ISSN NO: 2771-8840
Date of Publication: 30-10-2022

Gradual Changes of Drip Irrigation in Agriculture of Samarkand Region

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Resume: There are constant changes in the structure of agricultural industries. One such change is the processes associated with irrigation systems. The article talks about modern irrigation methods implemented in the region, including drip irrigation. The change of these processes in 2008-2018 was scientifically analyzed and tabulated. The data is presented in two different charts for better understanding. In the concluding part of the work, proposals and recommendations on the implementation of drip irrigation in the region are given.

Key words: modern irrigation technologies, water resources, drip irrigation, Samarkand region, districts, drainage channels, Jomboy, Pakhtachi.

Introduction. Water shortage and water use problems have always been relevant in arid climate regions. Modern irrigation technologies play an important role in solving these issues. However, not all of them can be regularly used in the economy of our country. In general, modern technologies include sprinkler, drip, subsoil, aerosol irrigation, etc. Of these, in our conditions, drip irrigation is widely used in agriculture.

Samarkand region is considered one of the country's favorable geographical location. Situation of Natural geographic of Uzbekistan in the mountainous area, in the central area are on the economic and geographic, also have many opportunities in socio-economic development of the region. In particular, the role of the hydrographic noteworthy advantage.

Reports that state the average annual amount of 5385 million m^3, of which 251 million m^3 of water are formed in the same place, the basic water come from Zarafshan river. The vast majority of water resources (4024 m^3), namely 74.7 per cent will be spent on the territory of the region (the farm is used, to evaporate, sticks, etc..), While the rest of 1351 million m^3 of water will be returned to the river [3].

Water resources of the region and its quantitative indicators of wealth across regions and the quality of (water sources). 2819.3 million m^3 of water per year to the economy of the region [2]. Zarafshan River provides 86 percent of the total water consumption in the region.

Agricultural drainage channels also play an important role, especially in the eastern areas, it is also used as drinking water. The total amount of water to be kept 268.9 million m3, 9.5 percent of the total. Creeks and springs waters, mainly in mountain and foothill areas of irrigated land is especially important to provide water. Not a small amount of underground water (45.3 million m^3), and improve the quality of drinking water is used for the needs of the population as well as livestock.

Drip irrigation is a method in which water is applied to the soil, while a large part of the soil surface remains dry. In this irrigation, through a network of small-diameter pipes installed at a certain distance from each other and having small holes, water is supplied in the form of drops to the soil surface at a close distance from the plant, and thanks to this, water consumption is saved.

The root that sprouts from the soil under the holes of the drip irrigation pipes creates a certain spherical wetted area around it, that is, not the entire irrigated area, but only the land in the circle adjacent to the trunk of a fruit tree, vine or other plant. gets wet. Drip irrigation is mainly used to supply water to gardens and vineyards and to grow crops in greenhouses. Later, this method is also used for growing vegetables and other crops in the region.

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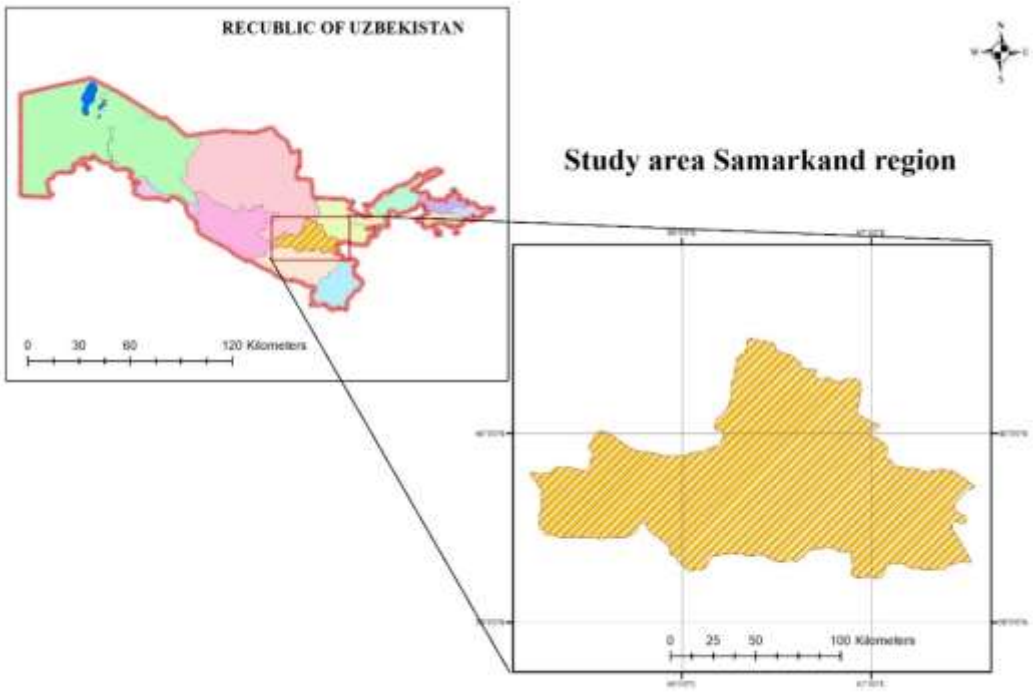
In recent years, the introduction of water-saving technologies has been started in the agriculture of Samarkand region. Some of the modern irrigation technologies are currently used in the region, while others are intended to be used in the future. Currently, several works on drip irrigation are being carried out.

2. Study area.

The studied region of Samarkand region (Fig. 1) is one of the regions with better water resources of the Republic of Uzbekistan. The amount of water used in agriculture in the region is limited, and their quality also causes some limitations. These are, first of all, that the amount of water used for agriculture is still very high. Currently, as a result of the use of regional agriculture for these and other purposes, water resources are decreasing. Compensating for this loss requires a consistent increase in land productivity [4].



Picture 1. Map of the Samarkand region

3. Materials and methods

Information about drip irrigation implemented in Samarkand region is mainly available in the Zarafshan Irrigation Systems Basin Department. In addition, the Regional Department of Agriculture, the Regional Council of Farmers also directly participated in the implementation of these tasks. Statistical-mathematical, comparative-analytical, historical, cartographic, and system content methods were used in the work.

Results. Drip irrigation has been widely developed in regional agriculture, especially in the last 10 years. In all regions of the region, in different years, this process is being implemented step by step. In general, from 2008 to 2013, drip irrigation was carried out in all districts within the limits of possibility (Table 1). In particular, in 2013 and 2014, five districts, in 2015 and 2016, in 12 districts, in 2017, in all districts, but in 2018, drip irrigation was implemented in 11 districts [2]. In the last year, these tasks were not fulfilled in Narpay, Nurabad and Pakhtachi districts. The main reason for this can be the salinity of the land. Because in saline lands, if the plant is watered with drops, a strong pressure occurs around the roots (due to the salt), and after not receiving the required amount of nutrients, it stops developing. Therefore, these works are mainly used in areas with satisfactory soil conditions.

The areas of drip irrigation were gradually increased from year to year. In this decade, almost all the planned works have been implemented. That is, if it was 100% in the first four years (2008-2012), then it was fulfilled with more (Fig. 1). Especially in 2015, the plan was implemented by 1.5 times.

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During the years 2008-2018, a total of 9995.8 hectares of land was tested in the region. This process is mostly observed in suburban districts, and only in 4 districts (Zomboy, Samarkand, Bulung'ur, Pastdargom) more than half of the total share of the region (57.5%) is correct (2 - picture). This method of modern irrigation works has been implemented in various fields in the regions of the region.

Figure 1

Information on the introduction of drip irrigation methods in the districts of Samarkand region in 2008-2018 (percent)

№	Name of districts	2008-2012 yy	2013 y	2014 y	2015 y	2016 y	2017 y	2018 y	Total
1	Bulungur	148		292	407	70	142	130	**1189**
2	Jomboy	65	520	397	207	220	610	900	**2919**
3	Istikhan	31					37	134	**202.3**
4	Kattakurgan	60				16	297	80	**453**
5	Narpay	292				15	20		**327**
6	Nurabad	398	40			65	80		**583**
7	Akdarya	50	8	27	60	50	10	86	**291**
8	Pastdargam	192			343	190	200	207	**1132**
9	Pakhtachi	4					30		**34**
10	Payarik	255	5			100	200	110	**670**
11	Samarkand	862	40	100	266	65	87	93	**1513**
12	Tailak	25		40	56	40	30	34	**225**
13	Urgut	10.5			20	90	50	69	**239.5**
14	Kushrabot	10					148	60	**218**
Total		**2403**	**613**	**856**	**1359**	**921**	**1941**	**1903**	**9995.8**

***Source**: Information from Zarafshan Irrigation Systems Basin Department.*

Introduction of drip irrigation method in the region allows efficient use of water, reduces its consumption. The environmental utilization rate reaches 95%, which ensures:

- the amount of irrigation corresponds to the plants' water needs;
- water is supplied directly to the part of the root located in the soil;
- evaporation from the soil surface is reduced;
- there will be no excess water flow on the surface of the earth;
- total energy and labor consumption is reduced, constant human participation in irrigation is not required;
- it is possible to automate the process;
- it is possible to combine irrigation with fertilizing, reduce their consumption and improve the nutrition of plants;
- weeds do not grow due to the fact that water is delivered directly to the roots of crops;
- agrotechnical activities (cultivation, mowing) are economized;
- reduces the possibility of secondary salinity.

In addition to positive aspects, drip irrigation has some disadvantages:

There is a need for large initial financial costs, especially when using an automatic irrigation system;

It is necessary to accurately adjust the amount of water supplied to each plant. This is especially important when the water supply network is very long. In this case, it is required to adjust the amount of water transferred using special devices;

Automatic irrigation control system is complex. Failure or malfunction of any element can lead to crop failure.

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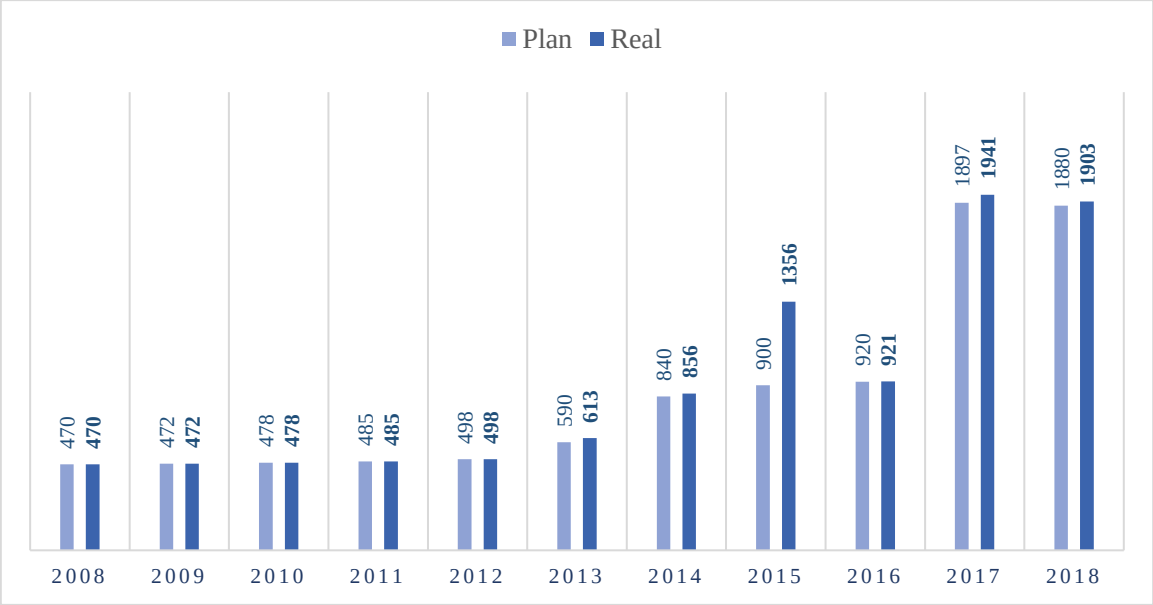
In order to widely introduce drip irrigation technology, first of all, it is necessary to thoroughly study these shortcomings and find measures to prevent or eliminate them.



Picture 2. Dynamics of drip irrigated areas in the region (in ha)

Source. Prepared by the author based on the data of Zarafshan Irrigation Systems Basin Management (ZISBM) 2008-2018.

The greatest useful coefficient of irrigation technology (FIK) is achieved in soil irrigation - 0.98; 0.95 in drip irrigation and 0.80-0.90 in sprinkler irrigation [2]. However, large amounts of money are spent on organizing and using sprinkler, drip and subsoil irrigation. In addition, highly qualified specialists are required to operate and maintain these systems. The aforementioned irrigation methods are currently used in certain natural (climatic, soil and hydrogeological) conditions. These methods can be used in automorphic soils, i.e. in soils with a very deep seepage water level and light mechanical composition. The level of mineralization of underground water should not exceed 3 grams per liter. Irrigation does not allow suspended particles to exist in the water, as this can cause the system to clog drippers and nozzles. In order to use the sprinkler irrigation method other than the conditions mentioned above, the wind speed in the irrigated area should not exceed 3-5 meters per second.

Drip irrigation is the most water-saving method among the irrigation technologies available today. This method requires less financial costs and labor costs compared to sprinkler and subsoil irrigation. Drip irrigation can be effectively used in the following conditions:

• in areas with a significant slope and elevation. In the mountain and sub-mountain regions of the region, including Urgut, Bulungur, Ishtikhan, Kattakorgan, Koshrabot districts;

• in soils with high water absorption. Mainly in desert and barren zones, including Nurabad, Koshrabot, Pastdargom, Pakhtachi, Narpay districts;

• in places where water resources are scarce. This is also in desert and barren zones, including Nurabad, Koshrabot, Pakhtachi, Narpay districts;

• when there are water sources that do not have suspended particles or when the water is initially cooled;

• for irrigation of gardens, vineyards and greenhouses and small areas. In suburban areas.

Currently, various systems of drip irrigation are used. Many of them are very expensive, their structure is very complex, and their use requires well-trained specialists and special conditions. It should be noted that the capacities for the production of drip irrigation systems and their components are being created in Uzbekistan. For now, it is necessary to import the main parts of drip irrigation (droppers) from abroad. This complicates the mass introduction of the drip irrigation system in the Republic.

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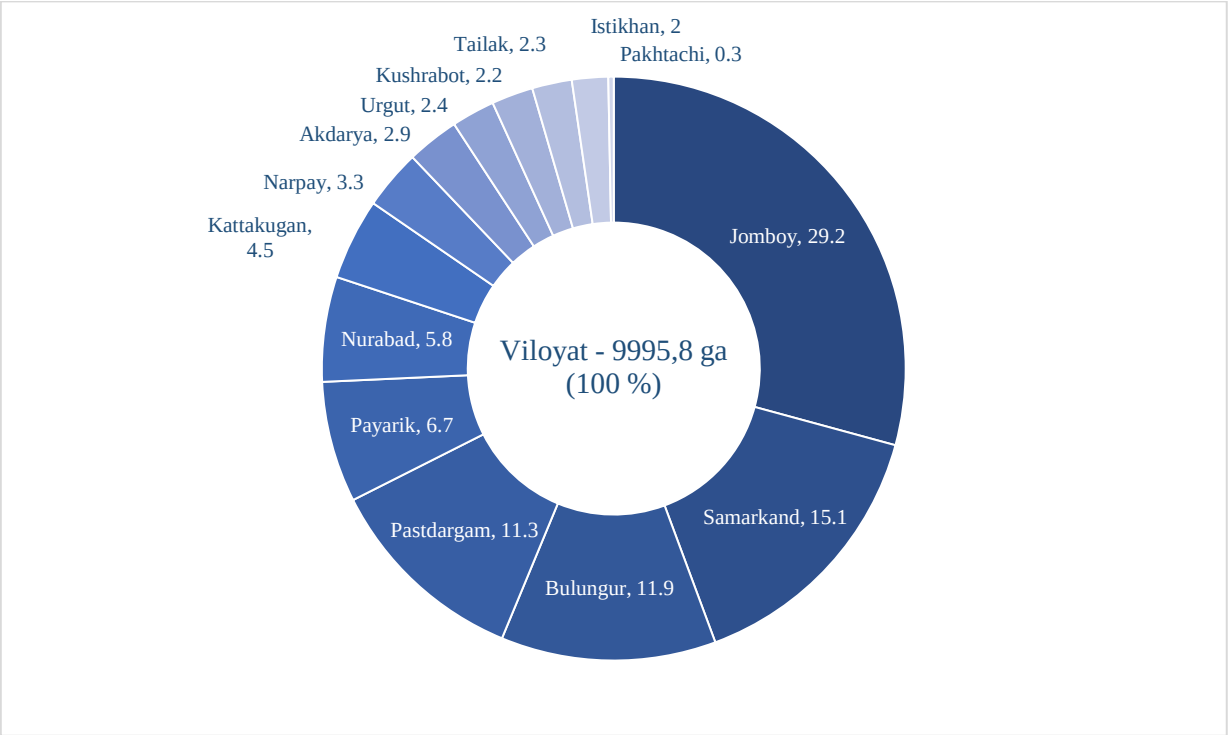
The main part of the new drip irrigation system consists of irrigation hoses made of flexible polyethylene with no visible interior. They are firmly connected to the main pipe, and along its central axis there are very small (micro) water discharge holes - drippers. This technology is very suitable for small greenhouses, because it does not require expensive components to make such a system. The main part of the system can be made from simple materials that are always at hand. In addition, the system is very easy to use, and this is important. With its help, it is possible to feed the crops in the specified amount and to do this with irrigation.



Picture 3. Share of regional districts in drip irrigated land (in %)

Source. *It was prepared by the author based on the data of Zarafshan Irrigation Systems Basin Department (ZITHB) 2008-2018.*

As a result of harvesting rice and softening the land with the help of deep softeners, applying agrotechnological measures, there is no need to prepare the land for planting in the spring, it is possible to collect the seed with the moisture of the soil, to carry out the planting 8-10 days earlier than in other areas, and to save water. ensures the cultivation of a fairy tale and quality harvest. According to the analysis, vegetation water is supplied less than once in such areas, and 1.2-1.4 thousand m3 of water is saved per hectare [1].

In areas irrigated by drip and rain, water does not soak into the ground excessively, because the moisture layer of the soil does not exceed 40 centimeters, and the main part of the roots of plants is mainly located in this layer. As a result, due to the reduction of water seepage into the ground and the prevention of the outflow of water to collectors and drains on large areas, it is possible to save money spent on the operation of collector-drainage.

In the spring and autumn months of the year, there is a water shortage in the upper part of the Kattakorgan and Okdaryo reservoirs of the region. In order to mitigate the effects of this water shortage in the region, along with measures to clean ditches, modern technologies that save water resources are being introduced.

Conclusion. In the regions of the region (Zomboy, Aqdaryo, Ishtikhon), a number of works are being carried out on the rational use of water resources, the introduction of modern achievements in this regard, and the involvement of water-saving technologies in agriculture (Fig. 3). These are mainly horizontal and drip irrigation, and there are currently insufficient opportunities and conditions to use other methods (sprinkling and subsoil irrigation). Moreover, this irrigation work has not reached its optimal level. Especially the drip

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irrigation system needs a lot of reforms. These reforms include introduction of modern technologies, increase of qualified personnel, increase of expenses for development of irrigation works, etc. However, the most important thing is to constantly monitor this process, and gradually expand the irrigation areas.

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