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INFLUENCE OF INTRODUCING MINERAL FERTILIZERS ON THE NUMBER OF SEEDLINGS, ACCUMULATION OF DRY MATTER AND FORMATION OF GREEN MASS IN SUGAR BEET

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Annotation. When growing sugar beet as a re-crop after winter wheat harvest, seed wetting and encapsulation ensures even seedlings. And also, mineral fertilizers have a positive effect on the growth and development of plants. In the variant where sugar beet seeds after wetting were encapsulated with a mixture of 75% vermicompost and 25% soil with the use of mineral fertilizers at a rate of $N_{200}P_{150}K_{200}$ kg/ha, the accumulation of dry matter, the number of seedlings and green mass was the highest.

Key words: dry matter, sugar beet, mineral fertilizers, root crops, capsule.

Introduction. To date, according to the International Fertilizer Manufacturers and Consumers Association (IFA), “global demand for mineral fertilizers in the 2020-2021 season is 193.5 million tons of a.i”. Obtaining the planned high and high-quality harvest is impossible without meeting the nutrient needs of agricultural crops. Therefore, conducting research to maintain and improve soil fertility, obtaining high and high-quality crop yields by developing scientifically based optimal norms and terms of fertilizer application is an urgent task.

The world produces 170 million tons of sugar per year, 80% of which is obtained from sugar cane and 20% from sugar beets, for which about 280 million tons of sugar beets are grown annually. In this regard, special attention is paid to

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research on the rational use of available land resources, increasing the yield of sugar beet while maintaining soil fertility, the effective use of mineral and organic fertilizers and modern agronomic methods of growing sugar beet.

In the republic, scientific research is being carried out and put into practice, aimed at the effective use of mineral fertilizers to increase soil fertility and the yield of repeated crops in areas freed from winter wheat, and certain results are achieved. The strategy for the development of agriculture of the Republic of Uzbekistan in 2020–2030 sets important tasks for "... introducing systems for the efficient use of fertilizers, taking into account soil and climatic conditions, taking measures to preserve and further improve soil fertility". In this regard, the development of an acceptable system for the use of mineral fertilizers that ensures high and high-quality yields of re-crops, obtaining the planned harvest of re-sowing sugar beets by creating a nutrient medium in the soil according to the requirements in the development phases in irrigated soils of the Andijan region is of great importance.

According to the results of scientific research by I.M.Mamedov [4] and A.Zaluzhsky [2], they showed that mineral fertilizers in irrigated chestnut soils have a positive effect on the growth and development of sugar beet. With an increase in the rate of mineral fertilizers, the number of leaves and leaf surface of sugar beet, photosynthesis, dry matter, crop accumulation and sugar content increase. In their experiments, the above indicators were higher than in other options, defined as $N_{90}P_{90}K_{60}$; $N_{90}P_{90}K_{90}$ and $N_{60}P_{60}K_{40}$ kg/ha.

Among the agrotechnical measures carried out for agricultural crops, the norms of mineral fertilizers, including those for sugar beet, are of great importance. In terms of nutrient intake, sugar beet ranks first among agricultural crops. Due to the strong development, their roots extend to the soil to a depth of 2 m and a width of up to 1 m. According to M.P.Smirnov and E.A.Muravina it is necessary to apply

180-250 kg/ha of nitrogen, 55-80 kg/ha of phosphorus and 250-400 kg/ha. absorbs potassium.

E.I.Zaslavsky and V.V.Ustyantsev, summing up the results of field experiments conducted at VNIISP, noted that sugar beet should be fed 2-3 times. In this case, it is recommended to carry out the first feeding before weeding, the second after weeding and the third, if any, before the distance between the rows is covered with leaves [3, p. 24-35].

The intensification of sugar beet growing methods increased nitrogen in tops from 2.82 to 3.27%, in root crops from 1.18 to 1.45%, phosphorus in tops from 0.77 to 0.86%, and in root crops from 0. 50 to 0.60%.

Since our soil and climatic conditions differ from the above-mentioned zones, the results of our studies in the conditions of light meadow-serozem soils of the Andijan region were completely different.

The aim of the study is to form a high and high-quality yield of re-sowing sugar beet roots by planting sugar beet families encapsulated with vermicompost and determining acceptable norms of mineral fertilizers under conditions of irrigated sierozem-meadow soils of the Andijan region.

Research objectives:

- encapsulation of sugar beet seeds and planting sugar beet as a re-crop in gray-meadow soils;

- determination of norms of mineral fertilizers for the dynamics of nitrate nitrogen, mobile phosphorus and exchangeable potassium in the soil;

- determination of the effect of encapsulated seeds and norms of mineral fertilizers on the phases of development of sugar beet (formation of true leaves, growth of leaves, development of root crops) on growth and development, accumulation of dry mass, on changes in the amount and ratio of total nitrogen, phosphorus and potassium in the composition of plants, on formation of a high and high-quality yield of root crops and sugar beet leaves;

- determination of the economic efficiency of seed encapsulation and norms of mineral fertilizers in sugar beet;

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- to develop scientific and practical recommendations aimed at the formation of a high and high-quality yield of sugar beet root crops;

- to develop a scientifically based system for the use of fertilizers and a method for planting encapsulated seeds, which ensures a high and high-quality yield of root crops and sugar beet leaves.

Irrigated sierozem–meadow soils of Andijan region, sugar beet variety “Ramon one-seed – 47”, mineral fertilizers, biohumus were chosen as the object of the study.

Research methods. The selection and study of soil and plant samples in laboratory, field and industrial experiments and their chemical analysis, biometric measurements and phenological observations were carried out in accordance with the following guidelines: field experiments - "Methodology of the field experiment" and "Methodology for conducting experiments in vegetable growing, melon growing and potato growing”, “Methods of conducting field experiments”, agrochemical analyzes - “Methods of agrochemical analyzes of soils and plants in Central Asia”. The variance-statistical analysis of the data obtained in the experiments was processed using the Microsoft Excel program according to the method of B.A.Dospekhov.

The reliability of the results of the study is justified by conducting dispersion-statistical analyzes of the obtained research data, the coincidence of theoretical and practical results, passing production tests of the results obtained, the validity of the results and conclusions, passing the approbation by scientists of the National Center for Knowledge and Innovation in Agriculture under the Ministry of Agriculture of the Republic of Uzbekistan and Andijan Institute of Agriculture and Agrotechnologies, comparison of research results with international and local experiments, discussion of research results at international and republican scientific conferences, publications in periodicals of foreign and republican scientific journals recommended by the Higher Attestation Commission under the Cabinet of

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Ministers of the Republic of Uzbekistan, implementation of the results into practice.

Scientific and practical significance of the research results.

The scientific significance of the results of the study is explained by the development of an optimal system for applying mineral fertilizers to obtain a high and high-quality crop of root crops and leaves of re-sowing sugar beet under conditions of irrigated gray-meadow soils, determining the amount of mobile nutrients in the soil, the amount and ratio of NPK in the composition of plants in the phases of development sugar beet, scientific substantiation of the growth and development of sugar beet, accumulation of dry matter, absorption of nutrients by plants, formation of a high and high-quality crop of roots and leaves.

The practical significance of the results of the study lies in guaranteeing a high and high-quality yield of sugar beet using annual norms for applying mineral fertilizers according to the phases of plant development when growing re-sowing sugar beet in a short crop rotation system under irrigated sierozem-meadow soils of the Andijan region, as well as achieving high and high-quality sugar beet harvest and development of recommendations for production.

During the experiment, we observed the formation of dry matter during the growing season of sugar beet according to the options. It can be said that during the years of the study, the accumulation of dry matter by variants was based on one regularity (Fig. 1). within 11.9–18.9 g/plant. The introduction of mineral fertilizers had a positive effect on the growth and development of the plant, so the amount of dry matter in them was also significantly higher than in the control variant. For example: according to the variants of the experiment, the amount of dry matter was in the range of 30.4–42.6 g/plant. The highest result was observed in the 11th variant, where the seeds were encapsulated with 100% biohumus with the application of mineral fertilizers $N_{150}P_{100}K_{150}$ kg/ha amounted to 42.6 g/plant. And at the end of the growing season, the largest accumulation of dry matter was observed in the 9th variant - 190.4 g/plant.

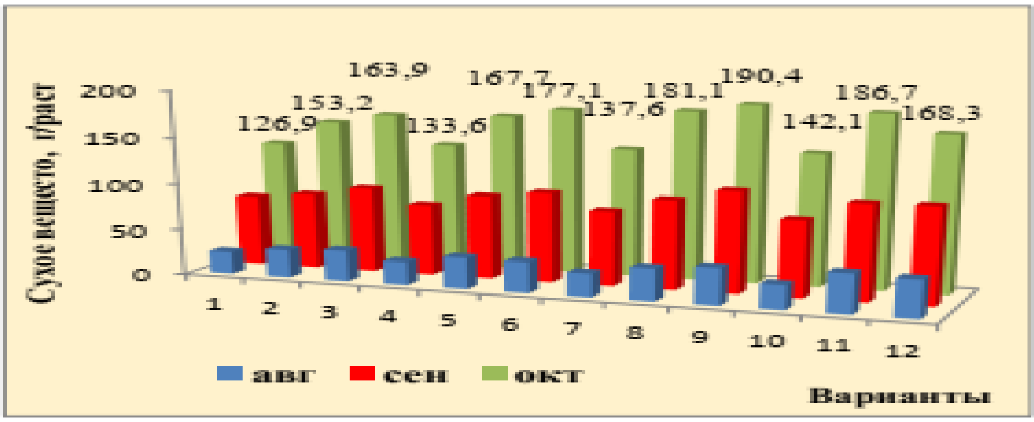

Рисунок 1. Накопление сухого вещества по вариантам опыта, г/растение, среднее 2017-2019 гг.

We have also tried to ensure that moisture is maintained in the soil when planting sugar beet as a secondary crop to achieve the desired plant density. For this, capsules were prepared by wetting the seeds in water up to 80% and adding soil and biohumus in different proportions and its effect on the number of seedlings and determining the number of leaves of sprouted plants, the shape of root crops throughout the growing season. IN 1; 2 and 3 - options planted in a simple way, the number of seedlings is much less, respectively 57.1; 57.8 and 58.9 thousand pieces. In order to obtain even seedlings after wetting, the seeds were encapsulated in different ratios of vermicompost and soil (50%; 75%; 100%;) and the plant density was 77.2–86.8 thousand plants per hectare.

When sowing encapsulated seeds with 50% vermicompost and 50% soil, plant density was 77.2; 77.4 and 78.7 thousand plants, and when sowing encapsulated seeds with 100% biohumus, their number (in 10;11;12 variants) was 85.4; 85.3 and 86.8 thousand plants, respectively.

This means that there is an inverse relationship between the number of seedlings and the length of root crops. It should be noted that the presence of a large number of seedlings was not effective in all variants. For example, in

In the 11th variant, the number of seedlings was 85.3 thousand pcs/ha, the yield of root crops (when fertilizing $N_{150}P_{100}K_{150}$ kg/ha) was

347.7 q/ha. And in the 12th variant, the number of seedlings was 86.8 thousand pieces/ha, where fertilizer $N_{200}P_{150}K_{200}$ was applied, the yield of

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root crops was 343.0 c/ha. In this case, we see that the indicators only grow with an increase in the application rates of mineral fertilizers. In conclusion, we can say that the high growth and development of re-sowing sugar beet depends primarily on the amount of mineral fertilizers applied, and then on the number of seedlings (r=0.38).

In field experiments, we also observed the formation of a sugar beet leaf crop. Favorable weather conditions have been maintained over the years of the experiments. Therefore, the ongoing agrotechnical measures effectively influenced the growth and formation of the sugar beet crop. In our August observations during the vegetation of plants, when plant seeds were planted in a simple way and the norms of mineral fertilizers were $N_0P_0K_0$; $N_{150}P_{100}K_{150}$ and $N_{200}P_{150}K_{200}$ kg/ha, weight of sugar beet leaves per plant is 12.2; 14.3 and 16.7 g/plant (Table 1).

1-table

Growth and development of sugar beet leaves, green mass, (average for 2017–2019)

№	Density of plantings, thousand pcs/ha	Leaf weight, g/plant			Biological yield of leaves, c/ha		
		August	September	October	August	September	October
1	57,1	12,5	24,2	69,8	7,2	13,8	39,9
2	57,8	14,3	36,8	85,4	8,3	21,3	49,4
3	58,9	16,7	44,3	97,7	9,8	26,1	57,6
4	77,2	12,6	26,9	67,6	9,7	20,8	52,2
5	77,4	15,2	37,2	86,9	12,1	29,5	69,2
6	78,7	16,9	45,2	100,5	13,1	35,0	77,8
7	81,6	12,1	27,3	70,2	10,1	21,8	55,9

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8	82,1	15,7	37,0	88,9	12,9	30,4	73,0
9	83,4	17,5	46,1	101,0	14,4	38,0	83,2
10	85,4	12,9	27,7	70,9	11,0	23,7	60,5
11	85,3	17,8	45,3	102,1	15,2	38,6	87,1
12	86,8	18,4	49,6	107,6	16,5	44,5	96,6

By increasing the number of plants in the studied other variants where mineral fertilizers were not used (4; 7; 10–var.), the mass of leaves and leaf yield did not increase significantly: respectively 12.6; 12.1 and 12.9 g/plant 9.7; 10.1; 11.0 q/ha. With the appointment of norms of mineral fertilizers, for sugar beet $N_{150}P_{100}K_{150}$, depending on the number of shoots, the leaf yield increased markedly. This can be seen in 5; 8 and 11 variants of the experiment with a mass of leaves on one plant 15.2; 15.7 and 17.8 g/plant. When studying the biological yield of a leaf from one hectare of land, from the data obtained, calculated by the density of plants, it was revealed that it was obtained by 2.4; 2.8; 4.2 c/ha more yield than in unfertilized variants. Similar data were obtained for the variants with the norm of mineral fertilizers $N_{200}P_{150}K_{200}$ kg/kg, which can only be explained by an increase in the norms of mineral fertilizers. The high density of sugar beet plants prevents the growth and development of root crops, and the presence of large leaf surfaces in an effort to light can be explained by a sufficient amount of mineral fertilizers. Therefore, when growing sugar beet as a second crop, an increase in the number of seedlings has a negative impact on the formation of root crops and crop accumulation. However, due to the strong influence of mineral fertilizers on the growth and development of leaves, the leaf mass of a single plant and the biological leaf yield can be significant. Here, the sowing of encapsulated sugar beet seeds with 100% vermicompost and the application of mineral fertilizers in the amount of $N_{200}P_{150}K_{200}$ kg/ha ensures the biological yield of green mass up to 96.6 centners/ha.

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Summary section.

1. The application of mineral fertilizers at the rate of $N_{200}P_{150}K_{200}$ kg/ha and encapsulation of seeds with a mixture of 75% biohumus and 25% soil after 100% soaking ensured a yield of sugar beet roots of 370.2 c/ha and 83.2 c/ha leaf yield.

2. Depending on the norms of mineral fertilizers, there is a significant difference in the growth and development of plants, the application of mineral fertilizers at the rate of $N_{200}P_{150}K_{200}$ kg/ha, encapsulation of seeds with 100% biohumus ensured the formation of a leaf mass of 111.3 g/plant and the highest leaf yield - 96, 6 kg/ha.

3. Determination of norms of mineral fertilizers for sugar beet N200P150K200 kg/ha and encapsulation of seeds with a mixture of 75% vermicompost and 25% soil provided the highest formation of dry matter, respectively, 190.4 g/plant.

4. There is a weak correlation between the yield of sugar beet roots and planting density (r = 0.38), that is, the high growth and development of the sugar beet roots of re-sowing depends primarily on the amount of mineral fertilizers applied, and then on the number of plantations. This phenomenon was observed in the variants where the number of plantations was 82400 plants/ha, the highest yield was 370.2 centners/ha, and in the variant with 86800 plants/ha the yield was 343.0 centners/ha.

5. As a result of the increase in the number of seedlings in the cultivation of sugar beet as a secondary crop, the growth and development of leaves increased compared to root crops. Especially, the encapsulation of sugar beet seeds with 100% biohumus and the application of mineral fertilizers at the rate of $N_{200}P_{150}K_{200}$ kg/ha ensured the production of green mass 96 kg/ha, digestible protein 191.2 kg/ha and fodder accumulation 1738 kg/ha.

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