Agri Articles
(e-Magazine for Agricultural Articles)
Volume: 03, Issue: 02 (MAR-APR, 2023)
Available online at http://www.agriarticles.com
©Agri Articles, ISSN: 2582-9882

Drip Irrigation: Efficient Irrigation System

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Water use in food production is a growing problem in the face of climate change and a rising global population. Water is an increasingly scarce global resource, and agriculture is the biggest consumer of our planet's finite water resources. Globally, agriculture uses 70% of the world's fresh water supply and 95% of all water withdrawals in some developing countries. Drip irrigation is the most water-efficient irrigation system, capable of dramatically reducing a farm's water use while increasing crop yields and quality. But, like every irrigation system, drip irrigation isn't a magic bullet. Drip irrigation is expensive to install and labor-intensive and may not pencil out in lower-value crops. Drip irrigation is a low-pressure system for precision water delivery. It uses a system of pipes, tubing and emitters or sprinklers. Drip irrigation is also sometimes known as trickle irrigation or micro-irrigation and water is delivered in low amounts but over long periods of time. Compared to traditional irrigation methods such as center pivot irrigation or flood irrigation, a drip or micro-irrigation system can increase a farmer's water efficiency by up to 70% and reduce energy costs by 50%. Drip irrigation occurs at the ground level, significantly reducing evaporation loss and eliminating water runoff, two significant inefficiencies in other irrigation systems. Drip irrigation pipes or tubing are closed off with an end cap, allowing the water flow to pressurize through the length of the pipe. This creates the pressure that forces the water to drip (or spray) out from the emitter points. Although different types of pipes can be used for drip irrigation, including PVC and galvanized iron, the most common way to deliver water in a drip irrigation system is via flexible polyethylene or 'black roll pipe.' Depending on the crop, soil type, and production practices, drip irrigation lines may be laid to soil or buried.

Is Drip Irrigation the Same as Micro Irrigation?

Drip irrigation and micro-irrigation are slightly different low-pressure, precision-delivery irrigation systems. Micro-irrigation systems are also sometimes called micro-spray. In a true drip irrigation system, water does indeed 'drip.' Either from the slits in the tubing itself or drip irrigation emitters mounted at the base of a plant. Micro-sprinkler irrigation uses the same piping and low-pressure delivery to bring water to the field as drip irrigation. But, in a micro-irrigation system, water is delivered through small, low-pressure sprinkler devices mounted on short risers staked into the drip tubing. Micro-irrigation sprinkler heads are adjustable for how wide of an area they spray although a 3 to 10 feet diameter is most common. The spray pattern can be adjusted to accommodate for different pattern diameters, like part of a circle or a full circle. Operators can also change the spray method by switching out the sprinkler heads. Bubblers, misters, streams and spray pattern sprinkler nozzle heads are all options.

A micro-irrigation system is helpful for crops that have a widespread, like strawberries, or if farmers need to utilize their irrigation system to help cool off their crops

during hot weather. A micro-irrigation system is also preferred in sandy soils because they disperse water over a larger area. Versus when water is delivered from a true drip system on sandy soils the water tends to move directly down rather than in a horizontal pattern and may not provide adequate soil moisture to support crop growth.

Crops Most Commonly Irrigated with Drip Irrigation

Any crop can be irrigated with drip irrigation. However, drip irrigation is most commonly used in high-value specialty crop production such as vegetables or perennial crops such as berries and fruit trees. Home gardeners often use drip irrigation kits or micro irrigation systems in landscape plantings or vegetable gardens. Commercial vegetable row crop producers benefit from drip irrigation in multiple ways-low water and energy use, reduced weed pressure, and higher quality produce less subjected to disease and pest pressure. This helps to reduce food waste at harvest time and can help offset the higher expense of a drip irrigation system.

The Pros of a Drip Irrigation System

- ✓ **Drip Irrigation is Water, Energy and Fertilizer Efficient:** Drip irrigation is the most water-efficient irrigation system, with up to 90% water use efficiency especially compared to sprinkler systems, flood irrigation or center pivot irrigation. Because drip irrigation is a low-pressure method for delivering crop watering needs, it can also have low energy requirements. When combined with injector systems, farmers can also save on their fertilizer and pesticide use by capitalizing on the precision level of a drip irrigation system.
- ✓ **Drip Irrigation Increases Crop Yields and Quality:** Because drip irrigation systems deliver water at the root zone level, it avoids promoting leaf scalding or humid conditions that can lead to pests, crop disease and reductions in crop quality that reduce harvest yields.
- ✓ **Drip Irrigation is Adaptable:** Drip irrigation systems are highly flexible. They can be designed for any size and shape of the field. Drip irrigation systems are also easily expandable and can be used even with low water pressure.

The Cons of a Drip Irrigation System

- **Drip Irrigation is Expensive:** Drip irrigation is the most expensive irrigation system to set up and manage, requiring significant amounts of labor for installation, removal, and seasonal maintenance. For this reason, drip irrigation is typically not seen in large acreage commodity crops and is more often used in high-value specialty crop production.
- **Drip Irrigation is Prone to Maintenance Intensive:** Drip irrigation cannot be used in areas with high iron content in the water (typical of some groundwater systems) as it clogs up drip irrigation emitters and sprinklers. It is also prone to damage from rodents or field cultivation.
- **Drip Tape Irrigation Systems Create Plastic Waste:** Drip tape systems, especially, are a source of single-use plastic because the drip tape is typically only used for one season before removal and disposal.

Conclusion

Drip irrigation is the most efficient method of delivering water and nutrients to crops. It delivers water and nutrients directly to the root zone of the plant in the right amounts and at the right time, ensuring that each plant receives exactly what it requires, when it requires it, to grow optimally. Farmers can increase yields while saving water, fertilizer, energy, and even crop protection products by using drip irrigation.