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Vitamin And Mineral Contents Of Wheat Germ

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SUMMARY

The germ of wheat is a by-product of milling industry and a source of vitamins and minerals. The levels of vitamins (B_1, B_2, B_6, E, niacin and folic acid) and minerals (Na, K, Ni, Cu, Zn, Mg, Fe, Ca and P) in two samples were given in this study.

ÖZET

Buğday embriyosu, öğütme endüstrisinin bir yan ürünü olup vitamin ve mineral madde kaynağıdır. Çalışmamızda, ticari buğday embriyosu örneklerinin vitamin (B_1, B_2, B_6, E vitaminleri, niasin ve folik asit) ve mineral madde (Na, K, Ni, Cu, Zn, Mg, Ca ve P) içeriklerine ait analitik değerler tesbit edilmiştir.

1. INTRODUCTION

Depending on the milling procedure and raw material quality, wheat germ is obtained as a result of the milling process in amounts of 0,01 to 0,03 % It is a unique, highly concentrated source of nutrients. The nutrient content of wheat germ compared with a person's average daily requirements is presented in Table 1.

Table 1. Nutrient content and requirements supplied by wheat germ

	100 g of wheat germ contains	Daily requirement as per DGE (German Food Association)	100 g supplies
Protein	28 g	68	41 %
Fat	10 g		
Linoleic acid	6 g	10 g	60 %
Carbohydrates (excl. fibre)	38 g		
Sugar	15 g		
Starch	16 g		
Fibre	15 g	30-40	40-50 %
Minerals	4-5 g		

Appelt, 1990.

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Wheat germ can be used in the food, cosmetic, chemical and pharmaceutical industry, owing to their particularly rich composition of biologically active compounds. About 0,5 % of the wheat milled is removed as germ for human nutrition. About 8 to 9 million tons of the germ is sold as feed at a lower price than that pune germ. Wheat germ can be dried, roasted, ground, or blended, and used in breakfast food or baked products. The presence of high amounts of vitamins in the wheat germ, particularly vitamin E, thiamin, riboflavin, and pyridoxin, makes it an excellent raw material for the enrichment or preparation of vitamin concentrates (POSNER, 1985; KARWOWSKA and KOSTRZEWA, 1988).

Wheat germ contains nutritional protein which has a high lysine content, large quantites of minerals, and oil with a high vitamin E content, as well as the whole group of B vitamins. Moreover, wheat germ also contains a large quantity of trace elements essential to dietary well being (BALDINI et. al., 1981/82; MONDA, 1984; ATILLANE et. al., 1985; APPELT, 1987). The likely supply of nutrient obtainable from consuming 100 g of wheat germ per day, is presented in Tablo 2.

Tablo 2. Contituents of wheat germ and requirements supplied

	100 gr of wheat germ contains	Avarage daily requirement as per DGE (German Food Association)	100 g supplies
Vitamin E	15 mg	12 mg	125 %
Vitamin B_1	2 mg	1,6 mg	125 %
Vitamin B_2	0,7 mg	2,0 mg	35 %
Vitamin B_6	3,0 mg	1,8 mg	166 %
Niacin	4,5 mg	15,0 mg	30 %
Folic acid	0,5 mg	0,4 mg	125 %
Pantothenic acid	10,0 mg	0,8 mg	125 %
Iron	8 mg	12-18 mg	44-66 %
Sodium	5 mg	2-3 g	
Potassium	1100 mg	2,3 g	36-55 %
Magnesium	284 mg	260 mg	109 %
Zinc	20 mg	20 mg	100 %
Phosphorus	1290 mg	800 mg	161 %
Manganese	22 mg	4 mg	550 %
Copper	0,8 mg	2 mg	40 %

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The aim of the present studies was to show the nutrient content of wheat germ in Turkey.

2. EXPERIMENT

Material

Two samples of wheat germ, were used in this research.

Methods

Minerals (Na, K, Ni, Cu, Zn, Mg, Fe, Ca, P) were determined by AAS according to the Official Methods of Analysis of A.O.A.C. (ANON, 1970) The Official Methods of the Association of Vitamin Chemists was used to determine the vitamin E content of wheat germs (ANON, 1966). The water-soluble vitamins (B_1, B_2, B_6, niacin and folic acid) were determined by HPLC according to Wehling and Welzel's method (WEHLING and WETZEL, 1984). This method was modified as follows: mobile phase was a mixture of methanol/water (78 : 22), and contained $2,4 \times 10^{-3}$ M PIC B_6, and was used UV detector (254 nm).

3. RESULTS AND DISCUSSION

All of the analytical data of minerals and vitamins of wheat germs, obtained from two different factory, can be shown in Table 3 and 4.

Tablo 3. Mineral contents of wheat germs.

Sample / Element	No. 1 (mg/100 g)	No. 2 (mg/100 g)
Sodium	126,2	141,0
Potassium	622,5	715,2
Nickel	7,5	8,9
Copper	2,8	3,1
Zinc	91,3	86,7
Magnesium	313,8	354,5
Iron	106,3	102,4
Calcium	46,4	67,1
Phosphorus	1200,0	1120,0

Table 4. Vitamin contents of wheat germs.

Sample / Vitamin	No. 1 (mg/100 g)	No. 2 (mg/100 g)
Thiamin (B_1)	1,272	0,646
Riboflavin (B_2)	0,741	0,661
Pyridoxin (B_6)	1,103	1,209
Niacin	4,640	4,218
Folic acid	0,191	0,196
E (Tocopherol)	14,500	16,700

The mineral differences between the samples of wheat germ are not significant. The amounts of sodium, potassium, nickel, copper, magnesium, and calcium in sample 2 were found larger than that in sample 1. The mineral composition of wheat germs used in these experiments was found to be similar to that indicated by ANON. (1971). SIMILARLY, GASIOROWSKİ et. al. (1976, 1980) studied the nutritional aspects of wheat germ.

The amounts of vitamin B_1, B_2 and niacin in sample 1 were larger than that in sample 2. The biggest difference between samples was in vitamin B_1 (0,626 %). In general exeept B_1, it was observed that the composition of vitamin was very similar in both samples of wheat germ. MONDA (1984) determined that the vitamin E, B_1, B_2, Pantothenic acid, niacin were 32,0; 1,5; 0,6; 1,5; 4,0 mg/100 g respectively. HJARDE et. al. (196) summed up available data for wheat germs. These were 5,8 - 14,7 mg/100 g for vitamin B_1, 0,55 - 0,67 mg/100 g for vitamin B_2, 1,4 - 1,8 mg/100 g for vitamin B_6 and 3,25 - 5,70 mg/100 g for niacin. The same results were indicated by ANON (1971), CIRILLI (1971), GASIOROWSKİ et. al. (1981), SUMBUL and TANJU (1982), POSNER (1985) in their studies.

An important point for the costumer and user of wheat germ and its products is its nutritional value. We think that wheat germ contains many, valuable materials and ingradients being important to human beings.

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D Ü Z E L T M E

Dergimizin 1991 yılı, 16. Cilt, 3. Sayısında Sayfa 189 - 194 arasında Asuman GÜRSEL ve Ayşe GÜRSOY tarafından yazılan «Protein - Su İnteraksiyonları» adlı makalede 2 yazım hatası olmuştur. Özür diler düzeltiriz.

GIDA Teknolojisi Dergisi

Yer	Yanlış	Doğru
Çizelge 1, Misellerde Molekül ağırlığı - dalton	2 - 18 x 10^3	2 - 18 x 10^8
Çizelge 3	Isıtılmamış (90°C'de)	Isıtılmış (90°C'de)