Nutrient Leaching Update from S. Florida

J.L. Cisar

2005/06:
Sod Source and Effect of N Timing on N Leaching

Materials and Methods

Sod Types (2)	1. Mineral: T1 (2.4%); T2 (2.6%); T3 (2.7%) 2. Organic: T1 (82%); T2 (80%); T3 (58%)
Fert. Trts. (3)	1. No fertilizer 2. 50 kg N ha^{-1} at trial initiation 3. 50 kg N ha^{-1} 30 days after initiation
N Source:	6-6-6 (total N, 2.35% ammonium-N & 3.65% urea)
Irrigation Trts. (2)	1. ALT: 0.25" 2X/Daily for 30 days, then 0.50" every other day for 30 days 2. WO: 0.25" 2X/Daily for 30 days, then 0.50" at sign of wilt for 30 days
Replications (3)	
Total Plots (36)	
Trials (3)	T1: 3/05-5/05; T2: 9/05-11/05; T3: 3/06-5/06
Trial Duration:	Approximately 2 months, then sod removed and plots left fallow for 2 months

Construction phase


Organic sod installed

Flow-weighted nitrate-N concentrations, mg L^{-1} (mean ± std. dev.) for each factor during the 3 trials.

	TRIAL 1		TRIAL 2		TRIAL 3	
	0-30DAI	31-60DAI	0-30DAI	31-60DAI	0-30DAI	31-60DAI
Fertilizer						
None	10.5 ± 6.7	1.5 ± 2.1	3.8 ± 4.0	0.6 ± 1.1	11.3 ± 17.1	0.12 ± 0.39
0DAI	21.7 ± 11.7	0.8 ± 0.8	15.5 ± 11.2	2.7 ± 4.7	20.1 ± 18.9	0.01 ± 0.04
30DAI	n/a	0.5 ± 0.3	n/a	14.7 ± 15.8	n/a	0.00 ± 0.00
SIGNIF.	ns	ns	ns	*	ns	ns
Irrigation						
ALT	n/a	0.8 ± 1.4	n/a	7.3 ± 13.7	n/a	0.00 ± 0.00
WO	n/a	1.0 ± 1.4	n/a	4.6 ± 8.2	n/a	0.08 ± 0.32
SIGNIF.	---	ns	---	ns	---	ns
Sod						
Organic	14.5 ± 10.2	1.0 ± 1.5	7.9 ± 8.9	4.1 ± 6.7	12.0 ± 20.9	0.00 ± 0.00
Mineral	13.6 ± 9.9	0.8 ± 1.3	7.5 ± 9.4	7.9 ± 14.4	16.4 ± 14.8	0.08 ± 0.32
SIGNIF.	ns	ns	ns	ns	ns	ns

ns and * = P>0.05 and P<0.05

Irrigation was not tested for 0-30 days after initiation (DAI) since irrigation treatments were not initiated until DAI.

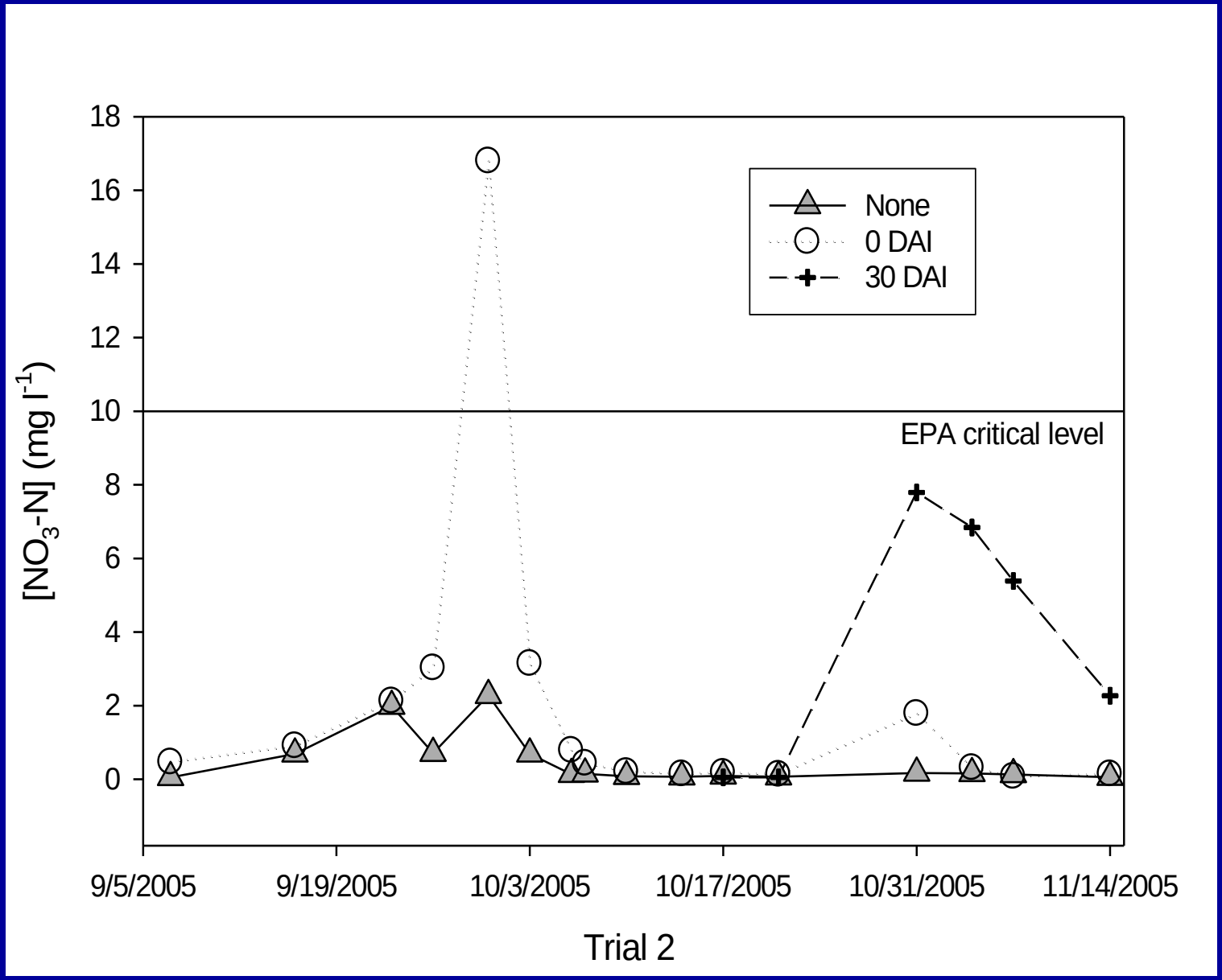
Nitrate-N leaching, mg m^{-2} (mean ± std. dev.) for each factor during the 3 trials.

	TRIAL 1		TRIAL 2		TRIAL 3	
	0-30DAI	31-60DAI	0-30DAI	31-60DAI	0-30DAI	31-60DAI
Fertilizer						
None	581 ± 442	48 ± 80	543 ± 592	36 ± 56	1018 ±	5.93 ± 20.3
0DAI	1040 ± 732	10 ± 5	2179 ±	196 ± 361	1468	0.37 ± 1.23
30DAI	n/a	7 ± 9	1664	985 ±	1818 ±	0.02 ± 0.07
			n/a	1098	1698	
					n/a	
SIGNIF.	ns	ns	ns	*	ns	ns
Irrigation						
ALT	n/a	24 ± 50	n/a	519 ± 537	n/a	0.01 ± 0.06
WO	n/a	20 ± 51	n/a	292 ± 566	n/a	4.20 ± 16.6
SIGNIF.	---	ns	---	ns	---	ns
Sod						
Organic	678 ± 511	23 ± 52	1123 ±	276 ± 443	1107 ±	0.03 ± 0.14
Mineral	772 ± 653	22 ± 49	1269	236 ± 999	1873	4.18 ± 16.6
			1055 ±		162 ± 1229	
			1382			
SIGNIF.	ns	ns	ns	ns	ns	ns

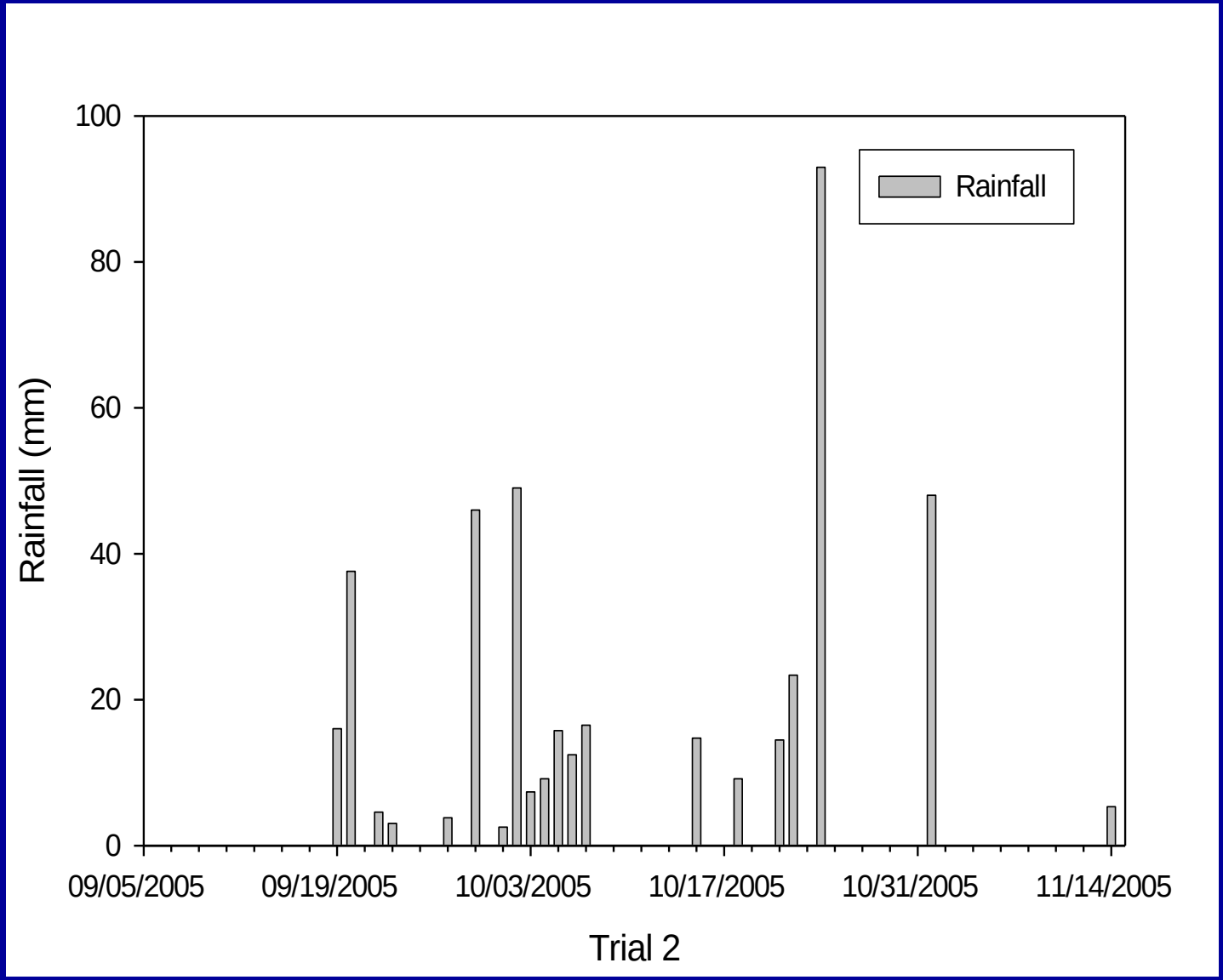
ns and * = P>0.05 and P<0.05

Irrigation was not tested for 0-30 days after initiation (DAI) since irrigation treatments were not initiated until DAI.

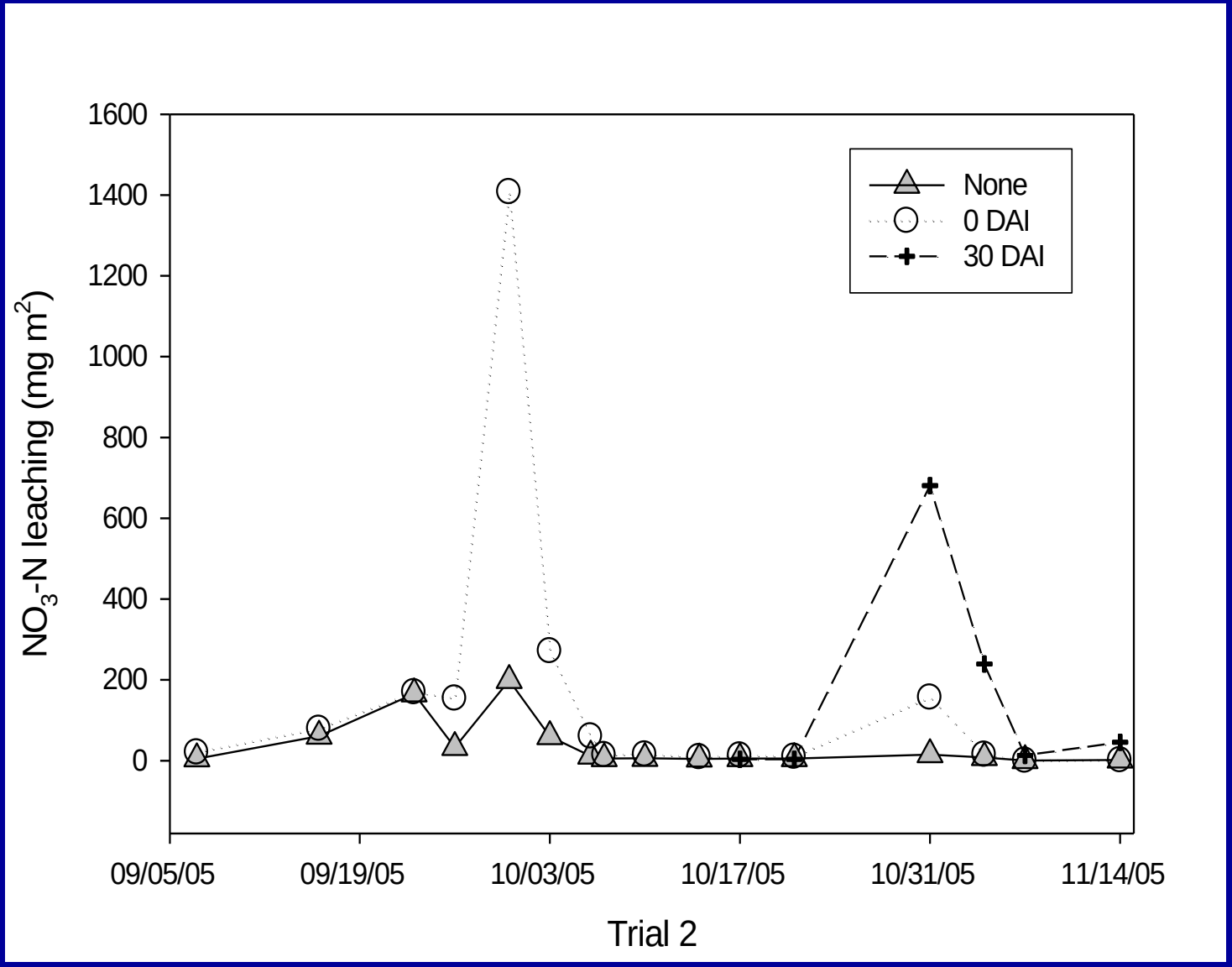
Nitrate-N concentrations during Trial 2



Trial 2 Daily Rainfall (mm)

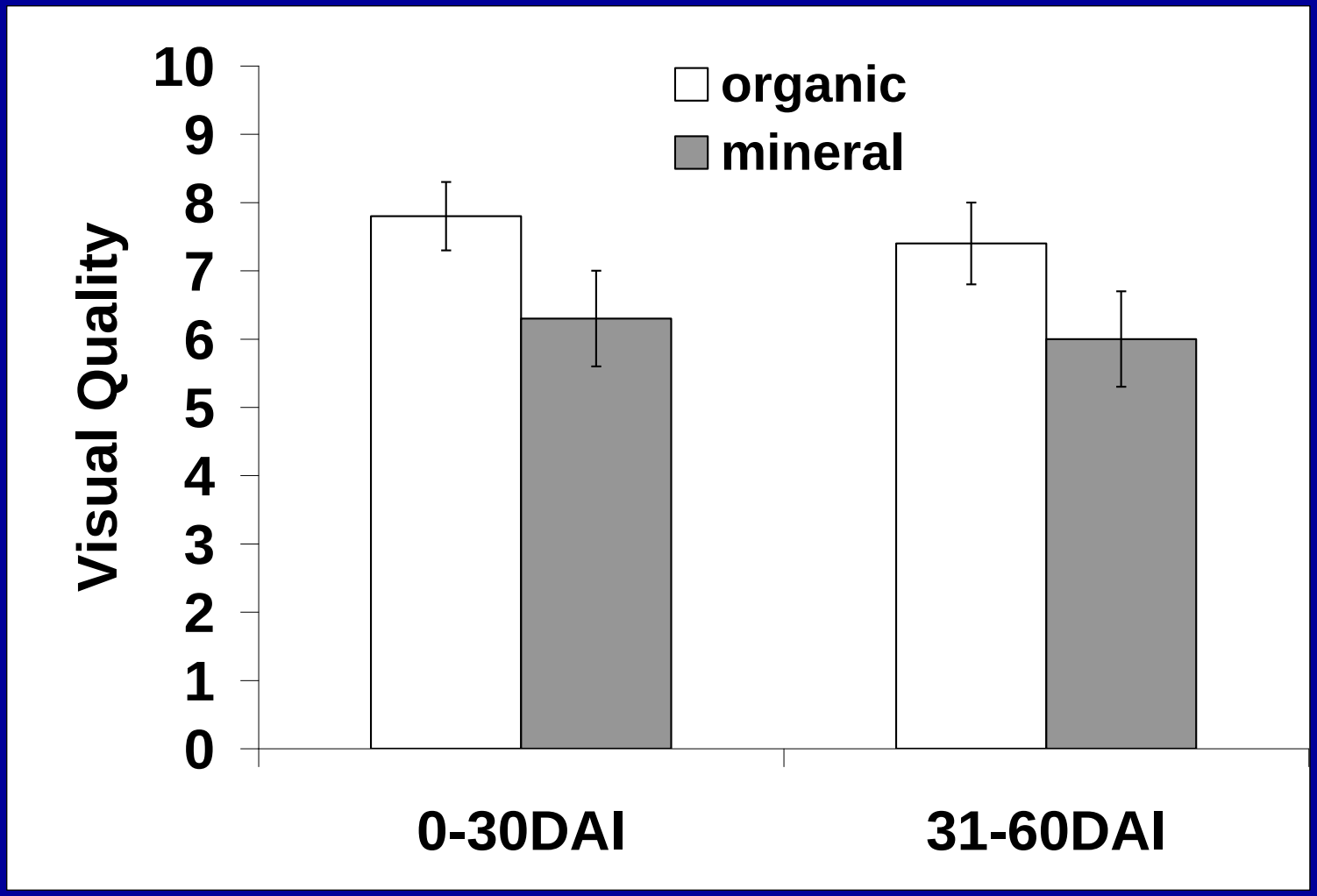


Nitrate-N leaching during Trial 2




Treatment differences

Trial 1 Visual Quality



Key Findings

-Regardless of soil type, N mineralization from sod resulted in considerable nitrate-N leaching in the first 30 days.

-The amount of nitrate-N leaching from fertilizing directly after sod installation mitigated the benefit of quality.

-Evaluate other N sources?

The Influence of Nitrogen Source and Application Timing on NO_3-N Leaching and Agronomic Responses of St. Augustinegrass

Neil Young :Master of Science

Materials and Methods

Grass:	**St. Augustinegrass**
N Rate:	**300 kg ha^{-1} yr^{-1}.**
Irrigation:	**0.25inch 3X/week**
Reps:	**3**
Total Plots:	**36**
Design:	**Randomized Complete Block**

MATERIALS AND METHODS (cont.)

N sources and applications frequencies

Fertilizer Source	Fertilizer Description	% N	Rate Kg ha^{-1}	Application Freq./year	Fertilizer Manufacturer
CRL 1	Methylene urea + triazone liquid	30	50	6	Georgia-Pacific, Inc. Decatur, GA
CRL 2	Methylene urea + triazone liquid	30	100	3	Georgia-Pacific Inc. Decatur, GA
CRL 3	Methylene urea + triazone liquid	30	150	2	Georgia-Pacific Inc. Decatur, GA
PCU 1	Polymer coated urea	42	50	6	Pursell Inc., Sylacauga, AL
PCU 2	Polymer coated urea	42	100	3	Pursell Inc., Sylacauga, AL
PCU 3	Polymer coated urea	42	150	2	Pursell Inc., Sylacauga, AL
UPCU 1	PCU: urea	44	50	6	Pursell Inc. & PCS Sales, Inc
UPCU 2	PCU: urea	44	100	3	Pursell Inc. & PCS Sales, Inc
Urea	Urea	46	50	6	PCS Sales, Inc. Northbrook, IL
BS1	Composite bio-solid	6	50	6	Milorganite, Milwaukee, WI
BS2	Composite bio-solid	6	100	3	Milorganite, Milwaukee, WI
BS3	Composite bio-solid	6	150	2	Milorganite, Milwaukee, WI

Results: Mean Flow-weighted NO_x-N (MFWN) Averaged per Cycle for 49 kg N ha^{-1} Sources

- Mean weighted-flow = total NO_x-N leached / total mean percolate.
- MCL = 10 mg L^{-1} as N (Safe Drinking Water Act, 1974).

TREATMENT	2007					2008					
	--- Wet Season ---			- Dry Season -		--- Wet season ---			--- Dry Season ---		
	C1	C2	C3	C5	C6	C7	C8	C9	C10	C11	C12
	mg [NO_x-N] L^{-1}										
BSD1	0.62	0.44	0.47	0.40	0.39	0.75	0.59	0.46	0.40	0.30	0.33
PCU1	0.64	0.43	0.43	0.41	0.30	0.48	0.59	0.44	0.38	0.29	0.31
CRL1	0.54	0.73	0.43	0.76	0.45	0.47	1.51	0.50	0.42	0.32	0.45
UPCU1	0.62	1.81	0.41	0.40	0.40	0.51	0.62	0.50	0.43	0.32	0.39
UREA1	6.40	3.09	0.38	0.41	0.32	2.32	0.59	0.50	0.34	0.25	0.95
CONTRAST											
UREA1 vs. OTHERS	*	***	NS	NS	NS	NS	NS	NS	NS	NS	NS
UREA vs. UPCU1	*	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
PCU1 vs. BS1	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
CRL1 vs. BS1 & PCU1	NS	NS	NS	**	NS	NS	NS	NS	NS	NS	NS

NS, *, **, ***, = P>0.05, P<0.05, P<0.01, P<0.001

MWFN Averaged per Cycle for 98 kg N ha^{-1} Sources.

TREATMENT	------- 2007 -------			------- 2008 -------		
	C1	C2	C3	C4	C5	C6
	---------- mg $[NO_x\text{-}N]$ L^{-1} ----------					
BSD2	0.55	0.43	0.39	0.50	0.41	0.34
PCU2	0.53	0.55	0.35	0.48	0.43	0.26
CRL2	1.03	0.43	1.29	1.21	0.49	0.47
UPCU2	10.49	0.40	1.75	0.52	0.36	0.36
CONTRAST						
UPCU2 vs. OTHERS	**	NS	NS	NS	NS	NS
CRL2 vs. BSD2 & PCU2	NS	NS	NS	NS	NS	NS
BSD2 vs. PCU2	NS	NS	NS	NS	NS	NS

NS, *, **, ***, = P>0.05, P<0.05, P<0.01, P<0.001

MFWN Averaged per Cycle for 147 kg N ha^{-1} Sources.

TREATMENT	--- 2007 ---	--------- 2008 ---------	
	Wet Season	Wet Season	Dry Season
	C1	C3	C4
	---------- mg $[NO_x\text{-}N]$ L^{-1} ----------		
BSD	0.48	0.47	0.52
PCU3	0.50	0.53	0.32
CRL3	1.20	2.85	2.43
CONTRAST			
CRL3 vs. BSD3 & PCU3	*	NS	**
BSD3 vs. PCU3	NS	NS	NS

NS, *, **, ***, = P>0.05, P<0.05, P<0.01, P<0.001

Nitrogen budget of inputs vs. N accounted for by leaching and N uptake for C1 (April 30 - June 30, 2007).

SOURCE	N INPUTS		INORGANIC-N RECOVERED					
	FERT†	IRRIG‡	NO_x-N	NH_4-N	TN§	NUP¶	NL††	REC‡‡
	kg ha^{-1}						%	
BSD1	49	0.93	0.34	0.55	0.89	2.93	1.8	7.6
PCU1	49	0.93	0.35	0.57	0.93	1.16	1.9	4.2
CRL1	49	0.93	0.29	0.49	0.78	1.56	1.6	4.7
UPCU1	49	0.93	0.34	0.54	0.88	1.98	1.8	5.7
UREA1	49	0.93	2.75	0.49	3.25	3.41	6.5	13.3
CV (%)			23.4	17.1	21.7	40.4		26.2
CONTRAST								
UREA VS. OTHERS			**	NS	**	NS		**
UREA VS. UPCU1			*	NS	*	NS		*
CRL1 VS. BSD1, PCU1			NS	NS	NS	NS		NS
BSD1 VS. PCU1			NS	NS	NS	NS		NS

NS, *, **, ***, = P>0.05, P<0.05, P<0.01, P<0.001

† FERT: Fertilizer N applied per application cycle.
‡ IRRIG: N supplied via irrigation + precipitation.
§ TN: Total N (NOx-N plus NH4-N leachates).
¶ NUP: Relative Nitrogen uptake.
††NL: Nitrogen leached.
‡‡REC: Relative N recovery, the percent of inorganic-N recovered compared to N inputs.

Nitrogen budget of inputs vs. N accounted for by leaching and N uptake for C2 (July 1 - August 31, 2007).

SOURCE	N INPUTS		INORGANIC-N RECOVERED					
	FERT†	IRRIG‡	NOx-N	NH4-N	TN§	NUP¶	NL††	REC‡‡
	kg ha^{-1}						%	
BSD1	49	0.62	0.23	0.31	0.54	12.6	1.1	26.5
PCU1	49	0.62	0.23	0.34	0.57	5.26	1.2	12.2
CRL1	49	0.62	0.40	0.39	0.79	4.25	1.6	9.7
UPCU1	49	0.62	0.99	0.31	1.30	10.96	2.6	24.7
UREA1	49	0.62	2.31	0.60	2.91	15.43	5.9	36.9
CV (%)			16.8	22.7	13.2	12.0		13.8
CONTRAST								
UREA VS. OTHERS			**	**	**	*		NS
UREA VS. UPCU1			NS	**	NS	NS		NS
CRL1 VS. BSD1, PCU1			NS	NS	NS	NS		NS
BSD1 VS. PCU1			NS	NS	NS	NS		NS

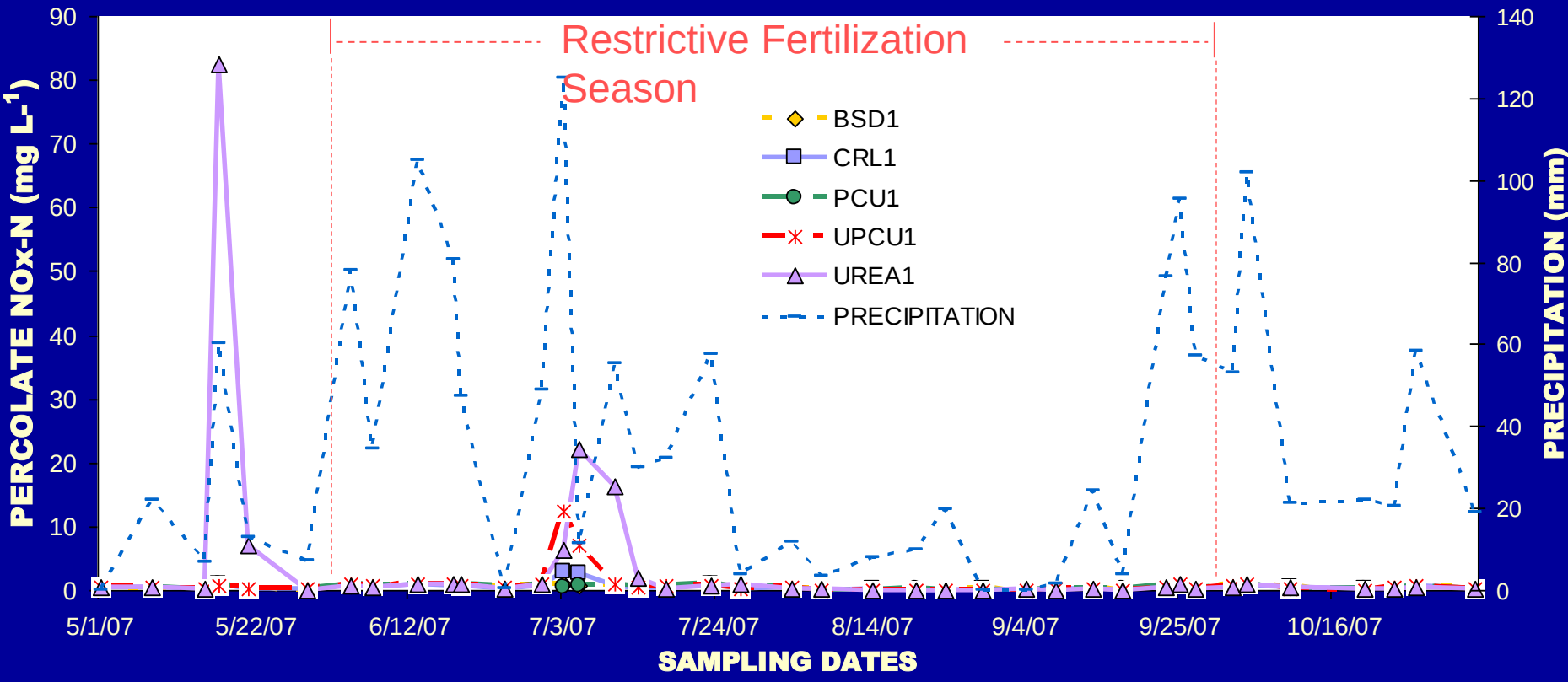
NS, *, **, ***, = P>0.05, P<0.05, P<0.01, P<0.001

† FERT: Fertilizer N applied per application cycle.
‡ IRRIG: N supplied via irrigation + precipitation.
§ TN: Total N (NOx-N plus NH4-N leachates).
¶ NUP: Relative Nitrogen uptake.
††NL: Nitrogen leached.
‡‡REC: Relative N recovery, the percent of inorganic-N recovered compared to N inputs.

Nitrogen budget of inputs vs. N accounted for by leaching and N uptake for C4 (May 16 – Sept. 6, 2008).

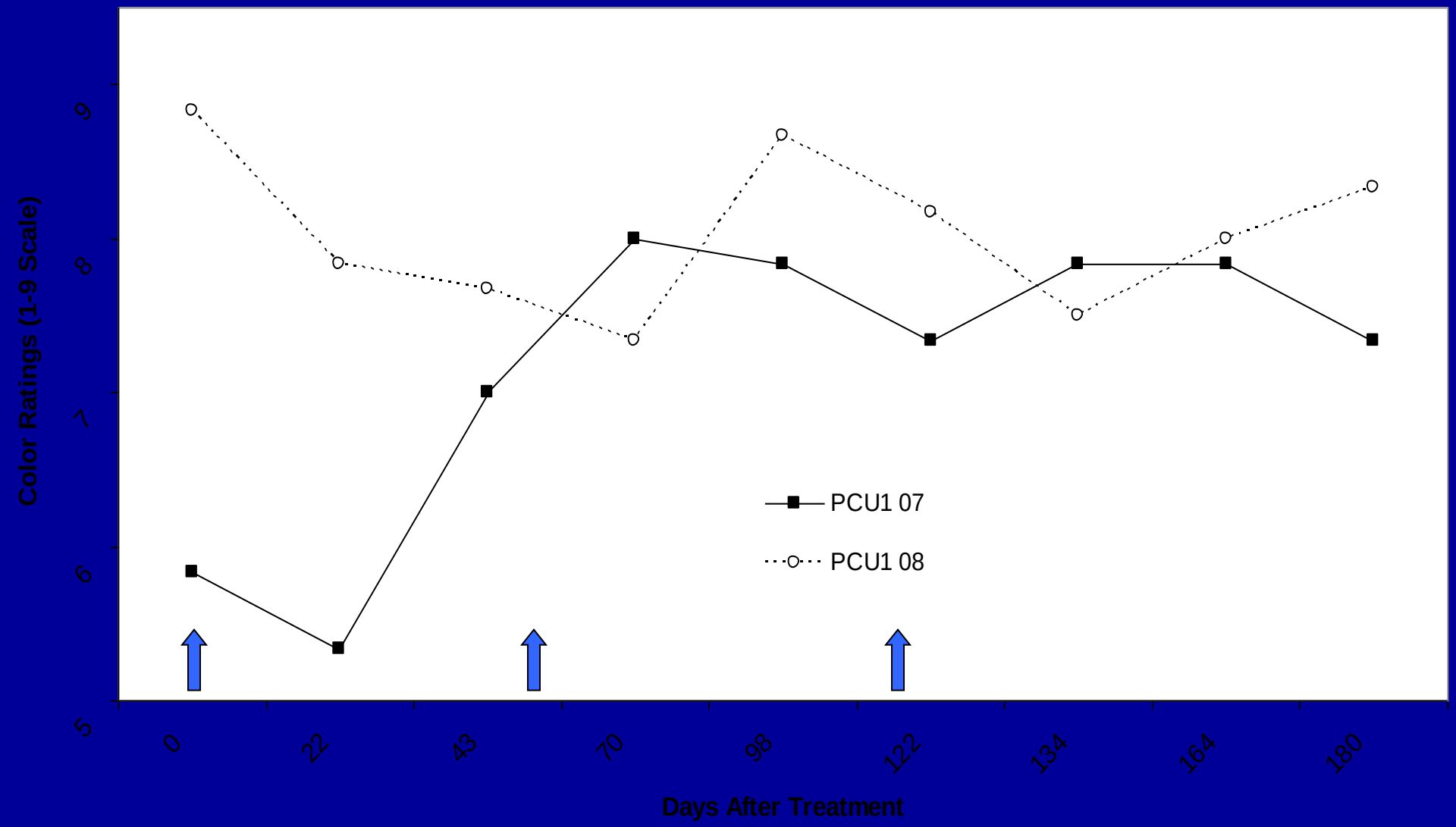
SOURCE	N INPUTS		INORGANIC-N RECOVERED					
	FERT†	IRRIG‡	NO_x-N	NH_4-N	TN§	NUP¶	NL††	REC‡‡
	---------- kg ha^{-1} ----------						----- % -----	
BSD2	98	1.7	0.424	0.413	0.837	19.1	0.8	20.0
PCU2	98	1.7	0.402	0.446	0.848	50.7	0.9	51.7
CRL2	98	1.7	1.018	0.642	1.661	3.5	1.7	5.2
UPCU2	98	1.7	3.185	0.370	3.555	27.5	3.6	31.2
CV (%)			29.2	11.9	19.3	17.1		13.7
CONTRAST								
UPCU2 VS. OTHERS			NS	NS	NS	NS		NS
CRL2 VS. BSD2, PCU2			NS	*	NS	***		***
BSD2 VS. PCU2			NS	NS	NS	**		**

Individual Sampling Event Percolate [NO_x-N] Conc. for N sources at 49 kg N ha^{-1} (April 30 – October 30, 2007).

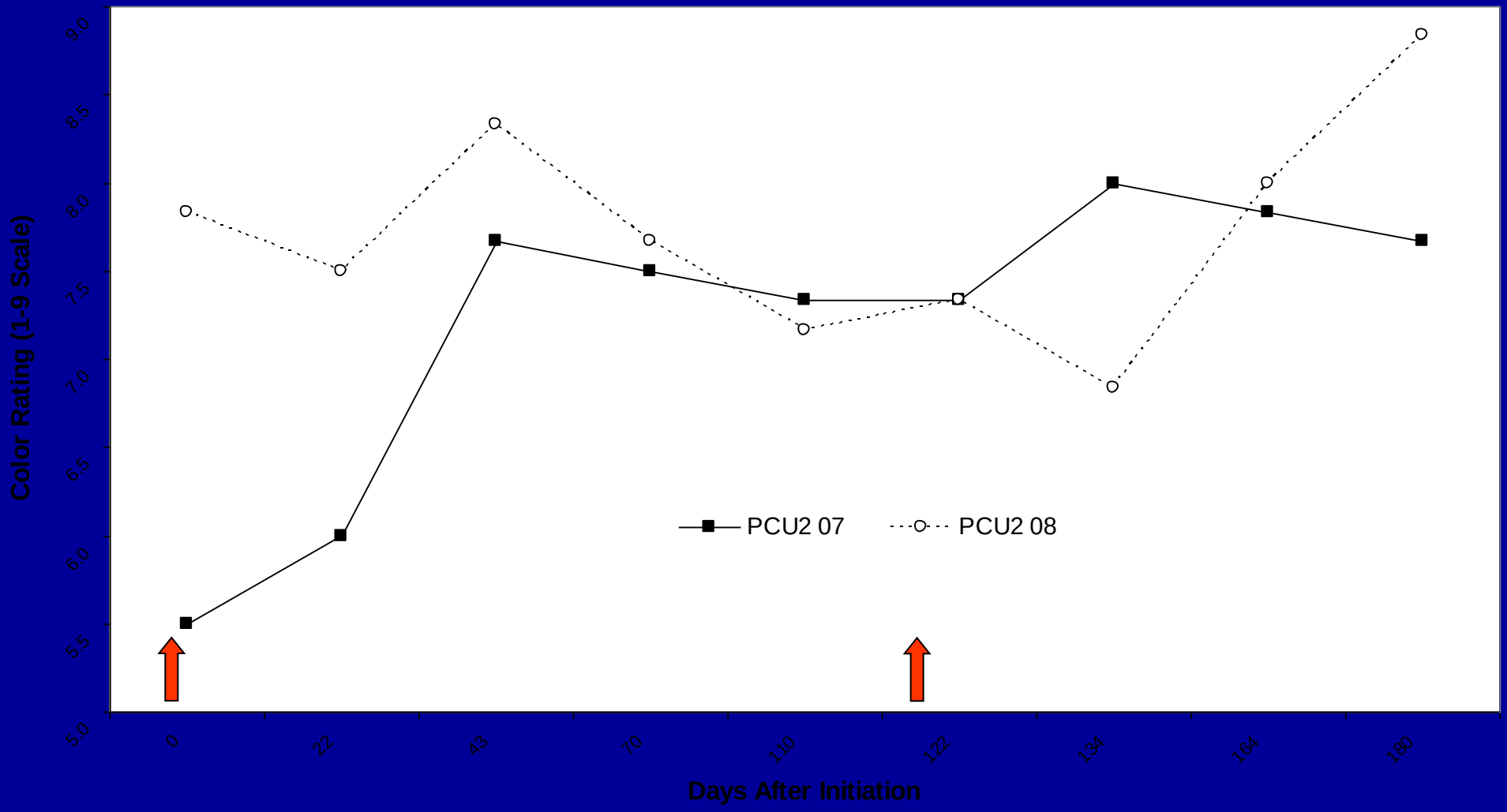


St. Augustinegrass response from Polyon® 42 applied at 1 lb N 1000ft^{-2} on 60 day application intervals. Application dates were 04/30/07, 06/30/07, and 08/30/08.

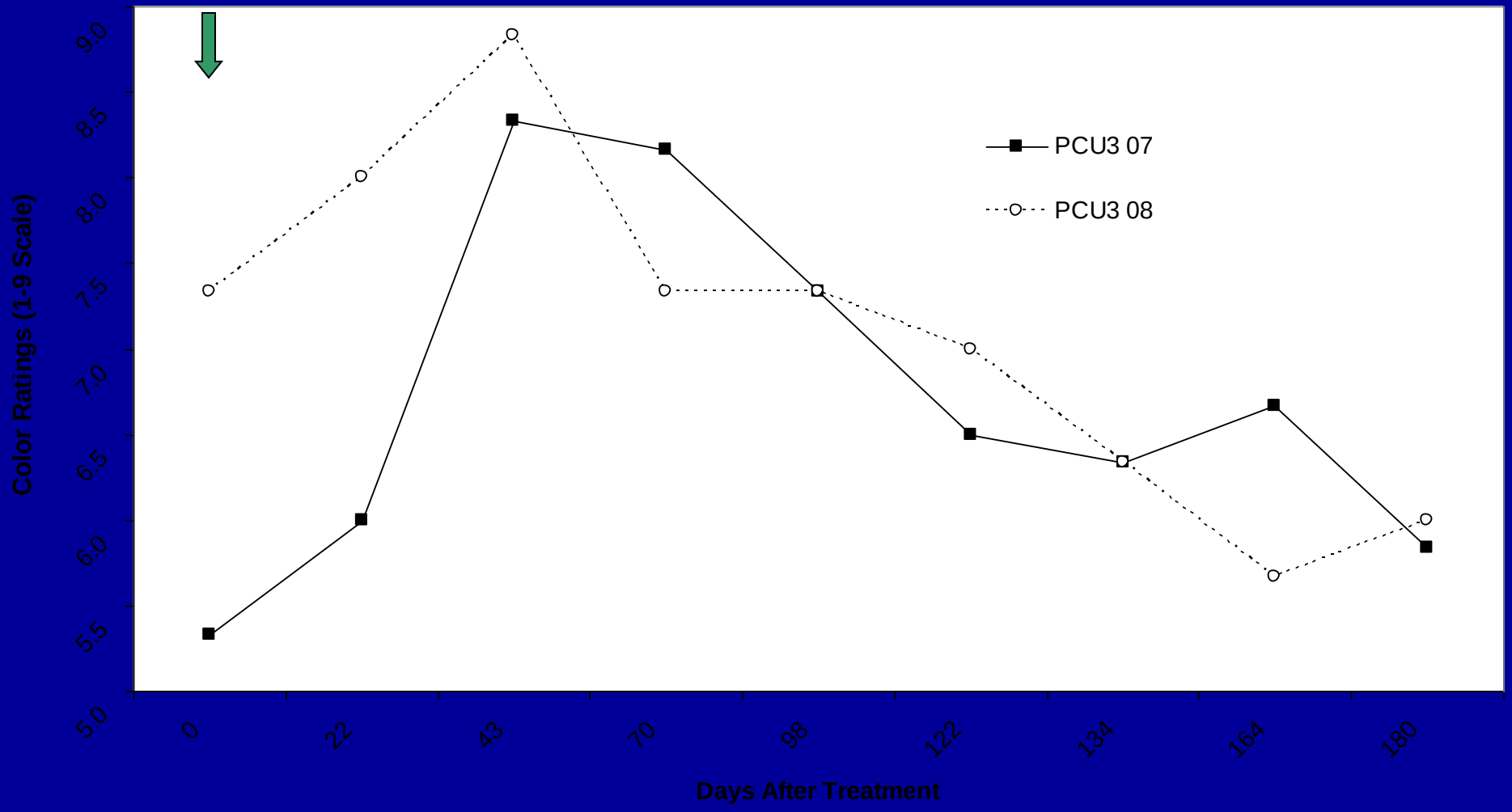
Comparison of St. Augustinegrass color response from Polyon® 42 @ 1 lb N 1000ft^2 over three, 60 day cycles from the summers of 07 and 08. Blue arrows indicate fertilization



Comparison of St. Augustinegrass color response from Polyon® 42 @ 2 lb N 1000ft^{-2} over two, 120 day cycles from the summers of 07 and 08. Red arrows indicate fertilization events.



Comparison of St. Augustinegrass color response from Polyon® 42 @ 3 lbs N 1000ft^{-2} over a 180 day cycle from the summer of 07 and 08. Green arrows indicate fertilization events.



2008: Nitrogen Leaching on Established St. Augustinegrass and Bahiagrass as Affected by N Rate and Irrigation

Pauric McGroary, Ph. D.


FLREC Field Day 2008

Materials and Methods

Grasses:	**St. Augustinegrass, Bahiagrass**	
N Rates:	**St. Aug.**	**98, 196, 294, and 588 kg N ha^{-1}.**
	Bahia	**49, 98, 196, and 294 kg N ha^{-1}.**
N Source	**Urea**	
Application:	**Bi-monthly**	
Irrigation:	**0.5 inch 3X/week**	
	0.1 inch daily & shut off when rain	
Reps:	**4**	
Total Plots:	**64**	

Experimental design

Randomized complete block split plot

Irrigation regime (main plot (8 x 8 m)

X

N rates → (subplots 2 x 4 m)

X

4 Reps

Maintenance

- Phosphorous and potassium applied at 196 kg ha^{-1} yr^{-1} and 392 kg ha^{-1} yr^{-1}, respectively
- Experiment plots were maintained at a height of 75 mm using a rotary mower
- Pesticides were applied according to their label when required
- Grass clippings were removed

St. Augustinegrass quality Year 1

Factor	O-D	D-M	M-A	A-J	J-A	A-O
Irrigation	----------Quality (1-10)----------					
Regime						
Low	6.9	7.0	7.0	7.1	7.1	7.1
High	6.9	6.9	6.8	7.1	7.1	7.0
Sig.	NS	NS	NS	NS	NS	NS
N rate (kg ha^{-1} yr^{-1}).						
98	6.2	6.0	6.2	6.1	6.4	6.5
196	6.8	6.6	6.5	6.7	6.8	6.8
294	7.0	7.2	7.1	7.4	7.3	7.2
588	7.5	7.9	8.0	8.3	7.9	7.8
Sig.	**	**	**	**	**	**
Irr. x N interaction						
Sig.	NS	NS	NS	NS	NS	NS

**, and NS refer to $P < 0.01$, and $P > 0.05$, respectively.

St. Augustinegrass volume-weighed average Year 1

Factor	O-D	D-M	M-A	A-J	J-A	A-O
†Irrigation	----------NO_3-N mg L^{-1}----------					
Regime						
Low	0.08	0.07	0.09	0.07	0.06	0.11
High	0.50	0.10	0.23	0.10	0.18	0.07
Sig.	NS	NS	NS	NS	NS	NS
N rate (kg ha^{-1} yr^{-1}).						
98	0.10	0.05	0.06	0.06	0.06	0.07
196	0.20	0.14	0.09	0.06	0.07	0.09
296	0.80	0.12	0.40	0.16	0.20	0.15
588	0.08	0.12	0.10	0.07	0.12	0.06
Sig.	NS	NS	NS	NS	NS	NS
Irr. X N Interaction						
Sig.	NS	NS	NS	NS	NS	NS

*, and NS refer to $P < 0.05$, and $P > 0.05$, respectively

St. Augustinegrass Leaching Year 1

Factor	O-D	D-M	M-A	A-J	J-A	A-O
Irrigation	----------NO_3-N mg m^{-2}----------					
Regime						
Low	9.9a	4.2	0.3a	3.0a	5.1a	1.8a
High	45.3b	15.0	2.1b	4.7b	14.7b	2.7b
Sig.	*	NS	*	*	**	**
N rate (kg ha^{-1} yr^{-1}).						
98	1.2	1.1	0.2	0.9	2.9	1.0
196	2.1	1.6	0.2	1.4	1.6	3.3
296	0.7	0.7	0.1	1.1	3.2	0.7
588	9.0	9.7	1.2	1.6	5.6	0.8
Sig.	*	NS	NS	NS	NS	NS
Irr. X N Interaction						
Sig.	NS	NS	NS	NS	NS	NS

*, and NS refer to $P < 0.05$, and $P > 0.05$, respectively

Bahiagrass Quality Year 1

Factor	O-D	D-M	M-A	A-J	J-A	A-O
Irrigation	----------Quality (1-10)----------					
Regime						
Low	7.1	7.0	6.7	7.1	7.1	7.2
High	7.1	6.8	6.7	7.3	7.1	7.0
Sig.	NS	NS	NS	NS	NS	NS
N rate						
(kg ha^{-1} yr^{-1}).						
49	6.9	6.3	6.3	6.9	6.9	6.8
98	7.0	6.8	6.7	7.2	7.0	7.0
196	7.2	7.0	7.8	7.2	7.1	7.3
294	7.4	7.3	7.3	7.6	7.3	7.3
Sig.	**	**	**	**	**	**
Irr. X N Interaction						
Sig.	NS	NS	NS	NS	NS	NS

**, and NS refer to $P < 0.01$, and $P > 0.05$, respectively.

Bahiagrass volume-weighed average Year 1

Factor	O-D	D-M	M-A	A-J	J-A	A-O
Irrigation	----------NO_3-N mg L^{-1}----------					
Regime						
Low	0.20	0.09	0.06	0.06	0.07	0.05
High	0.80	0.30	0.09	0.07	0.10	005
Sig.	NS	NS	NS	NS	NS	NS
N rate (kg ha^{-1} yr^{-1}).						
49	0.40	0.11	0.05	0.09	0.08	0.05
98	1.40	0.50	0.06	0.0.5	0.09	0.06
196	0.08	0.06	0.13	0.05	0.07	0.05
296	0.09	0.11	0.06	0.07	0.11	0.5
Sig.	NS	NS	NS	NS	NS	NS
Irr. X N Interaction						
Sig.	NS	NS	NS	NS	NS	NS

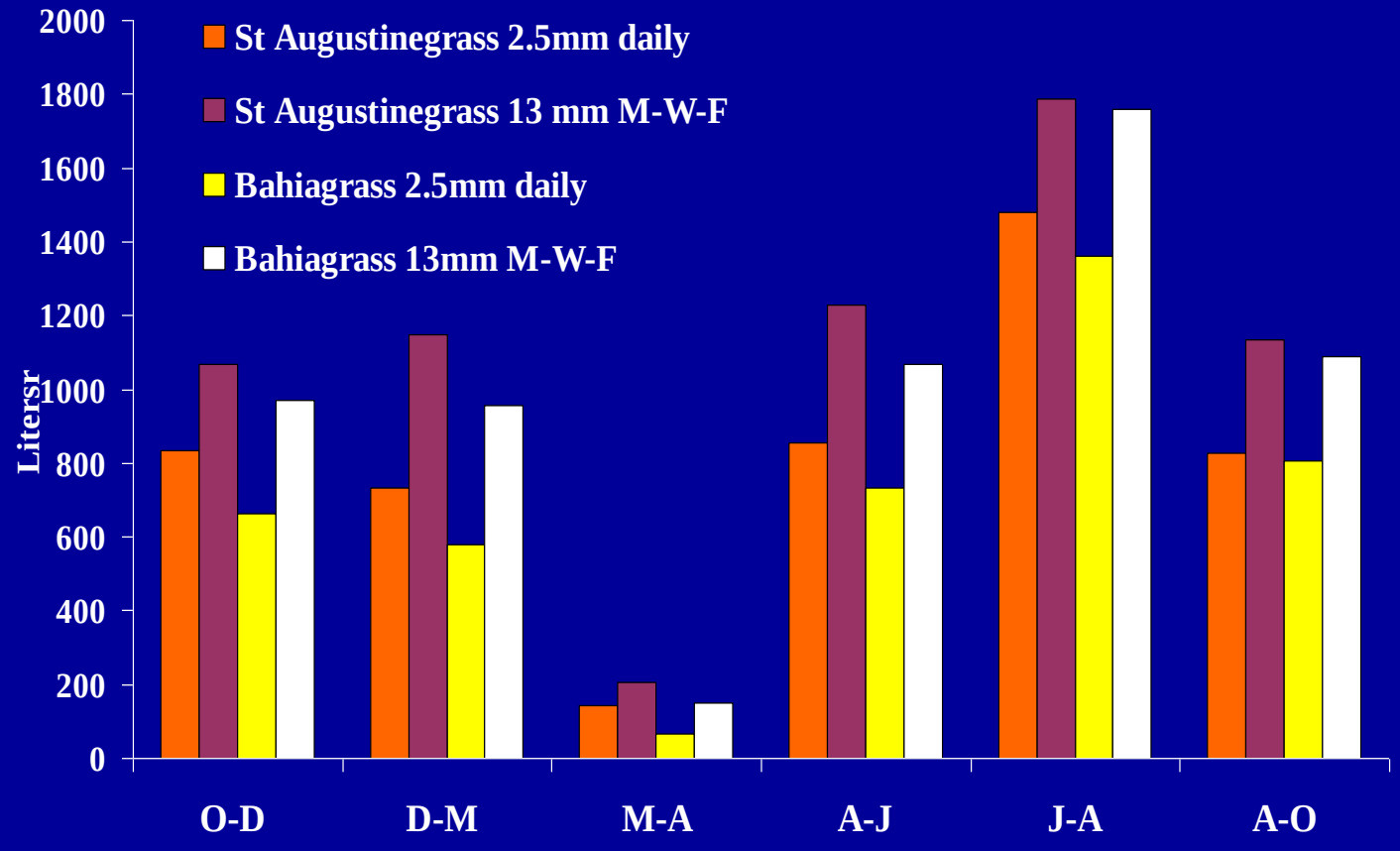
NS refer to $P > 0.05$, respectively.

Bahiagrass leaching

Factor	O-D	D-M	M-A	A-J	J-A	A-O
Irrigation	----------NO_3-N mg m^{-2}----------					
Regime						
Low	0.7a	0.7	0.1a	0.7	1.4	0.6a
High	1.2b	0.6	1.2b	1.2	1.6	1.9b
Sig.	*	NS	**	NS	NS	**
N rate (kg ha^{-1} yr^{-1}).						
49	0.6	0.8	0.1	0.7	1.4	1.2
98	1.0	0.8	0.1	1.4	1.7	0.8
196	1.0	0.7	0.1	0.9	1.4	2.2
296	1.3	0.5	0.1	0.6	1.4	0.8
Sig.	NS	NS	NS	NS	NS	NS
Irr. X N Interaction						
Sig.	NS	NS	NS	NS	NS	NS

*, and NS refer to $P < 0.05$, and $P > 0.05$, respectively.

Total percolate




Bahiagrass rates
2 lbs N/M/yr
1 lb N/M/yr
6 lbs N/M/yr
4 lbs N/M/yr
2 lbs N/M/yr

2009 SUMMER BLACKOUT TEST

Summer Blackout Test Materials and Methods

Grass:	**St. Augustinegrass**
N Rate:	**2.0 lbs. N/1000 ft^2**
Irrigation:	**0.25inch 3X/week unless voided by rain event**
Reps:	**6**
Total Plots:	**36**

N sources and manufacturers

Code	Description	%N	Manufacturer
URE	granular urea	46	PCS Sales, Inc. Northbrook, IL
UXCU	70:30 urea:xcu	45	
BS	sewage sludge bio-solid	5	Milorganite, Milwaukee, WI
PCU	polymer coated urea	41	Agrium Advanced Tech, AL
XCU	polymer coated urea	43	Agrium Advanced Technologies, AL

Turfgrass quality ratings

TREATMENT	5/18	6/15	6/22	6/25	7/2	7/10	7/20	8/6
URE	6.8	7.8a	7.9a	8.2bc	7.3b	7.0	7.2a	6.6b
UXCU	6.8	7.8a	7.9a	8.6ab	8.1a	6.7	7.0a	6.8ab
BS	6.7	6.9bc	7.2b	7.8c	7.2b	7.3	7.3a	6.7b
PCU	6.7	6.5c	5.8c	5.7d	6.1c	6.8	7.3a	7.2a
XCU	6.5	7.2b	8.1a	9.0a	8.4a	6.9	7.4a	6.8ab
CHK	6.7	6.5c	6.0c	5.8d	5.7c	6.3	5.8b	5.4c
Signif.	ns	**	**	**	**	ns	**	**

ns and ** = P > 0.10 and P < 0.01

Turfgrass quality ratings (cont.)

TRT	8/21	9/3	9/18	10/2	11/2	12/4
URE	6.4b	6.5ab	6.8b	6.7b	6.1b	6.1ab
UXCU	6.5b	6.2b	6.4b	6.4b	5.8b	5.7bc
BS	6.8b	6.7ab	7.2ab	6.8ab	6.3b	6.1ab
PCU	7.4a	7.0a	7.7a	7.5a	7.2a	6.3a
XCU	6.8b	6.6ab	6.7b	6.5b	6.2b	5.8bc
CHK	5.6c	5.4c	5.5c	5.3c	5.2c	5.4c
Signif.	**	**	**	**	**	**

ns = P > 0.10

Turfgrass color ratings

TRT	5/18	6/15	6/22	6/25	7/2	7/10	7/20	8/6
URE	6.4	8.1a	8.3a	8.2b	7.7b	7.2	7.3a	6.7b
UXCU	6.6	8.0a	8.3a	8.4ab	8.5a	6.8	7.2a	7.1ab
BS	6.3	7.3b	7.4b	7.4c	7.4b	7.7	7.4a	7.0ab
PCU	6.3	6.8bc	6.3c	5.6d	6.3c	7.1	7.5a	7.4a
XCU	6.3	7.2b	8.6a	9.0a	8.6a	7.3	7.7a	7.3a
CHK	6.5	6.5c	6.1c	5.5d	5.8c	6.3	6.0b	5.6c
Signif.	ns	**	**	**	**	ns	**	**

ns and ** = P>0.10 and P<0.01

Turfgrass color ratings (cont.)

TRT	8/21	9/3	9/18	10/2	11/2	12/4
URE	6.7b	6.8b	6.8b	6.2b	5.7a	6.5ab
UXCU	6.9b	6.6b	6.6b	5.9b	5.7a	6.2b
BS	6.9b	6.8b	7.1ab	6.3b	5.8a	6.6ab
PCU	7.4a	7.5a	7.5a	7.2a	5.9a	6.8a
XCU	7.0b	6.8b	6.9ab	6.2b	5.6ab	6.7a
CHK	6.1c	5.8c	5.8c	5.3c	5.3b	6.3ab
Signif.	**	**	**	**	*	+

**, *, and + = P<0.01, P<0.05, and P<0.10

Turfgrass density ratings

TRT	5/18	9/3	9/18	10/2
URE	5.8	6.3b	6.7b	6.3b
UXCU	5.5	6.1b	6.4b	6.1bc
BS	5.5	6.3b	6.8ab	6.4b
PCU	5.8	7.1a	7.5a	7.3a
XCU	5.7	6.5b	6.5b	6.4b
CHK	5.8	5.2c	5.3c	5.8c
Signif.	ns	**	**	**

ns and ** = P>0.10 and P<0.05

Turfgrass clipping yields (grams)

TRT	6/15	6/22	7/2	7/10	7/20
URE	15.6a	27.8a	46.2ab	36.8a	38.5b
UXCU	14.1a	23.2a	42.4b	33.1a	33.7b
BS	8.0b	11.9b	27.6c	30.0a	34.2b
PCU	7.8b	5.8b	10.1d	13.9b	21.4c
XCU	10.5ab	21.9a	55.3a	41.1a	48.7a
CHK	7.8b	3.9b	8.1d	8.2b	9.1d
Signif.	*	**	**	**	**

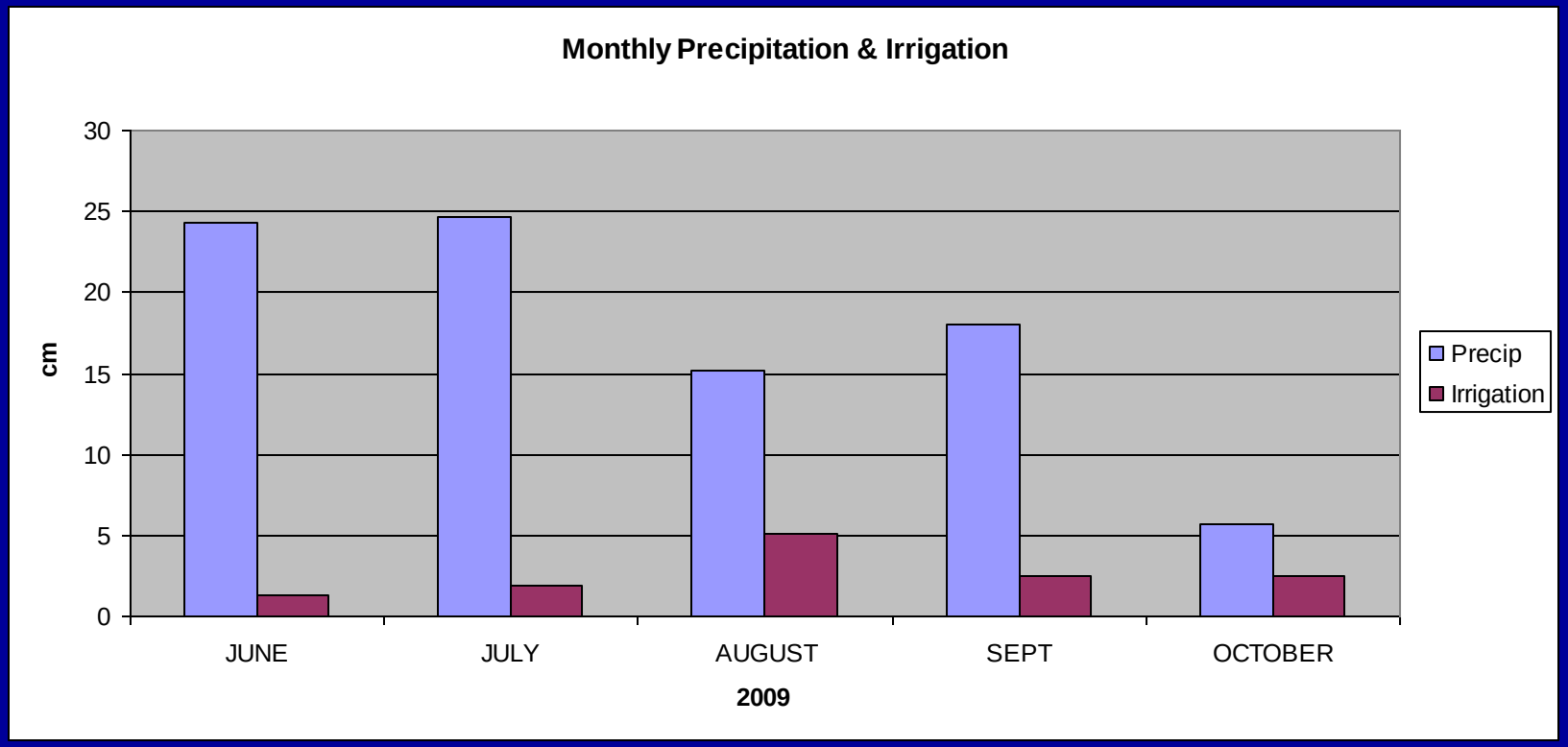
* and ** = $P<0.05$ and $P<0.01$

Turfgrass clipping yields (cont.)

TRT	8/6	8/21	9/3	9/18	10/2	11/2	12/9
URE	37.5b	36.8ab	13.8b	48.8b	34.6b	47.8ab	12.4
UXCU	31.5b	34.8b	12.1b	43.5b	32.2b	38.0b	5.8
BS	35.2b	37.3ab	15.8b	48.8b	35.1b	45.4ab	8.7
PCU	32.1b	48.5ab	27.9a	70.1a	53.6a	56.3a	9.9
XCU	51.4a	50.7a	18.5b	52.1b	35.1b	43.9b	6.6
CHK	8.8c	9.4c	3.9c	24.1c	14.2c	25.1c	4.5
Signif.	**	**	**	**	**	**	ns

** and ns = $P<0.01$ and $P>0.01$

Monthly ppt. & irrigation (cm)



NO_3-N leached (mg m^{-2})

TRT	6/8	6/10	6/15	6/17	6/24	6/29
URE	9.3	6.5	1107.3a	799.5a	985.6a	24.7
UXCU	3.1	2.8	565.1ab	127.0b	522.4ab	38.7
BS	13.2	8.2	55.6b	28.4b	50.9b	24.5
PCU	5.1	5.3	22.7b	3.8b	34.4b	7.1
XCU	4.4	1.5	34.4b	18.6b	189.7b	32.9
CHK	0.8	0.3	4.5b	0.0b	9.1b	0.8
Signif.	ns	ns	**	**	**	ns

ns and ** = P>0.10 and P<0.01

Total leached (mg m^{-2}) 6/8/09—10/6/09

TRT	NO_3-N	NH_3-N	TOTAL N
URE	3111.2a	264.47a	3375.67a
UXCU	1596.4b	155.96b	1752.36b
BS	408.7bc	143.21b	551.91c
PCU	307.4bc	145.08b	452.48c
XCU	541.4bc	165.19b	706.59bc
CHK	20.5c	159.94b	180.34c
Signif.	**	+	**

ns and + = P>0.10 and P<0.10
Means with the same letter within a column are not significant according to Duncan's Multiple Range Test.


Pre-experiment: May 2009


July 2009


Post-experiment: December 2009

2008-2010
Base Line Levels of Phosphorous Leaching from Soils with Varying Soil Test Levels

OBJECTIVES

- To determine the amount of phosphorous leached from soils categorized as: very low, low, medium, high and, very high by the UF Extension lab

Experimental design

Randomized complete block

P soil levels **(subplots 2 x 0.5 m)**

X

4 Reps

Grass Selected

- St Augustinegrass

  “cv. Floratam”

Treatments

- **5 x Phosphorous soil levels determined by UF Extension Lab**

1.) **V. Low soil P,**
2.) **Low soil P,**
3.) **Medium soil P,**
4.) **High soil P,**
5.) **V. High soil P,**

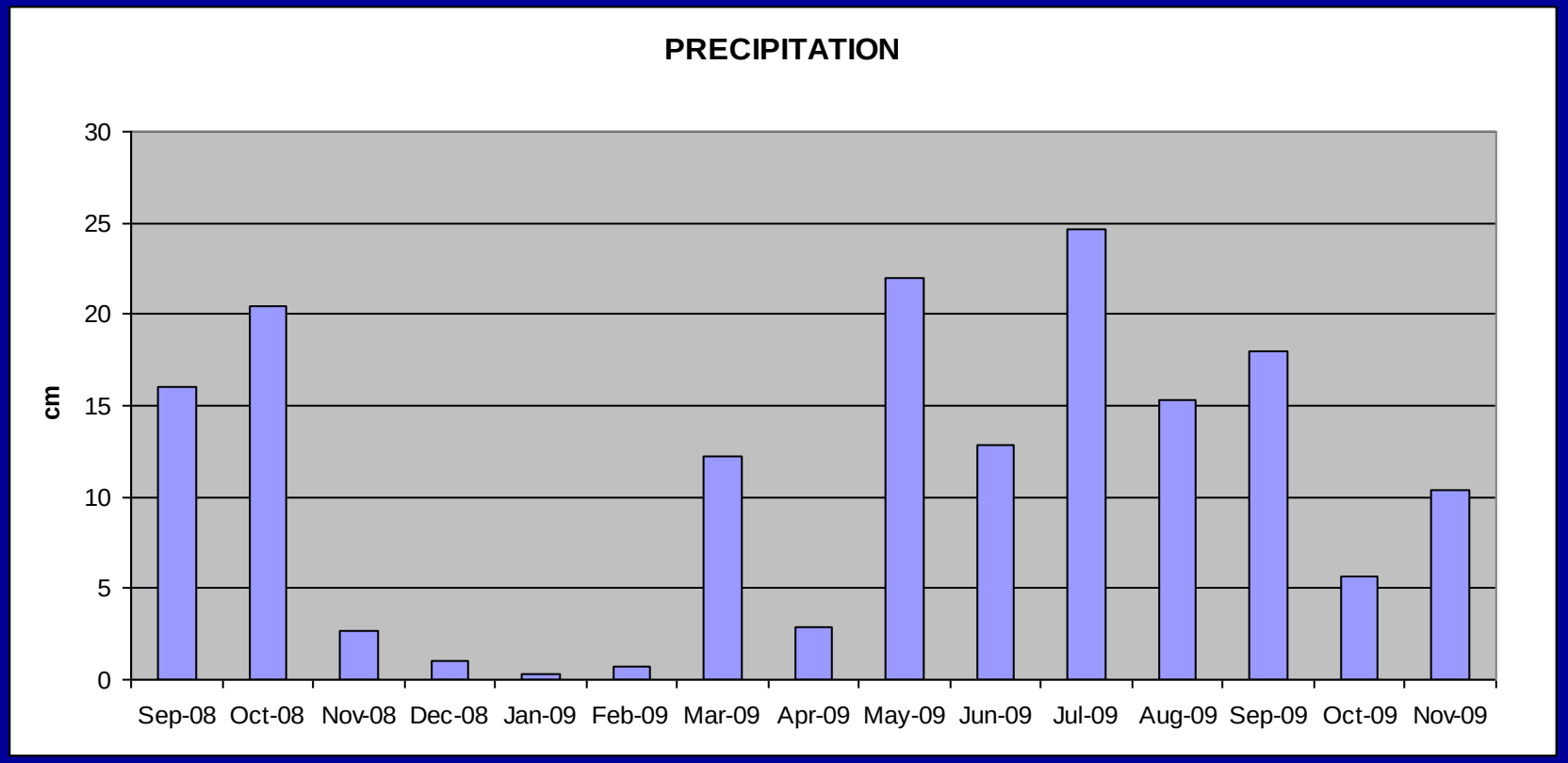
Materials and Methods

Material and Methods cont.

Materials and Methods

Materials and Methods cont.

Precipitation (cm) during experimental period.



Extension Soil Testing Lab soil P (ppm) results

SOIL TRT	8/30/08	4/1/09	10/10/09	4/22/10
V. LOW	7.5d	12.3b	9.3c	7.0b
LOW	11.3cd	14.3ab	9.5c	8.5b
MED	19.5c	30.5ab	11.5c	13..5b
HIGH	33.5b	34.0a	18.5b	14.0b
V. HIGH	55.5a	33.5a	31.8a	29.5a
Signif.	**	*	**	**

** and * = P<0.01 and P<0.05

Greenhouse P Test

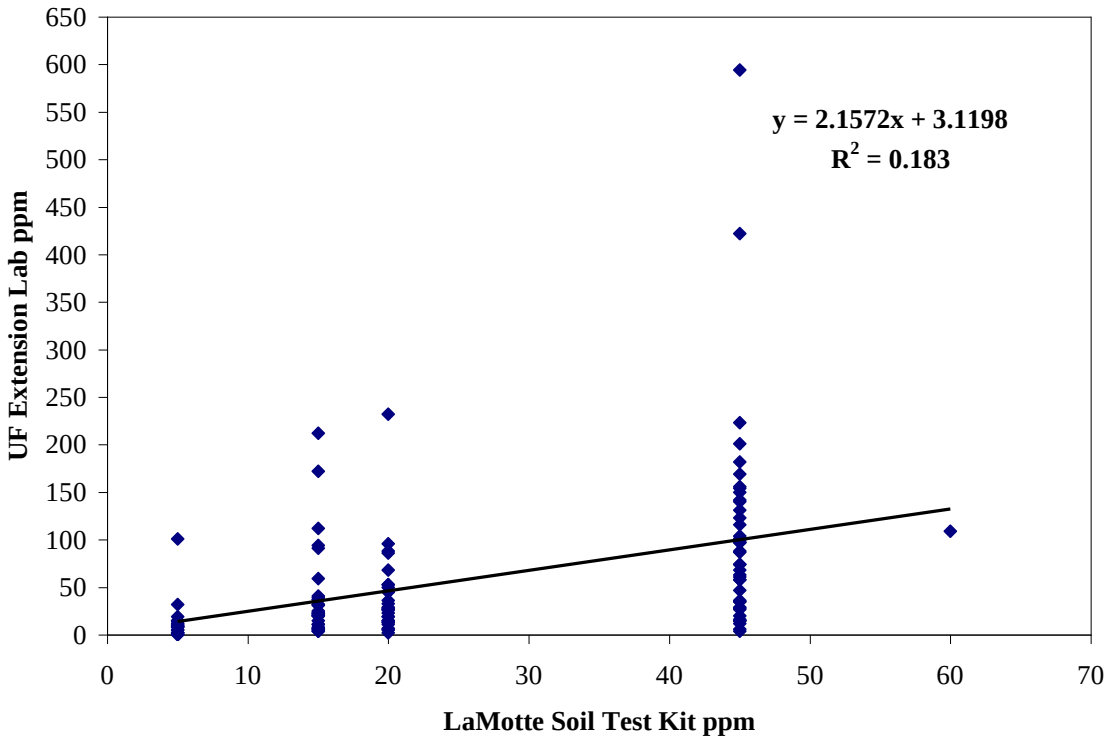

2001 Greenhouse
Column # 317

P SOIL TEST KIT EXPERIMENT:

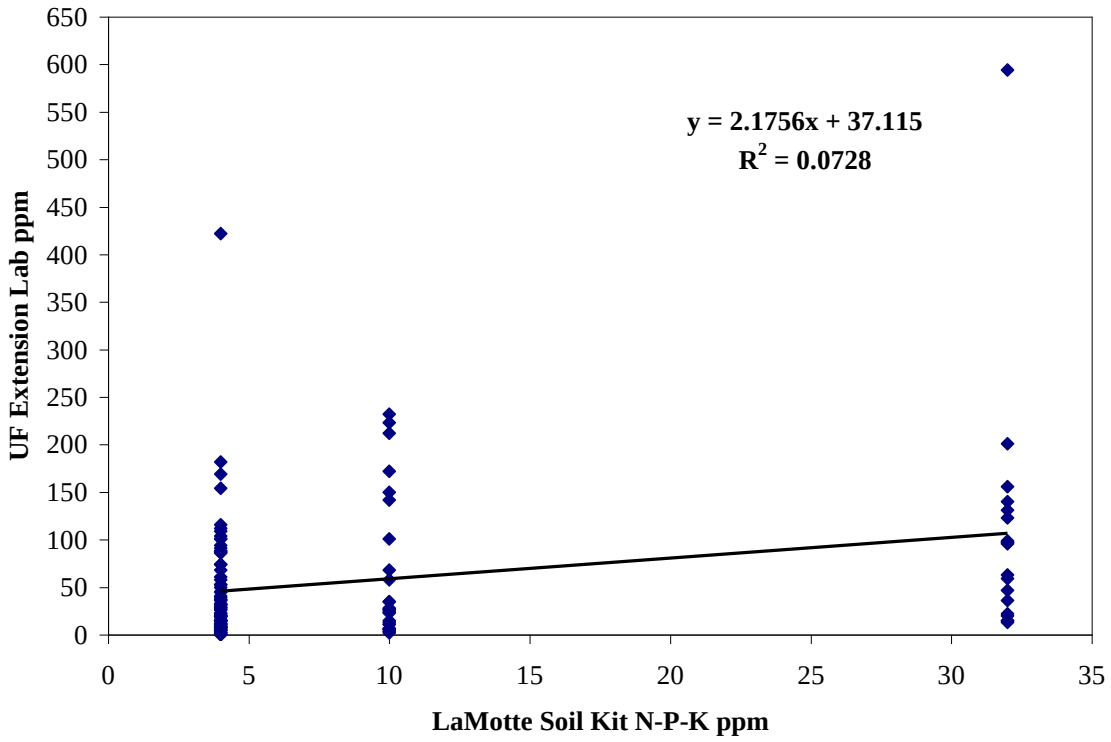
An Evaluation of Phosphorus Soil Analyses Kits for Judging Phosphorus Fertilization Requirements for Home Lawns

The rates of low, medium and high for the UF extensions lab and the soil test kits.

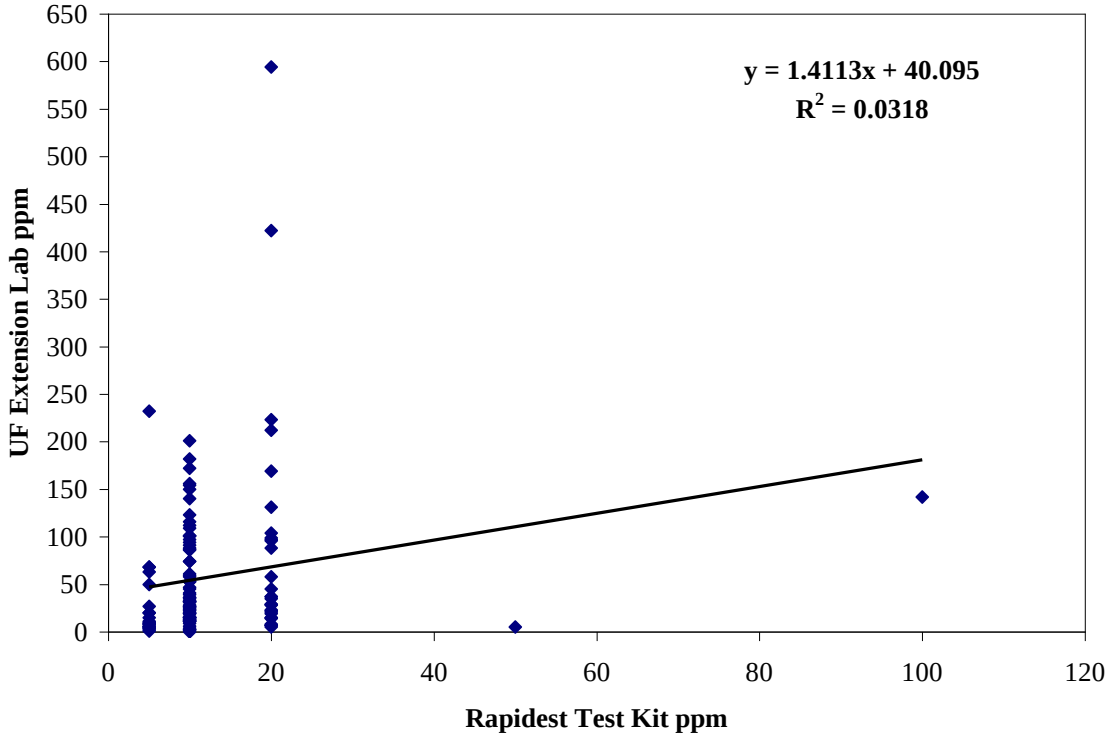
	University of Florida Extension Lab (ESTL)	LaMotte Model EL	LaMotte N.P.K	Rapitest Soil Test
V. Low	0-10	ppm		5
Low	10-15	0-25	4	10
Medium	15-30	25-50	10	20
High	30-60	50+	32	40



Correlation of [P] from soils sent to ESTL with [P] from soils used in LaMotte Soil Test



Correlation of [P] from soils sent to ESTL with [P] from soils used in LaMotte Soil Kit N-P-K Test Kit.



- **Correlation of [P] from soils sent to ESTL with [P] from soils used in Rapitest Soil Test Kit.**