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THE EFFECT OF SOWING DATES AND SEEDLING DENSITY ON THE NUMBER AND MASS OF SUGAR BEET LEAVES

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Abstract

In this article, data and analysis results are presented regarding the effects of sowing dates and plant densities on the number and mass of sugar-beet leaves. It was observed that among the sugar-beet varieties, “Eldona” showed superiority in terms of leaf number and leaf mass, having 2.3–3.1 more leaves and 12.8–14.5 g greater leaf mass compared to the “Sado” variety. Regardless of the variety, when sugar beet was sown during the period of March 20–30, it produced 2.0–2.5 more leaves and 11.0–12.5 g greater leaf mass compared to sowing during April 5–15. Increasing plant density from 83,000 to 166,000 plants per hectare, however, caused the number of leaves to decrease from 6.5 to 12.5 leaves and the leaf mass to decrease from 23.0 g to 36.0 g.

Keywords: Sugar beet, number of leaves, sowing dates, mass, seedling density, Sado, Eldona.

Introduction

The global population’s demand for food products makes the food industry critically important. Therefore, ensuring the sustainable development of local food and raw material production, and supplying the market with safe and high-quality food products in assortments and quantities defined by standards, remains one of the primary tasks.

Globally, the countries with the largest areas planted with sugar beet include India, Brazil, Thailand, China, Australia, Mexico, Cuba, and the United States of America

In yield-oriented varieties, the leaf area of the plant reaches its maximum size at the beginning of the growing season, whereas in sugar-oriented varieties it reaches its peak toward the end of the growing season. The relatively intensive development of

leaf organs at the end of the growing season ensures a high sugar content in the roots [2].

Biological maturity of sugar beet is characterized by the rapid senescence of older leaves, a slowdown in root mass growth, a decrease in the rate of sugar accumulation in the roots, an increase in the amount of high-quality juice, and a reduction in water and ash content [3].

During the period when the maximum leaf area of the leaf apparatus is formed and the plant transitions to the highest level of root development, the realization of photosynthetically active radiation (PAR) places sugar beet first among crops in terms of the PAR utilization coefficient—namely 4.3, which is twice as high as that of some cereal crops [4, 5].

Materials and Methods

The present study was conducted during 2023–2025 at the experimental field of Tashkent State Agrarian University, located in Kibray district of Tashkent region, under typical sierozem soil conditions.

The experiment consisted of 16 treatments, in which two sugar beet varieties, “Sado” and “Eldona”, were studied under two planting dates and four seedling densities. The total area of each treatment was 240 m², with an accounting (harvested) area of 120 m². The experiment was arranged in a single tier with three replications. The area of one replication was 3,840 m², and the total experimental area covered 1.15 hectares.

The experiment was carried out based on the methodology described by Xalikov B.M. [1], titled Methods of Conducting Experiments and Phenological Observations in Sugar Beet.

Results and Discussion

Leaves play a fundamental role in plant life by supplying the plant with nutrients. Depending on their biological characteristics, leaves are arranged in different patterns and have various shapes, yet they perform the same essential function.

Therefore, during the observations carried out in this study, the effects of planting dates and different seedling densities on the number and mass of leaves during sugar beet cultivation were examined. It was determined that these studied factors had a significant influence on both the number of leaves and their mass in sugar beet.

During the growth and development period of sugar beet, as root development intensifies, the process of leaf development slows down. Yellowing and shedding of leaves begin from the lower part of the plant. In sugar beet, the number of leaves reaches

its maximum level by the first ten days of August. After reaching this peak, leaf development gradually ceases and the number of leaves begins to decline. This process continues until harvest. Based on this pattern, the data obtained on August 1, representing the peak period of leaf development, were selected for analysis.

According to the data obtained in the first year of the experiment (2023), in the early planting period (March 20–30) of the sugar beet variety “Sado”, the number of leaves in the respective treatments was 45.1, 39.3, 50.5, and 52.0 leaves per plant, with corresponding leaf masses of 281.4, 268.3, 294.0, and 304.2 g. In the treatments planted during April 5–15, the number of leaves was 43.2, 37.3, 48.1, and 49.9 per plant, while leaf mass amounted to 268.7, 256.2, 282.9, and 292.0 g.

Analysis of the obtained data shows that when this sugar beet variety was planted earlier (March 20–30), the number of leaves increased by 1.9–2.4 leaves per plant and leaf mass increased by 11.1–12.7 g compared to the later planting period

Based on the data obtained on the effect of seedling density in this variety, it was observed that as seedling density increased, the number and mass of leaves per plant decreased. For example, when sugar beet was planted during March 20–30 and the seedling density was 166 thousand plants per hectare, the number of leaves per plant was 39.3 and their mass was 268.3 g. In contrast, in the treatment with 90 thousand plants per hectare, these values increased to 50.5 leaves and 294.0 g,

Table 1

Number and Mass of Sugar Beet Leaves, 2023

Var №	varieties	sowing dates	sowing system	Seedling density, thousand/ha	1.06		1.07		1.08		1.09		Before Harvest	
					Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g
1	Sado	20-30.03	60x15-1	110 (control)	17,1	73,1	26,5	162,9	45,1	281,4	34,9	227,8	30,2	208,7
2			60x10-1	166	11,4	65,2	19,7	150,4	39,3	268,3	29,7	210,4	23,4	189,8
3			60x18-1	90	19,5	78,3	29,8	178,4	50,5	294,0	40,4	250,1	35,6	220,5
4			60x20-1	83	21,6	82,1	32,3	189,8	52,0	304,2	41,1	255,7	36,2	225,7
5		05-15.04	60x15-1	110 (control)	14,9	62,0	23,1	147,4	43,2	268,7	32,8	217,7	27,9	195,6
6			60x10-1	166	9,2	54,1	16,5	134,9	37,3	256,2	27,6	200,3	21,1	176,7
7			60x18-1	90	17,3	67,2	25,6	162,9	48,1	282,9	38,3	240,0	33,3	207,4
8			60x20-1	83	19,4	71,0	29,1	174,3	49,9	292,0	39,0	245,6	33,9	212,6
9	Eldona	20-30.03	60x15-1	110 (control)	18,9	82,0	28,9	175,4	48,2	294,9	37,0	240,4	31,9	216,5
10			60x10-1	166	13,2	74,1	22,1	162,7	42,0	281,1	31,8	228,4	25,1	197,3
11			60x18-1	90	21,3	87,2	32,2	190,9	53,5	308,5	42,5	262,5	37,3	228,1
12			60x20-1	83	23,4	91,0	34,7	202,4	54,3	317,0	43,6	268,1	37,9	233,5
13		05-15.04	60x15-1	110 (control)	17,2	74,1	25,8	161,1	46,0	282,8	35,4	230,2	29,5	203,1
14			60x10-1	166	11,5	66,2	19,2	148,6	40,1	270,3	30,2	212,8	22,6	184,2
15			60x18-1	90	19,6	79,3	28,3	176,6	50,9	297,1	38,6	252,5	34,8	214,6
16			60x20-1	83	21,7	83,1	31,8	188,1	52,7	306,1	41,6	258,1	48,9	220,1

Table 2

Number and Mass of Sugar Beet Leaves, 2024

Var №	Varieties	Sowing dates	sowing system	Seedling density, thousand/ha	1.06		1.07		1.08		1.09		Before Harvest	
					Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g	Number of Leaves, Pieces	Leaf Mass, g
1	Sado	20-30.03	60x15-1	10 (control)	14,5	60,5	23,9	50,3	43,1	268,6	32,3	215,2	27,6	196,1
2			60x10-1	166	8,8	52,6	17,1	37,8	37,2	256,1	27,1	197,8	20,8	177,0
3			60x18-1	90	16,9	66,0	27,2	65,8	48,0	282,8	37,8	237,5	33,0	207,9
4			60x20-1	83	19,0	69,5	29,7	76,8	49,8	291,9	38,5	243,1	33,6	213,1
5		05-15.04	60x15-1	10 (control)	12,3	49,4	20,5	34,8	40,6	256,1	30,2	205,1	25,3	183,0
6			60x10-1	166	6,6	41,5	13,9	22,3	34,7	243,5	25,0	187,7	18,5	164,1
7			60x18-1	90	14,7	54,6	23,0	50,3	45,5	269,9	35,7	227,4	30,7	194,8
8			60x20-1	83	16,8	58,4	26,5	61,7	47,3	279,4	36,4	233,0	31,3	200,0
9	Eldona	20-30.03	60x15-1	10 (control)	16,3	69,4	26,3	62,8	45,9	281,6	34,4	227,8	29,3	203,7
10			60x10-1	166	10,6	61,5	19,5	50,1	39,7	269,1	29,2	215,8	22,5	184,7
11			60x18-1	90	18,7	74,6	29,6	78,3	50,5	295,8	39,9	249,9	34,7	215,5
12			60x20-1	83	20,8	78,4	32,1	89,8	52,3	304,9	41,0	255,5	35,3	220,9
13		05-15.04	60x15-1	10 (control)	14,6	53,6	23,2	48,5	43,4	270,3	32,8	217,5	26,9	190,5
14			60x10-1	166	8,9	53,6	16,6	36,0	37,5	257,7	27,6	200,2	20,0	171,6
15			60x18-1	90	17,0	66,7	25,7	64,0	48,3	284,5	36,0	240,2	32,2	202,0
16			60x20-1	83	19,1	70,5	29,2	75,5	50,1	293,5	39,0	245,5	46,3	207,5

while in the treatment with 83 thousand plants per hectare they reached 52.0 leaves and 304.2 g, respectively.

The same pattern was observed in the treatments planted during April 5–15. When seedling density was 166 thousand plants per hectare, the number of leaves was 37.3 with a mass of 256.2 g; at 90 thousand plants per hectare, 48.1 leaves and 282.9 g; and at 83 thousand plants per hectare, 49.9 leaves and 292.0 g were recorded. Thus, increasing seedling density from 83 thousand to 166 thousand plants per hectare reduced the number of leaves by an average of 6.6 to 12.7 leaves per plant and decreased leaf mass by 22.8 to 35.9 g.

In the early planting period (March 20–30) of the sugar beet variety *"Eldona"*, the number of leaves was 48.2, 42.0, 53.5, and 54.3 per plant, with corresponding leaf masses of 294.9, 281.1, 308.5, and 317.0 g. In the treatments planted during April 5–15, the number of leaves was 46.0, 40.1, 50.9, and 52.7 per plant, and leaf mass amounted to 282.8, 270.3, 297.1, and 306.1 g. It can be concluded that this variety also produced 1.6–2.6 more leaves per plant and 10.8–12.1 g higher leaf mass when planted earlier (March 20–30).

According to the data on seedling density, a similar trend was observed in this

variety: as seedling density increased, both the number and mass of leaves per plant decreased. For instance, when planted during March 20–30 with a density of 166 thousand plants per hectare, the number of leaves per plant was 42.0 and leaf mass was 281.1 g. At 90 thousand plants per hectare, these values increased to 53.5 leaves and 308.5 g, while at 83 thousand plants per hectare they reached 54.3 leaves and 317.0 g.

The same pattern was also observed in the April 5–15 planting period: at a density of 166 thousand plants per hectare, the number of leaves was 40.1 with a mass of 270.3 g; at 90 thousand plants per hectare, 50.9 leaves and 297.1 g; and at 83 thousand plants per hectare, 52.7 leaves and 306.1 g were recorded.

Similar trends were observed in the data obtained during the 2024 and 2025 growing seasons as well.

Conclusion

It can be concluded that among the sugar beet varieties, “Eldona” showed superiority in terms of leaf number and leaf mass. Compared with the “Sado*”* variety, “Eldona*”* produced 2.3–3.1 more leaves per plant and had a higher leaf mass by 12.8–14.5 g.

Regardless of variety, planting sugar beet during March 20–30 ensured an increase in leaf number by 2.0–2.5 leaves per plant and leaf mass by 11.0–12.5 g compared with planting during April 5–15. In contrast, increasing seedling density from 83 thousand to 166 thousand plants per hectare led to a reduction in leaf number by 6.5–12.5 leaves per plant and a decrease in leaf mass by 23.0–36.0 g.

REFERENCES

1. Xoliqov B.M. Qand lavlagida tajriba o‘tkazish va fenologik kuzatishlar olib borish usullari //Dala tajribalarini o‘tkazish uslublari. Qo‘llanma, Toshkent, O‘zPITI, 2007 yil, 55-60 b.

2. Юнусов Р.А. Семеноводство - престижная отрасл // Сахарная свекла. - Москва, 1999. - № 9.- С.22-24.

3. Буренин В.И. Столовая свекла. В кн. «Овошние култури», Ленинград, Лениздат, 1980. - С. 72-78.

4. Пиркин В.И., Гореленко В.И., Гизбуллина Л.Н. Перспективы развития свекловодства в Украине //Сахарная свекла. -М., 2008. №9. С. 12-14.

5. Брилёв В.В., Леховчик Н.И. Управление процессом орошения сахарной свёклы. Технология високых урожаев. Ж; № 10 . 2016, С. 20-22.