This presentation premiered at WaterSmart Innovations

watersmartinnovations.com
TWCA® Qualified Turfgrasses provide up to 50% Water Savings
Turfgrass Water Conservation Alliance® is a non-profit avenue to test and qualify turfgrass cultivars for improved drought tolerance and educate others based on the research.
In many of societies, turf (grass) has received an undeserved black eye with respect to $\text{H}_2\text{O}$.
Some Grasses are "WATER HOGS"

Some are not!
Finding Balance
Lawns and Water Conservation

1 acre of trees produces enough oxygen for 18 people
1 acre of grass produces enough oxygen for 64 people
1 acre of rocks produces enough oxygen for 0 people
## Benefits of Turfgrass

<table>
<thead>
<tr>
<th>Recreational</th>
<th>Functional</th>
<th>Aesthetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low cost surfaces</td>
<td>Soil erosion control</td>
<td>Beauty</td>
</tr>
<tr>
<td>Physical health</td>
<td>Dust prevention</td>
<td>Quality of life</td>
</tr>
<tr>
<td>Mental health</td>
<td>Rain water entrapment</td>
<td>Mental health</td>
</tr>
<tr>
<td>Safety cushion</td>
<td>Heat dissipation</td>
<td>Social harmony</td>
</tr>
<tr>
<td>Spectator environment</td>
<td>Glare reduction</td>
<td>Community pride</td>
</tr>
<tr>
<td></td>
<td>Pest reduction</td>
<td>Increased property values</td>
</tr>
<tr>
<td></td>
<td>Fire prevention</td>
<td>Complements trees and shrubs in</td>
</tr>
<tr>
<td></td>
<td>Security</td>
<td>landscape</td>
</tr>
<tr>
<td></td>
<td>Environmental protection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Carbon Sequestering</td>
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</tbody>
</table>
Different ideas of landscape and landscape maintenance which uses more water...
How much water does your lawn use?

Mallard* required 8,800 gallons of water to maintain a 5,000 square foot lawn over the entire summer (90 days).

Solar Green* required 19,700 gallons of water to maintain the same area; using nearly two of these tanks over the same time period!

*after 27 days with no water applied Albany, OR  2008
How does the Turfgrass Water Conservation Alliance® conduct their trials?
TWCA

- Non-profit organization formed in 2009
- Based on an accepted protocol (PST, NTEP, AR) since 2002
- Includes four grass seed companies – each participant develops their own brand
- Utilizing 10 rain out structures (OR (3), AR (2), VA, IN, NC, Ontario CAN, & Univ of Laval Quebec, CAN)
- Studies at 7 field trials in arid environments (OR (2), UC Riverside CA, So NJ, Olds College, Alberta, Canada & Univ of UT)
PROTOCOL

- Minimum testing = 2 location/years
- Finish in the top statistical group with Digital Imagery Analysis (DIA) data collections
- Acceptable measure of turf quality
- 3rd party peer review of cultivars
- Comprise a minimum of 60% in blends or mixtures
- More information available at www.tgwca.org
Turfgrass Breeders Trial (CTBT)

- Heat Tolerance
- Drought Tolerance
- Disease
- Insect
- Persistence
- Turf Quality

For more information: www.ctbt-us.info
Planting a trial in ROS
A new planting established
RAIN OUT STRUCTURE
(ROS)
ROS at Univ of Arkansas
ROS at Univ of Guelph
Disease Trial in NJ
Quality Ratings - Subjective

- Relatively poor correlations exist among researchers \((r < 0.68)\)

(Skogley and Sawyer, 1992)  
(Horst et al., 1984)
Quality Ratings - Subjective

- Relatively poor correlations exist among researchers ($r < 0.68$)

(Skogley and Sawyer, 1992)
(Horst et al., 1984)
Light box and digital camera ease of use
Digital Image Analysis (DIA)

Types of Analysis
- Color
- Cover
- Turf Quality

Application
- Drought
- Disease
- Wear
- Color

Kentucky Bluegrass 74% Coverage
Evaluations

- **Visual quality ratings (bi-weekly)**
  - (1-9 with 9 = optimal turfgrass quality, 6 = acceptable turf)

- **Cover analysis using digital images (weekly)**
  (Richardson et al. 2001)

99.2% green turf cover

28.6% green turf cover
Digital Image Analysis (DIA)

1. Objective vs. Subjective
2. Utilizes 1 to 9 scale
3. 4 Parameters with 1 Evaluation
4. Highly Repeatable
5. Calculate overall turf quality
6. Requires minimal expertise
7. Permanent record on file
Kentucky Bluegrass

50 Days With No Water

Mallard - 38% Green Cover

Geronimo - 2% Green Cover
Water Usage Study
Methods

- Top, middle and bottom **cultivars from** previous studies selected for testing
- Included Kentucky bluegrass (2 hybrid), tall fescue, perennial ryegrass
- Maintained at a 1” mowing height
- Turf well watered before dry down began
- Turfgrass near 100% green cover at beginning of drought stress
- Dry down period = July 1 – Sept 30 in 2008 & 2009
- Turf watered when the percentage of green cover dropped below 40%
Methods (cont.)

- Withhold water
- Mow 3 times per week at 1”
- Digital photos 24 hours after mowing
- Study continues until top entry is reduced to 25% green cover
- Analyzed using non-linear regression analysis with data fit to a sigmoid curve.
Average Temperatures and Humidity for 2008 and 2009

<table>
<thead>
<tr>
<th>Month</th>
<th>2008</th>
<th>2009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jul-08</td>
<td>51.9</td>
<td>53.1</td>
</tr>
<tr>
<td>Aug-08</td>
<td>73.5</td>
<td>60.5</td>
</tr>
<tr>
<td>Sep-08</td>
<td>95.1</td>
<td>71.1</td>
</tr>
<tr>
<td>Jul-09</td>
<td>54.9</td>
<td>57.1</td>
</tr>
<tr>
<td>Aug-09</td>
<td>77.9</td>
<td>75.1</td>
</tr>
<tr>
<td>Sep-09</td>
<td>101</td>
<td>97</td>
</tr>
</tbody>
</table>

- **Low**, **Average**, **High**
Evapotranspiration (E.T.) Rates for 2008 and 2009

Water in Inches

<table>
<thead>
<tr>
<th></th>
<th>July</th>
<th>August</th>
<th>September</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Legend:
- **July**
- **August**
- **September**
- **Total**
Evapotranspiration

- 99% water in plant is lost via transpiration
- Policy makers use ET to determine plant water use

\[ ET = \text{Reference ET (ET}_o\text{)} \times \text{Crop coefficient (K}_c\text{)} \]
Assuming a 5,000 square foot lawn, this chart shows the amount of water required to maintain 40% green cover at 90 days in Albany, Oregon. (08/09)

<table>
<thead>
<tr>
<th>Cultivar</th>
<th>2008 Water (gallons)</th>
<th>2009 Water (gallons)</th>
<th>08/09 Avg Water (gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kentucky Bluegrass</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Mallard</td>
<td>8,826</td>
<td>6,749</td>
<td>7,788</td>
</tr>
<tr>
<td>Bluestone</td>
<td>11,422</td>
<td>9,864</td>
<td>10,643</td>
</tr>
<tr>
<td>Eagleton</td>
<td>12,460</td>
<td>9,864</td>
<td>11,162</td>
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<tr>
<td>Midnight</td>
<td>14,017</td>
<td>13,498</td>
<td>13,758</td>
</tr>
<tr>
<td>Reveille</td>
<td>16,094</td>
<td>9,864</td>
<td>12,979</td>
</tr>
<tr>
<td>Solar Green</td>
<td>18,690</td>
<td>14,537</td>
<td>16,613</td>
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<tr>
<td><strong>Ryegrass</strong></td>
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<td></td>
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<tr>
<td>APR2105</td>
<td>10,903</td>
<td>20,248</td>
<td>15,575</td>
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<tr>
<td>Soprano</td>
<td>12,460</td>
<td>16,613</td>
<td>14,537</td>
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<tr>
<td>Protégé GLR</td>
<td>14,017</td>
<td>16,094</td>
<td>15,056</td>
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<tr>
<td>Brightstar</td>
<td>16,613</td>
<td>21,286</td>
<td>18,949</td>
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<tr>
<td><strong>Tall Fescue</strong></td>
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<tr>
<td>RK4</td>
<td>3,634</td>
<td>10,383</td>
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<td>KY-31</td>
<td>5,711</td>
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<td>8,047</td>
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<tr>
<td>Greystone</td>
<td>5,711</td>
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<td>Rebel Exeda</td>
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<td>ATF1258</td>
<td>7,788</td>
<td>10,903</td>
<td>9,345</td>
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<tr>
<td>Penn 1901</td>
<td>7,788</td>
<td>12,460</td>
<td>10,124</td>
</tr>
</tbody>
</table>
Help from Friends

- **Earthworms**
- **Mycorrhizae fungi** - water & phosphorous uptake
- **Azospirillum bacteria** - brasilense amplifies effect of Arbuscular Mycorrhizae
- **Agrobacterium radiobacter** - phosphorus solubilizing bacteria
WE MAY NOT CHANGE THE WORLD
BUT WE CAN MAKE OUR CONTRIBUTION
How can you help?

By Using TWCA® Qualified cultivars you can …

• Save up to 50% water to keep the green
• Use less fertilizer to keep the green
• Use less chemicals to keep the green
WHERE CAN I ACQUIRE THE TWCA® VARIETIES

Visit [www.tgwca.org](http://www.tgwca.org) to find a distributor
TWCA®
Finding a Balance with Lawns and Water Conservation
Questions?

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www.tgwca.org