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TECHNOLOGY OF EXTRACTION OF BIOACTIVE SUBSTANCES FROM CEREAL BRAINS

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Annotation

This article discusses the technology of extraction of bioactive substances from cereal grains, its theoretical foundations and practical significance. Cereal grains contain a high amount of vitamins, antioxidants, essential fatty acids and other biologically active compounds, and their effective extraction is important for the modern food and pharmaceutical industries. The article analyzes the advantages and disadvantages of methods such as extraction, cold pressing, enzymatic processing. Special attention is also paid to the issues of preserving the quality of bioactive substances, ensuring their stability, and optimizing technological processes. The results of the research expand the possibilities of producing products with high added value based on bioactive substances obtained from cereal grains.

Keywords

grain germ, bioactive substances, extraction, cold pressing, enzymatic processing, antioxidants, essential fatty acids, food technology, innovative methods, functional products.

In the modern food and pharmaceutical industry, the extraction of bioactive substances from natural raw materials is one of the important scientific and practical directions. Grain germs are especially important due to their rich chemical composition. Grain germs are the embryonic part of the grain, which contains many biologically active substances necessary for the body. These substances include vitamins, antioxidants, essential fatty acids, phospholipids and phytosterols. Therefore, the effective extraction of bioactive substances from grain germs and the production of high-quality products from them is an urgent issue.

Grain germs are characterized as a component with high nutritional and biological value. They contain up to 25–30% fats, up to 20–35% proteins, as well as many vitamins and minerals. In particular, elements such as vitamin E, group B vitamins, iron, magnesium, zinc and phosphorus are found in high concentrations. In addition, cereal bran is a source of tocopherols and polyphenols, which have antioxidant properties.[4]

The diversity of bioactive substances places high demands on their extraction technologies. Because these substances can quickly decompose under the influence of heat, light and oxygen. Therefore, preserving their natural properties during the extraction process is an important task.

Bioactive substances extracted from cereal bran are divided into several groups. The first group includes fat-soluble substances - essential fatty acids, phospholipids and phytosterols. These substances play an important role in improving the functioning of the cardiovascular system.

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The second group includes water-soluble substances - vitamins, phenolic compounds and some enzymes. They have antioxidant properties and protect the body from free radicals.

The third group is proteins and peptides, which, as biologically active components, participate in strengthening the immune system.

Various technologies are used to extract bioactive substances from grain kernels. Each of them has its own advantages and disadvantages.[3]

The cold pressing method is considered one of the most natural and environmentally friendly methods for extracting oil from grain kernels. In this method, the raw material is not exposed to high temperatures, as a result of which the bioactive substances contained in the oil, especially tocopherols and essential fatty acids, are preserved to the maximum. However, the disadvantage of this method is that the product yield is relatively low.

Extraction is one of the most common methods for extracting bioactive substances. In this process, the necessary components are extracted using organic solvents (for example, hexane, ethanol). The extraction method has high efficiency and allows you to obtain a large volume of product. At the same time, solvent residues can negatively affect the quality of the product, so it is important to completely eliminate them.

Enzymatic processing technology facilitates the separation of bioactive substances by breaking down complex compounds in grain kernels. This method is environmentally safe and increases the biological activity of bioactive substances. Enzymes break down cell walls and release beneficial components.

In recent years, the technology of extraction using supercritical carbon dioxide (CO_2) has been widely developed. This method is highly efficient and ensures the purity of bioactive substances. In addition, this method does not use harmful solvents rtant in the process of extracting bioactive substances. These include temperature, pressure, time, type of solvent and degree of grinding of the raw material. By choosing these parameters correctly, it is possible to increase the yield of the product and improve its quality.[4]

Also, ensuring the stability of the extracted bioactive substances is an important issue. For this, it is recommended to add antioxidant additives, store in vacuum conditions and process at low temperatures.

Bioactive substances extracted from grain germs have a wide range of applications. In the food industry, they are used in the production of functional products, biologically active additives and dietary foods. In the pharmaceutical industry, these substances are included in the composition of medicines and prophylactic preparations.

In cosmetology, substances obtained from cereal grains are also widely used, as an effective means of nourishing, rejuvenating and protecting the skin.

Currently, many scientific studies are being conducted on the extraction of bioactive substances from cereal grains. These studies are aimed at developing new, effective and environmentally friendly technologies.

In the future, nanotechnologies and biotechnology will expand the possibilities of increasing the biological activity of bioactive substances and their targeted delivery. This will be of great importance in improving human health.[3]

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In conclusion, cereal grains are a rich source of bioactive substances. Their effective extraction requires the use of modern technologies. Methods such as cold pressing, extraction, enzymatic processing and supercritical fluid extraction ensure the preservation of the quality of bioactive substances and their maximum separation. Bioactive substances obtained from cereal grains are widely used in the food, pharmaceutical and cosmetology industries and are of great importance in strengthening human health.

References

1. O‘zbekiston Respublikasi Prezidentining “Oziq-ovqat xavfsizligini ta’minlash va sog‘lomovqatlanish tizimini takomillashtirish chora-tadbirlari to‘g‘risida”gi PQ–4086-sonli Qarori. —Toshkent, 2019 yil.
2. “O‘zbekiston Respublikasida 2022–2026 yillarda oziq-ovqat sanoatini rivojlantirishstrategiyasi”. — Toshkent: O‘zbekiston Respublikasi Iqtisodiyot va moliya vazirligi, 2022.
3. Abdurahmonova, M. “Funktsional oziq-ovqat mahsulotlari ishlab chiqarishtexnologiyalarining ilmiy asoslari”. — Toshkent: Fan va texnologiya nashriyoti, 2021.
4. Karimova, G. “Don mahsulotlarining biologik qiymatini oshirishda essensial yog‘ kislotalarining roli”. // Oziq-ovqat texnologiyasi jurnali, 2023. №4. — B. 45–52.