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INFLUENCE OF IRON MICRONUTRIENT ON THE FORMATION OF YIELD OF SOYBEAN VARIETIES

Abstract: *The article provides data on the formation of the yield of soybean varieties "Orzu" and "Nafis" under the influence of iron. In this article, , the effect of iron under the background of mineral fertilizers on the growth, development, yield formation and grain quality is given in comparison with control option, the positive effect of iron on the formation of the yield and its quality is determined.*

Key words: *Soybean, Orzu, Nafis, growth, development, iron, mineral fertilizer, yield, protein, oil, grain.*

Language: *English*

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Introduction

The modernization of agriculture of the republic and its intensive development are envisaged in order to solve the problem of food security, production of environmentally friendly products, and increase the share of agricultural exports.

In recent years, special attention has been paid to the expansion of soybean grain production in the country. This is due to the multifaceted use of soybeans, due to the chemical composition of the grain. Soybean grain contains 28-55% protein, which is equal to the protein of meat, eggs, milk; 18-27% environmentally friendly vegetable oil; 20% carbohydrates, numerous mineral salts, vitamins.

In the period when there is a deficiency of protein, soybean grain, rich in proteins and a set of essential amino acids, is a source of valuable protein. Therefore, in many countries soybean crops are expanding, gross grain production is increasing from year to year.

In Uzbekistan, in 2020, soybeans were sown in the main crops on an area of 20 thousand 300 hectares. Simultaneously with the expansion of the cultivated area, it is necessary to study the individual elements of the technology of cultivation of soybeans in the main and repeated crops in order to obtain higher yields. Biologically, soybeans can yield more than 100 c / ha, but in practice, it is difficult to get a yield of 40 c / ha. Basically, the yield of soybeans fluctuates between 15-30 c / ha. There are many reasons for the low yield of soybeans under production conditions, but they are often encountered: 1) insect pests and diseases; 2) the emerging deficiency of nutrients (for example, nitrogen, phosphorus, sulfur, zinc, iron, boron) associated with low doses of macro and micronutrient fertilizers), a low level of use of nodule bacteria inoculation.

Literature review

Scientists of Uzbekistan conducted studies to study the effect of mineral fertilizers on the yield of soybean varieties in different zones of the republic (D. Yormatova, 1989; Kh.Atabaeva, 2004, 2011; I. Israilov, 2011; N. Umarova, I. Abitov, 2016 and

others). But there are very few studies on the effect of microelements on the formation of the yield of soybean varieties. There is not enough data on this issue in the sections of soil differences.

The role of trace elements in the life of soybean culture is very great. Trace minerals are absorbed in smaller quantities by soybeans than nitrogen, phosphorus, potassium and sometimes calcium, magnesium and sulfur. Despite this, their role is no less important, and the lack of micronutrients leads to a significant slowdown in growth rates and a decrease in yield. Iron is a microelement that is absorbed by plants in the greatest amount, therefore it is sometimes referred to as a macroelement. However, in terms of physiological functions, this is a typical trace element. Iron plays an important role among all the metals found in plants. This proves that it is found in plant tissues in greater quantities than other metals.

Iron is a functional part of plant enzyme systems. Its role is especially important in oxidative and energy metabolism, in the formation of chlorophyll.

Iron plays an important role in metabolic processes such as enzyme activation, chlorophyll synthesis, photosynthesis, and nitrate reduction. (agrodialog.com.ua) Young trifoliate leaves of soybean plants experiencing iron deficiency first fade, after which they acquire pronounced chlorotic signs. Chlorosis begins at the edge of the leaves and spreads to the midrib. The edges and tips of young leaves die off and curl. Severe iron deficiency leads to premature leaf fall, as well as impairment of flowering and fruiting. Iron deficiency is typical of acidic soils with a coarse texture and low organic matter content. (agrodialog.com.ua),

Balanced application of fertilizers avoids both deficiency and excess of nutrients, as well as possible negative interactions between them. Iron fertilizers are used mainly for foliar feeding, since in the soil mineral forms of iron quickly bind to compounds inaccessible to plants; iron fertilizers are used for foliar feeding - a 0.5-1% solution of ferrous sulfate or 0.15-0.5% solution of an iron complex. Solutions are made in iron, plastic or glass tanks. However, they should not come into contact with copper, zinc or brass parts. Spraying is done 2 times during the praxis period at the beginning of flowering and bean formation. Foliar feeding of plants with signs of chlorosis is carried out 2-3 times in the morning and whether the evening hours. Consequently, all the missing substances must be introduced in doses that are optimal for the nutrition of the culture, taking into account the level of their general influence on the plant and on each other. Only in this case, a positive interaction is possible between them, leading to an increase in yields (agrodialog.com.ua).

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 [13].

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 [9].

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 [11].

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 [8].

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 mung bean 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 [7].

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 [14].

According to data of Khayrullayev Sardor Shamsiddin o'g'li and Usmonova Shhista 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 [10].

According to data of Kayrullayev Sardor Shamsiddin ugli and Usmonova Shokhista Usmon kizi, Mineral fertilizers and sulfur microelements activate the symbiotic activity of the soybean variety "Orzu", averaging 32.4-42.3 million pieces per hectare, the number of nodules due to the background of mineral fertilizers increased by 13.6%, and found to have increased 19.4-23.4% due to sulfur. Also, the average weight of nodules was 6.46-9.56 c / ha, due to the background of mineral fertilizers the weight of nodules increased by 5.3%, and 17.1- 32.4%due to sulfur. During the validity period, according to the studied variants, the mass of nodules was accumulated at 6.46-9.56 c / ha per hectare, which contributes to the increase of nitrogen and organic matter in the soil and a slight increase in biological efficiency [12].

Methods and materials

Field studies were carried out at the Experimental field of the Tashkent State Agrarian University. The experimental field is located near Tashkent in the upper part of the Chirchik river in the Kibray district of the Tashkent region, at an altitude of 481 m above sea level. The experimental field has the following coordinates: 41°2'N and 38°31'E. The relief of the site is uneven, slightly wavy, with a general slope towards the Salar Canal. Water from the Buzsuv canal was used for irrigation.

Table 1. Characteristics of the soil of the arable layer of the experimental field

№	Indicator	Value
1.	Arable layer, cm	25
2	Humus horizon, cm	50
3.	pH saline	7
4.	Hydrolytic acidity, mg.eq. per 100 g of soil	0,7
5.	The amount of absorbed bases	6,6-7,0
6.	Absorption capacity, mg equivalent per 100 g of soil	7,4-7,6
7.	Degree of saturation with bases,%	88-90

Before the experiment was set up, the content of nitrogen, phosphorus and potassium was determined in the experimental field. The data are summarized in Table 2 below.

The soil of the experimental site belongs to typical sierozem soils of old irrigation, non-saline, with a low humus content of 0.9 - 0.7%, nitrogen 0.082-0.066%, phosphorus 0.153-0.139%, i.e. the supply of nutrients to the soil is low. The soil is characterized by weak structure, good water permeability with high capillarity.

Groundwater occurs at a depth of 5-6 m. The reaction of the soil solution is slightly alkaline. Irrigation causes soil compaction. Another unfavorable property is the tendency to form a soil crust after irrigation or precipitation.

Table 2. NPK content in the soil of the experimental plot

№	Soil horizons, cm	Gross content, %				Mobile forms, mg / kg		
		humus	$N\text{-}NO_3$	P_2O_5	K_2O	$N\text{-}NO_3$	P_2O_5	K_2O
1. 2.	0-30 30-50	1,08 1,02	0,08 0,07	0,14 0,13	1,33 1,30	42,1 38,9	23,0 21,0	180,6 162,0

With the use of organic and mineral fertilizers and good agricultural technology, high yields of field crops can be obtained on these soils.

Research object: soybean varieties "Orzu", Nafis, iron norms, NPK fertilizer complex and typical sierozem soil. The studies were carried out by the field method in four replicates. The plots were allocated by randomization. Plots are 4-row, 10 m long, 2.8 m wide, plots area 28 m^2. During the research, modern methods were used. All phenological studies were carried out according to the "Methodology of the State Variety Testing of Agricultural Crops, the leaf area was determined by the method of nibbling according to Nichiporovich. Statistical processing of the research results was carried out according to the "Methodology of field experience" (B.A.Dospekhov, 1985)

Experimental options: 1. Control without the use of mineral and micronutrient fertilizers; 2.Background- $N_{50}P_{100}K_{70}$; 3. Iron rate 2.5 g / 10 l; 4.Iron-5.0 g / 10 l; 5. Iron - 7.5 g / 10 l; Microfertilizers were applied by foliar feeding in the form of a suspension in the budding phase and the formation of beans in the morning according to the accepted standards for study.

Sowing was carried out on May 2 in a wide-row method with a row spacing of 60 cm, between plants 5 cm, a numerical sowing rate of 500 thousand pieces of germinating seeds for the Orzu variety and 400 thousand pieces of seeds for the Nafis variety, or 62.5 and 68 kg / ha to a depth of 5 cm. During the praxis period, 3 cultivations and 5 irrigations were carried out. Harvested when the pods are fully ripe.

Results and discussion

They showed a positive effect of micronutrient fertilizers under the background of $N_{50}P_{100}K_{70}$ on plant growth, on the mass of 1000 seeds, as well as on the yield of soybeans. Plant density has a significant impact on the size of the crop. The Orzu variety has 500 thousand units when sowing. seeds, preserved for harvesting 451.5-477.2 thousand pieces, and in the Nafis variety seeds - 355.3-374.2 thousand pieces, when sowing 400 thousand pieces.

Table 3. Formation of Yield of soybean varieties under the influence of iron nutrient

№	Options	Seedling thickness, Thousand /ha	Praxis period, days	Plant height, cm	Leaf area m^2/ha	Weight of root, c/ha
Orzu						
1	Control	451,5	111	103,3	38,88	22,2
2	Background-$N_{50}P_{100}K_{70}$	457,0	111	107.9	43,30	26,7
3	Background+Fe-2,5	477,2	111	110,9	42,30	28,6
4	Background+Fe-5,0	463,1	112	107,5	39,90	29,7
5	Background +Fe-7,5	463,2	111	101,5	30,70	29,5
Nafis						
1	Control	355,3	124	144,3	44,80	22,8
2	Background-$N_{50}P_{100}K_{70}$	367,7	126	147,1	48,10	29.7
3	Background+Fe-2,5	374,2	130	149,4	48.0	31,1
4	Background+Fe-5,0	372,6	130	142,4	46,90	32,0
5	Background+Fe-7,5	372,6	129	142,6	45,20	31,0

The studied options influenced only the development of the Nafis variety. The praxis period has lengthened by 2-6 days. Due to mineral fertilizers, the height increased by 4.9 cm in the Orzu variety and by 2.9 cm in the Nafis variety compared to the control option. With the introduction of iron at different rates, the height of the plants increased by Background+Fe-2.5 7.6 cm; and on the Background+Fe-5.0 -4.2 cm; and decreased by 1.8 cm at Background+Fe-7.5. With the introduction of iron in the Nafis variety, with different rates, the plant height increased due to fertilization by 2.8 cm. On the Background+Fe-2.5 - 2.3 cm; on the Background+Fe-5.0 decreased by 1.9 cm and 1.7 cm.

The leaf area due to the application of Background-$N_{50}P_{100}K_{70}$ increased by 4.42 thousand m^2 / ha and decreased by 2.9 thousand cm^2 / ha with the introduction of Background+Fe-7.5.

The weight of 1000 pieces of grain in the control was 137.7 grams. In all variants of soybean nutrition with mineral and micronutrient fertilizers, larger seeds were formed. The mass of 1000 seeds in the Orzu variety increased by 11.5 grams with the introduction of mineral fertilizers and decreased with the introduction of the iron trace element in all variants.

Due to macro and micronutrient fertilizers, the mass of roots increased in the Orzu variety by 4.5 - 7.5; In the Nafis variety by 5.9-9.2 centners / ha (Table 3).

Weight 1000 pieces of seeds in the Nafis variety increased by 1.6 g with the introduction of mineral fertilizers, and in the Orzu variety - 1.5 g. With the introduction of the iron trace element, a decrease in the indicator is observed in all variants.

Improving the nutrition of soybeans with mineral and micronutrient fertilizers ensured an increase in grain yield. So, on the control option was received 19 c / ha of grain. Due to the use of $N_{50}P_{100}K_{70}$, the grain yield of the Orzu variety increased by 7.6 c / ha. The use of $N_{50}P_{100}K_{70}$ with micronutrient fertilizers in the Orzu variety during the growing season provided an increase in the grain yield when applying different doses of iron by 0.9-0.3 c / ha, and the Nafis variety when applying iron to the Background+Fe-7.5 by 1 c / ha.

The yield of field crops depends on many factors, the most important of which are plant density. The yield obtained depends on the degree of germination safety.

The expected yield is determined by the plant density at the end of the growing season, the trace element iron was used only in the budding and flowering phases, so it did not affect the growing season of soybeans. The use of a microelement in the "Orzu" variety influenced the plant density, in the control 451.5 thousand / ha were formed, and in the Background - $N_{50}P_{100}K_{70}$ - 457.0 thousand / ha.

In the control variant and when using mineral fertilizers of the Orzu variety Background + Fe-2.5 and Fon + Fe-7.5, the growing season was the same 111 days. And when using Background + Fe-5.0, the growing season in comparison with the control variant was lengthened by 1 day and amounted to 112 days.

In the test variants of the Nafis variety, the growing season in general was 124-130 days. With the use of the trace element iron, the growing season was lengthened by 1-5 days. Compared to Orzu, the Nafis variety is mid-season.

The use of macro and microelements of iron in the Nafis cultivar also increased the leaf area in all variants.

The use of iron in the "Orzu" variety also affected the weight of roots, it increased by 2.4-3.5 c / ha, and the use of Background- $N_{50}P_{100}K_{70}$ decreased by 3.5 c / ha.

The use of macronutrients in the Nafis variety increased the root weight in the Background-$N_{50}P_{100}K_{70}$ variant by 6.9 c / ha compared to the control.

Compared with the control options with the use of iron, the weight of the roots increased from 8.2-9.2 c / ha.

In the "Orzu" variety, the ratio of protein in the control variant was 38.8%, and with the use of mineral fertilizers this indicator increased by 1.6%. When using the trace element iron, the indicator also increased in comparison with the control option from 7.5-9.7%.

Microelements of iron showed a great influence on the studied varieties.

In the "Nafis" variety, the ratio of protein in comparison with the control variant was increased due to the added trace element iron and mineral fertilizers from 5.1-8.6%.

The highest yield indicator of the "Orzu" variety was revealed when using Background-$N_{50}P_{100}K_{70}$, which increased by 7.6 c / ha. When using the trace element iron in all variants from 0.3-6.9 c / ha. In the control variant of the "Nafis" variety, the yield was 21.7 c / ha.

Table 4. Weight 1000 pieces. seeds, yield and quality of grain, depending on the norms of iron.

№	Options	Weight of 1000 pieces of seeds, gr	Grain quality		Grain yield c/ha
			protein	oil	
Orzu					
1	Control	137,7	38,8	19,3	18,8
2	Background-$N_{50}P_{100}K_{70}$	149,2	40,4	18,8	26,4
3	Background+Fe-2,5	131.0	46,3	19,0	25,7
4	Background+Fe-5,0	129.2	47,4	19,0	20,9
5	Background +Fe-7,5	126,7	48,5	18,6	19,1
Nafis					
1	Control	167,2	38.6	19,2	21,7
2	Background-$N_{50}P_{100}K_{70}$	168,8	44,8	18,6	28,9
3	Background+Fe-2,5	158,6	43.7	19,5	30,7
4	Background+Fe-5,0	153,6	45,7	20,0	24,8
5	Background +Fe-7,5	151,7	47.2	19,7	20,7

When using mineral fertilizers, the yield increased by 7.2 c / ha. When using Background+Fe-7.5 compared with the control option, the yield decreased by 1 centner / ha. And when using Background+Fe-2.5 it increased by 9 c / ha, Background+Fe-5.0 by 3.1 c / ha (Table 4).

Conclusions

In typical serozem conditions, the use of $N_{50}P_{100}K_{70}$ with different doses of iron promoted better plant growth, increased leaf area, and also ensured the formation of larger soybean seeds. The yield of soybean seeds of the "Orzu" and "Nafis" varieties increased due to the use of the trace element iron. Better data are obtained with moderate doses of iron. Cultivation of soybean varieties with the use of macro and micro fertilizers contributes to the improvement of grain quality.

References:

1. Atabaeva, H.N. (2004). *Soja*. Monografija. (p.96). Tashkent: Nac.jenc.
2. Atabaeva, H.N., Israilov, I.A., & Umarova, N.S. (2011). *SOJa-morfologija, biologija, tehnologija vozdelyvanija*. (p.94). Tashkent: Tosh DAU.
3. Guzhvin, S.A. (2004). *Vlijanie mineral`nyh i bakterial`nyh udobrenij na urozhajnost` i kachestvo semjan soi. Strategija razvitija APK*: tehnologii, jekonomika, pererabotka, upravlenie: Materialy Mezhdunarodnoj nauchno prakticheskoj konferencii, pos. Persinovskij, 2-6 fevr., T.2, pos. Persianovskij Rost, obl., p.50.
4. Kochurko, V.I., & Abarova, E. Je. (2014). Vnekornevaja podkormka. *Zemledelie*, №8.
5. Zavalenko, A.A. (2005). *Biopreparaty, udobrenija i urozhaj*. (p.302). Moscow: Izd-vo VNIIA.
6. Shhegorec, F.V. (2018). *Soevodstvo*. (p.52, 5). Blagoveshhensk.
7. 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. https://www.ikprress.org/index.php/PCBMB/article/view/6342
8. Atabayeva, K.N., Khayrullaev, S.S., & Usmonova, S.U. (2020). "The effect of sulphur on the branching of soybean varieties", *STJITT*, vol. 1, no. 2, pp. 4-6.
9. 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

10. Khayrullayev, S.S., & Usmonova, S. U. (2020). “The effect of stimulators on the location of the first pod of soybean varieties”, *STJITT*, vol. 1, no. 2, pp. 7-9.
11. Khayrullayev, S. S. (2021). 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, pp.63-68. DOI: 10.5958/2249-7137.2021.00582.6.
12. Khayrullayev, S. S., & Usmonova, S. U. (2021). Effect of sulfur micronutrient on symbiotic activity of “Orzu” variety of soybean. *The American Journal of Agriculture and Boimedical Engineering* (ISSN-2689-1018). May 31, pp.49-59. DOI: https://doi.org/10.37547/tajabe/Volume03Issue05-10.
13. Nazarovna, A.K., Bakhromovich, N.F., Alavkhonovich, K.A., & Ugli, K.S.S. (2020). Effects of Sulfur and Manganese Micronutrients on the Yield of Soybean Varieties. *Agricultural Sciences*, 11: 1048-1059. https://doi.org/10.4236/as.2020.1111068
14. Umarova, N. S., Bo’riboyev, B. Y., Khayrullayev, S. S., Usmonova, S. U., & Turdaliyeva, S. T. (2021). Effect of mineral fertilizers on morphophysological characteristics of local and foreign soybean varieties. *European Journal of Agricultural and Rural Education*, 2(4), pp. 39-42. https://scholarzest.com/index.php/ejare/article/view/611.
15. (n.d.). Retrieved from www.agrodialog.com.ua.soya-udobreniyahtmh-soy-micronutrients