Regional District of Nanaimo
Team WaterSmart
Drip / Micro Workshop

June 2009

Overview

- Irrigation System Anatomy
  - (controllers, backflow, valves, sprinklers)
- Items Required (pipe & fittings)
- Pressure and Elevation

- Drip / Micro Systems
  - Scheduling and precipitation rates
  - What new and what is coming

Water Source

- City Main:
  - Location where the typical irrigation system gets its water
  - The connection is usually deep
  - 2 feet is code in B.C
    - but they can be deeper

WATER METER

Manual Control Valves

- Gate Valve
- Ball Valve

Backflow Prevention Devices

- DC - Double Check Assembly
  - Prevents backflow and back siphonage
  - One per system
  - Most common usage is for irrigation systems
**PVC Piping**

- Work a medium layer of cement into the fitting socket
- Avoid puddling cement in the socket
- On pipe do not coat beyond the socket depth or allow cement to run down into the pipe beyond the bell

**Note**

- Too much cement and primer will cause damage to the pipe and will cause a failure of the system.

**Poly Pipe**

**Poly Fittings**

**Irrigation Controllers - Operation**

- **Spray Sprinklers**
  - Spacing: 10 feet – 15 Feet
  - Typical Precipitation Rate: 1.25 – 2.75 Inches per hour
**Sprinkler Heads**
- Rotary head (Rotors)
- Gear – Small - Mid-range - Large
- Ball Drive
- Impact – Small - Mid-range - Large

**Micro Irrigation**
Sprinkler Types
- Micro
  - Typical Precipitation Rates
  - 1.75 – 2.75 inches per hour

**Introduction to Hydraulics**
- 10 feet of elevation
  - Up we lose – 4.33 PSI
  - Down we gain - 4.33 PSI

**Drip / Micro Systems**
- Drip, or micro-irrigation, technology uses a network of plastic pipes to carry a low flow of water under low pressure to plants
  - Works well with Water-wise gardening drip irrigation.
  - Odd-shaped and narrow areas are easily irrigated with drip systems.
  - Puts the water at the root zone of the plant material
  - 90 percent efficiency verses sprinkler systems about 70 percent efficient.
  - Less loss of irrigation water due to wind
  - Drip irrigation stretches water supplies and may be exempt from water restrictions imposed during drought.
Drip and Micro Spray Irrigation

- Drip irrigation equipment can easily be installed.
- Low pressure, low flow equipment
- Some specialty equipment required

Advantages

- Delivers water slowly
- Immediately above, on or below the surface of the soil.
- Minimizes water loss due to runoff, wind, and evaporation.

Advantages

- Can be operated during the windy.
- Mold spots, or rotting of siding and fences experienced with overspray from sprinkler irrigation is eliminated
- Pavement deterioration associated with sprinkler irrigation runoff is eliminated.

Advantages

- Adaptable and changeable
- Drip systems can be easily expanded to irrigate additional plants
- Emitters can be simply exchanged or removed
- Emitter lines eliminated or repositioned.

Disadvantages

- If emitters are poorly placed, root development may be restricted
  - far apart or too few in number
- Water seeping at ground level is hard to see and makes it difficult to know if the system is working properly

Disadvantages

- Regular maintenance inspections are needed to maintain system effectiveness
- Clogs are much less likely with filtered water and proper pressure regulation
Drip and Micro Spray Irrigation

**Disadvantages**

- Drip tubing can be a tripping hazard especially for animals and children
  - cover with mulch
  - fastened with wire anchor pins every 2 to 3 feet.
- Drip lines can also be easily cut while doing landscape maintenance.

**Sprinkler Heads**

**Micro Sprays**

- 15 – 25 PSI
- Coverage – small area
  - up to 6”
- Precipitation Rates
  - 0.25 – 2.25 inches/hr
- Must filter the water to avoid contamination

**Micro Sprinklers**

**Micro Risers**

1/4” x 8”, 12” or 18” Riser
Emitter Placement

- Placed so that water reaches the roots
- New plantings place emitters over the root ball

Emitter Placement

- Trees and shrubs require emitters be moved away from the trunk and more added as the plant grows

Emitter Placement

- Drip emitter placement is also related to whether the soil is sand or clay.
- To compensate for lateral movement of water in the soil, locate emitters
  - 12 inches apart in sand,
  - 18 inches apart in loam,
  - and 24 inches apart in clay.

Soils and Drip Irrigation

- Wetted area at Soil Surface
- Cross Section of Wetted Area in Soil

<table>
<thead>
<tr>
<th>Soils</th>
<th>Wetted Area at Soil Surface</th>
<th>Cross Section of Wetted Area in Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sand</td>
<td>1-2'</td>
<td>2'-3'</td>
</tr>
<tr>
<td>Loam</td>
<td>3-5'</td>
<td>3'-5'</td>
</tr>
<tr>
<td>Clay</td>
<td>6'-10'</td>
<td>5'-7'</td>
</tr>
</tbody>
</table>
Scheduling

- Any irrigation system is only as efficient as the watering schedule used, and the maintenance done on the system.
- If systems are set to water excessively, any system including drip can waste water.

CONTROLLER

- Tips for reducing water and costs of an irrigation system:
  - Know how to run the irrigation controller
  - Adjust the watering times and the frequency based on weather conditions
  - Install a rain shutoff device or soil moisture sensor

Controllers

- Battery Controllers

Drip Control Zone

July is Water Smart Month for the Irrigation Industry

- So What can we do to be water smart
  - Program our Irrigation for systems seasonally
  - Understand and adjust our controllers
  - Check our system for breaks
  - Look as new technology for water savings
**Scheduling Irrigation**

How Much is too Much?

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**Irrigation Controllers - Operation**

We Irrigate to ET
ET – Evapotranspiration Rate

Can be measured by a weather station:
- Relative Humidity
- Air Temperature
- Wind Velocity
- Solar Radiation

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**Controller Scheduling**

Scheduling to Evapotranspiration

<table>
<thead>
<tr>
<th>Month</th>
<th>Jan</th>
<th>March</th>
<th>May</th>
<th>July</th>
<th>Sep</th>
<th>Nov</th>
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</thead>
<tbody>
<tr>
<td>Ave. Daily ET</td>
<td>0.05</td>
<td>0.10</td>
<td>0.15</td>
<td>0.20</td>
<td></td>
<td></td>
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<tr>
<td>Set for Max. ET by season</td>
<td>0.10</td>
<td>0.15</td>
<td>0.20</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted for ET through Season</td>
<td>0.05</td>
<td>0.10</td>
<td>0.15</td>
<td>0.20</td>
<td></td>
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</tr>
</tbody>
</table>

Water not used by plant.

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**Irrigation Controllers - Operation**

Soil texture and structure determines:
- Soil Infiltration Rate
  - Irrigation must be applied at rates slower than the soil infiltration
- Sandy soils can absorb water quicker than clay soils
- The maximum application rate is determined by the soil type
  - Cycle often if runoff occurs

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**CONTROLLER**

- To eliminate runoff, cycle your clock to 2-4 start times
  - no longer than 5 minutes each
  - 1 to 2 hours apart to allow water to soak into the soil
- Develop a separate drip schedule for trees, shrubs and flower beds
- Aerate in the spring and fall to loosen soil and reduce runoff

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**Irrigation Controllers - Operation**

FREE USE:

irrigationbc.com
Rain Shut-off Device

Basic Water Saving devices –
Shuts off automatic irrigation in the event of Rain

Irrigation Controllers - New Technology

New Sprinklers with more effective application of irrigation water.

Connect to the Web to transmit schedules over the Internet for contractor or Manufacturers’ advice and assistance.
Create automatic schedule for landscape/lighting.
Obtain online weather forecasts for zone adjustments using.

ET or Smart Controllers

Real ET for real plants
Generates local ET from its own dedicated sensors.
True plant, soil, & sprinkler database
Generates ET run times from scratch.

ET SENSOR sees evapo-transpiration...
ET MODULE knows crop coefficient, soil slope, sun, and PI data for each station.

Cost effective Solutions
New controller Applications
Verify the proper operation of each zone valve
- manually activating it from the controller

Controllers do not solve this problem!

Thank you