



GROWTH, DEVELOPMENT AND YIELD OF COTTON DEPENDING ON POTASSIUM NUTRITION IN CONDITIONS OF SOILS OF LOW-INCOME EXCHANGE POTASSIUM

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Article history:	Abstract:
Received: 6 th October 2022 Accepted: 6 th November 2022 Published: 11 th December 2022	The results of the research have established that in the conditions of medium-supplied with exchange potassium meadow-sulfur soils, due to the use of 90-120 kg / ha of potassium fertilizers or in NPK ratios of 1: 0.7: 0.4; 1: 0.7: 0.5 against the background of N ₂₅₀ P ₁₇₅ kg / ha, and on typical sulfur soils, poorly provided with exchange potassium due to the use of potassium fertilizers in a dose of 120-150 kg / ha or in fertilizer ratios of 1: 0.7: 0.5; 1: 0.7: 0.6 can be obtained additionally 33.7-35.4 and 32.7-34.8 quintals of high-quality raw cotton.
Keywords: Local potash fertilizer, typical serosem, meadow-serosem, cotton, varieties Bukhara-102, Omad, growth, development, yield of raw cotton	

INTRODUCTION. According to sources [6; 37-41 p.] Currently, in the world, mineral fertilizers, including potash fertilizers, are considered sufficiently secure for crops and make it possible to obtain high yields. The calculation of the ratio of nutrients (NPK) of mineral fertilizers used on average for 8 years indicates that for the USA this ratio was 1.00: 0.34: 0.37, for Canada 1.00: 0.42: 0.16, for France 1.00: 0.27: 0.34, for Germany 1.00: 0.16: 0.25. Therefore, potassium in mineral fertilizers in three times the developed countries, excluding Canada, accounts for 25-37 percent of the amount of nitrogen applied.

On a global scale, most of the scientific work on obtaining a high and high-quality cotton harvest, preserving and increasing soil fertility, the impact of the application of potash fertilizer norms on the growth, development and yield of plants is intensively continuing. In this regard, determining the availability of available potassium to plants in the soil of farms specialized in the cultivation of cotton in the conditions of the republic, determining in these conditions the various norms and ratios of potash fertilizers applied for the growth, development and yield of cotton, studying the effectiveness of potash fertilizers in cotton growing, and on this basis, increasing the way to improve the culture of agriculture is considered one of the urgent tasks.

In the republic, 70 percent of the areas of farms specializing in the cultivation of cotton are provided with a low and very low content of exchange potassium. The correct establishment of optimal norms and ratios of local potash fertilizers in cotton growing, the determination of the influence of the intensity of phenophases of cotton varieties, as well as the development of scientific research on obtaining high and high-quality yields from cotton is important.

Large-scale studies in the republic to improve the effectiveness of potash fertilizers in the cultivation of cotton in various soil and climatic conditions were conducted by I.I. Madraimov [4; 245 p.] , R.S. Nazarovym [5; 5-6 b.], Zh.I. Ismailov and B.Kh. Tillabekov [3; 13-15 p.] , foreign scholars of V.V. Nosov [6; 37-41 p.] , V.N. Yakimenko [7; 5-12 p.] , J.L. Jifon [8; p 13-15] and others have proven the positive effect of potash fertilizers on crops.

Despite the fact that potash fertilizer is important along with nitrogen and phosphorus fertilizers to increase yields and improve the quality of cotton fiber, research in solving these problems has not been studied enough in the republic, especially on typical and meadow gray earth soils.

THE QUESTION OF WHOSE RESEARCH WE HAD WAS:

determination of the influence of applied potash fertilizers on typical and meadow gray earth soils, on the intensity of phenophases of cotton varieties;

study of the effect of doses of potash fertilizers on growth, development, passage of development phases, formation of elements of the harvest of cotton varieties;

study of the effect of doses of local potash fertilizers on the number of leaves, leaf surface, photosynthetic potential of crops (FPP), net productivity of photosynthesis (NPF), coefficient of photosynthetic active radiation (K_{FAR});

determination of the effect of different doses and ratios of potash fertilizers on the cotton yield and technological qualities of fiber in conditions of typical and meadow gray earth soils;

evaluation of the effectiveness of local potash fertilizer, according to the results of the study.

MATERIALS AND METHODS.

The purpose of our research was to determine the optimal norms of local potash fertilizer for obtaining high and high-quality cotton yields in the conditions of typical and meadow gray-earth soils with low and medium-provided exchange potassium in Samarkand region. Field experiments in 2014-2016 were conducted in meadow-gray soils of Payaryk district, in 2017-2019 in typical gray-earth soils of Pastdargom district of Samarkand region.

All phenological observations, biometric records and harvesting during the cultivation of cotton on the field plot were carried out according to the method of UZPITI "Dala tazhribalarini tkazish uslubalari" [1; 145-b.], statistical and dispersion analysis of cotton yields was carried out according to B.A. Dospekhov [2; 356-p.].

**Table1
Experience Diagram**

№	Annual rate NPK, kg/ha			NPK distribution by application time, kg/ha										
				Under chilly ploughing			Together with sowing		Fertilizing in phase					
									2-4 true leaves		buttons-zaciya		Flowering	
				I		II		III						
N	P ₂ The ₅	K ₂ O	P ₂ The ₅	K ₂ O	N	P ₂ The ₅	N	N	K ₂ O	N	P ₂ The ₅			
1	-	-	-	-	-	-	-	-	-	-	-	-		
2	250	175	-	100	-	30	30	75	75	-	70	45		
3	250	175	60	100	30	30	30	75	75	30	70	45		
4	250	175	90	100	45	30	30	75	75	45	70	45		
5	250	175	120	100	60	30	30	75	75	60	70	45		
6	250	175	150	100	75	30	30	75	75	75	70	45		
7	250	175	180	100	90	30	30	75	75	90	70	45		
8	250	175	210	100	105	30	30	75	75	105	70	45		

RESEARCH RESULTS.

In the conditions of meadow-gray soils of Samarkand region, when using potash fertilizers at a dose of 90-120 kg / ha against the background of N₂₅₀P₁₇₅ kg / ha, the stem height and the average daily increase in the cotton variety Omad was the largest and amounted respectively to 85.7-89.1 cm; 0.65-0.63 cm, and on typical gray earth soils in the Bukhara-102 variety when using 120-150 kg / ha of potassium on the specified background NP as noted above, 85.4-86.7 cm; 0,70-0,71 cm.

The yield of the cotton varieties studied in the experiment under the influence of the mineral fertilizers used was different according to the years of the study. The yield of cotton in the control version in the study years (2014, 2015, 2016 years) was respectively 19.7; 20.5 and 21.3 c / ha, in the variant Von N₂₅₀P₁₇₅ on average for the years was 27.4; 29.3; 28.2 c / ha. It was found that the use of potassium fertilizers in a dose of 60 to 201 c / ha against the background of N₂₅₀P₁₇₅ ensured the yield of cotton in 2014 year from 28.6 c / ha to 32.8 c / ha, in 2015 years from 29.2 to 33.8 and in 2011 from 31.2 to 33.5 c / ha. In field experiments, the highest yield, respectively, for the years of the study was 34.5; 35.3 and 36.4 c / ha when using potash fertilizers at a dose of 120 kg / ha against the background of N₂₅₀P₁₇₅.

On medium-sized meadow-gray soils provided with exchange potassium, the use of potash fertilizers is more effective against the background of N₂₅₀P₁₇₅. The application of 60 kg / ha of potash fertilizers against the background of N₂₅₀P₁₇₅ ensured the cotton yield of 29.6 c / ha, at 90 kg / ha - 33.7 c / ha, with the application of 120 kg / ha - 35.4 c / ha. It was found that with an increase in doses of potassium fertilizers over 150, 180 and 210 kg / ha against the background of N₂₅₀P₁₇₅ cotton yield decreases, i.e. respectively according to potassium norms of 34.1; 34.0 and 33.2 c / ha (Figure 1).



The use of potassium in doses from 60 to 210 kg / ha against the background of N₂₅₀P₁₇₅ provided an increase in cotton yield by 9.1-14.9 c / ha compared to the option without fertilizers, and in comparison with the Fon option - N₂₅₀P₁₇₅ by 1.3-7.1 c / ha.

Under these conditions, the highest cotton yield of 35.4 c / ha was obtained in the version with the use of N₂₅₀P₁₇₅K₁₂₀ kg / ha and the increase in yield was 14.9 c / ha compared to the control version and 7.1 c / ha compared to the variant von N₂₅₀P₁₇₅. It should be noted that in the experiments the increase in potassium doses to 180 and 210 kg / ha against the background of N₂₅₀P₁₇₅ reduced its efficiency, the increase in yield compared to the variant von N₂₅₀P₁₇₅ was only 5.7 and 4.9 c / ha, respectively.

As shown by the results of experiments to study the effect of fertilizer doses on the yield of cotton of the Bukhara-102 variety in conditions of typical sulfur-soils poor in potassium, the yield in the control version for the years of conduct was obtained respectively 18.4; 19.5; 20.3 c / ha 25.6 c / ha of the crop, and the average for three years was 19.4 c / ha. over the years of research amounted to 24.6; 25,7; 26.5 c / ha, and on average for three years the yield was obtained 25.6 c / ha, which is 6.2 c / ha more compared to the control option.

In experiments conducted under the conditions of typical sulfur soils, the yield increases with an increase in doses of potash fertilizers. If in the variant von N₂₅₀P₁₇₅ on average for three years 25.6 centners were obtained from 1 hectare, and when applying 60 kg / ha of potassium against the same background, 27.5 quintals of the crop were obtained, the additional yield obtained at the expense of NPK was 8.1 quintals compared to the control option, and due to potassium 1.9 c. Under these conditions, an increase in potassium doses to 90 kg / ha against the background of N₂₅₀P₁₇₅ increased the cotton harvest by 30.2 c / ha, the additional yield amounted to 10.8 c / ha, and due to potassium increased by 4.6 c / ha (Figure-2).



With an increase in potassium doses to 120 kg / ha against the background of N₂₅₀P₁₇₅, the cotton yield increased and amounted to 32.7 c / ha, the additional yield compared to the control option was 13.3 c / ha.

A further increase in potassium doses to 180-210 kg / ha led to a decrease in cotton yield by 1.3-2.5 c / ha compared to the most optimal option - N₂₅₀P₁₇₅K₁₅₀ kg / ha.

CONCLUSIONS: 1. Based on the experiments, it has been established that the most optimal conditions for the growth and development of cotton of the "Omad" variety are created when potassium fertilizers are applied at a dose of 90-120 kg / ha against the background of N₂₅₀P₁₇₅, and for the variety "Bukhara-102" 120-150 kg / ha against the specified background.

2. In the conditions of meadow-gray soils of Samarkand region, when using potash fertilizers at a dose of 90-120 kg / ha against the background of N₂₅₀P₁₇₅ kg / ha, the stem height and the average daily increase in the cotton variety "Omad" was the largest and amounted respectively to 85.7-89.1 cm; 0.65-0.63 cm, and on typical sulfur soils in the variety "Bukhara-102" when using 120-150 kg / ha of potassium on the specified background NP as mentioned above noted 85.4-86.7 cm; 0.70-0.71 cm.

3. On meadow-gray soils, when cultivating cotton, it is advisable to apply 120 kg / ha of potash fertilizers against the background of N₂₅₀P₁₇₅, and on typical sulfur soils at a dose of 150 kg / ha. It has been established that in these conditions the optimal diet is ensured, the greatest photosynthetic indicators and yield are achieved.

4. The use of potash fertilizers in a dose of 90-120 kg / ha in the variety "Omad" ensured the formation of the largest number of fruit branches and boxes - 15.8-15.4 and 14.3-15.8 pcs. these indicators in the conditions of typical sulfur soils when using potassium at a dose of 120-150 kg / ha against the above background in the variety "Bukhara-102" amounted to 14.6-15.3 and 14.7-15.6 pcs.

5. It has been established that in conditions of medium-sized meadow-sulfur soils provided with exchange potassium, due to the use of 90-120 kg / ha of potash fertilizers or in NPK ratios of 1: 0.7: 0.4; 1: 0.7: 0.5 against the background of N₂₅₀P₁₇₅ kg / ha, and on typical sulfur soils poorly provided with exchange potassium due to the use of potassium fertilizers at a dose of 120-150 kg / ha or in fertilizer ratios of 1: 0.7: 0.5; 1: 0.7: 0.6, it is possible to obtain an additional 33.7-35.4 and 32.7-34.8 quintals of high-quality raw cotton.

6. In the conditions of meadow and typical gray earth soils, as a result of the use of 90-120 kg / ha of potash fertilizers against the background of N₂₅₀P₁₇₅ in the cultivation of cotton of the "Omad" variety and the use of 120-150 kg / ha of potassium fertilizers against this background NP in the cultivation of the cotton variety "Bukhara-102", high-quality fibers were obtained with a yield of 36.8-36.1; 37.0-37.4%, respectively, for grades 4.3-4.3; medium length (UHM) – 1,09-1,10; 1.10-1.11 inch, relative tensile strength (Str) - 26.8-27.3; 25,4-26,2 gk/tex.

7. It has been established that in the conditions of typical and meadow-gray soils the use of mineral fertilizers, taking into account the provision of their exchange potassium, there is an increase in profitability. Consequently, due to the doses of these mineral fertilizers, the profitability of the industry in typical sulfur soils compared to the control

increased by 15.2-19.1%, and on meadow-sulfur soils by 11.0-14.1% and this ensured the production of 6.00-6.05 and 6.54-6.50 kg of production at the expense of 1 kg of NPK.

8. In the conditions of meadow and typical gray soils of Samarkand region, taking into account the provision of soils with exchange potassium against the background of NP:

- on meadow-gray soils, with an average supply of exchange potassium (201-300 mg / kg) for the variety "Omad" use 90-120 kg / ha of potash fertilizers against the background of N₂₅₀P₁₇₅ kg / ha;

- on typical sulfur soils, with a low supply of exchange potassium (101-200 mg / kg) for the variety "Bukhara-102" use 120-150 kg / ha of potassium fertilizers against the background of N₂₅₀P₁₇₅ kg / ha.

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