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THE EFFECT OF MINERAL FERTILIZER RATES AND SUSPENSION APPLICATION ON SESAME YIELD

Iminov Abduvali Abdumannobovich,
Doctor of Agricultural Sciences, Professor,
Tashkent State Agrarian University

Toshboyev G‘ayratbek Omatillo o‘g‘li

ABSTRACT
This article presents data on the effect of foliar application of NANO EKO VERM and ENWIGO liquid organo-mineral fertilizers in the form of suspensions on the yield of the “Sadaf” sesame variety. The fertilizers were applied at the 4–6 true-leaf stage and at the beginning of flowering against different mineral fertilizer application rates. In sesame cultivation, supplementary foliar feeding with liquid organo-mineral fertilizers, in addition to mineral fertilizers, resulted in an additional seed yield of 1.7–5.4 centners per hectare compared with the treatments in which no suspension was applied.

Keywords: Sesame, mineral fertilizers, nitrogen, phosphorus, potassium, NANO EKO VERM and ENWIGO liquid organo-mineral fertilizers, yield.

Introduction

Currently, sesame is cultivated on more than 7.0 million hectares annually in approximately 70 countries worldwide, producing a total seed yield of about 6.7 million tons. The rapid growth of the world's population has led to an increase in demand for vegetable oils. Over the past 10 years, the area under sesame cultivation has increased by 17.6%, while compared with 2022, it increased by 1.1%. These figures indicate that the expansion of sesame-growing areas remains relatively slow compared with global population growth. Therefore, developing high-yielding, high-oil-content sesame varieties and developing and implementing

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agricultural technologies that ensure high and high-quality seed yields are among the pressing challenges of today.

In addition to being an important food crop for the world's population, sesame plays a significant role in the efficient utilization of rainfed agricultural land. Sudan, India, Myanmar, Tanzania, Nigeria, and China are among the leading sesame-producing countries, accounting for 64.8% of global sesame seed production. Under the current conditions of global climate change, developing high-yielding sesame varieties capable of withstanding various unpredictable environmental conditions and developing region-specific cultivation technologies are essential for meeting the population's demand for high-quality vegetable oil.

Review of the Literature

In their research, L. C. Patil and S. Hemanth [1] reported that, based on ANOVA analysis, sesame yield was strongly associated with seed weight per plant, the number of productive capsules, 1,000-seed weight, oil content, and the number of days to maturity across sesame lines with different genetic characteristics.

According to I. Yu. Romanova [2], broadcasting sesame seeds by hand requires a large quantity of seed and makes it difficult to mechanize agricultural operations. In contrast, when sesame is sown in rows and the inter-row spaces are cultivated two or three times with fertilizer application, yields can be six to eight times higher than those obtained through hand broadcasting. The application of 60 kg/ha of nitrogen and 40 kg/ha of phosphorus fertilizer also increases sesame yield.

Research Conditions and Methods

Field experiments were conducted under the conditions of long-cultivated, irrigated typical gray soils in Tashkent Region.

The experiment consisted of 16 treatments arranged in three tiers, with three replications. The total area of each treatment was 70 m², of which 35 m² constituted the net harvested area. The total experimental area was 0.336 hectares. The experimental design is presented in Table 2.4. The “Sadaf” sesame variety was used in the experiment.

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The field experimental design was established to investigate the effects of mineral fertilizer application rates and suspension application on the growth, development, and yield of the "Sadaf" sesame variety.

The research was conducted using field and laboratory methods. The following methodological guidelines were used: Methods of Conducting Field Experiments (UzPITI) [3], Methodology for State Variety Testing of Agricultural Crops [4], and Methods of Agrochemical, Agrophysical, and Microbiological Investigations in the Fields of Cotton-Growing Regions [5].

Research Results and Discussion

Our research established that mineral fertilizer application rates and suspension treatments affected the yield of the "Sadaf" sesame variety (Table 1).

According to the experimental results, when mineral fertilizers were applied at a rate of N60 P90 K60 kg/ha, foliar application of NANO EKO VERM liquid organo-mineral fertilizer at the 4–6 true-leaf stage and during flowering resulted in sesame yields ranging from 13.7 to 17.2 centners per hectare. The highest yield under this fertilizer regime was obtained when NANO EKO VERM was applied at 1.5 L/ha at the 4–6 true-leaf stage and 2.0 L/ha at the beginning of flowering. The yield reached 17.2 centners per hectare, which was 3.5 centners per hectare higher than that in the treatment without suspension application.

When mineral fertilizers were applied at a rate of N60 P90 K60 kg/ha, foliar application of ENWIGO liquid organo-mineral fertilizer at the 4–6 true-leaf stage and during flowering resulted in sesame yields ranging from 14.1 to 17.5 centners per hectare. The highest yield under this fertilizer regime was recorded when ENWIGO was applied at 0.4 L/ha at the 4–6 true-leaf stage and 0.5 L/ha at the beginning of flowering. The yield reached 17.5 centners per hectare, which was 3.4 centners per hectare higher than that in the treatment without suspension application.

When mineral fertilizers were applied at a rate of N120 P90 K60 kg/ha, foliar application of NANO EKO VERM liquid organo-mineral fertilizer at the 4–6 true-leaf stage and during flowering resulted in sesame yields ranging from 19.1 to 24.3

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centners per hectare. The highest yield under this fertilizer regime was obtained when NANO EKO VERM was applied at 1.5 L/ha at the 4–6 true-leaf stage and 2.0 L/ha at the beginning of flowering. The yield reached 24.3 centners per hectare, which was 5.2 centners per hectare higher than that in the treatment without suspension application.

When mineral fertilizers were applied at a rate of N120 P90 K60 kg/ha, foliar application of ENWIGO liquid organo-mineral fertilizer at the 4–6 true-leaf stage and during flowering resulted in sesame yields ranging from 19.8 to 25.2 centners per hectare. The highest yield under this fertilizer regime was recorded when ENWIGO was applied at 0.4 L/ha at the 4–6 true-leaf stage and 0.5 L/ha at the beginning of flowering. The yield reached 25.2 centners per hectare, which was 5.4 centners per hectare higher than that in the treatment without suspension application.

Table 1. The effect of mineral fertilizer rates and suspension application on sesame yield q/ha

№ var	Mineral fertilizer rate, kg/ha	Foliar fertilizers	4-6 true leaf stage	Flowering	Replications				Average
					I	II	III	IV	
1	**N_{60} R_{90} K_{60}**	**NANO EKO VERM**	With water		13,2	14,1	13,5	14,0	13,7
2			1,0 l/ha	1,5 l/ ha	15,1	15,8	15,2	15,6	15,4
3			1,5 l/ ha	2,0 l/ ha	16,9	17,6	17,0	17,4	17,2
4			2,0 l/ ha	2,5 l/ ha	16,3	17,0	16,4	16,8	16,6
5		**ENWIGO**	With water		13,8	14,4	14,4	13,8	14,1
6			0,3 l/ ha	0,4 l/ ha	15,6	16,3	15,6	16,2	15,9
7			0,4 l/ ha	0,5 l/ ha	17,2	17,9	17,8	17,2	17,5
8			0,5 l/ ha	0,6 l/ ha	16,7	17,4	17,3	16,7	17,0
9	**N_{120} R_{90} K_{60}**	**NANO EKO VERM**	With water		18,8	19,6	19,4	18,8	19,1
10			1,0 l/ ha	1,5 l/ ha	22,0	22,9	22,1	22,7	22,4
11			1,5 l/ ha	2,0 l/ ha	23,9	24,9	24,6	24,0	24,3
12			2,0 l/ ha	2,5 l/ ha	23,2	24,2	24,0	23,2	23,6
13		**ENWIGO**	With water		19,4	20,3	20,1	19,5	19,8
14			0,3 l/ ha	0,4 l/ ha	22,9	23,9	23,2	23,4	23,3
15			0,4 l/ ha	0,5 l/ ha	24,7	25,8	25,4	25,0	25,2
16			0,5 l/ ha	0,6 l/ ha	24,0	25,0	24,2	24,6	24,4

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Conclusion

Based on the results presented above, it can be concluded that foliar application of NANO EKO VERM and ENWIGO liquid organo-mineral fertilizers at the 4–6 true-leaf stage and during flowering, in addition to mineral fertilizers, had a positive effect on sesame yield. Compared with the treatments in which no suspension was applied, these treatments provided an additional seed yield of 1.7–5.4 centners per hectare.

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