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SELECTION OF LARGE SEED AND HIGH YIELDING LINES OF BREAD WHEAT FOR DROUGHT CONDITIONS

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ABSTRACT

One of the most important tasks in the creation of new varieties is the study of various features of world collection lines of bread wheat suitable for the soil and climatic conditions of the republic, the selection of high-yielding, disease and pest-resistant lines and their involvement in selection

work. With the help of ICARDA, 165 varieties and lines were planted and studied in the Optional and Winter Wheat Observatory (25th - FAWWON - IR) from the International Winter Wheat Improvement Program (IWWIP - CIMMYT Turkey). As a result of studying the valuable properties of bread wheat varieties and lines, 10 lines superior to standard varieties were selected and transferred to the next stage of selection.

KEYWORDS: *Bread Wheat, Variety, Line, Breeding, Vegetation Period, 1000 Kernel Weight.*

INTRODUCTION

In 2019, world wheat production was 762.2 million tons, an increase of 3.9% over the 2018 season. Wheat production in the world reached its highest level in 2017 - 773 million tons [1, 2, 5].

Looking at last year's list of the most advanced wheat-growing countries, China (134 million tons), India (102 million tons) and Russia (75 million tons) are among the top three countries with the highest wheat production in 2019. together it accounts for 41 percent of world production. These countries are followed by the United States, France, Canada, Ukraine, Pakistan, Australia, Turkey, Germany and Argentina, which together account for 34% of world production [11, 22].

When creating the best varieties of bread wheat on irrigated lands, the early maturing properties of the variety, the composition of the grain and its quality indicators, the external environment and agronomic measures have a strong influence [3, 6, 7].

Wheat can be exposed to heat at any stage of the growing cycle. The average air temperature for the growth and development of wheat is 18 - 25 ^{0}C, and when it exceeds 32 ^{0}C it begins to have a negative effect. An increase in air temperature above 32 ^{0}C has a strong effect on the reproductive organs, having a major negative effect on the process of grain filling in the middle and late stages of developmental phases [4, 10, 12].

There are important rules on the selection donor varieties. In thepractice of synthetic breeding for the creation breeding material first of all parenting pairs are selected by hybridization. The success of hybridization depends on how properly the parent pairs are selected [8, 9, 13].

In turn, high-yield selection leads to a decrease in resistance to adverse external factors i.e. abiotic and biotic influences, so a comprehensive approach to the creation of competitive varieties is required. One of the decisive factors in achieving an increase in productivity and resistance to adverse conditions in selection is the correct planning of the selection process, i.e. the choice of research direction and methods. This task can be performed only with a complete understanding of the exact state of productivity in the conditions of the area where the selection work is carried out [14, 18, 20].

The productivity of wheat grain is studied in relation to the elements of yield. The analysis of yield elements allows breeders to take a conscious approach to the synthetic selection of varieties. Selection is a final and relatively responsible component in obtaining valuable forms in the selection process. Therefore, it is especially important for the breeder to know the relationship between the characteristics of the selection work, as well as the characteristics of the

plant. When the selection work is carried out using correlation, it creates the basis for a relatively efficient work [15, 17].

In the process to create new varieties with high yield, the crossing is carried out to take an attention of productivity features of plants. For example, for the wheat they are the quantity of productive plants, a grain size, a weight of 1000 grains, a yield of variety and etc [16, 19].

The weight of 1000 grains is an indicator of the size and fullness of the grain. This is a sign of diversity, and at the same time emphasizes that the climate during the period of strong saturation depends on the conditions. It has been scientifically determined that the size of a grain of wheat depends on the duration of the growth period, in particular, on the elongation period of maturing [21, 26].

The amount of protein in wheat grain is one of the main elements of quality indicators and is closely related not only to its nutritional value, but also to its technological quality [24, 25, 36].

Today, 15-20 percent of the wheat grown in the world meets the demand for strong wheat, while the quality of grain is 50-55 percent of weak wheat. This weak wheat can give quality bread only if 20-40 percent strong wheat is added to it [23, 27].

Wheat yield depends on plant structure, metabolism, and substances in the grain. Every physiological phenomenon can change under the influence of genotype and environment, and there is an inextricable link between genotype and environment [28, 30, 34].

The variability and heredity of quantitative traits are not uniformly covered in the literature. A characteristic feature of this is that it depends on the external environmental conditions, which poses a great difficulty in selection. The most important thing in selection is a specific genotype or homo- and heterozygous and other indicators of productivity is what genetic potential it has [27, 29].

These two factors depend on the selection of the best genotypes from hybrid mixtures in hybridization. Dilmurodov et al. stressed the need for a comprehensive study of complex primary forms in order to properly apply genetic theory in the selection process [31, 33, 38].

The duration of vegetation stages are used for the selection of pairs and creation varieties with early maturity. Moreover, for this, in the crossing process a vegetation stage of a pair should be shorter, on the second pair not exactly this vegetation period, but another one should be short. Only then, it could be for the purpose of what was focused [32, 35, 37].

MATERIALS AND METHODS

On the nursery of the selection of primary source and donors for the breeding 165 varieties and lines were selected and researched which belonged to different ecological and geographical regions. The varieties and lines were placed on 1 m^2 with 1 replications. In research a placement scheme of the field experiment was based on the “Alpha lattice design” of the program Genestat 3. A placement of the experiment and during the research a phenological observation, a calculation and analysis were based on the method of Union Institute of Plant Breeding (UIP,1984), and biometric analysis were based on the methods of the Commission of the State variety testing of agricultural crops (1985, 1989). Mathematical and statistical analysis of the

experiment were committed according to the developed guide by B.A. Dospekhov (the Method of field experiment, 1985).

RESULTS AND DISCUSSION

Experiments of winter cereal crops the seeds were sown on October 22 in 2017-2018 seasons. Of these studied varieties and lines, 18 varieties and lines were selected mainly according to drought, early maturing, yield and 1000 grain weight and other valuable economic characteristics. During phenological observations of varieties and lines, the sown seeds germinated on November 5-6 after irrigation, and in the experiment it was noted that the varieties and lines entered the harvesting phase on December 5-8.

While the tubing phase of the varieties and lines was observed from 28 February to 5 March, it was found that early on BEZOSTAYA, BiII98 varieties and lines were 2 and that these lines entered the tubing phase on 28 February. Varieties and lines such as KACHU / SOLALA, OGOSTA / SE 7/7 / 91-142 ..., PASTOR / MILAN / 7 / Z .., ESPADA / KARAHAN, PRL / 2 * PASTOR // PB ... body and entered the tube phase on March 1-5.

When analyzing the days from germination to germination, it became clear that the germination period of the studied varieties and lines was 155-177 days. In the Gozgon variety, which was taken as a standard variety, this period was 163 days, while in 89 varieties and lines, the germination period was shorter.

It was noted that out of 18 selected varieties and lines, 9 varieties and lines entered the mating phase in 155-158 days, 8 varieties and lines in 158-169 days, and the remaining 2 varieties and lines in 170-176 days.

In the experiment, the transition of varieties and lines to the full maturing phase took place from 25 May to 6 June. It was observed that the variety Gozgan entered the full maturing phase on June 2, and the number of varieties and lines that entered the maturing phase in a shorter period of time than the standard was 125. It was noted that 29 of the studied varieties and lines entered the full maturing phase on 25 May and were identified as early maturing lines.

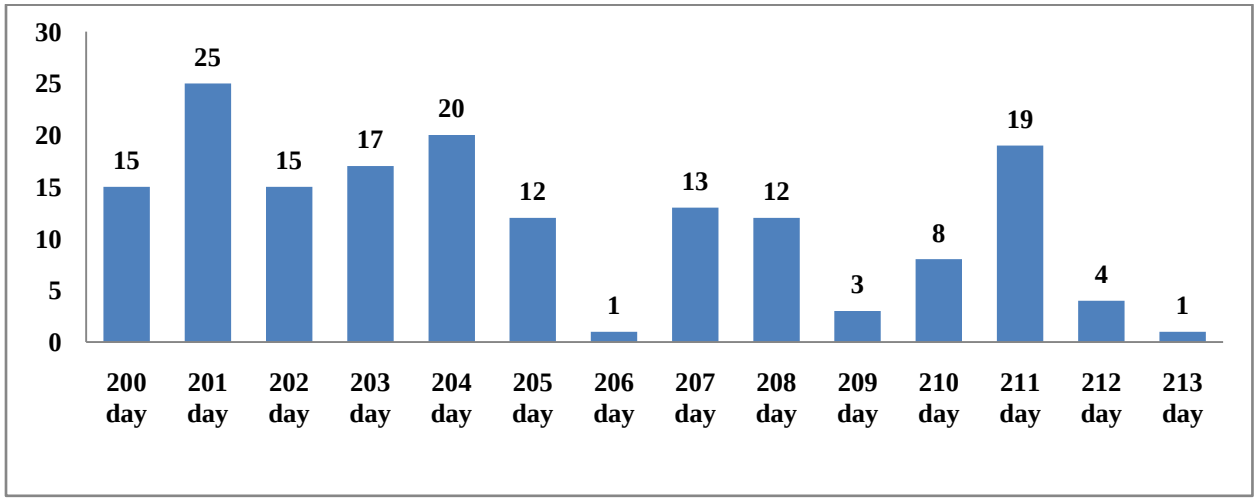

Figure 1. Number of varieties and lines according to the period of growth, day (Karshi, 2017-2018).

The growing period of the studied varieties and lines was 200-213 days at the time of determination. The Gozgon variety, taken as a local check, was found to have entered the full maturing phase in 207 days.

TABLE 1 VARIETIES AND LINES SELECTED ACCORDING TO THE CHARACTERISTICS OF EARLY MATURING (KARSHI, 2017-2018).

Plots	Name	Germination date	Tillering date	Shooting date	Heading date	Days to heading date	Maturity date	Days to maturity date
14	ND643//2*PRL/2*PASTOR/6/CHEN/AE.SQUARROSA (TAUS)//BCN/4/RAN/NE701136//CI13449/CTK/3/CUPE/5/130L1.11/GUN91//KINACI97	05.ноя	05.дек	28.фев	11.апр	157	25.май	201
15	DANPHE #1/6/CA8055/4/ROMTAST/BON/3/DIBO//SU92/CI13645/5/AGRI/BJY//VEES	06.ноя	08.дек	27.фев	11.апр	156	25.май	200
16	WHEAR//INQALAB 91*2/TUKURU/3/PYN/BAU//ATTILA	06.ноя	06.дек	01.мар	11.апр	156	25.май	200
35	DESCONSE../3/494J6.11//TRAP #1/BOW/5/ALAMOOT/3/ALVD//ALDAN"S"/IAS58/4/ALAMOOT/GASPARD	06.ноя	06.дек	03.мар	12.апр	157	25.май	200
43	AGRI/NAC//ATTILA/6/TAST/SPRW//ZAR/5/YUANDONG 3/4/PPB8-68/CHRC/3/PYN//TAM101/AMIGO/7/494J6.11//TRAP#1/BOW	05.ноя	08.дек	01.мар	13.апр	159	25.май	201
44	BILINMIYEN96.27//ZNAKHIDKA/5/HK48/MNCH/4/BLL//F72.23/TLL/3/MNCH	05.ноя	07.дек	04.мар	12.апр	158	25.май	201
61	ESPADA/KARAHAN	06.ноя	08.дек	27.фев	12.апр	157	25.май	200
62	ESPADA/KARAHAN	05.ноя	07.дек	01.мар	12.апр	158	25.май	201
63	WHEAR//INQALAB 91*2/TUKURU/3/PYN/BAU//ATTILA	05.ноя	05.дек	02.мар	27.апр	173	25.май	201
84	OGOSTA/SE…/7/91-142 A 61/3/F35.70/MO73//1D13.1/MLT/6/PI/MZ//CNO67/3/LFN/4/ANT/5/ATTILA/8/ZARGANA-3	06.ноя	08.дек	02.мар	12.апр	157	25.май	200

85	PFAU/MILAN/3/SKAUZ/KS94U 215//SKAUZ/4/OVL*3/AMAD/5 /BILLINGS	05.ноя	06.дек	28.фев	12.апр	158	25.май	201
87	PRL/2*PASTOR//OVL/5/T67/JG R 'S'//K92/3/SNF/4/JGR 'S'//JGR 'S'/HBC059E	05.ноя	07.дек	27.фев	12.апр	158	25.май	201
91	PVN//CAR422/ANA/5/BOW/CR OW//BUC/PVN/3/YR/4/TRAP#1 /6/WELS-2/7/AP01T2421/BCG99-156	06.ноя	06.дек	03.мар	13.апр	158	25.май	200
116	KS010525-1-3/KS020363WM~1	06.ноя	07.дек	02.мар	12.апр	157	25.май	200
117	EVEREST/KS050176^1	05.ноя	08.дек	03.мар	12.апр	158	25.май	201
123	SARVAR	06.ноя	06.дек	27.фев	10.апр	155	25.май	200
124	ISFARA	05.ноя	07.дек	01.мар	10.апр	156	25.май	201
125	CMH80A.768/3*CNO79//AZADI /3/2*ZRN	06.ноя	08.дек	03.мар	10.апр	155	25.май	200
126	ALD/SNB//ZRN*2/3/YACO/PA RUS//PARUS	05.ноя	05.дек	28.фев	10.апр	156	25.май	201
156	CROC_1/AE.SQUARROSA (210)//PBW343*2/KUKUNA/3/P BW343*2/KUKUNA	05.ноя	07.дек	27.фев	10.апр	156	25.май	201
157	T.DICOCCON CI9309/AE.SQUARROSA (409)//MUTUS/3/2*MUTUS	06.ноя	05.дек	02.мар	11.апр	156	25.май	200
158	DANPHE #1*2/SOLALA	05.ноя	07.дек	26.фев	10.апр	156	25.май	201
159	REEDLING#1	05.ноя	08.дек	01.мар	10.апр	156	25.май	201
162	KVZ/PPR47.89C//TACUPETO F2001*2/BRAMBLING/3/2*TA CUPETO F2001*2/BRAMBLING	06.ноя	05.дек	05.мар	10.апр	155	25.май	200
163	T.DICOCCON CI9309/AE.SQUARROSA (409)//MUTUS/3/2*MUTUS	06.ноя	08.дек	01.мар	11.апр	156	25.май	200
164	PRL/2*PASTOR//PBW343*2/K UKUNA/3/ROLF07/4/CMH75A. 66/SERI	05.ноя	06.дек	02.мар	10.апр	156	25.май	201
165	KACHU/SOLALA	06.ноя	05.дек	02.мар	10.апр	155	25.май	200

It was noted that the plant height of the studied varieties and lines ranged from 59 to 115 cm before analysis. In the selection of the variety and lines, attention was paid to the selection of lines resistant to medium-sized deposition. When the relationship between plant height and yield was studied, it was found that there was a positive correlation between r = 0.33 and r = 0.21 per 1000 grain weight.

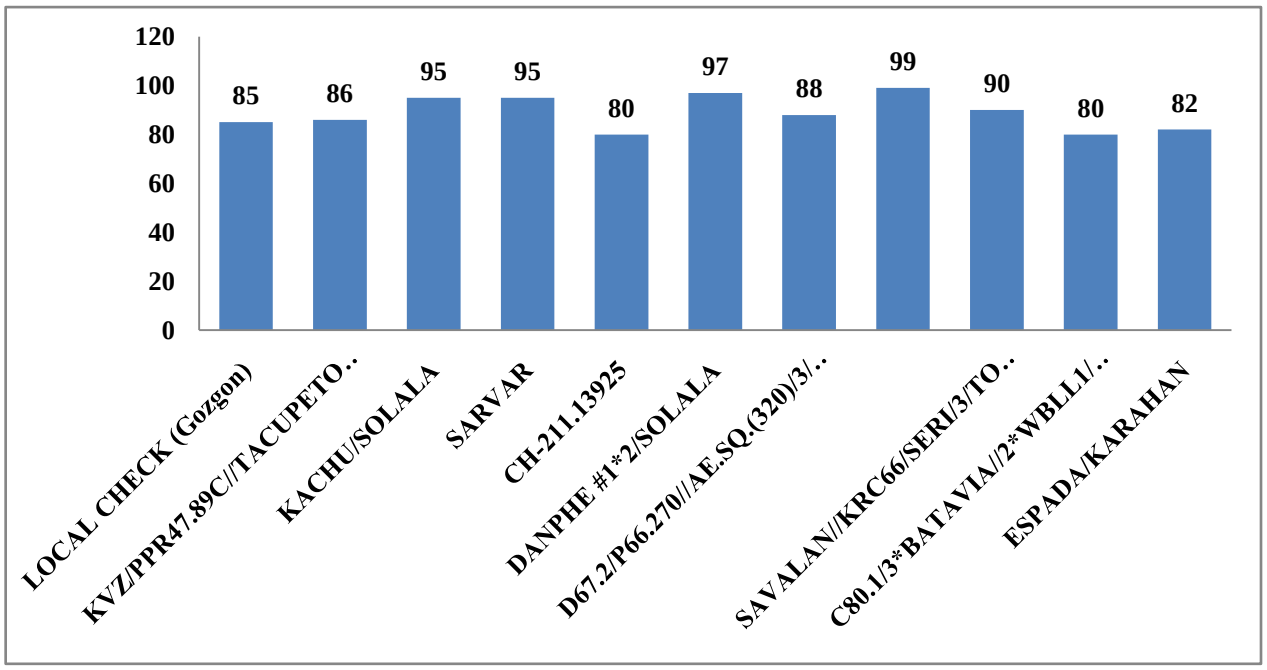

Figure 2. Selected varieties and lines plant height indicator, cm (Karshi, 2017-2018).

In the experiment, the final joint length of the cultivar and lines was also determined. The main purpose of this is that the length of peduncle in years of drought indicates drought tolerance. It was noted that the length of peduncle in varieties and lines was 25 - 54 cm. In the Gozgan variety, planted as a standard variety, the length of peduncle was 35 cm, while in 68 varieties and lines, this figure was found to be higher than the standard variety. The number of lines with a final peduncle length of 40 cm and a height of 33 cm was 33.

Spike length has a positive effect on the yield of varieties and lines. In the experiment, it was noted that the spike length index ranged from 7 to 13 cm. In the Anzoda variety, this figure was 12 cm. The number of varieties and lines with spike lengths of 10 cm and above was 82.

It was noted that the number of spikes in the spike ranged from 10 to 22. The number of spikes in the standard Gozgan variety was 20. It was found that there were 5 lines with a higher number of spikes than the standard variety.

TABLE 2 PRODUCTIVITY INDICATORS OF SELECTED LINES (KARSHI, 2017-2018).

Plots	Name	Grain yield, c/ha	1000 kernel weight, g	DFays to heading date	Days to maturity date	Plant height, cm	Peduncle length, cm	Spike length, cm
1	BEZOSTAYA	44	40.5	171	211	70	30	11
2	SERI	34	38.2	167	211	76	32	10
3	SULTAN95	14	29	177	202	70	30	11
4	KATIA1	30	35	157	203	76	32	10
5	KONYA	32	36.8	161	210	85	30	9
6	**Gozgon (check)**	51	39.4	161	210	85	35	10
162	KVZ/PPR47.89C//TACUPETO F2001*2/BRAMBLING/3/2*TACUPETO F2001*2/BRAMBLING	54	49	155	200	86	33	11
165	KACHU/SOLALA	34	48.8	155	200	95	40	9
123	SARVAR	69	48.2	155	200	95	42	12
155	CH-211.13925	44	47.8	174	211	80	30	10
158	DANPHE #1*2/SOLALA	46	46.2	156	201	97	40	10
100	D67.2/P66.270//AE.SQ.(320)/3/CUNNINGHAM/4/U1254-4-4-7-2/DONG XIE4/3/VORONA//PRL/VEE#6 (OCW00M604S-1)/5/TX91D6991/B1551	54	45	170	202	88	35	9
89	FRET 2*2/4/SNI/TRAP #1/3/KAUZ*2/TRAP//KAUZ/4/OK91P648/OK94P597 (OK03520)/5/ENDURANCE	58	42.8	162	204	99	35	10
57	SAVALAN//KRC66/SERI/3/TORIK/4/2*F10S-1//STOZHER/KARL	58	41.6	159	203	90	36	10
72	C80.1/3*BATAVIA//2*WBLL1/3/2*KRONSTAD F2004/4/BONITO//KAREE/TUGELA	48	41	156	202	80	40	10
61	ESPADA/KARAHAN	50	40.8	157	200	82	32	8

It was noted that the weight value per 1000 grains of the studied varieties and lines ranged from 23.8 to 49 g. While the sample Gozgon variety had a grain weight of 39.4 g per 1000 grains, this figure was found to be higher in 33 varieties and lines. The number of varieties and lines weighing 40 g and above per 1000 grains was 30.

When the correlation of 1000 grain weights with the yield index was studied, it was found that r = 0.25 had a positive correlation.

The yield of varieties and lines was determined to be 14 - 90 c / ha. While the standard Gozgon variety showed a yield of 51 c / ha, 47 varieties and lines were found to be superior to the standard.

Based on the results of the study of all the valuable properties of the studied lines, 8 lines were selected for testing in the selection nursery next year.

CONCLUSION

In the observatory collection nursery of optional and winter wheat, 8 lines with all valuable properties were selected and transferred to the breeding nursery.

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