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TECHNICAL AND TECHNOLOGICAL ELEMENTS OF DRIP IRRIGATION OF FIBER COTTON

Butayarov Abduqodir Tuxtayevich
Termez Engineering and Technological Institute, Doctor of Philosophy, Associate Professor, Uzbekistan

ABOUT ARTICLE

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Abstract: Currently, the efficiency of using water resources is observed to decrease sharply due to sudden changes in weather, therefore, the use of modern irrigation systems is considered to be the demand of the time. As a result of significant savings in water consumption, mineral fertilizer, and fuel lubrication materials, only the root part of the plant is moistened, and the amount of water wasted by evaporation is significantly saved. Damage caused by water flowing over the edge of the field is not allowed. Significant savings in labor costs are achieved.

INTRODUCTION

The lack of rational use of water resources in Uzbekistan is currently one of the main reasons hindering the sustainable development of irrigated agriculture. One way to solve the problem may be to use a drip irrigation system (DIS). Drip irrigation was first developed in Israel in the early 1960s and introduced as an independent type of irrigation on an industrial scale. The positive results obtained in a short period of time contributed to the rapid spread of drip irrigation in many countries around the world. Drip irrigation is based on the fact that a small amount of water reaches the vascular part of plants.

Table 1

Irrigation technology is an element

Parameters	Irrigation method	Slope	Distance between drip hose (own), m		Wetting of the soil layer, cm	Water consumption in drip hose, l/h		Distance between drippers in a drip hose, m	Drip hose (ega) uniform wetting reliability factor, %
1	Irrigation (I)	0,003 - 0,004	0,6	0,9	60-100-60	-	-	-	0,71
2	Drip irrigation (DI)		0,6	0,9	40-60-40	1,6	2,2	0,2	0,99
								0,3	0,97
								0,4	0,89
3	Drip irrigation (DI)		0,6	0,9	40-40-40	1,6	2,2	0,2	0,99
								0,3	0,96
								0,4	0,88
4	Drip irrigation (DI)		0,6	0,9	60-60-60	1,6	2,2	0,2	0,99
								0,3	0,96
								0,4	0,88

Table 1 lists the elements of the field drip irrigation equipment used in the field experiment.

Irrigation rates are determined by the following formula:

$m_n=100\cdot\gamma\cdot h\cdot A\cdot(\beta_1-\beta_2)$ m3/ha (1)

Here h is the estimated depth of the soil layer, m;

γ is the bulk density of the soil, t/m3;

A is the moisture zone, m2;

β_1 is the small (moisture capacity) volume of moisture in absolutely dry soil mass, %.

β_2 is the actual moisture before irrigation, corresponding to the lower (lower) limit of optimal soil moisture.

$$m_1 = 100 \cdot 1{,}33 \cdot 0{,}5 \cdot 0{,}66(21.8_1 - 15{,}26_2) = 287.0 \text{ м}^3/\text{га}$$

$m_2 = 100 \cdot 1.33 \cdot 0{,}5 \cdot 0{,}66(21.8_1 - 15{,}26_2) = 287.0$ м³/га

$m_3 = 100 \cdot 1{,}32 \cdot 0{,}7 \cdot 0{,}66(21.8_1 - 16{,}35_2) = 323.1$ м³/га.

$m_4 = 100 \cdot 1{,}32 \cdot 0{,}7 \cdot 0{,}66(21.8_1 - 16{,}35_2) = 323.1$ м³/га

$m_5 = 100 \cdot 1{,}35 \cdot 0{,}7 \cdot 0{,}66(21.8_1 - 16{,}35_2) = 330.5$ м³/га (2)

$m_6 = 100 \cdot 1{,}33 \cdot 0{,}7 \cdot 0{,}66(21.8_1 - 16{,}35_2) = 325.6$ м³/га

$m_7 = 100 \cdot 1{,}33 \cdot 0{,}5 \cdot 0{,}66(21.8_1 - 14{,}17_2) = 333.5$ м³/га

$m_8 = 100 \cdot 1{,}34 \cdot 0{,}5 \cdot 0{,}66(21.8_1 - 14{,}17_2) = 313.9$ м³/га

The area wetted by one drop is determined by the following formula e:

$$A_1 = n \cdot \frac{A}{(a \cdot b)} = 1 \cdot \frac{0{,}3}{(0{,}2 \cdot 0{,}6)} = 0{,}66$$

In this: n- number of drippers per plant;

A- wetted area from one water outlet, m2;

ab- planting scheme of the plant (crop), m2; bottom

T_sh- drip hose piece;

K_s- number of seedlings piece;

Duration of water yield:

$$t = \frac{m}{E \cdot q \cdot n} = \frac{350000}{0{,}96 \cdot 1{,}6 \cdot 55666} = 4{,}5 \quad \text{соат/га} \tag{3}$$

$E - coefficient\ of\ water\ use\ E = 0.96 \ldots .0.98\ equals;$

$q - \ water\ consumption\ by\ dripper, l/soat;$

$n - \ number\ of\ drippers\ per\ 1.$

$The\ area\ irrigated\ at\ one\ time\ (ha)\ is\ determined\ by\ the\ values\ of\ the\ minimum\ period\ of\ the\ irrigatio$

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$$A = S/(\Delta t\_min\ ) = 60/9 = 6.66\ equals.$$

$$In\ this. S - \ area\ of\ the\ modular\ (irrigated)\ site, ha;$$

$$〖\Delta t〗\_min - \ minimum\ irrigation\ period, days.$$

$$Irrigation\ time\ is\ determined\ by\ the\ following\ formula.$$

$$t^1{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{300}{66{,}6} = 4{,}55\ час \qquad t^2{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{300}{66{,}6} = 4{,}55\ час$$

$$t^3{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66{,}6} = 5{,}3\ час \qquad t^4{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66.6} = 5{,}3\ час$$

$$t^5{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66{,}6} = 5{,}30\ час \qquad t^6{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66{,}6} = 5{,}30\ час \qquad (4)$$

$$t^7{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66{,}6} = 5{,}31\ час \qquad t^8{}_g = \frac{m_{эл}}{Q_{эг}} = \frac{350}{66{,}6} = 5{,}31\ час$$

The value of the coefficient of uniform moistening of the calculated layer with drip irrigation was determined using the following formula.

$$K^1{}_н = \frac{m_p}{m_{мах}} = \frac{300}{350} = 0{,}85 \qquad K^2{}_н = \frac{m_p}{m_{мах}} = \frac{300}{350} = 0.85$$

$$K^3{}_н = \frac{m_p}{m_{мах}} = \frac{380}{380} = 1.0 \qquad K^4{}_н = \frac{m_p}{m_{мах}} = \frac{380}{380} = 1.0$$

$$K^5{}_н = \frac{m_p}{m_{мах}} = \frac{380}{380} = 1{,}0 \qquad K^6{}_н = \frac{m_p}{m_{мах}} = \frac{380}{380} = 1{,}0 \qquad (5)$$

$$K^7{}_н = \frac{m_p}{m_{мах}} = \frac{350}{380} = 0{,}96 \qquad K^8{}_н = \frac{m_p}{m_{мах}} = \frac{350}{380} = 0{,}96$$

In the process of improving the technology of drip irrigation of cotton, the calculated layer had a uniform moistening coefficient of Kn=0.96%, which proved that the water necessary for the growth and development of cotton is provided in the standard mode without loss of expected water consumption.

CONCLUSION

The calculations are given for 10 hectares of each type of agricultural crop, since it is on this size of land that minimal economies of scale can be achieved and investments begin to pay off. Depending on the expansion of irrigated land, the effect on the timing of reimbursement of incurred costs is calculated. The estimates are valid for 2021 and may change over time. Thus, the TST is pulled up to the plant and then covered with soil. The part of the tube where the dripper (emitter) is fixed remains outside. The cost of investment in the TST installation is calculated based on the corresponding prices of the manufacturing enterprise of the ZAMIN ANGORSKIY CLUSTER cluster farm, which is a cooperative enterprise with enterprises producing drip irrigation systems in the Surkhandarya region. The installation of TST on 10 hectares of cotton area is the most expensive - 91.6 million soums, and installation on the same cotton area will cost 88.4 million soums. The cheapest and most profitable is TST for 10 hectares of garden - 50.4 million soums. The calculations of the benefits are as follows (per 1 hectare of land): - As a result of a significant reduction in the time of irrigation and pump operation, electricity consumption for all crops will be significantly reduced. As a result, drip irrigation reduces electricity costs by 499,000 soums per 1 hectare of cotton, by 317,000 soums per 1 hectare of wheat and by 320,000 soums per 1 hectare of wheat per season. - The costs of diesel fuel and agronomic measures will be reduced, especially for cotton, since cotton cultivation involves a large number of agronomic measures compared to wheat cultivation and gardening. Drip irrigation allows saving 100 thousand soums of diesel fuel and 85 thousand soums of agronomic measures per hectare of cotton. As a result of the effective application (through the system) and assimilation of mineral fertilizers with drip irrigation, the cost of fertilizers is reduced: annually 114 thousand soums per 1 hectare of cotton, and 37 thousand soums per 1 hectare of wheat. - Labor costs will be reduced by 300 thousand soums for all crops under consideration. - The projected increase in yield will be quite variable and will amount to an average of 40 percent for all crops. The annual profit was determined based on the average yield of agricultural crops and the average prices set for them. - Water savings for all crops will amount to 11,769 m3 per year per 1 hectare of cotton, 6,700 m3 per 1 hectare of wheat, 11,650 m3 per 1 hectare of orchard. The estimated savings due to tax breaks are 81,000 soums per harvest per year. - The payback period is the ratio of investments to annual total profit. According to calculations, investments made in drip irrigation of cotton will pay off in a little more than 3 years, for wheat - in 4 years.

Investment in the garden is the most profitable, and the payback period is less than 2 years. Thus, TST is not only a careful attitude to natural capital (water conservation, soil improvement, energy and fuel savings, reduction of harmful emissions into the air, etc.), moreover, from an economic point of view, it is not only a garden, but it is also useful for cotton and wheat in the medium term.

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