

## IMPROVING THE DRIP IRRIGATION SYSTEM FOR CROPS IN FOOTHILL AREAS OF KASHKADARYA WITH MINOR ELEVATION DIFFERENCE

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**Annotatsiya.** Ushbu tadqiqot ekinlar uchun qo'shimcha nasos uskunalari talab qilmaydigan va tomchilatib sug'orish liniyasining uzunligi bo'ylab suvning bir tekis taqsimlanishini ta'minlaydigan ochiq oqimli tomchilatib sug'orish tizimini ishlab chiqish uchun o'tkazildi. Ushbu tadqiqot umumiy ilmiy usullarga, xususan, jarayonlarni matematik modellashtirishga, grafik usulga va eksperimental ishlab chiqarish tajribasiga asoslanadi. Natijalarni tahlil qilish dala tajribasini o'tkazish metodologiyasi va aniq shartlar va muammolarni hisobga olgan holda amalga oshirildi. Tadqiqot Qashqadaryoning Yakkabog' tumanida, iqlimi aniq kontinental bo'lgan tog' oldi hududlarida dala tajribalarida o'tkazildi. Tizim bir vaqtning o'zida butun sug'oriladigan yer maydonini tomchilatib tozalashni to'liq avtomatlashtirish, o'simlik ildiz zonasining qisqa muddatda mahalliy namlanishini ta'minlash maqsadida hisoblangan sug'orish normalarini yig'ish imkonini beradi. Tuproqqa suv etkazib berishning texnik vositalari mavjud. Ochiq oqimli tomchilatib sug'orish tizimi qurg'oqchil zonadagi fermer va dehqonlar uchun yuqori samarali mikro sug'orish imkonini beradi. Tuproqqa suv yetkazib berishning texnik vositalariga ega ochiq oqimli tomchilatib sug'orish tizimi qurg'oqchil zonadagi fermer va dehqon xo'jaliklari uchun yuqori samarali mikro sug'orish imkonini beradi. Sug'orish sxemasining geometrik parametrlarini optimallashtirish, shu jumladan sug'orishdan oldin namlikning miqdori, turi, granulometrik tarkibi, tuproqning

suv fizik xususiyatlari, tomchilatib yuboriladigan liniyalarning nisbiy joylashuvi, tomizgichlarning sig'im egri chizig'i va tizim bosimi. asosiy omillar hisoblanadi. ekinlarning hosildorligi va rivojlanishini ta'minlash uchun minimal suv sarfini ta'minlash.

**Kalit so'zlar:** noan'anaviy sug'orish usuli, sug'orish tizimi, sug'orish texnologiyasi, suv, bog', sug'orish, tuproq unumdorligi, mahalliy oqava suvlarni yig'ish, tog' etaklarida tokzorlarni sug'orish.

**Аннотация.** Данное исследование проведено с целью разработки прямоточной системы капельного орошения, не требующей дополнительного насосного оборудования для посевов и обеспечивающей равномерное распределение воды по длине линии капельного орошения. Это исследование базируется на общенаучных методах, в частности, математическом моделировании процессов, графическом методе и опытно-производственном опыте. Анализ результатов проводился с учетом методики полевого опыта и конкретных условий и задач. Исследования проводились в Яккабогском районе Кашкадарьи, в предгорьях с резко континентальным климатом, в полевых опытах. Система позволяет полностью автоматизировать капельную обработку всей площади орошаемых земель одновременно, собирать поливные нормы, рассчитанные с целью обеспечения кратковременного локального увлажнения прикорневой

зоны растений. Имеются технические средства подачи воды в почву. Система капельного орошения с открытым потоком обеспечивает высокоэффективное микроорошение для фермеров и владельцев ранчо в засушливой зоне. Проточная система капельного орошения с техническими средствами подачи воды в почву позволяет проводить высокоэффективный микроорошение для фермерских и крестьянских хозяйств засушливой зоны. Оптимизация геометрических параметров поливной схемы, включая количество, тип, гранулометрический состав влаги перед поливом, водно-физические свойства почвы, взаимное расположение капельных линий, характеристику производительности капельниц и напор в системе. являются основными факторами. обеспечить минимальное потребление воды для обеспечения продуктивности и развития сельскохозяйственных культур.

**Ключевые слова:** нетрадиционный способ орошения, оросительная система, технология орошения, вода, сад, орошение, плодородие почвы склона, сбор местных сточных вод, орошение виноградников в предгорьях.

**Annotation.** This study was conducted to develop an open-flow drip irrigation system that does not require additional pumping equipment for crops and ensures uniform distribution of water along the length of the drip irrigation line. This research is based on general scientific methods, in particular, mathematical modeling of processes, graphical method and experimental production experience. The analysis of the results was carried out taking into account the methodology of the field experiment and the specific conditions and problems. The research was conducted in the Yakkabog district of

Kashkadarya, in the foothills with a distinctly continental climate, in field experiments. The system allows to fully automate the drip treatment of the entire irrigated land area at the same time, to collect irrigation rates calculated in order to ensure short-term local moistening of the plant root zone. There are technical means of supplying water to the soil. The open-flow drip irrigation system provides highly efficient micro-irrigation for farmers and ranchers in the arid zone. An open-flow drip irrigation system with technical means of delivering water to the soil enables highly efficient micro-irrigation for farmers and peasant farms in the arid zone. Optimizing the geometric parameters of the irrigation scheme, including the amount, type, granulometric composition of moisture before irrigation, water physical properties of the soil, the relative location of the drip lines, the capacity curve of the drippers and the system pressure. are the main factors. ensure minimum water consumption to ensure crop productivity and development.

**Key words:** non-traditional irrigation method, irrigation system, irrigation technology, water, garden, irrigation, soil fertility slope, collection of local sewage, irrigation of vineyards in the foothills.

**Introduction.** Water is the source of life for any living organism, including plants. The plant organism is an integral part of its internal structure and has a direct impact on its growth, development, yield and crop quality; complex physiological processes, such as photosynthesis, transpiration and respiration, are normal and intense. Gardens and vineyards are relatively drought-resistant, but they can grow well at the right time and yield rich crops, [1].

Smirnov K.V., Maltabar L.M. and other scientists have shown that the main part of the water consumes grapes for transpiration and breathing, and only a

certain part of the water consumes directly for the production of organic matter. In the conditions of Central Asia, in particular Uzbekistan, to collect 1 centner of grapes, 44- Along with other spheres, agriculture plays an important role in further strengthening the country's economy.

In conditions of shortage of irrigation water, the use of water-saving technologies for the cultivation of high-quality harvest in gardening is the most important and urgent task. Based on the achievements of science in the development of the agrarian sector and the improvement of people's well-being, the millennial experience of ancestors, the increase in the fertility of agricultural lands, the production of abundant and high-quality crops, the cultivation of various fruits such as grapes, walnut, almonds in the foothills plays an important role. For the cultivation of the vineyard in the mountainous and foothill areas of Uzbekistan, the most effective cities are the cities of Kitab, Shakhrisabz, Yakkabag of Kashkadarya region, Urgut city, Samarkand of Samarkand region, Baysun city, Denov of Surkhandarya region, Akhangaran city, Parkent and Chirchik of Tashkent region.

Choosing a place for a vineyard in the mountain and foothill areas, you need to pay attention to: the planting area should be at least 10-15 hectares and should be able to expand it. To be able to mechanize the work of planting grapes and care for it, the slope of the area should not exceed 10 degrees, if the area has a slope, then it should be aligned in the form of a ladder. Wet slopes, which are not so light and dry in the summer, are suitable for vineyards. Grapes should be planted ahead of time on the southern slopes of the higher zone, so that the sugar content in it is high. For better use of rainwater, grape rows should be located across the slope.

If the slope is 5-10 degrees, then the rows of grapes should be located across the slope, and if the slope is more than 10 degrees, then these places should be

aligned in the form of a ladder. The area where the vineyard is to be built must be carefully prepared. Depending on the variety of grapes, soil and climatic conditions, the number of grape seedlings per hectare of foothill areas is determined. At the same time, it is desirable to take the distance between rows of grapes 2.5-3 m, and between seedlings in each row - 1.5-3 m [4].

In our Republic viticulture has been spreading since ancient times. And today, gardening issues are in the focus of the government. Today, the demand for raisins is not only responsible for the domestic market, but also for demand in the foreign market.

Increasing gardening to a high level, creating and locating fruit trees and grape varieties suitable for soil climatic conditions, using new and modern agrotechnologies to increase their productivity, thereby expanding the range of fruit and vegetable products and increasing the demand for fruits and grape products. Republican irrigated lands, geological and hydrogeological objects, orchards and vineyards in the hills and foothills, their biological needs, soil types, as well as resource-saving irrigation technologies, new, modern and innovative irrigation, irrigation methods (methods of unconventional irrigation of orchards and vineyards). For the irrigation season, water is the basis for ensuring water supply for water supply, crop yields, creating scientific foundations and using renewable technologies.

**Materials and methods.** In order to improve the technology of irrigation of orchards and vineyards, scientific research was carried out in the farm of the Normuminota of the Yakkabag district of the Kashkadarya region on the basis of scientific research.

The field of experiments is located in the Yakkabagsky district of the Kashkadarya region, on the territory of B. Khudoyarov's farm, directly adjacent to the mountain

slopes. The proposed economic zone is located in the hilly part of the Khantog Range of the western branch of the Hissar Range. On this farm, grapes are grown according to the scheme 3x2.5, 3x2. Therefore, the number of seedlings per hectare is determined by the following formula:

$$K = \frac{10000}{a \cdot b}, \quad (1)$$

Where: **K** - number of seedlings per 1 hectare; **a** is the distance between rows; **b** is the distance between the seedlings in the row;

The soil moisture accumulated due to precipitation in the lowlands of Uzbekistan is not sufficient for a good harvest of grapes. The moisture content of the soil is regulated by irrigation during certain periods of vegetation. In mountainous and foothill regions, where the annual amount of precipitation is 450-500 mm, vineyards can be irrigated or irrigated 1-2 times. Also timely and quality soil cultivation, weed control, mulching, collection of local wastewater, planting protective trees and other agrotechnical measures are also important.

Knowledge of the agrophysical properties of soils is important for increasing yields. The physical properties of soils and the physical processes occurring in them are among the main factors in the formation of soil nature. Therefore, much attention is paid to their study.

The Kashkadarya region has a continental climate, and at the same time, hot summers, very cold winters, northern arctic cold air currents, and low temperatures. In January, the average air temperature can drop from 0 ° C to + 2 ° C, sometimes from -15 ° C to -25 ° C in winter. Summer is hot and dry, and it lasts a long time. In July, the temperature rises from + 44 ° C to + 47 ° C during the day. In the second half of summer, Garmsel's winds blow for 7-15 days, causing

significant damage to crops. The amount of precipitation in the northeast is increasing. Annual precipitation is 290-300 mm, precipitation is 320-550 mm and 550-650 mm in the mountains. Rain falls mainly in spring and winter. The long-term average sum of precipitation calculated by the Kashkadarya provincial station is demonstrated in Figure 1 below. As you can see in Fig. 1, the maximum monthly rainfall during the months is three months, that is, March 50 mm, December 45 mm and 39 mm.

Mountain and foothill zones are fundamentally different from their plains, depending on their soil-climatic and economic conditions. Therefore, the creation of a vineyard, the selection of varieties, their placement and care in these areas require special attention. Currently, in a number of mountain and foothill areas of Uzbekistan (Bahmal, Urgut, Khatirchi, Kitab, Yakkabog and Shakhrisabz, etc.), vineyards are developed and raisins are grown from high-quality grape varieties. According to the research conducted by the scientific research institute of horticulture and viticulture of academician Mahmud Mirzaev, in the mountainous and foothill areas of the country it is possible to master more than 700 thousand hectares of land. However, this requires special preparation for the soil and climatic conditions of these lands, (6).



**Figure 1. Long-term average sum of precipitation in the Kashkadarya province**

This is very important for gardening and viticulture in our country. In the mountain and foothill areas are more than 700 000

hectares. The creation of gardens and vineyards in these areas is an important factor in the efficient use of land resources. The use of modern irrigation technologies and conservation of water resources in these areas leads to broad economic benefits. Our experience, saving irrigation water, led to irrigation 15-20% by irrigating irrigated gardens with saberable bulk water from polyethylene basin [8].

In order to obtain high grapes in the conditions of central Tajikistan, a system of intrasoil irrigation with polyethylene humidifiers is recommended; the diameter of the perforations is not more than 1 mm, the diameter of the tubes is of the order of 40 mm, the slope is 0.002 .... 0.005; on one row of vineyard - two tubes, located 0.5 m from the axis of the row; irrigation network is calculated on the following costs: humidifier -0.11 l / s.100 m, supply network -0.15 l / s 100 m.

It is advisable to carry out intra-soil watering with a decrease in humidity in a meter layer of soil to 65% of PPV. There are 2 .... 4 irrigation, the latter not later than 20 ..... 25 August; while at the end of the vegetation it is allowed to reduce the moisture content of the calculated soil layer to 50 ..... 55% PPV for the purpose of accumulating sugar in grape berries. [9]

The most important factor causing the washing of water under the influence of natural local water is the shape, length and slope of the slope. The depth of soil degradation is more active on the slopes than on the plains. The thickness reduces the flow velocity and increases the length. It should be noted that large, heavy particles are at the bottom of the water flow, and light particles move along the surface of the water flow. Y. Denisov recommends the following expression for calculation of  $Q_{max}$ , formed by dissolved ice and glacial water for the rivers of the Central Asian region, (7).

$$\bar{M} = \frac{0.325 * h}{2.64 * \delta_h + 0.020 \sqrt{h}} : l/sek, km^2 \quad (2)$$

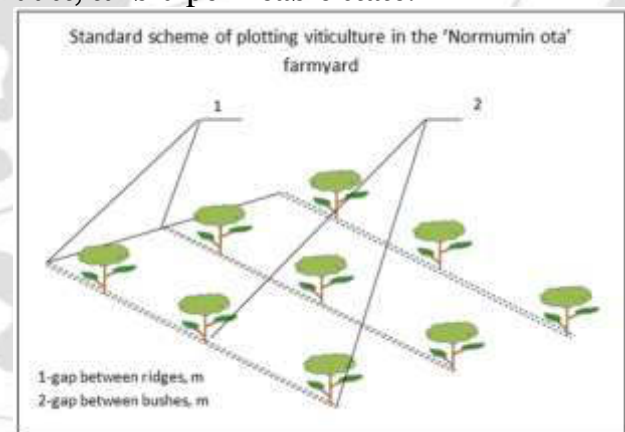
*In this statement:*

$h$ - total thickness of water flow, mm;

$\delta_h$  is the mean square root of the basin. Km

In the picture below there is a swimming pool, where the main farm "Normuminota" collects natural rainwater. The length of the water area is 3.8 m, depth is 2 m, width is 2.2 m. Irrigation of grape seedlings "Sultan-Sort" was carried out on a farm field. In the first case, the use of water collected from alpinist gardens and vineyards in subsequent furrows.

When growing vineyards from mountain areas in the first case is that, the water used for the subsequent furrows will move to the subsequent furrows. As a result of the process, because of the rain, particles are washed off the surface of the soil due to rain, heavy drops of rain fall almost by force, the slope of the parts of the soil is poured onto small particles, sprinkled around the same time due to the inclination and strong water flow, soil particles melt in dust, turbid permeable state.



**Conditional signs**

- |    |                           |
|----|---------------------------|
| 1. | Pool for collecting water |
| 2. | regulating valve          |
| 3. | distribution pipeline     |
| 4. | irrigation hoses          |

**Figure 2. Scheme of the proposed technology and technique of watering vineyards, planted on adyrnoy terraced slopes**

The farm "Normumin ota", owned by the Water Users Association of the

Yakkabag district of the Kashkadarya region, is working on irrigation with 3 hectares of land, with 3 local natural irrigation waters.

Prevents ingress of incoming and outgoing parts of the pond from local wastewater by spraying water and evaporating the film.

**Conclusion.** The farm "Normumin ota" located in the Yakkabagsky district of the Kashkadarya region was put into operation on a plot of 1 hectare on a test site. The water that raises the local flow is the pool. The total area of the pond basin is 2.2 m wide, 2 m deep, and its length is 3.8 m, i.e. 17 m<sup>3</sup> of water. A new irrigation technology was used to irrigate grapes when collecting these local streams and lack of water. In June and July, irrigation of vineyards by collecting water will be warmer, and a lack of moisture will be less productive, using collected water for irrigation as a result of the yield of grapes.

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