

YIELD CHARACTERISTICS AND GRAIN YIELD OF SOFT WHEAT (*Triticum aestivum* L.) VARIETY SAMPLES

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Abstract

The creation of soft wheat varieties resistant to lodging, diseases, and pests for irrigated areas, tolerant to adverse climatic conditions, high-yielding, with high grain quality, and the development of a scientifically based accelerated seed production scheme for varieties with high seed and crop quality, as well as effective variety agrotechnics for new varieties are among the tasks.

Keywords. Initial material, yield, winter wheat, variety samples, hybridization, seeding rate.

Relevance of the Topic. Currently, wheat ranks first among other crops worldwide in terms of its cultivated area. Its total cultivated area worldwide amounts to 225 million hectares (FAO, 2012).

Major wheat-producing countries include Russia, China, the United States, India, Canada, Argentina, France, and several others. Wheat is one of the most widely grown major cereal crops. More than half of the world's population uses wheat bread as a staple food. Wheat bread is high in protein and starch; because the protein is mainly in the gluten, high-quality bread is made from its flour. Wheat bread is highly valued for its taste, nutritional value, and digestibility. The protein content of wheat grain ranges from 11.0% to 18-19%, depending on the variety and growing conditions.

The Strategy of Actions of the Republic of Uzbekistan for 2017-2021 states that "...intensive methods will be introduced into agricultural production, primarily the creation of new selective varieties of agricultural crops adapted to local soil-climatic and ecological conditions, the introduction of modern agrotechnologies in grain crop fields, and special attention will be paid to the development of grain farming".

According to international statistical data, the total world wheat production currently amounts to 772 million tons.

Wheat is grown in nearly 130 countries worldwide. In major wheat-growing countries such as the USA, Russia, Ukraine, France, Italy, Spain, Poland, China, Syria, and Japan, extensive research is being conducted on creating high-potential varieties using genetic laws and advanced breeding technologies, including utilizing the short-stem gene to control short stature. Identifying the correlation between genes controlling short stature in wheat and grain yield, creating short-statured, lodging-resistant varieties resistant to biotic and abiotic factors, selecting initial material for marker-assisted selection, and conducting molecular genetic studies are important tasks..

Increasing the yield and quality of cereal crops, particularly soft wheat, and developing fast-maturing varieties resistant to adverse environmental factors are crucial tasks in modern wheat farming in Uzbekistan to further strengthen food security. Uzbekistan has achieved wheat self-sufficiency and is now among the few countries exporting it.

Research on the identification of short-stemmed varieties to increase wheat yield has yielded several key findings globally, including: the development of short-stemmed, strong-stalked, lodging-resistant mutant lines of soft wheat using experimental mutagenesis (CIMMYT, Mexico); the identification and chromosomal localization of genes controlling the inheritance of short-stemmed traits in wheat, from Rht-B1 to Rht-8 (Center for Crop Improvement, Australia); the determination that there is no negative correlation between stem length and yield, meaning that reducing stem length does not negatively affect yield (Department of Plant Sciences and Plant Pathology, Montana State University, Bozeman, MT, United States); and the finding that short-stemmed wheat varieties with the Rht1 and/or Rht2 genes have higher yields than medium and tall varieties due to increased grain number per spike and spike number per square meter.

In developing new soft wheat varieties and lines, collaborative research was conducted with international research centers CIMMYT-ICARDA, the Institute of

Plant Genetics (Uzbekistan), the Odessa Institute of Selection and Genetics (Ukraine), the Institute of Plant Genetics (Moscow, Russia), the Krasnodar Agricultural Research Institute, and the All-Russian Research Institute of Cereal Crops named after I.G. Kalinenko. This research involved selecting and crossing soft wheat samples of diverse geographic origins to create new short-stemmed varieties.

The research utilized soft wheat samples from international research centers ICARDA (International Center for Agricultural Research in the Dry Areas), the International Maize and Wheat Improvement Center (CIMMYT, Mexico), the Odessa Institute of Selection and Genetics (Ukraine), the Institute of Plant Genetics (Russia), the Krasnodar Agricultural Research Institute, and the All-Russian Research Institute of Cereal Crops named after I.G. Kalinenko, as well as the following short-stemmed soft wheat lines: C 195/02, C 196/03, C 74/63, C 60/45, C 60/60, C 95/01, C 47/97, C 95/01, No. 11/2018, No. 12/2018, No. 15/2018, No. 18/2018, No. 153/2017, KP No. 184/2017, No. 36/2018, No. 22/2018, No. 71/2018, and the varieties Istiqlol-20 and Semurg'.

A global collection of soft wheat samples with valuable breeding traits was studied under irrigated conditions in Samarkand and Jizzakh regions. Samples resistant to adverse environmental factors (cold, drought, heat, diseases, and lodging) were selected as initial sources.

Yield Characteristics and Grain Yield of Soft Wheat Variety Samples

As the population grows, so does the demand for grain and grain products. However, increases in wheat acreage and grain yield depend on several factors, including the geographical location of countries, soil and climatic conditions, and advancements in science and technology.

Current wheat breeding focuses on creating varieties adapted to the specific characteristics of each region and external environmental conditions, maintaining yield under any circumstances. Studying the wheat gene pool is crucial for this.

Wheat, particularly winter wheat, excels in yield compared to other cereal crops. Higher yields are observed in European countries, while lower yields are found in Africa and Latin America. Wheat yield is critical in breeding programs. Three main

traits are considered when evaluating yield in wheat breeding: large spike size, productive tillering, and large grain size.

Yield, influenced by spike length and the number of spikelets per spike, is largely determined by varietal characteristics. Productive tillering, the number of grains per spike, and the weight of 1000 grains, while influenced by the external environment, significantly contribute to high yields. A positive correlation was found between yield and the weight of 1000 grains in the variety samples.

Studies by A. Amanov, L. Gafurova, and F. Nurbekov have shown that grain crop yield is affected by productive tillering, the number of grains per spike, the weight of 1000 grains, and the agroecological background or the topography of the plot.

Higher grain yields are observed when planting winter wheat with a medium to large 1000-grain weight; yields decrease sharply with smaller grain weights.

Winter wheat yields improve with earlier planting. Early planting results in greater tillering during the autumn; late planting leads to reduced tillering, with some plants failing to tiller at all.

In the control Kraska variety, spike length ranged from 9.2 cm to 13.5 cm. Higher spike lengths were observed in Uz-40666 (Argentina) at 13.5 cm, 78.76/Condor (Iran) at 12.3 cm, and K-48347 (Kenya) at 12.8 cm. The number of spikelets per spike ranged from 20.8 to 17.4, with K-61188 (Australia) at 20.8 and 78.76 Condor (Iran) at 19.5 showing higher values than the control.

The number of grains per spike ranged from 48 to 60, with 54 grains in the control variety. Higher values were observed in K-54215 (China) and 78.76/Condor (Iran).

The weight of grains per spike in the control Kraska variety was 1.8 grams, while the studied samples ranged from 1.4 to 2.4 grams. The highest weight of grains per spike was found in SWM-16234 (Mexico) at 2.4 grams and CWI-33789 (Mexico) at 2.1 grams.

The weight of 1000 grains ranged from 38 to 45 grams in the studied samples, with the control variety at 39 grams, Feng you (China) at 45 grams, and 78.76/Condor (Iran) at 44.0 grams.

Grain yield per m² in the studied samples ranged from 400 to 840 grams, with high yields observed in Feng you (China) at 800 g/m², 78.76/Condor (Iran) at 810 g/m², K-61188 (Australia) at 840 g/m², and CWI-33789 (Mexico) at 803 g/m²..

Productivity indicators of soft wheat variety samples

№	Sample name	Country name	Number of productive balls. Dona, M±m	Spike length, CM, M±m	Number of spikes in spikes, pieces, M±m	1000 дона дон	1м ² даги дон
1.	Крошка (Н)	Russian	3,4± 1,2	9,2 ± 0,8	17,4± 0,8	38± 1,9	421
2.	K-48347	Kenya	4,7± 0,7	12,8± 0,1	18,4± 2,1	40± 0,5	400
3.	УЗ-40666	Argentina	3,8± 1,7	13,5± 0,1	18,7± 1,1	41± 0,6	762
4.	K-54215	China	3,7± 1,4	9,9± 0,8	18,6± 0,6	40± 0,4	806
5.	Feng you	China	4,2± 0,9	10,0± 0,9	18,2± 1,1	45± 0,2	800
6.	K-61188	Australia	5,1± 1,5	12,1± 0,5	20,8± 0,7	41± 0,8	840
7.	SWM-16234	Mexico	4,6± 0,7	11,6± 0,7	18,9± 0,9	39± 1,0	657
8.	CWI-33789	Mexico	4,9± 0,9	11,3± 1,6	18,1± 2,1	40± 1,9	803
9.	78.76/Condor	Iran	5,3± 0,3	12,3± 0,4	19,5± 0,8	44± 0,6	810
10	K- 56905	canada	5,0± 0,2	9,5± 0,6	19,1± 0,6	40± 0,5	780
	Error of experience	S _x	1,5	0,160	0,251	35,8	1,524
	Difference mean error	S _d	1, 2	0,226	0,356	29,7	2,155
	ЭКФ	ЭКФ ₀₅	0,14	0,45	0,70	39,9	4,27
		ЭКФ ₀₅	0,12	0,41	0,69	38,7	4,12

The results of our studies show that the yield indicators of the varieties and samples studied were found to be different depending on their productivity. Before the Breeders of Uzbekistan is the task of creating varieties of Bushy grain crops for

irrigated lands in the current period that are well adapted to local conditions. It is especially important to create varieties that preserve drought, diseases, lying down and other valuable farm signs with a high yield in themselves. We recommend using samples of the variety studied and selected in the experiment as the starting material for creating soft wheat varieties with short stems.

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