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## INCREASE THE NUTRITIONAL VALUE OF PASTA WITH GRAINS AND PULSES

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**Abstract.** The main goal of this study is to develop a paste formulation containing a mixture of ginger, lemon and mint powder, as well as a combination of legumes and cereals with high nutritional value. This will expand the range of pasta. The task of achieving high quality and economic efficiency is solved by improving a number of technological processes and applying innovative methods. The effectiveness of using innovative methods of freeze-drying and microwave drying is shown in comparison with the process of drying instant pasta by frying them in vegetable oil.

**Keywords:** ginger, lemon and mint powder, lyophilization and microwave drying.

**INTRODUCTION.** On February 2, 2020, President Shavkat Mirziyoyev met with scientists, young researchers, heads of research institutions and representatives of the manufacturing sector. The most important tasks in the field of science were discussed at the meeting. The President instructed to comprehensively develop food products, including food mix, biomedical. It serves as a fundamental and technological basis for the development of agriculture, food processing, the food industry, as well as the study of the composition of food products and their impact on human health, the formation of a healthy lifestyle among the population and the importance of promoting proper nutrition. was highlighted. The nature of Uzbekistan is rich in many food plants.

Our great scientists have deeply studied these plants and have written many books about their beneficial properties. If we read this literature, deeply analyze it and carry out such scientific research, we will undoubtedly achieve great success. Pasta is widely used in everyday life, general food due to its quick preparation (cooking time 3-20 minutes depending on the navigation), good compatibility with other products and high nutritional value.

The composition of pasta without additives includes: Proteins 9-13%, easily digestible carbohydrates 76-78%, fats - 1.0%, minerals - 0.5-0.9%, dietary fiber - 0.1-0.6% . The energy value of 100 g of the product is about 1400 kJ. The product contains more vitamins than B and PP vitamins. In addition, pasta has other advantages [1].

It can be stored for more than a year without changing its properties, does not wear out at all, has low hygroscopic properties compared to dry cereals, and is resistant to transportation. Due to the popularity of pasta in the world and the growing demand for it, pasta has developed rapidly. This has led to the introduction of accelerated technologies that can reduce time-consuming and energy-intensive processes and increase yields. Today, as before, Italy is the leading country in the production, consumption and export of pasta. Pasta in Italy in the last decade, production amounted to 1800-2500 thousand tons. There are 26 kg of pasta per capita (more than 40 kg per year in the southern regions) and more than 20% of the production is exported.

The United States is the second largest producer of pasta. The annual production capacity was 1300-1800 thousand tons, and the population per capita was 7.4 kg in 1987 and

13.4 kg in 2018. Now this figure has reached about 14 kg. The stable demand for pasta among the local population is a good reason to include the product in the list of functional food products. There are many opportunities in the production and enrichment of non-traditional types and varieties of products.

Table-1

## Cereals and legumes of local production

Plant type	Content, %			Ingredients, 100 mg/g						The energy value	
	Squirrels	oils	Carbohydrates	Potassium	calcium	magnesium	iron	B1	pp	kcal	kJ
Soft wheat flour	12,7	1,6	66,6	350	57	104	5.7	0,46	7,13	315	1318
Hard Wheat flour	12,5	1,9	67,6	325	62	114	5.3	0,37	4,94	320	1339
Rice flour	7.3	2.0	63,1	202	66	116	2,6	0,52	3,82	284	1188
bean flour	22,3	1,7	54,5	1100	150	103	12,4	0,5	2.1	309	1293
chickpea flour	23,0	1,2	53,3	873	115	107	9.4	0,81	2.2	303	1268
soy flour	34,9	17,3	26,5	1607	348	191	11,8	0,94	202	395	1444
mush flour	24,2	1,5	46,3	672	83	80	11,8	0,50	1,8	295	1218
mustard flour	25,8	30,8	23,4	608	254	238	-	-	-	474	1485
barley flour	10.50	1,60	74,5	309	32,0	96,0	2,7	0,4	2,4	345	1165

In enriching the chemical composition and nutritional value of pasta, it is important and valuable for the human body to add legumes and cereals (buckwheat, mung beans, soybeans, peas, rice, barley) to the pasta recipe. Promising innovative projects in the pasta industry. In developed European countries, pasta is produced only from durum wheat. In Uzbekistan, we do not grow durum wheat and do not have this raw material base, therefore we use only flour from soft wheat grains. In order to develop the raw material base, the Government of the Republic has determined specific measures to expand the sown areas of durum wheat, increase the production of pasta from durum and highly transparent wheat grains [2]. Targets and goals: In the production of traditional and instant pasta (food mix), in the preparation of additives with high nutritional and functional value (spices, protein-rich cereals, medicinal fruits and vegetables) and in pasta production, enrichment of the product composition and improvement of consumer properties, as well as the study of technological processes with high efficiency (energy saving, antimicrobial devices, fully automated) are the goals and objectives of our scientific work.

**MATERIAL AND METHODS.** From flour of soft varieties of wheat are characterized by high calorie content, but low nutritional value. Therefore, the enrichment of pasta with natural additives rich in protein and vitamins with high nutritional value, as well as medicinal (ginger, zest, kiikoti, mint, licorice, saffron, frankincense, sesame, sesame, razor, parsley,

roccola, black currant, etc.) can be used from plant substances [7-13]. Vitamins used as fortifiers should be heat stable (do not decompose when pasta is boiled) and water soluble (to facilitate their addition during dough kneading). Therefore, it is advisable to use B vitamins (B1, PP) [3-6].

From a certain dose of vitamin B1 in the preparation of pasta from baking flour, the use allows obtaining products of a color close to the color of durum wheat products, while increasing the nutritional value of the product. Since 50% of the vitamins added to foods are digested during cooking, it is advisable to fortify pasta for soup.

Table-2

### Chemical composition of medicinal plants of local production

Types of medicinal plants	Content, %			Ingredients, 100 mg/g						The energy value	
	squirts	oils	carbohydrates	Potassium	calcium	magnesium	iron	B1	pp	kcal	kJ
Znajabil	1,82	0,75	15,8	415	16	43	0,6	-	0,75	80	335
glows	8,0	10,0	65	72	-	48	230	-	-	354	2000
Garlic	16,6	0,7	63,7	480	79	19	31	29	4	331	1386
white onion	10.41	1,04	79,12	985	384	113	3,9	0,5	1,8	341	1428
Chilli	10.58	5,81	69,86	1870	45	88	6,0	0,1	-	324	1356
Mint	19,93	6.03	52.04	1924	1488	602	87,5	0,3	-	285	1193
Beet	1,5	0,1	8,8	120	370	550	7,8	1,3	2	42	168,4
White turnip	0,60	0,10	4.10	227	27	16,0	0,4	0,1	-	18	75,3
Lemon	7.4	0,18	75,5	345	28	139	0,75	0,02	6,2	345	1444
Pumpkin flour	1,00	0,10	6.50	204	25	14	0,4	0,05	0,7	22	92
Rucola	2,58	0,66	2,05	369	160	47	1,46	0,04	0,31	25	105

Our scientific and analytical project will help to effectively use the local raw material base and expand the range of new products and production. This is one of the most important goals and objectives facing the food industry. Instant pasta is a popular food product in our country. Thanks to the savings in cooking time and the convenience of eating, the demand from the population is high. About 200 million dollars of foreign currency will be spent on these products. The consumption of instant pasta is 1 kg per capita per year, while the total consumption of pasta is 3-5 kg per capita per year. The peculiarity of instant pasta is that the product is dried in vegetable oil heated to a temperature of 130-150 degrees Celsius, the moisture content is dried and turned into a finished product. During the roasting process, flour proteins, as a result of strong denaturation, bind fatty lipids. Such cases reduce the shelf life of the finished product, which negatively affects its quality.

We can use modified starch in pasta production. Starch added to the dough plays an antioxidant role, and as the amount of starch increases, its antioxidant effect becomes more pronounced. In the production of instant pasta, it is possible to obtain a quality product without the use of a frying system, for which we can dry the semi-finished product by microwave drying after the evaporation process. The peculiarity of this process is that the

protein and vitamins in the product do not lose their properties, all harmful microbes are lost, the fat mass, which increases the cost of the product, is not involved. To date, there is no information that a method similar to the technology of microwave drying of products has been invented. This is the rare case when serious defense equipment bypassed many branches of science and economics, began to be used in household appliances, and then overgrown with various industries. Microwave equipment is widely used for quick drying and cold preservation of fruits, vegetables, spices, meat, fish, cereals and other products, as well as for the production of natural food colors.

At present, the microwave drying method is an integral part of many technological processes. The peculiarity of this method is that when exposed to microwave radiation, the entire product is heated simultaneously. The ease of use of microwave equipment can significantly reduce the cost of the drying process, which in turn reduces the cost of the finished product. Another important advantage of this drying method is that it is low temperature and requires less time to obtain a dehydrated product.

The effective use of this valuable property of microwave drying in the processing of products allows you to save the maximum amount of vitamins and other useful substances. Foods dried in a microwave oven have a long shelf life. Because under the strong influence of the microwave field, any microflora is completely destroyed, that is, the product is disinfected simultaneously with drying. The environmental friendliness of this drying method is due to the fact that the power source of the microwave oven is the cleanest form of electricity. The technological process of microwave drying completely eliminates the release of harmful emissions into the atmosphere. Today, microwave technologies are widely used in the production of many food products, including children's and adolescents, special nutrition for athletes, dietary products, instant products, sauces, seasonings, dryers, meat, and are effectively used in the dairy and non-confectionery industries [14-14]. twenty]. It is used to impart color, taste and aroma to natural dried products made by microwave drying without the use of chemical additives and dyes.

Microwave drying technology allows you to increase the shelf life of dried products up to 1 year or more without preservatives. Products dried under the influence of a strong microwave field do not require special storage conditions (refrigeration equipment, etc.), and significantly reduce storage and transportation costs. We can say that the method of microwave drying in an airless environment, which today is an innovative device, is an improved sublimation method. The influence of the method of airless microwave drying on the quality and efficiency of pasta storage has not been studied enough. One of the objectives of the study was to determine the parameters that ensure maximum preservation of products by studying the process of drying pasta in the form of semi-finished products and microwave airless environment when drying plants that we intend to use. Under laboratory conditions, an experimental setup was used for airless drying of vegetable raw materials in a microwave oven. Air drying without the use of a microwave oven has been found to provide good nutrient retention during drying and storage of dried foods.

**RESULTS AND DISCUSSION.** The content of valuable substances in instant pasta dried by the microwave airless medium drying method is several times higher than the amount of dried substances by convective and frying methods. Looking at the cost-effectiveness of the study, agricultural fruits and vegetables and other wet fruits are dried by various methods (convective, sublimation, infrared irradiation).

These methods primarily consume a lot of electricity and dry wet food for a long period of time. The chemical composition of dried products can be well preserved with some of our methods (sublimation), but economically this leads to an increase in the cost of the product.

Table-3

## Innovative Methods for Drying Instant Pasta in a Microwave Airless Environment

Types of semi-finished products	Moisture content of dried semi-finished products, %						Differences
	In a drying microwave at a frequency of 1827 GHz for 3-4 minutes.			In a baking bath (palm vegetable oil) 3-5 minutes			
	Minimum amount	Maximum amount	Average index	Minimum amount	Maximum amount	Average index	
Prefabricated corner wall 0.5 mm	4,3	4,7	4,4	3,7	4,1	3,9	0,5
Instant pasta wall 1mm	3,9	4,3	4,1	2,9	3,3	3,1	1,0
Best before date	12-24 months			5-9 months			12 months

In the production of instant and slow cooking pasta, consumers use a mixture of ginger, lemon and mint powder grown in the local climate of Uzbekistan, as well as flour and cereals from cereals and legumes with high nutritional value, to produce a variety of traditional and non-traditional instant pasta products that combine has unique healing properties. In addition, the use of the airless microwave drying method gave excellent and efficient results compared to the current method. The most important thing is that the color, smell and taste of the product remain the same. Excess vegetable oil was also saved. These results led to a reduction in the cost of production, an extension of the shelf life. In Table 3 below, we compare the difference between the airless microwave drying method and the roasting method.

The results of the table show that drying products in a microwave airless environment increases the shelf life. This is a very important stage of the technological process, and it is important to implement it correctly. The use of microwave airless drying in pasta factories is one of the innovative processes.

**CONCLUSION.** Ginger, lemon and mint powder, as well as a mixture of legumes and cereals with increased nutritional value. Pasta types have been expanded. High quality and cost-effectiveness are achieved through the improvement of a number of technological processes and the use of innovative methods. The efficiency of using innovative methods of sublimation and microwave drying is comparable to the process of drying pasta in vegetable oil.

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