Drip Irrigation Technology: A Resource Management Tool for Farmers

By John C. Roberts, in collaboration with Stuart W. Swales

Drip and allocation will now be recognized as one of the world's increasingly valuable and scarce natural resources. The agricultural community worldwide is recognizing the need to adapt sustainable farming practices to conserve water and avoid damaging productive farmland. Competing demands for water are already leading to conflicts where local supplies are limited. As the strain on the world's water resources continues to intensify, difficult decisions about water use and allocation will be made. Farmers, industrialists and the general population will be forced to implement conservation programs.

Drip irrigation technology addresses the urgent need to conserve water and nutrients to a plant's rootzone in the precise amounts required to meet the plant's needs. This means that less water, nutrients and fertilizers will potentially be used while at the same time increasing yields and producing higher quality crops.

Introduction to Drip

Although drip irrigation was pioneered in England in the 1940s, it was not until the advent of polyethylene plastics in the 1960s that drip irrigation was developed as a commercially viable technology in the United States and Israel. Initially, many farmers did not consider drip irrigation practical because it was such a significant departure from traditional flood and sprinkler methods. However, years of cooperative research among farmers, universities and government agencies have demonstrated the many advantages of drip irrigation. Today, as a result of the proven agronomic, conservation and economic benefits, drip irrigation has gained global acceptance and is being implemented at a rapid pace by competitive growers worldwide on vegetables, fruits, flowers, cotton, sugar cane, vineyards and many other crops.

Drip vs. Traditional Methods

Traditional irrigation methods such as flood and sprinkler apply water at high rates to a large area with limited ability to distribute the water to exactly where it is needed and promote consistent growth. This is accomplished through high frequency irrigation cycles, and by applying water through surface basins or furrows. Such methods are often used on a long-term vineyard or orchard applications.

Parts & Layout of a Drip Tape System

A drip irrigation system can be designed for any size farm, but all systems will have similar major system components: pump filters, pressure regulators, valves and drip tape. An optional, but highly recommended system component is a chemical and fertilizer injection subsystem. Automatic valve controllers, flow meters, soil moisture sensors, and other accessories are often installed by aplikated systems.

Benefits of Drip Irrigation

Water conservation was originally thought to be the primary benefit of drip irrigation. Experience has shown that a well-designed, placed and managed drip irrigation system offers other equally important agronomic and economic benefits. As a result, farmers worldwide are installing drip technology:

- Improved Crop Quality and Increased Yields
- Less water use
- Less labor
- Fewer weeds
- Faster growth
- Lower input costs
- More flexible field operations
- Reduced disease and insects
- Reduced fertilizer use
- Reduced herbicide use

Field layout and spacing are determined by the uniform delivery of water, chemicals and fertigation on an as needed basis. This minimizes the number of applications, thereby reducing input costs. Cost savings on chemicals of 25 to 50% are not uncommon with drip systems.

- Energy Conservation - The low operating pressure (0.5 bar) required for drip systems reduces pumping requirements, thereby consuming less energy than sprinkler systems.
- Less Growth Loss - Only the crop is irrigated, minimizing the growth between plant rows.
- Problem Soils Can Be Farmed More Effectively - Drip systems are ideal for heavy soils with low infiltration rates, since the water can be applied at a slow enough rate for the soil to absorb it, minimizing or eliminating surface run-off. Sandy soils, which are incapable of storing large amounts of water, can be farmed with drip systems using very high frequency irrigation.

![Image of drip tape installation](http://www.irrigationjournal.com)

SEE US ONLINE - http://www.irrigationjournal.com

**SEE US ONLINE** - http://www.irrigationjournal.com

```
**CIT Tested**
Turbulent Flow drip tape.

Star Slit Outlets open wide when pressurized.

Copper Core™ fights bacteria slime and algae.

Precision Forged secondary chamber creates superior emission uniformity.

Multi-filter Inlets protrude into primary chamber creating vortex streams cleaning adjacent inlet openings.
```

We are looking for qualified distributors. Please contact us at (714) 379-1100 or Fax us at (714) 898-2346

Drip Tape Manufacturers & Engineers Inc. 15661 Computer Lane, Huntington Beach, CA 92649
Drip Irrigation Technology: A Resource Management Tool for Farmers

By John C. Roberts, in collaboration with Stuart W. Stone

Water and arable land were once considered globally abundant and renewable resources. As we enter the 21st century, however, water is becoming recognized as one of the world's increasingly valuable and scarce natural resources. The agricultural community worldwide is recognizing the need to adapt sustainable farming practices to conserve water and avoid damaging productive farmland.

Competing demands for water are already leading to conflict where regional supplies are limited. As the strain on the world's water resources continues to intensify, difficult decisions about water use and allocation will be made. Farmers, industrialists and the general population will be forced to implement conservation programs.

Drip irrigation technology addresses the urgent need to conserve water and nutrients to a plant's roots in the precise amounts required to meet the plant's needs. This means that less water, chemicals, and fertilizers will be used while at the same time increasing yields and producing higher quality crops.

Introduction to Drip

Although drip irrigation was pioneered in England in the 1940s, it was not until the advent of polyethylene plastic in the 1960s that drip irrigation was developed as a commercially viable technology in the United States and Israel. Initially, many farmers did not consider drip irrigation practical because it was such a significant departure from traditional flood and sprinkler methods. However, years of cooperative research among farmers, universities, and government agencies have demonstrated the many advantages of drip irrigation. Today, as a result of the proven agronomic, conservation and economic benefits, drip irrigation has gained global acceptance and is being implemented at a rapid pace by competitive growers worldwide on vegetables, fruits, flowers, cotton, sugar cane, vineyards and many other crops.

Drip vs. Traditional Methods

Traditional irrigation methods such as flood and sprinkler apply water at high rates to a large area with limited ability to distribute the water to exactly where it is needed and promote consistent growth. This is accomplished through high frequency irrigation cycles, and by applying water in an area near the plant's roots as often as required by the crop.

Drip irrigation systems can be placed on the soil surface or as shown in the display above, or can be buried at depth, ranging from 4 to 30 centimeters. Buried drip systems are less susceptible to mechanical and pest damage.

Drip Irrigation Technology

The most important drip irrigation systems for the future are drip tape and in-line emitters. The primary factors which determine the most appropriate product type are application, cost, field conditions, and management practices.

Drip tape is a thin wall hose with emitters molded into the wall of the tube. Drip tape is available in available in wall thickness ranging from 0.12 mm to 0.40 mm and emitter spacing from 10 cm to 60 cm. A variety of flow rates are available to meet the needs of specific crops and growing conditions.

Drip tape is generally the most cost-effective technology for small and large-scale applications. In-line emitter systems have a higher cost and are more prone to mechanical damage. However, they are also more efficient and can be used in a wide range of applications.

BENEFITS

- Improved Crop Quality and Increased Yields - Using traditional irrigation methods, water and fertilizer cannot practically be applied in small amounts on a frequent basis. This means that the crop alternates between having too much and too little water and nutrients available. Drip irrigation scheduling allows water and nutrients to be delivered exactly when and where the crop needs them resulting in larger, higher quality harvests.
- Water Conservation - Drip systems allow a farmer to apply the precise amount of water a plant can beneficially use. Additionally, drip systems do not wet the entire field surface. As a result, water loss to evaporation, deep percolation and run-off are minimized. This not only conserves water, but also minimizes groundwater contamination.
- More Flexible Field Operations - Cultivation, spraying and harvesting can continue even when irrigating.
- Lower Input Costs - Drip tape enables the uniform delivery of water, chemicals and fertilizers on an as needed basis. This minimizes the over application of costly resources, thereby reducing input costs.
- Cost savings on chemicals of 25 to 50% are not uncommon with drip systems.
- Energy Conservation - The low operating pressure (0.5 bar) required for drip systems reduces pumping requirements, thereby consuming less energy than sprinkler systems.
- Reduced Disease - Less disease can occur because foliage is not wetted and soil moisture is controlled.
- Less Weed Growth - Only the crop is irrigated. Minimizing the weed growth between plant rows.
- Problem Soils Can Be Farmed More Effectively - Drip systems are ideal for heavy soils with low infiltration rates, since the water can be applied at a slow enough rate for the soil to absorb it, minimizing or eliminating surface run-off. Sandy soils, which are incapable of storing large amounts of water, also can be farmed with drip systems using very high frequency irrigation.

Tiger Tape with Copper Core

"CTT Tested"

Turbulent Flow Drip Tape

Star Silt Outlets open wide when pressurized

Copper Core™ fights bacteria slime and algae

Precision Forged secondary chamber creates superior emission uniformity

Multi-filter Inlets protrude into primary chamber creating vortex streams cleaning adjacent inlet openings.

We are looking for qualified distributors. Please contact us at (714) 379-1100 or FAX us at (714) 898-2346

Drip Tape Manufacturers & Engineers Inc., 15661 Computer Lane, Huntington Beach, CA 92649
Drip Irrigation Installation and Retrieval Equipment

Innovators in Drip Irrigation Installation and Retrieval Equipment.

- Installation equipment to place tape or tubing to depth of 24".
- Retrieval of drip tape for disposal from a soil depth of 12".
- Complete retrieval system for drip tape reuse.
- Cost Effective Proven Systems for Retrieval.

1 (800) PUL-TAPE, Ext. 100

ANDERSON ENGINEERING CORPORATION

Agricultural Signs and Design
P.O. Box 295, Santa Margarita, CA 93453

Circle 199 on Reader Service Card

Watering System

SOIL MOISTURE MEASUREMENTS

SAY WATER'S SAVING SECRET
SAY SOLVORS!

Delmhorst Optimum Blocks, installed as soil moisture sensors, provide accurate soil moisture measurements automatically with the new Digital Model KD-5 Soil Moisture Tensioners. Periodic readings give an accurate indication of soil moisture availability as a guide to scheduling irrigation. This system grasps the advantages and disadvantages of data interpretation at many locations in the root zone.

Delmhorst, Inc.
326 West Sharps, Sharps, PA 16028
Toll free 1-800-252-1461

Circle 109 on Reader Service Card

IA UPDATE

The IA Educational Offers Three New Courses

The Irrigation Association has expanded its list of sanctioned educational courses to help landscape and irrigation contractors train their crews. The new half-day courses are:

- Sprinkler System Scheduling
- Field Hydraulics
- Design Hydraulics

IA staff will help local sponsor groups arrange meetings and provide materials for these and other courses.

Toll-free 1-888-283-7645

Nashville Expo Exhibit Hall Will Be Filled to Capacity

All booth space for the 1997 International Irrigation Exposition in Nashville, Tennessee, November 26-28, is reserved and hotels are filling up quickly, reports IA Expo manager Denise Stone. "Registration packets are in 8x11, and we encourage everyone to send them back as soon as possible," Stone adds. Packets include registration forms for educational seminars. The Opryland Hotel complex will be filled to capacity. That includes hotels rooms, the Opry, the Showcase Exposition, and Golf Tournament. Sufficient off-site hotel space is available so everyone who wants to attend can attend.

Waterworks-Journal | http://www.irrigationjournal.com

NEW!

AquaPRO

Soil Moisture Sensor

"AquaPRO"—a major advance in the measurement of soil water potential—directly and accurately measures soil moisture available to plants, and sets a new standard in irrigation and water management.

AquaPRO out-performs tensiometers and psychrometers, and provides the only meaningful guide for watering (see graph).

- Cuts irrigation costs.
- Optimizes water management.
- Improves plant quality - yield.
- Effective for all soils.
- Moisture-free and easy to use.
- Dependable worldwide.

AquaPRO Soil Moisture Sensor

3432 Park Glen North • Minneapolis, MN 55446
(612) 827-0747 • Fax (612) 827-7617

Waterproof and durable - developed in collaboration with University of Minnesota and USDA/USDA-ARS

www.aqua-pro.com

SOIL SENSORS, INC.

Circle 110 on Reader Service Card