

Innovative Technology of Oil from Wheat Germ

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Abstract — The global trend of technology development of deep processing of crops intended for the production of high value. Such food is vegetable oil produced from wheat germ. Vegetable oil is produced from wheat germ has curative properties of high nutritional value; in this context has a high demand all over the world.

Annually in Kazakhstan more than 15,0 million t on the average reap wheat crop, from them more than 5 million t of a flour are developed. The application of modern mill complexes allows making wheat germ flour in the formulation of their annual number of over 100 thousand tons, placing Kazakhstan in first place in the world in production of wheat germ. A production of germs of wheat in such large number creates a problem it to deep processing. In connection with this urgent problem facing the process industry professionals, the development of high-technology production of vegetable oil from wheat germ, which has a great demand not only in the population of Kazakhstan, but also in foreign countries.

Keywords— wheaten germ, vegetable oil

I. INTRODUCTION

SATISFACTION of physiological needs for essential components cannot be based only on the known technological solutions is urgent search for new approaches to the development of healthy food, pre-optimized nutrients. One solution could be the production of fortified wheat germ oil foods with directional combining plant materials, provided that the latter are characterized by the presence of important nutrients. Promising is the use of raw materials such as wheat germ oil, when applied to medical purposes it is taken orally, directly or adding a variety of salads, cereal, baked goods.

Wheat germ oil has a high nutritional and biological value, and is truly unique in its biochemical composition and curative properties of natural plant product. It is a natural antioxidant that helps to keep other vegetable oils.

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Valued in the food industry, and it comes as a dietary product (e.g., capsules, soft gelatin), and on the safety of health edible oil.

Wheat germ oil is different from many vegetable oils is very high (over 70%) and the most balanced in polyunsaturated fatty acids (linoleic acid (omega-6) acids in the product is present from 45 to 60% linolenic (Omega-3) - Up to 11% , the content is oleic (omega-9) acid is 12 to 30%). Also in wheat germ oil in much smaller numbers are saturated fatty acids (palmitic - from 14 to 17%, stearic - from 0.5 to 2.3%, and so on) [1].

A distinctive feature of the wheat germ oil compared to most vegetable oils is a high content of "vitamin of youth" E (tocopherol) - only 100 g of wheat germ oil contains up to 400 mg of this powerful natural antioxidant.

Wheat germ oil is also an excellent source of vitamins B (B1, B2, B3, B5, B6, B9).

This valuable product is not only used in the food industry as various food additives, but also in various areas of medicine for the treatment of many diseases.

II. CHEMICAL COMPOSITION OF WHEAT GERM

Modern technologies of grain into flour can get the germ of up to 10-35% cuts that affect the composition and biological value of the finished product [2]. In addition, the chemical composition of wheat germ depends significantly on the genetic characteristics of raw materials, climate, cultivation of grain, as well as its productivity. We studied the nutritional and biological value of wheat germ and found that the protein content to 34% fat and 11% starch in the embryo is found, found levels of about 22% sucrose. Thus, the embryo almost 80% of the proteins, carbohydrates and fats. Amino acids in wheat are distributed unevenly. The germ is the richest in essential amino acids, primarily lysine. In infancy it is contained in more than two times higher than in the endosperm (or an average of 5.6 and 2.1%).

III. SEPARATION AND CLEARING

Wheat germ contains significant amounts of organic impurities not oiled: mealy Particulate grain (up to 4%), husks (5-6%), etc. The presence of impurities in processed embryos, first, increases the losses of oil cake or meal, and secondly, the effect of the expanders worsens. In connection with this pre-clean the germs from the litter. Purification of wheat germ from husks and impurities of several stages: separation, moisture, freezing, re-screening.

Separation. When sifting wheat germ pick up the device with a set of sieves number 2 and number 5. Sieving time - 3-4 minutes.

Hydration. After the screening process should humidification spray water for the most effective cleaning.

Spray water temperature 30-35 ° C. The thickness of embryos spray 5-7 mm. Speed mixers 100-150 r / min. Dripping time 5-7 minutes.

Freeze. Wet wheat germ spread out evenly on the plastic trays and placed in a freezer. Thickness - 7.5 mm. Freezing temperature - (-15 ° C) - (-20 ° C). Freezing time - 3-6 hours

Repeated separation. Exit husks and impurities of 10%. As a result, we have developed a rational technology of purification of wheat germ from husks and impurities, process parameters which are listed above.

IV. WHEAT GERM DRYING

It is known that uniform heating of the product during the process of vacuum freeze drying with microwave energy input is achieved only when the small thickness of the product layer (10-30 mm) [3]. Therefore, we conducted a study on the influence of the thickness of wheat germ in the process of vacuum freeze-drying on its duration. At a higher layer is increasing its thermal and moisture repellency, leading to the freezing of the layer as a result of moisture on desublimation colder product particles are closer to the surface layer.

We studied the kinetics of the process of vacuum freeze drying with microwave energy supply, which allowed us to determine a rational power of the electromagnetic field at the 1200 and thickness of the product within 20 mm. The optimum temperature and drying time to achieve moisture wheat germ to 14%, which is 50-55 minutes at a temperature of -10 ° C

V. WHEAT GERM GRANULATION

Dried in vacuum freeze-drying with microwave energy input, pre-screened through a hole diameter of 3 mm and fed to the granulator. The obtained wet granules were dried at a temperature of 60-65 ° C to a residual moisture content of 13-14% in the granules. The dried granules are cooled to a temperature of 20 ° C and sent to the press.

VI. PRESSING

In the process of vegetable oil major and most difficult process is very pressing. Separation of the lipid component of the embryo from the protein-carbohydrate component is

determined by the pressure of the swelling. For example, if the swelling pressure for conventional oil crops (sunflower, canola, soy, etc.) from 10 to 30 atm., The swelling pressure of the fetus is about 120 atm. In this regard, the press picked up, providing high pressure. Pressing was performed at a temperature of 70°C and pressure of 100-120 atm.

VII. CONCLUSION

The research resulted in the technology for production of oil from the wheat germ, which allows you to fully preserve all the biologically valuable substances in wheat by-products – boundary, and makes it possible to obtain a biologically active product.

Thus, a technology of wheat germ oil by cold pressing, which is solely for the mechanical processing of raw materials without heating and the use of third-party components, thus preserving the full range of unique natural components of wheat germ.

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