Basic Drip Irrigation
7/17/20  10am

The Program will begin Shortly
Basic Drip Irrigation

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Justin Black – Water Conservation Worker II
Basic Drip Irrigation Webinar Outline

Lesson 1.
Identifying types of drip systems
Inline and Point Source

Lesson 2.
Design and Installation Fundamentals

Lesson 3.
Scheduling for Success
Types of Drip

We will cover these skills:

• Identifying the difference between point source drip and inline drip systems.

• Precipitation rates of both systems.

• Filters/Pressure Regulation.

• Flushing capability, manually or automatically.
Point Source Drip
Point Source Drip

- Used in sparsely planted areas
- Deep Watering
- Good on slopes
Inline Drip
Inline Drip System

- Uniform deep watering
- Used for densely planted areas
- Can be used during drought
Inline Drip System

- Used for plants that have
  - Similar water requirements
  - Similar Microclimate exposure
- Placed on surface or subsurface (turf)
- Even water distribution through capillary action
- Design dictated by soil type and flow rate of emitter
Inline Drip – Grid Spacing
Inline Drip ¼ inch Tubing

***Good for small tight areas, rock gardens, veggie beds
Drip Tape for Agriculture or Gardens

**** Typically Used in raised beds, under weed mat, or in furrows
Flow Rates

- Flow rates of emitters must match plant water requirements.
- Use WUCOLS to identify Plant Water Requirements

  a. Higher water use plants need 2-4 gph emitter.
  b. Medium water use plants need 1.0 gph emitter.
  c. Low water use or potted plants need 0.5 gph emitter.
  d. Many emitters are color coded for the gph depending on the manufacturer.
Emitter Water Output Gallons Per Hour (gph)

***Does not show .5 gph emitter.
Drip Systems Summary

- Learned different types of drip systems.
  - Point Source Drip
  - Inline Drip
  - Drip Tape
- Matching the emitter size to the plant water requirement!
  - .5 gph low
  - 1.0 gph med
  - 2.0-4.0 gph high
- WUCOLS IV- for Plant Water Use Requirements
- Water Use Classification of Landscape species
Landscape design and installation

- Basics for designing a drip system
- Hydro Zones
- New Point Source Drip Systems
- Retrofit Existing System to Point Source Drip
- Inline Drip Applications
Drip System Design Basics

- **Draw a Plan of Your Irrigation**
  - A rough layout of your yard, planting areas, plant types, sizes
  - Water locations - is it a new “POC” (point of connection) or existing watering system to be retrofitted
  - Your plan does not need to be precisely to scale.
  - But it should be a fair representation of future and existing plantings in order get a count of
    a. number of emitters on that zone
    b. lengths of drip tubing needed for the area/zone
    c. To identify separate hydrozones
Hydro Zones – Separate zones for specific
a. plant types (trees vs shrubs vs ground cover vs turf vs garden)
b. microclimates
c. plant water use requirements

*** Need to take in account HZ’s no matter on what type of drip system you install or retrofit.
Design Basics

- **Determine available pressure on a hose spigot**
  - Most drip systems will require between about 10-30 PSI (pound per square inch) in the main supply tubing. Make sure you have at least 50-80 PSI available at the source or before the zone valve.

- **Flow Bucket Test**
  - If available pressure is higher, you may need to have one or more pressure regulators installed, depending on the type of irrigation device selected.

- **Pressure regulation** can be done at the hose spigot, irrigation control valve or on a retro kit at the spray head.
Point of Connection (POC)

- A new installation or manifold at main service line from the house
- An existing zone valve being converted to an inline drip zone
- A hose spigot
- Rain barrel?
New Drip System

- At the main service line into the house a tee and shut off needs to be plumbed in.

- Add a manifold which contains the number of drip zone control valves based on your sketch and hydrozones.

- Add sprinkler control wire in same trench and run to you irrigation timer.

- Connect drip zone valves to poly pipe and run to separate planting areas.

- Pipe in planting areas can be either point source or inline but should not be both on the same valve.
Point Source Design Basics

- PE pipe moves water from the zone valve through ½” poly tubing to plant locations and emission devices.

- Water then moves through smaller 1/4” polyethylene or vinyl distribution tubing.

- Distribution tubing is attached via connectors punched directly into the supply tubing by utilizing a punch tool.

- From the main supply tubing connection, distribution tubing is easily run to various plant and emitter locations through a series of tees, couplings and elbows and ¼” tubing.
  
  *Older systems were 1/8” can be retrofitted to 1/4”

- With its small diameter, distribution tubing is very flexible and can be run in difficult locations and interspersed among plants, hardscapes or other obstacles.
<table>
<thead>
<tr>
<th>Plants Type</th>
<th>No. of Emitters</th>
<th>Output</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vegetables (closely spaced)</td>
<td>1</td>
<td>1/2–1 gph</td>
<td>every foot</td>
</tr>
<tr>
<td>Vegetables (widely spaced)</td>
<td>1</td>
<td>1–2 gph</td>
<td>base of each plant</td>
</tr>
<tr>
<td>Flowerbeds</td>
<td>1</td>
<td>1 gph</td>
<td>base of each plant</td>
</tr>
<tr>
<td>Groundcovers</td>
<td>1</td>
<td>1 gph</td>
<td>base of each plant</td>
</tr>
<tr>
<td>Shrubs (2–3 feet)</td>
<td>1–2</td>
<td>1 gph</td>
<td>base of plant</td>
</tr>
<tr>
<td>Trees &amp; Shrubs (3–5 feet)</td>
<td>2</td>
<td>1 gph</td>
<td>1/2–1 foot away from trunk</td>
</tr>
<tr>
<td>Trees &amp; Shrubs (5–10 feet)</td>
<td>2–3</td>
<td>2 gph</td>
<td>2 feet away from trunk</td>
</tr>
<tr>
<td>Trees &amp; Shrubs (10–20 feet)</td>
<td>3–4</td>
<td>2 gph</td>
<td>3 feet away, at dripline</td>
</tr>
<tr>
<td>Trees (over 20 feet)</td>
<td>6</td>
<td>2 gph</td>
<td>4 feet away, at dripline</td>
</tr>
</tbody>
</table>

Quantity of Emitters for Point Source Drip systems
Emitter Placement

- Placing your drip emitters too close together or too far apart is a bad move.

- Placing them evenly will ensure that your plants get the proper amount of water without having areas oversaturated.

- A good rule of thumb is to place drip emitters evenly spaced along the plant line and a minimum of six inches from the base of the plant.

- Drip Systems are dynamic and should move with the drip line of the tree or shrub as plants grow.
Drip Irrigation Parts – New System

- Zone Valve with Filter
- Pressure Reducer
- ½” Connector
- ½” Tee
- ½” 90 or elbow
- Button Emitter
- ¼” Connector
- Flag Emitter
- ¼” Plug
- ½” Poly Pipe
Retrofit Drip System

- Retrofit existing pop up spray type sprinklers to a drip system.
- Add a section to an existing drip system.
- Use a hose spigot for small areas or potted plants use, add the line and a battery operated timer.
- Upsize emitter sizes and additional pipe if necessary for larger trees or more mature plants.
Drip Irrigation – Retrofit System’s

½” Tubing

****Can be used to retrofit to point source or inline drip systems
Octabubbler

Spray to Drip Retrofit Kit ¼” Tubing

Drip Irrigation Parts – Retrofit System
Inline Drip System

- Determine grid pattern necessary and pipe and row spacing. Based on plant density.
- Consider:
  a. Row spacing (12”, 24”)
  b. Distance between emitters (6”, 12”, 18”)
  c. Precipitation or Flow Rate .4 gph, .6gph, .9gph (Inline Drip tubing varies from .4, .6 and .9 gallons per hour).
- Match plant water requirements and soil type to emitter output.
- **YES,** you can over water with drip!!!!
Drip Zone Control Valve

- Anti-syphon
- Filter
- Pressure Reducer

- Going into PVC as shown but could go directly into the ½” distribution or supply tube.
Inline Drip Tubing with Built-in Emitters

***Examples of 1/2” tube and ¼” spaghetti tubing

***In areas where there are no plants, or under sidewalks, use “blank tubing” or tubing with no holes or emitters. Ten reconnect to the inline tubing with emitters, this will help keep the weeds at bay.
Inline Drip Built-in Emitter-Close Up
Screw this into after the pressure reducer/filter.
Inline Drip System Sample Layouts
Inline Drip System Retrofit Kits

*** Convert a spray system to an inline drip system (you will need to cap other existing spray heads)


Landscape Design and Installation Summary

- **Point Source Drip**
  - Design flow rates of emitters to plant type in a group
  - ¼” inch tubing, connectors and emitters go together
  - Match the emitter size to the plant water requirement - .5 gph low, 1.0 gph med, 2.0 gph high

- **Inline Drip**
  - Grids, rectangles or line
  - Spacing of emitter line and built in emitters must be considered
  - Stake pipes down with metal stakes
Scheduling for Success

- Evapotranspiration from plants/soils
- Plant establishment tips and schedule vs. a weather-based irrigation schedule
- Scheduling your irrigation timer - see City of Roseville Irrigation Schedule
Evapotranspiration

What is Evapotranspiration?

*the process by which water is transferred from the land to the atmosphere by evaporation from the soil and other surfaces and by transpiration from plants.*

- Soil moisture deficit, only put back what water is required not to saturation or run-off
- Weather Based Scheduling- Adjust Seasonally!
## Plant Establishment

- **Ways to encourage growth**

- **Normal weather-based schedule**

### Table: Encourages & Limits Growth

<table>
<thead>
<tr>
<th>Encourages growth</th>
<th>Limits growth</th>
<th>Additional factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>loose soil</td>
<td>compacted soil</td>
<td>organic matter added to backfill soil no more than 1/3rd</td>
</tr>
<tr>
<td>proper irrigation management</td>
<td>little or no irrigation or too much</td>
<td>root stimulant products, kelp, B-12</td>
</tr>
<tr>
<td>mulch 4-6” around planting hole</td>
<td>grass and weeds close to trunk</td>
<td>fertilizing at planting</td>
</tr>
<tr>
<td>root flare slightly above soil surface 1”</td>
<td>planting too deep</td>
<td>adding spores of mycorrhizae*</td>
</tr>
<tr>
<td>leaving top of tree/shrub intact</td>
<td>pruning at planting</td>
<td>Use a soil moisture meter</td>
</tr>
</tbody>
</table>

*can enhance growth on seedlings under certain circumstances*
# Irrigation Schedule

- **Seasonal Schedule**
- **Minutes Per Week**
- **All Sprinkler Types**
- Set up Individual programs for plant types and irrigation system type.

## Quick sprinkler tips
- Check system regularly for leaks or missing drip emitters
- Adjust and straighten sprinklers for overspray on hardscape like sidewalks and driveways
- Install check valves for low head drainage

## Call us at (916) 774-5761
to schedule a Water Wise House
Call if you have questions.

## Irrigation Watering Schedule

<table>
<thead>
<tr>
<th>Season</th>
<th>Months</th>
<th>Programs</th>
<th>Turf/Fixed Spray</th>
<th>Shrub/Spray Fixed</th>
<th>Drip System</th>
<th>Turf/Rotary Nozzle</th>
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<td>Winter</td>
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</table>
## Irrigation Watering Schedule

**Check your systems regularly**

### Winter

<table>
<thead>
<tr>
<th>System</th>
<th>December</th>
<th>January</th>
<th>February</th>
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<tr>
<td>Turf/Fixed Spray</td>
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<td>Shrub Spray Fixed</td>
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<td>Turf/Rotary Nozzle</td>
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### Spring

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### Fall

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<td>Turf/Rotary Nozzle</td>
<td>168</td>
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</table>

### Quick sprinkler tips

- Check system regularly for leaks or missing drip emitters.
- Adjust and straighten sprinklers for overspray on hardscape like sidewalks and drive ways.
- Install check valves for low head drainage.

### Call us at (916) 774-5761

To schedule a Water Wise House. Call if you have questions.
Scheduling for Success Summary

- Evapotranspiration
- Establishment Pre-Post Establishment
- Sample Schedule
Internet Resources

California Landscape Contractors Association- www.CLCA.com
City of Roseville- www.roseville.ca.us/savewater
Regional Water Authority- www.bewatersmart.info
DIY Network- https://www.diynetwork.com/.../landscaping/how-to-install-a-drip-irrigation-system
The Irrigation Association- www.irrigation.org
Irrigation tutorial- www.irrigationtutorials.com
Jain- https://jainsusa.com/training/point-source-inline-irrigation/
Netafim- https://www.netafimusa.com/landscape/
Peaceful Valley (Drip Tape)- https://pdfs.groworganic.com/media/pdfs/catalog/Tools-Irrigation-2020-WEB.pdf
Landscape Products- https://landscapeproductsinc.com/
WUCOLS-Water Use Classification of Landscape Species- https://ucanr.edu/sites/WUCOLS/
YouTube- https://www.bing.com/videos/search?q=youtube+drip+irrigation+channel&qpvt=youtube+drip+irrigation+channel&FORM=VDRE
Thank you for joining us.

roseville.ca.us/savewater