RESEARCH ON THE USE OF *FAGOPYRUM SP.* FOR CULINARY PREPARATIONS

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At present, nutritional studies are oriented towards obtaining new functional foods. The utilization of Fagopyrum sp. fruits (buckwheat) opens new perspectives for the improvement of human nutrition.

Our research focuses on the preparation and characterization of several culinary products obtained with buckwheat. A comparative study between buckwheat based products and similar buckwheat - free products was performed.

***Key words**: functional food, basic meals, buckwheat, sensory analysis*

Buckwheat (*Fagopyrum esculentum*) is a plant of the genus *Fagopyrum*, family *Polygonaceae*. The herb is 20 - 60 cm high. Although it does not fall under the category of cereals, its seeds are similar to those of wheat and is used as grind flour. The plant comes from Asia and is widely spread in Europe by the Mongol and Turkish peoples.

Buckwheat (*Hrishca*, buckwheat) is not exactly a cereal but the fruit-seed of a plant, full of energy and nutrients, and its origins are in Asia being available all year round. The buckwheat flowers are very attractive to bees that produce special honey of dark colour and strong aroma.

Buckwheat has been cultivated since ancient times, but it is now when it stands for one of the most important alternative crops and an important raw material in the production of functional foods.

In the tissues and seeds of this plant there are many nutrients. It is a valuable source of starch, protein, natural antioxidants, dietary fiber. The proteins contained in the buckwheat flour have a unique amino acid composition with special biological activity. In addition to proteins of high nutritive value, the buckwheat seed also contain several components with healing effects: flavonoids and flavone, phytosterols, fagopirines, proteins that bind thiamine. Unfortunately, the proteins with allergenic effect and their derivatives are present in seeds. For the food industry the newest trend is to develop new functional foods, but perspectives are also focused on the production of food with curative effects.

The whole buckwheat groats contain 55% starch, 12% protein, 4% fat, 2% soluble carbohydrate, 7% fiber, 2% ash and 18% organic acids, phenolic compounds, tannins, phosphorilates sugars, nucleotides, nucleic acids, etc [1].

These values depend on the species of buckwheat. The protein components in buckwheat flour are only quantitatively less than those of oatmeal, but more numerous than those of rice, wheat, millet, sorghum, corn flours[2].

The buckwheat flour also contains rare elements such as K, Mg, P, Fe, Ca, Cu, Zn, Se, Ba, B, I, Pt, Co. These minerals are relatively concentrated in the outer layers of seeds and nuts.

The Flavonoides are a major group of natural antioxidants with effect in countering heart disease and cancer. In recent years, these substances have been investigated for the effects they have: anti-allergic, antibiotics, anti-carcinogenic and also antioxidant properties. They reduce the level of cholesterol in the blood, keep arteries and capillaries strong and flexible, reducing hypertension and the risk of arteriosclerosis [3, 4].

Therapeutic effects of consumption of buckwheat- based products are the following:

- reduces cholesterol (total cholesterol and LDL cholesterol - "bad" cholesterol) – by facilitating elimination of fats in faeces - protects against atherosclerosis;
- prevent the formation of biliary lithiasis (stones in gall bladder) - by improving the synthesis of biliary acids and removal of acidic and neutral fats;
- improves the content in magnesium and antioxidants, has a relaxing effect on blood vessels, improving circulation and reducing blood pressure;
- due to lack of gluten content it is a very useful food for people who are on a restrictive diet - such as in celiac disease;
- decrease the level of glucose and the response to insulin - hypoglycaemia effect, effective in diabetes;
- provides protection against breast cancer and hormone-dependent types of cancers;
- by the routine antioxidant - buckwheat is an antidote against irradiation with X-ray or other radiations [5].

MATERIAL AND METHOD

As materials were used:

- Beans and buckwheat flakes from specialized stores for homeopathic products;
- Raw materials of animal and vegetable origin (meat, eggs, milk, vegetable oil and spices) from the market.

Following the research carried out we aimed at setting a number of recipes for getting the best culinary preparations with the addition of buckwheat [7].

For sensory evaluation the following preparations were conducted:

- vegetable-based preparations: beans stew, stew of buckwheat beans, stew of buckwheat flakes [6];
- stuffed vegetables: peppers filled with rice, peppers filled with buckwheat beans, filling in leaves: rice Sarmalute (minced meat rolls in cabbage leaves), Sarmalute with buckwheat flakes;
- hash in leaves: meat rissole, buckwheat rissole, vegetable pie with meat and buckwheat.

The raw and auxiliary materials used to prepare the basic food preparations tested are shown in *Table 1*.

Table 2 provides a comparative analysis of the energy value of the classic products and those with addition of buckwheat.

Table 2

Energy value of the basic culinary preparations

Final products	Classical Variant (kcal)	Buckwheat Variant (kcal)
Filled peppers	878,20	564,45
Sarmale	868,11	637,85
Rissoles	823,40	556,18
Block	4105,46	1258,02
Stew	493,83	667,61

RESULTS AND DISCUSSIONS

Culinary preparations in the classical variant and those on the basis of buckwheat were sensory analyzed by a group of specialists and the score assigned to the quality indexes is illustrated in *Figure 1*.

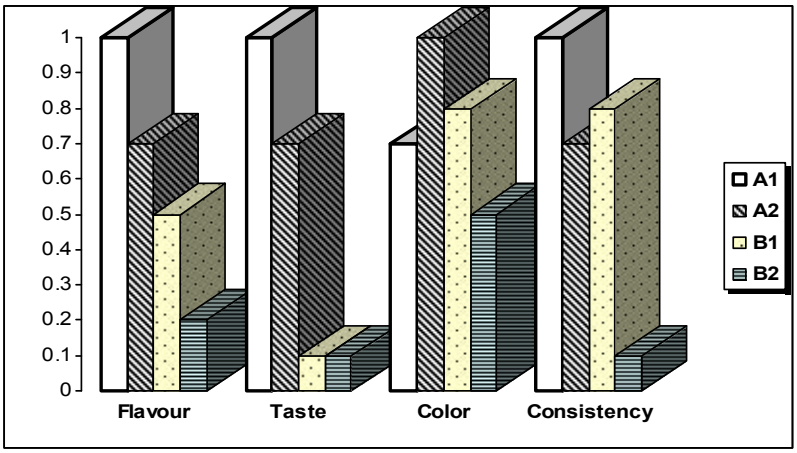

Figure 1 **Results of sensory analysis for stuffed peppers and sarmale**
A1 -peppers stuffed with rice, *A2*- peppers stuffed with buckwheat;
B1- buckwheat *sarmale* ; *B2* – rice *sarmale*

This figure shows that peppers stuffed with rice have a max. score in terms of flavour , taste and consistency unlike peppers stuffed with buckwheat which taste is less good being in the range 0,6-0,8, but the color obtained maximum score. The sarmale with buckwheat have low scores for flavour, consistency and taste, unlike the those with rice which characteristics of flavour , consistency and color are noticeably higher.

In case of rissoles and block classivally prepared and with e addition of buckwheat the sensory analysis results are shown in *Figure 2*.

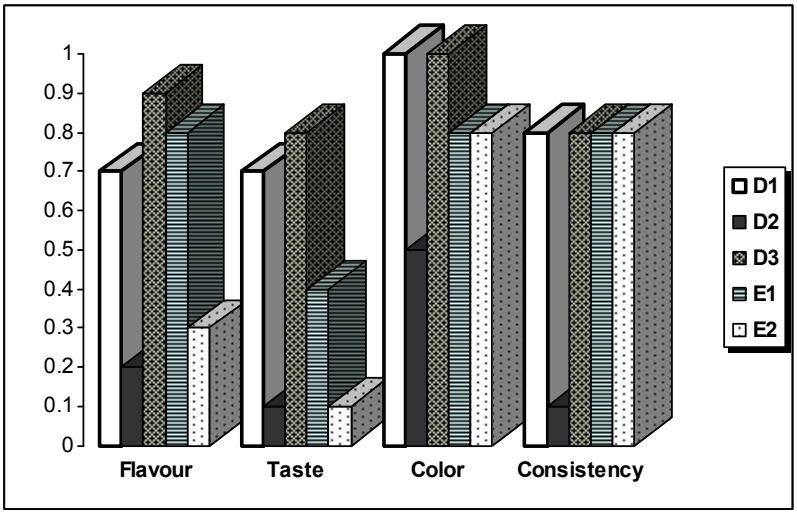

Figure 2 **Results of sensory analysis of rissoles and block**
D1-rissoles with boiled buckwheat, *D2*-rissoles with soaked buckwheat;
D3: meat rissoles; *E1*-meat pie; *E2* - buckwheat pie

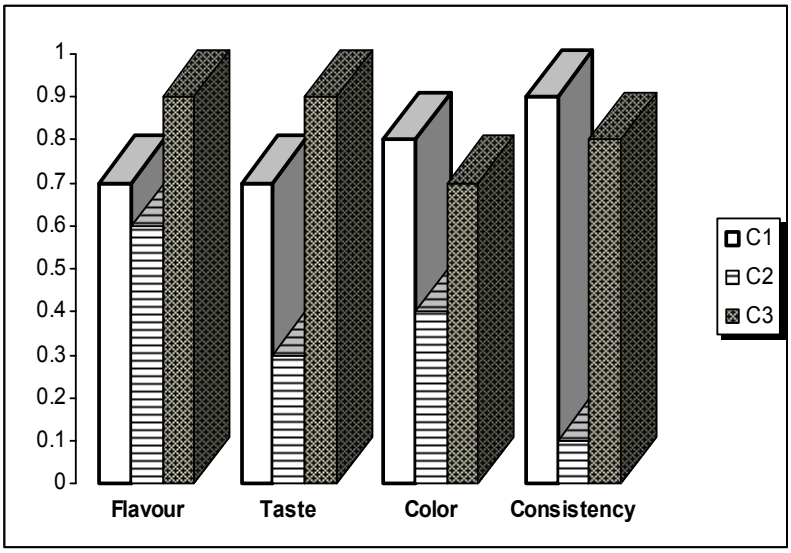

Figure 3 **Results of stew sensory analysis**
C1- buckwheat beans stew ; *C2* - buckwheat flakes stew ; *C3* - beans stew

In this figure it can be seen that the meat block gets a much higher score for flavour and taste as compared with buckwheat where taste, flavor and smell are very persistent. In case of rissoles the best option is that of meat, but those having cooked buckwheat beans obtained results very close to the meat rissoles.

Noteworthy is that rissoles with boiled buckwheat beans is the product with the best results of all the buckwheat-based preparations. The poorest results got the rissoles with soacked buckwheat beans where all features gor the lowest score. The results of sensory analysis of all stew variants are shown in *figure 3*.

From the analysis of the results we can see that buckwheat bean stew takes higher values in all of the quality features in comparison with the buckwheat flakes stew which, in order to reach a consistency of the buckwheat grains and beans stews , had to be enriched with semolina. The classic variant has the best score both in terms of taste and flavour.

Product **defects, causes** and **remedy** possibilities are presented in *table 3*.

CONCLUSIONS

As a result of the research and analysis carried out on culinary preparations with the addition of buckwheat, we can conclude the following:

Using grains of buckwheat in culinary preparations may present a number of **advantages**:

- Increasing the diversity range;

- Products feature a lower energy value in comparison with classical preparations, but higher nutritional value, due to the trophins existing in the beans/grains of buckwheat;
- Achieving a higher economic efficiency if buckwheat would grow in our country.

Inconveniences resulting from the use of buckwheat grains in our diets are:

- creating market sales by educating consumers to use grains of buckwheat in their food;
- products based on buckwheat requires the addition of spices in larger quantities or different products for softening the buckwheat flavour;
- buckwheat flakes are not recommended for use in minced composition, they can be used at breakfast as cereal and in mixtures.
- It is recommended to cook the buckwheat grains and not soaked in order not to obtain a preparation of raw or crisp appearance.

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Table 1

Ingredients used for basic food preparations, classical and with addition of buckwheat

Ingredients	UM	Type of preparation											
		With grains										With flakes	
		Stuffed peppers		Pie		Rissoles			Stew			Sarmale	
		I	II	I	II	I	II	III	I	II	III	I	II
Buckwheat grain	g	51		100		50	51		50				
- flakes	g										50	50	
Buckwheat flour	g			200	200								
Rice	g		75										75
Onion	g	54	65	133	200	52,5	51,5	53				56	54
Tomatoes	g	66,5	50			54	53	52				47,5	56
Peppers	g	150	145										
Mushrooms	g			200	200								
Garlic	g								5	3,5	4,5		
Minced meat	g				600			200					
Sunflower oil	ml	25	24	25	25	27	26	25	45	30	50	25	30
Lime juice	ml								5	2	4		
Eggs	buc.	1	1	4	6	2	2	2				1	1
Green parsley	g	14	13	13	12	13	12	13				13	12
Dill	g	11	12	12	12	11	12	13				12	11
Vine leaf	g											105	100
Wheat flour	g			400	400								
Beans	g									150			
Total	g	401,5	410,02	1258	1630	302,5	289,5	323,02	55,05	155,53	54,55	333,52	358,03
Final product	g	395,5	400,6	1150	1500	255	240,7	300,85	50,05	145,25	50,95	300,95	310,05
Specific cons.		1,01	1,02	1,09	1,08	1,18	1,2	1,07	1,09	1,07	1,07	1,1	1,15
Yield	%	0,98	0,97	0,91	0,92	0,84	0,83	0,93	0,9	0,93	0,93	0,9	0,86

Table 3

Characterization of buckwheat-based final products

Culinary product	Defects	Causes	Remedy
Peppers stuffed with buckwheat grains	Characteristic taste and smell	Lack of spices	A more pregnant use of spices to settle down the taste / aroma of buckwheat.
Sarmale with buckwheat flakes	Soft consistency, with unpleasant taste and smell	Due to the use of buckwheat flakes. Buckwheat flakes are not indicated for use in composition. Lack of spices	Flakes can be replaced with buckwheat grain. Sarmale must be spicy
Pie with buckwheat grains	Unpleasant smell and taste of leaves / grits	Inadequate use of spices	A more intense use of spices
Rissoles with soaked buckwheat	Very hard consistence after being fried	Using soaked grains	The buckwheat grains must be boiled before use
Stew with buckwheat grains	It tastes slightly unpleasant, rough, slightly pungent	Using soaked grains	Beans should be cooked, add more garlic and lemon juice
Stew with buckwheat flakes	Very soft consistency, a little pungent rough taste	Buckwheat flakes give a soft consistency	Add semolina to strengthen consistency