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Fund for Support of Sustainable Innovative Techniques and Technologies in the Cotton Sector

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Abstract

The challenges of global climate change, population growth, the development of measures to adapt agricultural production to the negative effects of climate change, the introduction of effective economic mechanisms, as well as the expansion of scientific research to improve food security are emerging. In particular, today about 35.5 million tons of cotton are grown worldwide, occupying 35 million hectares of cotton fields. The profitability of cotton growing in the world has remained unchanged over the past few years. This is negatively affected by the increase in environmental stressors for cotton, such as excessive rainfall during planting, high temperatures during the flowering period, decreased soil fertility, increased pest and disease groups, and a lack of agrotechnology to deal with stressors. At the same time, the importance of solving these problems in cotton growing, increasing the efficiency of the use of resources used in cotton growing, the introduction of innovative, resource-saving technologies in the industry is growing. According to experts, given that the world's population will reach 9.6 billion by 2050, the issue of efficient use of available agricultural resources in food production is very important. In this regard, the issue of efficient use of resources in cotton growing, encouraging the introduction of resource-saving technologies is a matter of state concern.

Keywords:cotton, resources, agrotechnology, resource-saving technologies, innovative techniques, fund for support

1. Introduction

Measures that increase the efficiency of the use of resources in the cotton industry and the implementation of resource-saving technologies are of national importance. The modernization of agriculture, the introduction of intensive methods of agricultural production, modern agro-technologies, which save water and other resources, and the use of high-performance agricultural machinery are the priority tasks. It is also noted that there are no effective mechanisms to economically incentivize the introduction of water-saving technologies in cotton growing and state support for local producers who supply drip irrigation systems. In this regard, it is important to expand the scope of research to increase the efficiency of the implementation of resource-saving technologies in cotton growing.

Cotton production is a production process with very high resource costs, especially water and labour. Therefore, the issue of resource conservation is important for ensuring the competitiveness of products, and it is advisable to take a scientific and practical approach to resource savings in the production of raw cotton in the following areas:

First, it is desirable to consider the absolute cost savings in cotton production. Such a consideration implies the absolute reduction in the material, technical and labour resources involved in the production of raw cotton by the area under cotton. For example, such a reduction may mean decreasing water consumption per hectare of land,labour costs perhectare, or the amount of fuel consumed per acre. At the same time, the main benchmarks are the resource consumption rates or current indicators used in advanced cotton producing farms - Thus it is important to reduce the costs of the material and technical resources spent on cotton fields by

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simultaneously replacing more expensive resources with other cheaper resources in real time. For example, expensive mineral fertilizers can be replaced by less expensive and environmentally friendly fertilizers.

Second, it is desirable to consider the relative cost savings in cotton production. Such a consideration implies a reduction in unit costs per unit of production as a result of increasing the productivity of cotton, while the amount of resources consumed by the area under cotton is unchanged.

Third, it is desirable to adopt a comprehensive approach to saving resources in cotton production. Such an approach includes compliance with he "Consolidation of Resource Consumption Directive" and "Relative Consumption Directive" while reducing costs in cotton production.

2. Materials and methods

It is possible to observe different points of view focusing on the economic essence of the concept of resources. In particular, O. Zokirov said, "Resource is understood from the point of view of society as a set of natural resources used for continuous reproduction of social production and satisfaction of personal consumption of members of society. Resource is a French word meaning an auxiliary tool [2].

According to A. Olmasov, "all the material and intangible means necessary for the creation of goods and services and their delivery from production to consumption constitute economic resources of labor [3]. However, in the first definition, the concept of resource is given in a much narrower sense, one that is limited only to natural resources.

Based on the above considerations, the composition of the resources available in the cotton sector can be summarized as follows. That is, material and technical resources, labour resources, financial and credit resources, intellectual products, information resources and, in our opinion, administrative resources in cotton growing should be taken into account.

A number of economists have conducted research on the use of resource-saving technologies. In particular, A. Abdiev commented on the resources spent in the cotton sector: "The amount of mineral fertilizers used for cotton growing is growing from year to year, but they do not always ensure the growth of cotton yields, as they are not used effectively in practice. Therefore, it is expedient to develop new technological methods of application of mineral fertilizers" [4]. The economist O. Shermatov said, Technology should be considered as a complex interconnected system. Disruption of any process in this system drastically reduces the efficiency of resources expended in all subsequent processes. On the contrary, the correct implementation of technological processes, the introduction of new technologies will ensure a large amount of output per unit of resource consumed"[5].

It is recommended to determine the resource-saving ratio (ПТТ) by evaluating the weight of innovative digital saving technologies and techniques in the resource management system of the cotton sector. Therefore, it is proposed to calculate these indicators in the system of socioeconomic efficiency gains in cotton production.

The four indicators are the share of digital and innovative technologies (ТСтт) in cotton production technologies; the ratio of innovative resource-saving digital technologies to the value of the cotton industry in terms of gross product (КСтт); the share of innovative resource-saving digital technologies in total cotton production costs (ХСтт); and the ratio of innovative resource-saving digital technologies to the annual investment in the cotton sector in the economy (ИСтт).

$$\mathbf{П_{ТТ}} = \frac{\mathbf{ТС_{ТТ}} + \mathbf{КС_{ТТ}} + \mathbf{ХС_{ТТ}} + \mathbf{ИС_{ТТ}}}{\mathbf{4}}$$

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The increase in this index may be the result of an increased use of modern technologies in the resource management system of the cotton sector and the sustainability of the development of the sector in the future.

The costs of raw cotton cultivation in the Uychi, Kosonsoy and Pop districts, with different areas of land, environmental conditions, soil fertility, labour resources and climatic conditions in the Namangan region are analysed. In this process, the costs of producing 1 ton of raw cotton in the districts in 2018 were studied (Table 1). The table shows that the cost per 1 ton of raw cotton in 2018 varied in the Uychi, Pop and Kosonsoy districts.

In the Kosonsay district, the cost element was lower than that in the rest of the district, which was 30 percent. The cost of one ton of raw cotton is 1261,000 soum. In the Pop district, it is 1156 thousand soum, and in the Uychi district, it is 1255 thousand soum.

In general, the share of wages in the cost of cotton is much higher than the other expenditures in the districts under analysis. This demonstrates the high level of the material security of workers in the cotton sector. In particular, this figure is 36% in the Uychi district, 36% in the Pop district, and 30% in the Kosonsoy district.

Table 1.

Composition of the Costs per ton of Cotton Production in the Uychi, Kosonsoy and Pop Districts of the Namangan Region (2018)

Indicators	Uychi		Kosonsoy		Pop		Difference of Uychi relative to Pop (+, -)	Difference of Uychi relative to Kosonsoy (+, -)
	Cost of a ton of cotton, thousand soum	Share of types of expenses, %	Cost of a ton of cotton, thousand soum	Share of types of expenses %	A ton of cotton cost, thousand soum	Share of types of expenses, %	Cost of a ton of cotton	Cost of a ton of cotton
Wages	1255	36	1156	36	1261	30	-99	6
Seed	114	3	169	5	209	5	55	95
Mineral fertilizers	529	15	451	14	651	16	-78	122
Plant protection	114	3	146	5	206	5	32	92
Mechanization service	309	9	305	9	310	7	-4	1
YMC	627	18	544	17	831	20	-83	204
SIU service	39	1	13	0	23	1	-26	-16
Single land tax	40	1	47	1	96	2	7	56
Other expenses	483	14	398	12	552	13	-85	69
Total	3511	100	3228	100	4140	100	-283	629

One of the most important issues in the cotton industry today is the sowing process. This issue necessitates the use of resource-saving technologies in this area (Table 2).

One such resource-saving technology for the 2018 season was used in the Mingbulak district of the Namangan region. Information on the use of sawdust on the farm "BusolihaOtaboev" of the Navoi MTP of the Mingbulak district was studied. The farm has a total

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area of 30 hectares of cotton fields with a yield of 26.7 centners. Using traditional technology, the seed cost per hectare is 45 kg. Using energy-saving technology, the seed costs 25 kg per ha. This usage allowed us to save 20 (45-25) kg or 120000 (20 * 6000) seeds per hectare of cotton fields.

Table 2. Savings on sowing on the Azamat and Otaboev farms in the Mingbulak district from Technology Efficiency (2018)

Indicators	Azamat farms	Otaboev farms	Material and financial resources that will remain at the disposal of the farm through cost-effective technology
	Traditional Technology	Energy saving technology	
Cotton area, ha	30	30	0
Productivity, t/ha	25,0	26,7	1,7
Seed consumption per hectare, kg	45	25	20
Price for one kg of seeds, soum	6000	6000	0
Seed costs per hectare of cotton fields, soum	270 000	150 000	120 000
Fuel volume per hectare, litre	7	2,5	4,5
Fuel consumption per hectare, soum	30 100	10 750	19 350
Salary for sowing per hectare, soum	140 000	140 000	0
Total costs per hectare, soum	440 100	165 750	274 350
Total household expenses, soum	13 203 000	4 972 500	8 410 500
Work per hour, e	1	3	2
Term of sowing, days	3	1	2

At the same time, fuel consumption per hectare decreased by 4.5 litres. The 1-hour working capacity of this technique is 3 hectares. The BusolihaOtaboev farm saves 8,410,500 soum as a result of the use of sawdust.

In the conditions of the technical and technological modernization of cotton production, the economic incentives for the introduction of resource-saving techniques and technologies in the industry should be provided by the state. Government support measures – financial and economic support and organizational and economic support – play an important role in economically incentivizing the introduction of resource-saving technologies.

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3. RESULTS AND DISCUSSION

The following system is proposed for "additional investment in the process of creating resource-saving technologies in agriculture" (Figure 1).

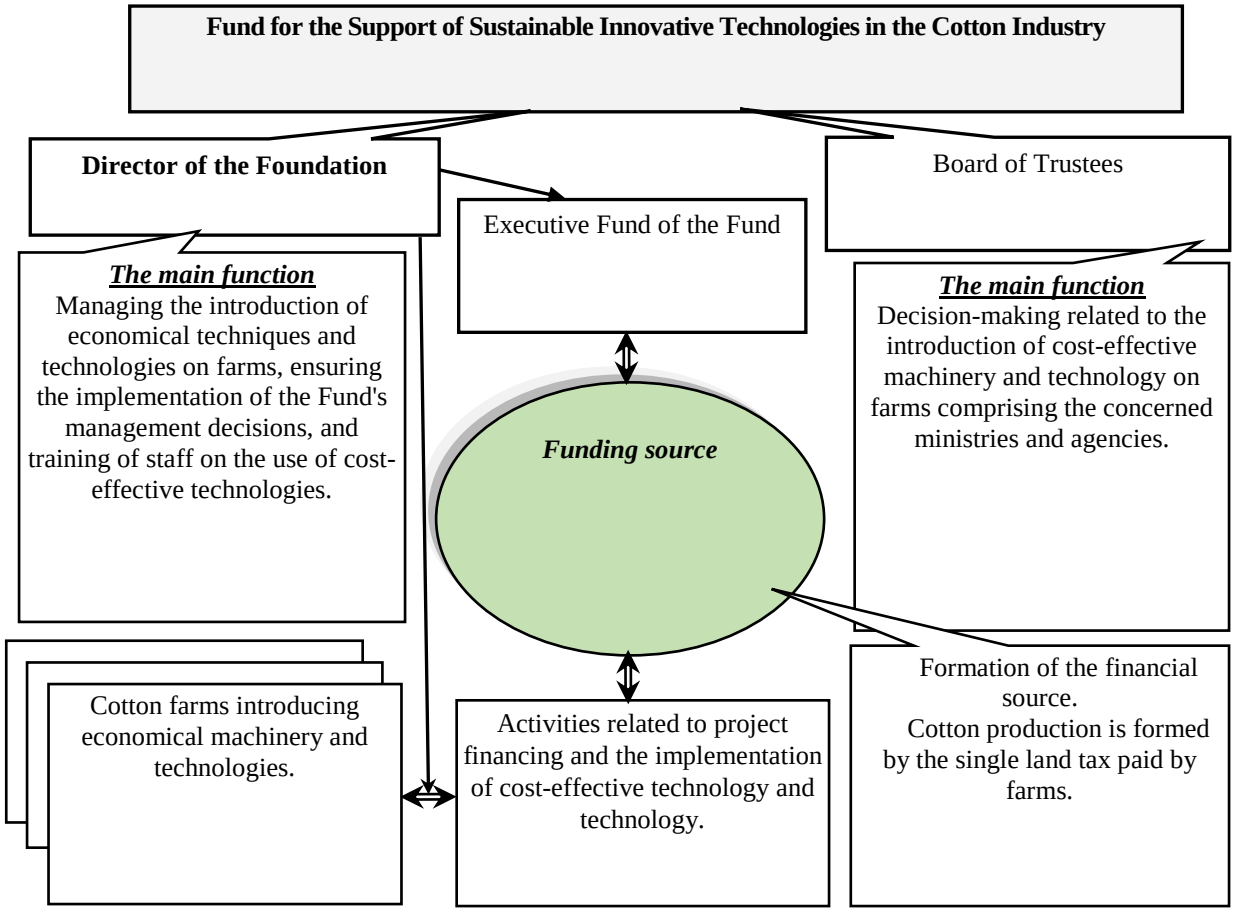

Figure 1. Mechanism of the formation of the "Fund for Support of Sustainable Innovative Techniques and Technologies in the Cotton Sector"

Funds will be provided by farms at 1.0% of the cost of raw cotton grown on a standard basis at the expense of one point of cotton fields (as recommended below).

In the last year, the average grade of cotton sown areas in the district was determined (based on data from the Ergeodezcadastre District Department or inspector) (УБТум).

The average crop yield (t/ha) in the district for the past year is calculated based on data from the District Agriculture Department or the Statistics Department.

Based on the above data, the value of products grown per municipality was based on the normative indicators of the amount of raw cotton grown per hectare of cotton fields in the relevant district. The following approach is recommended (ТПХ):

$$\mathbf{ТП_{Х}} = \frac{\mathbf{ББ_{ПХ}} + \mathbf{АП_{Х}}}{\mathbf{2}} \times \mathbf{ПХУ_{Б}} \qquad (2)$$

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Here: ББПХ - 1 point bonus standard cotton yield, t/ha;

АПХ - is cotton grown at the expense of one point bonus raw material (based on the average yield in the district), t/ha;

ПХУБ - is the average selling price of raw cotton of the district in the previous year, centner/soum

The following method (ЖПК) is used to determine the amount of funds allocated to the fund based on the total yield of raw cotton calculated on the basis of the standard yield and actual productivity of cotton fields in the district.

$$\mathbf{ЖП_{К}} = \left(\mathbf{ЖМ_{Тум}} \times \mathbf{УБ_{Тум}} \times \frac{\mathbf{ББ_{ПХ}} + \mathbf{АП_{Х}}}{\mathbf{2}} \times \mathbf{ПХУ_{Б}} \right) \div 100 \quad (3)$$

Where : ЖПК - total cotton crop area in the area, ha.

The following results were obtained when using this method in the Uychi district of the Namangan region (Table 3).

The average yield in 2018 was 24.6 centners. The average score in the district is 78.2 points. Consequently, cotton raw material produced at the expense of one point bonus class is equal to 0.3 c/d (АПХ).

The average selling price of raw cotton in the district in 2018 was 339,700 soum per centner (ПХУБ). The rate is 0.4 centners per point (ББПХ). Using the formula above, we obtain the following result.

Table 3.

Amount information on Funds to the Uychi District Fund

Indicator	Name Measurement	in practice	By default	Difference by standard (+, -)
Total cotton area by area (ЖМТум)	ha	6269	x	
Average Cotton Growth Bonus by district in 2018 (УБТум)	points	78,2	x	
Cotton raw material grown at the expense of one point bonus	t/ha	0,3	0,4	- 0,1
Cost of products grown at the expense of one point bonus in the district	soum	118 895	135 880	- 16 985
Average selling price of raw cotton in the district for the previous year (ПХУБ)	centner/soum	339 700	x	
The total number of farms	pieces	156	x	
Funds allocated to the Fund	soum	582 865 854	x	
Funds to one fund per farm	soum	3 736 320	4 270 080	- 533 760

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The amount of the bonuses produced in the home district is 118,895 soum.

$$\mathbf{ТП_{Х} = \frac{0{,}4 + 0{,}3}{2} \times 339700 = 118895}$$

The amount of funds allocated to the Uychi District Fund (ЖПК) is calculated as follows:

$$\mathbf{ЖП_{К}} = (6269 \times 78{,}2 \times 118895) \div 100 = 58286585{,}41$$

In 2018, the total area under cotton in the district was 6,269 hectares (ЖМТум). In 2018, the average cotton yield score of cotton fields in the district was 78.2 points (УБТум).

The amount of funds allocated to the fund, based on the standard yield and current productivity of cotton fields in the Uychi district, is 582 865 854 soum, which is based on the value of raw cotton produced.

In cotton production, production, maintenance and cost management
also play an important role. These costs include:

1. The salaries of ancillary production staff.
2. The salaries of service staff.
3. The salaries of administrative staff.
4. The economic costs of state-owned buildings and equipment.
5. Water supply facilities and equipment.
6. Business trip costs.
7. Repair costs.[7]

The conditions for the cultivation of cotton on farms also vary. While some areas are irrigated at no extra cost, some areas require significant irrigation. There are also differences in cotton leaching and other land reclamation activities. However, regardless of the cotton conditions in all fields, raw cotton is bought at the same price across the country. Therefore, it is necessary to expand the practice of subsidizing cotton-growing farms at the expense of additional expenses in the country and farmers, which will introduce cost-effective machinery and technologies.

Conclusion

There are three main approaches to the issue of saving cotton resources: The first is that it is desirable to consider the absolute cost savings in cotton production. Second, the relative resource savings in cotton production should be considered. Third, it is desirable to adopt a comprehensive approach to saving resources in cotton production. This approach includes following the "Consolidation of Resource Consumption Directive" and "Relative Consumption Directive" approaches while reducing costs. The use of resource-saving technologies in cotton production should be compensated for by another technological process, that is lost at the expense of less use of certain resources. Therefore, it is expedient to use the factors that influence cost savings in cotton production. The cost-effectiveness of resource-saving technologies should be demonstrated in the cotton industry, with lower costs per hectare and lower costs per unit of output. The criterion of economic efficiency in terms of resource savings is that it is desirable to understand what issues should be addressed as the economic effect of resource savings in cotton production. Such understanding requires comparing actual performance with selected criteria. Cotton production has changed as a result of the following activities aimed at diversifying agricultural crops: first, expanding grain crops to meet the

population's demand for food and ensuring grain independence; and, second, taking measures to eliminate the cotton monopoly as a result of taking measures to maintain the ecological balance and to increase soil fertility.

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