American Journal Of Agriculture And Horticulture Innovations

VOLUME Vol.05 Issue10 2025
PAGE NO. 45-51
DOI 10.37547/ajahi/Volume05Issue10-08

Effect Of Microfertalizers On Root Weight Of Soybean Varieties

Khayrullaev Sardor Shamsiddin ugli
Associate professor (PhD), Posdoctoral student (DSc) of Tashkent State Agrarian University, Uzbekistan

Usmonova Shohista Usmon kizi
PhD, Posdoctoral student (DSc) of Research Institute of Plants Genetic Resources, Uzbekistan

Pardaboeva Jasmina Ulugbek kizi
Master student of Tashkent State Agrarian University, Uzbekistan

Received: 30 August 2025; **Accepted:** 15 September 2025; **Published:** 28 October 2025

Abstract: This article presents data on the effect of micronutrients on root weight of soybean varieties and their analysis. According to it, it was found that microfertilizers affected the symbiotic activity of soybean varieties. It was noted that the number and weight of nodules per plant were higher when sulfur and manganese were fed through the leaves at medium rates. It was also observed that the number and weight of nodules increased when microfertilizers were applied at medium rates per hectare. It was found that the number and weight of nodules under the influence of microfertilizers were higher in the Orzu variety, and that microfertilizers had a good effect on root activity, and in both varieties, medium rates of microfertilizers had a positive effect on root formation.

Keywords: Soybean, variety, Nafis, Orzu, fertilizers, micronutrients, root weight.

Introduction: In our republic, in recent years, it is important to make good use of areas that have been harvested from grain crops, to grow a second crop, to increase soil fertility, to grow high-quality valuable grain crops, including soybean, and to produce a high yield with the effective use of regional bioclimatic resources.

Soybean crop among legumes is a valuable crop to increase soil fertility that accumulates a lot of nitrogen during the season, and has a lot of protein and oil in its seeds (2, 5).

The soil and climatic conditions of Uzbekistan provide an opportunity to plant and harvest several different crops per year, with the effective use of irrigated land. The high temperature that lasts from mid-May to the end of September is very favorable for the growth of heat-loving crops (soybeans, mung beans, etc.) and grain formation (4, 5).

Soybean is a biologically clean crop that improves soil structure and activates biological processes. Analysis shows that 0.65-0.72% humus in the soil before soybean planting reaches 0.95-1.03% after soybean planting (4).

In recent years, in addition to organic, mineral and green fertilizers, bacterial fertilizers and inoculants have been widely used in agriculture to increase the yield of leguminous crops, including soybean has taken research results in various sources on how to make, collect, absorb, satisfy the plant's need for nitrogen up to 50-70% and increase soil fertility, improve water-physical properties, drastically reduce the use of nitrogen fertilizers (7, 8, 9, 10, 11, 12).

Kh.N. Atabaeva., F.B. Namozov., A.A. Kurbanov and S.Sh. Khayrullaev in their experiments conducted in 2018-2020, when they applied micronutrients to the soybean crop, micronutrients affected the height of the soybean stem, leaf, root development, nodule formation, grain quality and productivity, and provided a high yield [10].

According to R. Jo'raeva., J. Toshpol'atov., A. Iminov., Kh. Bozorov and L. Zaynitdinova, S. Khatamov and S. Sh.

Khayrullaev, in their experiments conducted in 2015-2017, soybean plant mineral fertilizers and belonging to the rhizobium group it was observed that the yield increased by 12.6-12.8 q/ha when exposed to azotobacteria strains compared to the control variant [11, 14].

According to Khayrullayev Sardor Shamsiddin ugli (2021), the application of micronutrients in the suspension method 2 times during the application period of soybean varieties in the conditions of meadow-swamp soils provides an increase in grain quality [16]. According to data of Atabayeva Khalima Nazarovna, Khayrullaev Sardor Shamsiddin o'g'li, and Usmonova Shohista Usmon qizi (2020), sulfur has a positive effect on the branching of soybean varieties on the background of mineral fertilizers, and in 2018 the number of branches in the variety "Orzu" increased by 0.8-1.3 compared to the control option due to the micro element sulfur. In the "Nafis" variety, this figure was 0.3-0.4, and good results were obtained from medium and high sulfur standards. In 2019, these indicators increased by 0.3-0.7 in the variants of sulfur compared to the control in the "Orzu" variety, increased by 0.1-0.3 in the "Nafis" variety, and good results were obtained from the medium and high standards of sulfur [13]. According to Iminov Abduvali Abdumannobovich, Khayrullayev Sardor Shamsiddin ugli, et al, Nitragine treatment of soybean and mung bean seeds before sowing had a positive effect on seed germination under both laboratory and field conditions, the germination rate of seeds in the laboratory under the conditions of cotton cultivation in the following year under the background of non-treatment by nitragine before sowing the seeds of soybean and mungbean crops grown as a secondary crop after winter wheat was 0.3-1.3%, and field fertility was 0.2-0.8% higher. Also, it was found that the use of phosphorus and potassium fertilizers in soybean and mung bean crops grown as a secondary crop was 0.6-1.0% higher in the laboratory, and 0.6-0.7% higher in the field than in the control options without mineral fertilizers in studies [12]. According to Umarova Nigora Sadriddinovna, Bo'riboyev Bekzod Yetmish ugli, Khayrullayev Sardor Shamsiddin ugli, Usmonova Shokhista Usmon kizi, & Turdaliyeva Shokhista Tulkinjon kizi, the demand of the soybean plant for mineral fertilizers, it was observed that when NPK and liquid fertilizer were used together, all the biometric parameters and yields of the plant increased by varieties compared to other methods. The use of mineral fertilizers in different ways in typical sierozem soil conditions affects the grain yield of local and foreign varieties. In other words, the average yield of medium-ripe soybean varieties "Nafis" was 43.4 c / ha, "Vilana" was 42.4 c / ha, and the best way to increase the yield is to apply fertilizers as NPK in combination with liquid fertilizer [17]. According to data of Khayrullayev Sardor Shamsiddin o'g'li and Usmonova Shohista Usmon qizi, the location of the lower first pod in soybean varieties is 12.8-15.9 cm in Orzu variety, 3-3.1 cm in Radimax stimulator, 2.2-2.4 cm in Gummat stimulator, 2.1 cm in Tecamin stimulator and 3.1 cm in Algora stimulator was found to be high. The most effective results were observed in Radimax, Gummat and Algora bio-simulators, and the location of the lower first pod was detected 14.7-17.6 cm in the "Nafis" variety, which was 2.5-2.9 cm higher in the Radimax stimulator, 2.2-2.5 cm higher in the Gummat stimulator, 2.1 cm higher in the Tecamine stimulator, and 2.4 cm higher in the Algora stimulator than in the control variant. The most effective results were observed in Radimax, Gummat and Algora biosimulators [15]. According to Atabayeva, K. N., Umarova, N. S., Yakubov, S., & Khayrullaev, S. S, positive results were obtained from moderate levels of sulphur and manganese, and low levels of iron. Macro and micronutrients had a positive effect on soy yield. An additional 7.6 quintals (q)/ha was harvested in exchange for macro fertilizer. Compared to the background variant, the yield was 4.6-8.3 q/ha for sulphur and 4.9-9.8 q/ha for manganese. The yield of the iron element was lower than that of the background variant. Grain quality has changed in exchange for macro and micronutrients. In exchange for mineral fertilizers, this figure increased by 2.4%. In exchange for the element sulphur, the protein increased by 3.1-5.8%; an increase of 4.4-8.4% was observed in exchange for the element manganese. It was noted that the protein increased by 7.9-8.7% in exchange for the element iron [18]. Khayrullayev, S. S., & Kizi Usmonova, S. U explained that mineral fertilizers and sulfur microelements activate the symbiotic activity of soybean variety "Orzu", averaging 32.4-42.3 million nodules per hectare, the number of nodules due to the background of mineral fertilizers increased by 13.6%, and there was an increase of 19.4-23,4% due to sulfur, as well as an average weight of nodules was 6.46-9.56 c / ha, the weight of nodules increased by 5.3% due to mineral fertilizers, and 17.1-32.4% due to sulfur. During the application period, 6.46-9.56 c / ha of nodules mass was accumulated per hectare according to the studied variants, which contributes to the increase of nitrogen and organic matter in the soil and a slight increase in biological efficiency [19]. Usmonova Sh.U, Khayrullaev S.Sh, Shomuqimov N.N, & Gaynanova A.F, said that the influence of stimulants on soybeans affected the weight of 1000 grains of Vilana cultivar, under the influence of Gummat stimulator this figure was 2.2-7.4 grams higher than on basis of mineral

fertilizers (Background), and under the influence of Rival stimulator-3.0-6.0 grams [20]. According to Khayrullaev S. S, In the variant, where not used mineral fertilizers and micronutrients, the leaf area in the control variant of the Orzu variety of soybean was 51.1 thousand m2 / ha. Under the influence of microelements, the leaf area of Orzu was 59.1-64.6 thousand m2 / ha. The highest rates of exposure to micronutrients were observed with medium use of sulfur and manganese. Under influence macro and micro fertilizers, the leaf area of Orzu variety increased from 4.0 to 13.5 thousand m2 / ha, or from 7.3 to 20.9% [21].

It was found that when the plants were exposed to urea at different rates, they had an effect on their biometric indicators, and when the urea rate was increased to 15 grams, all biometric indicators were better than other options (Umarova Nigora Sadriddinovna, et.al. 2023) [22]. The application of stimulants to plants increases their resistance to abiotic factors. All the stimulators in the experiment showed their effect for the preservation of the plant, and the foliar feeding variant of the fulvogummat stimulator showed a better result than the other stimulators (Usmonova Shokhista Usman kizi, et.al. 2023) [23].

Usmonova Shokhista and other scientists noticed that the growth process has a great role in the formation of the plant's fruit, and the use of stimulants in the experiment showed a positive effect on the growth process of the plant. The studied stimulators have an effect on the growth process, among the stimulators Fulvogummat stimulator was 164.9 cm tall when fed from the leaf, and recorded a good indicator among the variants (Usmonova Shokhista Usman kizi and et.al. 2023) [24].

METHODS

The experiments were carried out in the field and laboratory methods. The experiments were carried out using the methods of “Methods of conducting field experiments” (UzPITI), “Methodology of field experiments” (B. Dospekhov), “Methodology of State variety testing of agricultural crops”, “Methods of agrochemical, agrophysical studies of the soil of Central Asia”, leaf surface Nichiporovich (weight method), number and weight of nodes G.S.Posipanov. The field experimental systems of the conducted dissertation research were carried out as follows (see Table 1).

In 2018-2020, the effect of microfertilizer rates (S and Mn) on plant growth, development and yield in the Orzu and Nafis varieties of soybean was studied in our experiments. The experiments were carried out on the 1st border of the 13th card. In this experiment, the variants were in 4 replicates, the number of variants was 16, the number of plots was 64, the length of the plots was 10 m, the width was 2.8 m. The variants were placed in a randomized manner. Each variant had 4 rows, and the total area of each plot was 28.0 m2, of which 2 rows in the middle (14 m2 area) were designated as counting rows, and 2 rows on the edge (14 m2 area) were designated as protection rows. The number of counting plants was 20.

The following phenological observations, biometric measurements, chemical and statistical analyses were carried out in the experiments:

Phenological observations were made during the periods of budding, tillering, flowering, podding and ripening. These observations were made on plants counted in all replicates. In all experiments, the development periods and their duration were determined by variants.

Table 1

EXPERIMENTAL SCHEME

No	Options	Micronutrients rates, g/300 l	Application dates	
			Budding-flowering phase	The end of flowering-the beginning of Podding phase
“Orzu” variety				
1	Control	-	-	-
2	Background-$N_{50}P_{100}K_{70}$	-	-	-

3	Background +S_1	90,0	45,0	45,0
4	Background +S_2	180,0	90,0	90,0
5	Background +S_3	270,0	135,0	135,0
6	Background +Mn_1	150,0	75,0	75,0
7	Background +Mn_2	300,0	150,0	150,0
8	Background +Mn_3	450,0	225,0	225,0
“Nafis” variety				
9	Control (without fertilizers)	-	-	-
10	Background-$N_{50}P_{100}K_{70}$	-	-	-
11	Background +S_1	90,0	45,0	45,0
12	Background +S_2	180,0	90,0	90,0
13	Background +S_3	270,0	135,0	135,0
14	Background +Mn_1	150,0	75,0	75,0
15	Background +Mn_2	300,0	150,0	150,0
16	Background +Mn_3	450,0	225,0	225,0

The number of leaves was determined in all plots of plants with calculated leaves. The leaf surface area, photosynthetic capacity and net productivity of soybean varieties were determined by leaf sections according to the method of Nichiporovich (1961). For this, 5 typical plants were taken from the protection row in two replicates (1,3 or 2,4) and analyzed. The weight of the stem, leaves and pods of the plants was determined in a wet and dry state. The leaf surface was determined in 4 stages during the growing season, in the budding, flowering and podding phases. Also, the number and weight of nodes were determined in these periods according to the method of G.S. Posipanov. The root weight of soybean varieties was also determined during this period. For this purpose, when harvesting, a monolith measuring 70x5x30 cm was dug up and sampled, the roots in the soil were separated, the roots were washed and weighed in a wet and dry state (5 plants were taken).

Before harvesting, biometric measurements were taken on the counted plants. The counted plants were analyzed in 4 replicates: for this, the counted plants were separated from the plots separately by variant and replicate, and their stem height, number of branches, height of the lower first pod, number of pods and grains, pod and grain weight, grain yield (%), hay mass and 1000 grain weight were determined. To determine the 1000 grain weight, 1000 seed samples were counted, weighed and the average indicator was determined. The yield of soybean varieties was determined. For this, the pods of the plants in the counted rows were collected in the plots, threshed and the grain weight was determined. The yield was determined when the yield in the plot was converted into hectares using the number of bushes.

Statistical analysis of the obtained data was carried out using the Microsoft Excel program and the method of B.A.Dospekhov's “Method of field experiments” (B.Dospekhov, 1985, 2012);

The economic efficiency of growing soybean varieties in meadow-boggy soils was determined using the method of V.Polojiy.

RESULTS AND DISCUSSION

The development, growth, and yield of a plant depend primarily on root development. If the root is well developed, the plant will grow well, develop, and ultimately yield a bountiful crop. Biological processes important for plant life occur in the soybean root system. Sulfur and manganese microfertilizers activate enzymes that contribute to biochemical reactions in plant roots and stimulate biological nitrogen fixation.

In our experiment, based on average 3-year data, the root weight of the "Orzu" variety during the tillering period was 11.1-15.8 q/ha among all variants. The difference between the variants during the tillering period is not significant. During the flowering period, the control variant produced 16.8 q/ha, while the background variant with mineral fertilizers produced 1.7 q/ha or 27.0% more root weight than the control variant (see Table 2).

The variants with sulfur microfertilizers applied in combination with the background of mineral fertilizers produced 20.5; 21.1 and 20.8 q/ha, respectively, which were 3.7; 4.3 and 4.0 q/ha or 22.0; 25.6 and 23.8% higher root weight than the control variant, and 2.0; 2.6 and 2.3 q/ha or 10.8; 14.1 and 12.4% higher root weight than the background variant with mineral fertilizers. In the variants where manganese microfertilizer rates were applied together with the mineral fertilizer background, the root weight was 20.4, 21.6, 20.4 q/ha, respectively, and the low and high rates were 3.6 q/ha or 21.4% higher than the control variant, and the medium rate was 4.8 q/ha or 28.5%. The low and high rates were 1.9 q/ha or 10.3% higher than the background variant where mineral fertilizers were applied, and the medium rate was 3.1 q/ha or 16.8%.

During the podding period, the root weight in the control variant was 26.3 q/ha, and the background variant where mineral fertilizers were applied was 1.4 q/ha higher than the control variant. In the variants where sulfur microfertilizer rates were applied together with the mineral fertilizer background, the root weight was formed by 2.3; 4.1 and 3.5 q/ha or 8.7; 15.5 and 13.3% more than the control variant, and by 0.9; 2.7 and 2.1 q/ha or 3.2; 9.7 and 7.6 q/ha more than the background variant. In the variants where manganese microfertilizer rates were applied together with the mineral fertilizer background, the root weight was formed by 2.3; 4.0 and 3.8 q/ha or 8.7; 15.2 and 14.4% more than the control variant, and by 0.9, 2.6, 2.4 q/ha or 3.2; A greater root weight of 9.4 and 8.7% was produced (see Table 2).

Table 2

The effect of microfertilizers on the root weight of soybean varieties, q/ha (2018-2020)

Micronutrients application rates, g/l	Developmental phases		
	budding	flowering	podding
Orzu variety			
Control (without fertilizers)	11,1	16,8	26,3
Background – $N_{50}P_{100}K_{70}$ kg/ha	14,1	18,5	27,7
Background + S_{90}	15,4	20,5	28,6
Background + S_{180}	15,5	21,1	30,4
Background + S_{270}	14,5	20,8	29,8
Background + Mn_{150}	14,7	20,4	28,6
Background + Mn_{300}	15,2	21,6	30,3
Background + Mn_{450}	15,8	20,4	30,1
Nafis variety			
Control (without fertilizers)	13,2	18,3	22,8
Background – N50P100K70 kg/ha	15,5	21,9	29,7
Background + S90	15,6	21,6	30,6
Background + S180	16,1	22,0	31,7

Background + S270	15,9	21,3	31,0
Background + Mn150	18,9	22,2	31,1
Background + Mn300	16,1	23,4	32,0
Background + Mn450	15,0	19,9	31,0

In the “Nafis” variety, the root weight during the budding period was 13.2-18.9 q/ha per hectare among all variants. During the flowering period, the control variant was 18.3 q/ha, and the background variant with mineral fertilizers produced 3.6 q/ha or 19.6% more root weight than the control variant. In the variants with sulfur microfertilizer standards applied together with the background of mineral fertilizers, the root weight was 21.6; 22.0 and 21.3 q/ha, respectively, which was 3.3; 3.7 and 3.0 q/ha more than the control variant, less than the background variant and 0.3 and 0.6 q/ha less than the high norm, and 0.1 q/ha more than the high norm. In the variants where manganese microfertilizer rates were applied together with the background of mineral fertilizers, the root weight was 22.2; 23.4 and 19.9 q/ha, respectively, which was 3.9; 5.1 and 8.7 q/ha more than the control variant, and less than the background variant where mineral fertilizers were applied, and 0.3 and 1.5 q/ha more than the medium rate, and 2.0 q/ha less than the high rate. During the podding period, the root weight in the control variant was 22.8 q/ha, and the background variant where mineral fertilizers were applied produced 6.9 q/ha or 30.3% more root weight than the control variant. In the variants where sulfur microfertilizer rates were applied together with the mineral fertilizer background, the root weight was formed by 7.8; 8.9 and 8.2 q/ha or 34.2; 39.0 and 35.9% more than the control variant, and by 0.9, 2.0 and 1.3 q/ha or 3.0; 6.7 and 4.4% more than the background variant. In the variants where manganese microfertilizer rates were applied together with the mineral fertilizer background, the root weight was formed by 8.3; 9.2 and 8.2 q/ha or 36.4; 40.4 and 35.9% more than the control variant, and by 1.4; 2.3 and 1.3 q/ha or 4.7; A 7.7 and 4.4% increase in root weight was achieved (see Table 2).

CONCLUSION

Thus, it was found that microfertilizers affected the symbiotic activity of soybean varieties. It was noted that the number and weight of nodules per plant were higher when sulfur and manganese were fed through the leaves at medium rates. It was also observed that the number and weight of nodules increased when microfertilizers were applied at medium rates per hectare. It was found that the number and weight of nodules under the influence of microfertilizers were higher in the Orzu variety, and that microfertilizers had a good effect on root activity, and in both varieties, medium rates of microfertilizers had a positive effect on root formation.

REFERANCES

1. Atabaeva Kh.N.- Soybean. (Monograph). T.: Uzb. Mil. Enc, 2004.-200 p. (in Uzbek language);
2. Oripov R., Khalilov N. Plant science Tashkent 2006.-380 p. (in Uzbek language);
3. Atabaeva Kh.N., Umarova N.S. Soybean Biology. Textbook. T: Navruz. 2020-P.-200. (in Uzbek language)
4. Baranov V.F. History of the origin, distribution and study of soybean culture // Soybean. Biology and cultivation technology. – Krasnodar, 2005. – P.13-18. (in Russian language);
5. Dorosinsky L.M. Nodule bacteria and nitragin. – M.: Kolos, 1970. – 250 p. (in Russian language);
6. Kostenko I.P. Soybean fertilizer // Agriculture. – 1977. – No. 5. – 75 p. (in Russian language);
7. Mishustin E.N., Shilnikova V.K. Nodule bacteria and inoculation process. – M.: Nauka, 1973. – 388 p. (in Russian language);
8. Jonson H.S., Boane L.V. Soybean inoculation is it necdalt crops anol soils., 1977. – № 10. – P. 10-15;
9. Nazarovna, AK, Bakhromovich, NF, Alavkhonovich KA, Ugli KSS. Effects of Sulfur and Manganese Micronutrients on the Yield of Soybean Varieties. *Agricultural Sciences*, 2020;11: 1048-1059. https://doi.org/10.4236/as.2020.1111068;
10. JURAEVA R., TASHPULATOV J., IMINOV A., BOZOROV X., ZAYNITDINOVA L., & KUKANOVA S. (2020). EFFICIENCY OF SYMBIOTIC NITROGEN FIXATION OF SOY NODULE BACTERIA AFTER PRESERVATION. PLANT CELL BIOTECHNOLOGY AND MOLECULAR BIOLOGY, 21(61-62), 7279. Retrieved from https://www.ikprress.org/index.php/PCBMB/article/view/5644;
11. ABDUMANNOBOVICH, I. A., UGLI, K. S. S., ERGASHBOYEVNA, K. D., UGLI, H. S. R., & TURSINALIEVICH, K. S. (2021). EFFECTS OF NITRAGINE AND MINERAL FERTILIZER RATES USED

ON REPEATED LEGUME CROPS ON SEED GERMINABILITY. PLANT CELL BIOTECHNOLOGY AND MALECULAR BIOLOGY, 22(35-36), 251-258. Retrieved from https://www.ikprress.org/index.php/PCBMB/article/view/6342;

12. Atabayeva Khalima Nazarovna1, Khayrullaev Sardor Shamsiddin o'g'li, and Usmonova Shohista Usmon qizi, "THE EFFECT OF SULPHUR ON THE BRANCHING OF SOYBEAN VARIETIES", *STJITT*, vol. 1, no. 2, pp. 4-6, Aug. 2020;
13. Iminov, A. A., Hatamov, S. R. O., & Khayrullaev, S. S. O. (2020). Effect Of Nitragine And Mineral Fertilizers On Soil Microbiological Properties In Planted As Secondary Legume Crops. *The American Journal of Agriculture and Biomedical Engineering*, *2*(08), 169-172. https://doi.org/10.37547/tajabe/Volume02Issue08-22;
14. Khayrullayev Sardor Shamsiddin o'g'li and Usmonova Shhista Usmon qizi, "THE EFFECT OF STIMULATORS ON THE LOCATION OF THE FIRST POD OF SOYBEAN VARIETIES", STJITT, vol. 1, no. 2, pp. 7-9, Aug. 2020;
15. Khayrullayev Sardor Shamsiddinugli. Effect Of Sulfur And Manganese Micro Nutrients On Grain Quality Of Soybean Varieties. ACADEMICIA: An International Multidisciplinary Research Journal https://saarj.com. Vol. 11, Issue 3, March 2021. DOI: 10.5958/2249-7137.2021.00582.6. P.63-68;
16. Umarova Nigora Sadriddinovna, Bo'riboyev Bekzod Yetmish ugli, Khayrullayev Sardor Shamsiddin ugli, Usmonova Shokhista Usmon kizi, & Turdaliyeva Shokhista Tulkinjon kizi. (2021). EFFECT OF MINERAL FERTILIZERS ON MORPHOPHYSOLOGICAL CHARACTERISTICS OF LOCAL AND FOREIGN SOYBEAN VARIETIES. European Journal of Agricultural and Rural Education, 2(4), 39-42. Retrieved from https://scholarzest.com/index.php/ejare/article/view/611;
17. Atabayeva, K. N., Umarova, N. S., Yakubov, S., & Khayrullaev, S. S. (2021, December). Influence of trace elements on soybean yield in grassland-swamp soils. In *IOP Conference Series: Earth and Environmental Science* (Vol. 939, No. 1, p. 012049). IOP Publishing;
18. Ugli Khayrullayev, S. S., & Kizi Usmonova, S. U. (2021). Effect Of Sulfur Micronutrient On Symbiotic Activity Of "Orzu" Variety Of Soybean. *The American Journal of Agriculture and Biomedical Engineering*, *3*(05), 49–59. https://doi.org/10.37547/tajabe/Volume03Issue05-10;
19. Usmonova Sh.U, Khayrullaev S.Sh, Shomuqimov N.N, & Gaynanova A.F. (2022). Effect Of Stimulators On Thousand Piece Grain Weight Of "Vilana" Cultivar Of Soybean. *Central Asian Journal of Theoretical and Applied Science*, *3*(4), 153-157. Retrieved from https://cajotas.centralasianstudies.org/index.php/CAJOTAS/article/view/467;
20. Khayrullaev S. S. Influence of sufur and manganese micronutrients on formation of leaf area of "Orzu" cultivar of soybean //ISJ Theoretical & Applied Science, 03 (107). – 2022. – C. 287-191;
21. Umarova Nigora Sadriddinovna, & Khayrullaev Sardor Shamsiddin ugli. (2023). THE EFFECT OF USING DIFFERENT UREA NORMS IN SUSPENSION METHOD ON BIOMETRIC INDICATORS OF SOYBEAN. Spectrum Journal of Innovation, Reforms and Development, 15, 159–164. Retrieved from https://sjird.journalspark.org/index.php/sjird/article/view/665;
22. Usmonova Shokhista Usman kizi, Atabaeva Halima Nazarovna, & Khayrullaev Sardor Shamsiddin ugli3. (2023). THE EFFECT OF STIMULANTS ON THE NUMBER OF BUSHES AND PRESERVATION LEVEL OF THE NAFIS VARIETY OF SOYBEAN. Spectrum Journal of Innovation, Reforms and Development, 15, 177–184. Retrieved from https://sjird.journalspark.org/index.php/sjird/article/view/668;
23. Usmonova Shokhista Usman kizi, Atabaeva Halima Nazarovna, & Khayrullaev Sardor Shamsiddin ugli. (2023). The Effect of Stimulants on the Stem Height of the Nafis Variety of Soybean. Texas Journal of Multidisciplinary Studies, 20, 86–91. Retrieved from https://zienjournals.com/index.php/tjm/article/view/3988.