

## NUTRITIONAL VALUE OF CHICKPEA SEEDS PROTEINS

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**Abstract:** Chickpeas is an important source of vegetable protein, rich in essential amino acids. In this paper were studied nutrition and grain protein amino acid content of chickpeas. It was found that chickpeas proteins include albumine 13.42% (water soluble), globulins 66.60% (soluble salt) gluteline 8.90% (acid soluble) and constitutional protein 11.30%. Amino acid composition is characterized by relatively high content of leucine, lysine, valine, isoleucine, amino limit is: cysteine and methionine with chemical score of 41%.

**Key words:** chickpeas, proteins, amino acids

### Introduction

One of the most significant factor for human health is correct nutrition. Chickpeas are in the middle of the pyramid and are present in the human diet even replacing meat with high protein content and therefore are considered queens proteins. One of perspective legumes in Moldova is chickpeas, this crop is grown in agricultural areas of risk (Celac, 2009). In terms of global importance chickpeas is the third legumes after beans and peas.

Chickpeas is a remarkable legume rich in many nutrients, which are crucial for health: starch, high quality protein (up to 30% ... 35%), dietary fiber, minerals, vitamins and is a valuable protein supplement for cereal products. (Alajaji et al., 2008).

Low consumption of chickpeas is one example of a scarce resource exploitation vegetable food. Chickpeas is considered the king of dry vegetables, very important legume in the diet of many countries, it can be used to prepare different types of dishes: salads, soups, purées, basic preparations.

Chickpeas has the best glycemic index and greatly reduce cholesterol, also play a role in preventing diabetes and cardiovascular diseases, and it can promote the rehabilitation of the food exploration.

The purpose of this paper is to study protein nutritional value and the structure of chickpeas grown in Moldova.

### Materials and methods

As stuff was used chickpeas of 2011 crop that was harvested at the Institute of Plant, Balti, Republic of Moldova. Chickpea samples used for analysis, according to the requirements STAS 8758-76, representing spherical grains with one end slightly elongated, from yellow to brown, without odors (mold) and impurities.

The determination of chemical composition were performed using standard methods. Total nitrogen was determined by the Kjeldahl method, protein nitrogen - after sedimentation with copper hydroxide by Barnstein method, using the same method, protein fractions were determined by the method of Osborn. (Ермаков, 1987).

Determination of amino acid composition was performed after protein hydrolysis with boiling 6N HCl at AAA-339, RSSC, amino acid analyzer.

### Results and discussion

The protein content of chickpea seeds is influenced by genetic and environmental factors. (Chavan et al., 1986). Protein, forms of nitrogen and quantitative distribution of protein fractions of chickpea seeds are presented in table 1.

**Table 1.** Composition and distribution of protein fractions in chickpeas

No.	Components	Content, %
Biochemical composition		
1.	Dry substance	86,68
2.	Protein ( N * 6,25 )	23,81
Nitrogen compounds		
3.	Total nitrogen % of dry substance	3,81
4.	Total protein nitrogen fractions	3,80 (100%)
5.	Albumin nitrogen	0,51 (13,42%)
6.	Globulin nitrogen	2,53(66,60%)
7.	Glutelin nitrogen	0,34 (8,90%)
8.	Residual nitrogen	0,43 (11,30%)
Forms of nitrogen		
9.	Protein nitrogen (summary)	2,97 ( 100% )
10.	Extractive nitrogen (summary)	0,76 ( 25,6% )
11.	Residual nitrogen	0,08 ( 2,7 % )

The storage proteins of chickpea seeds include albumins (water soluble), globulins (salt soluble), prolamines (alcohol soluble), glutelins (acid/alkali soluble) and residual proteins. The globulins, consisting mainly of legumin and vicilin, constitute the major storage protein (66,6%) followed by albumins (13,42%), glutelins (8,9%) and the residual proteins (11.3%).

The cotyledon is the largest component of a chickpea seeds, hence, it contains the majority of the globulins, glutelins and albumins (Emami et al., 2002).

Studies have shown that the globulins do not contain methionine and cystine (sulfur amino acids). While the albumins and glutelins have higher level of these two amino acids (Clementea et al., 2000). Hence, the poor nutritive value of chickpeas is due to globulins fractions (Chavan et al., 1986).

Studies have shown that legume protein fractions are mainly deficient in sulfurcontaining amino acids and tryptophan but they are rich in lysine, unlike cereals. Therefore, care must be applied to provide a good balance of amino acids in human nutrition by combination of legumes and cereals.

The average of amino acid composition in chickpeas proteins and chemical score calculated for each amino acid are shown in table 2.

**Table 2.** Amino acid composition (g/100 g protein) and chemical score (%) of chickpeas protein

No.	Amino acid	Chickpeas	FAO	Chemical score, %
<i>Essential amino acids</i>				
1.	isoleucine	3,19	4,0	79,7
2.	leucine	6,72	7,0	96
3.	lysine	6,25	5,5	125
4.	methionine+cysteine	1,44	3,5	41
5.	tyrosine	2,21	3,0	73
6.	phenylalanine	4,40	3,0	146
7.	threonine	1,70	4,0	42
8.	tryptophan	1,55	1	155
9.	valine	3,95	5,0	79
Nonessential amino acids				
10.	arginine	6,46		
11.	histidine	2,35		
12.	alanine	4,32		
13.	aspartic acid	10,92		
14.	glutaminic acid	15,41		
15.	glycine	0,20		
16.	proline	4,95		
17.	serine	6,55		

The data presented shows that the biological value of chickpeas is high and shows that it is a valuable product for human consumption. Amino acid composition is characterized by relatively high content of leucine, lysine, isoleucine, amino limit is: cysteine + methionine with chemical score of 41%.

### Conclusions

Studies have shown that chickpea are an important source of balanced protein in essential amino acids. The limiting amino acids in chickpeas, according to the chemical score, are sulfur-containing amino acids like methionine + cysteine 41%.

According to the content of soluble protein of chickpea, it is no difference from other bean crops.

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