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BREEDING OF HIGH-YIELDING AND HIGH-CHLOROPHYLL VARIETIES OF WINTER CHICKPEA

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Abstract: *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. Among the 20 studied varieties and lines of winter chickpea, 3-4 days earlier than standard varieties, adapted to mechanization, plant height 58.0-64.3 cm, weight of 1000 grains 345.6-370.1 g, yield 21.1-26 ,1 c/ha, protein content of 27.7-29.3 percent, high photosynthetic productivity, 7 genotypes were selected. In the study, the Obikor (KR20-CICTN-37) variety, which is early-yielding, adapted to mechanization, has high photosynthetic productivity, and is superior to standard varieties, was selected and recommended to be submitted to the Agricultural Crops Varieties Testing Center.*

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

Introduction: N. N. Balashova, in her scientific works published in recent years, writes that peas are grown in small areas in lower Povalje, Saratov, Orenburg, Penza, Astrakhan and Omsk regions of Russia. Chickea is a suitable companion crop for wheat in the Russian conditions. He noted that when wheat was planted after chickea, the yield increased from 26.4 t/ha to 35 t/ha. Currently,

the Kabuli type of chickpea is being developed by the ICARDA International Research Institute for Arid Regions. Due to the fact that peas do not require nitrogen and are a crop that is resistant to any unfavorable conditions, its prospects are expanding more and more [5].

M.G. Saxena noted the damage of peas by Ascochyta robici and Fusarium rasintectum fungi in Syrian soil and climate conditions. He found that chickpea yields increased by 73% when irrigated compared to non-irrigated conditions in Syria, and 65% when planted before winter compared to spring planting [3, 4].

R.S.Malhotra and others found out that some species were slightly damaged by frost when they were planted in the fall and evaluated the cold resistance of different varieties of chickea in different soil and climate conditions of India [1].

Poma, I., Sarno, R., Noto, F. and Zora, conducted experiments on the planting pattern and thickness of chickea, and considered that the best planting pattern for chickea should be 40 x 10 cm, and the thickness should be 25 plants per 1 m2 [2].

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: The number of pods per bush and the number of grains in pods and the number of grains per bush are particularly important for increasing productivity. The average number of pods per plant in 20 varieties and varieties of winter chickpea studied was from 27 to 49 pieces. The number of pods in one plant was 33 in the model Abad variety and 29 in the Polvan variety. It was found that there were 12 lines with higher number of pods than the model cultivars.

When the number of grains per plant was studied, it was noted that it was in the range of 30-51. It was found that there are 11 lines where the number of grains per plant is higher than that of the model varieties.

The weight of 1000 grains of winter chickpea varieties and rows is the main indicator of high productivity. According to the demand of the population, there is a great need for large grain pea grains.

It was noted that the weight of 1000 grains of 20 varieties and varieties of winter chickpeas was in the range of 266.1-370.1 g. The weight of 1000 grains was 322.6 g in the Andoza Obad variety, while this indicator was found to be higher in 8 varieties and lines.

The main indicator of all agricultural crops is productivity. All other indicators serve for selection aimed at increasing productivity.

In the framework of the study, it was found that the yield indicators of winter chickpea varieties and rows were in the range of 12.9-26.1 ts/ha. Productivity was 18.1 t/ha in model Abad variety and 15.9 t/ha in Polvon variety, and it was found that the productivity in 7 lines is superior to model varieties.

When studying the correlative relationship of productivity with other indicators, there is a negative correlation with the vegetation period of r=-0.69; r=0.88 with the number of pods per plant; r=0.89 with the number of grains in one plant; r=0.79 with a weight of 1000 grains; it was found that there is a strong positive correlation with the amount of protein, r=0.79.

It was found that the protein content of the grain of winter chickpeas was in the range of 21.9-29.3 percent. It was noted that the amount of protein was 26.7% in the sample Abad variety and 24.2% in the Polvan variety. It was found that there are 7 lines in which the protein content of the grain is superior to the model varieties.

Table-1. Yield and protein content of winter chickpea varieties and lines, Guzor-2022.

№	Name of genotypes	Grain yield, c/ha				Protein content, %
		Rep-1	Rep-2	Rep-3	Mean	
1	Obod (check)	18.2	18.8	17.4	18.1	26.7
2	Polvon (check)	15.3	16.4	15.9	15.9	24.2
3	KR-20-LCAYT-RF-1	22.2	23.1	23.7	23.0	29.1
4	KR-20-LCAYT-RF-2	13.6	14.2	14.5	14.1	22.3
5	KR-20-LCAYT-RF-3	25.4	26.3	25.9	25.9	27.7
6	KR-20-LCAYT-RF-5	17.2	18.4	17.6	17.7	24.3
7	KR-20-LCAYT-RF-6	13.5	12.8	12.4	12.9	22.2
8	KR-20-LCAYT-RF-7	15.3	16.4	15.8	15.8	25.9
9	KR-20-LCAYT-RF-8	22.6	21.8	21.6	22.0	29.0
10	KR-20-LCAYT-RF-10	24.3	25.1	24.7	24.7	28.5
11	KR-20-LCAYT-RF-11	17.4	17.3	18.2	17.6	25.5

12	KR-20-LCAYT-RF-12	12.7	13.8	13.4	13.3	23.9
13	KR-20-LCAYT-RF-13	20.8	21.6	20.9	21.1	29.1
14	KR-20-LCAYT-RF-14	14.8	14.2	14.6	14.5	26.7
15	KR20-CICTN-01	16.2	15.9	16.1	16.1	21.9
16	KR20-CICTN-11	18.3	18.4	17.6	18.1	24.4
17	KR20-CICTN-17	24.8	25.6	25.3	25.2	29.3
18	KR20-CICTN-24	13.8	13.2	12.8	13.3	25.8
19	KR20-CICTN-33	15.2	15.6	16.1	15.6	24.7
20	KR20-CICTN-37	26.3	26.1	25.8	26.1	28.1
	Minimum				12.9	21.9
	Mean				18.6	26.0
	Maximum				26.1	29.3
	LSD				0.77	0.57
	LSD %				4.14	2.18
	CV %				2.6	1.3

In order to evaluate the photosynthetic productivity of winter chickpea cultivars and lines, the amount of green biomass was estimated using the GreenSeeker tool in 3 development phases. In this case, the device evaluates the degree of greenness of varieties and lines and the coverage of the earth with leaves using infrared rays. It was found that the amount of green biomass of winter chickpea varieties and lines was 0.244-0.312 in the budding phase, 0.275-0.375 in the flowering phase, and 0.456-0.618 in the podding phase. It was noted that there were 10 lines with higher green biomass content than the model cultivars.

Table-2. Selection of varieties and lines of high photosynthetic productivity of winter chickpea, Guzor-2022.

№	Name of genotypes	Grain yield, c/ha	Level of greenness, NDVI			Chlorophyll content		
			Budding date	Flowering date	Podding date	Budding date	Flowering date	Podding date
1	Obod (check)	18.1	0.258	0.318	0.527	32.9	43.2	50.8

2	Polvon (check)	15.9	0.245	0.296	0.456	29.2	38.8	44.5
3	KR-20-LCAYT-RF-1	23.0	0.294	0.361	0.590	32.9	45.8	53.8
4	KR-20-LCAYT-RF-2	14.1	0.230	0.287	0.494	26.1	37.0	45.9
5	KR-20-LCAYT-RF-3	25.9	0.308	0.375	0.603	34.9	42.0	49.0
6	KR-20-LCAYT-RF-5	17.7	0.261	0.314	0.526	30.9	36.5	44.0
7	KR-20-LCAYT-RF-6	12.9	0.280	0.303	0.504	33.0	39.4	46.6
8	KR-20-LCAYT-RF-7	15.8	0.234	0.284	0.474	28.4	40.1	45.6
9	KR-20-LCAYT-RF-8	22.0	0.294	0.346	0.574	35.9	46.1	55.1
10	KR-20-LCAYT-RF-10	24.7	0.312	0.368	0.590	33.0	43.4	51.3
11	KR-20-LCAYT-RF-11	17.6	0.263	0.320	0.525	27.7	36.5	43.2
12	KR-20-LCAYT-RF-12	13.3	0.236	0.275	0.479	29.7	36.0	44.4
13	KR-20-LCAYT-RF-13	21.1	0.288	0.357	0.580	34.9	41.6	47.9
14	KR-20-LCAYT-RF-14	14.5	0.254	0.288	0.537	30.8	37.4	45.9
15	KR20-CICTN-01	16.1	0.246	0.296	0.488	26.8	34.5	42.9
16	KR20-CICTN-11	18.1	0.291	0.334	0.545	32.8	38.1	45.7
17	KR20-CICTN-17	25.2	0.305	0.374	0.618	36.3	43.2	52.9
18	KR20-CICTN-24	13.3	0.257	0.296	0.534	27.2	35.7	45.1
19	KR20-CICTN-33	15.6	0.224	0.285	0.493	29.4	37.0	44.4
20	KR20-CICTN-37	26.1	0.296	0.352	0.610	33.5	40.8	48.2
	Minimum	12.9	0.224	0.275	0.456	26.1	34.5	42.9
	Mean	18.6	0.269	0.321	0.537	31.3	39.7	47.4
	Maximum	26.1	0.312	0.375	0.618	36.3	46.1	55.1
	LSD	0.77						
	LSD %	4.14						
	CV %	2.6						

It was found that the correlative relationship between the amount of green biomass and the yield is strongly positive, r=0.83 in the budding phase, r=0.94 in the flowering phase, and r=0.88 in the podding phase.

The amount of chlorophyll in the leaves of the varieties and lines was 26.1-36.3% in the budding phase, 34.5-46.1% in the flowering phase, and 42.9-55.1% in the podding phase. 8 varieties and lines with high chlorophyll content in leaves were found to have high photosynthetic productivity.

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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