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SELECTION OF NEW VARIETIES OF EARLY-MATURING WINTER CHICKPEA AND ADAPTED TO MECHANIZATION

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Abstract: More than 12 million tons of chickpea were grown in the world in the last year's season, and India, Australia, Myanmar, Pakistan, Turkey, Ethiopia, Russia, and Iran are the countries that produce the most chickpeas. Currently, the possibility of meeting the demand for chickpea grain from the crop grown in our republic is very low. In the study, 20 winter chickpea genotypes were evaluated and selected under irrigated field conditions. Winter chickpea genotypes were determined by parameters such as growth period, plant height, location of lower pods relative to the soil surface, yield indicators, weight of 1000 grains, NDVI indicator, chlorophyll content, and protein content.

Key words: winter chickpea, genotype, variety, line, plant height, yield, chlorophyll content, fusarium disease.

Introduction: Morphological characteristics of pea varieties are different: ground-covering, slightly erect-stemmed, and erect-growing. Low-growing varieties are up to 35 cm tall, slightly erect and erect varieties are relatively tall, 30-70 cm [2].

In the dry lands of Uzbekistan, it is necessary to allocate more fertile, well-supplied with moisture, clean from perennial weeds, typical and gray soils for peas. The growing period of peas varies depending on the variety and growing conditions. Usually, its growth period is 80-110 days, most varieties ripen in 70-80 days after germination [3, 4].

K.K.Paliwal, S.R.Ramgiri, M.S.Lal found in their experiments that the number of pods in peas and the number of grains in pods have a positive effect on its yield and crop quality. If the number of pods and grains is large, the yield is

high, and it has been proven that the mass of 1000 grains has a positive effect on productivity. The weight of 1000 grains of peas grown on irrigated land is 11-20 g compared to that of non-irrigated land. found to be high [1].

Materials and methods: Field experiments were conducted in the experimental field of Guzor district branch and Kamashi district branch of Southern Agricultural Scientific Research Institute. Experiments in field conditions were conducted in the field experiment area of the Laboratory of Genetics and Breeding of Legumes. Experiments in laboratory conditions were carried out in the institute's "Laboratory of Plant Biochemistry and Evaluation of Quality Indicators" and "Laboratory of Organo-Mineral Fertilizers and Agrochemical Gross Analysis".

The experiment layout is based on Complete block design and Alpha lattice design of GenStat 13 software. Phenological observations, calculations and analyzes are carried out according to the method of the All-Union Plant Science Institute VIR, 1984, and biometric analyzes are carried out according to the methods of the Center for Testing Agricultural Crops (1985, 1989).

Technological quality indicators of grain of autumn chickea grown in the experimental field were determined according to methodological manuals "Metodycheskie rekomendatsii po otsenke kachestvo zerna", "Metody biokhimicheskogo issledovaniya rastenii".

Statistical analyzes were performed based on the method of B.A. Dospekhov (1985).

The amount of chlorophyll pigment in plant leaves was measured and compared among varieties during the conversion of sunlight into energy through photosynthesis. For this, it was done by sending a wave to the specified surface of the leaves using the "Chlorophyll Meter SPAD-502 Plus" device available at the institute.

Results and discussion: Research work was carried out in the experimental area of Guzor department of the Southern Agricultural Scientific Research Institute to select productive, mechanized and high photosynthetic productivity varieties of winter chickpea in irrigated fields. 20 cultivars and lines were planted in 3 replications on a plot area of 10 m^2 in the winter chickpea competitive cultivar trial nursery. Planting of field experiments was carried out on November 25.

Table-1. Field germination of winter chickpea varieties and lines, Guzor-2022.

№	Name of genotypes	Planting	Germination	Field germination, %

		time	date	Number of planting seeds, pcs	The number of germinated plants, pcs	Germination, %
1	**Obod (check)**	25.11.21	17.01.22	145	143	98.6
2	**Polvon (check)**	25.11.21	19.01.22	145	138	95.2
3	KR-20-LCAYT-RF-1	25.11.21	17.01.22	145	142	97.7
4	KR-20-LCAYT-RF-2	25.11.21	19.01.22	145	143	98.4
5	KR-20-LCAYT-RF-3	25.11.21	17.01.22	145	140	96.3
6	KR-20-LCAYT-RF-5	25.11.21	20.01.22	145	142	97.7
7	KR-20-LCAYT-RF-6	25.11.21	18.01.22	145	138	94.9
8	KR-20-LCAYT-RF-7	25.11.21	17.01.22	145	139	95.6
9	KR-20-LCAYT-RF-8	25.11.21	19.01.22	145	142	98.2
10	KR-20-LCAYT-RF-10	25.11.21	18.01.22	145	143	98.9
11	KR-20-LCAYT-RF-11	25.11.21	17.01.22	145	140	96.3
12	KR-20-LCAYT-RF-12	25.11.21	20.01.22	145	139	95.9
13	KR-20-LCAYT-RF-13	25.11.21	18.01.22	145	142	98.2
14	KR-20-LCAYT-RF-14	25.11.21	17.01.22	145	140	96.8
15	KR20-CICTN-01	25.11.21	18.01.22	145	138	94.9
16	KR20-CICTN-11	25.11.21	20.01.22	145	138	95.2
17	KR20-CICTN-17	25.11.21	19.01.22	145	142	98.2
18	KR20-CICTN-24	25.11.21	17.01.22	145	140	96.6
19	KR20-CICTN-33	25.11.21	20.01.22	145	142	98.2
20	KR20-CICTN-37	25.11.21	18.01.22	145	143	98.9
	Minimum	**25.11.21**	**17.01.22**	**145**	**138**	**94.9**
	Mean	**25.11.21**	**18.01.22**	**145**	**141**	**97.0**
	Maximum	**25.11.21**	**20.01.22**	**145**	**143**	**98.9**
	LSD					**0.76**
	LSD %					**0.79**
	CV %					**0.5**

Germination of varieties and lines took place on January 17-20, depending on weather conditions. It was determined that the field germination of the seeds of the varieties and lines was in the range of 94.9-98.9 percent.

The growth development of winter chickpea varieties and lines was studied in the phases of branching, budding, flowering, podding and full maturing. It was determined that the branching phase was on February 14-22, the budding phase was on April 2-10, flowering was on April 8-19, pod formation was on April 22-May 4, and the full maturing phase was on June 1-11.

Table-2. Growth phases of winter chickpea varieties and lines, Guzor-2022.

№	Name of genotypes	Branching date	Budding date	Flowering date	Podding date	Maturity date	Days to maturity date
1	**Obod (check)**	20.02.22	07.04.22	12.04.22	28.04.22	05.06.22	139
2	**Polvon (check)**	18.02.22	08.04.22	15.04.22	30.04.22	06.06.22	138

3	KR-20-LCAYT-RF-1	14.02.22	02.04.22	08.04.22	24.04.22	02.06.22	136
4	KR-20-LCAYT-RF-2	21.02.22	09.04.22	16.04.22	02.05.22	07.06.22	139
5	KR-20-LCAYT-RF-3	15.02.22	03.04.22	10.04.22	22.04.22	04.06.22	138
6	KR-20-LCAYT-RF-5	21.02.22	10.04.22	16.04.22	28.04.22	09.06.22	140
7	KR-20-LCAYT-RF-6	18.02.22	09.04.22	14.04.22	26.04.22	11.06.22	144
8	KR-20-LCAYT-RF-7	20.02.22	09.04.22	17.04.22	01.05.22	08.06.22	142
9	KR-20-LCAYT-RF-8	18.02.22	03.04.22	08.04.22	24.04.22	01.06.22	133
10	KR-20-LCAYT-RF-10	14.02.22	04.04.22	19.04.22	04.05.22	03.06.22	136
11	KR-20-LCAYT-RF-11	18.02.22	08.04.22	14.04.22	29.04.22	09.06.22	143
12	KR-20-LCAYT-RF-12	19.02.22	07.04.22	13.04.22	26.04.22	11.06.22	142
13	KR-20-LCAYT-RF-13	15.02.22	05.04.22	11.04.22	23.04.22	04.06.22	137
14	KR-20-LCAYT-RF-14	18.02.22	06.04.22	14.04.22	26.04.22	07.06.22	142
15	KR20-CICTN-01	21.02.22	10.04.22	16.04.22	30.04.22	09.06.22	142
16	KR20-CICTN-11	22.02.22	08.04.22	15.04.22	27.04.22	11.06.22	142
17	KR20-CICTN-17	17.02.22	04.04.22	09.04.22	24.04.22	08.06.22	140
18	KR20-CICTN-24	21.02.22	06.04.22	11.04.22	28.04.22	04.06.22	138
19	KR20-CICTN-33	21.02.22	08.04.22	15.04.22	24.04.22	08.06.22	139
20	KR20-CICTN-37	17.02.22	07.04.22	14.04.22	27.04.22	02.06.22	135
	Minimum	**14.02.22**	**02.04.22**	**08.04.22**	**22.04.22**	**01.06.22**	**133**
	Mean	**18.02.22**	**07.04.22**	**13.04.22**	**27.04.22**	**06.06.22**	**139**
	Maximum	**22.02.22**	**10.04.22**	**19.04.22**	**04.05.22**	**11.06.22**	**144**
	LSD						**1.32**
	LSD %						**0.95**
	CV %						**0.6**

The vegetation period was 133-144 days. The model Abad variety reached the full maturing phase in 139 days and the Polvon variety in 138 days, while 5 winter chickpea lines were found to be early compared to the model varieties.

Currently, in the cultivation of winter chickpea varieties, selection of varieties suitable for harvesting with the help of mechanization and introduction into production remains one of the most urgent tasks. Because the main part of the grown crop is collected by manual labor. Therefore, when choosing varieties suitable for mechanized harvesting of winter chickpea, it is necessary to take into account the location of the lower pods and the length of the plant with the surface of the soil.

Table-3. Selection of varieties and lines of winter chickpea adapted to mechanization, Guzor-2022.

№	Name of genotypes	Plant height, cm				The location of the lower pods (relative to the soil surface), cm			
		Rep-1	Rep-2	Rep-3	Mean	Rep-1	Rep-2	Rep-3	Mean

1	**Obod (check)**	53.6	52.6	54.2	**53.5**	16.3	17.3	16.9	**16.8**
2	**Polvon (check)**	46.8	45.9	46.4	**46.4**	12.6	13.2	12.9	**12.9**
3	KR-20-LCAYT-RF-1	62.6	63.5	61.8	**62.6**	18.6	19.4	19.1	**19.0**
4	KR-20-LCAYT-RF-2	42.6	43.2	42.8	**42.9**	14.2	15.3	13.8	**14.4**
5	KR-20-LCAYT-RF-3	59.2	60.4	61.6	**60.4**	20.3	18.2	19.6	**19.4**
6	KR-20-LCAYT-RF-5	51.4	52.6	50.8	**51.6**	14.3	15.2	14.8	**14.8**
7	KR-20-LCAYT-RF-6	41.4	42.3	40.7	**41.5**	15.2	15.3	15.1	**15.2**
8	KR-20-LCAYT-RF-7	38.9	39.2	38.1	**38.7**	12.6	12.8	12.3	**12.6**
9	KR-20-LCAYT-RF-8	64.3	65.3	63.4	**64.3**	20.8	21.2	20.6	**20.9**
10	KR-20-LCAYT-RF-10	62.4	60.6	59.7	**60.9**	18.6	19.2	18.9	**18.9**
11	KR-20-LCAYT-RF-11	45.3	46.8	46.2	**46.1**	13.6	14.2	14.1	**14.0**
12	KR-20-LCAYT-RF-12	52.3	54.2	51.9	**52.8**	15.3	16.2	16.4	**16.0**
13	KR-20-LCAYT-RF-13	57.6	58.3	58.1	**58.0**	19.6	18.8	19.2	**19.2**
14	KR-20-LCAYT-RF-14	39.5	38.2	39.7	**39.1**	11.6	12.5	12.4	**12.2**
15	KR20-CICTN-01	44.3	45.2	45.8	**45.1**	15.6	16.2	15.8	**15.9**
16	KR20-CICTN-11	49.2	50.6	48.3	**49.4**	14.3	14.7	14.6	**14.5**
17	KR20-CICTN-17	60.4	60.8	60.7	**60.6**	18.9	19.2	18.8	**19.0**
18	KR20-CICTN-24	45.9	46.3	46.2	**46.1**	15.3	15.1	15.6	**15.3**
19	KR20-CICTN-33	53.6	52.4	51.7	**52.6**	18.3	19.2	19.6	**19.0**
20	KR20-CICTN-37	63.2	64.8	63.4	**63.8**	20.8	21.3	21.7	**21.3**
	Minimum				**38.7**				**12.2**
	Mean				**51.8**				**16.6**
	Maximum				**64.3**				**21.3**
	LSD				**1.31**				
	LSD %				**2.52**				
	CV %				**1.6**				

According to the results of the 3rd return, when analyzing the plant height of winter chickpea varieties and lines, it was found that the average height was 38.7-64.3 cm. The standard plant height was 53.5 cm in the Abad variety and 46.4 cm in the Polvon variety. According to the statistical mathematical analysis, it was observed that the plant height was higher in 7 lines. The height of the 7 lines selected according to the plant height indicator was 58.0-64.3 cm.

It was found that the distance between the lower pods and the soil surface of winter chickpea varieties and lines was in the range of 12.2-21.3 cm. It was found that the lower pods were located at a distance of 16.8 cm from the soil surface in the case of the Obad variety and 12.9 cm in the Polvon variety. It was found that there were 8 lines with higher performance than the model varieties.

7 lines with a high plant height and a large distance of the lower pods from the soil surface were selected and used for breeding to create new varieties adapted to mechanization.

Conclusions: Among the 20 varieties and lines studied in the nursery of winter chickpea competition in irrigated fields, 3-4 days earlier compared to standard varieties, adapted to mechanization, plant height 58.0-64.3 cm, weight of 1000 grains 345.6-370.1 g, 7 lines with high photosynthetic productivity with yield of 21.1-26.1 t/ha, protein content of 27.7-29.3% were selected. Obikor (KR20-CICTN-37) variety, which is early-early, fruitful, adapted to mechanization, has high photosynthetic productivity, and its indicators are higher than standard varieties, was selected in the competitive variety testing nursery, and it was recommended to submit it to the Agricultural Crops Variety Testing Center.

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