Sprinkler Irrigation Catch Can Uniformity & Soil Moisture Uniformity

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Background

- **DU_{lq} attemped for irrigation scheduling use in Florida**
  - **DU_{lq} of residential systems depends on testing technique**
  - **DU_{lq} measured on residential systems typically ~0.50 or less**
  - **Run times 50-100% higher than existing**
  - **No quality issues in existing landscapes**

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Literature Review

- Analytical yield & uniformity relationship
- Yield reduction due to non-uniformity not well documented in the field
- Redistribution of irrigation water within canopy (ag. crops)
- Minimal information on turf quality & uniformity

Objectives

- **Determine relationship between soil moisture variability and catch can variability**

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Methodology

- Plots
  - 4.6 m X 4.6 m (15 ft X 15 ft)
  - 15Q Spray heads
  - 25 catch cans
- Tests at 3 pressures
  - 414 kPa (60 psi)
  - 138 kPa (20 psi)
  - 69 kPa (10 psi)

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Experimental Site

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Methodology

- **Arredondo FS**
  - **Field capacity 7-10% (no runoff)**
  - **Permanent wilting point 2-3%**
  - **Infiltration rate 179 mm/hr (7 in/hr)**

$$DU_{lq} = \frac{V_{low25\%}}{V_{avg}}$$

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Testing Conditions

- **Soil moisture content**
  - **Gravimetric 10 cm (4 in) long X 5.7 cm (2.2 in) dia.**
  - **TDR 20 cm (8 in) long rods**
- **Soil sample & TDR collection rotated 90 deg.**
- **Soil sample locations repacked**
- **Low wind (< 2.5 m/s; 5 mph)**

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Uniformity Data Collection

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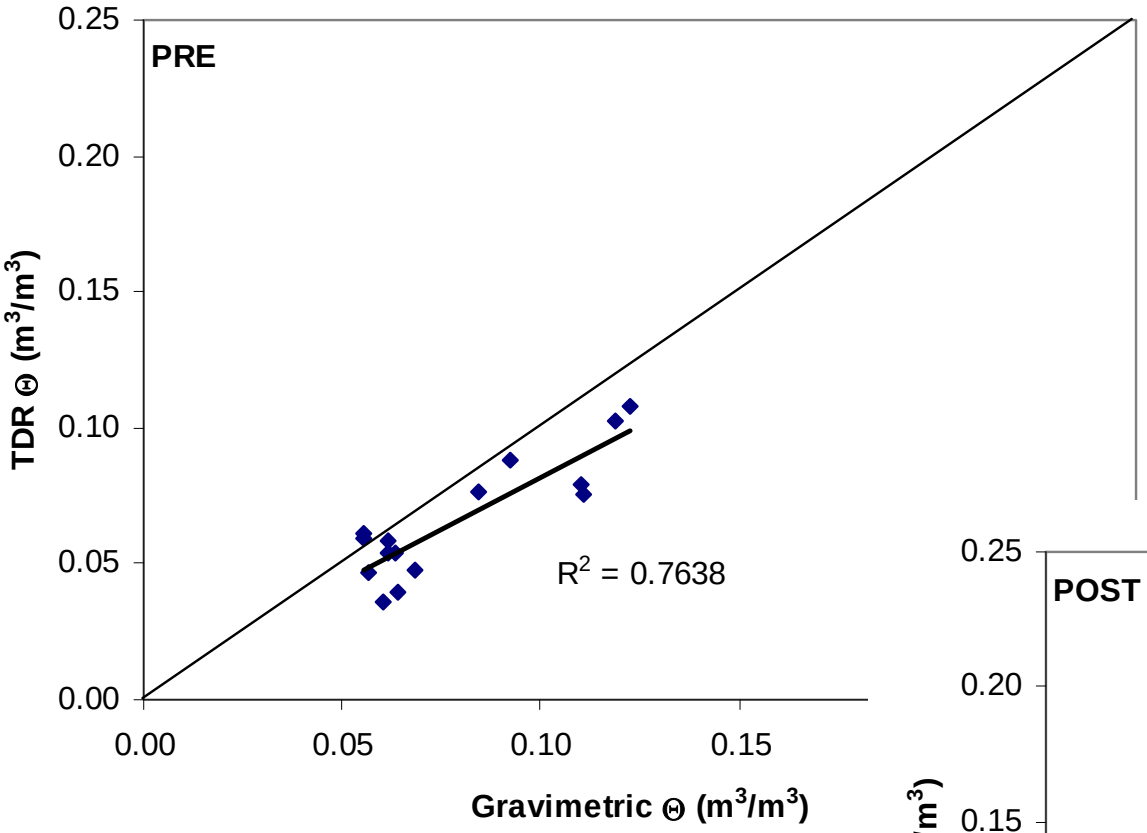
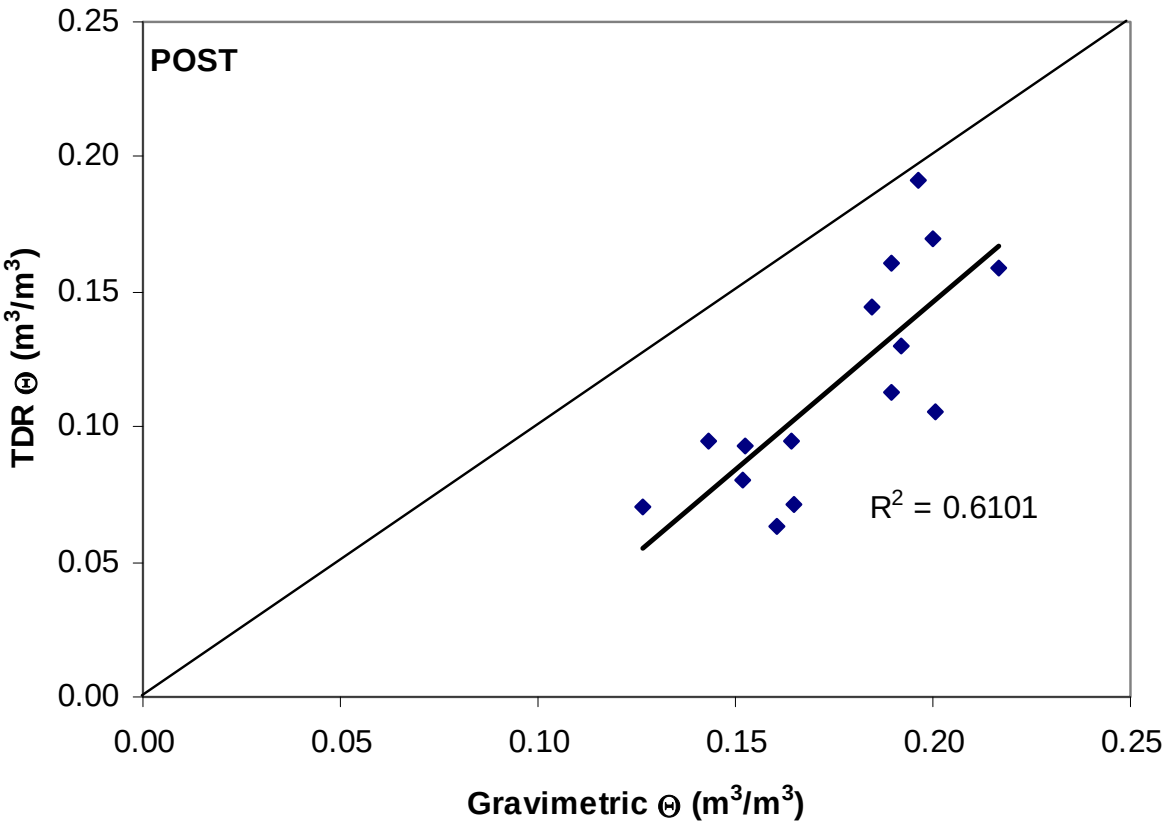
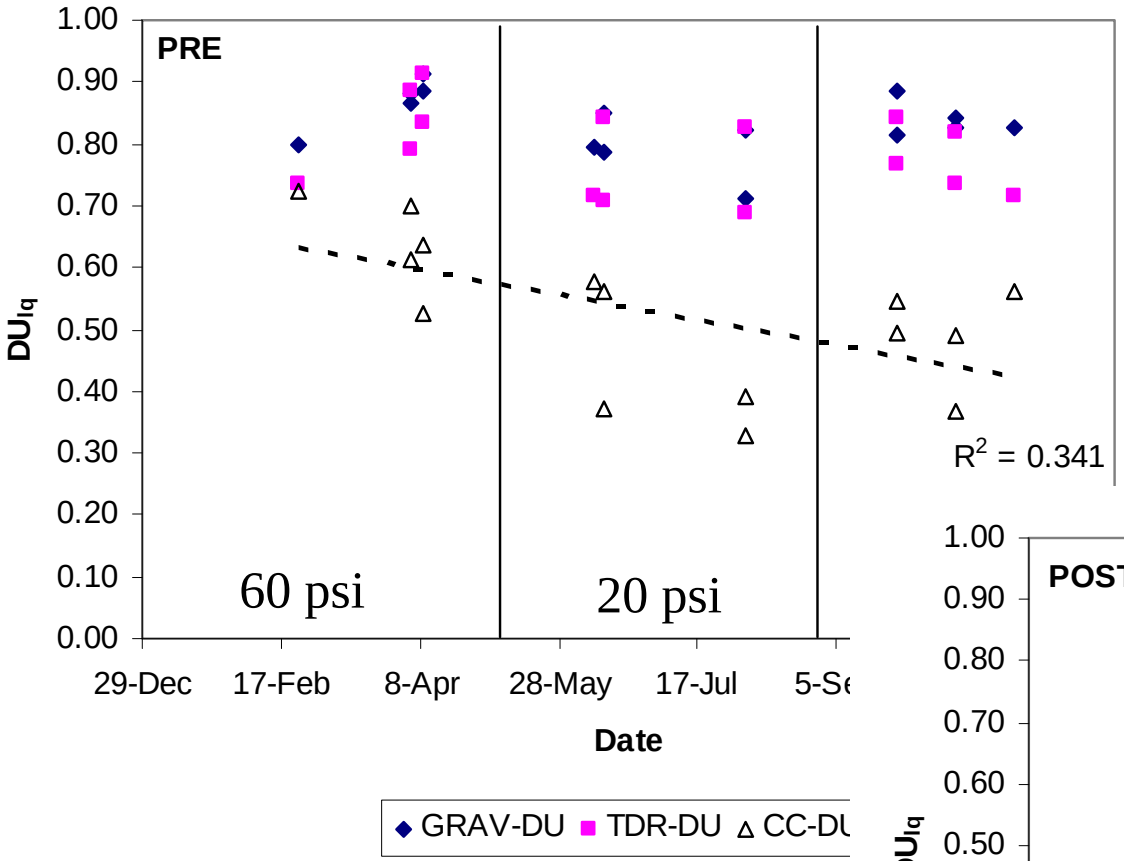
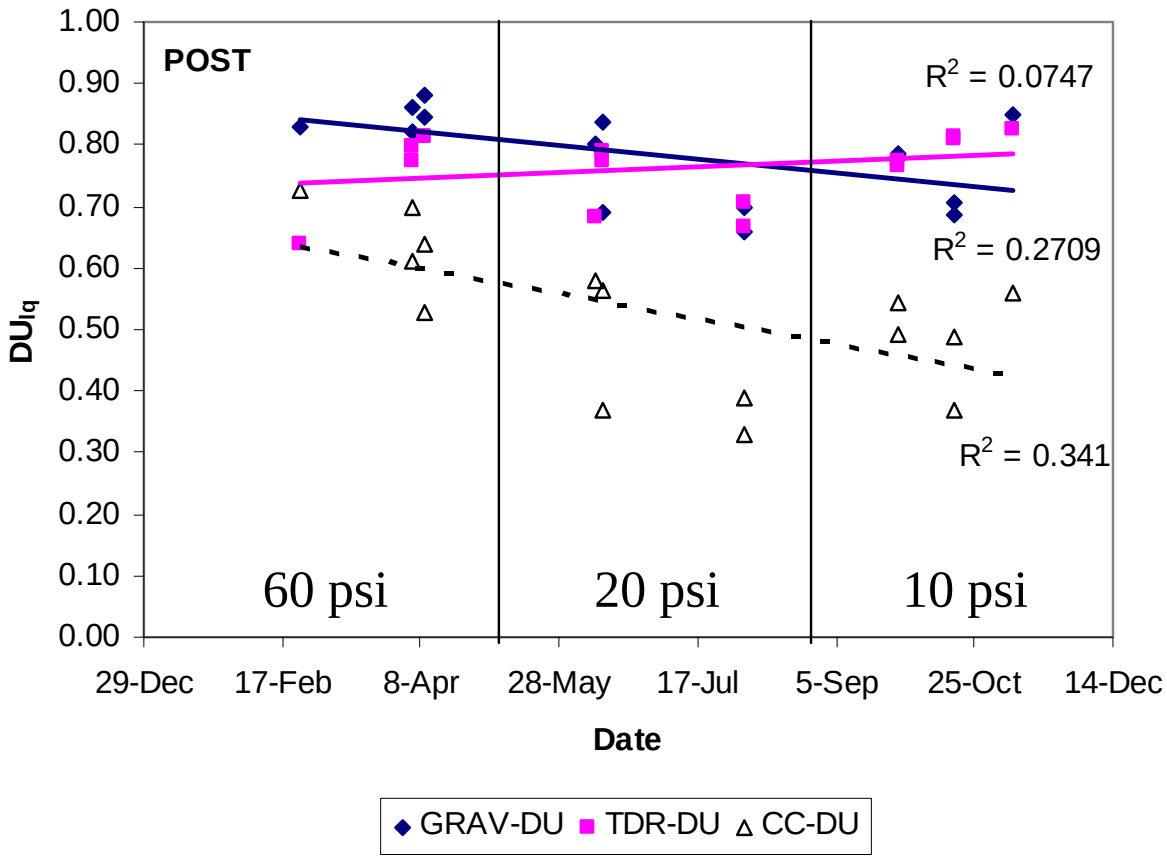
TDR SMC vs. Gravimetric SMC





Irrigation Effect on DU_{lq}





Pressure Effect on Distribution Uniformity

Pres.	TDR Pre-Irr.	Grav. Pre-Irr.	TDR Post-Irr.	Grav. Post-Irr.	Catch Can
(psi)	----------DU_{lq}----------				
60	0.77 a	0.83 a	0.74 a	0.83 a	0.63 a
20	0.81 a	0.86 a	0.79 a	0.83 a	0.55 b
10	0.78 a	0.81 a	0.75 a	0.69 b	0.39 c

Different letters indicate a significant difference within columns

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Pressure Effect on Soil Moisture Content

Pres.	TDR Pre-Irr.	Grav. Pre-Irr.	TDR Post-Irr.	Grav. Post-Irr.	Catch Can
(psi)	----------(m^3/m^3)----------				(in)
60	0.07 a	0.07 a	0.15 a	0.20 a	0.72 a
20	0.07 a	0.09 a	0.11 b	0.17 b	0.47 b
10	0.06 a	0.08 a	0.09 b	0.15 c	0.39 c

Different letters indicate a significant difference within columns

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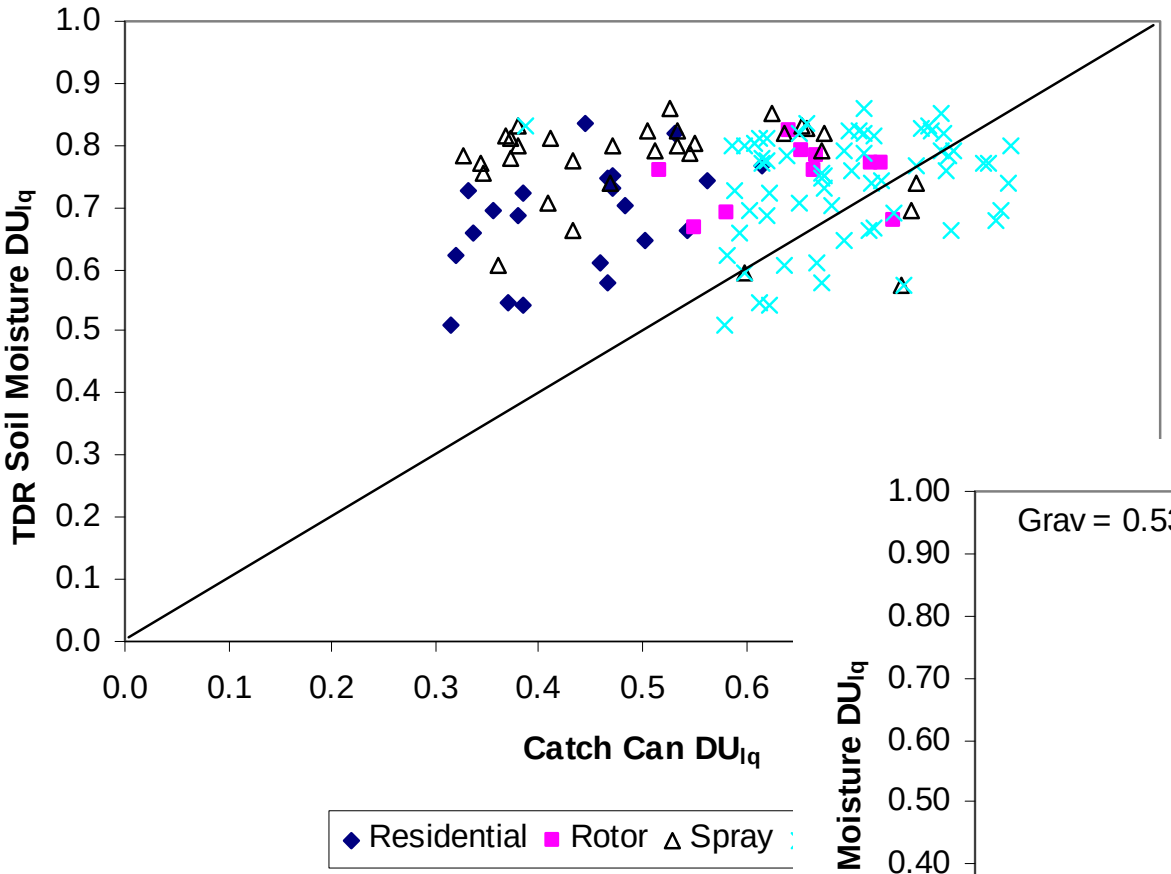
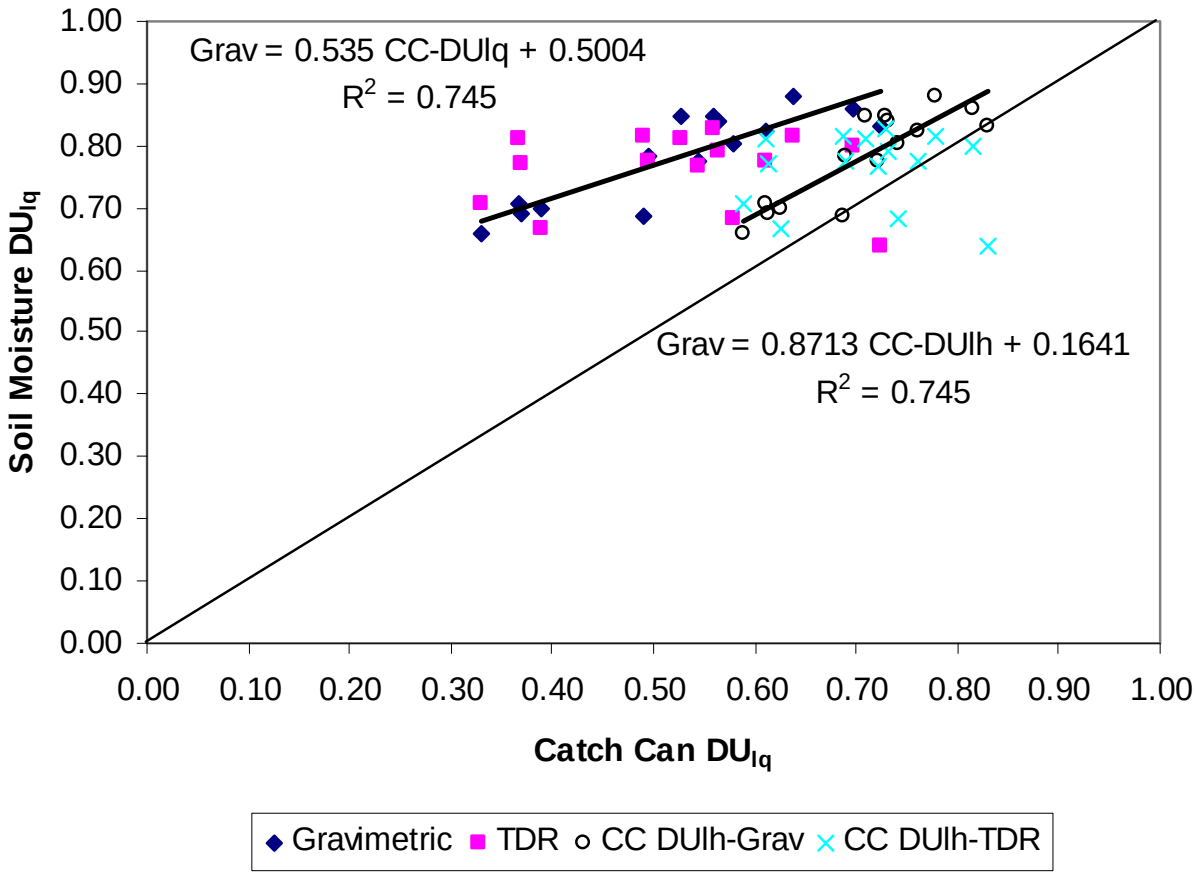
Residential Testing





$$DU_{lh} = 0.386 + (0.614 * DU_{lq})$$

Plot Testing

Conclusions

- SMC uniformity relatively insensitive to irrigation uniformity levels tested here (CC DU_{lq} 0.39-0.63)
- CC DU_{lh} approximates SMC DU_{lq}
- CC DU_{lh} may be a reasonable indicator of irrigation system performance

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Go Gators! Beat Oklahoma!
Thank you!
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