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THE EFFECT OF MINERAL FERTILIZERS ON THE YIELD AND OIL CONTENT OF SOYBEAN GRAINS OF THE ARLETA VARIETY

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ABSTRACT

The article describes promising indicators for expanding the soybean sown area and increasing the production of soybean oil in our republic and highlights the results of field experiments on the effect of the norm of mineral fertilizers on the yield and oil content of soybean grains.

KEYWORDS

Soybean, mineral fertilizers, high yield, seed production, soil-climatic, agrochemical, fat content, humus, vegetation, processing.

INTRODUCTION

In the past two decades, the global soybean market has been growing stronger against the background of an increase in animal husbandry demand for soybean meal, and the use of soybean oil for the production of biodiesel and food products. Over the past decade, the

average annual growth rate of soybean production was 2.7%, and world soybean trade - was 5.1%. In 2019/20, the global soybean harvest is estimated at almost 342 million tons (+31% compared to 2009/10), and the volume of world trade is almost 152 million tons

(+65%) [1-3]. 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 soybean plants, increase its yield, rational use of technologies for the use of land resources, selection of varieties in accordance with the soil and climatic conditions of the republic, on the study of norms, terms and methods of application of mineral fertilizers, as well as research on the use of effective crop rotation systems. However, in relation to the Fergana Valley, studies on the effect of mineral fertilizers and other factors on the yield of soybeans and on the level of its fat content have not been conducted.

Based on the foregoing, field experiments were conducted to study the effect of the rate of mineral fertilizers on the yield of soybean grains sown as the main crop in the soil and climatic conditions of the Fergana Valley in 2019. The purpose of the study is to study the extent to which the application rate of fertilizers affects not only the yield but also the fat content of soybean seeds. This article analyses the results of an experiment to study the effect of fertilizer rates on soybean yields [4-8].

The experiments were carried out in the field of the Ferghana Experimental Station of the Uzbek Research Institute of Selection, Seed Production and Agro technical Technologies of Cotton Cultivation

(UzNISSATVKh). The soil of the experimental plot is typically meadow-saz, with a heavy mechanical composition, in which groundwater is located deep (>3). Cotton predecessor. In the experiment, phonological observations were carried out when sowing the variety "Arleta", 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).

The experiment was carried out in 5 variants and 3 repetitions. The difference between the options for fertilizer application rates is 10-20 kg.

The area of each option was 480 m², 4.8 m wide, and 100 m long. The total area of the experimental plot is 7200 m².

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

Mineral fertilizers were used as mineral fertilizers (Table 1): ammonium nitrate (34% N), urea (46% N), superphosphate (17-20% P₂O₅) and potassium chloride (K₂O).

Table 1. Norms and terms of fertilization (experimental system)

No.	The annual rate of fertilizers, kg/ha			Terms of top dressing (by 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
one.	-	-	-	-	-	-	-	-	-
2.	50	70	50	25	30	25	25	40	25
3.	60	80	60	30	30	30	30	50	30
four	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, soybeans were treated 3 times with a cotton cultivator KRX-4, 2 times fed, 1 time weeding and 1 time treated with ketmen manually. According to existing recommendations, the first top dressing was carried out when 3-4 leaves appeared, the second top dressing was in the bud-flowering phase. At the first top dressing, fertilizer was applied to the middle of the row spacing to a depth of 12-14 cm, and the second top dressing to a depth of 16-18 cm at the rates specified in the experiment system.

All agrotechnical measures were carried out in compliance with the requirements for field

experiments. 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 manually with extreme care. The harvested crop according to variants and repetitions was threshed in a specially adjusted grain combine and according to variants was separately weighed. After appropriate processing of experimental data, the average yield for the variants was determined. The results of the experiments by variants and repetition are shown in the table.

Table 2. Yields obtained by experimental options

Options	Quantity of mineral fertilizers (NPK), kg/ha	Grain yield, c/ha (2019)
one	Without fertilizer (Control)	15,8 0
2	N50P70K50	20,6 +4,8
3	N60P80K60	22,8 +7,0
four	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 fertilizer application rates, as a result of the combined action of NPK, soybean yield increases significantly. The highest grain yield (25.4 q/ha) was observed in the 4th variant, when the fertilizer application rate was N80P90K70, while an additional yield of 9.6 q/ha was obtained compared to the control variant.

The subsequent increase in the amount of fertilizer (N₁₀₀P₁₀₀K₈₀), 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 influence of the application rate of mineral fertilizers on the oil content of soybean grains was also studied. The amount of soybean oil obtained from each variant of the experimental system was processed separately by a variant in the laboratory of “Fargonayogmoy” JSC. The influence of the norm of mineral fertilizers on the oil content of the grain is presented in the following table.

Table 3. Influence of the rate of mineral fertilizers on the oil content of soybean grain Arleta

Options	Weight of 1000 grains, gr	Mineral and organic impurities, %	Humidity, %	Amount of oil, %
Option 1 control	120.7	0.96	6,85	19.8
Option 2 N ₅₀ P ₇₀ K ₅₀	133.0	0.53	6,60	20.2
Option 3 N ₆₀ P ₈₀ K ₆₀	155.2	0.45	6,87	22.3
Option 4 N ₈₀ P ₉₀ K ₇₀	180.1	0.26	7,07	24
Option 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 2-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 compared to control. In the 4th variant with the

N₈₀P₉₀K₇₀ fertilizer application rate, the highest fat content was obtained - 24%, which is 4.2% more than the control. And, in the 5th option (N₁₀₀P₁₀₀ K₈₀), the fat content was slightly reduced - up to 23.4%, that is, 0.6% lower compared to the 4th option.

CONCLUSION

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 c) and high oil content of grain (24%) should be considered the most optimal fertilizer application rate: N-80 kg, P-90 kg and K-70 kg.

Grain yield samples obtained according to the options are brought to the Fergana Oil and Fat Plant and oil are obtained from them in the factory laboratory. Depending on the amount of oil obtained, the influence of fertilizer application rates on the fat content of soybean seeds is determined, and the conclusion is made based on the results.

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