HIGH-EFFICIENCY IRRIGATION SYSTEMS (HEIS) HELPS IN MORE PRODUCTION WITH LESS USE OF WATER FOR CROPS

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High-Efficiency System comprising of pipes, emitters, fittings, filters, control devices, pumping unit, and other accessories. HEIS increases agricultural production by utilizing available irrigation water more efficiently. HEIS saves water, and increased cropping intensity. There are several irrigation systems used i.e Drip, micro sprinklers, floppy sprinklers and bubblers, and others, However here we will talk about the most common drip irrigation system.


DRIP


Micro Splinker


Floppy Sprinkler


Bublers

Introduction to Most Common Drip Irrigation System.

The water resources of Pakistan are dwindling but its water needs are continuously rising due to a tremendous increase in population and urbanization. The per capita surface water availability has declined from 5,260 cubic meters per year in 1951 to around 1,000 cubic meters in 2016. This quantity is likely to further drop to about 860 cubic meters by 2025 marking our transition from a "water-stressed" to a "water-scarce" country[1]. Under the situation an efficient and economic use of water is imperative.

[1] National Water Policy of Pakistan 2018.

Background and Rationale

Agriculture constitutes the largest sector of Pakistan's economy and the majority of the population, directly or indirectly, is dependent on this sector. It contributes about 24 percent of Gross Domestic Product (GDP) and accounts for half of the employed labor force and is the largest source of foreign exchange earnings. Agriculture accounts for over 70% percent of all freshwater consumption in Pakistan, and nearly 50 percent is wasted due to poor irrigation practices.

Technology Brief, Drip Irrigation:

Drip irrigation involves dripping water onto the soil at very low rates (2-20 liters/hour) from a system of small-diameter plastic pipes fitted with outlets called emitters or drippers. Water is applied close to plants so that only part of the soil in which the roots grow is wetted, unlike surface and sprinkler irrigation, which involves wetting the whole soil profile. With drip irrigation water applications are more frequent (usually every 1-3 days) than with other methods and this provides a very favorable high moisture level in the soil in which plants can flourish.

Drip irrigation is more effective in tunnel farming, vineyards, and fruit orchards as compared to open-field horticulture farming. In Balochistan, the water-scarce areas having too far water sources with non-leveled farms, here the drip irrigation system contributes substantially in productivity leading to better profit margins for the farmers.

- Drip Irrigation method that applies water to plants at a very low rate of application and without any pressure
- The concept of the system is to target the roots of the crop rather than the entire land area the crops cover.
- Water is able to reach the deepest roots of the crop through capillaries and gravity

According to World Bank estimates conventional irrigation methods such as flood irrigation render significant water losses of 20 percent to 25 percent. Meanwhile, uneven fields and poor farm design further add to agricultural losses. A typical drip irrigation system consists of the following components:

- High-Efficiency System comprising of pipes, emitters, fittings, filters, control devices, pumping unit, and other accessories.
- The objective is to increase agricultural production by utilizing available irrigation water more efficiently and judiciously.
- increased cropping intensity
- very small flow rate can be used, whereas a conventional system requires a high flow rate to irrigate the field.

Comparison of Flood Irrigation Vs Drip Irrigation;

Flood Irrigation	Drip Irrigation
▪ Flood irrigation causes high levels of humidity in the fields which increases the probability of diseases in the crop.	▪ Drip Irrigation System saves 50-60% water and per acre cost of pesticides decreases by 30%
▪ In winter flood irrigation keeps fields wet for a long time due to which the fertilizer application timings suffer and get prolonged.	▪ Drip provides water and fertilizers at the right time and can save losses up to 50% in fertilizer application.
▪ Causes low crop fruiting because of inappropriate fertilizer frequency	▪ Having drip to fulfill appropriate water and fertilizer needs of the crop; 20-25% increase in yield.
▪ High growth of weeds costs more labor	▪ Low growth of weeds reduces the incidental expense

Conclusion:

Drip irrigation is a solution to reduce the wastage of water in agriculture through flooding of fields. In addition to this, drip irrigation has nonquantifiable benefits such as reduced soil erosion, improved seed germination, efficient use of fertilizers and pesticides, etc.