British Journal of Global Ecology and Sustainable Development
Volume-21, October, 2023
ISSN (E): 2754-9291

EFFICIENCY OF DRIP IRRIGATION IN ZHALOLLITDIN SARDOR KHAMKOR IN NAMANGAN REGION

Gulyamov Saidakhror Saidakhmedovich,
Academician, Doctor of Economics, Professor,
Head of the Department of the Institute of Personnel Training of the
Agency for Statistics under the President of the Republic of Uzbekistan,

Gulyamov Saidasror Saidakhmedovich,
Academician, Doctor of Economics, Professor,

Rasulova Muxabbat Tishabayevna,
Head Teacher., Tashkent State Agrarian University, TSAU, Uzbekistan

Annotation:
The article provides information on the results achieved using the drip irrigation method in the farm of Jalaluddin Sardar Hamkor of the Namangan region.

Keywords: drip irrigation, water transportation, irrigation interval, horticultural crops, peripheral water flow.

Annotatsiya:
Maqolada Namangan viloyati Jaloliddin Sardor xamkor fermer xo‘jaligida ekinlarni tomchilab sug‘orish usulidan foydalanib erishilgan natijalari haqida ma’lumotlar keltirilgan.

Kalit so‘zlar: tomchilatib sug'orish, suv tashish, sug'orishlararo interval, bog'dorchilik ekinlari, periferik suv oqimi.

Аннотация:
В статье представлена информация о результатах, достигнутых при использовании метода капельного орошения в фермерском хозяйстве Джалалуддина Сардара Хамкора Наманганской области.

Ключевые слова: капельное орошение, транспортировка воды, межполивной интервал, садовые культуры, периферийный сток воды.

Introduction

The agro-industrial complex is the most important component of the economy of the Republic of Uzbekistan. It creates about 30% of the national income. 35-36% of the able-bodied population works.

According to the State Statistics Committee of the Republic of Uzbekistan, the volume of gross agricultural output in January-December 2017 amounted to 69.504.2 billion.

Journal Zone Publishing, Ilford, United Kingdom

sum, or 102.0 percent of the corresponding period of 2016, including crop production – 68,906.7 billion sum (101.9 percent), forestry – 117.9 billion sum (101.6 percent), fisheries – 479.6 billion sum (126.8%).

Irrigation is one of the main elements in the success of growing agricultural crops. crops and their cost-effectiveness, therefore, it requires special attention and study. Improper irrigation, even with high-quality water, can damage both the plant and the soil. Irrigation systems should use such methods and techniques of irrigation that would ensure the most economical and rational use of limited water resources with minimal production losses.

The irrational use of water resources is one of the main reasons impeding the sustainable development of irrigated agriculture in Uzbekistan. One of the ways to solve the problem may be the use of a drip irrigation system.

Drip irrigation was first developed and implemented on an industrial scale, as an independent type of irrigation in Israel, in the early 60s. The positive results obtained in a short time contributed to the rapid spread of drip irrigation in many countries of the world. Drip irrigation is based on the flow of water in small doses to the root zone of plants. At the same time, the amount and frequency of water supply is regulated in accordance with the needs of plants.

Water comes to all plants evenly and in the same amount. And exactly as much as the plant needs, without unnecessary flooding of the soil and water loss. In addition, huge water losses are reduced due to evaporation during the transportation of water through irrigation channels to plants in the fields.

Drip irrigation - is a relatively new method of irrigation of agricultural plantings. It is characterized by the presence of a constant distribution network under pressure, which allows continuous or frequent watering, exactly corresponding to the water consumption of plantations. With drip irrigation, only a limited part of the soil surface is moistened, without surface runoff or water filtration into the deep layers of the soil. With surface irrigation or sprinkling irrigation due to a large irrigation interval, conditions of local waterlogging are periodically created in the soil, followed by drying to the level of withering humidity, which, of course, exposes plants to stress and disrupts the normal rhythm of their development. Drip irrigation, on the other hand, allows maintaining the moisture content of the root layer during the entire growing season at an optimal level without significant fluctuations, characteristic of all other irrigation methods.

With drip irrigation, soil moistening is carried out by capillary way. Due to this, optimal water-physical properties of the soil are preserved and moisture losses due to surface runoff and infiltration into the depth are eliminated.

Consistent measures are being taken in the country to radically reform the mechanisms of water resources use, ensure their rational and efficient use, support and stimulate the introduction of water-saving technologies in economic sectors, as well as improve the reclamation condition of irrigated lands.

Journal Zone Publishing, Ilford, United Kingdom

The measures taken, as well as the mechanisms of state support, only in 2019 made it possible to ensure the introduction of water-saving irrigation technologies on an additional 33.2 thousand hectares, which amounted to 44 percent of the total area of land on which such technologies are used.

However, the total area of application of water-saving irrigation technologies is only 75 thousand hectares, or 1.7 percent of the total area of irrigated land, which necessitates further intensification of measures aimed at expanding the use of water-saving technologies in agriculture and ensuring the efficiency of water use.

In order to further expand the mechanisms to stimulate the introduction of water-saving irrigation technologies and increase the efficiency of water resources use in agriculture, as well as improve the fertility of agricultural land:

1. To take note that in accordance with:

a) Decree of the President of the Republic of Uzbekistan dated June 17, 2019 No. UP-5742 "On measures for the effective use of land and water resources in agriculture", the forecast indicators for the introduction of water-saving technologies on 253,381 hectares of acreage during 2019-2022 were approved[1];

b) resolutions of the President of the Republic of Uzbekistan:

dated December 27, 2018, No. PP-4087 "On urgent measures to create favorable conditions for the widespread use of drip irrigation technology in the production of raw cotton[2], raw cotton producers are provided subsidies for the introduction of drip irrigation technologies in the amount of 8 million soums per hectare of sown area of raw cotton;

- ✓ dated February 5, 2019, No. PP-4161 «On the organization of the Agency for the Development of Viticulture and Winemaking under the Ministry of Agriculture of the Republic of Uzbekistan»[3] subsidies for the introduction of drip irrigation technology in the amount of 8 million soums per hectare of sown area of grapes are provided for the creation of new grape plantations;
- ✓ dated March 20, 2019, No. PP-4246 «On measures for the further development of horticulture and greenhouses in the Republic of Uzbekistan»[4], subsidies for the introduction of water-saving irrigation technologies in the amount of no more than 6 million soums per hectare of acreage are provided for the creation of new gardens and greenhouses.

The Ministry of Water Management, the Ministry of Agriculture of the Republic of Uzbekistan, the Council of Farmers, Dehkan farms and Owners of Homesteads of Uzbekistan, the Council of Ministers of the Republic of Karakalpakstan and the khokimiyats of the regions to ensure the effective implementation of the approved forecast indicators for the introduction of water-saving irrigation technologies in 2020 on 43,825 hectares, including on acreage:

[1] https://lex.uz/docs/4378524
[2] https://lex.uz/docs/4133402
[3] https://lex.uz/docs/4278986
[4] https://lex.uz/docs/4249836

Journal Zone Publishing, Ilford, United Kingdom

- ❖ cotton - by 24,859 hectares;
- ❖ fruit crops - on 11,498 hectares;
- ❖ vineyards - on 4,987 hectares;
- ❖ other crops - on 2,481 hectares.

2. To establish from January 1, 2020 the following procedure for state support for the introduction of water-saving irrigation technologies:

- ✓ of the President of the Republic of Uzbekistan dated December 11, 2020 No. PP-4919 National Database of Legislation, 12.12.2020, No. 07/20/4919/1616) import contracts concluded by agricultural producers as part of the implementation of water-saving irrigation technologies are not subject to the requirements for mandatory examination and registration of import contracts concluded by recipients of budgetary funds.

The cost of investments for the installation of a drip irrigation system was calculated on the basis of the corresponding price list of the manufacturer of drip irrigation systems in Namangan region – a production enterprise at the farm "Zhamoliddin Sardor Hamkor". The most expensive is the installation of a drip irrigation system for wheat – 91.6 million soums per 10 hectares, then for cotton – 88.4 million soums. The cheapest and most profitable is the drip irrigation system for 10 hectares of garden – 50.4 million soums.

We have already talked about drip irrigation and its benefits. It remains only to compare the manufacturers and the costs of implementing their systems. Benefit calculations are as follows (per 1 hectare):

- ✓ energy costs are significantly reduced for all crops as a result of a significant reduction in watering time and the operation of pumps for pumping water. As a result, drip irrigation reduces electricity costs by 499 thousand soums per 1 hectare of cotton, 317 thousand soums per 1 hectare of wheat and 320 thousand soums per 1 hectare of garden per season;
- ✓ the costs of diesel fuel and agrotechnical measures are reduced, especially for cotton, since cotton cultivation consists of more agrotechnical measures compared to wheat or gardening. Drip irrigation will save more than 100 thousand soums per 1 hectare of cotton on diesel fuel and 85 thousand soums per 1 hectare of cotton on agrotechnical events annually;
- ✓ due to the effective application (through the system) and assimilation of mineral fertilizers during drip irrigation, fertilizer costs are reduced: by 114 thousand soums per 1 hectare of cotton and 37 thousand soums per 1 hectare of wheat annually;
- ✓ labor costs are reduced – 200 thousand soums per 1 hectare for all crops under consideration;
- ✓ the projected yield growth is quite significant and averages 40% for all crops.
- ✓ Based on the average yields of crops and average prices for them, annual benefits were calculated:
- ✓ water savings for all crops is 11,760 m3 of water per 1 hectare of cotton, 6,600 m3 per 1 hectare of wheat, 11,455 m3 of water per year per 1 hectare of garden;

Journal Zone Publishing, Ilford, United Kingdom

✓ according to the Decree of the President of the Republic of Uzbekistan No. UP-4478 dated October 22, 2012, legal entities that have implemented a drip irrigation system will be exempt from paying a single land tax for a period of 5 years in part of the land plot on which drip irrigation is used Approximate calculation of savings from tax benefits is 81 thousand soums per 1 hectare for each crop in year;

✓ The payback period is the ratio of investments to annual total benefits. According to calculations, the investments made in drip irrigation for cotton will pay off in a little more than 3 years, and for wheat – in 4 years. The most profitable investments are obtained for the garden – the payback period is slightly less than 2 years (Fig.1).

✓ Thus, the drip irrigation system is beneficial not only from the point of view of careful attitude to natural capital (saving water resources, improving the soil of the earth, saving energy and fuel, reducing emissions, etc.), but and economically beneficial not only for the garden, but also for cotton and wheat in the medium term.

✓ Drip irrigation can be applied to any crop. According to the results of scientific research and advanced experiments with drip irrigation, an increase in crop yields was observed as follows:

❖ cotton – 50-55 c/ha;
❖ corn for green mass – 120-130 t/ha;
❖ corn for grain – 25-32 t/ha;
❖ tomatoes in the open ground – 130-140 t / ha, and in thgreenhouse – up to 500 t / ha;
❖ grapes – 5.0 t/ha; apples – 60 t/ha.

It should be noted that when using drip irrigation, the possibility of harvesting in favorable weather conditions is created due to the simultaneous ripening of the cotton crop. In a field where the harvest is harvested early, autumn-winter activities for the next harvest year are also carried out without difficulty and on dry days. Depending on the attention to local conditions, the chosen irrigation method must meet the following requirements: maintain the necessary water, air, nutrient, salt and thermal regime in the soil;

❖ to create the necessary soil moisture in the field; by reducing water consumption and achieving the maximum coefficient of rational use (at least 0.90–1.0) to ensure the established irrigation regime;
❖ preservation of the best soil structure; creation of conditions on irrigated areas for mechanization of work performed;
❖ ensure high productivity during irrigation;
❖ create conditions for the possibility of mechanizing and automating irrigation.

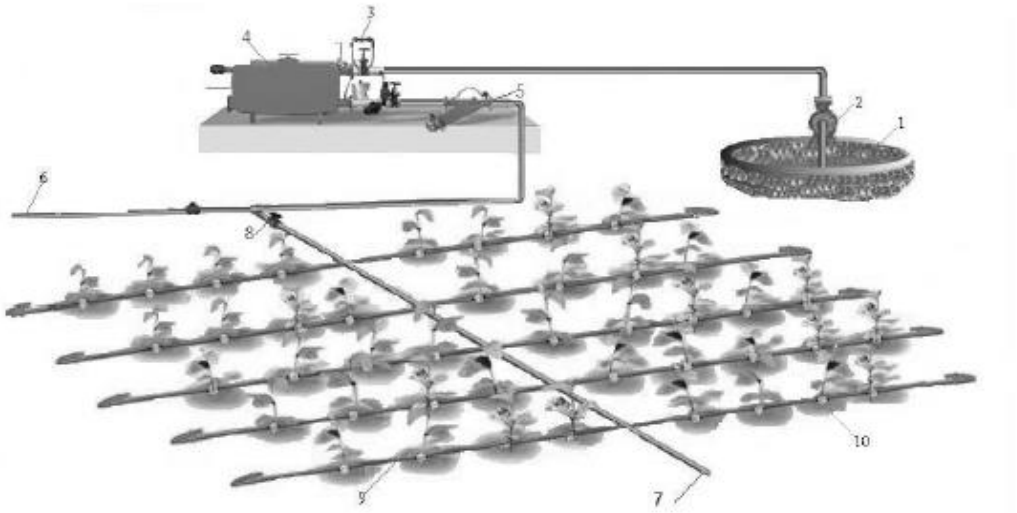
The drip irrigation system consists of a water source, pump device, device for making fertilizers, two-stage filters, main and distribution pipes and flexible plastic hoses with droplets. The location of the system elements is shown in figure 1. When dripping irrigation of agricultural crops, water supply directly to the location of the roots of each plant is carried out through special systems that are fully mechanized and automated,

Journal Zone Publishing, Ilford, United Kingdom

as well as equipped with a computer system. All system elements are connected by the control panel on communication lines and are controlled by the remote operator. The design of droplets is chosen so that, despite the significant change in water pressure in the system, they have the opportunity to serve water with the same norm.

The system works in the following order. So, the drops are not covered, the established water in the source (pool) is sucked by water pump 1 and under pressure is Fed through special filters 4 and 5, the main 6 and distribution pipes 7 to flexible plastic hoses 9 and further to drops 10. Water consumption and pressure in the system are controlled by the appropriate devices. In water in a special device system dissolve mineral fertilizer, trace elements, if necessary, add herbicides and deliver to the roots of plants in the established norm. Such field work is carried out by a special computer system, which first determines the time when the plant is thirsty, and then carries out irrigation. In conclusion, there is no doubt that the drip irrigation of agricultural crops is the most economical, convenient and promising method of irrigation.

Therefore, every farmer, regardless of whether he is a producer of raw cotton, cereals, fruits and vegetables, has a deep understanding of the advantages and essence of this method, that its introduction in their farms is the most rational and reasonable solution, especially at the present time, when water scarcity is growing.



1 – water source; 2 – pumping device; 3 – fertilizer application device; 4 – sand filter; 5 – disc or mesh filter; 6 – main pipe; 7 – distribution pipe; 8 – pressure regulator; 9 – hoses with droppers; 10 – droppers.

1 – water source; 2 – pumping device; 3 – fertilizer application device; 4 – sand filter; 5 – disc or mesh filter; 6 – main pipe; 7 – distribution pipe; 8 – pressure regulator; 9 – hoses with droppers; 10 – droppers.

Figure 1. General view of the drip irrigation system[5]

[5] https://cyberleninka.ru/article/n/kapelnyy-poliv-samyy-ekonomichnyy-perspektivnyy-sposob-poliva-kultur.

Journal Zone Publishing, Ilford, United Kingdom

The water problem is one of the main problems in the country, which unites the entire region. In some years, we could observe about 15-20% of water scarcity, this year there is still a tendency to decrease this statistic. The problem is aggravated by the fact that Uzbekistan owns only 20% of the total amount of water in the region, the remaining 80% comes from neighboring countries, where agriculture is also developing and water needs are constantly growing.

I see the solution to the problem in the following:

- ❖ introduction of drip irrigation system;
- ❖ the use of a polyethylene film, which provides water savings of an average of 50-60%;
- ❖ replacement of temporary sprinklers with polyethylene pipelines, as a result of which we will achieve a reduction in water filtration deep into the ground (Fig.2).

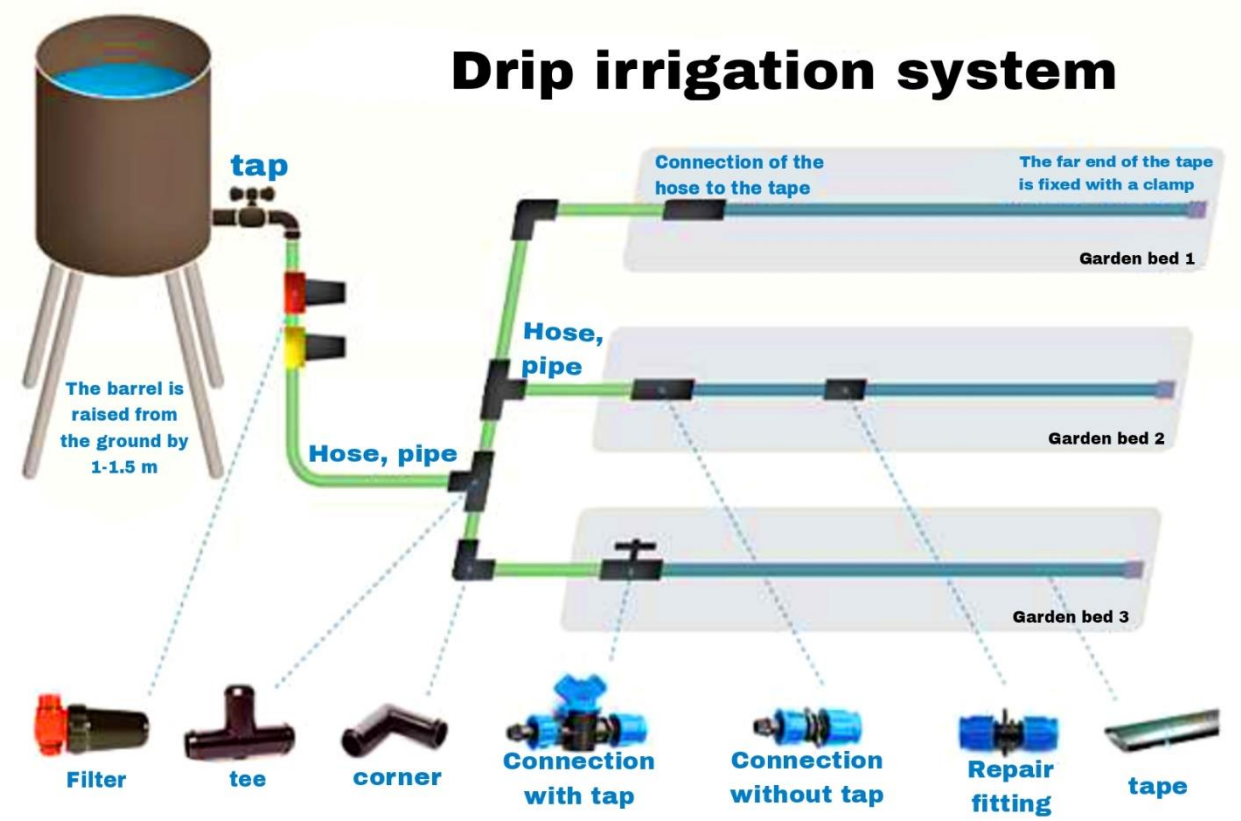


Figure 2.

At that time, similar systems were being developed in Uzbekistan. Already in 1968, Jamoliddin Boltabayev conducted his experiments on a plot of land of 1 hectare in Namangan. The drip irrigation system, which was first created by Jamoliddin in Namangan, was very simple – it consisted of ordinary hoses that the agronomist stretched across the site. With a heated soldering iron, he inserted a clothing button into it. After that, I made one, two or three holes in it (depending on the distance from the water source) to distribute the pressure.

Journal Zone Publishing, Ilford, United Kingdom

However, Jamolitdin failed to complete and widely implement his invention. His father's work was brought to life by his son Adbulvohid Boltabayev. At first, Adbulvohid successfully tested a tubular drip irrigation system in his cotton field. The farmer received 38 quintals of cotton from one hectare of land. For comparison, his neighbors from the same plot received from 15-21 quintals per hectare. In addition, Abdulvohid used three times less water, 50% less mineral fertilizers and 58-60 liters per hectare less fuel for agricultural machinery. Compare for yourself: with the usual system of irrigation ditches and channels, watering lasts three to four days. And with drip irrigation - a maximum of 5 - 6 hours. At the same time, the assimilation of mineral fertilizers is 90-95%, whereas with traditional irrigation it is only 30-35%.

The drip irrigation system is beneficial not only in terms of respect for natural capital (saving water resources, improving soil, saving energy and fuel, reducing emissions, etc.), but also in economic terms - not only for the garden, but also for cotton and wheat in the medium term.

According to research by scientists, the total irrigated area in Uzbekistan is 4.3 million hectares of land.

According to the Ministry of Finance, the introduction of a drip irrigation mechanism on an area of 1,500 hectares in 2016 cost 2 billion soums. According to the Ministry of Agriculture and Water Resources, the drip irrigation system in Uzbekistan until 2016 was implemented on 18.5 thousand hectares.

• As noted in the Ministry of Agriculture and Water Resources of Uzbekistan, drip irrigation makes it possible to save 65% of the water consumed in cotton growing and up to 54% in horticulture and vegetable growing, significantly increasing yields Within the framework of current legislation, it is indicated that the sources of the introduction of drip irrigation are the funds of the credit line of the Fund for Reclamation Improvement of Irrigated Lands under the Ministry of Finance, own funds agricultural producers, including loans from commercial banks.

Agricultural producers are allocated loans for the introduction of drip systems at the expense of the fund's credit line - up to 1000 times the minimum wage, with a six-month grace period for a period of at least three years at a preferential interest rate.

It is set at 6% per annum, including the bank's margin of 3%. Farmers who grow crops on lands with an average annual water shortage, as well as on machine irrigation lands with high costs for raising irrigation water, have the right to receive such loans.

✓ Conclusion. The widespread introduction of drip irrigation requires huge investments; however, it allows you to significantly save on the use of resources. For a hypothetical assessment of the effect of the widespread introduction of a drip irrigation system at the regional level, we took Namangan region as an example. The calculations are quite simple and clear:

✓ the extrapolation of the above results (Table) was made for the total sown area of cotton and wheat in the region, which amount to more than 86 thousand hectares of cotton and about 9 thousand hectares of wheat.

Journal Zone Publishing, Ilford, United Kingdom

As anchor units for evaluating the effectiveness of the drip irrigation system, we took resource savings per 1 hectare of cotton and wheat – the key agricultural crops in our country. It should be noted that this is a rather rough and approximate estimate when the results of one experiment are projected onto an entire area. However, due to the lack of other published experiments in Uzbekistan that would clearly demonstrate the effectiveness of drip irrigation (with all indicators), we focus on the results of the experiment in Namangan region, which allows us to visually assess the possible benefits of drip irrigation.

Based on average yields and prices, the use of drip irrigation provides:

- ✓ Water savings for all crops (cotton, cereals, orchards) over 11,500 cubic meters per year.
- ✓ Savings due to tax benefits - 81 thousand soums per 1 hectare.
- ✓ Energy savings – 317 - 499 thousand soums per 1 hectare.
- ✓ Diesel fuel economy - more than 100 thousand soums per 1 hectare.
- ✓ On fertilizers - 37-114 thousand soums per 1 hectare.
- ✓ On labor resources – up to 200 thousand soums per 1 hectare.
- ✓ An average of 1 million soums of benefits can be obtained from one hectare.
- ✓ The yield increases by 40% on average.
- ✓ The payback period is from two to four years.

References

1.Justification of optimal irrigation technologies – http://rosta-moscow.ru/news/obosnovanie-optimalnyx-texnologij-orosheniya /.

2. Business Expert-M LLP – "Production of fruit and vegetable crops using drip irrigation technology in Kostanay and North Kazakhstan regions", marketing research, 2019 A.Narayanamoorthy - Economics of drip irrigated cotton: a synthesis of four case studies, 2018.

3. Presidential Decree No. PP-1958 of April 19, 2018 "On measures to further improve the reclamation condition of irrigated lands and rational use of water resources for the period 2013-2017".

4. Resolution of the Cabinet of Ministers of the Republic of Uzbekistan No. 176 dated June 21, 2013 "On measures for the effective organization of the introduction and financing of drip irrigation systems and other water-saving irrigation technologies".

Journal Zone Publishing, Ilford, United Kingdom