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SELECTION OF VARIETIES AND LINES OF LENTILS (LENS CULINARIS) WITH HIGH GRAIN YIELD AND PROTEIN CONTENT

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Abstract:

There are more than 7 billion people on Earth today, of which 3 billion live in hunger. In addition to the quantity of products grown for food, it is important for its diversity, ecological purity, and richness in minerals beneficial to the human body and health. These nutrients are found in large quantities only in legumes, including lentils. Therefore, creating new varieties of lentils, increasing their yield and grain quality is an urgent task.

Keywords: Lentils, yield, protein, southern region, selection, variety, ridge, return, template, phenological observation.

INTRODUCTION: The role and importance of the agricultural sector in ensuring food security of the population on a global scale is increasing day by day. In particular, in our country, it is an urgent issue to rationally use existing resources and opportunities to provide the population with guaranteed agricultural products, further increase productivity and profitability, and introduce scientific achievements and modern approaches to the sector.

Today, the effects of high temperatures and water stress are attracting attention because they pose a serious threat to the productivity of legume crops, as they affect pollen viability, fertilization, and pod set [1].

Scientific research was conducted in the irrigated field of the Southern Agricultural Research Institute in the Karshi district, planting 20 varieties and rows of lentils in a competitive variety trial nursery in 3 rotations on an area of 2 m2.

According to the results of the study, when analyzing the germination period of lentil varieties and ridges in the competitive variety trial nursery, it was observed that the average germination date was March 5-7. It was observed that the number of sprouted plants of lentil varieties and ridges was 36-38 (90-95%). The number of sprouted plants in the standard varieties "Darmon" and "Sarbon" was 37. It was found that the number of sprouted plants in 5 ridges was higher than in the standard varieties (Table 1).

Table 1

The growing season of lentil varieties and ridges in the competitive variety testing nursery (Karshi - 2022).

№	Name	Germination, date	Number of sprouted grains, pieces	Branching, date	Budding, date	Bloom, date	Date of birth	Ripe, date	The day before ripening
1	**Darmon (template)**	05.mar	37	06.apr	20.apr	29.apr	11.may	27.may	83
2	**Sarbon (template)**	06.mar	37	05.apr	20.apr	28.apr	10.may	27.may	82
3	KR20-LIEN-E-07	06.mar	37	06.apr	21.apr	28.apr	10.may	26.may	82
4	KR20-LIEN-E-08	06.mar	38	06.apr	20.apr	27.apr	09.may	27.may	82
5	KR20-LIEN-E-10	07.mar	38	06.apr	19.apr	28.apr	10.may	25.may	79
6	KR20-LIEN-E-11	07.mar	37	06.apr	21.apr	28.apr	10.may	28.may	82
7	KR20-LIEN-E-13	06.mar	37	05.apr	21.apr	28.apr	10.may	27.may	82
8	KR20-LIEN-E-18	07.mar	37	06.apr	21.apr	27.apr	09.may	24.may	78

9	KR20-LIEN-E-25	07.mar	37	06.apr	20.apr	27.apr	10.may	26.may	80
10	KR20-LIEN-L-01	07.mar	37	06.apr	21.apr	27.apr	10.may	27.may	82
11	KR20-LIEN-L-04	06.mar	37	06.apr	21.apr	29.apr	09.may	27.may	81
12	KR20-LIEN-L-06	05.mar	38	06.apr	21.apr	28.apr	10.may	27.may	83
13	KR20-LIEN-L-09	06.mar	37	06.apr	20.apr	28.apr	10.may	27.may	82
14	KR20-LIEN-L-10	06.mar	37	07.apr	19.apr	27.apr	09.may	26.may	81
15	KR20-LIEN-L-14	07.mar	37	05.apr	20.apr	28.apr	10.may	25.may	79
16	KR20-LIEN-L-16	06.mar	38	06.apr	21.apr	28.apr	10.may	28.may	83
17	KR20-LIEN-L-18	06.mar	38	05.apr	20.apr	28.apr	10.may	26.may	81
18	KR20-LIEN-L-22	07.mar	36	07.apr	20.apr	27.apr	09.may	26.may	81
19	KR20-LIEN-L-23	07.mar	37	06.apr	20.apr	27.apr	10.may	25.may	80
20	KR20-LIEN-L-25	06.mar	37	05.apr	20.apr	27.apr	10.may	27.may	81
Average		**06.mar**	**37**	**06.apr**	**20.apr**	**28.apr**	**10.may**	**26.may**	**81**
Minimum indicator		**05.mar**	**36**	**05.apr**	**19.apr**	**27.apr**	**09.may**	**24.may**	**78**
Maximum indicator		**07.mar**	**38**	**07.apr**	**21.apr**	**29.apr**	**11.iyun**	**28.may**	**83**

According to the results of phenological observations, it was determined that the transition of lentil varieties and ridges to the branching phase occurred on average on April 5-7.

According to the results of phenological observations of lentil varieties and rows in the competitive variety trial nursery, the budding phase was analyzed, and the average number of days for returns was from April 19 to April 21. The flowering phase, on average, lasted from April 27 to April 29.

Temperatures above 32/20°C (max/min) during flowering and pod filling negatively affect lentil growth, from germination to grain filling, affecting yield and nutritional quality [2].

The pod formation phase of lentil varieties and ridges was observed on average from May 9 to May 11. It was found that 5 ridges produced pods earlier than the reference varieties.

The effects of heat stress are mainly felt during the reproductive stage of plants and during seed development, where they pose a serious threat to pollen viability, fertilization, and yield of leguminous crops [3].

According to the research conducted, the ripening period of lentil varieties and ridges was determined from May 24 to May 28. The ripening phase was observed earlier in 9 ridges compared to the reference varieties.

It was observed that the growth period of lentil varieties and ridges lasted from 78 to 83 days. The results of the study revealed that the growth period of 10 ridges was shorter than that of the reference varieties **(Figure 1).**

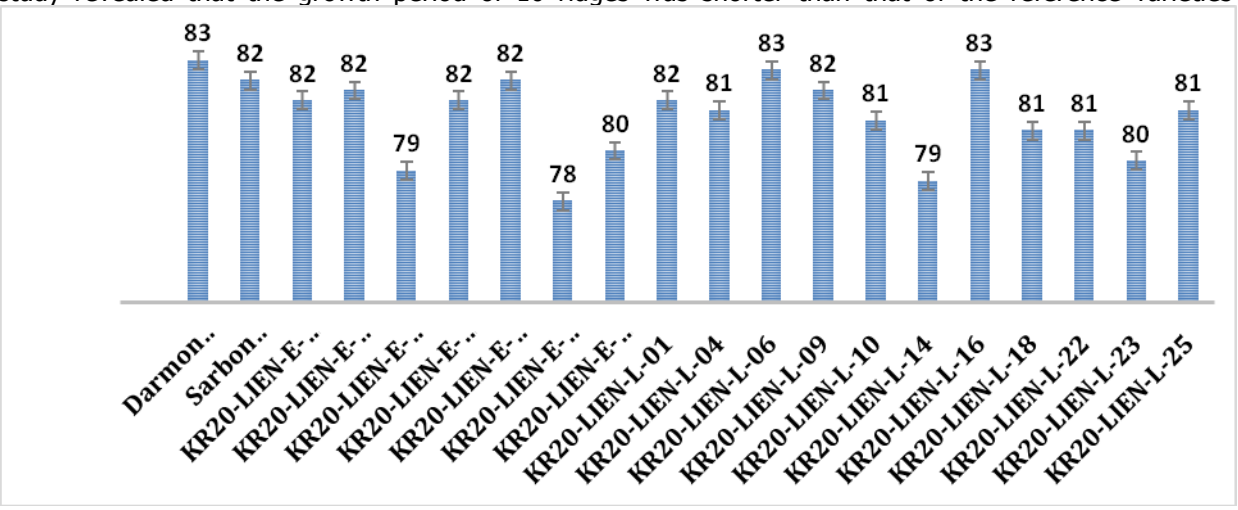

Figure 1. Lentil varieties and ridges days to maturity.
(Karshi – 2022)

According to the results of biometric measurements of lentil varieties and rows in the competitive variety trial nursery, it was determined that the average plant height index was 29–55 cm. It was observed that the plant height index was higher in 10 rows compared to the reference varieties **(Figure 2).**

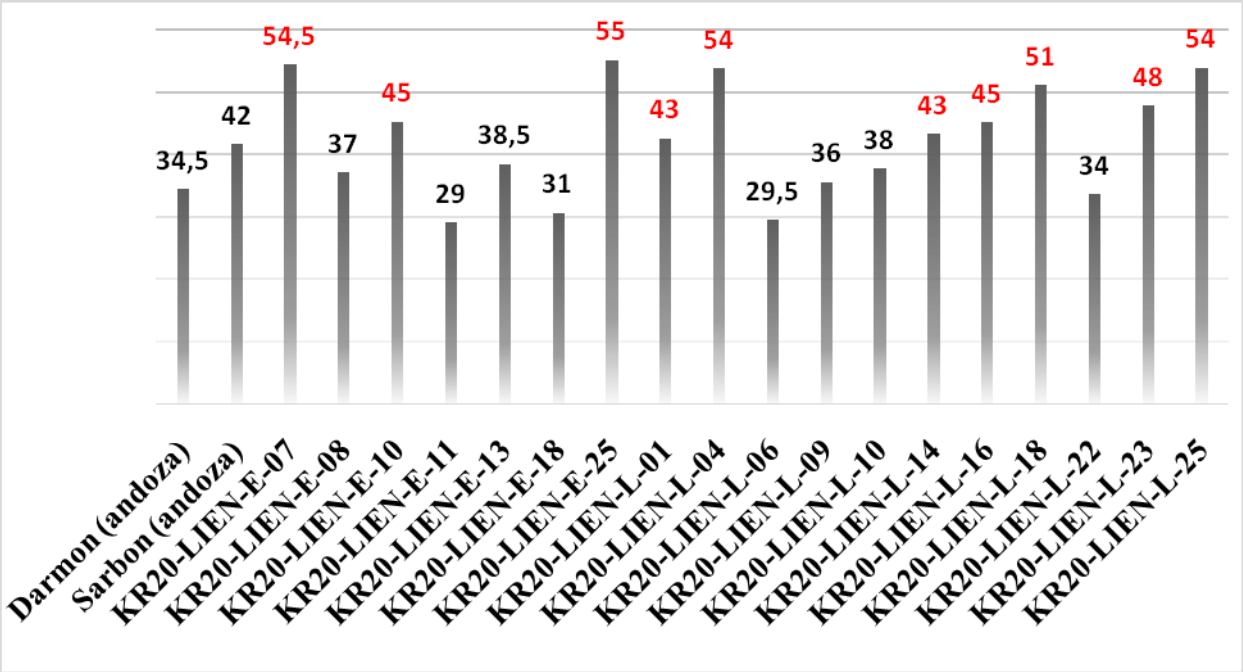

Figure 2. Plant height of lentil seedlings, cm.
(Karshi – 2022)

According to the results of the study, the number of fully matured plants of lentil varieties and lines was observed to be from 33 to 37 (82.5 - 92.5%)**(Table 2).**

Table 2
Yield index of lentil varieties and lines in the competitive variety testing nursery (Karshi–2022).

№	Name	Number of fully ripe plants, pieces	Number of pods per plant, pcs.				Number of grains per plant, grains	1000 tadon weight, g	Total number of grains	Productivity, s/ha	Protein content, %
			1 grain	2 grain	3 grain	Total					
1	**Darmon (template)**	36	73	31		104	135	77	4858	18,8	25,4
2	**Sarbon (template)**	34	91	30		121	151	73	5070	18,5	26,6
3	KR20-LIEN-E-07	35	71	21		92	113	68	3978	13,5	27,8
4	KR20-LIEN-E-08	37	67	33		100	133	78	4919	19,3	25,4
5	KR20-LIEN-E-10	37	90	26		115	141	83	5263	21,8	26,7
6	KR20-LIEN-E-11	35	84	17		101	118	68	4099	13,9	24,4
7	KR20-LIEN-E-13	36	62	25	2	88	115	76	4180	15,8	25,4
8	KR20-LIEN-E-18	37	104	28		132	160	80	5878	23,5	25,8
9	KR20-LIEN-E-25	35	109	26	1	136	163	83	5691	23,5	26,9
10	KR20-LIEN-L-01	36	58	34		93	127	70	4613	16,1	24,6
11	KR20-LIEN-L-04	36	67	29		96	125	76	4511	17,1	29,4
12	KR20-LIEN-L-06	33	78	14		92	106	60	3510	10,5	22,0
13	KR20-LIEN-L-09	36	66	30	2	97	129	70	4601	16,2	23,3
14	KR20-LIEN-L-10	35	92	20		112	132	75	4565	17,1	24,2
15	KR20-LIEN-L-14	37	90	24		114	138	80	5072	20,3	26,6
16	KR20-LIEN-L-16	37	87	23		110	134	74	4942	18,3	29,7
17	KR20-LIEN-L-18	33	70	18		89	107	61	3490	10,6	28,4
18	KR20-LIEN-L-22	36	64	23	2	88	113	75	4030	15,1	23,7
19	KR20-LIEN-L-23	37	102	24	3	127	153	83	5621	23,2	25,6

20	KR20-LIEN-L-25	37	70	24		94	118	78	4354	17,0	28,3
Average		36	80	25	2	105	131	74	4662	17,5	26,0
Minimum indicator		33	58	14	1	88	106	60	3490	10,5	22,0
Maximum indicator		37	109	34	3	136	163	83	5878	23,5	29,7

The number of single-grain pods per plant of lentil varieties and lines was found to be 58–109, the number of double-grain pods was 14–34, and the number of triple-grain pods was 1–3. The total number of pods per plant was observed to be 88–136 **(Figure 3).**

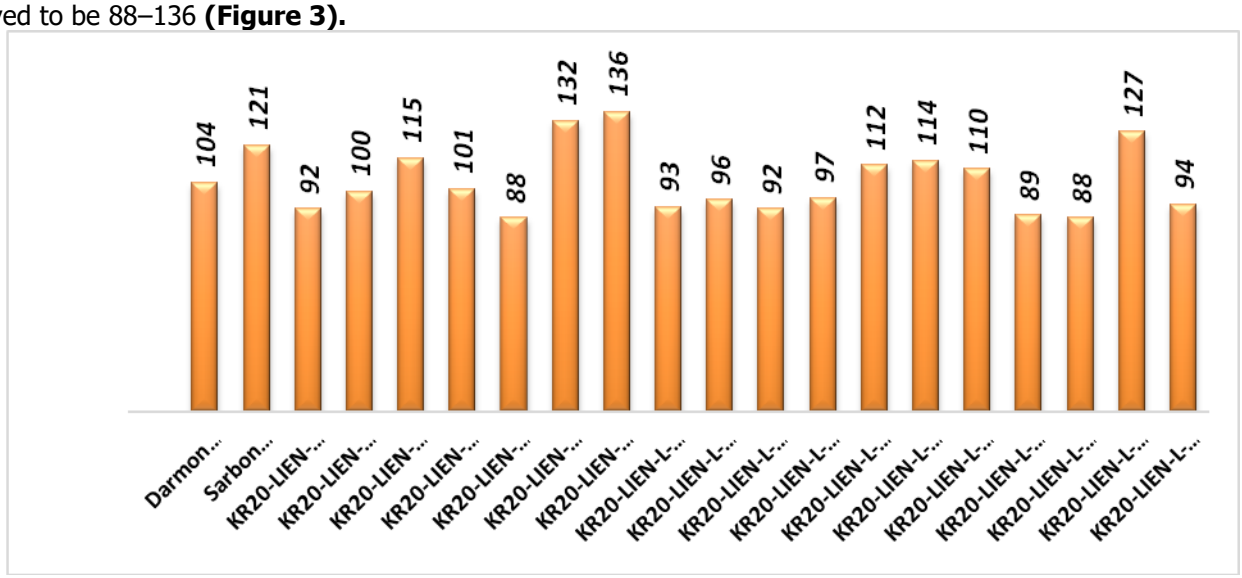

Figure 3. Number of pods per plant of lentil varieties, pcs. (Karshi – 2022).

According to the results of the experiment, it was determined that the number of grains per plant of lentil varieties and ridges is 106–136. The weight of 1000 grains of lentil varieties and ridges was determined to be 60–83 grams when studied in laboratory conditions. The weight of 1000 grains of the standard variety "Darmon" was determined to be 77 grams and the weight of 1000 grains of the standard variety "Sarbon" was determined to be 73 grams. It was determined that the weight of 1000 grains was higher in 6 ridges compared to the standard varieties **(Figure 4).**

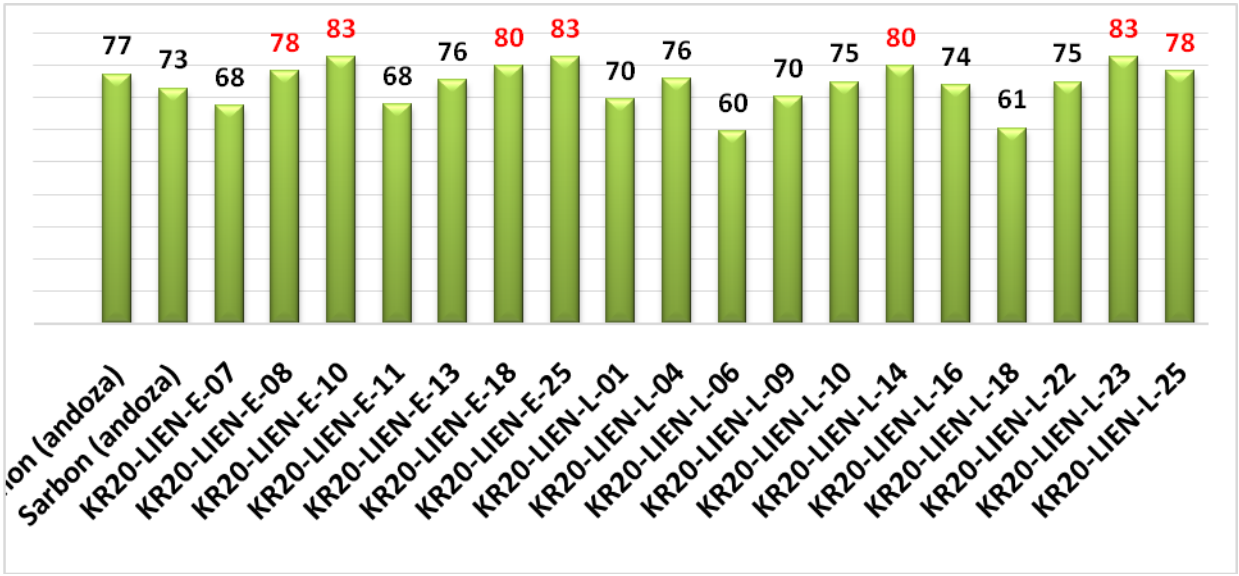

Figure 4. 1000-grain weight of lentil seedlings, g. (Karshi – 2022).

According to the results of the study, the average yield of lentil varieties and ridges was observed to be from 10.5 t/ha to 23.5 t/ha. The yield index of the standard variety "Darmon" was found to be 18.8 t/ha and the yield index of the "Sarbon" variety to be 18.5 t/ha. It was found that the yield index was higher in 6 ridges compared to the standard varieties **(Figure 5).**

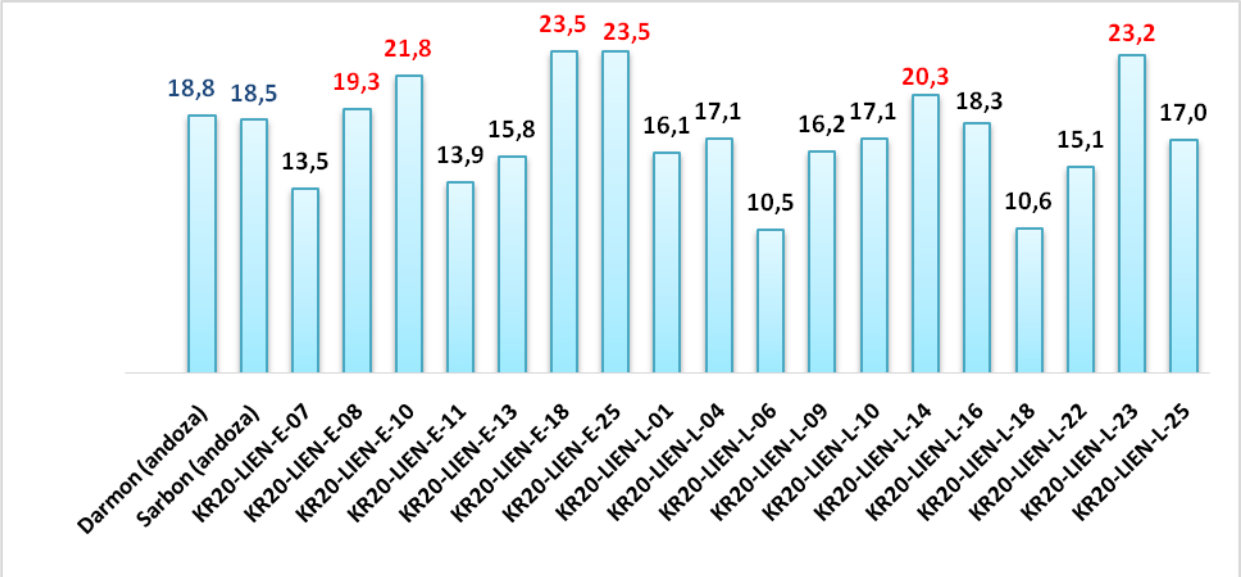

Figure 5. Yield index of lentil varieties, s/ha.
(Karshi – 2022).

Several days of high temperatures limit many physiological processes, including photosynthesis, metabolic pathways, electron flow, and respiration rates[4].

According to the results of the laboratory study, the average protein content of lentil varieties and strains was 22.0–29.7%. The protein content of the standard variety "Darmon" was 25.4%, and the protein content of the "Sarbon" variety was 26.6%. It was found that 7 strains had a higher protein content compared to the standard varieties **(Figure 6).**

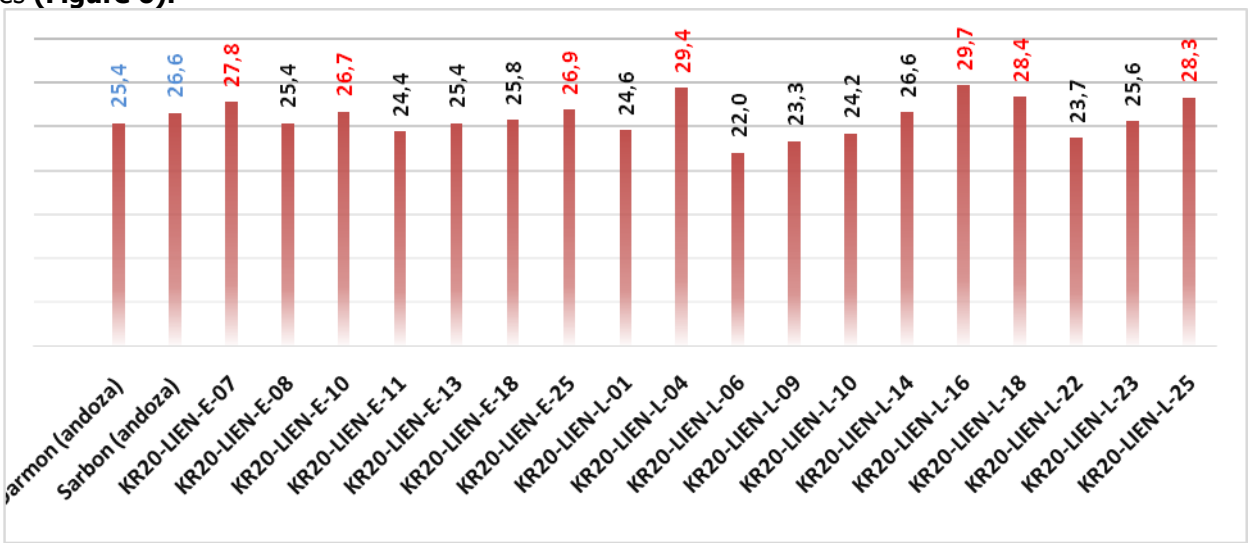

Figure 6. Protein content of lentil sprouts, %.
(Karshi – 2022).

SUMMARY: It should be noted that high temperatures during the growth stages of legumes, including lentils, significantly affected the grain yield and protein content of the plant.

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