary for the body through bread and bakery products is achieved through the use of BAC. Adding organic powder to bread and bakery products saves 30% of wheat flour consumption. Carrot powder, an abundant source of dietary fiber and mineral content can be used in the production of bakery and confectionery products. Protein, fat, ash and fiber contents in cakes can be increased by adding more carrot powder. The cake containing 20% carrot powder had a better appearance, taste, and texture compared to other cakes. This study suggested that cakes prepared with carrot and ginger powders of 20/5% (w/w) had comparatively better nutritional and sensory characteristics over control one. Therefore, bread and bakery products with 20% carrot powder are advised to consume in our everyday diet for health benefits.

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