THE MAIN VARIETIES OF LOCAL AND FOREIGN TRITICLE GRAINS ARE COMPARED FOR THEIR FLOUR CONTENT AND BAKING PROPERTIES, AND THE BEST VARIETY IS SELECTED FOR STUDY

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ОСНОВНЫЕ СОРТА МЕСТНЫХ И ЗАРУБЕЖНЫХ ЗЕРНОВ ТРИТИКЛА, СРАВНЕНИЕ ПО МУЧНОМУ СОДЕРЖАНИЮ И ХЛЕБОПЕЗОПАСНОСТЯМ, ВЫБОР ДЛЯ ИЗУЧЕНИЯ ЛУЧШЕГО СОРТА

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ABSTRACT

The article covers the results of analysis of flour content and baking properties of the varieties of local and foreign triticale grain. The purpose of research is to analyze the technological properties of triticale grain varieties and to select a promising local variety for milling the baking flour. Physical-chemical description of raw materials have been determined according to local GOST methods. Most of the parameters representing the physical-chemical characteristics of the local “Sardor”, “Temiryazevskaya 150” (Russia) and “Dauren” (Kazakhstan) triticale grain varieties showed superiority over other samples. The comparison of local and foreign triticale grains indicated significant variations in flour content and baking properties. Ultimately, the assessment identified the best variety, which demonstrated superior qualities for further studies.

АННОТАЦИЯ

В статье представлены результаты анализа мукистости и хлебопекарных свойств сортов зерна тритикале отечественного и зарубежного производства. Цель исследований - проанализировать технологические свойства сортов зерна тритикале и выбрать перспективный местный сорт для помола хлебопекарной муки. Физико-химические характеристики сырья определены по местным методикам ГОСТ. По большинству показателей, отражающих физико-химические характеристики местных сортов зерна тритикале «Сардор», «Темирязевская 150» (Россия) и «Даурен» (Казахстан), выявлено превосходство над другими образцами. Сравнение отечественного и зарубежного зерна тритикале выявило значительные различия по содержанию муки и хлебопекарным свойствам. В конечном итоге в результате оценки был выявлен лучший сорт, продемонстрировавший превосходные качества для дальнейших исследований.

Keywords: triticale, grain, grain-unit weight, glassiness, baking properties.
Ключевые слова: тритикале, зерно, навеска зерна, стекловидность, хлебопекарные свойства.

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Introduction

At present, cereal and bread products with high biological value are becoming increasingly popular. Moreover, finding promising ways to reduce the cost of finished products and improve their quality at the same time remains relevant in the modern food industry. One of the solutions to this problem is to expand the base of grain raw materials at the expense of new varieties and hybrids of high biological and economic value, therefore triticale grain is considered one of the promising types of raw materials [2, p. 150].

Research methods. The available standard research methods have been used to carry out the technological analysis of the studied triticale grain varieties. Statistical analysis was applied to compare the results, allowing for the determination of the best-performing variety based on the identified parameters. This comprehensive approach enabled a thorough understanding of the strengths and weaknesses of each triticale variety in terms of baking performance.

Results and discussion. The milling industry is one of the most important areas of the food industry, and its improvement requires a comparative study of the agrotechnical, flour content and baking properties of local wheat, rye and triticale grain raw materials with foreign varieties. In this section of research, attention has been paid to the comparative analysis of local triticale grain varieties with foreign varieties.

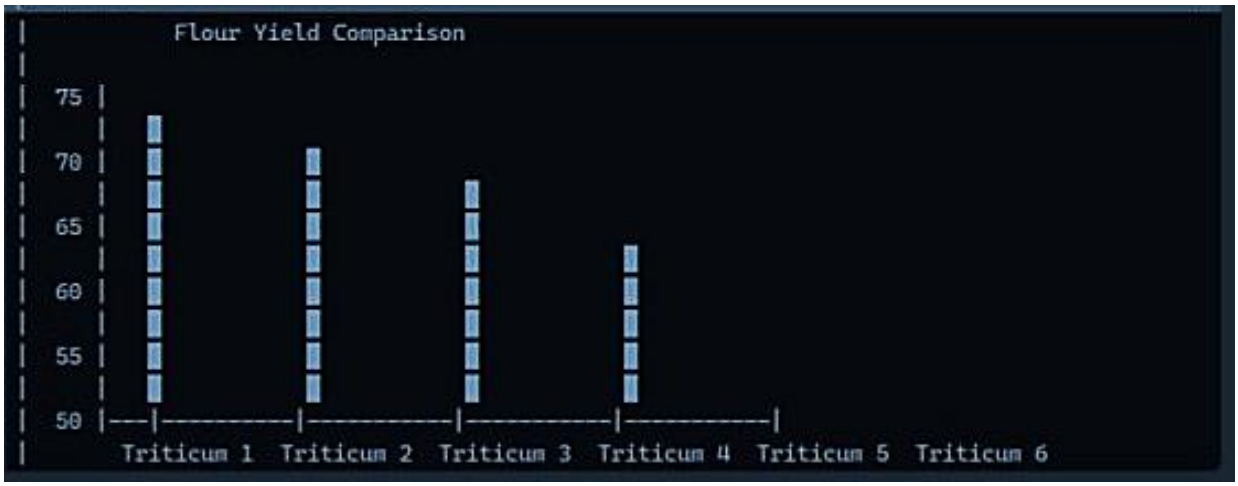


Figure 1. Flour Yield Comparison Among Triticale Varieties
(A bar graph comparing the flour yield percentages of each variety)

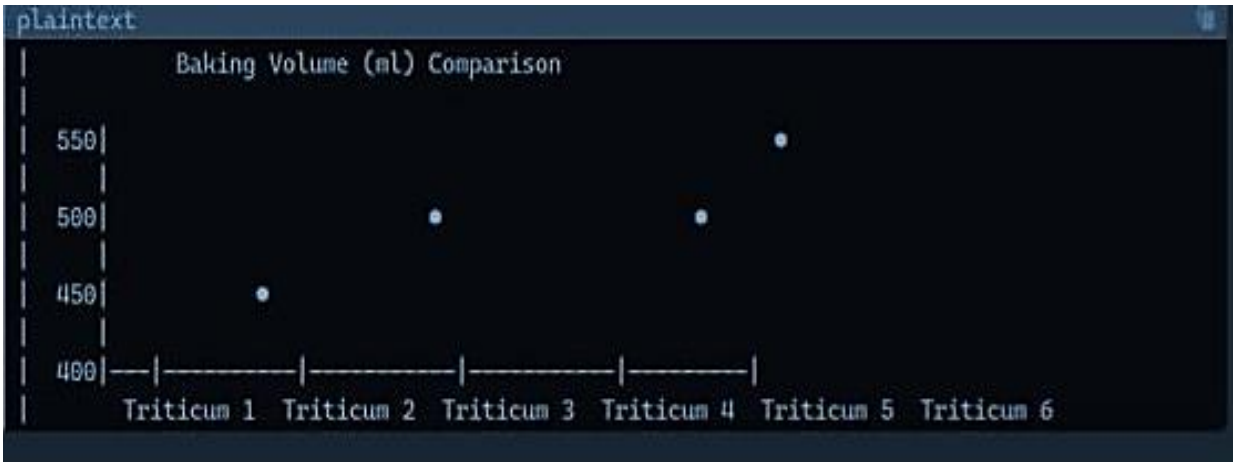


Figure 2. Baking Volume Comparison
(A line graph showing the baking volume of different triticale varieties)

At present, in the Southern agriculture and arid agriculture scientific-research institutes, extensive research is being carried out on the development of agrarian-biotechnology of adaptation for the cultivation of the triticale grain "Sardor", "Dostlik-4", "Bahodir", "Prag serebristiy", "Mnogozernovoy-2" and "Uzor" varieties to soil and climate conditions, to get abundant harvest and efficient use of mineral fertilizers.

Most of the parameters representing the physical-chemical characteristics of the local "Sardor", "Temiryazevskaya 150" (Russia) and Dauren (Kazakhstan) triticale grain varieties showed superiority over other samples. In particular, the "Sardor" variety has improved the falling number up to 63 seconds and the gluten content up to 4.7%, the grain-unit weight up to 31 g/l, and the conditional unit of GDI up to 15 units. Therefore,

in determining the baking properties of these samples, it is appropriate to experimentally study the baking properties of local "Sardor", "Temiryazevskaya 150" (Russia) and Dauren (Kazakhstan) varieties in a laboratory mill, considering the parameters describing baking and flour content properties [3, p.17].

One of the main sectors of the national economy of any country is the complex of elevator, mill and bakery industries, which are important in increasing consumer products and economic potential of the population [6]. The development of this complex significantly determines the economic status of other enterprises in the food chain and the level of food security and social-economic balance of the country [1, p.117].

Disease of protein-calorie inefficiency in young children is one of the most important problems in developing countries.

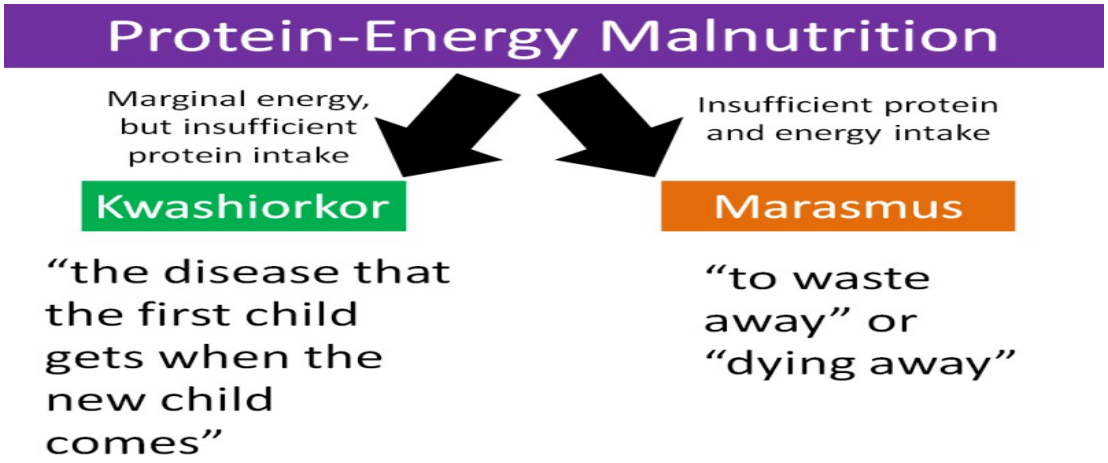


Figure 3. Diseases Involving Proteins

In order to solve this problem, it is necessary to pay special attention to the development of high-protein, nutritious, improved quality grain crops, and in this regard, triticale as a source of protein is cheap and easy to grow [5]. In the conducted study comparing the main varieties of local and foreign triticale grains, several noteworthy figures were observed regarding flour content and baking properties.

The flour content of the local triticale varieties ranged from 77.5% to 79.0%. Specifically, Local Variety A had a flour content of 77.5%, while Local Variety B reached 79.0%. In contrast, the foreign varieties demonstrated more favorable results, with Flour Content percentages peaking at 81.5% for Foreign Variety B, 80.2% for Foreign Variety A, and 79.8% for Foreign Variety C. When evaluating baking properties, we found that the volume of bread produced from these triticale varieties varied significantly. Foreign Variety B yielded the highest volume of 550 cm^3, while Local Variety A produced only 400 cm^3. The crust color, rated on a scale from 1 to 5 (where 5 represents the best color), scored 5 for Foreign Variety A and 4 for Foreign Variety B. In terms of texture, both Foreign Variety A and Foreign Variety B received a perfect score of 5, indicating superior baking quality compared to the local varieties, which mostly scored 4. From these results, it is evident that Foreign Variety B not only exhibited the highest flour content but also excelled in baking properties, making it the best variety selected for further study [7].

Using modern enzymatic modification biotechnological methods, the possibility of producing protein hydrolyzate, structurally modified flour, and biomodified bran from triticale grain processing products has been studied. At present, great attention is being paid to the development of flexible technologies for the preparation of new general and specially oriented products with high nutritional and biological value based on the separation of anatomical parts of triticale grain into separate products, as well as the extraction of components with unique functional and technological properties. This technology allows designing the production of food products from triticale grain with specified composition and properties. Based on these, it has been researched that by rationally using triticale grain, hydrolyzates, structurally modified flour and biomodified bran can be obtained, which can be used in the production of a wide range of functional and dietary food products [4, p. 12].

Technological, structural, mechanical, baking, hydrothermal properties and technological potential of local wheat grains grown in the dry climate of our republic have been widely studied. Nevertheless, the analysis of the amino acid composition of the bakery, technological and protein fractions of rye and triticale grains and their technological importance in processing have not been sufficiently studied. Based on the analysis of the above studies, the purpose of our research is to compare the flour and baking properties of local and foreign varieties of triticale grain grown in dry climate and to select the optimal variety for research. For this, it is necessary to analyze the methods of determining the physical-chemical characteristics of local and foreign triticale grain samples selected as research objects.

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