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Designing a Basic PVC Home Garden Drip Irrigation System

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GARDENING

People of all ages enjoy the benefits of gardening. These benefits range from producing high quality produce to working with the soil. Due to water demands, gardeners need to be concerned about water conservation. Garden irrigation methods have changed throughout the years. From the early days of flood irrigation to current underground drip irrigation, gardeners are continuing to look for more efficient methods.

DRIP IRRIGATION

Drip irrigation is a method which minimizes the use of water by allowing water to drip slowly to the roots of plants, either onto the soil surface or directly onto the root zone, through a network of valves, pipes, tubing, and emitters. There are many advantages of using drip irrigation. These include:

- Water savings, since only those areas directly around plant root zones are irrigated.
- Plants undergo less stress from variations in soil moisture.
- Slow application rate prevents excess surface water build-up and reduces evaporation.
- Weed growth is reduced because areas between plants are not irrigated.
- System can be designed for use in all types of terrain and soil conditions.
- System's low flow rate allows irrigation of larger areas and more plants can be watered at once.
- Through the use of fertilizer dispensers, chemicals and nutrients can be fed directly to the plant in controlled quantities.
- The water application rate can be tailored to fit each individual plant.

These benefits are only possible when a drip irrigation system is properly designed, managed and maintained.

There are also disadvantages of drip irrigation including:

- Drip irrigation requires some time for initial installation.
- It is more expensive than most sprinkler systems.
- The tiny emission holes can become clogged with soil particles, and sometimes algae or mineral precipitates will block these holes.
- Insects and rodents may damage the trickle line emitters.
- Management requirements are somewhat higher.

Raised bed using drip irrigation [1]

Underground drip irrigation [2]

DRIP IRRIGATION DESIGN

There are different components that can be used in drip irrigation systems. These include the delivery system, filters, emitters, pressure regulators, valves or gauges, chemical injectors, pipes, tubing, and controllers. The use of these components will depend on the type of drip irrigation system used. There is no one right way to design a system. A person must judge for themselves the kind of system that would work best for them. Water cost, water availability, water quality, product and installation costs and maintenance skill level requirements are all factors to be considered when deciding which system to use.

Raised bed with drip irrigation [3]

JUAB COUNTY DRIP SYSTEM

Home owners in Juab County designed a system that is simple, user friendly and effective. The system can be designed to meet the needs of the individual user. The system uses 1/2 inch to 1 inch PVC pipe, fittings and ball valves. The size of fittings and valves will correspond with the size of the pipe. The cost of materials will depend on the size of pipe, valves, and fittings used. Depending on the care of the system, the life expectancy of the materials is between 10 and 12 years. The main distribution line is glued. The laterals are not glued on either end.

Design example

Main distribution line is glued, lateral lines are not glued

End caps are used on the end of each lateral line to force the water through the irrigation drip holes. Manual valves are used to control the flow rate. This system can be used for vegetable and flower gardens, trees, shrubs and other such areas.

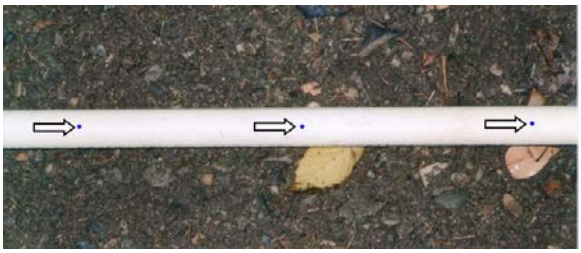
Flow rate is controlled by manual valves.

Plugs are used to restrict the water flow down the lines not being used

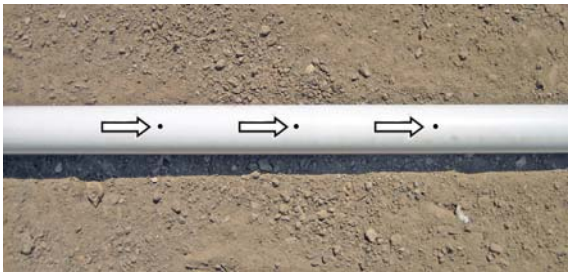
End cap on the end of each lateral line

HOLE SIZE AND SPACING

Hole size is one of the keys to the success of the system. A 1/16 inch drill bit is used to drill the holes in the pipe. Drilling the holes can be done several different ways. A person can use a drill press, a portable drill or a corded drill to make the holes. Using some type of stand such as several tables end to end to place the pipe on when drilling the holes will make it more convenient. For plants such as corn, carrots and peas, the holes are spaced every 6 inches. For plants such as watermelons, tomatoes, and pumpkins, the holes are spaced in groups of three, 3 inches apart and then 3 to 5 feet between each group. The spacing between each row will vary depending on the type of plants selected.



For corn, beans, etc. 1/16 inch hole drilled every 6 inches



For squash, tomatoes, etc., 3-1/16 inch holes drilled 3 inches apart and every 3 to 5 feet

NUTRIENT REQUIREMENTS

One of the essential elements of a successful garden is being able to meet the nutrient requirements of the plants during the season. The first step to creating a fertile garden soil is to determine current nutrient needs. Soil testing information is available at your local Extension office. There are different types of fertilizers available to the home gardener. These include both chemical and organic fertilizers. There are also different methods of applying fertilizers including injectors, foliar feeding, side dressing, banding and broadcasting. The Juab County Drip System can be used with most application methods, but the best results will be achieved by using some type of injector. Injectors can use either dry or liquid water-soluble fertilizer. By using an injector with this drip system, a gardener can control the quantity of fertilizer applied to meet the nutrient requirements of the different plants.

Fertilizer Injector [4]

DRIP SYSTEM BENEFITS

By using this system, users will enjoy several benefits. Water savings: in different studies home owners noticed water savings of 75-80%. Time savings: in the same studies, the participants experienced a 75-80% time savings in watering and weeding the gardens. Throughout the growing season, the study participants observed that the plants were healthier and produced at a higher level.

Jeff Banks Garden, Nephi, Utah

SUMMARY

Drip irrigation can help home gardeners enjoy the benefits of gardening. By using drip irrigation, gardeners will spend less time weeding and watering, will notice water savings and enjoy higher production. The Juab County drip irrigation system is designed to be simple to design and install, user friendly and effective. Using a system like this can help add to the enjoyment and satisfaction of raising home gardens.

Brent Taylor Garden, Levan Utah

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For more information about this drip irrigation system, contact Jeffrey E Banks, USU Extension Agent in Juab County, 160 North Main, Nephi, UT 84648. Phone: 435-623-3452. E-mail: jeff.banks@usu.edu. Juab County Web site: extension.usu.edu/juab. To learn about other types of drip irrigation systems, contact your local Extension office, an irrigation specialist or do a search on the Internet.