



THE EFFECT OF FERTILIZATION METHODS ON SOYBEAN VARIETY YIELDS

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Аннотация: Ушбу мақолада оч тусли бўз тупроқлар шароитида соянинг “Тошкент” ва “Мадад” навларини асосий экин сифатида етиштирилганда минерал ўғитлар меъёрларини ҳамда қўлланилган суспензияларни дон ҳосилдорлигига таъсири ўрганилган. Соя навларига илдиздан ташқари турли препаратларни қўллаганда ўсимликлар томонидан шаклланган ҳосил шаклланиб қолиши келтирилган.

Калит сўзлар: соя, агротехника, асосий экин, препарат, минерал ўғитлар, ҳосилдорлик, нав, суспензия, озиклантириш.

Аннотация: В данной статье изучено влияние норм минеральных удобрений и вносимых суспензий на урожайность зерна при выращивании сои сортов «Ташкент» и «Мадад» в качестве основной культуры в условиях светло-сероземов. При использовании различных препаратов помимо корней сортов сои отмечается формирование урожая, формируемого растениями.

Ключевые слова: соя, агротехника, основная культура, препарат, минеральные удобрения, урожайность, сорт, суспензия, подкормка.

Abstract: This article examines the effects of mineral fertilizer rates and the application of suspensions on grain yield when cultivating soybean varieties "Toshkent" and "Madad" as the main crop in light gray soils.. When using various preparations in addition to the roots of soybean varieties, the formation of a crop formed by plants is noted.

Keywords: soybean, agrotechnology, main crop, preparation, mineral fertilizers, yield, variety, suspension, nutrition..

Soybeans are cultivated on more than 70 million hectares worldwide. They yield nearly 400 different products. Soybeans improve soil ecology by converting free atmospheric nitrogen into biological nitrogen. It has been proven that there is a significant change in yield when soybean seeds are treated with nitragin and other preparations. It has been observed that when seeds are sown without nitrogen, the yield decreases. Additionally, foliar feeding in combination with seed treatment and sowing has led to a sharp increase in yield [2; p. 20, 5; pp. 23-24].

Kh. Atabayeva and M. Sattarov noted that when growing soybeans, the application of mineral fertilizers at a rate of 50 kg nitrogen, 100 kg phosphorus, and 70 kg potassium can yield an additional 6.2 centners per hectare of grain compared to the control. On meadow-swamp soils, adding 1.2 kg/ha of sulfur to mineral fertilizers can produce an additional 11.2-18.4 centners per hectare of yield compared to the control [1; p. 36.].

When cultivating soybeans, applying mineral fertilizers at the rate of N₅₀P₁₀₀K₇₀ enhances the photosynthetic activity of soybeans. In soybean agrotechnology, foliar feeding

with mineral fertilizers and microelements increases soybean grain yield by 6.2-14.2 centners per hectare [3; p. 40.].

D.S. Asilova, Z.Sh. Askarova, and D.S. Khalikova concluded that, similar to scientists' findings, mineral fertilizer rates also influence the increase in protein content. In variants 4 and 5, with high fertilizer rates of N₆₀P₁₂₀K₉₀ and N₆₀P₁₂₀K₁₂₀, the protein content in the Uzbek-6 variety was high (33.5-36.2%), while in the Uzbek-2 variety it was 33.2-36.0% [4; pp. 23-24.].

In our research conducted on light gray soils of the Kashkadarya region, we found that the yield indicators of soybean varieties change under the influence of mineral fertilizer rates applied to the soil and various fertilizers applied as foliar feeding. According to the results, the lowest yield for soybean varieties was 18.6 centners per hectare for the "Toshkent" variety in the control variant without fertilizers and suspensions, while the highest yield was 40.0 centners per hectare for the "Madad" variety with the foliar application of Caliphos against a background of mineral fertilizer application at a rate of N₁₂₀P₉₀K₆₀ (Table 1).

Table 1

The impact of sowing dates, rates, and fertilization systems on soybean yield, centners per hectare (2021-2023 yy.)

Fertilizer rate	Suspension	Variety name	2022 year	2023 year	2024 year	Average
Control (without fertilizer)	Control (without fertilizer)	Toshkent	17,2	20,0	18,6	18,6
		Madad	19,4	20,4	19,9	19,9
	Carbamide (standard)	Toshkent	23,4	23,4	24,4	23,7
		Madad	23,0	22,7	23,7	23,2
	Caliphos	Toshkent	22,7	24,4	27,6	24,9
		Madad	23,1	25,0	28,2	25,4
LNCF	Toshkent	23,5	23,8	26,1	24,5	
	Madad	23,7	24,8	26,8	25,1	
N ₆₀ P ₄₅ K ₃₀	Control (without fertilizer)	Toshkent	30,2	30,9	23,6	28,3
		Madad	33,4	31,9	25,1	30,1
	Carbamide (standard)	Toshkent	36,9	35,5	35,3	35,9
		Madad	34,9	33,5	32,8	33,7
	Caliphos	Toshkent	37,8	38,6	40,4	38,9
		Madad	37,4	39,1	41,8	39,4
LNCF	Toshkent	35,7	35,6	36,2	35,8	
	Madad	36,0	36,4	35,9	36,1	
N ₁₂₀ P ₉₀ K ₆₀	Control (without fertilizer)	Toshkent	28,4	30,8	33,6	30,9
		Madad	32,4	31,8	30,1	31,4
	Carbamide (standard)	Toshkent	35,5	35,5	33,8	35,0
		Madad	33,4	35,9	37,2	35,5
	Caliphos	Toshkent	39,1	38,4	39,6	39,0
		Madad	39,5	40,1	40,4	40,0
LNCF	Toshkent	36,5	36,2	37,5	36,7	
	Madad	36,4	38,4	38,7	37,8	
Error in the experiment		S_x	0,44	0,41	0,42	x

Standard error of the difference	S_d	0,62	0,57	0,60	x
Smallest difference, s/ha	SD₀₅	1,15	1,06	1,11	x
Smallest difference, %	SD₀₅	4,78	4,42	4,62	x
Standard deviation	S	0,76	0,70	0,73	x
Coefficient of variation	Cv, %	3,17	2,93	3,06	x

Analysis of the results obtained using agrotechnical measures revealed that the soybean grain yield for the "Toshkent" variety without mineral fertilizer application was 18.6 centners per hectare in the unfertilized (control) variant, 23.7 centners per hectare with urea application, 24.9 centners per hectare with Caliphos application, 24.5 centners per hectare with LNCF application. For the "Madad" variety, the yield was 19.9 centners per hectare in the unfertilized (control) variant, 23.2 centners per hectare with urea application, 25.4 centners per hectare with Caliphos application, and 25.1 centners per hectare with LNCF application.

Against the background of applying mineral fertilizers at a rate of N₆₀P₄₅K₃₀, the yield of the "Toshkent" variety was 28.3 centners per hectare in the variant without foliar fertilization (control), 35.9 centners per hectare with urea fertilization, 38.9 centners per hectare with Caliphos fertilization, 35.8 centners per hectare with LNCF fertilization. For the "Madad" variety, the yield was 30.1 centners per hectare in the variant without foliar fertilization (control), 33.7 centners per hectare with urea fertilization, 39.4 centners per hectare with Caliphos fertilization, and 36.1 centners per hectare with LNCF fertilization.

In the conditions of light gray soils of the Kashkadarya region, with the application of mineral fertilizers at the rate of N₁₂₀P₉₀K₆₀, the yield of the "Toshkent" variety was 30.9 centners per hectare in the variant without foliar feeding (control), 35.0 centners per hectare with urea feeding, 39.0 centners per hectare with Caliphos, 36.7 centners per hectare with LNCF. For the "Madad" variety, the yield was 31.4 centners per hectare in the variant without foliar feeding (control), 35.5 centners per hectare with urea feeding, 40.0 centners per hectare with Caliphos, and 37.8 centners per hectare with LNCF feeding.

As evident from the obtained data, foliar feeding plays a significant role even when cultivating soybean varieties with various mineral fertilizers. Notably, when using the Caliphos preparation for extra-root feeding, the yield increase compared to other variants was 3.0-4.0 centners per hectare for the "Toshkent" variety and 4.5-5.7 centners per hectare for the "Madad" variety.

Analysis of additional grain yield formation in soybean varieties under different mineral fertilizer backgrounds and foliar fertilizer applications revealed additional yields of up to 14.0 centners per hectare between mineral fertilizer rates, up to 10.6 centners per hectare between foliar fertilizers, and up to 2.2 centners per hectare between varieties.

In conclusion, it can be noted that in the light gray soil conditions of the Kashkadarya region, applying mineral fertilizers at a ratio of N₆₀P₄₅K₃₀ and feeding with the extra-root Caliphos preparation ensures higher yields compared to other options: 3.0-4.0 centners per hectare for the "Tashkent" variety and 4.5-5.7 centners per hectare for the "Madad" variety.

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