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The Application of Water-Saving Agrotechnics and Technologies is the Foundation of Water Security

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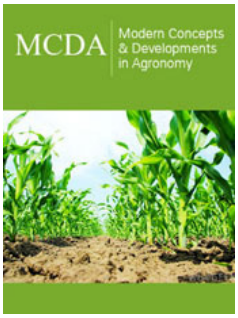

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Abstract

The article is devoted to the current state of infrastructure in the water farm system, the main problems, water losses and measures to struggle against them, and at the same time, the application of water-saving technologies in order to utilize irrigation water more efficiently.

Keywords: Irrigation; Global climate changes; Water losses; Water farms; Irrigation technologies; Leveling

Introduction

The main problems of the current state of the irrigation infrastructure. The irrigation and amelioration network in Azerbaijan was created mainly due to the expansion of irrigated areas for the purpose of fulfilling five-year mandatory government plans for the production of agricultural products in the former Soviet Union during the last hundred years.

In that period, the necessity of including the land in the agricultural cycle in a short period of time and supplying the areas involved in the agricultural cycle with water in a quick time, irrigation networks were built in the land channel, being mainly open structures. As well as the low level of operation and maintenance of the concrete-lined canals built at that time and the fact that they were used for a long time led to their rapid failure.

After the land reforms, 80-85% of the approximately 1,432 thousand hectares of irrigated land areas of the republic were given to private property. More than 90% of privately owned land in the republic is irrigated by the traditional method (surface method). In order to provide water to irrigated areas, 51702km of irrigation network was built and put into use.

Currently, the current state of irrigation systems and facilities can ensure the delivery of the required water to the field. However, they do not meet today's requirements because of the expansion of the irrigated areas from year to year, the repair and restoration of the intra-farm network and bringing it into full working condition, and its physically attrition due to being in use for more than 50 years. On the other hand, 1.1 million hectares of privately owned irrigated land needs to be leveled in advance using automated leveling aggregate with laser devices that meet modern requirements.

On the background of global climate changes, a strong decline of surface water in the water management balance is expected in the near future. Groundwater can be used to overcome this deficiency. At the same time, alternative water sources (Caspian Sea, collector-drainage and wastewater) can be used in the conditions of water shortage.

The main requirement of the modern era is to comply a more efficient use of existing water resources taking into account the uneven distribution of underground and surface water resources in the irrigated areas of the republic and the wide range change of natural

moisture potential (atmospheric precipitation to evaporation ratio R = 0.19-1.65).

Water losses occurring in the irrigation network. Changes in the natural environment due to global climate changes in the world primarily affect water resources. According to information from International Organizations, the reduction of freshwater resources will cause certain difficulties in the near future. We should consider that the Republic of Azerbaijan is among the countries with low water resources, and approximately 70% of the water resources in the territory are formed outside the country, and 30% within the country.

The main water use in the world is agriculture, and it takes 90-95% of the water used directly from rivers and reservoirs built for the purpose of regulating river water. The delivery of water taken from the water source to the irrigated areas is carried out by canals (highway, inter-farm and intra-farm) and aqueduct.

Water losses during water transportation are of great economic and ecological importance in the face of global climate changes and water scarcity.

Practically, the total water losses occurring in the system are divided into three parts and observed in the following rate: filtration -70-75%, evaporation 3-5%, and technical losses are 20-25%.

The first main cause of water losses is the supply of water to irrigated areas and in modern farming conditions, the main problems of irrigation of agricultural crops are the prevention of water losses in irrigation canals and irrigated areas [1].

The conducted analyzes show that if all underground channels are replaced by concrete channels on the background of global climate changes, water losses will be partially prevented, but it will not be possible to use water resources efficiently. In order to use water resources more efficiently, the following issues should be reflected. First of all, it is quite important to carry out laser leveling works (micro and macro) for the purpose of efficient use of water in irrigated small farms (share lands). After this process, the elements of traditional method (furrow, strip and planting) irrigation technique recommended by the Azerbaijan Amelioration SRI based on the results of long-term scientific research should be properly followed. In this case, the level of water losses that may occur in the field can be minimized.

In order to reduce water losses to the minimum level in small share lands, where the most water losses are allowed, it is appropriate to use modern types of sprinkler apparatus and synchronous impulse machines, depending on the size of the share lands [2]. For more efficient use of irrigation water and soil resources in irrigated areas, small share landowners should achieve the creation of large farms (cooperatives) by integrating them on the basis of voluntary principles and applying modern irrigation techniques and technologies in these areas [3]. This will make it possible to properly regulate the water inside the farm and, as a result, to follow the irrigation regimes at any time.

The most modern technologies are applied in the agricultural parks with large farms of the republic, besides modern irrigation technologies, pivot irrigation systems are installed, agricultural products are produced on modern innovation and scientific bases. Agricultural parks are an innovative and convenient mechanism for efficient use of land areas and water resources, increasing productivity, creating new production and processing areas, and applying modern irrigation systems. In this direction, Azerbaijan Amelioration SRI has conducted long-term scientific research works, positive results have been obtained and recommendations have been prepared.

In 1975-1980 and then SIA of Azerbaijan Hydrotechnics and Amelioration conducted extensive scientific research works in the direction of drip irrigation of orchards in the foothills of the republic, and positive results were obtained [4]. At present, drip irrigation is widely used by "Azersun Holding" company of Bilasuvar district of the republic, by "AGLAY LLC" company on the territory of 400 ha of Guba district, in Saatli, Ismayilli, Shamakhi and Absheron in the irrigation of olive groves. Based on the conducted research, it was determined that the irrigation process is fully automated, irrigation water is saved by 50-70% compared to the surface method, and the coefficient of land use is equal to 0.94-0.96 [5].

Larger farms typically get American-made Valley sprinkler apparatus. Due to the high selling price, small farms cannot buy them. For the purpose of more efficient use of irrigation water, in recent years, in different soil and climatic conditions of Kura-Araz agro-climatic region, large farms (in Bilasuvar, Yevlakh, Salyan, Imishli and other regions) and in Gabala region have used "VALLEY" artificial sprinkler apparatus manufactured by the USA. On the basis of the conducted research, it was determined that water loss is reduced by 40-50% and is approximately 15-17% by using in the irrigation of many agricultural crops (cotton, barley, perennial grass, wheat, clover, etc.) under any relief conditions [6].

During 2018-2021, intensive fruit orchards with a total area of more than 7,600 hectares were planted in the agricultural parks of the Republic of Azerbaijan, from which 17,000 tons of apples, 921 tons of olives, 960 tons of almonds, 934.7 tons of pomegranates, 1,356 tons of grapes, 715 tons of peaches, 368 tons of pears, etc. collected in 2021. Generally, more than 23,255 tons of fruit were obtained from orchards in 2021.

It is possible to obtain a stable and guaranteed product from agricultural plants by involving the appropriate fields of science and technology aimed at the efficiency of the use of water resources [7,8].

The technique and technology of irrigation has a decisive influence on the quality of soil water regime management, the productivity of agricultural plants, as well as the efficient use of soil-water-air, material-technical and energy resources, and the ecological state of the environment. By changing the water content of the growing environment, it is possible to regulate the water regime of the plant, thereby controlling the productivity process,

as well as shaping the product. The installation of modern rain-making equipment in the republic brings out the necessity of adapting them to the soil-water-climate conditions of the region, which provides a basis for conducting scientific-research works and developing recommendations on watering agricultural plants with modern irrigation techniques.

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