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Dependence of Growth Period, Yield Elements and Grain Quality of Winter Bread Wheat Varieties and Lines on Different Soil and Climate Conditions.

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Abstract: The scientific significance of the results of the study is explained by the selection of early maturing, high-yielding varieties and specimens of bread wheat with high technological quality of grain and resistance to heat, drought and disease, based on the assessment of different eco-geographical groups.
During the selection process, 24 specimens were selected for use in selection and crossbreeding, and in order to study 30 varieties and specimens in comparison with 6 regionized and promising varieties, agro-ecological varietal testing nurseries were established.
Experiments were conducted in three sites: desert, middle and foothill areas of the region (Kasbi, Karshi and Shakhrisabz districts), for a comprehensive evaluation of varieties and specimens, their precocity and resistance to diseases, and testing them in different soil climatic conditions.
The results obtained from the experimentation showed that the characteristics of the varieties and lines had varied in different soil and climatic conditions. Some bread wheat varieties and lines had stable, high and good quality yield in all three soil and climatic conditions.
The practical significance of the results of the study is manifested in the form of high-quality grain yields achieved as a result of testing of varieties of bread wheat from the gene-pool of wheat with complex traits and characteristics in different agro-ecological regions, and these varieties have been included to the group of promising varieties and recommended for sowing in irrigated fields and farms of Samarkand, Surkhandarya, Tashkent, Andijan and Kashkadarya regions.
Keywords: bread wheat, soil, climate, variety, line, grain quality.

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Introduction: The growing population of the world is further increasing the demand for grain and grain products. And accordingly, in recent years, the strict requirements for wheat varieties are growing.

The updated forecasts of the FAO show that global wheat production in 2020 will reach 758.3 million tons, which is 0.5% lower than last year's highest figure, but still shows a high level of crop production [4].

In 2019, world wheat production was 762.2 million tons, with an increase of 3.9% over the year 2018. Wheat production in the world reached its highest level in 2017, that is 773 million tons.

As a result of global climate change, grain-producing countries such as the United States, Canada, China, India and Russia are focusing on increasing grain yields by creating varieties of wheat resistant to various abiotic factors [11]. Improving the yield and quality of cereals, including bread wheat, is one of the most important tasks in today's grain production to ensure food security [5].

In wheat fields, several factors during the last months of spring and summer affect the growth, development and yield of grown wheat varieties [6]. At the same time, research on the development of high-yielding, high-quality varieties that are resistant to external stress factors and on the evaluation of hybrid lines is of great relevance today [7, 8].

Depending on the natural-climatic conditions of each region, it is necessary to create new varieties with a new genotype, good quality and high yields that alternatively grows [9, 10].

According to V.F Dorofeyev and others, there are more than 100 species of bread wheat (*Triticum aestivum*), many of which (*var, erytrospermum, var, luetescens, var, ferrigenium, var, greacum, var, albidum*) are widespread on all continents of the globe due to their excellent adaptation to the different climate conditions.

By the decision of the State Commission for Variety Testing of Agricultural Crops of the Republic of Uzbekistan, more than 40 wheat varieties have been included in the State Register, of which more than 20 are local wheat varieties.

According to the observations by Rajaram S., Borlaug N.E, Van Ginkel M., more than 200000 hybrids were developed under the bread wheat cultivation program between 1950 and 2002, and in the result of testing more than 10000 lines from these hybrid generations in different climatic conditions, more than 500 new varieties of bread wheat were created and introduced on an area of more than 40 million hectares [3].

As A. Morgunov, H. Brown, M. Mossad and R. Paroda stated that rainfed farming in Uzbekistan is a system of using non-irrigated lands. In the Republic of Uzbekistan, rainfed farming is practiced in the plains, hills, foothills and mountainous areas[19].

32% of wheat varieties grown in developing countries are exposed to heat during the growing season [7]. Local wheat varieties grown in Central Asia are heat-resistant, and harmful temperatures leading to protein coagulation in the early phases of the plant of these varieties are $+55^0C$+56^0C, and in the spiking-grain filling phase $+61^0C$ [15, 16].

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According to the FAO, the world's demand for food and protein is growing. The demand for plant protein increased 1.6 times, and the demand for animal protein less than 3 times. Consumption of vegetable protein is 70%, of which 55% is wheat protein [1].

According to some scientists, the valuable economic traits of wheat varieties in a region with low natural moisture content are its drought tolerance and the fact that varietal productivity does not decrease in years with low humidity [20].

As it has been stated by many authors, winter wheat varieties can be characterized by the predominance of individual elements (formation) of the crop structure, depending on the type and group of ripening period [17].

For the evaluation of the quality of wheat grains: protein content, sedimentation rate, number of free fall, the ability to maintain the size and shape of the bread, and the unit of gluten quality are the most important indicators in the production of bread and bread products [2]. At the same time, the amount and quality of gluten in the grain is the first factor in assessing the technological and nutritional richness of wheat grain. In full description of the technological quality of wheat grains, the environment in which wheat is grown also has a significant impact on the amount of protein, gluten content and quality [18]. During the ripening period of wheat, if the temperature is high and the rainfall is low, then the amount of protein and gluten in the grain is high. Grain gluten is low when it rains during the ripening period [22].

As a result of a comprehensive study of the lines adapted to the southern regions of the country, Dilmurodov and others selected the lines with high yield elements, high grain quality and technological characteristics of grain and recommended them as donors in hybridization [24, 25].

In the selection of heat-resistant varieties in the southern regions, the heat during the spiking-ripening or grain filling period had a great influence, and led to a decrease in grain quality and yield of sensible varieties[23, 26].

According to S. Gaybullaev and others, the southern regions of the country have a temperate climate for the cultivation of early and middle ripening wheat varieties. In the climatic conditions of our country, the formation of full grains occurs well in early-ripening and medium-ripening varieties, while in delayed-ripening varieties, due to high temperatures during grain formation, premature ripening of grain and formation of empty grains occur [12].

Materials and methods: Field experiments were carried out during 2012 – 2014, in experimental fields of Southern Agricultural Research Institute in Karshi. Laboratory experiments and surveys were conducted in "Determination of technological quality indicators of grain and physiology" laboratory. Experimental layout and phenological observations, calculation and analysis were carried out according to the method of All-Union Institute of Botany VIR (1984) and biometric analysis according to the method of the State Variety Testing Commission of Agricultural Crops (1985, 1989). Technological quality indicators of winter wheat grain grown in the experimental field were studied comparatively according to "Methodical recommendations for the evaluation of the quality of

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grain" [21], "Methods of biochemical research of plants", gluten content was compared by GOST 13586-1-68, grain hardiness by GOST 10987-76, grain moisture by GOST 13586-5-93, grain nature was compared according to GOST 3040-55, weight of 1000 grains according to GOST 10842-89. Statistical analyses were performed using the method of B.A. Dospekhov (1985) [14].

The field experimental scheme in the study was developed based on the Complete block design and Alpha lattice design of the Genestat 3 program.

During the selection process, 24 specimens were selected for use in selection and crossbreeding, and in order to study 30 varieties and specimens in comparison with 6 regionized and promising varieties, agro-ecological varietal testing nurseries were established and experiments were conducted in three sites: desert, middle and foothill areas of the region (Kasbi, Karshi and Shakhrisabz districts).

Results: Depending on the duration of the growing season, selection materials (varieties and specimens) are divided into 3 groups: early ripening, medium ripening and delayed ripening. All these three are important in production, and early-ripening, middle-, or delayed-ripening varieties can be planted, depending on the type of crop, the availability of land, the nature of the crop, and the purpose of the crop. Therefore, the creation of early maturing varieties of crops is one of the main tasks of selection. This is because the shorter the period from germination to full ripening of the crop, or the shorter the growing period, the better the quality of the crop in a short period of time, without loss.

In general, early ripening varieties allow to intensifying farming in all soil-climatic regions of the country. Phenological observations were performed to determine the precocity of the studied species and variety, including the duration of the growing season. Actually, phenological observations are carried out as follows:

1. Observation is made by eye, and therefore it is always performed by one person at the same time of day - morning or evening.
2. Monitoring is carried out in at least three sites (beginning, middle, end) of the field where each plant species or variety is planted.
3. Observation is carried out only unilaterally (on the east or west side of the ridge).

According to phenological observation, the date of the beginning of the developmental phases (10-15%) and the full (75%) transition to which day of the month, is recorded in a special journal. To do this, the crops should be monitored daily.

The journal also consider the timing of planting varieties and their harvesting. On the basis of these and on the basis of the duration of the periods between the individual developmental phases of the studied varieties or selection numbers, the vegetation period and precocity are determined.

The long duration of tillering of the plants is a positive case, in which coefficient of tillering gets higher, and side shoots become more. Particularly, during the flowering and grain filling phases the plants become sensible to air temperature and humidity. In germination and tillering phases, if humidity is enough or more than normal level and air temperature is low, this case prolongs these phases. If air temperature is low, spiking stage of the plants occur later, contrarily, if the air

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temperature is high, it accelerates.

During the years of experiments on the analysis of bread wheat varieties, the selected varieties and samples for agroecological variety testing nursery were studied in three different natural climatic and soil conditions of Kashkadarya region.

Among the studied bread wheat varieties, the duration of the "germination-ripening" period in the desert zone was 180-184 days in Entry-6,100/36 and 200/43 specimens, in middle zone 182-186 days and in foothill areas 185-189 days, for precocious Krasnodar-99, 100/37, 200/41 and 200/50 varieties and specimens in desert zone this indicator was 195-201 days, in middle zone 196-203 days and in foothills 201-206 days which were found as delayed-maturing varieties, in the remaining varieties in all three sites this indicator was 187-195 days and found as middle-ripening varieties.

It was determined that in the foothills, the “germination-ripening” phase of the varieties occurred 4-10 days later than in the desert zone.

According to the data obtained, if we focus on the germination-ripening periods of each variety in different years in the same climatic conditions, the full maturity of the Yaksart variety in the desert area was 190 days in 2010, 188 days in 2011 and 184 days in 2012. If we look at the germination-ripening period of the Tanya variety taken as a standard variety, it was 190 days in 2010 and 2011 and 185 days in 2012.

High rainfall in the spring of 2010 and 2011 and lower air temperatures than in 2012 caused to prolongation of tillering and shooting phases and also affected “germination-ripening” phase.

The obtained data shows that the average growth period of the varieties and specimens in Kasbi district during the years 2010-2012 was 188-188-186 days, in Karshi district 188-189-190 days and in Shakhrisabz district 192-194-193 days. Hence, according to the growing conditions of bread wheat varieties, the full growth period also increased to a certain interval as growth condition rose above sea level (Table 1).

Also, when analyzed by regions over the years, the average growth period was 189.5 days in 2010, 190.5 days in 2011 and 189.8 days in 2012. In irrigated regions, the long or short growing season of bread wheat varieties varied depending on the amount of annual precipitation, air temperature and relative humidity.

Table-1
The growth period and the plant height of the varieties and specimens (in 2010-2012)

№	Varieties	Growth period, day				Plant height, cm			
		Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m	Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m
1	Tanya	188,3±2,5	190,0±0,5	195,7±3,5	191,3±2,8	88,0±2,0	88,0±1,0	91,7±0,5	89,2±1,8

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2	Jaykhun	187,0±1,5	189,0±0,5	195,0±0,5	190,3±3,0	90,0±1,5	89,3±0,5	94,7±2,0	91,3±2,7
3	Entry-6	182,0±1,0	183,7±1,0	191,3±1,5	185,7±3,8	110,0±0,5	110,3±0,0	113,3±1,0	111,2±1,5
4	Farovon	181,0±0,5	183,7±0,5	195,3±1,0	186,7±5,8	102,0±1,5	100,3±1,0	109,3±2,0	103,9±4,5
5	Nota	185,7±0,5	188,3±1,5	195,3±1,0	189,8±3,5	92,0±1,0	88,3±3,0	93,0±0,0	91,1±2,3
6	Vostorg	185,0±1,5	187,0±0,5	194,7±4,0	188,9±3,8	82,0±1,0	84,3±0,0	88,0±0,5	84,8±1,8
7	Hisorak	185,7±1,0	186,7±2,0	200,3±2,0	190,9±6,8	80,0±2,0	81,7±1,5	86,3±0,0	82,7±2,3
8	Krasnodar-99	195,7±0,0	197,7±1,0	193,7±1,5	195,7±2,0	93,0±1,0	92,7±1,5	101,3±5,0	95,7±4,3
9	Entry-9-23	185,0±1,0	188,3±2,5	194,3±1,5	189,2±3,0	90,0±1,0	89,3±1,0	94,3±2,0	91,2±2,5
10	Barhayot	181,7±1,0	183,3±0,5	192,3±0,5	185,8±4,5	92,0±1,0	91,3±0,5	99,0±2,0	94,1±3,8
11	Turkiston	186,3±2,5	189,0±1,0	185,3±1,0	186,9±1,8	91,0±1,0	83,7±3,0	91,7±1,0	88,8±4,0
12	Yaksart	187,3+2,0	189,0±1,0	193,0±0,5	189,8±2,0	92,0±1,0	93,7±1,0	97,3±1,0	94,3±1,8
13	Selyanka	185,0±2,0	187,0±1,0	188,0±1,0	186,7±0,5	84,0±1,0	82,3±1,5	91,3±3,0	85,9±4,5
14	Entry-32	187,7±3,0	188,0±0,0	198,3±0,5	191,3±5,2	97,0±1,0	86,3±2,0	111,7±1,5	101,7±7,7
15	Bunyodkor	184,0±0,5	182,7±1,0	191,0±1,0	185,9±4,2	89,0±1,0	88,3±1,0	95,3±3,0	90,9±3,5
16	100/36	184,7+1,0	185,3±1,5	186,3±1,0	185,4±0,5	109,0±1,0	107,3±1,0	111,7±0,0	109,3±2,2
17	100/37	196,7+1,0	196,7±2,0	187,0±0,5	193,4±4,8	101,0±1,0	100,3±2,0	105,0±2,5	102,1±2,3
18	100/38	185,3±2,0	189,0±1,0	188,3±0,0	187,6±0,3	100,0±1,0	100,3±1,5	105,0±1,5	101,8±2,3
19	100/39	188,3±2,5	190,7±1,0	194,0±2,0	191,0±1,7	105,0±1,0	102,3±1,0	108,3±1,5	105,2±3,0
20	100/40	186,7+3,0	190,7±0,0	193,3±1,0	190,2±1,3	10,6,0±1,0	104,3±1,0	107,3±1,0	105,9±1,5
21	200/41	195,3±1,0	197,3±0,0	193,0±1,5	195,2±2,2	87,0±1,0	83,3±1,5	94,3±4,0	88,2±5,5
22	200/42	186,7±3,0	189,0±0,5	192,7±0,0	189,4±1,8	79,0±1,0	79,3±3,0	87,7±2,5	82,0±4,2
23	200/43	182,3±1,0	183,3±1,5	200,7±4,0	188,8±8,7	100,0±1,0	101,3±2,5	110,3±4,0	103,9±4,5
24	200/44	189,7±1,5	190,0±1,0	186,3±2,0	188,7±1,8	96,0±1,0	92,0±2,0	98,7±1,0	95,6±3,3
25	200/45	188,3±0,5	190,3±1,0	193,7±1,5	190,8±1,7	96,0±1,0	89,7±2,0	97,7±1,5	93,4±4,0
26	200/46	186,0±1,5	190,3±0,5	194,0±1,0	190,1±1,8	90,0±1,0	90,3±0,5	95,7±3,0	92,0±2,7
27	200/47	186,7±1,5	189,7±0,5	193,0±0,5	189,8±1,7	94,0±1,0	92,0±2,5	97,7±1,5	94,6±2,8
28	200/48	187,0±2,0	190,0±1,5	194,7±1,0	190,6±2,3	100,0±1,0	99,3±1,5	105,7±2,0	101,7±3,2

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29	200/49	186,0±1,5	191,3±1,0	193,0±0,5	190,1±0,8	92,0±1,0	91,3±1,0	95,7±1,0	93,0±2,2
30	200/50	198,7±2,0	201,0±0,5	205,3±0,0	201,7±2,2	97,0±1,0	94,0±1,5	100,3±1,5	97,1±3,2
	LSD $_{0.05}$				**5,45**				**2,93**

30 varieties and samples of winter bread wheat selected from collection, selection and control nurseries for agro-ecological variety testing were planted and studied in the regions of Kashkadarya region with different soil climatic conditions. The height of the plants was 79-110 cm in the conditions of the desert zone (takyr and bare area conditions) and in the middle zone (light gray soils), and the height of the plants did not differ significantly between the varieties (Table 1).

Plant height ranged from 85 cm to 113 cm in the foothills (typical gray soils) and was noted to be 7-10 cm higher than in the desert and middle zone. In the remaining varieties, plant height was noted to be higher as growing site moved from the desert area to the foothills.

The lowest rate of plant height was 79-88 cm in Tanya, Hisorak, Vostorg, 200/42 varieties and specimens in desert and middle areas, while in foothill areas they had 88-92 cm rate. The highest rate of plant height was observed in Entry-6,100/36, 100-39, 200/43 varieties and specimens, 100-113 cm.

For example, the plant height of the Nota variety was 92 cm in takyr soils, 88 cm in light gray soils and 93 cm in foothill typical gray soils (Table 1).

In all three experimental sites, the plant height was not between 60-75. Plant height of 76-90 cm was observed in 10 varieties and specimens in desert condition, in 11 varieties and specimens in middle areas and in 3 varieties in mountainous and foothill zones, plant height of 91-120 cm was in 20 varieties and specimens in desert zones, in 19 varieties in middle zones, and in 27 varieties and specimens in mountainous and foothill zones.

Among the studied varieties and specimens in desert zone, in standard Tanya variety this indicator was 88 cm and in Krasnodar-99 variety 95 cm, in 12 varieties and specimens Entry-6, Entry-32, 100/36, 100/37, 100/38, 100/39, 100/40, 200/43, 200/44, 200/47, 200/48 and 200/50 it was found to be higher than 95 cm.

When the plant height was studied in middle zones, it was 86 cm in Tanya variety, 93 cm in Krasnodar-99 variety, and in 10 varieties and specimens it was noted to be higher than 93 cm.

In foothill zones the plant height was recorded to be slight higher than in desert and middle zones. In standard Tanya variety it was 88 cm and in Krasnodar-99 vareity 105 cm, while in 9 varieties and specimens it was noted to be more than 105 cm.

When the average three-years study results on plant height of varieties and specimens in 3 sites were analyzed, it was determined that compared to standard variety, the plant height was always higher in 9 varieties and specimens, such as Entry-6, Entry-32, 100/36, 100/37, 100/38, 100/39, 100/40, 200/43 and 200/48 in all three sites.

During the testing of varieties and specimens in 3 sites, spike length also varied respectively depending on varieties. The spike length of standard Tanya variety and

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Krasnodar-99 variety showed 9-11 cm, while in other 10 varieties and specimens it was found to be between 12-13.

In the varieties and specimens studied in desert and middle zones, average spike length was 9-13 cm, the highest spike length was noted in middle zones in Entry-6, Vostorg, Entry-32, 100/38, 100/39, 200/41, 200/44, 200/45 and 200/50 varieties and specimens. The lowest rate of spike length was determined in Selyanka, Jaykhun and 200/48 varieties and specimens.

Among the varieties and specimens studied in foothill zones, Entry-32, Bunyodkor, 100/36, 100/38, 100/39, 200/41, 200/44 and 200/45 varieties and specimens had higher rate of spike length compared to standard varieties.

The plant height varied by 3-4 cm and the spike length varied according to the plant height (r = 0.47) for every 100 m of elevation above sea level from the desert region.

The grains in the spikes also varied, in the middle spikelets they are large, while the grains in the upper and lower spikelets are smaller.

The weight of 1000 grains in three zones were 39,6 g, 40,4 g and 41,2 g in Krasnodar-99 variety, 41,5 g, 42,0 g and 42,1 g in Farovon variety, 40,5 g, 41,3 g and 42,2 g in Barkhayot variety, 40,1 g, 40,8 g and 41, 4 g in Bunyodkor variety and 40,2 g, 40,8 g and 41,4 g in 100/38 variety. In the variety 200/50 with the largest grains, the weight of 1000 grains was 44,1g, 46,4 g and 46,5 g respectively (table-2).

When an average productivity was studied in three types of soil and climate conditions, it showed 50,2 c/ha, particularly, in Tanya variety 48 c/ha and 53,4 c/ha in desert zone during 2010-2012, in middle zone 57,2 c/ha, 55,3 c/ha and 52,8 c/ha, in foothill zones 61,3 c/ha, 62,6 c/ha and 63,7 c/ha (table-2).

While in Krasnodar-99 variety this indicator was 55,3 c/ha, 50,1 c/ha and 53,2 c/ha in desert zones, 59,1 c/ha, 58,8 c/ha and 57,2 c/ha in middle zone condition, 64,2 c/ha, 66,4 c/ha and 69,4 c/ha in mountainous and foothill zone condition (table-2).

Due to the sharp decrease in yield in the standard Tanya and Krasnodar-99 varieties in the desert zone, the drought-resistant Yaksart cultivar gave average 60,6 c /ha yield during 3 years.

Table-2

Indicators of the weight of 1000 grains and productivity in the studied varieties and specimens (in 2010-2012)

№	Varieties	1000 grains weight, g				Productivity, c/ha			
		Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m	Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m
1	Tanya	37,4±1,0	39,1±0,5	39,8±0,5	38,8±03	50,5±2,7	55,1±1,3	62,5±0,6	56,1±3,7
2	Jaykhun	41,2±0,4	42,2±0,9	42,7±0,6	42,0±0,3	53,8±1,3	64,1±0,8	52,6±1,1	56,8±5,8
3	Entry-6	39,2±1,0	39,4±0,5	39,6±0,1	39,4±0,1	56,6±1,0	60,1±1,6	65,2±0,1	60,6±2,6

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4	Farovon	41,5±0,6	42,3±0,9	42,2±0,6	42,0±0,1	65,7±1,9	67,7±2,6	75,5±2,2	69,6±3,9
5	Nota	38,3±0,9	39,4±0,5	39,6±0,4	39,1±0,1	48,8±1,3	52,4±2,9	57,0±0,9	52,8±2,3
6	Vostorg	39,1±0,6	40,5±0,5	40,2±0,5	39,9±0,1	53,1±1,3	56,9±1,9	59,3±1,1	56,4±1,2
7	Hisorak	38,8±0,6	40,3±0,9	40,9±0,4	40,0±0,3	55,1±1,2	61,6±1,1	67,9±2,0	61,5±3,1
8	Krasnodar-99	39,6±0,6	40,4±0,3	41,2±0,5	40,4±0,4	52,9±1,6	58,4±0,8	66,7±1,5	59,3±4,2
9	Entry-9-23	38,5±0,6	40,4±0,1	40,1±0,5	39,7±0,2	65,1±3,5	64,5±0,8	69,7±0,3	66,5±2,6
10	Barhayot	40,5±0,6	41,3±0,5	42,2±0,4	41,3±0,5	64,3±0,5	66,2±2,0	67,0±2,2	65,8±0,4
11	Turkiston	36,7±0,7	37,6±0,1	37,8±0,6	37,4±0,1	51,3±0,6	53,2±0,9	55,5±1,1	53,4±1,2
12	Yaksart	40,2±1,1	40,9±0,4	41,1±0,5	40,7±0,1	63,6±1,4	65,6±0,9	74,2±0,9	67,8±4,3
13	Selyanka	35,2±0,4	36,1±0,0	36,7±1,1	36,0±0,3	53,8±1,2	54,3±3,1	61,6±0,9	56,6±3,6
14	Entry-32	39,2±0,4	40,2±0,3	40,8±0,5	40,1±0,3	56,2±0,8	65,6±0,3	67,7±1,8	63,2±1,0
15	Bunyodkor	40,1±0,5	40,8±0,3	41,4±0,4	40,8±0,3	61,9±1,8	66,4±1,3	71,9±1,5	66,7±2,8
16	100/36	38,2±0,4	39,6±0,5	40,3±0,2	39,4±0,4	58,7±0,5	60,9±2,4	69,5±5,1	63,1±4,3
17	100/37	39,5±0,6	39,8±0,6	40,5±0,6	39,9±0,3	52,5±3,1	56,3±1,3	60,2±3,3	56,3±2,0
18	100/38	40,2±0,8	40,8±0,4	41,4±0,5	40,8±0,3	55,9±4,0	69,2±1,6	69,5±0,3	64,8±0,1
19	100/39	38,5±0,4	39,6±1,3	39,9±0,6	39,3±0,2	53,3±2,6	58,4±0,7	56,8±2,2	56,2±0,8
20	100/40	37,6±0,3	38,8±0,1	38,7±0,6	38,4±0,1	57,4±1,4	57,8±0,1	63,6±3,9	59,6±2,9
21	200/41	39,5±1,0	40,3±0,2	40,4±0,8	40,1±0,0	56,2±0,7	63,5±1,2	66,9±0,5	62,2±1,7
22	200/42	38,9±0,4	39,7±0,9	39,3±0,4	39,3±0,2	50,4±0,2	54,4±0,1	56,4±3,1	53,8±1,0
23	200/43	39,8±0,6	40,4±0,6	40,9±0,4	40,4±0,3	56,0±2,1	59,5±2,0	62,8±4,4	59,5±1,6
24	200/44	38,7±0,6	39,8±0,2	40,6±0,3	39,7±0,4	54,3±1,9	59,8±4,6	66,2±0,5	60,1±3,2
25	200/45	39,5±0,5	40,2±0,3	41,2±0,4	40,3±0,5	57,8±2,9	64,8±0,8	67,3±0,2	63,3±1,2
26	200/46	37,4±0,8	39,8±0,6	39,4±1,0	38,9±0,2	51,5±0,3	59,0±3,9	60,0±3,7	56,8±0,5
27	200/47	38,5±0,0	39,2±0,4	40,1±0,6	39,3±0,4	56,6±1,4	65,3±0,3	63,4±4,1	61,8±1,0
28	200/48	39,6±0,8	40,3±0,3	41,1±0,3	40,3±0,4	52,3±0,4	60,3±0,4	65,2±2,5	59,3±2,5
29	200/49	38,5±0,2	40,6±0,1	40,7±0,6	39,9±0,0	55,0±4,5	58,6±1,0	61,8±0,9	58,5±1,6
30	200/50	44,1±0,7	46,4±0,2	46,5±0,6	45,7±0,1	63,4±3,3	68,9±0,6	65,0±2,3	65,7±1,9
	LSD $_{0.05}$				**0,55**				**4,27**

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The yield indicator was high in 5 varieties and specimens, in Bunyodkor varity it was 61,9 c/ha, in Barhayot variety 64,3 c/ha, in Farovon variety 65,7 c/ha, in Entry-9-23 specimen 65,3 c/ha and 200/50 specimen 63,4 c/ha.

Among the varieties and specimens studied in light gray soils (middle zone) condition during 2010-2012, yield indicator was 57,2, 55,3 and 52,8 c/ha in Tanya variety, 59,1, 58,8 and 57,2 c/ha in Jaykhun variety, 67,1 63,9 and 65,7 c/ha in Yaksart variety, and compared to these varieties, Bunyodkor, Hisorak, Farovon, Barhayot, 200/50, 200/45, and Entry-32 varieties and specimens had high indicators of yield during the three years.

In middle zone, due to a sharp decrease in the yield of standard varieties Tanya and Krasnodar-99, the drought-tolerant Yaksart variety was used.

During the three years, average yield was 65,6 c/ha in Yaksart variety, 67,7 c/ha in Farovon variety, 66,2 c/ha in Barhayot variety, 65,6 c/ha in Entry-32 speimen, 66,4 c/ha in Bunyodkor variety, 69,2 c/ha in 100/38 specimen and 68,9 c/ha in 200/50 specimen and they manifested superiority over the standard varieties (table-2).

In foothill zones, during the average three years standard Tanya variety had 62,5 c/ha yield and Krasnodar-99 variety had 66,7 c/ha, while in the remaining 11 varieties and specimens grain yield was high.

The highest grain yield was recorded in 100/38 specimen 72,9, 67,4, 68,1 c/ha, in 200/41 specimen 73,2, 74,5, 78,8 c/ha, in Entry-9-23 variety 68,2, 70,2, 70,8 c/ha, in Bunyodkor variety 74,2, 72,2 and 69,3 c/ha, in Farovon variety 73,2, 74,5 and 78,8 c/ha, in Barhayot variety 66,2, 65,2 and 69,6 c/ha, in Hisorak variety 68,2, 69,7, and 65,7 c/ha, in Yaksart variety 72,2, 76,1 and 74,2 c/ha.

Comparing 30 varieties and specimens in three different soil climatic conditions, the yield was recorded to be 56 c/ ha for Tanya variety and 59.3 c/ha for Krasnodar-99. The highest rate of the yield among the studied varieties and specimens was noted in Farovon variety 69,6 c/ha, in Bunyodkor variety 66,7 c/ha, in Entry-9-23 specimen 66,4 c/ha, in Barhayot variety and 200/50 specimen 65,8 c/ha. There was no significant difference observed among the sites (table-2).

However, average productivity over the years among the sites was higher by 3,6-5,8 c/ha in middle zone compared to desert zone, in mountainous and foothill zone by 7,8-8,5 c/ha higher than in desert zone, and by 2,5-4,9 c/ha higher than in middle zone.

In order to test the varieties and samples in different climatic conditions, experiments were carried out on the adaptation, yield and quality indicators of 30 varieties and samples in 3 different soil climatic conditions.

In the evaluation of varieties and samples, they mainly compared with the standard Tanya variety in terms of yield, with Kranodar-99 variety in terms of quality and with early-maturing Yaksart variety in terms of resistance to drought and disease.

Among the varieties and specimens studied for the selection and adaptation to each site, the grain yield was higher in 11 varieties and specimens which were studied in foothill zones, such as 100/36, 100/38, 200/41, 200/50, Entry-9-23, Entry-32, Bunyodkor, Farovon, Barhayot, Hisorak and Yaksart, than standard varieties.

Compared to standard varieties, 6 varieties and specimens in middle zone, such as

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Farovon, Barhayot, Entry-32, Bunyodkor, 100/38 and 200/50, had higher grain yield indicators.

While in desert zone in 5 varieties and specimens, such as Bunyodkor, Barhayot, Farovon, Entry-9-23 and 200/50, grain yield was higher compared to standard varieties.

On average, during 3 years and in 3 soil climatic conditions, the standard Tanya variety yielded 56.0 c/ ha, Krasnodar-99 variety 59.3 c/ ha and Yaksart variety 63.6 c/ ha. Yields were higher in 17 varieties and specimens than standard varieties.

Due to the fact that 6 varieties (Farovon, Entry-9-23, Barhayot, Bunyodkor, 100/38 and 200/50) and specimens had not only higher yield, but also higher grain quality indicators in different soil and climatic conditions compared to Yaksart variety, experiments have shown that it is expedient to plant and propagate these varieties in all three areas.

When the same agro-techniques were used in the conditions of irrigated lands of Kashkadarya region, the yield of winter bread wheat increased to 3.6-8.5 c/ ha with the rise from takyr and barren soils to light gray and typical gray soils.

Table-3
The effect of weather conditions on productivity over the years and sites (March-May months).

Sites and years	Mean air temperature, ^{0}C	Rainfall amount, mm	Relative humidity, %	Mean productivity, c/ha
Kasbi (in 2010)	19,6	21,8	65,2	56,7
Kasbi (in 2010)	19,0	10,2	47,2	54,7
Kasbi (in 2010)	17,6	20,5	53,7	57
Karshi (in 2010)	18,1	54,4	64,2	61,7
Karshi (in 2010)	18,1	54,3	44,9	60,5
Karshi (in 2010)	17,5	52,5	56,3	60,6
Shakhrisabz (in 2010)	17,1	75,0	64,6	64,5
Shakhrisabz (in 2010)	17,3	37,8	53,1	63
Shkahrisabz (in 2010)	16,8	83,6	55,9	65,5

Furthermore, weather conditions also affect the increase in winter bread wheat yields in irrigated areas. During the years of experimentation, due to less rainfall during March-May months of 2011 in the desert and foothills than in other years, that is, in the desert 10.3-11.6 mm and in foothills 37.2-45.8 mm, an average annual yield also decreased by 2-2.3c/ ha in the desert zone and 1.5-2.5 c/ ha in the foothills in 2011 (Table 3).

When the amount of precipitation in the irrigated areas of Kashkadarya region in March-May is 10 mm less, it leads to a decrease in winter bread wheat yield up to 2 c/ ha in takyr and barren soils, and up to 2.2 c/ ha in typical gray soils when it is 40 mm less.

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Table-4
Correlation between weather conditions and an average productivity over the years and sites (March-May)

Indicators	Air temperature, ^{0}C	Amount of rainfall, mm	Relative air humidity, %
Amount of rainfall, mm	-0,71	1	
Relative air humidity, %	0,02	0,27	1
Average productivity, c/ha	-0,80	0,92	0,28

The amount of precipitation during March-May has a strong (r = 0.47) correlation with grain yield (Table -4)

Evaluation of wheat grain quality. The quality of grain is determined by the amount and quality of protein and gluten in it, the presence of vitamins B_1, B_2, E and carotene, the amount of ash, the activity of amylase, protease enzymes.

The nutritional value, taste, aroma and splendor of bread products depend more on the above-mentioned characteristics. The quality of bread also depends on its technological properties. The concept of flour strength is used to describe its technological properties of the flour.

High-quality wheat varieties for bread made from bread wheat flour are called strong wheat. They differ in the following main indicators: hardiness of the grain should not be less than 60 percent (in white grain varieties), 70 percent (in red grain varieties), protein content should be 14 percent, and gluten content not less than 28 percent.

The amount of protein and gluten in the grain varies dramatically depending on growing conditions. But its technological features, including the power of flour, are hereditary traits. The strength of flour is determined not by the amount of protein, but by its quality. The following table shows the yield of some winter bread wheat intensive varieties and the quality of flour and bread made from their grain.

The following main indicators are used to assess the quality of wheat grain: shape, kernel hardiness and other external signs, protein content, its soaking features in acetic acid, amount of crude gluten and physical properties of its flour, physical properties of dough, quality of bread baked in the laboratory.

The kernel hardiness of the grain is determined by cutting the grains or using a photoelectric diaphonoscope. Determining the amount of hardiness of whole grain gives a more accurate indication of the technological value of wheat grain. To do this, 100 grains are placed in the sieve of the device and the method of illumination is used.

Only 15-20 percent of the world's wheat yield are strong, 25-30 percent are medium and 50-55 percent are weak wheat. Creating and choosing varieties with high quality and suitable for the climatic conditions is a key factor in growing strong wheat.

The higher the amount of humus in the soil, the higher the amount of protein and gluten. The humus content of grain croplands in irrigated and rain-fed areas in

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Uzbekistan is 0.2-1.5%.

One of the factors that leads to an increase in the quality of winter wheat is the feeding of the plant by leaf with dissolution of urea of 30-40 kg/ha in water during the spiking and flowering phases.

The temperature during the spiking and flowering stages of winter wheat should be 18-20°C, if the temperature during the spiking and flowering of wheat is 35-40°C and the air is dry, it leads to the formation of small sized grains and deterioration of grain quality. The optimum temperature is 22-25°C during the grain ripening phase.

While studying 30 varieties and specimens of winter bread wheat during the experiment in three different soil and climatic conditions of the region, the protein content, gluten content of grain, and grain nature were analyzed.

The protein content of wheat grains grown in desert, i.e., takyr and barren soils, was lower than in light gray soils or typical gray soils.

Protein content of grain was 12,7 % in Tanya variety in desert zone, 14,9 % in middle zone and 14,6 % in foothill zone. While in Vostorg variety the protein content constituted 13,7 % in desert zone, 14,0 % in middle zone and 14,6 % in foothill zone, in Turkiston variety this indicators was 13,0% in desert zone, 15,1% in middle zone and 14,8 % in foothill zone.

In Entry-6 variety, the protein content of grain was 14,3% in desert zone condition, 14,9% in middle zone and 14,8% in foothill zone, in Yaksart vareity this rate was 14,2% in desert zone, 14,9% in middle zone and 15,9% in foothill zone, in 200/50 specimen the grain protein was 14,5% in desert zone, 16,6 n middle zone and 15,4 % in foothill zone.

When changes in protein content were studied in different soil climatic conditions and in different varieties and samples based on average three-year data, it was up to 11.8-15.5% in the desert zone, in the middle zone up to 12.9-17.8% and in the foothills up to 12.1-16 .8 percent (Table 5).

The data show that the protein content was high in the middle zone of the region. The fact that the protein content is more than 14%, which in turn indicates the good quality of the grain.

The protein content of grain was different in some varieties in three sites, in some varieties it was almost the same, such as in Hisorak variety 14,8%, 13,9% and 15,4%, in Farovon variety 14,2%, 14,7% and 15%, in Bunyodkor variety 14,9%, 15,3% and 15,9%, in 100/36 specimen 14,3% 14,0% and 14,6%, in 200/41 variety 15,5%, 16,1% and 15,5%, in 200/48 specimen 14,2%, 15,1% and 14,6%, in 200/49 specimen 14,4%, 15,7% and14,5% and in 200/50 specimen 14,5%, 16,6% and 15,4% (table-5).

The technological quality of grain also depends on the timing of sowing wheat seeds. During the ripening period of wheat, if the temperature is high and the rainfall is low, then the amount of protein and gluten in the grain is high.

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Table-5
Protein and gluten content of grain of varieties and specimens (in 2010-2012)

№	Varieties	Protein content, %				Gluten content, %			
		Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m	Kasbi, M±m	Karshi, M±m	Shakhrisabz, M±m	Average, M±m
1	Tanya	12,7 ±0,5	14,9±0,4	14,8±0,0	14,1±0,2	26,4±0,4	29,8±0,3	28,6±0,5	28,3±1,1
2	Jaykhun	13,9±0,0	15,7±0,9	15,3±0,0	14,8±0,4	28,9±0,6	28,2±0,6	26,4±0,8	27,8±1,3
3	Entry-6	14,3±0,2	14,9±0,5	14,9±0,1	14,7±0,0	30,6±0,2	30,2±0,7	21,5±0,9	27,4±0,8
4	Farovon	14,2±0,3	14,7±0,7	14,7±0,3	14,6±0,2	31,6±0,7	29,7±0,9	29,3±0,7	30,2±0,9
5	Nota	15,4±0,4	17,1±0,7	16,3±0,1	16,2±0,6	29,2±0,6	28,8±0,8	27,7±0,4	28,6±1,2
6	Vostorg	13,7±0,4	14,0±1,0	14,6±0,1	14,1±0,3	29,1±0,7	28,4±0,6	28,7±0,2	28,7±0,7
7	Hisorak	14,8±0,5	13,9±0,1	15,2±0,3	14,7±0,8	29,6±0,8	30,7±0,7	28,3±0,7	29,5±0,1
8	Krasnodar-99	13,7±0,3	12,9±0,4	14,6±0,2	13,7±0,8	27,5±0,6	28,4±0,9	27,7±0,3	27,9±0,4
9	Entry-9-23	15,2±0,4	15,1±0,3	12,4±0,1	14,1±1,5	31,2±0,4	25,2±0,3	21,4±0,8	25,9±0,6
10	Barhayot	14,7±0,3	14,8±0,7	15,4±0,1	14,9±0,3	31,4±0,7	28,3±0,7	27,6±0,8	29,1±0,8
11	Turkiston	13,0±0,1	15,1±0,5	14,9±0,2	14,3±0,1	29,2±0,8	28,8±0,6	27±0,1	28,3±0,4
12	Yaksart	14,2±0,2	14,9±0,8	15,0±0,6	14,7±0,0	31,6±0,7	30,5±0,9	29,6±0,5	30,6±1,5
13	Selyanka	13,2±0,2	13,7±0,3	13,9±0,2	13,7±0,2	30,8±0,5	28,7±0,8	28,9±0,4	29,5±1,1
14	Entry-32	15,0±0,1	13,1±0,5	13,0±0,4	13,7±0,1	31,6±0,6	26,2±0,5	23,6±0,2	27,1±1,7
15	Bunyodkor	14,9±0,5	15,5±0,9	15,9±0,5	15,4±0,3	30,9±0,4	30±0,6	28,6±0,6	29,8±0,7
16	100/36	14,3±0,2	14,0±0,9	14,5±0,4	14,3±0,3	30,1±0,6	34,8±0,1	29,9±0,9	31,6±0,8
17	100/37	11,8±0,9	13,2±0,5	12,5±0,0	12,4±0,5	25,4±0,7	31,4±0,8	28,5±0,2	28,4±0,6
18	100/38	12,4±0,4	13,2±0,9	12,6±0,0	12,7±0,4	25,7±0,8	29,4±0,5	28,6±0,4	27,9±0,5
19	100/39	12,2±0,0	13,5±0,1	13,0±0,1	12,8±0,5	25,5±0,6	28±0,8	28±0,6	27,2±0,3
20	100/40	14,7±0,2	16,1±0,3	15,8±0,0	15,5±0,3	30,7±0,5	35,4±0,6	30,1±0,1	32,1±1,1
21	200/41	15,5±0,2	16,1±0,2	15,7±0,4	15,7±0,3	31,8±0,9	32,4±0,3	29,7±0,3	31,3±0,6
22	200/42	13,8±0,2	14,8±0,4	15,2±0,0	14,5±0,0	28,7±0,6	30,4±0,9	29,2±0,5	29,4±0,1
23	200/43	12,5±0,1	13,5±0,1	13,5±0,2	13,1±0,1	26,1±0,8	30,1±0,1	26,8±0,7	27,7±0,3
24	200/44	14,1±0,0	15,6±0,2	14,2±0,3	14,6±0,8	29,2±0,7	29,3±0,4	27,9±0,4	28,8±0,9

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25	200/45	12,3±0,0	14,2±0,0	13,9±0,4	13,4±0,3	25,8±0,4	30,4±0,6	28,7±0,6	28,3±0,7
26	200/46	14,7±0,3	14,8±0,4	15,6±0,1	15,1±0,4	30,8±0,3	33,6±0,7	30,6±0,4	31,7±0,5
27	200/47	13,5±0,2	14,8±0,4	14,9±0,5	14,3±0,2	28,8±0,6	30,2±0,5	29,8±0,3	29,6±0,6
28	200/48	14,2±0,2	15,1±0,0	14,9±0,5	14,6±0,3	30,1±0,7	30,8±0,8	29,1±0,6	30±0,2
29	200/49	14,4±0,3	15,7±0,2	14,7±0,1	14,9±0,6	30,5±0,8	27,9±0,2	29,2±0,2	29,2±0,1
30	200/50	14,5±0,3	16,6±0,1	15,2±0,6	15,5±0,6	30,6±0,6	29,2±0,3	30,2±0,6	30±0,9
	LSD $_{0.05}$				**1,09**				**3,02**

Creating high-yielding wheat varieties with high grain quality is a very complex task. The fact that grain protein and gluten content and various other quality indicators depend on the external environment and growing conditions leads to a number of difficulties in selection in the creation of high-quality wheat varieties.

Hereditary of quality indicators are controlled by the number of genes. When we analyzed the amount of gluten content of grain of bread wheat varieties, in contrast to the protein content, the amount of gluten of the grain in the foothills zone of the region was lower than in the middle or desert sites. In the desert zone, changes in gluten content over an average of 3 years ranged from 25.4 to 32.3 percent. Gluten content ranged from 25.2 to 35.4 percent in the middle zone and from 21.4 to 30.6 percent in the foothills.

It has been reported in the literature that the quality of this variety is good when the gluten content in the grain is higher than 28 percent. When the results of the experiments were analyzed over an average of three years, it was observed that the samples studied in the desert area had higher gluten content than in the foothills.

In Tanya variety this indicator was 26,4%, 29,8% and 28,6%, in Krasnodar-99 variety 27,5%, 28,4% and 27,7%. However, in some varieties the gluten content was recorded to be higher than 28 % in all three sites.

For example, in Farovon variety it was 31,6%, 29,7% and 29,3%, in Yaksart variety 29,6%, 29,5% and 29,6%, in Bunyodkor variety 30,9%, 30,0% and 28,6%, in 100/36 specimen 30,1%, 34,8% and 29,9%, in 100/40 specimen 30,7%, 35,4% and 30,1%, in 200/41 specimen 31,8%, 32,4% and 29,7%, in 200/42 specimen 28,7%, 30,4% and 29,2%, in 200/46 specimen 30,8%, 33,6% and 30,6%, in 200/47 specimen 28,8%, 30,2% and 29,8%, in 200/48 specimen 30,1%, 30,8% and 29,1%, in 200/50 specimen 30,6%, 29,2% and 30,2 %.

Conclusion. The results showed that the growth period of varieties and specimens averaged 191 days. The growth period of the standard variety Krasnodar-99 was 198 days, in the varieties Farovon and Barhayot - 190 days, the variety Bunyodkor passed its full ripening phase in 189 days, manifesting 8-9 days earlier maturity than the standard variety.

Average productivity of the varieties and specimens constituted 60,5 c/ha, standard Krasnodar-99 variety had productivity of 59,3 c/ha, and 17 varieties and specimens

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were found to have higher productivity than the standard varieties. Compared to standard variety, Farovon variety yielded by 10,3 c/ha more, Barhayot variety by 6,5 c/ha, Bunyodkor variety by 7,4 c/ha more and they were selected for this regard. The selected varieties and samples were found to have higher weight of 1000 grains and grain quality indicators than the standard variety, and it was recommended to submit them to the State Variety Testing Commission.

During 2010-2012, the average growth period of varieties and specimens in the desert was 188-188-186 days, in the middle zone - 188-189-190 days, and in the foothills - 192-194-193 days and it showed that the full growth period also increased to a certain level as the growing conditions of bread wheat varieties rose above sea level.

In irrigated regions, it was found that the long or short growing period of bread wheat varieties varied depending on the amount of annual precipitation, air temperature and relative humidity. When analyzed in terms of the average years in the studied sites, it was 189.5 days in 2010, 190.5 days in 2011, and 189.8 days in 2012.

According to three-year data from the studied sites, the plant height increased to 3-4 cm for every 100 meters of a rise above sea level. Similarly, the length of the spike also varied according to the plant height ($r = 0.47$).

The productivity among the experimental areas over the years varied and it was higher by 3,6-5,8 c/ha in the middle zone compared to the desert zone, by 9,8 -11,5 c/ha in the mountainous and foothill areas compared to the desert zone, by 2,5 -4,9 c/ha in the mountainous and mountainous areas compared to middle zone. In the conditions of irrigated lands of Kashkadarya region, when the same agro-techniques were used, the yield of winter bread wheat increased to 3,6-8,5 c/ha with the rise from takyr and barren soils to light gray soils and typical gray soils.

Weather conditions also affect the increase in winter bread wheat yields in the irrigated areas of the region. During the experimental years, due to less precipitation in March-May of 2011, 10,3-11,6 mm less in the desert and 37,2-45,8 mm less in the foothills than in other years, the average annual yield was also less by 2-2,3 c/ha in the desert and 1,5-2,5 c/ha in the foothills in 2011 in comparison with other years.

When the amount of precipitation in the irrigated areas of Kashkadarya region in March-May was 10 mm less in takyr and barren soils, it led to a decrease in winter bread wheat yield up to 2 c/ ha, when 40 mm less in typical gray soils the yield was also less by 2,2 c/ha accordingly. The amount of precipitation in March-May had a strong ($r = 0.47$) correlation with the grain yield of winter bread wheat.

There was found a negative correlation between plant height and growth period of varieties and specimens ($r = -0.33$), a negative correlation between growth period and number of plants per 1 m^2 ($r = -0.11$), and the strongest positive correlation between the yield and the number of productive stems ($r = 0.54$) and between plant height and spike length ($r = 0.48$).

It was also found that there was a correlation ($r = 0.40$) between the length of the spike and the number of spiklets in the spike, as well as the correlation

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between the number of spiklets in the spike and the yield (r = 0.20) and the correlation between the spike length and yield (r = 0, 11), the strongest positive correlation was observed in the experiment between 1000 grains weight and grain nature (r = 0.87).

An increase in yield was observed in varieties and specimens with a direct or positive correlation to 1000 grains weight (r = 0.36) and grain nature (r = 0.16). This means that an increase in 1000 grains weight and grain nature will ensure that the grain is full, resulting in higher yields. Similarly, a positive correlation was found between the weight of 1000 grains and the amount of protein in the grain (r = 0.61) and the amount of protein and gluten in the grain (r = 0.66).

When the correlation of plant height with yield elements, a positive correlation was noted with spike length r=0,48, with the number of spikelets in the spike r=0,39, with grain nature r=0,70, with 1000 grains weight r=0,67, with spike weight r=0,54, with the number of grains in the spike r=0,45, with the weight of grains in the spike r= 0,38, with productivity r= 0,30.

This means that the height of the plant leads to more accumulation of nutrients in the plant body. This plays an important role in high yield elements.

In terms of early maturity - 8 varieties and specimens in the desert, 24 in the middle zone and 13 in the foothills, in terms of productivity - 5 in the desert, 6 in the middle zone and 10 in the foothills and in terms of plant height 4 varieties and specimens in the foothills, 5 in the middle zone and in the foothills 18 varieties and samples had higher indicators than the standard varieties.

According to productivity indicators, 5 varieties and specimens were found to have higher results in the desert zone, 6 in the middle zone and 10 in the foothills compared to the standard varieties. In the foothills, the productivity was higher than in both sites.

Plant height is also one of the most important indicators. This is because the higher height of the plant indicates its tendency to lodging. Due to the low annual rainfall in the desert and middle sites compared to the foothills and the number of irrigations, the plant height of 4 varieties and specimens was higher than the standard varieties in the desert zone, 5 in the middle zone and in the foothills 18 varieties and specimens had higher plant height .

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