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EFFECTIVENESS OF CULTIVATION OF COTTON VARIETY "SURKHAN-103" AT DIFFERENT PLANT DENSITY AND PLANT TOPPING

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Abstract: The article examines the influence of agrotechnical measures - plant density and topping method on cotton productivity and economic efficiency when cultivating fine-fiber cotton varieties in farms in the southern region of Surkhandarya region, specializing in cotton growing. It is scientifically substantiated to obtain a high yield of 3.50 t ha^{-1} and an additional yield of up to 0.38 t ha^{-1} of the "Surkhon-103" variety, as well as an additional income of 3.208.200 soums per hectare and a profitability of up to 90.1% when cultivated at an optimal plant density (120- 130 thousand pieces/ha) with chemical topping using the drug Entozhean.

Key words: "Surkhan-103", Adelphocoris lineolatus, plant density, plant topping, Entozhean, productivity, economic efficiency

Introduction

Uzbekistan is one of the leading cotton-growing countries in the world; in our country, mainly two types of cotton are grown, medium-fiber (Gossipium hirsutum) and fine-fiber (Gossipium barbadense). Fine-fiber cotton varieties are characterized by high fiber quality. However, cotton varieties belonging to this species are adapted to hot climates, and they can only be grown in the southern regions of Uzbekistan.

Cotton is one of the most important textile fibers in the world, accounting on average for about 25 percent of the world's total fiber use. The United States is the world's third largest cotton producer and leading exporter, accounting for one-third of the world's raw cotton trade. The US cotton industry annually produces more than $21 billion in goods and services, creating more than 125,000 jobs in a variety of industries, from agriculture to textile factories [11; 12].

A number of scientists in their studies have scientifically substantiated that plant density and topping are important for obtaining a high and high-quality cotton harvest. In recent years, the influence of plant density and stamping

methods on the death of herbivorous Alfalfa plant bug that damage cotton and crops in the cotton complex has not been sufficiently studied.

Literature review.

Today, about 200 million people in 84 countries around the world are engaged in the cultivation and processing of cotton by sowing seeds on 32-33 million hectares of land. Uzbekistan ranks 6 th in the world in cotton production after China, India, USA, Pakistan and Brazil. If at first Uzbekistan occupied third place in the export of cotton fiber after the USA and India, then in subsequent years, with the development of the domestic cotton processing industry, it moved to 6th place [10].

A. Shamsiev and others [9] on the development of agricultural technology for growing a high yield of cotton of fine-fiber cotton varieties “Iolotan-14”, “Surkhan-103” and “ST-1651” in the conditions of the Surkhandarya region, when studying the norms for applying mineral fertilizers and plant density, additional information was obtained harvest 0.56; 0.42; 0.48 t ha^{-1} compared to control.

In our republic, with three-time treatment with Sozhean, Entozhean, the norm is 15+45+90 g/ha during the cotton growing season (budding, flowering, fruiting) or the norm is 100-110 g/ha when 12-13 fruit branches accumulate on a cotton bush , spraying with Dalpix at a rate of 1.0-1.5 l/ha, Pix at a rate of 1.5-2.0 l/ha 5-7 days before or after watering cotton, there is no need to carry out manual chasing [8].

When leaving 120-130 thousand cotton plants of the Surkhon-103 variety on a hectare and carrying out chemical stamping with the drug Entozhean, the resistance of cotton to the herbivorous bug was determined, while 20.0-23.0 pieces of fruiting elements were formed on the cotton plant, of which 1.3-2.1 pieces were affected by the bug. The greatest degree of damage to the cotton plant by the bug was observed in the option without topping, and compared with the option where hand topping was carried out, the damage was 3.1% more, with chemical topping it was 4.9% more [3; 4].

The result of each agricultural activity is determined by the resulting cotton harvest. In the studies of M. Avliakulov and others [1; 2; 5] shows the influence of the timing and norms of irrigation, water regime on the cotton yield, where with a standing density of the cotton variety “Sulton” of 80-90 thousand bushes/ha, 4.11 t t ha^{-1} was obtained, and with a standing density of 70-80 thousand bushes/ha the yield was 4.33 t ha^{-1}, thereby determining the optimal density of the Sulton cotton variety of 70-80 thousand bushes/ha.

It has been established that in the conditions of the Surkhandarya region, an important factor in reducing the number of Alfalfa plant bug on cotton plants is

maintaining an optimal plant density of 90-100 thousand bushes/ha, irrigating cotton through the furrow at lower rates, carrying out topping of cotton with high quality and in favorable terms, as well as the use of Entozhean in the optimal time [6; 7].

Today, in the global cotton industry, the requirements for fiber quality are increasingly increasing. In this regard, an urgent task is to use standing density, irrigation and fertilizing regimes, taking into account the conditions of each region.

Research methodology

The research was carried out in the field on the basis of the methodological manuals “Methodology for state variety testing of agricultural crops”, “Methodology for conducting field experiments”. Yield indicators were mathematically processed by the method of variance analysis based on the manual “Methodology of field experience” by B.A. Dospehov.

Table 1

EXPERIMENTAL TABLE

Options	Plant density, thousand pieces/ha	Topping methods
1-control	120-130	Without topping
2		Carrying out hand topping
3		Application of Entogean
4- control	140-150	Without topping
5		Carrying out hand topping
6		Application of Entogean

Field experiments were carried out in takyr meadow soils of the Surkhandarya region during 2018-2020. The experiment studied the influence of such agrotechnical measures as plant density, as well as stamping methods on the damage caused by herbivorous Alfalfa plant bug when cultivating the fine-fiber cotton variety “Surkhon-103” (Table 1).

Results and discussion

The growth and development of cotton is influenced by soil fertility, timing and norms of sowing, watering, fertilizing, inter-row cultivation, topping methods, timing and norms of defoliation, and cotton diseases. Our scientific research has examined the effects of plant density and topping methods on cotton yields and economic efficiency.

The main objective of research conducted in agriculture, in particular in cotton growing, is the scientific substantiation of the influence of agrotechnical measures and external influencing factors planned for study on cotton yield.

If timely topping of cotton ensures the preservation of the elements of the harvest, an increase in the mass of the crop, as well as an improvement in the quality of the fiber, then a delay or absence of topping can lead to an increase in the leaf surface of the cotton plant, a thickening of the shell of the bolls, and a delay in ripening by 7-10 days. At the same time, when chemical chasing is carried out, the cotton bush acquires a compact cone-shaped shape, and aeration in the rows improves. As a result, the weight of the first harvest increases by 5-6 centners, and it becomes possible to harvest the crop in a short time.

In the experiment, the influence of plant density and topping methods on the number of herbivorous Alfalfa plant bug was studied, where it was shown that when the plant density of a fine-fiber cotton variety was 120-130 thousand bushes per hectare, the number of Alfalfa plant bug was 5-19 pieces, and with an increase in the number of plants by 10-20 thousand bushes per 1 hectare, the number of Alfalfa plant bug was 9-23 pieces, which is 3-4 pieces more (Figure 1).

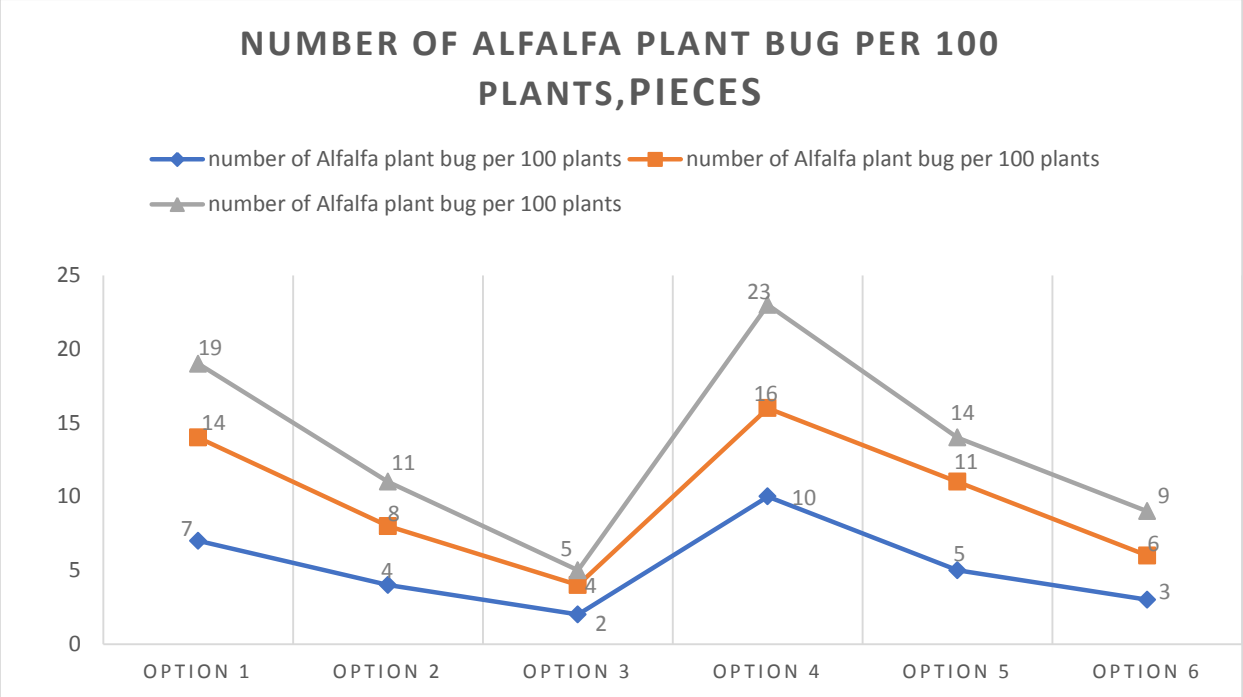

Figure 1. The number of Alfalfa plant bug (Adelphocoris lineolatus) on cotton plants cultivated at different Plant density and topping methods. Cotton variety “Surkhan-103”, 2020 y.

Also, when growing the fine-fiber cotton variety “Surkhon-103” at a density of 120-130 thousand plants per hectare with different methods of topping, the number of Alfalfa plant bug was 5-19 pieces, and in the variant with chemical topping using Entozhean, the occurrence of Alfalfa plant bug was lower. The number of Alfalfa plant bug in this option was 14 fewer compared to the option without topping; and by 6 pieces, compared to the option with manual embossing.

According to the data on cotton yields obtained in 2018-2020 in the conditions of takyr meadow soils of the Surkhandarya region, the indicator of the fine-fiber cotton variety “Surkhon-103” averaged 2.95-3.50 t ha^{-1} over three years.

With a high plant density, the cotton plant’s use of water and nutrients decreases, and the yield is 15-20% less. The experiment studied the effect of standing density on cotton yield when growing the fine-fiber variety “Surkhon-103” at different standing densities (120-130; 140-150 thousand pieces/ha).

Table 2

The influence of plant density and topping methods on cotton yield. Cotton variety “Surkhan-103”

№	Plant density, thousand pieces/ha	Topping methods	Productivity, t ha^{-1}					
			2018	2019	2020	Average	Additional yield compared to the topping methods, t ha^{-1}	Additional yield compared to plant density, t ha^{-1}
1	120-130	Without topping	3.18	3.26	2.92	3.12	-	0.17
2		Carrying out hand topping	3.37	3.43	3.30	3.37	0.25	0.21
3		Application of Entogean	3.56	3.58	3.36	3.50	0.38	0.22
4	140-150	Without topping	3.04	3.07	2.74	2.95	-	
5		Carrying out hand topping	3.17	3.22	3.08	3.16	0.21	
6		Application of Entogean	3.35	3.37	3.12	3.28	0.33	
	For factor A		LSD_{05}=0.22 t ha^{-1} Sx =0.7	LSD_{05}=0.40 t ha^{-1} Sx =1.2	LSD_{05}=0.87 t ha^{-1} Sx =2.8			
	For factor B		LSD_{05}=0.26 t ha^{-1} Sx =0.8 Sx =1.1	LSD_{05}=0.49 t ha^{-1} Sx =1.5 Sx =2.1	LSD_{05}=1.06 t ha^{-1} Sx =3.4 Sx =4.9			

When sowing plants with a density of 120-130 thousand pieces per hectare, the average yield over three years was 3.12-3.50 t ha^{-1}, and with 140-150 thousand pieces per hectare – 2.95-3.28 t ha^{-1}. An increase in the number of plants by 10-20 thousand pieces per 1 ha caused a decrease in yield by 0.17-0.22 t ha^{-1} (Table 2).

In the experiments conducted, the influence of topping methods, along with plant density, on cotton yield was also studied. When cultivating a variety of fine-fiber cotton against a background of 120-130 thousand bushes per hectare in options without topping, with manual topping and with chemical topping using Entojean, the average cotton yield for three years was 3.12-3.50 t ha^{-1}, in the 3rd option with chemical topping using the drug Entozhean, it amounted to 35.0 c/ha. Compared to the control option without topping, this option yielded 0.38 t ha^{-1} and compared to option 2 with manual topping, 0.13 t ha^{-1} of additional yield.

Based on the analysis of the data presented above, we can conclude that in the conditions of takyr meadow soils of the Surkhandarya region, when sowing varieties of fine-fiber cotton with a plant density of 120-130 thousand bushes using chemical stamping with the drug Entozhean, an additional yield of up to 0.38 t ha^{-1} is ensured.Currently, in agriculture, which is the main sector of the national economy of our country, work is being carried out aimed at increasing the economy, shaping it on the basis of new trends, reducing the cost of products, attracting new innovative technologies, as well as increasing the number and product quality. That is why the main basis of the economy is to obtain higher profits with lower production costs.It is known that the development of agricultural technology for cultivating each cotton variety in various soil and climatic conditions, the fight against pests and diseases, and the recommendation for production also ensure high economic efficiency of cotton growing.

In experiments conducted in 2018-2020, the greatest economic efficiency on average over three years was observed in the option of cultivating the fine-fiber cotton variety "Surkhon-103" at a standing density of 120-130 thousand bushes per hectare and carrying out chemical topping using the drug Entozhean in growing season. In this option, the conditional net profit was 21.821.840 sum/ha, additional income was 3.208.200 sum/ha, and the profitability level was 90.1% (Table 3).

For the fine-fiber cotton variety “Surkhon-103”, with an increase in standing density by 10-20 thousand bushes per hectare in the variant using the drug Entozhean, the conditional net profit amounted to 19.154.000 sum/ha, additional income was 2.776.200 sum/ha, and the level of profitability was equal to 79.9%. An increase in the number of plants led to a decrease in cotton yield by 0.22 t ha^{-1} and the profitability level to 10.2%.

Table 3

Economic efficiency of fine-fiber cotton varieties when cultivated in different Plant density and topping methods, cotton variety “Surkhon-103”

№	Options	Productivity, t ha^{-1}		Income from cotton, soum/ha	Expenses for growing crops, sum/ha			Conditional net profit, sum/ha	Additional income, sum/ha	Profitability, %
		Average over 3 years	Additional harvest		Total	for topping	For the collection and transportation of additional crops			
Standing density 120-130 thousand/ha										
1	Without topping	3.12		41034240.0	22420600			18613640		83.0
2	Carrying out hand topping	3.7	0.25	44322240.0	23658600	110000	1128000	20663640	2050000	87.3
3	Application of Entogean	3.50	0.38	46032000.0	24210160	75000	1714560	21821840	3208200	90.1
Standing density 140-150 thousand/ha										
4	Without topping	2.95		38798400.0	22420600			16377800		73.0
5	Carrying out hand topping	3.16	0.21	41560320.0	23478120	110000	947520	18082200	1704400	77.0
6	Application of Entogean	3.28	0.33	43138560.0	23984560	75000	1488960	19154000	2776200	79.9

The influence of cotton topping methods on the economic efficiency of the cotton harvest was also observed, for example, with manual topping, the conditional net profit was 20.663.640 sum/ha, additional income was 2.050.000 sum/ha, profitability was 87.3%, and compared to the option with chemical topping, less additional income was received at 1.158.200 sum

Conclusions. In the conditions of takyr meadow soils of the Surkhandarya region, which is the southern region of our republic, it is possible to achieve high economic efficiency by reducing the number of herbivorous Alfalfa plant bug and increasing cotton yields with optimal plant density, as well as timely implementation of the topping method.

To obtain a high and high-quality yield of cotton varieties of fine-fiber cotton and achieve high economic efficiency, it is recommended to cultivate it at a standing density of 120-130 thousand bushes per hectare and carry out chemical topping using the drug Entojean.

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