Strategies for Efficient Irrigation

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Basic goal:

Find ways to reduce amount of water used for irrigation
Water conservation campaigns

- Water scarcity
- Water costs
- Environmental morality
Irrigation habits after water conservation campaign in Corvallis, OR
Socio economic factors affect water habits
Beacon Hill Seattle

Corvallis, OR
Reduce irrigation by design

- Eliminate odd shaped areas
- Don’t leave unplanned areas
- Utilize Alternative plant materials
- Change placement of lawns
Don’t plant lawns where they don’t belong
Lawns: a poor choice for difficult to irrigate sites
Eliminate the lawn and extend the sidewalk
What is the plan?
Redesign to eliminate an impossible irrigation problem
Houston we have a problem!
Enclose lawns inside beds to keep water on lawns and beds and out of streets
Irrigation needs change as landscapes evolve
Tree vs. lawn competition
Thatch affects irrigation needs

- Leaf tissue (minor)
- Roots (major)
- Stems (major)
Rootzone issues affect irrigation strategies
Irrigation system issues

- Poor design and layout
- Growth of plant materials
- Poor irrigation uniformity
- Poor system maintenance
- Poor system management
Conceptual design flaws
Bad head placement
Design was ok until trees grew up.

Now one side is a swamp and the other side is dead from drought.
Hydraulic problems
Malfunctioning heads
Plant growth
Developing irrigation strategies

- prioritized irrigation
- alternative plant materials
- shrinking the irrigation season
- tuning irrigation systems
- improving soil conditions
High priority, irrigate as needed

Low priority, little or no irrigation
Strategic irrigation
Looking for alternative materials
Mowable groundcovers

- *Cotoneaster dammeri*
- *Euonymous fortunei*
- *Juniperus conferta*
- *Juniperus horizontalis*
- *Vinca minor*
Mowed *Euonymous fortunei*
Grass + dicot mixtures can reduce irrigation needs
Yarrow vs. ryegrass  5 weeks without water
Shrinking the season
2008: A dry year
Peak in July & August
Total irr. units = 140

2010: A normal year
Peak in August
Total irr. units = 116
Half Acre Garden in Corvallis

2012: Wet spring and very dry late summer
Total irrigation units = 97

[Graph showing irrigation units per month with peaks in August and September.]
Half Acre Garden in Corvallis

Irrigation months for three different years

Units

2008 Dry

2010 Normal

2012 Wet/Dry

Mar-Apr        Apr-May       May-June       June-July   July-Aug     Aug-Sept     Sept-Oct

0  5  10  15  20  25  30  35  40  45

50
Shrinking the irrigation season

1. Wait as long as possible before starting irrigation in spring

2. Irrigate consistently in summer

3. Stop irrigation ASAP in fall (around labor day most years)
Optimize system performance
Adjust spacing as needed

Head to head is still the best standard
Heads need to be vertical

Adjust annually
Check and adjust arc
Don’t mix head types
System designed for Stream Rotors
Poorly adjusted gear rotor substituted for stream rotor
Replace lost heads
Zones should account for microclimate differences
Excess pressure is a problem with spray heads.
Spray zones should have pressure regulators.
Measure precipitation rates

Make system adjustments first
What about soil?
How can this be irrigated efficiently?
Coring improves profile consistency
Mowing height vs. irrigation needs?

Standard dogma:

Mow high to get deeper roots. Deep roots require less water.
### Functional mowing heights

<table>
<thead>
<tr>
<th>Grass Type</th>
<th>Mowing Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine fescues</td>
<td>1.5” - 2.5”</td>
</tr>
<tr>
<td>Per. ryegrass</td>
<td>1.5” - 2.5”</td>
</tr>
<tr>
<td>Ky. bluegrass</td>
<td>1.5” - 2.5”</td>
</tr>
<tr>
<td>Tall fescue</td>
<td>2.0” - 3.0”</td>
</tr>
</tbody>
</table>
Lawns evolve from planted grasses to climax species.
Colonial bentgrass false crowns at high heights
Bentgrass appearance mowed at 2.5”
Functional mowing heights

Prostrate growing grasses

Colonial bentgrass  1.0” – 2.0”
Rough bluegrass     1.0” – 2.0”
Annual bluegrass    1.0” – 2.0”
Climax lawns        1.0” – 2.0”
Irrigating
Poor irrigation management is everywhere.
Recent irrigation research

North Carolina:
In ground systems used twice as much water as hose and sprinkler irrigation.

Homeowners all thought they used less water with in ground systems.
How do we measure water needs?

Lysimeters

- Measures maximum ET
- Primary reference for other measures
# Lysimeter ET rates of turfgrasses

Measured ET in inches/day

<table>
<thead>
<tr>
<th>Grass</th>
<th>West. WA*</th>
<th>Colorado</th>
<th>Southwest CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tall Fescue</td>
<td>0.15”</td>
<td>----</td>
<td>0.42”</td>
</tr>
<tr>
<td>Annual Bluegrass</td>
<td>0.14”</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Per. Ryegrass</td>
<td>0.14”</td>
<td>----</td>
<td>0.26”</td>
</tr>
<tr>
<td>Kentucky Bluegrass</td>
<td>0.12”</td>
<td>0.20”</td>
<td>----</td>
</tr>
<tr>
<td>Colonial Bentgrass</td>
<td>0.12”</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Cr. Red Fescue</td>
<td>0.11”</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Chewing's Fescue</td>
<td>0.09”</td>
<td>----</td>
<td>----</td>
</tr>
<tr>
<td>Hard Fescue</td>
<td>0.08”</td>
<td>----</td>
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</tr>
</tbody>
</table>

* Represent mid-summer ET rates
Weekly ET for Perennial Ryegrass:

.14” per day  X 7 days per week =

0.98” or about 1” per week

This represents the mid-summer weekly ET in Puyallup, WA.
Current technology for estimating water use
Basic Irrigation Questions

1. How much water is needed?

2. How often should it be applied?
   > Deep and infrequent
   > Light and frequent
Colorado State University research

The most efficient frequency*

Every 2 days @ 75% MWU
or
Every 4 days @ 85% MWU
or
Every 7 days @ 106% MWU

* Based on maintaining quality rating of 7
How often to irrigate?

In ground systems

Goal:
2-3 times per week

Reality:
- More than once per week
- Less than 7 times per week
Summary

• Reduce irrigation by design
• Prioritize areas
• Use alternative plant materials
• Tune and upgrade systems
• Shrink irrigation season
• Upgrade control systems