INFLUENCE OF SOME TECHNOLOGICAL FACTORS ON DIGESTIBILITY IN VITRO OF CHICKPEAS SEEDS PROTEINS

Gutium Olga

Technical University of Moldova – Chişinău, Moldova

Gutium Olga, nicolaev_olga@bk.ru

Abstract: It was studied the influence of technological factors on protein digestibility of chickpea seeds after enzymatic hydrolysis with pepsin in acid medium (pH 1.2). It was found that swelling, especially cooking and germination increases protein digestibility of chickpea grain from 34.38 to 68, 78%.
Keywords: chickpeas, digestibility, technological factors

Introduction

Chickpeas is a plant well adapted to arid areas and it is of special interest for cultivation in Moldova. (Celac, 2009). Chickpea seeds are an excellent source of fiber, folate, manganese, protein and minerals such as iron, copper and zinc. The proteins of chickpeas are 20-24% and contain protein inhibitors that limit the activity of trypsin and chymotrypsin of the digestive tract. (Chavan et al., 1986). The chickpea seeds also contain some nonprotein substances that have a negative effect on digestibility, such as taninele and phytates. At the same time some protease inhibitors may be sensitive to technological treatments of chickpeas and would affect their protein digestibility. The purpose of this paper is to study the influence of some technological factors on digestibility in vitro of chickpea's seeds protein.

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.

Protein's digestibility was determined in a) native seeds, b) wetted in water for 8 hours, c) wetted in water 8 hours and then boiled for 45 min and d) hydrated seeds then germinated for 45 hour.

Protein's digestibility in vitro was determined after enzymatic hydrolysis with pepsin in acid medium (pH 1.2) and judged by the content of soluble proteins formed as a result of enzymatic hydrolysis.

Soluble protein content was determined by measuring the light absorption at 280 nm (ultraviolet).

Results and discussion

Nutritional quality of proteins is determined by two factors: 1) digestibility (can be transformed and absorbed from the digestive tract), which depends on the physicochemical properties of proteins and 2) biological value which represents the percentage of protein that is retained in the body in order to use them for new tissue formation. Study in vitro digestibility of proteins chickpeas after treatment with pepsin showed that technological treatments chickpea seeds change their digestibility essentially.

Table 1. Pepsin digestibility of proteins chickpeas that were under cooking treatment

Technological processing	Digestibility,%
Nativ	34,38
Wetted	60,91
Boiled	62,49
Germinated	68,74

They found that all technological treatment improves protein digestibility. Growing protein digestibility after soaking and cooking chickpeas is probably first of all caused by the destruction of the secondary bonds protein molecules (molecules move from compact to elongated globular), so peptide bonds more accessible attack peptidases. During germination takes place intensive synthesis protease that after causes partial decomposition of proteins to peptides and amino acids. At the same time technological treatments affect (neutralize) activity protease inhibitor, which are present in appreciable quantities in the chickpeas. (Belev. M., 1977; Smirnoff P., 1976). Digestibility results obtained for germinated chickpeas is practically identical to those presented by Portari G.V. -72.36 %. (Guilherme Portari; Olga Luisa Tavano, 2005).

Conclusions

Soaking, cooking and germination significantly increase protein digestibility of chickpea. Protein digestibility varies depending on the technological treatment applied from 34.38% (for beans untreated) to 68.74% (for seeds germinated). Therefore germination can be as an alternative chickpea grain processing to improve digestibility of proteins.

Bibliografie

1. Celac V., Plantele leguminoase – actualitate şi viitor, ştiinţe agroindustriale, nr. 2, AŞM, Moldova, 2009.
2. Chavan, J. K., Kadam, S. S., Salunkhe D. K., Biotechnology and technology of chickpea (Cicer arietinum L.) seeds. CRC Critical Reviews in Food Science and Nutrition 25: 1986, p.107-158.
3. Guilherme Vanucchi Portari; Olga Tavano., Effect of chickpea (*Cicer arietinum* L.) germination on the major globulin content and *in vitro* digestibility. Ciênc. Tecnol. Aliment. vol.25 no.4 Campinas Oct./Dec. 2005.
4. Belew M., The tripsin and chymotripsin inhibitors in chickpeas (Cicer arietinum L.). the relationships among thesix iso inhibitors. European Journal of Biochemistry, 73, 411-420, 1977.
5. Smirnoff, P., Khalef, S., Birk, Y., Applebaum, S. W., A tripsin and chymotripsin inhibitors from chikpeas. European Journal of Biochemistry, 73, 411-420, 1976.