

Obtaining of high-protein product from textured pea flour using enzyme-assisted extraction

© Ekaterina S. Shishova, Natalia V. Khabibulina, and Alla A. Krasnoshtanova*⁺

Biotechnology Division. Dmitry Mendeleev University of Chemical Technology of Russia. MUCTR.

Miusskaya Sq., 9. Moscow, 125047. Russia. Phone: +7 (495) 495-23-79. E-mail: ernestine2007@yandex.ru.

*Supervising author; ⁺Corresponding author

Keywords: high-protein product, peas, hydrolysis, enzyme preparations, textured pea flour.

Abstract

Vegetable protein is now becoming a popular and economically more beneficial substitute for animal protein. Due to the peculiarities of Russia's climate, yellow peas are of particular interest as a source of protein. On its basis, products for sports, dietary and vegetarian food are produced. In order to obtain a high-protein product from pea raw materials in a "green" way, an investigation of the enrichment of the textured protein fraction of pea flour with protein by splitting the impurity polysaccharide components with amylases, cellulases, hemicellulases, xylanases, β -glucans for their transfer to the soluble fraction followed by removal with the liquid phase was conducted.

In the course of the work, the optimal conditions for hydrolysis of the polysaccharide component were selected. The influence of the type of enzyme preparations and their concentration, the duration of hydrolysis and the ratio of the solution of the enzyme preparation to the substrate on the efficiency of the process was studied. It has been established that amylolytic preparations actively cleave starch in the substrate, which leads to concomitant losses of the target component – protein – with the liquid phase by 30-40%. In this connection, it has been proposed to use enzyme preparations having activity against non-starch polysaccharides. It was shown that hydrolysis is expediently carried out at the ratio of the solution of the enzyme preparation to the substrate of 6:1 in order to minimize the costs of equipment and drying of the final products. It was shown that using the enzyme preparation "Ladozyme Respect Ultra", which includes cellulase, β -glucanase, pectinase and xylanase, the target product obtained from the textured protein fraction of pea flour is the purest and has the maximum protein content. The optimum concentration of the enzyme preparation "Ladozym Respect Ultra" is 4% of the weight of the substrate, which ensures the production of a high protein product with a crude protein content of up to 80% when it leaves 60% of the initial sample.

References

- [1] E.N. Oficerov. Amaranth is a promising raw material for the food and pharmaceutical industries. *Butlerov Communications*. **2001**. Vol.2. No.45. P.1-4. ROI: jbc-02/01-2-45-1
- [2] N.V. Magzumova, E.E. Malinovskaya, M.V. Kelesyan. Studying the possibility of using pea protein in the production of sausages boiled assortment group. *Nutrition, nutrition, nutrition problems*. **2013**. P.20-22. (russian)
- [3] N.V. Magzumova. Perfection of the technology of production of cooked sausages using vegetable proteins. *Proceedings of universities. Food technology*. **2012**. No.2-3. P.58-60. (russian)
- [4] T. Ralph, K. Frank, S. Gertrud. Possibilities of using plant proteins. *Possibilities of using vegetable proteins: a collection of articles of the International Scientific and Practical Conference (April 15, 2013, Voronezh)*. **2013**. 28p. (russian)
- [5] N.N. Maksimyuk, Yu.V. Marianovskaya. On the advantages of the enzymatic process for the production of protein hydrolysates. *Fundamental research*. **2009**. No.1. P.34-35. (russian)
- [6] V.Yu. Krumlikov. Enzymatic hydrolysis. Preparation of protein hydrolysates. Investigation of their properties. *Science, education, society: trends and development prospects: materials of the International Scientific and Practical Conference (December 13, 2015, Cheboksary)*. **2015**. P.15-17. (russian)
- [7] L.M. Domoroshchenkova. Modern technologies of obtaining food proteins from soybean meal. *Food industry*. **1999**. (russian)