

## **A STUDY ON VALORIFICATION OF SPROUTS ON A PRODUCT CALLED “APINUTRIGERMIX”**

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### **Abstract**

*The aim of this work was to create a food with many qualities: with a very high nutritional value, very pleasant, very easy to find, buy and eat and many people to like it. Ice cream is a very pleasant food and many people like it. Unfortunate is one of the most important sources of energy with very poor nutritional value. Is well known that sprouts are an important source for many nutrients. So we use 5 different kind of sprouted seeds, whipped cream, walnuts, sugar and eggs for our product. We calculate the caloric values and the nutritive values for ice cream with and without sprouts to prove its very high nutritional value.*

**Keywords:** *sprouted seeds, nutritional value, ice cream*

### **Introduction**

Sprouts are real-life vitamins, minerals, proteins and enzymes. Their nutritional value was discovered by the Chinese thousands of years ago (Wilhelmson, 2001). Also, sprouts have a regenerating effect on the human body (Watanabe, 2004) because of their high concentration of RNA, DNA, protein and essential nutrients that can be found only in living cells (synthetic supplements are not live food).

The chemical changes that occur in the sprouting seed activate a powerful enzyme factory (Barbu, 2001) never to be surpassed in later stage growth of any legumes. The rich enzyme concentration can lead heightened enzyme activity in your metabolism, leading to regeneration of the bloodstream. Sprouted grain appears to prevent depletion and earlier disappearance of youth. Some vitamins increase during sprouting by 500%! In wheat vitamin B-12 quadruples, other B vitamins increase 3 to 12 times (Holas, 1983), vitamin E content triples (Prodanov, 1997).

Sprouts are the ideal supplement - The food of the future. They are economical, ecological, low in calories and fat, easy to store, fast and easy to grow, tasty and versatile. For the avoidance of toxic build-up, free radicals, oxides, hydroxyls, etc....we need to add nutrients directly from nature (Costin, 1999) and 100% organic - Sprouts are the answer. This conviction was our motivation to develop the APINUTRIGERMIX product.

Germination of seeds leads to an increase in the nutrients content (see table 1). Even content in amino acids like lysine and tryptophan which are limiting amino acids for cereals increase. Germination has been used to lower the phytate content of seeds. Phytate is an antinutritional factor considered to reduce bioavailability of minerals.

### **Experimental**

Five different types of sprouted seeds (wheat, soybean, pea, bean and lentils), whipped cream, eggs, honey, sugar and walnuts were used for preparation of APINUTRIGERMIX product. The recipes with and without sprouted seeds can be seen in Table 2.

The seeds and the walnuts used were a common type purchased from a local market. Cream was of the brand „La Dorna”. The white refined sugar was of the brand „Cristal”. Honey and eggs were from producer.

Processing method for standard walnut ice cream it can be seen in figure 1. Our work team proposes a processing method for APINUTRIGERMIX product like that for standard recipe which was enhanced with some technological phases (part marked in grey color - see figure 1).

### **Results and Discussion**

A comparative evaluation for the caloric and the nutritional value of the two ice creams are shown in Table 3.

**Table 1** – Comparative information about nutrient content in dry seeds and in sprouted seeds\*

Seeds	WHEAT			BEANS			PEAS			LENTILS			SOYBEANS		
	a	b	c	a	b	c	a	b	c	a	b	c	a	b	c
Water (g)	12.7	47.7	30	11.7	90.7	79	11.2	62.2	51	11.9	67.3	55.4	8.54	69	60.46
Energy (kcal)	329	198	4.5	333	29	-65	341	128	-45.38	338	106	-59.5	416	122	-61.3
Protein (g)	15.4	7.49	-3.31	23.5	4.2	18	24.5	8.8	-4.31	28	8.96	-4.38	36.4	13	2.14
Lipid, total (g)	1.92	1.27	21	0.83	0.5	4.4	1.16	0.68	0.49	0.96	0.55	0.59	19.9	6.7	-0.15
Carbohydrate (g)	68	42.5	3.5	60	4.1	-23	60.3	28.2	6.7	57	22.1	2.88	30.1	9.57	-2.04
Fiber, total dietary (g)	12.2	1.1	-11.8	24.9	-	-	25.5	-	-	30.5	-	-	9.3	1.1	-6.62
<b>MINERALS</b>															
Ca (mg)	25	28	24	143	17	20	55	36	33.3	51	25	18.56	277	67	-86.74
Fe (mg)	3.6	2.14	0	8.2	0.81	-0.5	4.43	2.26	0.99	9.02	3.21	-0.42	15.7	2.1	-10.39
Mg (mg)	124	82	14	140	21	67	115	56	18.64	107	37	-8.3	280	72	-73.89
P (mg)	332	200	2.4	407	37	-62	366	165	24.35	454	173	13.73	704	164	-240.7
K (mg)	340	169	-65	1406	187	418	981	381	-96.79	905	322	-42.53	1797	484	-403.5
Na (mg)	2	16	28	24	6	37	15	20	36.02	10	11	22.29	2	14	42.97
Zn (mg)	2.78	1.65	0	2.79	0.4	1.1	3.01	1.05	-0.61	3.61	1.51	0.52	4.89	1.17	-1.57
Cu (mg)	0.41	0.26	0	0.95	0.15	0.5	0.86	0.27	-0.25	0.85	0.35	0.11	1.65	0.42	-0.45
Mn (mg)	4.05	1.85	-1.09	1.02	0.18	0.7	1.39	0.43	-0.43	1.42	0.5	-0.08	2.51	0.7	-0.49
Se (mg)	70.7	42.5	0.4	3.2	0.6	2.8	1.6	0.6	-0.21	8.2	0.6	-7.47	17.8	0.6	-17.53
<b>VITAMINS</b>															
Ascorbic acid (mg)	0	2.6	+	4.5	38.7	411	1.8	10.4	25.49	6.2	16.5	43.42	6	15.3	42.79

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Thiamin (mg)	0.5	0.22	-0.1	0.52	0.37	-1.9	0.72	0.22	-0.23	0.47	0.22	0.14	0.87	0.34	15
<b>Seeds</b>	WHEAT			BEANS			PEAS			LENTILS			SOYBEANS		
Riboflavin (mg)	0.11	0.15	0.1	0.21	0.25	2.4	0.21	0.15	0.16	0.24	0.12	0.09	0.87	0.11	-0.6
Niacin (mg)	5.71	3.08	-0.6	2.06	2.92	29	2.88	3.08	4.9	2.62	1.12	0.45	1.62	1.14	1.91
Pantothenic acid (mg)	0.93	0.94	0.7	0.78	0.36	2.9	1.75	1.02	0.73	1.84	0.57	-0.35	0.79	0.92	2.1
Vitamin B6 (mg)	0.33	0.26	1.2	0.39	0.08	0.4	0.17	0.26	0.5	0.53	0.19	-0.02	0.37	0.17	0.14
Folate (total) (mg)	43	38	23	394	59	188	274	144	72.39	433	100	-185.68	375	172	144.82
Vitamin B12 (mg)	0	0	-	0	0	0	0	0	0	0	0	0	0	0	0
Vitamin A (IU)	9	0	-	0	2	+	149	166	271.36	39	45	93.35	0	11	35.48
Vitamin E (mg)	1.01	-	-	0.22	-	-	0.09	-	-	0.33	-	-	0.85	-	-
Vitamin D (IU)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vitamin K (mg)	1.9	-	-	19	-	-	14.5	-	-	5	-	-	47	-	-
<b>LIPIDS</b>															
Total fatty acids saturated (g)	0.31	0.20	0	0.12	0.07	-12.8	0.16	0.12	0.14	0.13	0.05	0.01	2.88	0.92	-0.18
Total fatty acids monounsaturated (g)	0.3	0.15	0	0.06	0.03	0.2	0.24	0.06	-0.11	0.16	0.1	0.12	4.4	1.15	-1.1
Total fatty acids polyunsaturated (g)	0.76	0.55	0.18	0.45	0.27	2.4	0.49	0.32	0.29	0.44	0.21	0.14	11.2	3.78	-0.05
Cholesterol (g)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Phytosterols (g)	-	-	-	127	-	-	135	-	-	-	-	-	161	-	-
<b>AMINO ACIDS</b>															
Tryptophan (g)	0.19	0.11	0	0.27	0.04	0.1	0.27	-	-	0.25	-	-	0.53	0.15	-0.1
Threonine (g)	0.43	0.25	0	0.99	0.17	0.7	0.87	0.18	-0.5	1	0.32	-0.16	1.58	0.5	-0.11

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Isoleucine (g)	0.54	0.28	0	1.04	0.18	0.7	1.01	0.17	-0.69	1.21	0.32	-0.39	1.77	0.58	-0.06
Leucine (g)	1.03	0.5	-0.2	1.88	0.3	1.1	1.76	0.36	-1.03	2.03	0.62	-0.41	2.97	0.93	-0.25
<b>Seeds</b>	WHEAT			BEANS			PEAS			LENTILS			SOYBEANS		
Lysine (g)	0.4	0.24	0	1.61	0.23	0.6	1.77	0.38	-0.99	1.95	0.71	-0.04	2.42	0.75	-0.23
Methionine (g)	0.23	0.11	0	0.35	0.04	0.4	0.25	0.06	-0.12	0.23	0.1	0.04	0.49	0.13	-0.12
Cystine (g)	0.4	0.13	-0.2	0.25	0.04	0.15	0.37	0.15	-0.02	0.36	0.33	0.6	0.58	0.15	-0.15
Phenylalanine (g)	0.72	0.35	0	1.27	0.21	0.8	1.13	0.25	-0.61	1.38	0.44	-0.22	1.9	0.64	-0.01
Tyrosine (g)	0.44	0.27	0	0.66	0.14	0.7	0.71	0.12	-0.48	0.75	0.25	-0.09	1.38	0.47	0.01
Valine (g)	0.67	0.36	0	1.23	0.21	0.8	1.15	0.22	-0.71	1.39	0.39	-0.39	1.82	0.62	0.01
Arginine (g)	0.7	0.42	0	1.46	0.22	0.7	2.18	0.48	-1.19	2.16	0.61	-0.59	2.83	0.9	-0.19
Histidine (g)	0.33	0.19	0	0.65	0.11	1.1	0.59	0.16	-0.24	0.79	0.25	-0.13	0.98	0.34	0.03
Alanine (g)	0.55	0.29	0	0.98	0.17	0.7	1.08	0.24	-0.58	1.17	0.35	-0.26	1.71	0.54	-0.13
Aspartic acid (g)	0.8	0.45	0	2.85	0.54	2.58	2.89	0.65	-1.53	3.1	1.43	0.85	4.58	1.77	0.7
Glutamic acid (g)	4.94	1.87	-2	3.59	0.51	1.4	4.19	1.01	-2.05	4.35	1.25	-1.11	7.06	1.96	-1.4
Glycine (g)	0.62	0.3	0	0.92	0.14	0.4	1.09	0.2	-0.7	1.14	0.31	-0.35	1.68	0.5	-0.22
Proline (g)	1.68	0.67	-0.6	1	0.16	0.5	1.01	0.27	-0.42	1.17	0.35	-0.26	2.13	0.67	-0.17
Serine (g)	0.66	0.34	0	1.28	0.22	0.9	1.08	0.29	-0.45	1.29	0.49	0.03	2.11	0.65	-0.21

\* - values were calculated after USDA National Nutrient Database

-, + - nutrients which appear or disappear are marked with bold characters

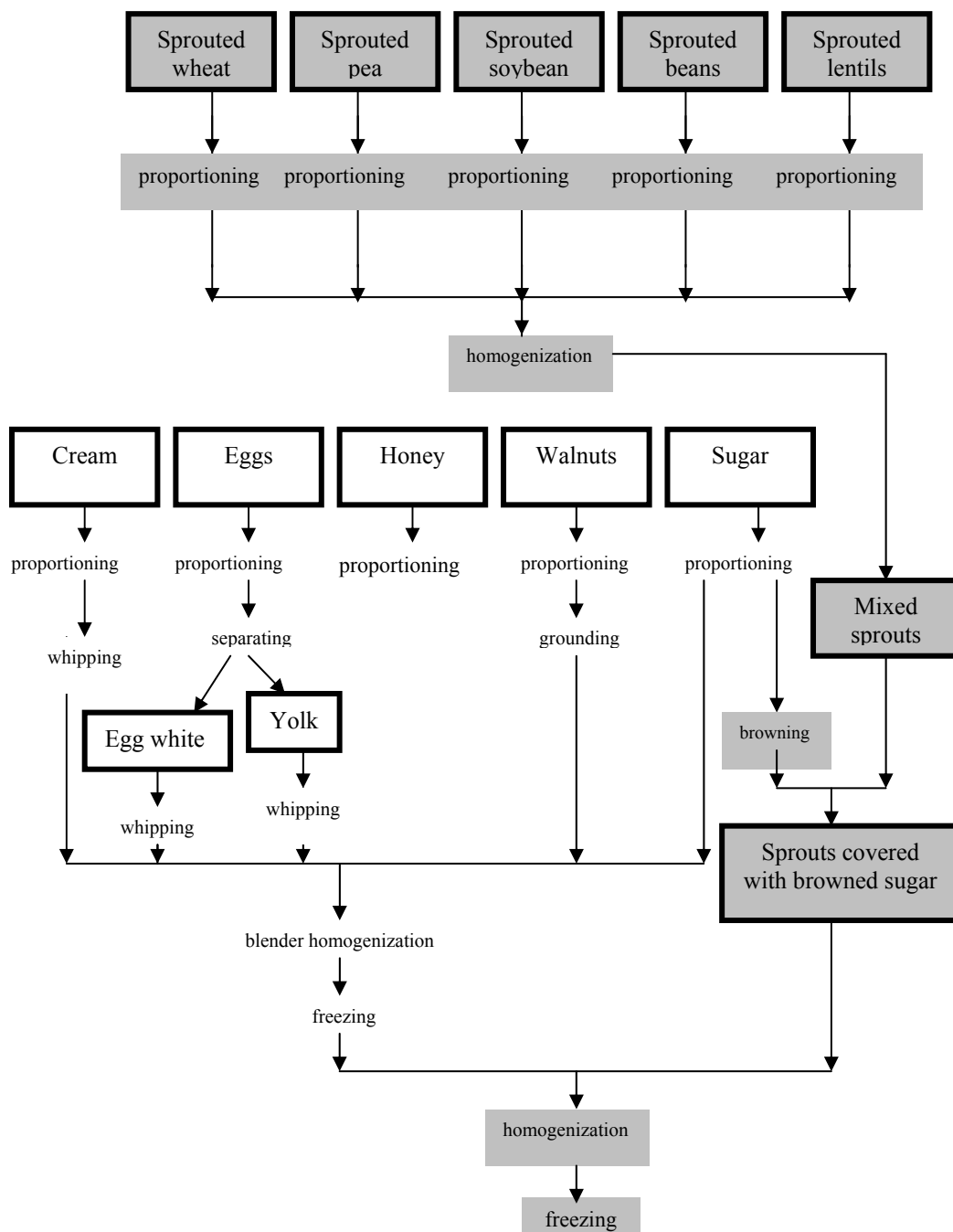
-- no determinations were found

a - dry seeds (amount in 100 grams of edible portion)

b - sprouted seeds (amount in 100 grams of edible portion)

c - variation of nutrients in content after sprouted (% - amount in 100 grams, dry matter)

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**Fig. 1.** Processing method for standard walnut ice cream (part marked in white color) and for APINUTRIGERMIX product (processing method for standard walnut ice cream enhanced with some technological phases - part marked in grey color).

**Table 2.** The recipe for ice cream without and with five different types of sprouted seeds

Ingredients (grams)	Ice cream standard (without sprouted seeds)	APINUTRIGERMIX product (ice cream with sprouted seeds)
Cream	500	500
Sugar	100	100
Honey	150	200
Eggs (9-10)	500	500
Walnuts	300	300
Sprouted wheat	-	60
Sprouted pea	-	60
Sprouted soybean	-	60
Sprouted beans	-	60
Sprouted lentils	-	60

**Table 3.** Comparatives dates for caloric and nutritional values of the two ice-creams, Walnut and APINUTRIGERMIX\*

Nutritional factors	Walnut	APINUTRIGERMIX	Interpretations
Energy (kcal)	311	272.2	☹ - 12.54 % ☺
Protein (g)	7.69	7.62	↔ ☹
Lipid, total (g)	26.15	21.63	☹ - 19.23 % ☺
Carbohydrate (g)	18.2	20.4	↗ + 11.96 % ☺
Fiber, total dietary (g)	1.31	1.14	☹ - 12.97 % ☹
<b>MINERALS</b>			
Calcium, Ca (mg)	40.54	38.69	☹ - 4.56 % ☹
Iron, Fe (mg)	1.2	1.32	↗ + 10 % ☺
Magnesium, Mg (mg)	36.9	38.62	↗ + 4.45 % ☺
Phosphorus, P (mg)	148.9	144.9	☹ - 2.76% ☹
Potassium, K (mg)	157.8	178.8	↗ + 11.75% ☺
Sodium, Na (mg)	58.19	49.69	☹ - 17.1% ☺
Zinc, Zn (mg)	1.05	1.04	↔ ☹
Copper, Cu (mg)	0.344	0.327	↔ ☹
Manganese, Mn (mg)	0.68	0.672	↔ ☹
Selenium, Se (µg)	11.41	10.74	☹ - 6% ☹
<b>VITAMINS</b>			
Ascorbic acid (mg)	0.493	3.05	↗ + 83% ☺
Thiamin (mg)	0.095	0.121	↗ + 25% ☺
Riboflavin (mg)	0.222	0.207	☹ - 10% ☹
Niacin (mg)	0.264	0.577	↗ + 54.38% ☺
Pantothenic acid (mg)	0.663	0.663	↔ ☹
Vitamin B <sub>6</sub> (mg)	0.160	0.162	↔ ☹
Folate (total) (µg)	35.61	45.3	↗ + 21.39% ☺
Vitamin B <sub>12</sub> (µg)	0.474	0.386	☹ - 23.68% ☹
Vitamin A (IU)	635.1	525.2	☹ - 20.98% ☹
Vitamin E (mg)	0.79	0.644	☹ - 23% ☹
Vitamin D (IU)	27.91	22.77	☹ - 22.5 % ☹
Vitamin K (µg)	1.65	1.34	☹ - 23.1% ☹
<b>LIPIDS</b>			
Total fatty acids saturated (g)	9.614	7.87	☹ - 22.1% ☺

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Total fatty acids monounsaturated (g)	5.758	4.74	↘ - 21.3% ☹
Total fatty acids polyunsaturated (g)	9.662	8.04	↘ - 20.14% ☹
Cholesterol (g)	180.6	147.3	↘ - 45.14% ☹
Phytosterols (g)	18.58	11.36	↘ - 63.55% ☹
<b>AMINO ACIDS</b>			
Tryptophan (g)	0.042	0.044	↔ ☹
Nutritional factors	Walnut ice cream	APINUTRIGERMIX product	Interpretations
Histidine (g)	0.093	0.109	↗ + 10 % ☹
Alanine (g)	0.158	0.179	↗ + 11.76% ☹
Aspartic acid (g)	0.406	0.485	↗ + 16.66% ☹
Glutamic acid (g)	0.685	0.767	↗ + 10.52% ☹
Glycine (g)	0.172	0.186	↗ + 5.55% ☹
Proline (g)	0.209	0.240	↗ + 16.66% ☹
Serine (g)	0.217	0.240	↗ + 12.5% ☹

\* - amount in 100 grams of edible portion

↗ - content increased; ↘ - content decreased; ↔ - insignificant modification; ☹ - a good thing; ☹ - a bad thing; ☹ - doesn't matter

## Conclusions

APINUTRIGERMIX is considered to be a more promising food for consumers in terms of nutrition and convenience. Actually processed foods containing sprouted seeds are not sold in Romania. Imbalanced nutrition and bad eating habits may cause quite serious health problems and a pleasant ice cream like APINUTRIGERMIX containing various functional materials may have benefits for health. Compared with others ice creams, this one made with sprouted seeds have a lower caloric value but more high nutrient value than others.

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