EXPANDING DISK RAIN SENSOR PERFORMANCE AND POTENTIAL IRRIGATION WATER SAVINGS

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RAIN SENSOR (RS)

- **RS can override the automatic irrigation system settings when there has been sufficient rain.**

REGULATIONS

- **Municipalities mandates and/or cost-saving programs for the use of RSs, because they appear to be a useful tool for water conservation with a relatively low cost, easy installation, and low maintenance.**
- **Florida law requires a RS that is properly installed and maintained on all automatic irrigation systems installed after 1991.**

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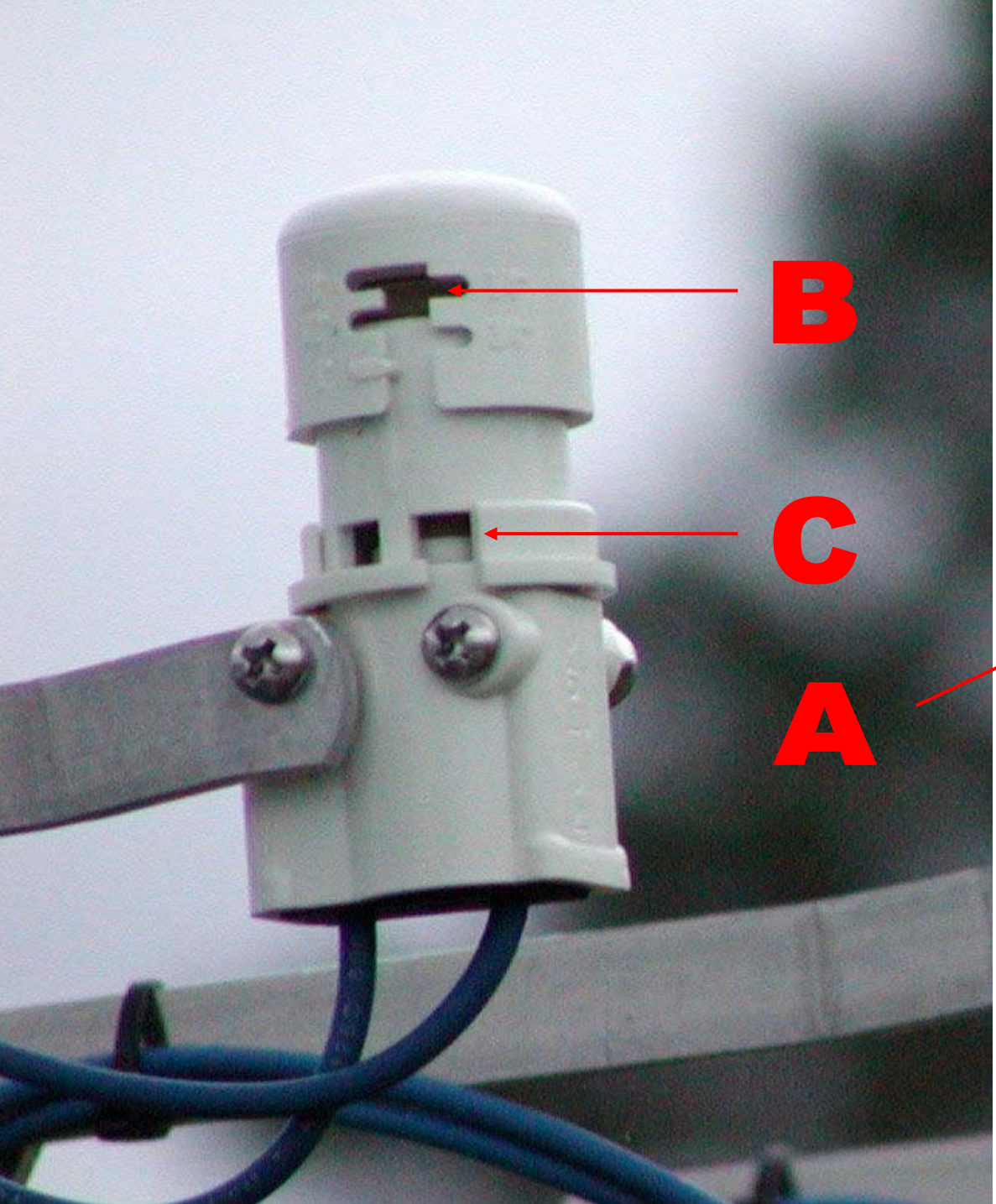

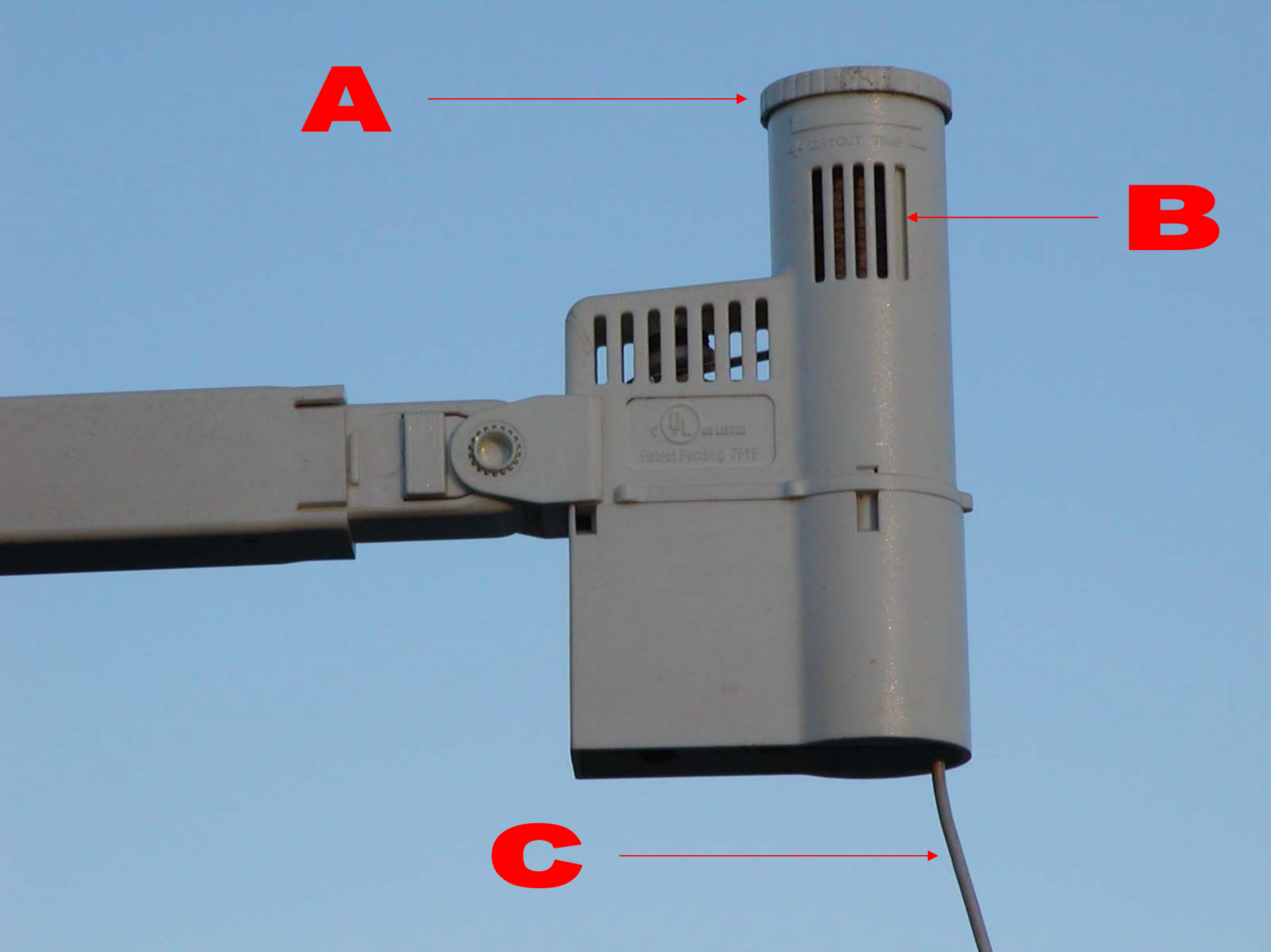
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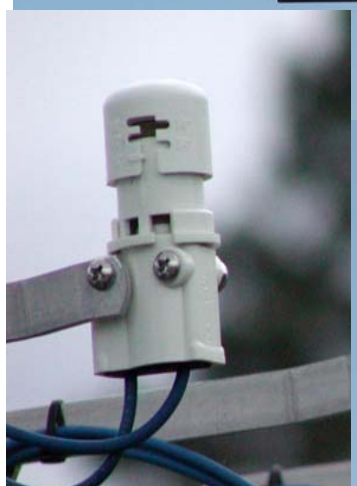
OBJECTIVES

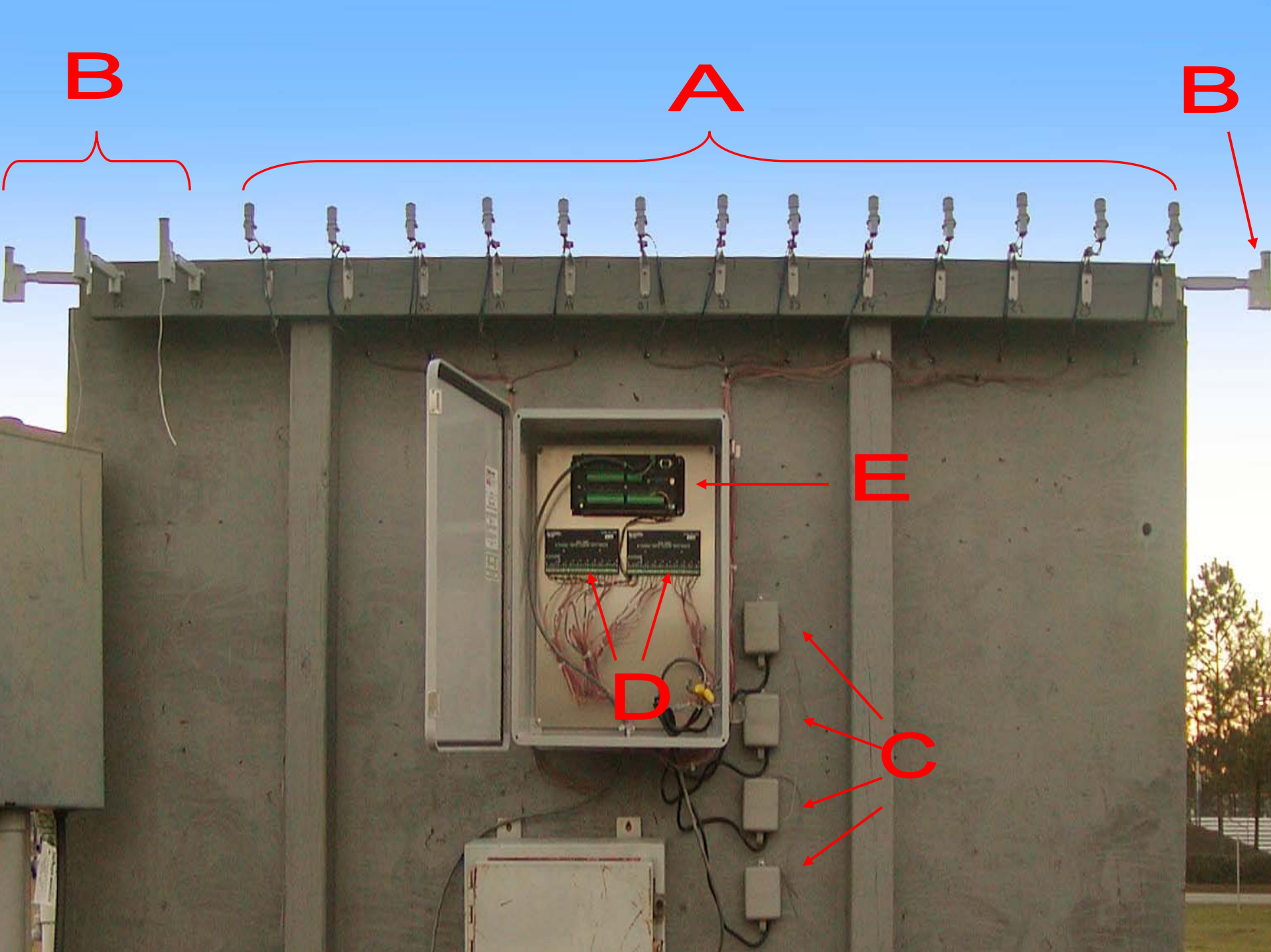
1. Evaluate the reliability of two commercially available expanding disk RS-types with respect to:
   - accuracy of set point with rainfall depth, and
   - number of irrigation cycles bypassed.
2. Quantify the amount of water that RSs could save compared to time-based irrigation schedules without RS.
3. Estimate the payback period of RSs at different set points.

MATERIALS AND METHODS

- **Location:**

On campus, UF, Gainesville, Florida

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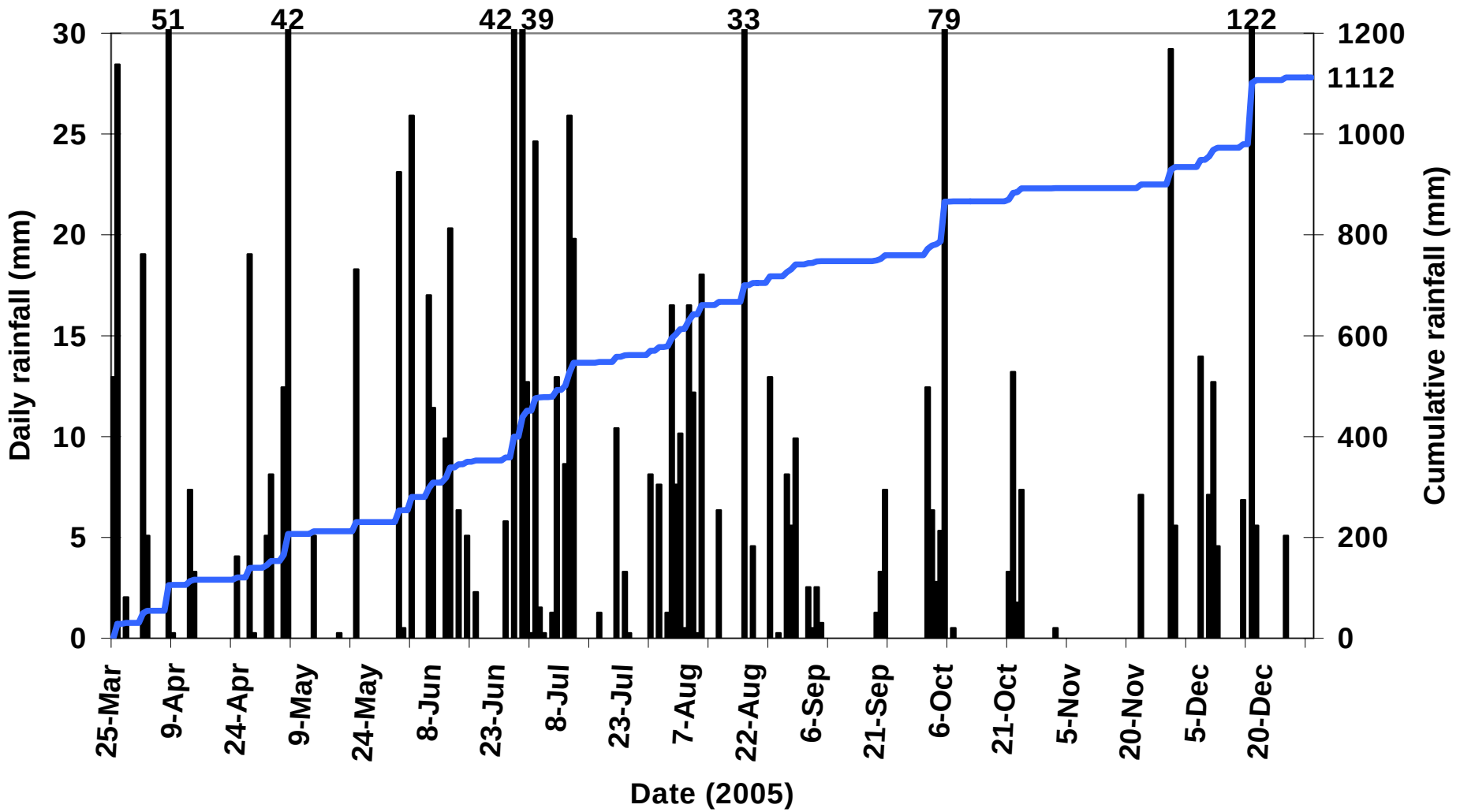
Weather Station

WL

3-MC

13-MC

25-MC

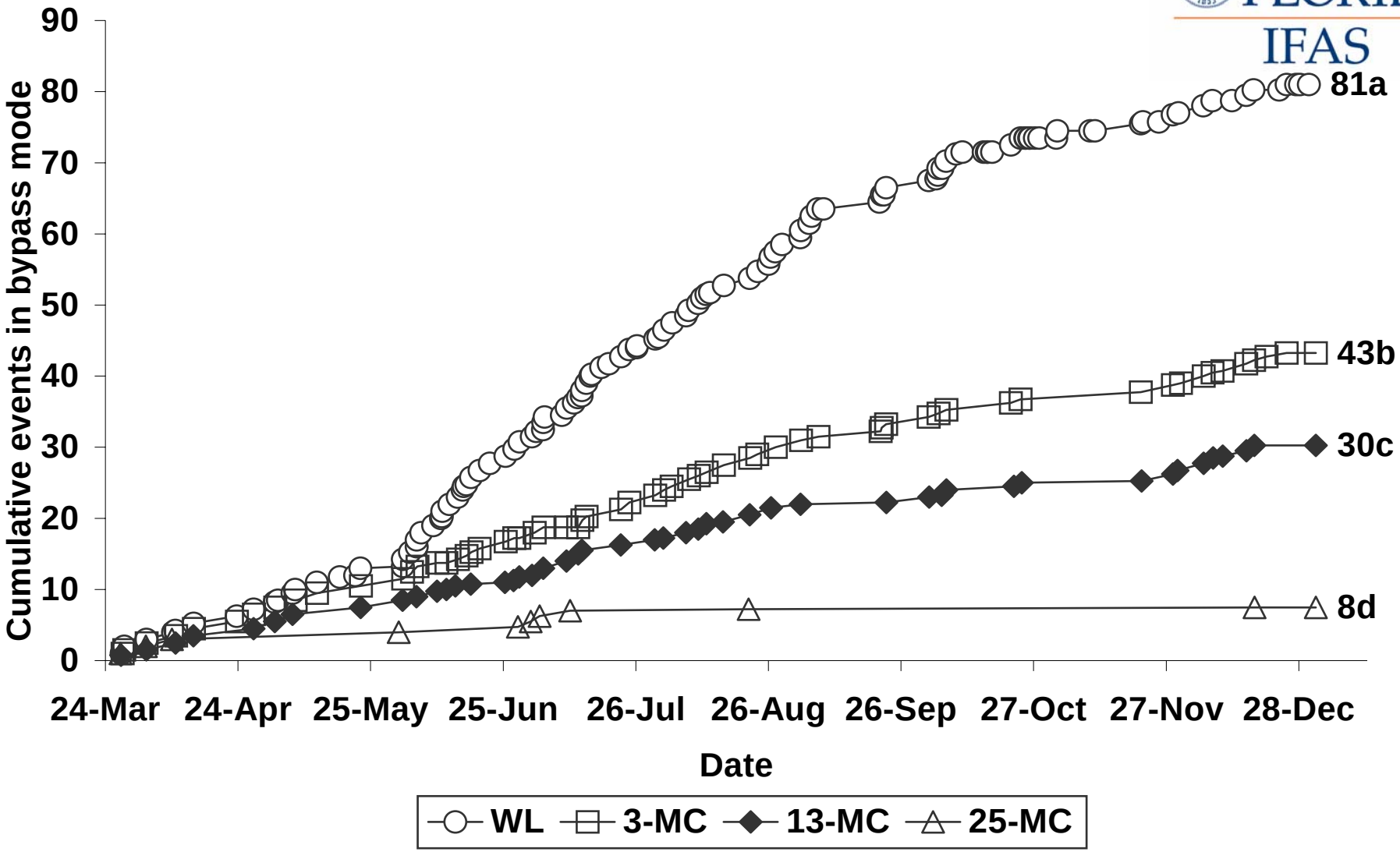


Daily and cumulative rainfall.

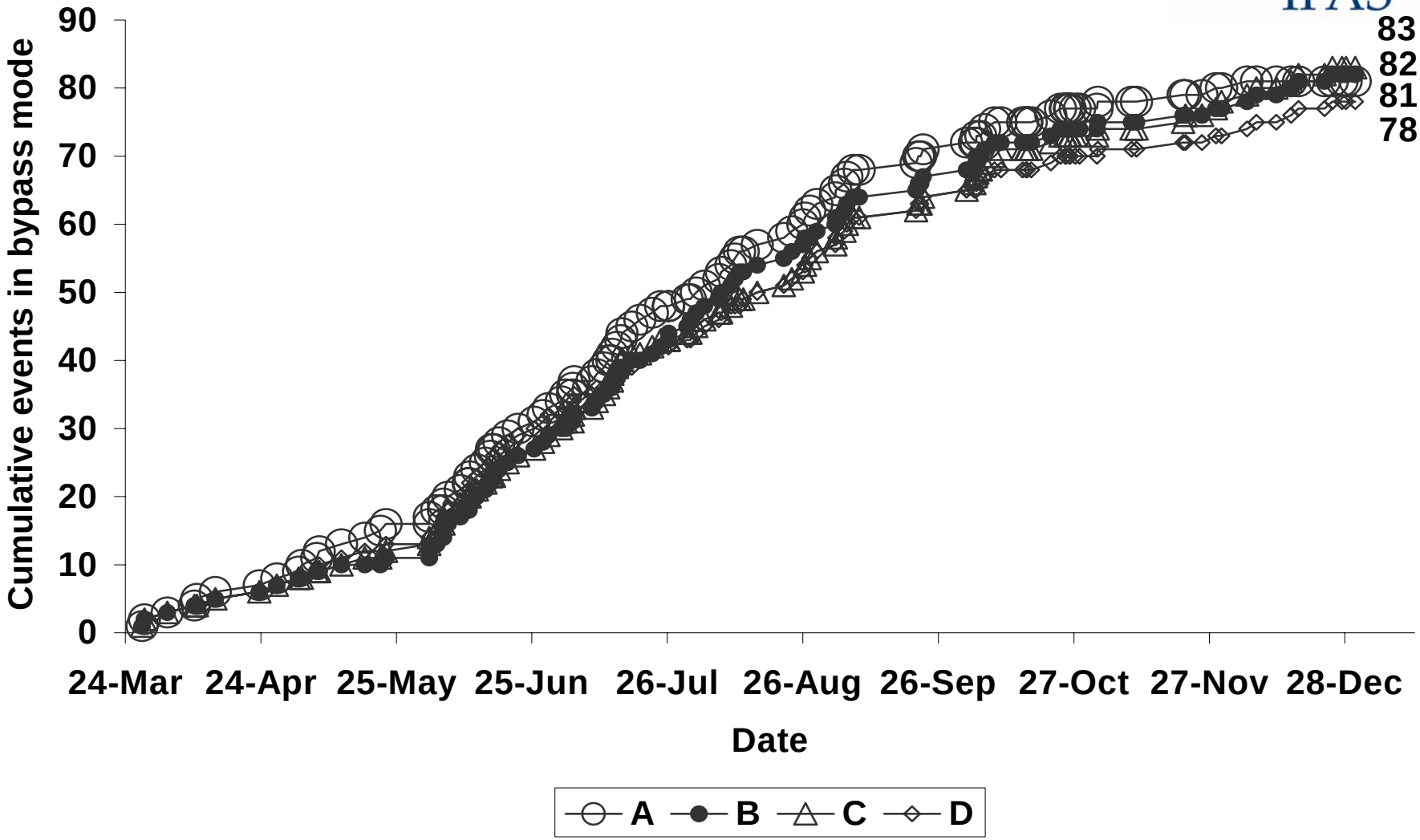
Depth of rainfall before RSs switched to bypass mode and accuracy.

Treatment	Set point (mm)	Rainfall depth (mm)	Accuracy (%)
3-MC	3	3.4	88
13-MC	13	10.0	77
25-MC	25	24.5	98
WL	---	1.4	---[z]

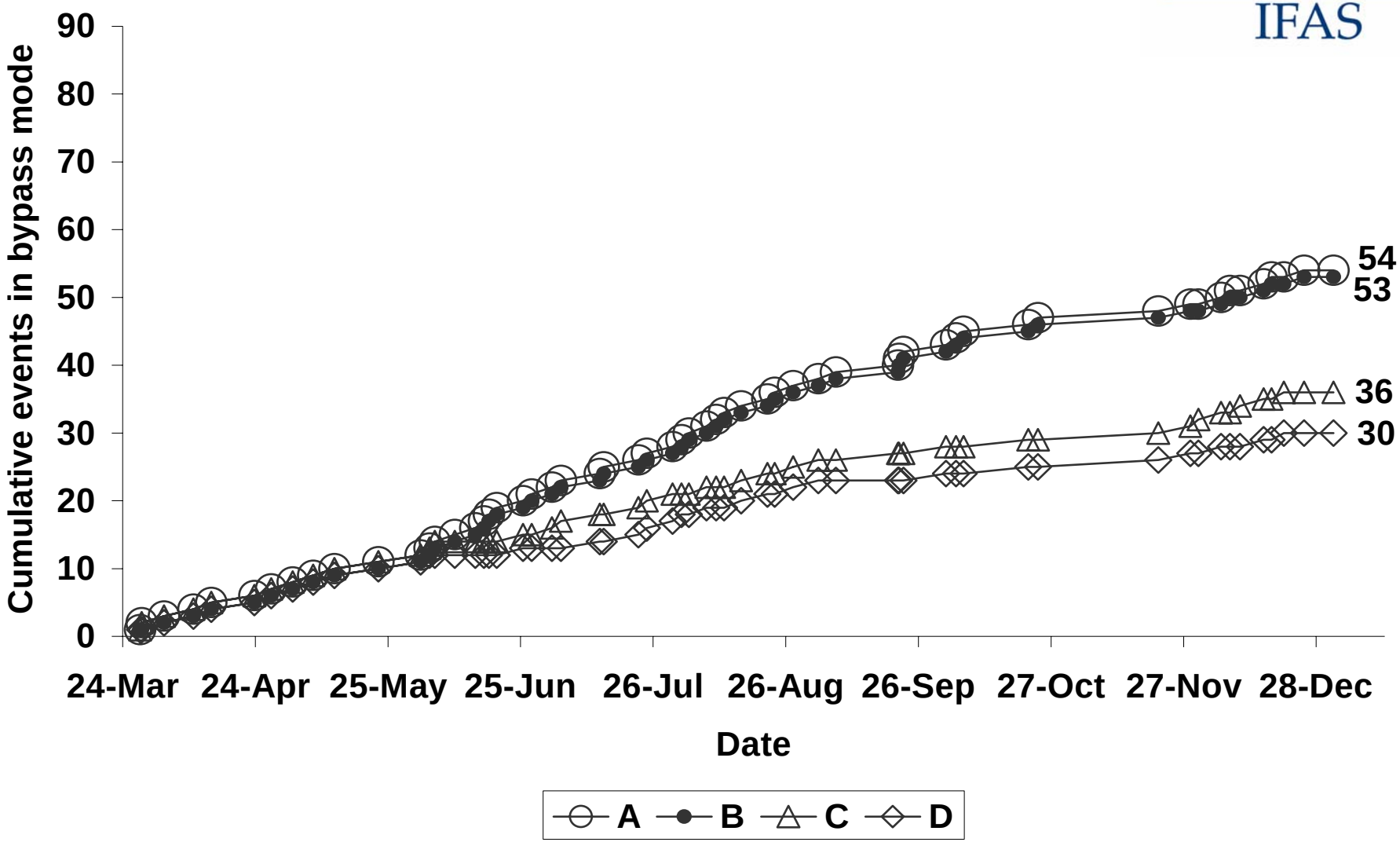
[z] Because these instruments do not declare a specific set point, no accuracy can be calculated.



Cumulative number of times rain sensors switched to bypass mode; average per treatment. Different letters indicate a significant difference by Duncan's Multiple Range Test (P<0.05)



Cumulative number of times rain sensors switched to bypass mode; WL treatment, with replicates indicated by A-D.



Cumulative number of times rain sensors switched to bypass mode; 3-MC treatment, with replicates indicated by A-D.

Large rainfall events not bypassed by some MC units.

Date	Rainfall (mm)	Treatments		
		3-MC	13-MC	25-MC
26-Mar	29		3, 4	
1-Apr	19		3, 4	
5-May	42		3, 4	
7-Jun	17	3, 4		
8-Jun	11	3, 4		
12-Jun	20	3, 4	2, 4	
27-Jun	42			3
29-Jun	39			4
2-Jul	25	3, 4	2, 3, 4	
3-Aug	16	3, 4		
7-Aug	17	3, 4		
8-Aug	12	3, 4		
10-Aug	18	3, 4		
20-Aug	33			1, 2, 3
6-Oct	79	3, 4	3, 4	1, 2, 3, 4
17-Dec	122	3, 4	2, 4	1, 2, 3

Hours after rain stopped and sensors switched to bypass mode; treatment 3-MC.

Date	Replicate (h)			
	1	2	3	4
3-Jul				6
1-Aug			6	
21-Sep	6	4		
30-Nov			18	
10-Dec			X	
16-Dec			18	
20-Dec			X	X

X = more than 24 h.

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Total potential water savings compared to a time-based treatment without a RS.

Treatment	Irrigation Depth (mm)	Water savings	
		(mm)	(%)
No rain sensor	818	0	0
WL	455	363	44
3-MC	573	245	30
13-MC	676	142	17
25-MC	793	25	3

CONCLUSIONS

- **MCs responded close to their set points.**
- **Some replicates showed an erratic behavior.**
- **The lower the set points on the MC the higher potential water savings.** c2
- **25-MC not recommended in Central Florida.** c3
- **Payback period < 1 year**
  - **area to be irrigated, cost of water, cost of installed RS, climatic conditions, irrigation scheduling, etc .**

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CONCLUSIONS

- **RSs useful and highly recommended tool when used by homeowners as a means to save water.**
- **Rain sensors should be tested over a long time period in order to understand performance through time, and under different weather conditions.**

c4


Questions?

Payback period.

Water cost	Payback period per treatment (years)			
($/TG[Y])	WL	3-MC	13-MC	25-MC
0.5	2.6	2.2	3.7	21.2
1.0	1.3	1.1	1.9	10.6
1.5	0.9	0.7	1.2	7.1
2.0	0.7	0.5	0.9	5.3
2.5	0.5	0.4	0.7	4.2

[Y]TG= thousand gallons

- Assumptions:
  - -Irrigated surface: 1000m^2
  - -Installed Cost : WL: $125
    MC: $ 75