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INFLUENCE OF MINERAL FERTILIZERS ON YIELD AND OIL PRODUCTIVITY OF SOY BEANS

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Abstract
The article describes the promising indicators for expanding the cultivated area of soybeans and increasing the production of soybean oil in our republic, highlights the results of field experiments on the effect of the rate of mineral fertilizers on the yield and oil content, soybean grain.

Keywords: Soybeans, mineral fertilizers, high-yield, seed-growing, soil-climatic, agrochemical, fat content, humus, vegetation, processing, meadow-saz.

Introduction
At present, the soybean plant ranks first among cereals in terms of the area sown in agriculture in the world. In terms of the area under crops, soybeans occupy the largest area among leguminous crops - 107 million hectares.
The Resolution of the President of the Republic of Uzbekistan No. PP-2832 of March 14, 2017 "On measures to increase the sowing of soybeans and the production of soybean grain in the republic in 2017-2021" was issued, as well as the Resolution No. PP-3144 of July 24, 2017 on amendments and changes to the aforementioned resolution, which adopted the "Program of measures to create high-yielding soybean varieties in the republic in 2017-2021, to establish primary seed production, production and increase the area of soybeans."
Soybean cultivation in our country is becoming more and more popular. The adopted program also sets the task of gradually expanding the cultivated areas of soybean crops and increasing the production of soybean oil in 2017-2018 in the

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republic. To this end, it is planned to plant 8,000 hectares in 2017, 11,100 hectares in 2018, 14,400 hectares in 2019, 17,300 hectares in 2020, and in 2021 it is planned to bring this figure to 19,700 hectares [1-3].

In order to ensure the implementation of these resolutions of the President of our country, in recent years, large-scale research work has been carried out in the republic to increase the cultivation of the soybean plant, to increase its yield, to rationalize the use of land use technologies, to select varieties in accordance with the soil and climatic conditions of the republic, on the study of the norms, terms and methods of using mineral fertilizers, as well as research is underway on the use of effective crop rotation systems [2,3,4]. However, in relation to the Fergana Valley, studies on the influence of mineral fertilizers and other factors on the yield of soybeans and the level of its fat content have not been carried out.

Based on the foregoing, field experiments were carried out to study the effect of the rate of mineral fertilizers on the yield of soybeans sown as the main crop in the soil and climatic conditions of the Fergana Valley in 2019. The aim of the study is to study the extent to which the rate of fertilization affects not only the yield, but also the fat content of soybean seeds. This article analyzes the results of an experiment to study the effect of fertilizer rates on the yield of soybeans.

The experiments were carried out in the field of the Fergana Experimental Station of the Uzbek Research Institute of Breeding, Seed Production and Agrotechnical Technologies of Cotton Growing (UzNIISSATVH). The soil of the experimental site is typically meadow-saz, with a heavy texture, in which the groundwater is located deep (> 3). The predecessor is cotton. In the experiment, phenological observations were carried out when sowing the Arleta variety sown on April 16, 2019 with a seeding rate of 60 kg / ha. Preparation of the experimental field, sowing, observation of plant development, harvesting, calculation and analysis of the experimental field were carried out on the basis of the "Methodology for conducting field experiments" (2007) (UzNIISSATVH) [3-5].

The following table shows the results of agrochemical analyzes of the soil of the experimental field before the experiment.

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Table 1. Agrochemical characteristics of the soil of the experimental field by options (2019)

Variants experiences	Horizons soil	General forms,%			Movable forms, mg / kg		
		humus	N	P_2O_5	NO_3	P_2O_5	K
1- v	0-30	1,086	0,102	0,166	15,85	5,8	125
1- v	30-50	1,038	0,091	0,158	10,58	4,2	75
2- v	0-30	1,062	0,097	0,166	19,60	5,4	100
2- v	30-50	0,941	0,088	0,150	8,72	4,2	100
3- v	0-30	1,155	0,113	0,158	8,72	8,0	150
3- v	30-50	1,014	0,091	0,144	7,68	6,6	100
4- v	0-30	1,392	0,130	0,182	14,06	3,8	150
4- v	30-50	1,062	0,097	0,166	9,62	3,4	150
5- v	0-30	1,250	0,124	0,168	10,8	3,4	150
5- v	30-50	1,014	0,097	0,150	9,32	2,8	100
Average	0-30	1,189	0,1132	0,168	13,806	5,28	135,0
Average	30-50	1,014	0,0928	0,1536	9,184	4,24	105,0

As can be seen from the table, the amount of humus in the 0-30 cm soil layer varies from 1.062 to 1.392% according to the options, and from 0.941 to 1.062% in the 30-50 cm layer. In the soil layers, the average amount of humus is 1.189% and 1.014%, respectively. There is no significant difference in the amount of humus for the variant. Also, there was no significant difference in the amount of nitrogen, phosphorus and potassium fertilizers in the layers in general and in the mobile forms of action. Thus, the site allocated for experimental variants can be considered methodically suitable for research [5].

The experiment was carried out in 5 variants and 3 replicates (Table 2). The difference between the options for fertilization rates is 10-20 kg.

The area of each variant was 480 m^2, 4.8 m wide, 100 m long. The total area of the experimental site is 7200 m^2.

Soybean seeds were sown with a pneumatic seeder SPCh-4, with a row spacing of 60 cm, to a depth of 4-5 cm on average. After sowing, in order to obtain friendly shoots, light watering was carried out. The figure shows a general view of a soybean field.

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Fig.1. Phenological observations of the experimental site of the soybean field.

Mineral fertilizers were used as mineral fertilizers (Table 2): ammonium nitrate (34% N), urea (46% N), superphosphate (17-20% P_20_5) and potassium chloride (K_20).

Table 2. Rate and timing of fertilization (experimental system)

№	Annual fertilizer rate, kg / ha			Terms of feeding (according to the phases of plant development)					
				During the appearance of 3-4 sheets			During the period of tying buds-flowering		
	N	P	K	N	P	K	N	P	K
1.	-	-	-	-	-	-	-	-	-
2.	50	70	50	25	30	25	25	40	25
3.	60	80	60	30	30	30	30	50	30
4	80	90	70	40	40	35	40	50	35
5.	100	100	80	50	50	30	50	50	50

In order to ensure air exchange during the growing season in the experimental plots, to improve heat and water permeability, in the row spacings of soybeans, processing was carried out 3 times with a cotton cultivator KRH-4, fed 2 times, weeding once and once manually processed with ketmen. According to existing recommendations, the first feeding was carried out when 3-4 leaves appeared, the second feeding was in the bud-flowering phase. At the first top dressing, the fertilizer was applied in the middle of the row spacing to a depth of 12-14 cm, and the second top dressing at a depth of 16-18 cm at the rates specified in the experiment system.

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All agrotechnical activities were carried out in compliance with the requirements for conducting field experiments. The maturity of soybeans was observed in early August. Harvesting was carried out after the fall of 85-95% of the leaves of the plant on August 8-9 by hand with extreme care. The harvested crop was threshed according to variants and repetitions in a specially reconfigured grain harvester and was weighed separately according to variants. After appropriate processing of the experimental data, the average yield for the options was determined. The results of experiments for variants and replications are shown in the table.

Table 3. Indicators of yield obtained by experimental options

Variants	The amount of mineral fertilizers (NPK), kg / ha	Grain yield, c / ha (2019)	
1	No fertilizer (Control)	15,8	0
2	N50P70K50	20,6	+4,8
3	N60P80K60	22,8	+7,0
4	N80P90K70	25,4	+9,6
5	N100P100K80	24,9	+9,1

From the information presented in the table, it can be seen that with an increase in the rates of fertilization, as a result of the combined action of NPK, the yield of soybeans significantly increases. The highest grain yield (25.4 c / ha) was observed in the 4th option, when the fertilizer application rate was $N_{80}P_{90}K_{70}$, while an additional yield of 9.6 c/ha was obtained compared to the control option [5].

The subsequent increase in the amount of fertilizer ($N_{100}P_{100}K_{80}$), due to the excessive development of the non-grain part of the plant, led to a slight decrease in grain yield compared to the previous option.

In accordance with the above described system of experimental experience, the effect of the rate of application of mineral fertilizers on the oil content of soybean grain was also studied. The amount of soybean oil obtained from each variant of the experiment system was processed separately according to the variant in the laboratory of JSC "Fargona yog-moy". The influence of the rate of mineral fertilizers on the oil content of grain is presented in the following table.

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Table 4. Influence of the rate of mineral fertilizers on the oil content of soybean grain of the Arleta variety

Variants	Weight of 1000 grains, gr	Mineral and organic impurities,%	Humidity, %	Amount of oil,%
Variant 1 Control	120. 7	0.96	6,85	19.8
Variant 2 N_{50} P_{70} K_{50}	133.0	0.53	6,60	20.2
Variant 3 N_{60} P_{80} K_{60}	155.2	0.45	6,87	22.3
Variant 4 N_{80} $P_{90}K_{70}$	180.1	0.26	7,07	24
Variant 5 $N_{100}P_{100}K_{80}$	175.5	0.24	6,98	23.4

As can be seen from the table, with an increase in the fertilizer rate in the 2nd variant, i.e. when applying fertilizer N50 P70 K50, the fat content is 20.2%, which is 0.4% higher than the control, and in the 3rd variant (N60 P80 K60) the fat content is 22.3%, which is 2.5% higher than control. In variant 4 with the rate of application of fertilizer N80P90K70, the highest fat content was obtained - 24%, which is 4.2% more than in the control. And, in option 5 (N100P100 K80), the fat content was slightly reduced - to 23.4%, that is, 0.6% lower compared to option 4 [6-10].

In conclusion, it can be noted that according to the experimental data obtained in the studied soil and climatic conditions, in order to obtain the highest yield of soybean grain (25.4 centers) and high grain oil content (24%), it should be considered the optimal rate of fertilization itself: N-80 kg, P-90 kg and K-70 kg.

Samples of grain harvest, obtained according to the options, are brought to the Fergana oil and fat plant and oil is obtained from them in the factory laboratory. Depending on the amount of oil obtained, the effect of fertilization rates on the fat content of soybean seeds is determined, and the final conclusion is made based on the results.

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