

Irrigation of Vegetable Crops

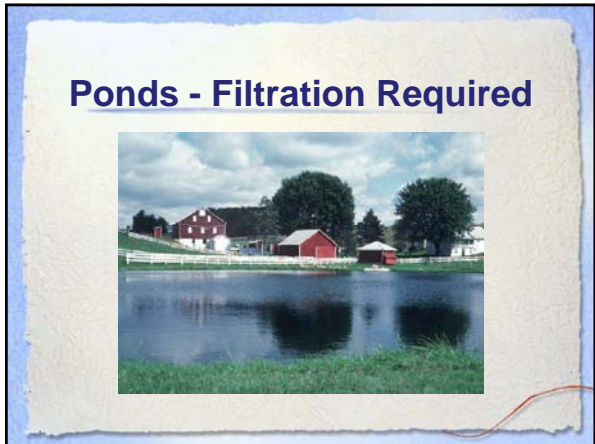
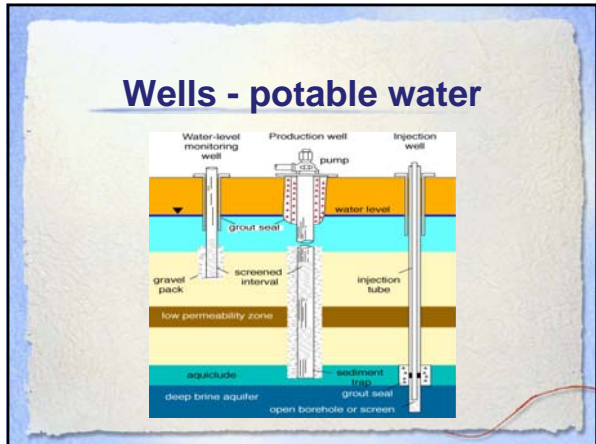
M. D. Orzolek
Department of Horticulture
The Pennsylvania State University

- ## Irrigation Requirements
- Water Source
 - Pump
 - Water Filtration if above ground source
 - Distribution lines
 - Injector for chemicals and fertilizers

- ## Water Source
- Public water
 - Wells
 - Ponds
 - Lakes
 - Streams

Public Water Supply Potable Water

QuickTime™ and a TIF (Uncompressed) decompressor are needed to see this picture.



Lake - Filtration Recommended



River or Stream Filtration Required



Water Quality

- pH between 5.8 - 6.8
- No residual chemicals especially herbicides
- Dissolved solids less than 500 ppm
- Bacteria (plate count/ml) less than 10,000
- Hardness as CaCO₃ less than 150 ppm

Overhead Irrigation Types

- Center Pivot
- Lateral
- Rolling
- Water Gun
- Solid set
- Drip irrigation

Overhead irrigation

- Because overhead irrigation systems need a plentiful supply of water at a relatively high pressure, they vary greatly in complexity and cost depending on the acreage you're covering. Another important thing to keep in mind is that, with overhead irrigation, the foliage of a crop does get wet. If the leaves remain wet for an extended period of time, anywhere from as little as 10 and up to 24 hours, this can cause problems with fungi and bacterial disease.

Center Pivot

- Center-pivots can range in length from 500 yards (circle radius) to the more common quarter-mile. The sprinkler arm is fed with water from the pivot point at the center of the circle. An outside set of wheels sets the master pace for the rotation, typically once every three days.

Center Pivots

- Older center pivots, with the sprinklers attached directly to the pipe, operate at relatively high pressure (60-80 psi), with wide water-spray patterns. They require 800 to 1,200 gallons per minute water source.

Center Pivot



Lateral Move System



Lateral Move System Water Source - canal



Rolling Wheel Irrigation



Solid Set



Drip Irrigation

- Low water volumes - 30 to 60 gallons per minute
- Low volume - header pressure 15-20 psi - drip line pressure - 8-10 psi
- Does not wet foliage
- Can inject fertilizers for accurate placement in soil

Drip Irrigation Components



Filtration Required for above ground water source

- Screen Filters
- Plastic Disk Filters
- Sand Filters
 - Swimming Pool
 - Stainless Steel Media
 - Ceramic

Screen Filters

- Screen filters are used to clean water from wells and public water systems, but not for surface water containing algae and other debris. Generally screen filters have a mesh size of 150.

Screen Filter



Disk Filters

- Disk filters are designed to clean dirty water for drip irrigation systems. Disk filters handle up to 3 times more dirt and debris than screen filters. Disk filter design is a stack of disks pressed together that have tiny grooves in the disks to allow clean water to pass through. Mesh size generally 120.

Disk Filter

Eurodrip Disk Filters

These high quality disk filters from Eurodrip are built to last and provide many years of service. The filter's construction provides easy access to the filter cartridge for cleaning with a smooth action clamp that is easily opened and closed. These disk filters are a true value for the price. Replacement filters are also available.

2" Eurodrip Disk Filter
120 Mesh - 132 Max GPM
145 Max PSI



\$160

3" Eurodrip Disk Filter
120 Mesh - 220 Max GPM
145 Max PSI



\$195

Replacement Filter



2" - \$75 3" - \$95

Sand Filters

- Sand Filtration employs a simple technique of water filtering down through a bed of sand and any solid particles like debris and dirt are trapped in the sand. To clean the filter, the sand is backwashed to remove all debris and dirt.

Choose the Correct Sand



Swimming Pool Sand Filter

QuickTime™ and a TIFF (Uncompressed) decompressor are needed to see this picture.

Stainless Steel Sand Filters



Ceramic Water Filter Unit



Fertilizer Injectors

Fertilizer injectors apply water and nutrients directly to the root of the plant at a controlled rate. By using fertilizer injection products effectively, you can feed roots, not weeds. Drip irrigation coupled with a fertilizer injector will decrease fertilizer and chemical leaching and minimize weeds problems and labor requirement in the field. Drip irrigation and injection of nutrients into the system will increase the size and quality of plants, conserve water and lower utility bills.

Fertilizer Injector Types

- Injectors work on one of two principles. Venturi-type injectors use a pressure difference between the water line and the stock tank to draw concentrated solutions into a faucet connection and mix them with water in the hose.

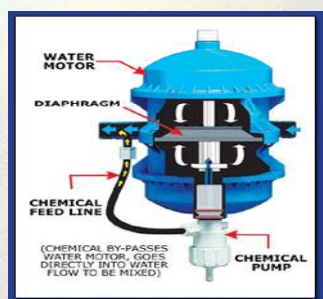
Fertilizer Injector Types

- Positive displacement injectors use mechanical or electric pumps, or water pressure to inject concentrated chemical solutions into the water line. Precise control over the amount of injected chemicals, smaller stock tank, and broader injection ratios has made positive displacement injectors a standard for the industry.

Venturi-type Injector



Positive displacement Fertilizer Injector



Drip Irrigation Tape

- Drip tape varies greatly in its specifications, depending on the manufacturer and its use. Depth of tape placement, distance between tapes, emitter spacing and flow, and irrigation management all must be chosen carefully based on crop water requirements and the soil's properties.

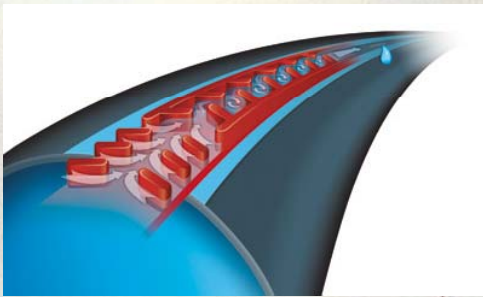
Wide selection of drip tape



Pressure Compensating Emitters in Drip Tape

- * Even Watering - PC emitters have the same flow regardless of pressure
- Easy to Use - The emitters are already installed.
- * Clog Resistant- PC emitters are self-flushing
- * Long Life - Lasts 8+ years exposed to sunlight and longer if mulched over.
-

Drip tape emitter



General Recommendations for use of Drip tape

- Place a water flow meter between the fertilizer injector and main header to record daily water use.
- Leaks can occur unexpectedly as a result of damage by insects, animals, or farming tools. Systematically monitor the lines for physical damage. It is important to fix holes as soon as possible to prevent uneven irrigation.

Emitter with hole



Splice coupler for drip tape repair



General Recommendations for use of Drip tape

- Once a month, flush the drip lines by opening the far ends of a portion of the tubes at one time and allowing the higher velocity water to rush out the sediment. Close the lines again before normal irrigation schedule continues.

General Recommendations for use of Drip tape

- In addition to maintaining the filtering stations, regular flushing of the drip tube and application of chlorine through the drip tube will help minimize clogs. Because algae growth and biological activity in the tube or tape are especially high during warmer months, chlorine usually is applied at 2-week intervals during these months.

Any Questions?

