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EFFECT OF MINERAL FERTILIZERS ON MORPHOPHYSOLOGICAL CHARACTERISTICS OF LOCAL AND FOREIGN SOYBEAN VARIETIES

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Abstract:

In this article, the importance of soybean plant, experimental method and conditions, the average yield of varieties when applying mineral fertilizers to the local variety "Nafis" and foreign variety "Velana" from the soil and in the liquid state during the growing season, average yield was 43.4-42.4 c / ha, while soybean cultivation with liquid fertilizer was 38.9-40.6 c / ha, and NPK with self-application was 41.8-41.4 c / ha, and the best result was obtained from with NPK, which the variant applied in combination with liquid fertilizer was found to have a good effect on other morpho-physiological parameters of the plant.

Keywords: Soybean, mineral fertilizer, liquid fertilizer, growth, development, yield.

INTRODUCTION

Today, soybeans are the most widely grown legume and oilseed crop in the world. The United States, Brazil, Argentina, China, and India have a strong focus on soybean, accounting for 90 percent of the world's soybean production. In recent years, soybean production has grown rapidly in Canada, Italy, France, Bolivia and Russia. Over the past 20 years, soybean production has increased 2.16 times (130 million tons per year), sown area 1.6 times, and yields 1.35 times [2; 3]. The soil and climatic conditions of Uzbekistan provide high grain and seedling yields from soybeans. Soybeans are grown on 62 million hectares in 60 countries. The reason soybeans are widely grown in different countries is that their grain and green mass are nutritious and are widely used in food, fodder, technical and medical [11]. Depending on the variety and growing conditions, soybeans contain 30-48% protein and 17-26% fat. Soybeans contain 20-25% carbohydrates, 4-5% ash elements (including calcium, phosphorus, potassium, sodium, iodine, molybdenum, etc.), vitamins (E, B_1, B_2, B_6, pantothenic acid, choline, folate, biotin and b.) occurs. More than a thousand products are obtained from the soybean. Soybean is one of the main crops in the production of feed protein, oil, sorghum, mixed fodder.

Soybean is a plant that requires mineral fertilizers. The soybean feeding system consists of fertilizing during planting and growing. To grow one quintal of soybeans, the plant absorbs 7.7-10 kg of nitrogen, 1.7-4.0 kg of phosphorus and 3.2-4.0 kg of potassium [4]. Soybean does not absorb nutrients evenly: 6-16% of nitrogen from germination to flowering 8.4-12.3% of phosphorus; absorbs 9-23% of potassium, 9-11% of calcium and 6-8% of magnesium. The rest of the nutrients are absorbed during flowering and podded. Therefore, mineral fertilizers are used in the cultivation of soybeans in different grades. High yields from soybean depend on intensive technologies such as heat, light, soil, mineral nutrition and varieties.

X.N.Atabaeva, F.B.Namozov, A.A.Kurbanov and S.Sh.Khayrullayev (2020), in their experiments in 2018-2020, found that when micronutrients affected soybean crops, micronutrients affected stem height, leaf and root development, root nodule formation, grain quality and yield, and provided high yields [10].

According to R.Juraeva, J.Tashpulatov, A.Iminov, H.Bozorov, Khatamov S.R, Khayrullaev S.Sh and L.Zaynitdinova (2020), in their experiments in 2015-2017, mineral fertilizers and rhizobium were applied to soybeans. When exposed to strains of azotabacteria belonging to the group, it was observed that the yield increased by 12.6-12.8 c / ha compared to the control variant, [6; pp.72-79], [5; p.172].

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 [8].

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 [1].

METHOD AND MATERIALS

The experiments were conducted on the experimental farm of Tashkent State Agrarian University.

The experimental place is located in Kibray district of Tashkent region. The soil is typical sierozem, non-saline, medium mechanical composition, groundwater depth is more than 5 m, soil content average 1.08-1.02% humus, nitrogen 0.080-0.07; phosphorus is 0.14-0.15% and nutrient supply is low. Field experiments are in 4 repetitions, the plots were 10 m long and 2.4 m wide. There are 4 rows, the total area of each plot is 24.0 m^2, of which 2 rows in the middle is accounting row, and 2 rows of them are protection rows at the edges. The options are placed by the randomization method. Conducting field experiments, calculations and observations are carried out by "Methodological manual of the State Commission for Variety Testing of Agricultural Crops (1989)", "Methods of conducting field experiments (UZPITI, 2007)" and "Methodology of field experiments" was carried out on the basis of B.A.Dospekhov. Leaf area was determined by A.A.Nichiporovich method, through leaf cuttings, for which 5 typical plants were taken from the protective rows and analyzed, leaf area was determined during the application period when 4 leaves appeared, flowering and podded period. The number and weight of nodules in these periods were determined by the method of G.S.Posipanov.

To determine the weight of the roots, a monolith is dug in the size of 60x5x30 cm, the roots are washed and weighed wet and dry state. Biometric measurements were performed on counted plants prior to harvest. The plant height, branching, number and weight of pods, number and weight of grains, and weight of 1000 grains were determined. To determine the yield, the pods were harvested, crushed and weighed from the area under cultivation, and the yield per hectare was determined using the number of bushes per hectare. All results of the study were analyzed by B.A.Dospekhov's method.

RESULTS AND DISCUSSION

Influence of application of mineral fertilizers in the form of NPK + Liquid Fertilizer, Liquid Fertilizer, NPK on medium-ripening varieties of soybean "Nafis" and "Vilana" was studied in our research in 2020. In the experiment, when soybeans were exposed to local Nafis and foreign Velana varieties in three different forms, NPK + Liquid Fertilizer, Liquid Fertilizer, NPK in the form of NPK + Liquid variant of Nafis variety, plant height 102,6 cm. The same figure was 100.6 cm in the foreign Velana variety, and the local Nafis variety was found to be 2 cm taller than the foreign Vilana variety, or 1.95%.

Local Nafis variety, the plant height in the variant with liquid fertilizer was 98.6 cm, in the variant with foreign Vilana the plant height in the variant used in the same way was 91.4 cm and the local Nafis variety was found to be 7.2 cm, or 7.3%, taller than the foreign Vilana variety. This means that the liquid fertilizer gives good results in the local variety.

Table 1

Influence of mineral fertilizers on morpho-physiological characteristics of local and foreign soybean varieties

Varieties	Options	Mineral fertilizers	Plant height, cm	Number of branches	Number of pods per plant, pieces	Number of grains in one pod, pieces	Yield c/ha	1,000 seeds weight, gr
Nafis	1	NPK + liquid state	102,6	3,4	228,2	396,9	43,4	171,2
	2	Lequid state	98,6	3,2	120,7	293,7	38,9	165,2
	3	NPK	100,8	3,3	127,4	356,9	41,8	166,1
Vilana	1	NPK + liquid state	100,6	3,3	215,5	544,1	42,4	142,3
	2	Lequid state	91,4	3,1	180,6	412,1	40,6	133,7
	3	NPK	97,7	3,2	199,8	435,2	41,4	142,1

In the third variant where the NPK fertilizer was applied, the plant height in the local Nafis variety was 100.8 cm, and in the foreign Vilana variety, the plant height was 97.7 cm, and the local Nafis variety was found to be 3.1 cm, or 3.1%, taller than the foreign Vilana variety. According to the above-mentioned fertilizer options, the number of plant branches in the local Nafis variety was 3.4 in the first variant, while in the first variant of the foreign Vilana variety used in the same way, the plant height was 3.3, with a difference of 2.9% between varieties, a good result

was obtained from the local Nafis variety. In the second variant, where local Nafis variety liquid fertilizer was applied, the number of plant branches was 3.2, and the same figure was 3.1 for foreign Vilana and 0.1 for foreign Vilana was found to be 2.9% higher. In the third variant of the local Nafis variety, the number of branches was 3.3, while in the third variant of the foreign Vilana variety, which was used in the same way, the figure was 3.2, and the difference in varieties were similar to variant 2 that was found to be 2.9%. According to the variants used, the number of pods of the plant in the first variant of the local Nafis variety was 228.2, in the first variant of the Vilana variety this figure was 215.5, and in the local Nafis variety, it was found to be higher 12,7, or 5.6% compared to the foreign Vilana variety. In the case of the second liquid fertilizer, the figure was 120.7 and 180.6, respectively, and the foreign Vilana variety produced more legumes than the local Nafis variety. In the variant with the third NPK, this figure was 127.4 and 199.8, respectively. Here, too, the foreign variety has a better result than the local variety. According to the variants used, the number of grains in the legume of the plant was 396.9 in the local Nafis variety, 544.1 in the first variant of the Vilana variety used in the same way, and the local Nafis variety was found to be to 147.2, or 37.1% less compared to the foreign Vilana variety. In the variant where liquid fertilizer was applied to the same varieties, the number of grains in the pods of the local Nafis variety was 293.7, while in the variant of the foreign Vilana variety used in the same way, the number of grains in the pods was 412.1, the local Nafis variety was found to be 118.4, or 40.3%, higher to the foreign Vilana variety. In the third variant, where local Nafis variety NPK fertilizer was applied, the number of grains in the one pod was 356.9, the same figure was 435.2 in the foreign Velana variety, the local Nafis variety was found to be 78.3, or 21.9% less compared to the foreign Vilana variety. According to the above fertilizer options, the yield of the local Nafis variety in the first variant was 43.4 c / ha, in the first variant of the foreign Vilana variety, the yield from the plant was 42.4 c / ha, the local Nafis variety was found to be 1 c / ha, or 2.3%, higher than that of the foreign Vilana variety. In the second variant, where local Nafis variety, which liquid fertilizer was applied, the yield was 38.9 c / ha. The yield of the foreign Vilana variety was 40.6 c / ha, and the local Nafis variety was found to be 1.7 c / ha, or 4.4% less than the foreign Vilana variety. In the third variant of the local Nafis variety, the yield was 41.8 c / ha, while in the third variant of the foreign Vilana variety used in this method, the figure was 41.4 c / ha. The local Nafis variety was found to be 0.4 c / ha, or 0.9%, higher than the foreign Vilana variety. According to the variants of mineral fertilizers applied in the same order, the effect on the weight of 1000 seeds of the plant, in the first variant of the local Nafis variety, this figure was 171.2 g, and in the foreign Vilana variety, it was 142.4 g and the local Nafis variety was found to be 28.9 g, or 16.8% higher than the foreign Vilana variety. In the variant where liquid fertilizer was applied to the same varieties, the weight of 1000 seeds in the local Nafis variety was 165.2 g, in the foreign Vilana variety it was 133.7 g, and in the local Nafis variety it was 31.5 gr, which is 19.1% higher compared to the foreign Vilana variety. In the third variant, where local Nafis variety, NPK fertilizer was applied, the weight of 1000 seeds of soybean plant was 166.1 g, and it was 142.1 g in the foreign Velana variety and the Nafis variety was found to be 24 g, or 14.4% higher than the foreign Vilana variety.

CONCLUSION

In our experiment, the yield of soybeans using mineral fertilizers NPK + liquid, Liquid fertilizer and NPK methods was summarized as follows:

Due to 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.

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