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Growth, Development And Productivity Indicators Of Bread Wheat Lines Established In Local Conditions

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Abstract: It is known that today, the food problem, the increase of the population, the decrease of cultivated land areas, and the destruction of ecology are increasing the demands for new varieties of agricultural crops. That is why the government of our republic pays great attention to the field of selection and seed production. In this context, studies were conducted on 35 varieties and lines of soft wheat in the laboratory of genetics and selection of spiked grain crops of the Southern Agricultural Research Institute. "Shams" and "Antonina" varieties, which are planted in large areas of our republic, were taken as model varieties. As a result of the research, wheat lines with a short growing season and high productivity were selected.

Key words: autumn soft wheat, vegetation period, plant height, spike length, productivity.

Introduction: Currently, in Uzbekistan, wheat species T.aestivum L. and T.durum Dest., are cultivated and widely cultivated [1, 8, 12, 18, 22].

Wheat bread has high taste and nutritional properties, is well digested and absorbed by the body. Wheat grain is also used in cereal, pasta and confectionery industry. It is the main product for 35% of the world's population and provides about 20% of the population's energy needs [4, 11, 15, 20, 28].

Global wheat production must increase by 2 percent annually to meet future demands. Cultivating wheat varieties with high grain yield potential, water use efficiency, heat tolerance, grain quality, and resistance to important diseases and pests can help provide at least half of the desired increase in production. The other half should be done through good agronomic and soil management practices and promotion policies [5, 7, 13, 17].

Complex carbohydrates found in bread and other wheat-based foods provide the energy needed by the human body. Carbohydrates are the body's source of energy. Wheat flour is a vehicle for vitamins and minerals and an important source of carbohydrates, potassium, magnesium, B vitamins, folic acid, antioxidants and phytochemicals [3, 6, 9].

Wheat provides about 20% of the protein for more than half of the world's population. Wheat is the basis of the staple food products of developing and developed countries worldwide. People do not get protein deficiency disease just because they eat wheat [10, 14, 16, 27].

The main method of preliminary assessment of variety diversity is the comparative study of biological productivity and yield elements in variety samples. The most important element that will shape the future harvest is the yield of spikes and the number of productive stalks. In turn, the productivity of the ear consists of characteristics such as the size of the grain and the mass of 1000 grains [2, 19, 21, 25].

Stable traits such as productive spikes, grain formation per spike, and 1000-grain mass should also be considered. At the same time, it is necessary to take into account the relationship between quantitative and qualitative indicators. For example, it is known that the relationship between the mass of 1000 grains and the amount of protein is compensatory, therefore, both characteristics should be controlled in selection work for yield and product quality [23, 24, 26].

Material and methods. In the study area, 35 varieties and ridges were placed in 3 rows, the crop area was 10 m2, and test works were carried out as part of the research on the selection of varieties and ridges of winter soft wheat suitable for climate changes, productive and with high grain quality. Field experiments were

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conducted at the experimental field of the Karshi Department of the Southern Agricultural Scientific Research Institute.

2 model varieties and 33 new lines were selected for the experiment. Shams and Antonina varieties, which are planted on a large area in the irrigated areas of our republic, were taken as model varieties. The ridges selected for the research are examples of selection brought from local and foreign scientific centers with high disease and pest resistance, productivity and grain quality indicators in local conditions.

The Alpha lattice design of the international GenStat-13 program was used to develop the scheme of random placement of genotypes in the experiment.

Results: According to the results of the conducted research, it was observed that soft wheat varieties and lines entered the germination phase on October 11-13. As a result of phenological observations, it was determined that the transition of varieties and ridges to the flowering phase corresponded to November 15-19 on average. Based on the results of the analysis, it was determined that the germination-sprouting period was on average from 34 to 39 days according to the returns.

Based on the results of the analysis, it was determined that the transition of soft wheat varieties and ridges to the tuber phase occurred on average on the 7th of January and the 18th of February. According to the results of the analysis, it was found that the period of sprouting and sprouting was from 87 to 129 days.

The growth period is one of the main problems in breeding. A complete growing season consists of the sum of two main intermediate periods: germination-earing and earing-ripening. Compared to the second main period - earing-ripening, the duration of the first period depends more on the biological characteristics of the variety than on the weather environment.

According to the results of the research, when the transition of soft wheat varieties and lines to the earing phase was analyzed, it was determined based on the results of the analysis that the germination-earing period was from 170 to 184 days, corresponding to April 1-13 according to the returns.

As it is known, it has been proven in studies that the growth period of the varieties and ridges that entered the earing phase early in grain crops with spikes is short.

Table 1

Results of phenological monitoring of soft wheat varieties and lines (Karshi-2021-2022 yr.).

№	Name of genotypes	Germi-nation date	Tillering date	Shooting date	Heading date	Maturity date	Vegetation period
1	**Shams (check)**	12.okt	15.nov	01.feb	03.apr	03.june	234
2	**Antonina (check)**	12.okt	18.nov	30.jan	02.apr	06.june	237
3	KR20-BWF5IR-71	12.okt	16.nov	29.jan	06.apr	02.june	233
4	KR20-BWF5IR-75	11.okt	15.nov	07.jan	08.apr	03.june	235
5	KR20-BWF5IR-76	11.okt	17.nov	29.jan	03.apr	03.june	235
6	KR20-BWF5IR-124	11.okt	17.nov	19.jan	06.apr	03.june	235
7	KR20-BWF5IR-132	11.okt	18.nov	11.jan	13.apr	03.june	235
8	KR20-BWF5IR-156	12.okt	15.nov	30.jan	02.apr	03.june	234
9	KR20-BWF5IR-207	11.okt	17.nov	12.feb	07.apr	03.june	235
10	KR20-BWF5IR-938	11.okt	17.nov	15.jan	06.apr	03.june	235
11	KR20-BWF5IR-1760	11.okt	16.nov	30.jan	04.apr	03.june	235
12	KR20-BWF5IR-1763	11.okt	18.nov	03.feb	01.apr	03.june	235
13	KR20-BWF5IR-2114	12.okt	18.nov	05.feb	01.apr	04.june	235
14	KR20-BWF5IR-2145	12.okt	16.nov	03.feb	05.apr	03.june	235
15	KR20-BWF5IR-2158	11.okt	17.nov	09.feb	05.apr	02.june	234
16	KR20-BWF5IR-2180	11.okt	19.nov	16.feb	08.apr	05.june	237
17	KR20-BWF5IR-2222	11.okt	18.nov	12.feb	04.apr	04.june	236
18	KR20-BWF5IR-2252	11.okt	19.nov	01.feb	07.apr	04.june	236
19	KR20-BWF5IR-2265	12.okt	16.nov	20.jan	04.apr	02.june	233
20	KR20-BWF5IR-2269	11.okt	19.nov	26.jan	07.apr	03.june	235
21	KR20-BWF5IR-2435	11.okt	16.nov	16.feb	04.apr	2 june	233

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22	KR20-BWF5IR-2463	11.okt	17.nov	07.jan	01.apr	3 june	234
23	KR20-BWF5IR-2581	12.okt	15.nov	24.jan	03.apr	4 june	235
24	KR20-BWF5IR-2644	11.okt	16.nov	21.jan	04.apr	5 june	236
25	KR20-BWF5IR-2724	11.okt	16.nov	13.jan	06.apr	3 june	235
26	KR20-BWF5IR-2729	13.okt	17.nov	08.jan	05.apr	1 june	232
27	KR20-BWF5IR-2734	11.okt	15.nov	01.feb	04.apr	3 june	235
28	KR20-BWF5IR-3150	11.okt	17.nov	08.jan	01.apr	6 june	238
29	KR20-BWF5IR-3284	11.okt	19.nov	08.jan	03.apr	2 june	233
30	KR20-BWF5IR-3360	11.okt	16.nov	26.jan	04.apr	5 june	236
31	KR20-BWF5IR-3484	13.okt	19.nov	20.jan	01.apr	2 june	232
32	KR20-BWF5IR-3508	11.okt	16.nov	11.jan	04.apr	2 june	234
33	KR20-BWF5IR-3510	11.okt	17.nov	07.feb	03.apr	4 june	236
34	KR20-BWF5IR-3517	12.okt	19.nov	14.feb	06.apr	2 june	233
35	KR20-BWF5IR-3528	11.okt	18.nov	18.feb	06.apr	4 june	236
Mean		***11.okt***	***17.nov***	***27.jan***	***04.apr***	***03.june***	***235***
Maximum		***13.okt***	***19.nov***	***18.feb***	***13.apr***	***06.june***	***238***
Minimum		***11.okt***	***15.nov***	***07.jan***	***01.apr***	***01.june***	***232***

According to the results of the analysis, the germination-heading period of the model "Shams" and "Antonina" varieties was 173 days, and the number of ridges that went from the model varieties to the earing phase early was 6.

It has been proven in scientific studies that the duration of the plant growth period is determined by the natural variability of the variety and depends on the growing conditions.

When the transition of soft wheat varieties and ridges to the full ripening phase was analyzed, it was determined as a result of the analysis that the growth period was 232-238 days, corresponding to June 1-6 on average.

Creation of early varieties of wheat is one of the main tasks of breeding. Because the period from the germination of the seed to the full ripening of the plant or the growing season is short, the crop is harvested in such a short period of time, with good quality, without spoilage.

According to the results of the research, the growth period of the model "Shams" variety was 234 days, and the growth period of the "Antonina" variety was 237 days, while the number of ridges with a short growth period from the model varieties was 7 and were selected as early ridges.

Biometric indicators of soft wheat varieties and ridges studied in the research conducted in the southern region of the republic were analyzed. According to the results of the analysis, it was found that the plant length of the varieties and ridges was on average from 94 cm to 133 cm according to the returns.

It is known that the length of the final joint in grain crops shows the drought resistance of the plant. From this point of view, it was found that the average length of 35 varieties and ridges of soft wheat studied in the study was 35-45 cm according to returns.

Table 2

Biometric indicators of soft wheat varieties and lines (Karshi-2021-2022 yr.).

№	Name of genotypes	Plant height, cm				Peduncle length, cm			
		Rep-1	Rep-2	Rep-3	Mean	Rep-1	Rep-2	Rep-3	Mean
1	**Shams (check)**	114	109	113	**112.0**	44	42	44	**43.3**
2	**Antonina (check)**	100	102	103	**101.7**	37	40	51	**42.7**
3	KR20-BWF5IR-71	105	108	101	**104.7**	38	41	41	**40.0**
4	KR20-BWF5IR-75	110	100	101	**103.7**	35	36	34	**35.0**
5	KR20-BWF5IR-76	95	100	96	**97.0**	32	46	38	**38.7**
6	KR20-BWF5IR-124	109	113	93	**105.0**	35	42	41	**39.3**
7	KR20-BWF5IR-132	105	107	118	**110.0**	37	38	44	**39.7**
8	KR20-BWF5IR-156	110	115	105	**110.0**	40	39	42	**40.3**

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9	KR20-BWF5IR-207	105	116	104	**108.3**	35	40	45	**40.0**
10	KR20-BWF5IR-938	104	110	112	**108.7**	44	41	39	**41.3**
11	KR20-BWF5IR-1760	103	107	118	**109.3**	46	41	40	**42.3**
12	KR20-BWF5IR-1763	122	100	103	**108.3**	38	36	44	**39.3**
13	KR20-BWF5IR-2114	114	102	104	**106.7**	38	44	35	**39.0**
14	KR20-BWF5IR-2145	130	110	110	**116.7**	50	41	33	**41.3**
15	KR20-BWF5IR-2158	106	110	120	**112.0**	40	37	41	**39.3**
16	KR20-BWF5IR-2180	115	119	110	**114.7**	47	43	36	**42.0**
17	KR20-BWF5IR-2222	108	105	110	**107.7**	35	37	34	**35.3**
18	KR20-BWF5IR-2252	113	104	115	**110.7**	42	36	40	**39.3**
19	KR20-BWF5IR-2265	103	119	103	**108.3**	40	44	42	**42.0**
20	KR20-BWF5IR-2269	114	102	118	**111.3**	37	38	35	**36.7**
21	KR20-BWF5IR-2435	124	102	103	**109.7**	52	37	33	**40.7**
22	KR20-BWF5IR-2463	112	97	101	**103.3**	37	37	35	**36.3**
23	KR20-BWF5IR-2581	112	97	97	**102.0**	43	29	33	**35.0**
24	KR20-BWF5IR-2644	113	115	100	**109.3**	35	47	46	**42.7**
25	KR20-BWF5IR-2724	130	116	112	**119.3**	37	43	44	**41.3**
26	KR20-BWF5IR-2729	115	108	109	**110.7**	44	41	42	**42.3**
27	KR20-BWF5IR-2734	108	87	88	**94.3**	39	34	34	**35.7**
28	KR20-BWF5IR-3150	101	104	110	**105.0**	38	39	40	**39.0**
29	KR20-BWF5IR-3284	98	106	111	**105.0**	35	34	40	**36.3**
30	KR20-BWF5IR-3360	110	109	125	**114.7**	47	38	47	**44.0**
31	KR20-BWF5IR-3484	102	104	102	**102.7**	42	32	37	**37.0**
32	KR20-BWF5IR-3508	97	107	109	**104.3**	33	39	40	**37.3**
33	KR20-BWF5IR-3510	99	110	91	**100.0**	39	36	39	**38.0**
34	KR20-BWF5IR-3517	104	111	104	**106.3**	37	36	38	**37.0**
35	KR20-BWF5IR-3528	100	98	104	**100.7**	36	33	39	**36.0**

It is known from the literature that the spike length and the number of spikes in the spike are one of the important parameters that determine grain yield. It has been proven in the researches of many scientists that dry and hot weather during the earing and ripening phases, in turn, reduces the grain formation in the spikes and spikes.

According to the results of the conducted research, when the spike length of soft wheat varieties and ridges was analyzed, it was found that it was 9-12 cm on average according to returns. In this case, it was found out as a result of biometric measurements that the spike length was 11 cm in the "Shams" variety, and 10 cm in the "Antonina" variety.

It was found that KR20-BWF5IR-1760, KR20-BWF5IR-2114, KR20-BWF5IR-2252, KR20-BWF5IR-2269, which have long spike length, were 12 cm long (Fig. 3.4). It was found that there is a positive correlation between spike length and grain yield, r=0.60.

Table 3

Spike length and number of spikeletss of soft wheat varieties and lines, 2021-2022 year.

№	Name of genotypes	Spike length, cm				Spikelets, pc			
		Rep-1	Rep-2	Rep-3	Mean	Rep-1	Rep-2	Rep-3	Mean
1	**Shams (check)**	12	10	11	**11.0**	21	17	22	**20.0**
2	**Antonina (check)**	11	11	14	**12.0**	19	20	24	**21.0**
9	KR20-BWF5IR-207	13	10	9	**10.7**	18	18	14	**16.7**
16	KR20-BWF5IR-2180	9	11	8	**9.3**	17	22	15	**18.0**
19	KR20-BWF5IR-2265	11	11	11	**11.0**	17	20	17	**18.0**
7	KR20-BWF5IR-132	10	10	9	**9.7**	19	20	16	**18.3**

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4	KR20-BWF5IR-75	10	10	11	**10.3**	19	18	18	**18.3**
22	KR20-BWF5IR-2463	10	11	10	**10.3**	19	16	20	**18.3**
30	KR20-BWF5IR-3360	10	10	11	**10.3**	17	19	20	**18.7**
5	KR20-BWF5IR-76	11	10	11	**10.7**	18	20	18	**18.7**
8	KR20-BWF5IR-156	9	12	11	**10.7**	19	20	17	**18.7**
34	KR20-BWF5IR-3517	9	10	11	**10.0**	15	21	21	**19.0**
3	KR20-BWF5IR-71	10	10	11	**10.3**	19	17	21	**19.0**
25	KR20-BWF5IR-2724	11	11	10	**10.7**	20	18	19	**19.0**
24	KR20-BWF5IR-2644	10	9	10	**9.7**	18	20	20	**19.3**
28	KR20-BWF5IR-3150	10	8	11	**9.7**	21	16	21	**19.3**
26	KR20-BWF5IR-2729	11	10	11	**10.7**	21	17	20	**19.3**
6	KR20-BWF5IR-124	13	10	10	**11.0**	23	19	16	**19.3**
10	KR20-BWF5IR-938	11	11	11	**11.0**	21	20	17	**19.3**
11	KR20-BWF5IR-1760	10	11	12	**11.0**	19	19	20	**19.3**
31	KR20-BWF5IR-3484	13	10	9	**10.7**	19	20	20	**19.7**
35	KR20-BWF5IR-3528	10	11	11	**10.7**	20	22	18	**20.0**
13	KR20-BWF5IR-2114	10	11	12	**11.0**	19	21	20	**20.0**
33	KR20-BWF5IR-3510	10	12	11	**11.0**	19	21	20	**20.0**
17	KR20-BWF5IR-2222	12	10	9	**10.3**	22	19	20	**20.3**
32	KR20-BWF5IR-3508	9	11	11	**10.3**	19	22	20	**20.3**
12	KR20-BWF5IR-1763	11	12	12	**11.7**	20	21	20	**20.3**
18	KR20-BWF5IR-2252	15	9	11	**11.7**	24	17	20	**20.3**
20	KR20-BWF5IR-2269	17	10	10	**12.3**	20	17	24	**20.3**
21	KR20-BWF5IR-2435	11	11	10	**10.7**	21	21	20	**20.7**
23	KR20-BWF5IR-2581	10	11	10	**10.3**	20	22	21	**21.0**
27	KR20-BWF5IR-2734	11	9	11	**10.3**	21	19	24	**21.3**
15	KR20-BWF5IR-2158	11	12	9	**10.7**	20	23	21	**21.3**
14	KR20-BWF5IR-2145	12	12	10	**11.3**	21	22	22	**21.7**
29	KR20-BWF5IR-3284	12	11	11	**11.3**	23	23	19	**21.7**

When analyzing the number of spikes in the ear of soft wheat varieties and lines, it was found that the average was 17-22 according to returns. In this case, it was found that the number of spikes in the spike of the sample "Shams" was 19, and the number of spikes in the spike of "Antonina" was 20. As a result of the analysis, it was found that the number of spikes in the spike is from 21 to 22 in 7 ridges with a large number of spikes in the spike from the model varieties. It was found that there is a positive correlation r=0.65 between the number of spikes in the spike and grain yield.

According to the results of the research carried out in the conditions of 2021-2022, it was found that the yield index of soft wheat varieties and lines was analyzed on average from 15.2 c/ha to -50.4 c/ha.

Table 4

Grain yield of soft wheat varieties and lines, 2021-2022 year.

№	Name of genotypes	Grain yield, c/ha				Differences of check		Group
		Rep-1	Rep-2	Rep-3	Mean	c/ha	%	
1	**Shams (check)**	62.8	62.4	62.6	**62.6**	0.0	0.0	II
2	**Antonina (check)**	55.2	55.0	55.4	**55.2**	-7.4	-11.8	III
3	KR20-BWF5IR-71	51.2	50.8	51.0	**51.0**	-11.6	-18.5	III
4	KR20-BWF5IR-75	60.4	61.0	61.4	**60.9**	-1.7	-2.7	II
5	KR20-BWF5IR-76	59.6	59.4	59.6	**59.5**	-3.1	-4.9	III

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6	KR20-BWF5IR-124	59.6	59.4	59.6	**59.5**	-3.1	-4.9	III
7	KR20-BWF5IR-132	33.6	33.2	33.0	**33.3**	-29.3	-46.9	III
8	KR20-BWF5IR-156	61.6	61.2	61.4	**61.4**	-1.2	-1.9	II
9	KR20-BWF5IR-207	30.4	30.2	30.4	**30.3**	-32.3	-51.5	III
10	KR20-BWF5IR-938	61.2	60.6	61.0	**60.9**	-1.7	-2.7	II
11	KR20-BWF5IR-1760	78.0	76.0	76.0	**76.7**	14.1	22.5	I
12	KR20-BWF5IR-1763	63.6	63.4	63.5	**63.5**	0.9	1.5	II
13	KR20-BWF5IR-2114	42.0	42.0	42.2	**42.1**	-20.5	-32.8	III
14	KR20-BWF5IR-2145	79.6	79.3	79.5	**79.5**	16.9	26.9	I
15	KR20-BWF5IR-2158	68.4	68.4	68.6	**68.4**	5.8	9.3	I
16	KR20-BWF5IR-2180	61.6	61.4	61.0	**61.3**	-1.3	-2.0	II
17	KR20-BWF5IR-2222	69.2	69.1	69.2	**69.1**	6.5	10.5	I
18	KR20-BWF5IR-2252	64.0	63.6	63.6	**63.7**	1.1	1.8	II
19	KR20-BWF5IR-2265	51.2	51.0	50.8	**51.0**	-11.6	-18.5	III
20	KR20-BWF5IR-2269	49.2	49.2	49.1	**49.1**	-13.5	-21.5	III
21	KR20-BWF5IR-2435	71.6	71.4	71.4	**71.5**	8.9	14.2	I
22	KR20-BWF5IR-2463	31.6	31.4	31.6	**31.5**	-31.1	-49.6	III
23	KR20-BWF5IR-2581	93.2	93.0	93.2	**93.1**	30.5	48.8	I
24	KR20-BWF5IR-2644	46.4	46.2	46.0	**46.2**	-16.4	-26.2	III
25	KR20-BWF5IR-2724	65.8	65.4	65.6	**65.6**	3.0	4.8	I
26	KR20-BWF5IR-2729	58.0	56.0	58.0	**57.3**	-5.3	-8.4	III
27	KR20-BWF5IR-2734	100.8	100.8	100.7	**100.7**	38.1	60.9	I
28	KR20-BWF5IR-3150	45.6	45.4	45.6	**45.5**	-17.1	-27.3	III
29	KR20-BWF5IR-3284	47.6	47.5	47.5	**47.5**	-15.1	-24.1	III
30	KR20-BWF5IR-3360	32.0	31.6	31.8	**31.8**	-30.8	-49.2	III
31	KR20-BWF5IR-3484	65.2	65.0	65.2	**65.1**	2.5	4.0	I
32	KR20-BWF5IR-3508	30.5	30.4	30.3	**30.4**	-32.2	-51.5	III
33	KR20-BWF5IR-3510	66.8	66.6	66.8	**66.7**	4.1	6.6	I
34	KR20-BWF5IR-3517	31.0	30.6	30.8	**30.8**	-31.8	-50.8	III
35	KR20-BWF5IR-3528	68.0	67.6	67.8	**67.8**	5.2	8.3	I
	Minimum				**30.3**			
	Mean				**57.5**			
	Maximum				**100.7**			
	LSD 0.05				**2.76**			
	CV %				**3.4**			

In conclusion, it was found that the grain yield of the sample "Shams" variety was 62.6 c/ha, while the grain yield of the "Antonina" variety was 55.2 c/ha. The number of lines with high grain yield from model varieties was 11 and recommended for the next stages of selection.

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