IMPLEMENTATION OF DRIP IRRIGATION TECHNOLOGY.

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ABDUAHADOV SARDORJON AKHMADJON O‘G‘LI

Independent Researcher

SAYFULLOYEV MIRSHOHID BOTIR O‘G‘LI

Independent Researcher

SHERMAMATOV YUSUFXON SHOKIR O‘G‘LI

Independent Researcher

SHAXOBIDDINOV ABDULLA ABDUSALIM O‘G‘LI

Independent Researcher

Abstract. The article presents the implementation of drip irrigation technology as an effective approach to rational water use under conditions of water scarcity. The study considers the application of a settling tower to reduce the turbidity of irrigation water and ensure its suitability for drip irrigation systems. Laboratory experiments were conducted using water with turbidity levels of 3, 5, and 7 g/l at artificial tower heights of 1.5, 2.0, and 2.5 m. The experimental results showed that at tower heights of 2.0 and 2.5 m, the required pressure can be maintained without the use of an additional settling tank, while the system can operate at a water turbidity of up to 5 g/l. The selection of pump capacity is determined according to the required irrigation water discharge, and the use of solar energy can provide an additional energy-efficient solution. The study also considers the main factors affecting irrigation scheduling, including soil water-physical properties, irrigation duration, number and discharge of drippers, and the characteristics of the soil wetting zone. The results demonstrate the potential of drip irrigation technology for reducing irrigation water consumption and improving the efficiency of agricultural water use.

Keywords: drip irrigation, water scarcity, water saving, water turbidity, settling

tower, irrigation water, pump, soil moisture.

Annotatsiya. Maqolada suv tanqisligi sharoitida suv resurslaridan oqilona foydalanishning samarali usuli sifatida tomchilatib sug‘orish texnologiyasini joriy etish masalalari ko‘rib chiqilgan. Sug‘orish suvining loyqalik darajasini kamaytirish va uni tomchilatib sug‘orish tizimida foydalanishga tayyorlash maqsadida tindiruvchi minoradan foydalanish imkoniyati tadqiq etilgan. Laboratoriya sharoitida suvning 3, 5 va 7 g/l loyqalik darajalarida, 1,5; 2,0 va 2,5 m sun’iy balandliklarda tajribalar o‘tkazilgan. Tajriba natijalariga ko‘ra, 2,0 va 2,5 m balandliklarda qo‘shimcha tindirgichsiz zarur bosimni saqlab turish mumkinligi hamda tizim 5 g/l gacha bo‘lgan loyqalikdagi suvda ishlashi aniqlandi. Nasosning suv sarfi sug‘oriladigan maydonning talab etiladigan suv sarabiga muvofiq tanlanishi, shuningdek, nasos quvvatiga mos quyosh batareyalaridan foydalanish imkoniyati ko‘rib chiqilgan. Tadqiqotda sug‘orish muddatlari, tuproqning suv-fizik xususiyatlari, tomizgichlar soni va suv sarfi hamda tuproqdagi namlanish zonasiga ta’sir etuvchi asosiy omillar ham tahlil qilingan. Natijalar tomchilatib sug‘orish texnologiyasi sug‘orish suvini tejash va qishloq xo‘jaligida suv resurslaridan foydalanish samaradorligini oshirish imkonini berishini ko‘rsatadi.

Kalit so‘zlar: tomchilatib sug‘orish, suv tanqisligi, suvni tejash, suv loyqaligi, tindiruvchi minora, sug‘orish suvi, nasos, tuproq namligi.

Аннотация. В статье рассмотрены вопросы внедрения технологии капельного орошения как эффективного способа рационального использования водных ресурсов в условиях дефицита воды. Исследована возможность применения отстойной башни для снижения мутности оросительной воды и подготовки её к использованию в системе капельного орошения. В лабораторных условиях проведены эксперименты при мутности воды 3, 5 и 7 г/л и искусственной высоте 1,5; 2,0 и 2,5 м. По результатам экспериментов установлено, что при высоте 2,0 и 2,5 м возможно поддержание необходимого

давления без дополнительного отстойника, а система может работать с водой мутностью до 5 г/л. Рассмотрена возможность выбора производительности насоса в зависимости от требуемого расхода воды для орошаемой площади, а также применения солнечных батарей, соответствующих мощности выбранного насоса. В работе также рассмотрены основные факторы, влияющие на режим орошения, включая водно-физические свойства почвы, продолжительность орошения, количество и расход капельниц, а также характеристики зоны увлажнения почвы. Полученные результаты показывают возможность применения технологии капельного орошения для сокращения расхода оросительной воды и повышения эффективности использования водных ресурсов в сельском хозяйстве.

Ключевые слова: капельное орошение, дефицит воды, водосбережение, мутность воды, отстойная башня, оросительная вода, насос, влажность почвы.

A number of scientific works are being carried out in the Republic of Uzbekistan to prevent water scarcity [1–5]. In Uzbekistan, roads are primarily built overland. Currently, this method of preventing water scarcity is yielding good results. Therefore, as an experiment, the drip irrigation method was used in the Kashkadarya region. The advantages of this method are significant savings in irrigation water for local soil moisture [4]. With drip irrigation, it is possible to irrigate circular slopes and apply fertilizers and pesticides alongside the irrigation water. It consumes less energy than sprinkler irrigation, and the issue of land leveling is left aside [2, 4].



Figure 1. Scheme of the drip irrigation system with a settling tower

Due to the high turbidity level of the republic's waters, the turbidity level was reduced through a water settling tower for irrigation. In the laboratory, we conducted experiments on water with turbidity levels of 3 g/l, 5 g/l, and 7 g/l at artificial heights of 1.5 m, 2.0 m, and 2.5 m. The experiment showed that at heights of 2.0 m and 2.5 m, the pressure is maintained without a settling tank.

Operates at a turbidity of 5 g/l. The height of the tower is selected taking into account the degree of water turbidity. We pump water into the tower. The water discharge capacity of the pump is selected depending on the water flow rate to the irrigation area. We can use a solar battery corresponding to the selected pump power.

The irrigation schedule depends on the water rates during the irrigation period, the duration and duration of irrigation, moisture zones, the number of drippers and water flow rates, their location, and the water-physical properties of the soil.



Figure 2. Moisture content contours in heavy and light soils

The irrigation rate is determined by the following formula:

h - design depth of the soil layer, m; γ - bulk density of the soil, t/m3; A is the wetting area, m2; ωfs is the minimum moisture content in the absolute dry soil mass, %; ωpw is the pre-irrigation moisture content corresponding to the lower limit of optimal soil moisture.

If is the water utilization coefficient, equal to 0.96...0.98; qdr is the drip flow rate, l/s; n is the number of drips per -1.

Contours of the character of moisture content in heavy and light soils.

The humidification focus is formed depending on the water-physical properties of agricultural crops and the agrobiological indicators of the soil, the consumption of micro-irrigators, and the duration of irrigation. Drip irrigation is a type of local micro-irrigation in which irrigation water is supplied through special micro-irrigators in small doses to the zone where plant roots are fed. Drip irrigation allows for a continuous supply of water and nutrients to the plant. The application of dosed (saturated) water throughout the entire irrigation period allows for the formation of an optimal regime in the root-feeding layer of the soil according to the water consumption of the irrigated crop and increases the yield of agricultural crops.

Experiments with drip irrigation show that compared to sprinkler irrigation, the yield of fruit crops and vineyards increased by 10–30%. Efficiency of drip irrigation is necessary for timely crops

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