

INFLUENCE OF ENZYME PRODUCTS ON THE ELECTROPHORETIC MOBILITY AND FUNCTIONAL PROPERTIES OF PROTEIN FRACTIONS FROM RAPESEED CAKE

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Sunflower and rapeseed should be noted among the oilseeds grown in Russia. Crops acreage of sunflower is more than 5.5 million hectares; the area of rape crops is almost 10 times less in the country. Sunflower seeds and rapeseed do not concede soy in protein content. In the sunflower oil cake studied the protein mass fraction is 39%, in the rapeseed oil cake it is 40%.

The inclusion of oilseeds protein in food systems is advisable after a preliminary transformation of their functional properties. The prevalence of alkali soluble fraction among the sunflower proteins causes obtaining of biomodified proteins as the work objectives. Water-soluble fraction prevails among the rapeseed proteins, but the glutelin content is high enough. Moreover, we have a complex substrate composition (protein fractions are combined with the carbohydrate fractions), so to increase the degree of extraction of the protein fractions from the oil cake and to ensure a high level of functional and technological properties it is necessary to choose a complex enzyme products.

As biocatalysts, we used Russian enzyme preparations: of fungal origin Amilolux A and Cellolux A, of bacterial origin Protosubtilin GZx, of animal origin - food collagenase, as well as import preparation of bacterial origin - GC-401 (manufactured by "Jenikor INTERNATIONAL" USA).

The mass fraction of water- and salt-soluble protein fractions was evaluated to compare the effectiveness of using of selected enzyme products. Enzyme preparations were used in a dosage of 0.8-1.0 units of target activity per gram of substrate in hydromodule of 1: 5. The results show that the best results for the mass fractions output involved in the formation of functional and technological properties of food systems are achieved by using the Cellolux A preparation. Under the influence of this preparation the mass fraction of salt-soluble protein fraction for sunflower increases by more than 7 times, rapeseed - by 2.5 times, therefore, it is advisable to introduce the given preparation in the obtaining of protein in the extraction stage under optimal conditions of enzyme action.

By preference of influence on the oil raw material to maximize the proteins transfer in the salt-soluble form. The tested enzyme preparations can be arranged in the following increasing order: food collagenase from crab hepatopancreas, protosubtilin G3x, GC - 401 Amilolux A, CelloLux A.

To determine the relative electrophoretic mobilities and the amounts of protein fractions as a result of complex enzyme products action nondenaturing PAAG electrophoresis was per-

formed. Its results are shown on the slide. It was found out that the greatest number of protein-6 fragments appeared as a result of proteolysis under the influence of GS-401 preparation. The absence of many stripes in the sample treated with collagenase can be explained by the fact that the enzyme given functions in animal cells and is likely to require animal proteins for its operation.

The use of Amilolux A preparation caused four proteins fragments with a high electrophoretic mobility. This is probably due to the removal of starch components associated with the protein globule (under the action of α -amylases).

After application of CelloLux A preparation electrophoretic analysis showed the presence of three protein zones.

Removal of cellulose from carbohydrate-protein complex increased the R_f value of all protein fractions.

The process scheme of obtaining protein isolate from oilseeds involves protein extraction with salt solution, followed by precipitation with acid type reagent, which hydrochloric acid can be. However, the ability of chlorogenic acid sunflower oilcake to form dark-colored complexes with proteins limits the possibility of their use in the food industry. In selecting a reagent preference is given to aqueous solution of succinic acid, as in the interaction of succinic and chlorogenic acids more polar complexes are formed, which are readily soluble in water.

In organoleptic indicators and chemical composition the quality of the protein obtained by precipitation with succinic acid is higher than that of the protein precipitated with hydrochloric acid. It is characterized by the absence of odor and light color. The protein content in the preparation is 87%. This allows us to relate it to the isolates.

Sunflowerseed protein isolate is almost as good as proteins of soybean and rapeseed in functional properties. It surpasses them in many respects in terms of fat storage capacity. Rapeseed protein isolate surpasses soy isolate in all respects.