



## NUTRITIONAL SUPPLEMENTS FROM GRAIN WITH MACRO- AND MICROELEMENT COMPOSITION OF SPROUTED COBS

I.R. Askarov

Doctor of Chemical Sciences, Professor, Academy of Uzbekistan "TABABAT", Uzbekistan

D.T. Khasanova

PhD in Chemistry, Associate Professor, Andijan State University, Andijan, Uzbekistan

Article history:		Abstract:
<b>Received:</b>	28 <sup>th</sup> December 2023	This article delves into the myriad benefits of nutritional supplements derived from grain with a focus on the macro- and microelement composition of sprouted cobs. A comprehensive exploration of the advantages associated with grains featuring sprouted cobs is presented, emphasizing their pivotal role in crafting nutritional supplements tailored for Functional Nutrition. Additionally, the article provides a practical and convenient method for home harvesting and preparation of wheat grain. Through rigorous studies, the macro- and microelement content of a novel nutritional supplement, derived from wheat grain, is meticulously analyzed. The findings illuminate the nutritional richness of the supplement, offering valuable insights for those seeking to enhance their dietary well-being
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### INTRODUCTION

Harvested grains have been used since ancient times to restore the activity of the endocrine system, to treat diabetes, to increase the overall strength of the body, as a softening agent, and to treat central nervous system diseases, cough and bronchitis. Cereal grains, also used in medicine and folk medicine, are a good source of vitamin E. Therefore, it is recommended for pregnant women for the growth and development of the embryo in the uterus. In the process of harvesting grains, internal enzymes are activated, and their amount increases 10 times [1]

### EXPERIENCE PART

**Experiment 1.** There are easy ways to make wheat germ at home. For this:

1. 100 g of grain is taken and washed 2-3 times.
2. Washed wheat grains are poured with water until the surface is 2-3 cm, and left for 1 day at a room temperature of 20-22 °C with water at 24-30 °C.
3. Then pour water from it, spread it in a dark place with a thickness of 2 cm and cover it with wet gauze.
4. Moisture is controlled until the roots of the grain are 2-3 mm long and the white shoots sprout. Depending on the conditions, the grains are kept moist so that they do not dry out.
5. When the grain roots are 2-3 mm, they are washed and considered grainy [2].

It is recommended to wash the grain twice a day so that it does not become sour. Nutrient substances are decomposed as a result of the activation of enzymes in the process of harvesting grains. These broken-down substances are easily absorbed by the body (amino acids, simple sugars, fatty acids). It is a harvested grain with 1-2 mm roots, which differs from whole grain in its amino acid, vitamin and mineral composition. Vitamins of group E and B in milled grains increase several times. Vitamin E has immunomodulatory and rejuvenating properties [3], [4]

The cheapest and most useful products for meeting the need for vitamins are whole grains, nuts, and legumes [5].

The composition of wheat in many ways:

- Up to 70% of carbohydrates are in the form of starch, disaccharides, nutritional tissues;
- 14% proteins (12 non-exchangeable and 8 exchangeable);
- up to 3% fiber;
- 2.5% fat and fatty acids;
- Minerals include Ca, K, P, Mg, Si, Fe, Zn, Cu, Mn, Na, Se, J;
- Vitamins include group B vitamins and C, D, E, and PP;

Cereal enzymes take an active part in the breakdown of proteins (break them down to amino acids), fats (break down into fatty acids) and carbohydrates (break down into easily absorbed sugars - maltose) [6], [7].

The ingredients are not considered active until the wheat grain is extracted. When grain is harvested, all substances are activated, their quantity increases and all stored nutrients are used for germination. Therefore, when wheat is consumed, it receives ready-to-absorb nutrients and does not require excessive energy to digest it [8].

From our research, it became known that many necessary components strengthen the immune system of the human body, treat anaemia, and improve the digestive system [9]. The following table shows the chemical composition of raw materials selected for food additives.

**Table 1. Chemical composition of the food additive**

No	Chemical composition				
	Protein, gr	Vitamins, mg	Carbohydrates, gr	Moisture, gr	Fats, gr
Raisins	3.4	22.6	79.52	14.97	0.46
Walnuts (Greek)	16.2	146.08	11.1	6	60.8
Sprouted wheat	7.49	45.3	42,53	47.75	1.27
Milled barley	5.8	94.85	31.7	46.5	1.3

The table below shows the composition of the food additive in different proportions of selected components.

**Table 2. Composition of new food additive compositions**

Compositions	Raisins (g)	Nuts (g)	Wheat (g)
ADU-1	25	25	50
ADU-2	30	30	40
ADU-3	50	20	30
ADU-4	33	33	33

As can be seen from above table 2, the yield of wheat collected in the composition of food additive ADU-1 was 50% (50 g), in the composition of ADU-4 it was 33% (33 g), and the same other components were selected in different proportions.

The amount of macro and micronutrients in the new ADU-4 food composition based on the selected components was chemically analysed.

**Experiment 2.** Macro and microelements in samples taken for experiments were determined by the optical emission spectrometric method avio 200 (isp-oes). For analysis, 200 mg of the sample was taken on an analytical balance (FA220 4N) for mineralization, i.e. to turn it into a clear solution. A mineralization device (MILESTONE Ethos Easy, Italy) was used to mineralize the sample. For this, a sample (200 mg), 6 ml of distilled nitric acid (HNO<sub>3</sub>), i.e. acid distilled in an infrared acid purification device (Distillacid BSB-939-IR) and 2 ml of hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) as an oxidant, are placed in the test tube of the device. 20 min. during 180 °C, all of the mixture is mineralized.

After the mineralization process is completed, the mixture in the test tube is diluted with distilled water (BIOSAN, Latvia) to 30 ml in a separate conical volumetric flask.

The solution in the flask is placed in special test tubes in the Autosampling Department for analysis. The prepared sample was analyzed in an Avio200 ISP – OES Inductively Coupled Plasma Optical Emission Spectrometer (Perkin Elmer, USA). The accuracy level of the device is high and allows to measurement of the elements in the solution up to 10<sup>-9</sup>g.

**RESULTS AND DISCUSSION**

The data obtained as a result of the analysis are as follows:

27 elements were analyzed

Element	Li (mg/L)	Al (mg/l)	Mo (mg/l)	Te (mg/l)	Se (mg/l)	Sb (mg/l)	Sn (mg/l)	Sr (mg/l)	K (mg/l)
Amount	1.9	83.2	4.9	3.4	0	0	0	267.4	8354
Percentage	0.002	0.083	0.005	0.0034	0	0	0	0.267	8.354

Ba (mg/l)	Cr (mg/l)	B (mg/l)	Ca (mg/L)	As (mg/l)	Fe (mg/L)	Na (mg/l)	Pb (mg/l)	Cd (mg/l)
12.6	108.4	1598.4	289.5	0	1198.2	733.8	0	0
0.013	0.108	1.589	0.289	0	1.198	0.733	0	0

V (mg/l)	Zn (mg/l)	Cu (mg/l)	Ag (mg/L)	Hg (mg/L)	Co (mg/l)	Ni (mg/L)	P (mg/l)	C (mg/l)	Mg (mg/L)
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0.56	1994.6	1138.4	0	0	0.14	0.74	7182.1	29.4	2012.9
0.0006	1.994	1.138	0	0	0.0001	0.001	7.182	0.029	2.013

## CONCLUSIONS

When the sample of the proposed food additive was analyzed, it was found that it is rich in trace elements such as K, P, Mg, and Zn. This increases the nutritional value of the product.

Potassium is one of the electrolytes in the body, most of it is inside the cells and ensures the functioning of the cells. This element plays an important role in the formation and functioning of nerve and muscle tissues. 90% of potassium is inside the cell, controls water-salt exchange and participates in the transmission of nerve impulses. Potassium deficiency leads to cardiovascular disorders. The body's daily need for potassium is 2000-4000 mg, and in the nutritional supplement offered by us, its amount is 8354 mg. This indicator fully covers the body's need for potassium and does not leave the need for chemical preparations in the treatment of various potassium deficiency diseases.

Phosphorus is part of body tissue and is important in synthesis and hydrolysis processes in the body. The daily requirement is 1200 mg, which is necessary for the body's energy production, muscle and nervous system activity, and bone growth. It also plays an important role in maintaining acid-base balance. This food supplement contains 7182 mg, which is almost 6 times more than the daily requirement, and solves the problems associated with phosphorus deficiency.

Zinc is necessary for the production of DNA and proteins in the body, muscle growth and recovery. It is considered necessary for the correct evaluation of taste and smell and helps to heal wounds. It strengthens the immune system and fights bacteria and viruses. Improves the digestive system and regulates hormones. The daily limit for zinc is 11 mg, and the nutritional supplement we offer contains 1994 mg of zinc, which was determined by chemical analysis. It can be used in the treatment of diseases related to it, fully covering the daily needs of the body.

Magnesium plays an important role in the activation of enzymes. Improves the functioning of the nervous system and heart muscles. It also participates in the growth of bones and lowers blood pressure by regulating heart rate. Regulates blood sugar levels. It relieves muscle pain. The magnesium element together with calcium increases the mineral density of bone tissue. The daily norm is 320-420 mg, and in the nutritional supplement we offer, it turned out to be 2012 mg. This helps in the treatment of several magnesium deficiency diseases.

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