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THE EFFECT OF GRAIN SPROUTS ON FERMENTATION PROCESSES AND FOOD QUALITY

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Annotation. This article examines fermentation processes of grain germ and their impact on food quality, biological value, and digestibility. Fermentation enhances bioactive compounds, improving nutritional and functional properties. The study highlights technological aspects and practical significance of these processes in developing high-quality and health-promoting food products.

Keywords: grain germ, fermentation, food quality, bioactive compounds, nutritional value, technology.

Аннотация. В статье рассматриваются процессы ферментации зародышей зерна и их влияние на качество пищевых продуктов, биологическую ценность и усвояемость. В результате ферментации увеличивается содержание биологически активных веществ, улучшаются питательные и функциональные свойства продукта. Анализируются технологические особенности и практическая значимость данного процесса.

Ключевые слова: зародыш зерна, ферментация, качество пищи, биологически активные вещества, пищевая ценность, технология.

Annotatsiya. Ushbu maqolada don murtaklarining fermentatsiya jarayonlari va ularning oziq-ovqat sifati, biologik qiymati hamda hazm bo‘lishiga ta’siri yoritiladi. Fermentatsiya natijasida biofaol moddalar miqdori ortib, mahsulotning oziqlik va funksional xususiyatlari yaxshilanadi. Jarayonning texnologik jihatlari va amaliy ahamiyati tahlil qilinadi.

Kalit so‘zlar: don murtagi, fermentatsiya, oziq-ovqat sifati, biofaol moddalar, oziqlik qiymati, texnologiya.

INTRODUCTION.

Nowadays, improving food safety and quality is one of the most pressing issues on a global scale. The growing population, the growing demand for healthy nutrition, and the growing need for functional food products require new technological approaches. In this context, the effective use of grain products and their components is of great importance. The germ (embryo) of the grain is distinguished by its high nutritional value. It is a source of proteins, fats, vitamins, minerals, and bioactive substances.

In recent years, the possibilities of further improving the nutritional and functional properties of grain germs by fermenting them have been widely studied. Fermentation is a complex biochemical process involving microorganisms that

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reformulates the substances contained in the product, facilitates their digestibility, and increases its biological value. This article provides a detailed analysis of the fermentation processes of grain germs, their mechanisms, and their impact on food quality.

Grain germ is the most valuable part of the grain, containing a high level of nutrients. In particular, it contains up to 20–30% protein, 8–15% fat, many vitamins (especially group B and vitamin E), minerals (iron, zinc, magnesium) and enzymes. In addition, grain germ is rich in bioactive substances with antioxidant properties, such as tocopherols and phytosterols.[5; 67]

However, one of the significant disadvantages of grain germ is its rapid spoilage. As a result of oxidation of the fats in its composition, its quality decreases during storage. Therefore, it is necessary to use effective methods of its processing. Fermentation is one of such promising methods.

Fermentation is the process of decomposition of organic substances and the formation of new products using microorganisms (bacteria, yeasts and molds). Lactic acid bacteria (Lactobacillus), yeasts (Saccharomyces) and some fungi are mainly involved in the fermentation of grain germ.

The following main changes occur during fermentation:

Complex carbohydrates are broken down into simple forms;

Proteins are broken down into peptides and amino acids;

Fats are partially hydrolyzed;

Antinutritional substances (e.g. phytic acid) are reduced;

New bioactive compounds are formed.

As a result, the nutritional value of the product increases, its digestibility improves, and its organoleptic properties (taste, smell, texture) improve.

Grain germ fermentation technology

Grain germ fermentation consists of several stages:

Raw material preparation - cleaning, grinding and moistening of the grain.

Inoculation - enrichment with selected microorganisms.

Fermentation process - carried out at a certain temperature (usually 25–37°C) and humidity.

Drying and storage - making the finished product stable.[4; 145]

Correct selection of process parameters (temperature, pH, time) directly affects product quality. For example, lactic acid fermentation increases the acidity of the product and limits the development of harmful microorganisms.

Effect of fermentation on food quality

Increase in nutritional value

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As a result of fermentation, proteins and carbohydrates in the grain germ are converted into a form that is easily digestible for the body. The amount of amino acids increases, and the synthesis of vitamins (especially group B) increases.

Fermentation increases the amount of antioxidants. This helps to reduce free radicals in the body and prevent various diseases.

Phytic acid, which is present in the grain germ, reduces the absorption of minerals. During the fermentation process, this substance breaks down, as a result of which the bioavailability of elements such as iron and zinc improves.

Fermentation gives the product a unique pleasant taste and smell. This increases its acceptance by consumers.

Organic acids formed during the fermentation process stop the development of pathogenic microorganisms. As a result, the shelf life of the product is extended.

Based on the fermentation of grain germ, it is possible to produce various functional food products. For example:

Fermented flour products (bread, porridge);

Dietary supplements;

Energy bars and healthy snacks;

Drinks (fermented cereal drinks).[6; 150]

Such products are especially useful for athletes, children and people leading a healthy lifestyle.

Today, scientific research is developing new methods for fermenting grain germ. Work is underway to create highly effective microorganisms using biotechnology and genetic engineering.

Also, automation of the fermentation process, increasing its efficiency and applying it on an industrial scale are important directions. In the future, the creation of a new generation of functional food products based on fermented grain germ is expected.

In conclusion, the fermentation processes of grain sprouts are of great importance in the food industry. This process allows to increase the nutritional value of the product, increase the content of biologically active substances and improve its digestibility. Also, fermentation improves the organoleptic properties and ensures the microbiological safety of the product.

By fermenting grain sprouts based on modern technologies, it is possible to create high-quality, healthy and functional food products. This is an important factor in ensuring healthy nutrition of the population and strengthening food security.

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