RELEVANCE OF THE RAIN IRRIGATION METHOD

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Abstract. At a time when the countries of the world are experiencing a financial and economic crisis, one of the most important tasks of our state is the rational use of available resources to raise agriculture to a higher level, the introduction of scientifically based, resource-saving, and improved agricultural technologies for the care of agricultural crops, as well as obtaining high and quality yields with minimal costs. Currently, considering the population growth on Earth, the increasing demand for water resources, and the decrease in river water volume year by year, the application of resource-saving irrigation technologies for obtaining high-quality agricultural products is relevant.

Keywords: Irrigation, resource-saving, irrigation, sprinkler irrigation, water-saving, irrigation rate, salt leaching, vegetation

Therefore, the rational use of available water resources, the widespread introduction of water-saving irrigation technologies is one of the urgent tasks before us.The expansion of irrigated land areas has led to an increase in water consumption in agriculture.

Irrigation is the artificial moistening of the soil or the supply of water to lands with insufficient natural moisture. Irrigation is the artificial moistening of the soil with water from sources, a type of melioration. Irrigation creates the most favorable water regime in the part of the soil where plant roots are distributed. This creates favorable

conditions for plants to absorb nutrients - mineral and organic fertilizers from the soil - and ensures high yields of agricultural crops.

In China, India, Pakistan, Iran, Russia, Japan, Egypt (all sown areas are irrigated), the USA, Mexico, Italy, Bulgaria, France, and other countries, irrigated lands expanded especially rapidly in the 20th century, and large irrigation systems were built. In the 1950s, the total area of irrigated land in the world was 121 million hectares, in the 1980s - more than 230 million hectares, and at the end of the 20th century - 271.4 million hectares. In Asia, 191.2 million hectares are irrigated, in North America - 30.4, in Europe - 24.6, in Africa - 12.5, in Australia - 2.4 million hectares (1999).

The expansion of irrigated land areas led to increased water consumption in agriculture. As a result, seasonal, and in subsequent years, long-term river flow regulation through the construction of reservoirs became an important issue. The creation of high-power pumps made it possible to gradually raise about 250-300 m3/s of water to a height and irrigate agricultural fields by machine method. Currently, the total annual volume in the Aral Sea basin is 105 billion m3, of which 95 billion m3 of water is used for irrigation. This requires replenishing water resources and saving water in all links of the irrigation system. Water resources are replenished mainly through inter-basin water redistribution (Amu-Bukhara, Amu-Karakul, Karakum, and other canals), reuse of wastewater and saline drainage waters.

Irrigation is a set of technical, agrotechnical, and organizational-economic measures based on hydraulic regulations that ensure the standardized (established) amount of water for the soil. Irrigation is divided into regular and periodic, depending on the time of irrigation. By purpose, irrigation is subdivided into reserve, flushing, vegetative, nutrient (juice), and other types. In some cases, uniform irrigation can be carried out for several purposes. The methods of flow irrigation known since ancient times (flooding, cutting into planks, taking furrows) were gradually improved, and such improved irrigation methods as sprinkling, drip irrigation and subsoil dilution, aerosol irrigation were created. In the arid climate of Central Asia, agricultural crops require a

large amount of water, therefore, on irrigated areas, mainly surface irrigation and partial sprinkler irrigation are used.

In recent years, consistent reforms have been carried out to effectively use land and water resources, improve the water management system, and modernize and develop water management facilities. At the same time, the shortage of water resources is increasing year by year due to global climate change, population growth, and the growing need of economic sectors for water.The average annual volume of water used amounted to 51 - 53 billion cubic meters, including 97.2 percent from rivers and streams, 1.9 percent from collector networks, 0.9 percent from underground sources, which is 20 percent less than the allocated water intake limit.

In order to ensure a stable water supply for the population and all sectors of the republic's economy in 2020-2030, improve the melioration state of irrigated lands, widely introduce market principles and mechanisms, as well as digital technologies in water management, ensure the reliable operation of water management facilities, and increase the efficiency of land and water resources use: the Concept for the Development of Water Management of the Republic of Uzbekistan for 2020-2030 has been developed, and these priority tasks are being implemented in the prescribed manner and within the established timeframe.

Sprinkler irrigation is the delivery of water to the soil surface and plants in the form of artificial rain using special machines, devices, and aggregates. The water requirement of plants depends on climatic and natural conditions, biological characteristics and varieties of agricultural crops, age, duration of the growing season, amount of harvest, soil fertility, and agricultural techniques. The amount of water that can retain the calculated soil layer after irrigation is the limiting field moisture capacity

(MWC). When accounting for the irrigation rate of agricultural crops, it is necessary to take into account the absorption of groundwater by plants.

Sprinkler shaft DSH-10. DDA-100M Sprinkler Machine

Leaders in the application of sprinkler and drip irrigation technologies: Finland (100%); Great Britain (100%), Slovenia (100%), Lithuania (100%), Estonia (100%), Slovakia (99.9%), Israel (99.6%), Germany (98.1%), Malawi (88.4%), Hungary (87.3%), Canada (79.2%), Russia (78.2%), South Africa (77.0%), Spain (69.3%), Brazil (61.6%), Italy (58.1%), Korea (59.4%), USA (56.5%), Saudi Arabia (56.4%), France (51.1%).

Of the existing 69.01 million hectares of irrigated land in China, 3.41 million hectares are irrigated by sprinkler irrigation, and 1.94 million hectares are irrigated by drip irrigation, or 7.75% of irrigated land in China uses water-saving irrigation technologies. These indicators in the USA are 56.64% (rain - 50.0% and drizzle - 6.64%), in Russia - 78.2% (77.8% and 0.40%), in Israel - 99.5% (16.0% and 73.5%).

In our republic, the technology of drip irrigation, which is an economical irrigation method, is widely used in growing agricultural products, and positive results are being achieved. At the same time, there are such types of crops and fields where the possibilities of applying drip irrigation are limited. The possibilities of implementing drip irrigation technology in the cultivation of fodder crops for livestock (alfalfa, etc.), irrigated grain crops, and vegetable products are limited. These plants are in season.

The need for 3-5 harvests (forage crops) depends on the sowing method and the plant's root system (grain crops, fallow lands, pastures, etc.). On such sown areas, it is effective to apply a cost-effective irrigation technology.

According to the "International Commission on Irrigation and Drainage," about 14% (39 million hectares) of the total irrigated land in the world is equipped with water-saving irrigation systems, of which 12% (33 million hectares) are irrigated by sprinkler irrigation and 2% (6 million hectares) by micro-sprinkler irrigation.

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Sprinkler irrigation unit.

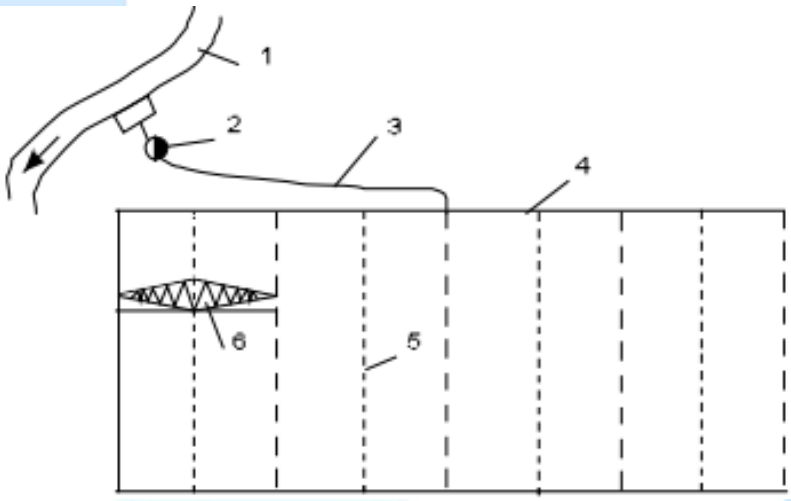
Benefits of sprinkler irrigation:

- the possibility of changing the depth of soil moisture using irrigation norms;
- increasing relative humidity and lowering the temperature of the surface air layer, preventing frostbite of crops;
- uniform distribution of water across the field and absence of requirements for its relief;
- the absence of the need to build irrigation furrows and ditches;
- possibility of applying mineral fertilizers with irrigation water; - possibility of adaptation to furrow irrigation;
- water-saving method, high water use coefficient (WSS);
- high land use coefficient (LUE).

Disadvantages of sprinkler irrigation:

- high demand for metal for machines and devices;
- high energy consumption in the irrigation process (for the implementation of m = 300 m3/ha, 40-100 kWh of electricity is consumed);
- low productivity with high irrigation rates; uneven water distribution with strong winds, increased evaporation;
- complexity of irrigation technology;
- limited use of saline lands;

- disruption of the structure of the topsoil layer, formation of crust are the main shortcomings.



Sprinkler irrigation system: 1-source; 2- device for creating artificial pressure; 3-economic sector; 4 - spring; 5-temporary (water supply) network; 6-precipitation irrigation device.

In the world, a leading place is occupied by the fundamental reformation of the mechanisms for using natural resources, ensuring their rational and efficient use, developing and applying economical technologies and equipment in the branches of the national economy. Considering that "in the world, economically efficient irrigation technology has been implemented on an area of more than 33 million hectares," the use of irrigation machines and devices that carry out the irrigation process with minimal energy and resource expenditure is one of the important tasks in growing agricultural crops. In this regard, much attention is being paid to improving the procedures for using and operating sprinkler irrigation devices as one of the effective irrigation methods in agricultural production.

The efficient use of the republic's land and water resources, including the cultivation of rich and high-quality agricultural products that meet the requirements of world standards, is inextricably linked to accelerating the development and implementation of resource-saving irrigation technologies. The Concept for the Development of Water Management of the Republic of Uzbekistan for 2020-2030 defines tasks, including..."improvement of water-saving irrigation technologies

depending on soil and climatic conditions and the type of agricultural crops, expansion of research and development work to increase efficiency and create new ones, introduction of new developments into practice". In the implementation of these tasks, including in the cultivation of agricultural products, one of the important tasks is to ensure the quality and resource saving of sprinkler irrigation devices and their irrigation process, reducing water resource losses and energy costs through surface irrigation under low pressure.

Based on the above, the correct choice of irrigation method, depending on the plant species and its water requirements for growing agricultural products, currently achieves high and quality yields of agricultural crops with low water consumption under water deficit conditions.

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