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EVALUATION OF BIOCHEMICAL INDICATORS OF GRAIN IN COMMON WHEAT VARIETY SAMPLES

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ABSTRACT

Today, 70 percent of the world's protein needs come from wheat, legumes and other crops, and the rest from soybeans and poultry products. Selection of samples based on morphological, biological and economic characteristics and characteristics from among varietal samples of world collections; to identify a positive correlation between protein content and gluten content in wheat grain.

Wheat (Triticum aestivum L.) is considered a vital source of food security worldwide due to its richness in proteins, essential amino acids, carbohydrates, vitamins, and enzymes that are crucial for human health. According to FAO data, the global wheat production forecast for 2024 is currently estimated at 789.0 million tons, which is 0.6% (5.2 million tons) higher than the production in 2023.

Breeders around the world are actively conducting selection work aimed at increasing the yield and quality of cereal crops, including soft wheat, and improving their baking properties to ensure food security for the growing global population.

Wheat is cultivated in nearly 130 countries worldwide. Countries with significant wheat production such as the USA, Russia, Ukraine, France, Italy, Spain, Poland, China, Syria, and Japan are conducting extensive scientific research. They are effectively using genetic principles and advanced breeding technologies, particularly genes that control

short-stemmed growth in wheat, to create high-potential varieties.

Research Objectives

The research aims to:

Select samples from the global collection of soft wheat varieties of different geographical origins based on their morphological, biological, and economically valuable traits.

Identify a positive correlation between the protein content and gluten in wheat grains.

Research Object

The research is based on soft wheat varieties obtained from international scientific centers such as ICARDA (International Center for Agricultural Research in the Dry Areas), CIMMYT (International Maize and Wheat Improvement Center, Mexico), the Institute of Breeding and Genetics in Odessa (Ukraine), the Plant Science Research Institute (Russia), the Krasnodar Agricultural Research Institute, and the I.G. Kalinenko All-Russian Research Institute of Grain Crops.

A positive correlation exists between the protein content and the amount of gluten in wheat grains, with a correlation coefficient close to one (r = 0.97). The protein content in wheat grains tends to vary depending on the growing conditions.

In many countries, including Uzbekistan, the population's protein needs are primarily met through bakery products. There is a direct relationship between protein content and gluten levels. In strong wheat varieties, the correlation between protein and gluten content reaches a level of 0.9.

The protein and gluten content in the grain varies significantly depending on cultivation conditions. It is not the quantity of protein that determines the flour strength but its quality. The yield and quality of flour and bread produced from selected autumn soft wheat varieties of intensive type based on grain quality are shown in the table below.

The protein content ranges from 12.4% to 16.2%, with the control variety ‘Zamin-1’ showing a protein content of 14.1%. The highest indicators were identified in the following samples:

9809/15 SIT (16.2%)

K-40700 (France) – 15.4%

K-60097 (Hungary) – 15.4%

Table 1: Protein content in grain samples of common wheat varieties (Samarkand, 2020-2021).)

N	Variety sample names and catalog number	Country name	Protein content, %			Average protein content
			1	2	3	
1.	Zamin-1 (control)	Uzbekistan	12,7	14,9	14,8	14,1
2.	Krasnodar -99	Russian	13,8	13,4	13,6	13,6

3.	K-69401	Tunis	14,3	14,9	14,9	14,7
4.	Ф 364	Romania	14,2	14,7	14,7	14,6
5.	9809/15	SIT	15,4	17,1	16,3	16,2
6.	LUMA 11	China	13,7	14,0	14,6	14,1
7.	9809/15	SIT	14,8	13,9	15,2	14,7
8.	9820/15	Iran	13,7	12,9	14,6	13,7
9.	9821/16	SIT	15,2	15,1	12,4	14,1
10.	83/108	SIMMUT	14,7	14,8	15,4	14,9
11.	9821/16	SIT	13,0	15,1	14,9	14,1
12.	FRL-2004	Turkey	14,2	14,9	15,1	14,7
13.	АТАУ 85	Turkey	13,2	13,7	13,9	13,7
14.	CWI 64790	Mexico	15,0	13,1	13,0	13,7
15.	K-60097	Hungary	14,9	15,5	15,9	15,4
16.	N92L192	USA	14,3	14,0	14,5	14,3
17.	K-520293	Yugoslavia	11,8	13,2	12,5	12,5
18.	K-46023	Yugoslavia	12,4	13,2	12,6	12,7
19.	FRL-2314	Iran	12,2	13,2	13,0	12,8
20.	K-40700	France	15,9	16,1	15,7	15,4
	Experimental error	**S_x =**				**0,389**
	Mean standard error of the difference	**S_d =**				**0,550**
	EKF	**EKF_{05} =**				**1,09**
		EKF_{05} =				**7,584**

The protein content variation in the studied varieties and samples averaged from 12.4% to 16.2% over three years. A protein content exceeding 14% indicates good grain quality. Analysis of the experimental data revealed that the samples with relatively high gluten content were K-40700 (France) (32.1%), N92 L192 (USA) (31.6%), and FRL-2004 (Turkey) (30.6%). The control variety, Zamin 1, had a gluten content of 28.3%.

In the studied varieties and samples, yield showed a strong positive correlation with gluten content (r = 0.69), grain vitreousness (r = 0.63), number of grains per ear (r = 0.61), grain hectoliter weight (r = 0.76), grain protein content (r = 0.48), ear length (r = 0.62), 1000-grain weight (r = 0.72), and ear weight (r = 0.53).

Conclusion. One of the key indicators determining grain quality is grain hectoliter weight (test weight). Grain hectoliter weight allows determining the fullness of the grain and the flour extraction rate.

The grain hectoliter weight of the soft wheat varieties and samples ranged from 760.5 g/L to 807.3 g/L. The following varieties and samples exhibited higher grain hectoliter weight compared to the control variety, Zamin 1 (768.7 g/L): LUMA 11 (807.3 g/L) and K-60097 (Hungary) (800 g/L).

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