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Efficiency Of Formation And Use Of Water Resources In Irrigated Agriculture Of The Republic Of Uzbekistan

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Abstract

This article examines the sources of water used in agriculture in the Republic of Uzbekistan, as well as the proposals and recommendations of economists on the results of scientific research on the efficiency of water resources. Therefore, according to the results of the research, the author defines the terms water resources, the level of water supply, efficient and rational use of water resources and the provision of water on a rotating basis. Also, in the field of efficient and rational use of water, practical recommendations were given on the use of modern methods of irrigation, such as drip irrigation, mulching with film and straw, irrigation through flexible pipes.

Keywords: water resources, rivers, streams, springs, reservoirs, fresh and moderately mineralized waters, water problem, water conservation and protection, water fee, water cost, simple field irrigation method, drip irrigation method, film and straw mulch irrigation method, irrigation through flexible pipes

Introduction

There is a shortage of moisture in a large part of the world suitable for agriculture, including Central Asia, and therefore since ancient times man has spent a lot of effort and labor to correct the imbalance of natural factors and increase the water supply of land.

The geographical location of Central Asia, its arid climate, ie very dry weather, hot

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and dry summers, humid and cold winters, ie sharply continental climate and insufficient atmospheric precipitation during the vegetation period, require artificial irrigation and cultural farming reached. The history of irrigated agriculture in our country goes back a long way and has a history of almost 10 thousand years. Irrigation and related canals, construction works were carried out in the valleys of the Amudarya, Syrdarya and Zarafshan rivers. It is known from historical data that in the VII-IX centuries BC in the ancient states of Bactria, Sogdiana, Khorezm, in the Fergana Valley, irrigation works were carried out, irrigation networks, water collection facilities were built.

If we look at the Dargam canal on the Zarafshan river, which was built by hand 2,500 years ago and has survived to the present day, we can be sure that our ancestors were very clever and noble people who could calculate their ups and downs with great accuracy. In addition, the ancient and still preserved Narpay, Mirzaariq, Shohrud, Vobkent, Pirmast, Sultanabad and many other canals that receive water from the Zarafshan River can be listed.

The capitals of the ancient states were built along the canals that receive water from the Zarafshan River. The Dargam canal supplied water to Samarkand (Maroqand), while the Shohrud canal passed through Bukhara. Archaeological excavations have shown that the most developed period of irrigation networks in the lower reaches of the Amudarya dates back to the VI century BC to III century AD. In the middle of the 19th century, the territory of present-day Uzbekistan included the Bukhara Emirate, Kokand and Khiva khanates, and their semi-independent administrative territories, with a population of about 3.5 million. It is estimated that 90% of the population is engaged in agriculture - farming and animal husbandry, and the area of irrigated land is 1.6-1.8 million ha. This means that at that time the average irrigated area was 0.45-0.5 per capita. It should be noted that the development of irrigated lands, including orchards, vineyards and farmers' barns, is the result of the gradual development of dead lands (lands that have not yet been irrigated), the release of water into arable lands.

Materials and methods

Economic research, comparative comparison, logical and abstract thinking methods were used in the research process.

Result and discussion

Water is one of the basic conditions for life on earth. However, at present, not all water in nature can be used directly. Water resources are not only all fresh and moderately mineralized water, in our opinion, **water resources** are all fresh and moderately mineralized groundwater and surface water, which vary in economic stages, and are used in all sectors of the economy, including agriculture. is the sum of possible water sources.

Water is a renewable natural resource. But for this, firstly, the reserves of rivers, glaciers, groundwater must not change over the centuries, and secondly, the level of pollution of natural waters under the influence of human activities should not exceed their ability to qualitatively regenerate themselves.

The main sources of water resources in the country are rivers, streams, springs,

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reservoirs, natural fresh water in lakes, as well as fresh and moderately mineralized groundwater. It is known that the surface water resources of Central Asia are very unevenly distributed depending on the climatic and orographic characteristics of the country. In the vast plains, which occupy almost two-thirds of it, flowing water is very rare. Most of the rivers that flow from the mountains to these lands, to their confluence, are not joined by any stream.

There are many rivers, big and small rivers and streams in the mountains of our country. In the foothills, which surround the mountains, there are more dense artificial hydrographic networks. They consist of irrigation canals, ditches, as well as ditches and collectors that draw water from rivers, streams and springs and spread it to the surrounding land.

In the plains, and especially in the foothills, the evaporation process is very strong. This is because the water formed in the mountains is spread over large fields through irrigation canals and ditches, most of which evaporate directly into the atmosphere from the water surface, soil surface and plants. The annual reserves of rivers flowing through Central Asia are 129.7 km3, and their distribution by river basins is given in Table 1.

Table 1

Water resources of Central Asian rivers

River basins	Average annual water consumption, m3 / s	Annual flow rate, km3 / year		
		average	most	at least
AMUDARYO				
Panj	1140,0	35,0	49,10	27,66
Vaxsh	661,0	20,8	28,6	16,2
Kofirnikon	187,0	5,89	9,81	4,09
Surxondaryo, Sheroboddaryo	127,0	4,0	5,71	2,44
Kashkadaryo	49,6	1,56	2,72	0,897
Zarafshon	169,0	5,32	6,86	3,81
All	2332,6	73,57	100,8	55,1
SIRDARYO				
Norin	448,0	13,8	23,4	8,17
Fargona valley	405,8	12,8	24,6	6,35
Turkiston ridge	4,63	0,303	0,446	0,225
Okangaron	38,5	1,22	3,04	0,577
Chirchik	248,0	7,82	14,5	4,53
Kalas	6,67	0,21	0,507	0,088
Aris	64,2	2,02	4,91	0,35
Koratog ridge	21,1	0,663	1,61	0,11
All	1242,9	38,84	72,67	20,4
CHUV, TALAS, ISSIKKUL, OKSUV BASIN				
Chuv	137,0	4,33	10,48	0,74

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Talas	68,0	2,14	5,2	0,37
Issikkul basin	118,0	3,72	9,03	0,64
Oksuv	225,0	7,07	12,2	2,22
Ҳаммаси	548,0	17,26	36,91	3,97
TURKMANISTON BERK BASIN				
Atrek	9,85	0,50	0,74,	0,034
Tajan	27,0	0,85	2,03	0,093
Murgob	53,3	1,68	2,6	0,373
Kopetdog ridge	10,4	0,33	0,70	0,030
All	100,55	3,16	6,07	0,53
Total across Central Asia	4224,1	132,83	216,45	890,0

Water resources of Central Asian rivers have been assessed differently in different sources (Table 2). Among them is the accuracy of the data of OOGMITI (Central Asian Research Institute of Hydrometeorology). Because it also takes into account the observations of recent years.

Table 2

Water resources of Central Asian rivers, km3 / year

Rivers	**Authors**				
	V.L.Shults	M.N.Bolshakov	SMI	DGI	UzMU
Amudaryo	79,0	-	72,8	69,5	73,6
Sirdaryo	37,8	38,3	36,7	37,0	38,8
Chuv, Talas	6,0	6,5	-	-	6,47

If we compare the data on Uzbekistan with the amount determined by W. L. Schultz in the 60s, we can be sure that the difference is not large. According to VL Schultz, the annual surface water resources of the republic are 99.5 km3, of which only 12.2 km3 is formed in the territory of Uzbekistan.

Table 3

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Water resources of Central Asian countries

States	Area, thousand km2 /%	Annual flow amount, km3			External flow	
		1	2	3	1	3
Uzbekistan	447,4/35,04	11,1	10,6	9,5	-	-
Turkmenistan	488,0/38,44	1,0	-	1,1	-	2,9
Tajikistan	143,0/11,20	51,2	53,4	47,4	20,0	20,7
Kirgizistan	198,5/15,54	52,8	49,2	48,7	-	-
Total	1276,9/100	126,1	-	106,7	-	23,6

The large-scale and widespread use of water resources has led to changes in existing connections in nature, as well as in the system of sectors of the economy. These changes affect the interests of many sectors of the economy and as a result have had negative consequences along with positive ones. If the whole water management system is considered as a single complex and taking into account changes in existing natural conditions, it is possible to ensure that the negative consequences of various sectors of the economy based on long-term forecasting of water quantity and quality requirements will be negligible.

Many of our scientists have noted that the "Water Management Complex" means water facilities, their service providers (S.Ch. Djalalov), their management system and water users (R.A. Abdullahanov). However, the water management system is the economic direction of the state, which is to protect and restore the efficient and rational use of water resources in order to maximize the demand for water in all sectors of the economy and eliminate the negative processes associated with it. and it should be understood that it deals with the delivery and cleaning of secondary consumers.

Therefore, the **efficient and rational use of water resources** means that the use of water and water in full compliance with all laws and regulations on its protection is the indicator that provides the society with the highest efficiency not only today but also in the future in case of water shortage. suitable.

In the middle of the 19th century and beyond, the priority of agricultural crops was as follows: grain crops in the first place, horticulture and viticulture in the second place, vegetables and melons in the third place, alfalfa and other crops for livestock in the fourth place, and cotton in the fifth place.

Research work on water management and reclamation in our country began in the late XIX and early XX centuries, and this field reached its peak in the 60s of the last century. At present, 15.9 million hectares of arable land in the country. hectares, irrigated area is 4.3 million hectares or 9.3% of the total area. Irrigated lands account for more than 95% of agricultural production.

Stabilization of socio-economic development of the country in the context of economic liberalization depends in many respects on the level of effective use of existing irrigated

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agriculture and water resources potential. As the first President of the Republic of Uzbekistan I.A. Karimov noted: "Uzbekistan has long been a country of irrigated agriculture. Irrigated agriculture is the basis of the republic's independence in the field of food and the main source of export products".

One of the universal problems facing humanity, the whole developed society, is the problem of efficient use of water and water resources. The role of water in human life is incomparable.

One of the universal problems facing humanity, the whole developed society, is the problem of efficient use of water and water resources. The role of water in human life is incomparable.

It is estimated that in the future, in contrast to the growth of the planet's population, natural resources - oil, coal, peat, water, fertile soil - will gradually decline. Also, today the increase in demand for water and water resources in the agricultural sector, a sharp decline in water and the inefficient loss of water in the irrigation network leads to an increase in demand for water.

Hence, the water problem is one of the most important problems in the sustainable development of agriculture in the history of mankind associated with economic growth. In the context of deepening economic reforms in our country, efficient and maximum use of water resources is required to fully provide the population with agricultural food products. Currently, the area of irrigated land in the Central Asian region is 8.5 million hectares. In the region, large-scale water management and intensive development of new lands are underway.

Improving water use efficiency, saving and protecting water can be seen in the research work of our scientists as the main of these problems.

For example, according to the World Bank, "Improving the efficiency of water use should be done by improving its pricing ..." or, as S. Perry puts it, "While we recognize that water is a social commodity, it is also an economic commodity. This recognition should play a key role in decision-making and the price of water should be set". Pricing for water in irrigated agriculture is an effective way to reduce the demand for it. But the price set for water and its supply services is so low that it cannot have a clear effect on demand, and it is much lower than the balance between supply and demand. That is, the price of water does not allow for significant technical innovations and investments. This makes it difficult to manage water distribution simply, use it efficiently, and provide water resources.

M.M.Matkarimov emphasizes that payment for water and its services should be made by four methods of calculation. That is, the first method says to pay according to the income received by agricultural enterprises, the second method according to the area of irrigated land, the third method according to the type of crop planted, and the fourth method according to the amount of water used. It is no secret that today water is supplied to agricultural enterprises, farms and dehkan farms on the basis of the type of crop, on the basis of limits and schedules, and water payments are determined taking into account the costs incurred.

However, M.M.Matkarimov considers it expedient to use the fourth method of payment for water and its delivery services. That is, making a payment for water depending on the amount of water used is definitely the right idea. However, the lack of

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water meters in all water users today does not make it possible to measure the amount of water used. Scientific research has shown that it would be advisable to pay for water based on both the area under cultivation and the amount of water used. Because, as mentioned above, it is advisable to implement each type of crop on the basis of irrigation standards, in the specified timeframes, depending on the amount of water used on a schedule, by calculating the cost of water and its delivery. If the amount of water used for the cultivation of agricultural products is calculated at the cost of 1 m3 of water (35.5 soums) (operating costs), then it leads to an increase in the cost of production. Therefore, determining the cost of water used to grow crops through the cost of 1 m3 of water, which corresponds to the cost of operation, will be a heavy burden for agricultural enterprises. Therefore, this process should be carried out gradually. At the same time, life itself shows the need for government support in covering the costs of cleaning, maintenance and operation of irrigation networks.

At present, the state has borne all the expenses in this direction. However, with the payment for irrigation water, the state budget will save some money. It would be expedient to spend these funds on the reconstruction, improvement of irrigation systems, the introduction of new technologies.

According to Professor A.Abduganiev, the coefficient of water use is determined by the ratio of the actual irrigated area to the irrigated area. And in this, of course, special attention was paid to the norms of watering crops. Scientific research shows that in our opinion, when calculating the coefficient of water use of the whole system, it is expedient to determine the amount of water reaching the last plot of land by the ratio of water from sources and can be determined using the following formula:

$$SFK = \frac{EOUYBS}{MOS}$$

or

$$SFK = \frac{EOYYBS}{MOS} * 100\% \quad \textbf{(1)}$$

In this: SFK- water use ratio;
EOUYBS- the amount of water reaching the last plot of land, m3
MOS-amount of water from sources, m3

In determining the water use coefficient using this formula, of course, it will be necessary to install water meters on each farm. In a market economy, the goal can be achieved if modern methods of irrigation are used to save water resources.

Waste of water resources will be prevented if regular maintenance and timely overhaul of irrigation systems in agriculture is carried out. This will increase the utilization rate of irrigated water, as well as increase water efficiency. Therefore, in order to use irrigation water efficiently, it is advisable to use irrigation methods based on modern requirements.

In summary, in our opinion, when we say the **level of water supply**, it is expedient to determine the amount of water actually consumed by the ratio of the amount of water to be supplied on a normative basis. In this case, the norm is determined on the basis of scientifically based irrigation norms of plants, and it is determined using the following formula:

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$$SRTD = \frac{XSSM}{MBSM} * 100\% \quad (2)$$

In this: SRTD - level of water supply, in percent;
XSSM- the amount of water actually consumed, m3;
MBSM- the amount of water to be supplied on the basis of the norm, m3

S. Jalolov puts forward the concept of economic assessment of water resources, taking into account regional disparities in water use. At the heart of this concept is the idea of introducing a three-tier evaluation mechanism in the use of water resources. That is, to determine the cost of water supply to agricultural lands; determination of the amount of national income generated per unit of water resources used in the network; the issue of determining the economic value of water resources as the sum of water supply and national income generated in agriculture was studied.

The research conducted by P.Khojalepesov on the problems of water use in agriculture is mainly focused on the use of water resources in high-salinity arable lands of the Republic of Karakalpakstan and the improvement of reclamation of arable lands.

However, the problems shown in Figure 2 hinder the targeted and efficient use of water resources in agriculture.

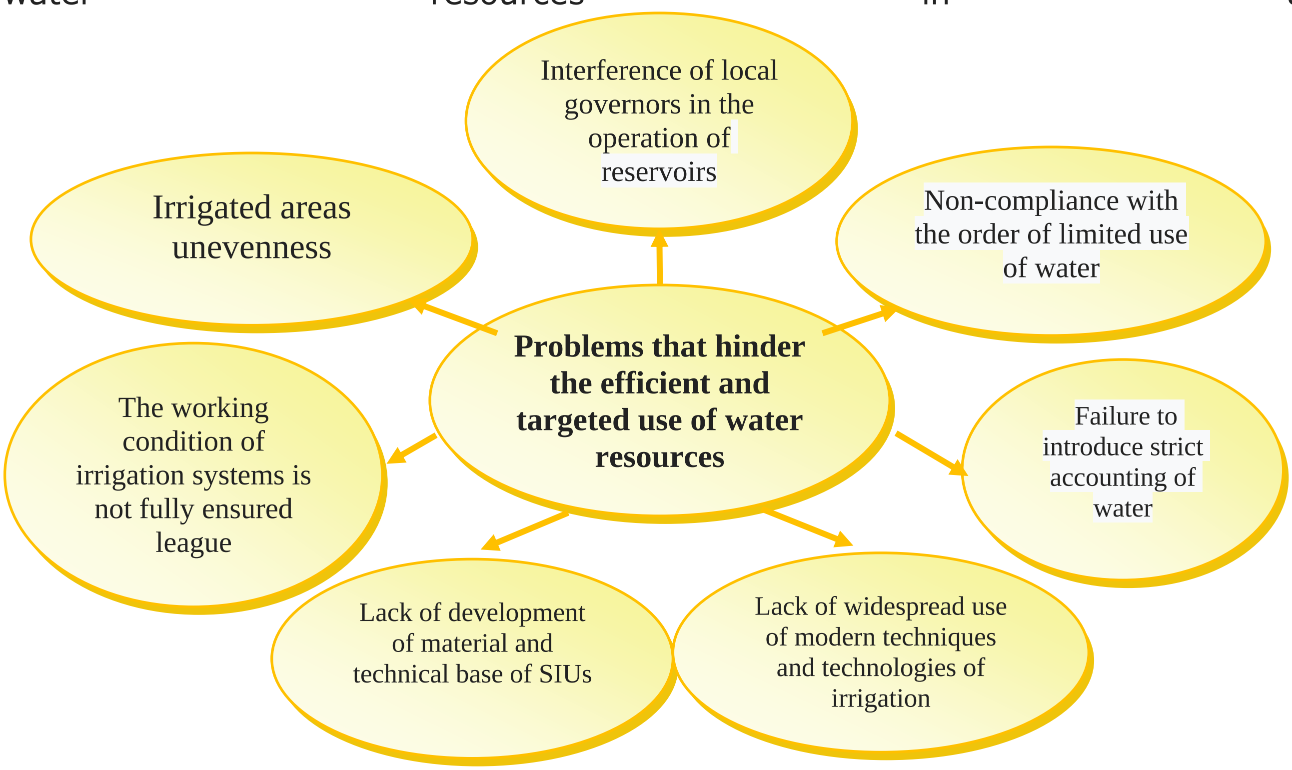

Figure 2**. Problems of targeted and efficient use of water resources in agriculture of the country.**

This means that the effective and targeted use of water resources in agriculture will not be possible without addressing the above problems.

For the future development of agriculture and the efficient and rational use of water resources, according to many scientists, the zoning of water resources is expedient.

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Because, first, 85-90 percent of the water resources used are spent on agriculture. Second, for some regions, the main factor is not unlimited land areas, but water resources.

In turn, water zoning is a generalized complex that helps to protect and restore natural resources. GV Voropaev (1984) together with the co-authors describes it as follows: "Water zoning is defined as the identification, delimitation and classification of existing territorial water complexes, characterized by the generality of water resources used, the specialization of water management and significant domestic production links."

Given the excellent generalizability of fogging, the following factors are taken into account:

- Socio-economic indicators;
- Environmental conditions;
- Hydro geological and reclamation conditions;
- Soil and water conditions;
- In-depth analysis of the geographic data system of water resources for the zoning of each natural and aquatic economy, accurate management of water resources, development of effective recommendations for improving the ecological and reclamation situation.

This, in turn, will help to identify important problems of water resources management, improve the ecological and reclamation of lands, the introduction of resource-saving technologies. It also takes into account the specifics of the natural-water economy of each district.

In order to reduce water consumption and increase the efficiency of the canals, it was proposed to provide water on a rotating basis. Water supply schedules are developed on a rotating schedule, and in areas where water supply is difficult, water supply schedules are developed on a “card” basis.

Based on factors such as the climatic zone of the region, the mechanical composition of the soil, the degree of salinity of the soil, the variety of crops and the timing of sowing, water supply was organized on a "rotational schedule".

The main objectives of the rotation schedule are: 1) the correct use of the water capacity of inter-farm and on-farm irrigation networks; 2) full and timely supply of agricultural crops with water; 3) efficient use of irrigation water, ie elimination of water waste; 4) increase the productivity of watermen and agricultural machinery and the proper organization of their labor.

Currently, the water problem is being solved as a result of the use of wells and ditches in running water.

In recent years, flexible hose irrigation has been widely used to increase the efficiency of water use in agriculture. In this way there is no need to take temporary bullet holes in the pile. As a result, on the one hand, if the hectare is full, on the other hand, it is ensured that water is supplied from all fields in equal proportions. When using such hoses, labor productivity is reduced by 3-4% compared to irrigated with a furrow, and it takes 11.8 working days to irrigate one hectare of land (in the normal way, 12.2 working days).

According to many years of research, 45-53 kg of fuel per hectare is used when cotton is cultivated 6-7 times during the growing season, while drip irrigation is used 3-4 times between rows and 25-30 kg of fuel is consumed. It can be seen that the drip

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irrigation method reduces the penetration of tractors into the row spacing of cotton by 2-3 times, saving 35-40% of fuel and lubricants. It also increases the agrophysical properties of the soil.

Typical gray soils are prone to irrigation erosion, with 24-26 tons of soil per hectare being washed away each year as a result of irrigating cotton fields. It was found that this figure can reach 40-45 tons when irrigation is of poor quality, incorrect and carried out at high water rates. Due to the fact that drip irrigation is carried out without drainage, irrigation erosion is completely eliminated. As a result, soil washing is prevented and productivity is improved. In addition, as a result of irrigation erosion, the washing of humus and nutrients along with the washed soil is eliminated, the mineral fertilizers ensure the full growth and development of the plant, and an additional 2-3 buds are allowed to grow.

During the growing season, when cotton is irrigated 5-6 times by simple sowing, the average water consumption is 5673 m3 / ha, while drip irrigation is used 7 times, and the seasonal irrigation rate is 3663 m3 / ha. As a result, water savings of 1810 m3 / ha (31.9%) will be achieved. Table 4 below shows the impact of water-saving technologies on increasing cotton yields, which can be observed to increase cotton yields by 13.5 quintals with the use of drip irrigation technology.

Table 4

The impact of water-saving technologies on cotton yields

Irrigation method	**Productivity s / ga**	**Fuel consumption of lubricants, kg / ha**	**Water consumption, m3**	**Cost of 1 ha thousand soums**	**Income from 1 ha thousand soums**	**1gadan benefit thousand soums**
Irrigation	26	45-53	50000	863,4	1190,8	327,4
Drip irrigation	39,5	25-30	36500	1100	1809,1	-

The results of Table 4 show that one hectare of land costs 1100 thousand soums. It is natural that most farms are not financially able to afford the equipment and tools needed to apply advanced irrigation methods. Therefore, in order to introduce them to advanced irrigation technologies and methods, it is advisable to organize the supply of the necessary equipment on a leasing basis.

This means that the efficiency of drip irrigation is superior to that of conventional irrigation, and in the current period of water scarcity, it is advisable to use this method of irrigation in agriculture of our region.

Studies show that in typical gray soils, the soil moisture before irrigation during the growth of cotton is 65-65-60% relative to ChDNS and 70-70-60% when irrigated with a simple furrow in the order of 1-3-1 system 5 times in three years, between rows and in the straw mulched variant, it was watered 7 times in a 1-4-2 system. The seasonal water norm was found to be 4377–4402 and 4193–4242 m3 per hectare in the irrigated variants with the help of ordinary furrows, and 3820-3821 m3 and 2755–2712 m3 in the mulched

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variants with film and straw.

Water saving is 556–582 m3 per hectare on average according to the irrigation regime in the variants mulched with film and straw between rows, compared to the options irrigated by ordinary furrows; 12.7–13.2% and 1341–1530 m3 or 31.9–36.1%, 65–65–60%, respectively, 70–70–60%, respectively, 1108–1066 m3 or 27.9–29% per hectare formed.

The seasonal water norm is 2858–2736 m3 per hectare in the cases where the upper part of the egat is irrigated with black polyethylene film and the lower part is mulched with straw, irrigation water was saved by an average of 1004–1040 m3 or 26.6–26.8% per hectare compared to the options irrigated by ordinary furrows.

In the variants where the upper part of the field is open and the lower part is irrigated with straw, the seasonal water norm is 350–402 m3 or 9.3–10.0% per hectare compared to the control. In typical gray soils, the seasonal water norm for cotton is 4850 m3 per hectare when irrigated from ordinary furrows, and 3650–3688 m3 when irrigated with film and straw, which is 2706 m3 and 2155–2166 m3 per hectare when irrigated with furrows.

540–551 m3 or 19.9–20.4% per hectare, 1182–1220 m3 or 24.3–25.1% of the row spacing in the film and straw mulched variants compared to the normal furrow irrigation 1495–2160 m3 or 40.9–44.3% of irrigation water was saved. It was noted that this figure was 182–350 m3 or 13.0–17.1% per hectare, respectively, in the conditions of gray soils of Kashkadarya region.

The water consumption rate of cotton was 6,470 m3 per hectare when irrigated from each field with a simple irrigator, 5,337-5,260 m3 per hectare when irrigated with film and straw, while this figure was 4,325 when irrigated intermittently; 3707 and 3774 m3, respectively, and detailed data on this are given in the following table (Table 5).

Table 5

Water balance of the experimental field and water consumption of cotton (2014–2018)

Indicators	Experiment options					
	1	2	3	4	5	6
Soil moisture reserve at the beginning of the application period, m3 / ha (0-200 cm)	4528	4528	4528	4528	4528	4528
Soil moisture reserve at the end of the application period, m3 / ha (0-200 cm)	3914	3847	3942	3895	3962	3906
Soil backup moisture utilization, m3 / ha	614	681	586	633	566	622
Use of soil backup moisture, %	9,4	12,7	11,1	14,6	15,3	16,5
Seasonal water norm, m3 /	4870	3670	3688	2706	2155	2166

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ha						
Seasonal water norm, %	75,2	68,8	70,1	62,6	58,1	57,4
Precipitation, m3 / ha	986	986	986	986	986	986
Precipitation, %	15,2	18,5	18,7	22,8	26,6	26,1
Water consumption of cotton, m3 / ha	6470	5337	5260	4325	3707	3774
Cotton yield, ts / ha	32,3	35,5	39,3	28,7	32,7	36,0
The amount of irrigation water used to harvest 1 quintal of cotton, m3	150,8	103,4	93,8	94,2	65,9	60,2
Total amount of water used to harvest 1 quintal of cotton, m3	200,3	150,3	133,8	150,7	113,4	104,8
Covering 1 m3 of irrigation water with cotton crop, kg	0,66	0,96	1,0	1,1	1,52	1,66
Covering 1 m3 of total water with cotton crop, kg	0,49	0,66	0,74	0,67	0,89	0,95

It is also shown that the irrigation water consumed for 1 quintal of cotton was saved by an average of 33.6-56, m3 in the inter-irrigated options compared to the options irrigated from each field. In the studies, the coverage of 1 m3 of irrigation water with a cotton crop averaged 0.44 in the inter-irrigated options compared to the irrigated options from each field; 0.56 and 0.66 quintals higher, respectively, and the positive values were obtained from the irrigated variants mulched between the rows with film and straw

Table 6

Economic indicators of different irrigation methods for cotton

Indicators	Simple method	Drip irrigation method	Mulch irrigation technology with polyethylene film	Discrete method	Row spacing method
Seasonal water norm, m3 / ha	5,5	2,75	3,0	5,0	4,5
Number of irrigations, times	5	10	7	5	6
Water economy,%	-	50	25-30	10	18
Productivity, ts / ha	35	40	45	37	35

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Several types of water-saving technologies are used in our country. These include film-based irrigation, the use of flexible pipes instead of ditches, the use of underground irrigation technology, sprinkler irrigation, and drip irrigation. For example, drip irrigation saves 20 to 60 percent of water compared to other methods.

If we talk about the effectiveness of drip irrigation, it is one of the promising ways to use water sparingly and efficiently, increase crop yields, mix mineral fertilizers, growing and developing substances, herbicides with water. When using this method, first of all, tillage is sharply reduced, the consumption of fuels and lubricants is reduced by 30-40 percent, and the consumption of mineral fertilizers is reduced by 20-25 percent. As a result of frequent watering with small norms during the growing season, the water-air regime of the soil is improved, and irrigation is carried out without drainage. Seasonal irrigation saves 35-50 percent, the top layer of soil is kept granular, and productivity is improved. The following table provides information on drip irrigation technology introduced in agriculture of Kashkadarya region, with a total of 7693 drip irrigation technologies introduced in the region in 2013-2019, which achieves efficient and rational use of water resources. Our farmers have started using this technology, proving in practice that it is really effective (Table 7). To build a drip irrigation system, you will need a water pump, filter pond, fertilizer, main and distribution pipes, irrigation hoses and auxiliary parts. Currently, most of this equipment is produced in our country. The water pump is manufactured at the "Suvmash" plant, filters, plastic pipes of different diameters, hoses, auxiliary and connecting parts at "Shortangazkimyo", "Mahsuspolymer", "Jizzakhplastmassa" and other enterprises.

Table 7

Information on the introduction of drip irrigation technology in the districts of Kashkadarya region in 2013-2019

№	Districts name	Total	Over the years						
			2013	2014	2015	2016	2017	2018	2019
1	Guzor	368	7	34	50	60	142	5	70
2	Karshi	750	115	110	100	110	110	138	67
3	Koson	202	2	5	50	50	50		45
4	Kamashi	198	7	15	40	40	54		42
5	Kitob	985	121	77	100	110	90	280	207
6	Mirishkor	159	1	1	40	40	40		37
7	Muborak	379	7	31	30	30	30	150	101
8	Nishon	921	233	290	118	100	100		80
9	Kasbi	190		10	60	60	60		
10	Chirokchi	383	52	44	70	73	80		64
11	Shaxrisabz	587	5	95	100	110	100	100	77
12	Yakabog	2571	11	25	100	160	110	1203	962
	Total	**7693**	**561**	**737**	**858**	**943**	**966**	**1876**	**1752**

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In Kashkadarya region in 2017, 300 sets of flexible pipes were imported and used to irrigate 12,000 hectares of grain and cotton fields. In 2018, 621 farms on 13,450 hectares irrigated cotton and other agricultural crops using portable flexible pipes.

Also, in 2017, 207 farms in the region used the technology of polyethylene film irrigation to irrigate 2607 hectares of cotton and other agricultural crops. In 2018, 438 farms introduced polyethylene film irrigation technology on cotton and other agricultural crops on an area of 5,202 hectares.

Conclusion

Given the limited amount of water resources in the country and in Kashkadarya region, as well as the importance of water resources in the economy, the effective use of water-saving technologies in the country and the region, the further introduction of modern equipment and technologies in agricultural irrigation. We make suggestions:

- The legal framework for water users' associations and their activities needs to be improved;
- Establishment by the Center for Science and Technology Development of the Republic of Uzbekistan of research work related to the rational management and efficient use of water resources, the creation and introduction of modern irrigation technologies as a priority scientific direction;
- Introduce a system of project training for farms using modern water-saving irrigation technologies to ensure the effective operation of this system;
- Radical reform of the mechanism of preferential lending for the introduction of drip irrigation, simplification of lending procedures and increase the amount of credit;
- Ensuring strict adherence to state-mandated decisions made by local executive authorities;
- Introduction of drip irrigation and other water-saving irrigation systems. Great attention to local natural conditions in the formation of the State Program;
- Simplification of the procedure for allocating polyethylene granules at the declared prices to specialized organizations producing components for drip irrigation systems and other water-saving irrigation technologies, introduced under the state program;
- Strengthen the promotion of the benefits of water-saving irrigation technologies;
- Pay special attention to the contribution of current and capital repairs of water facilities in determining the amount of funds allocated to the sector.

We believe that the widespread introduction of water-saving technologies in our country, as well as in our region, the use of facilities created by the state will serve to further develop agricultural production and improve the welfare of our people.

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