

Variable rate irrigation in South Carolina flue-cured tobacco

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Background

- Production Considerations
 - 15- 25% of current production can be irrigated
 - Increased interest in center pivot irrigation throughout tobacco growing region of SC
 - Timely irrigation maintains regular growth schedule which improves yields and quality
 - Adequate water in region to supplement water demands of crops
 - Government programs to assist center pivot purchases
 - Variable rate irrigation helps equilibrate differences in soil structure and water availability across our variable soil types

Research Goals

- Study tobacco production under pivot irrigation
- Study different irrigation regimes utilizing a variable rate center pivot system
- Study four nitrogen rates under three different irrigation regimes

Objectives

1: Evaluate different irrigation rates utilizing a variable rate Valley pivot



2: Evaluate different nitrogen rates utilizing calcium nitrate



Materials & Methods

Location: Pee Dee REC; Florence, SC

Transplanted: 5/10/2013 Indv N Trts: 5/28/2013

Variety: NC 196

Treatment List:

Fertility

750 lbs of 6-6-18 at TP

A. 65 lbs N

B. 75 lbs N

C. 85 lbs N

D. 95 lbs N

Irrigation

100 gal/acre at TP

X. 0"

Y. 0.5"

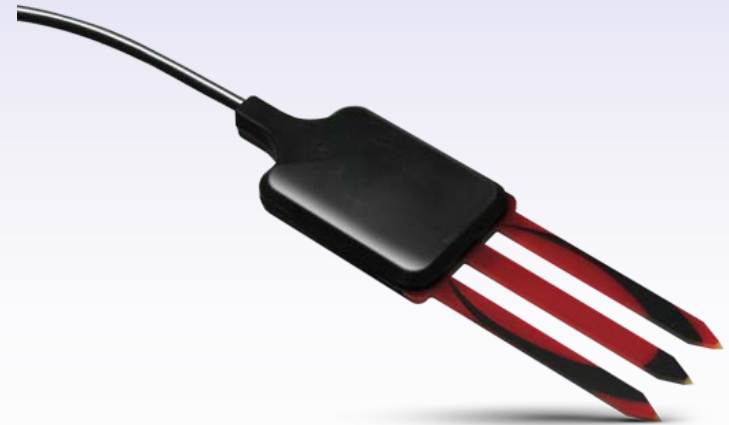
Z. 1"

Initiate irrigation at
30 CB at 8" depth

Materials & Methods

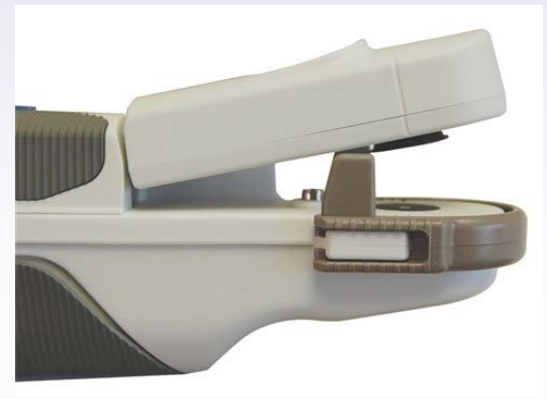


Record moisture content of soil profile at 0.5', 1', 1.5', & 2' depths



Materials & Methods

Measure chlorophyll content at different stalk positions & leaf regions over growing season using a SPAD chlorophyll meter



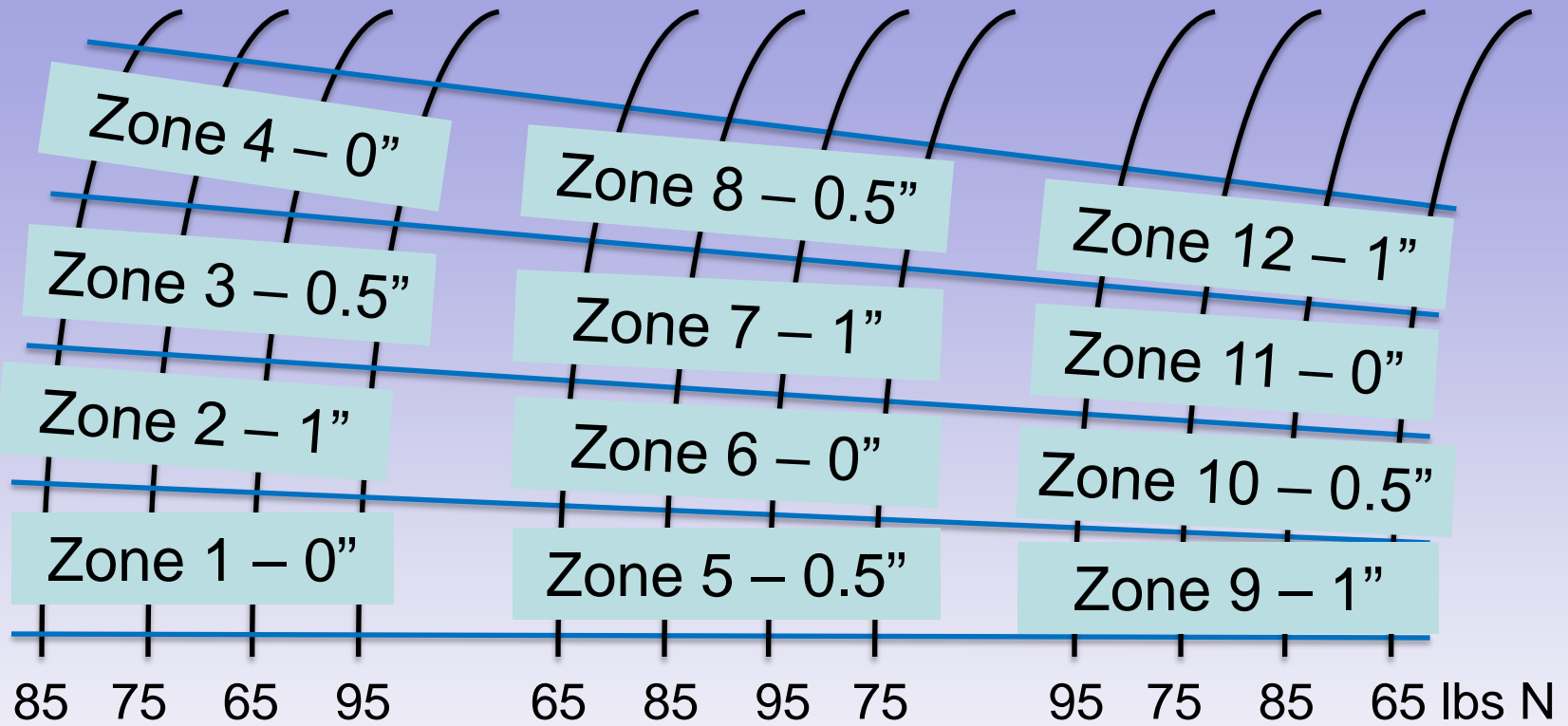
Materials & Methods



Observe leaf reflectance in the visible light spectrum using a Licor spectroradiometer



Plot Plan



Rep 4	Irrigation	0"										0.5"										1"										
	lbs N	K	K	85	75	65	95	K	K	K	K	K	K	K	K	65	85	95	75	K	K	K	K	K	K	K	K	95	75	85	65	K
Rep 3	Irrigation	0.5"										1"										0"										
	lbs N	K	K	85	75	65	95	K	K	K	K	K	K	K	K	65	85	95	75	K	K	K	K	K	K	K	K	95	75	85	65	K
Rep 2	Irrigation	1"										0"										0.5"										
	lbs N	K	K	85	75	65	95	K	K	K	K	K	K	K	K	65	85	95	75	K	K	K	K	K	K	K	K	95	75	85	65	K
Rep 1	Irrigation	0"										0.5"										1"										
	lbs N	K	K	85	75	65	95	K	K	K	K	K	K	K	K	65	85	95	75	K	K	K	K	K	K	K	K	95	75	85	65	K

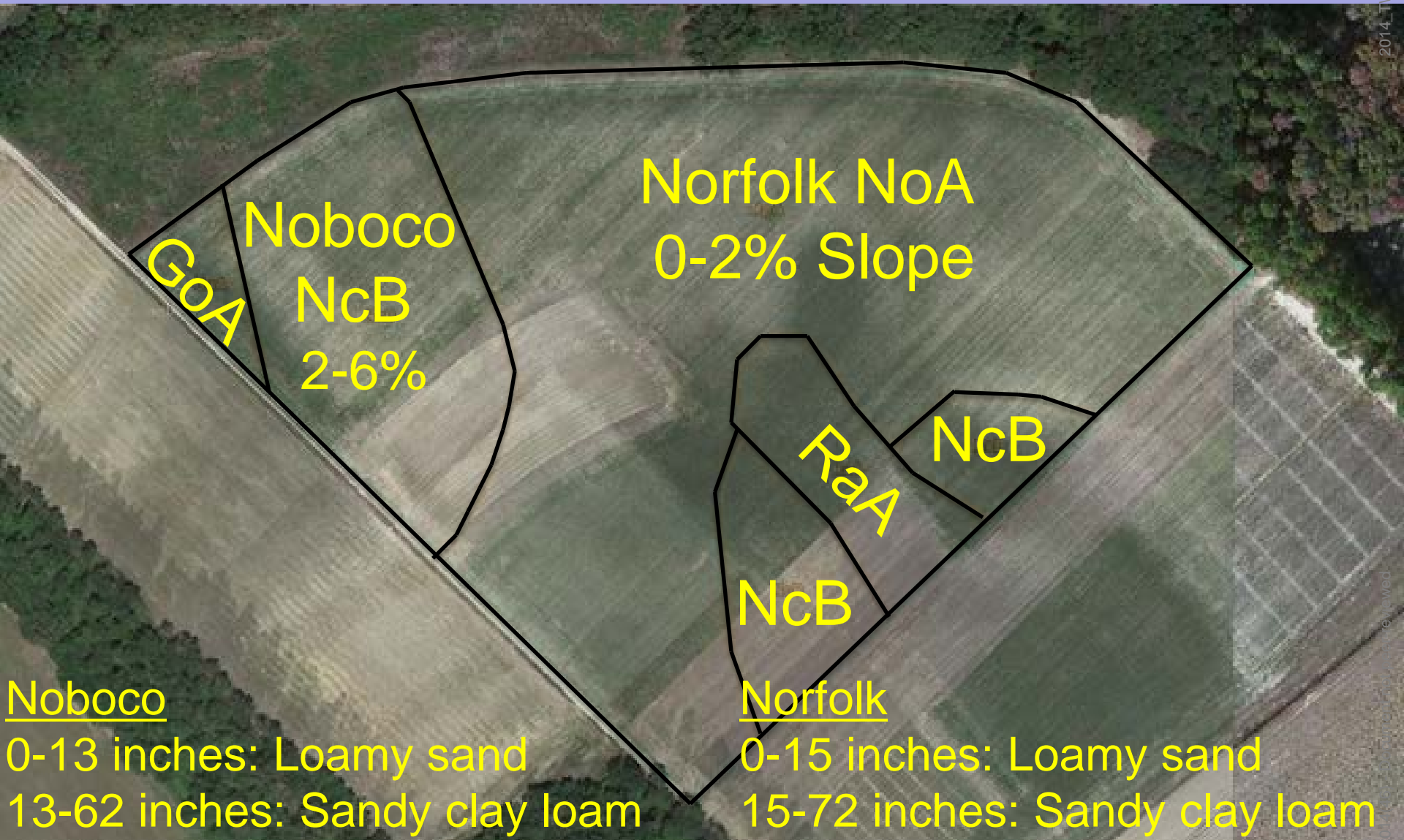
K = K 346, 75 lbs N applied

Arial Field View



—| 205' —| 205' —| 205' —| 205' —●

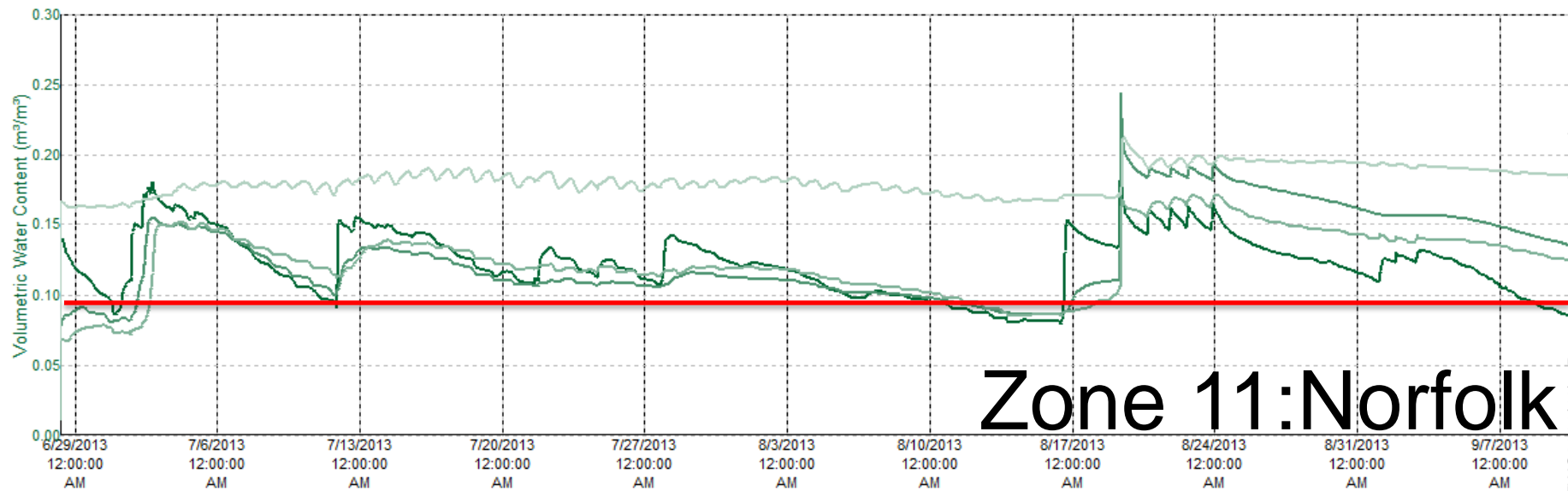
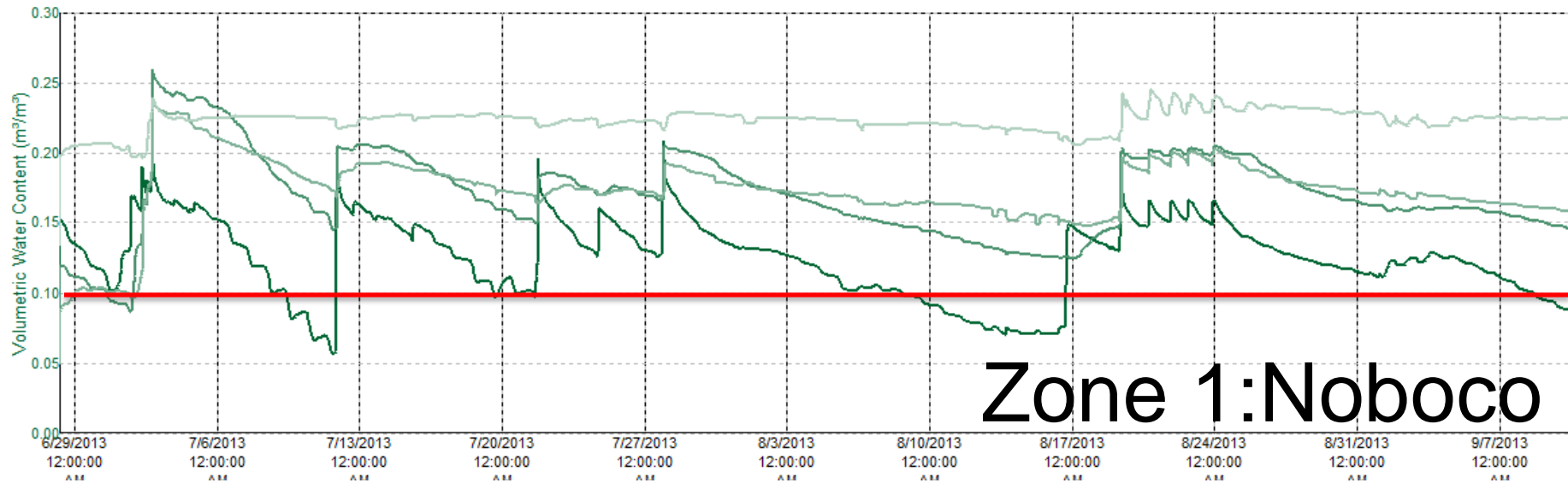
Soils Map



Noboco
0-13 inches: Loamy sand
13-62 inches: Sandy clay loam

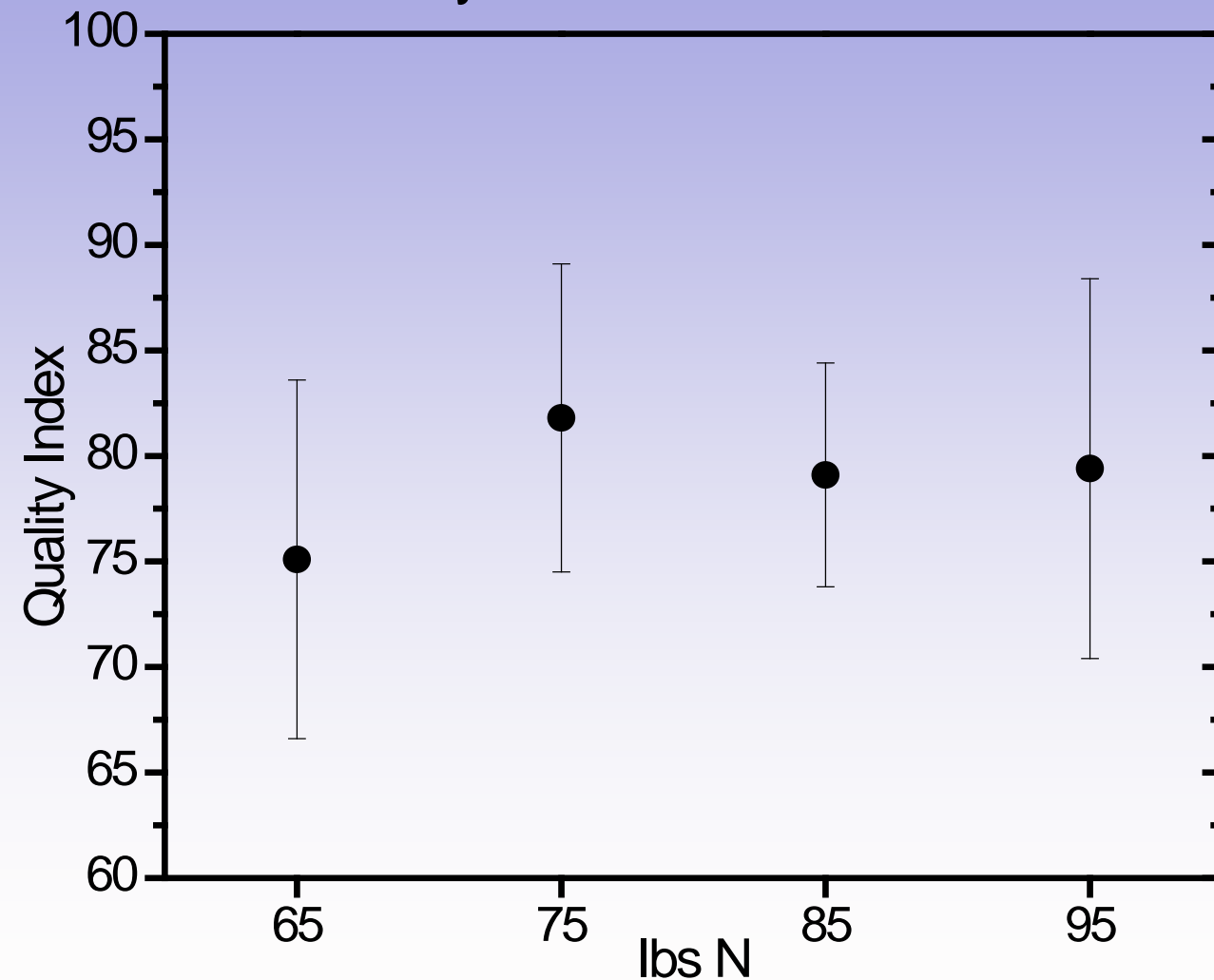
Norfolk
0-15 inches: Loamy sand
15-72 inches: Sandy clay loam

Preliminary Results



Preliminary Results

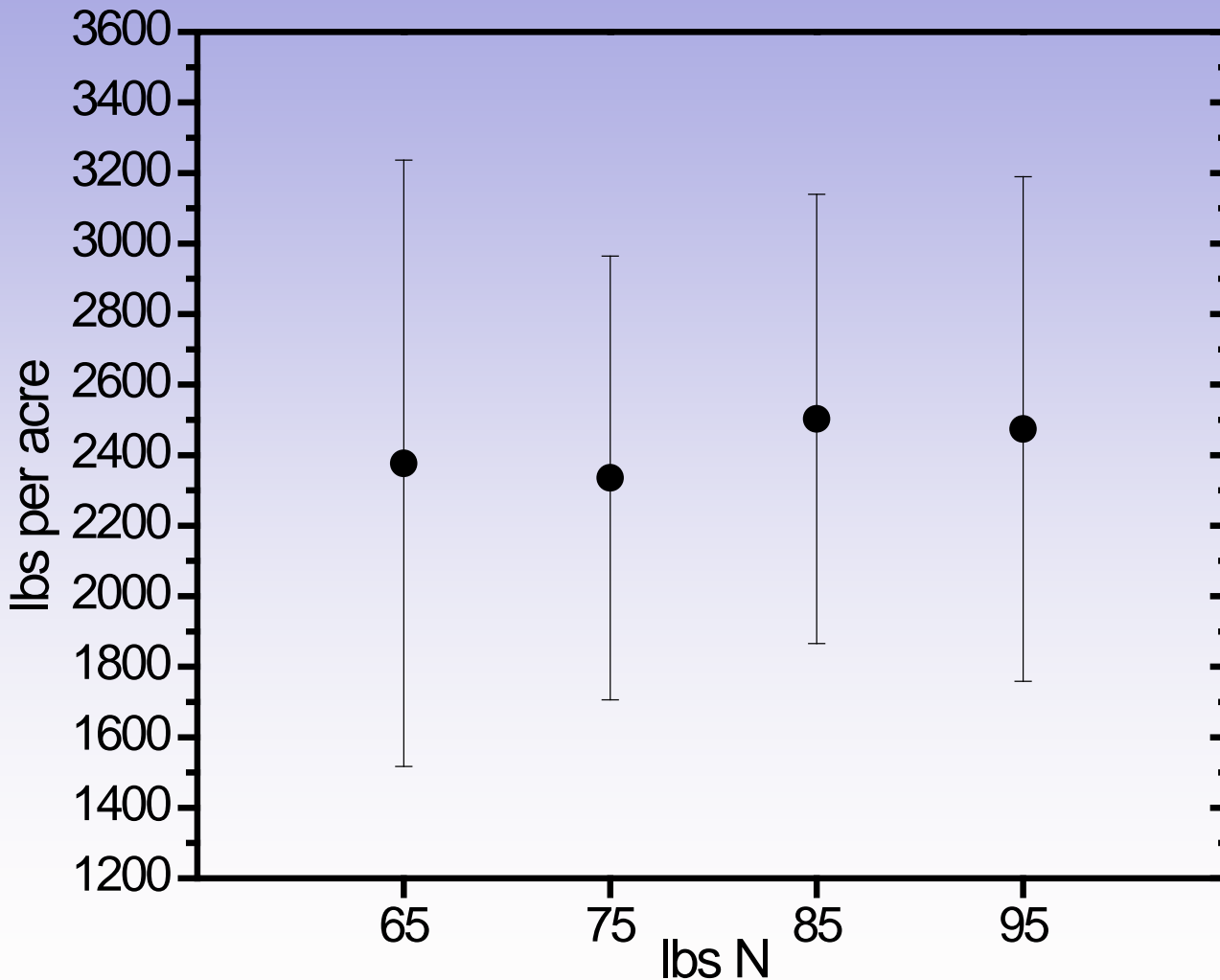
Quality Index vs N Treatment



Lbs N	Average
65	75.1 ± 8.5
75	81.8 ± 7.3
85	79.1 ± 5.3
95	79.4 ± 9.0

Preliminary Results

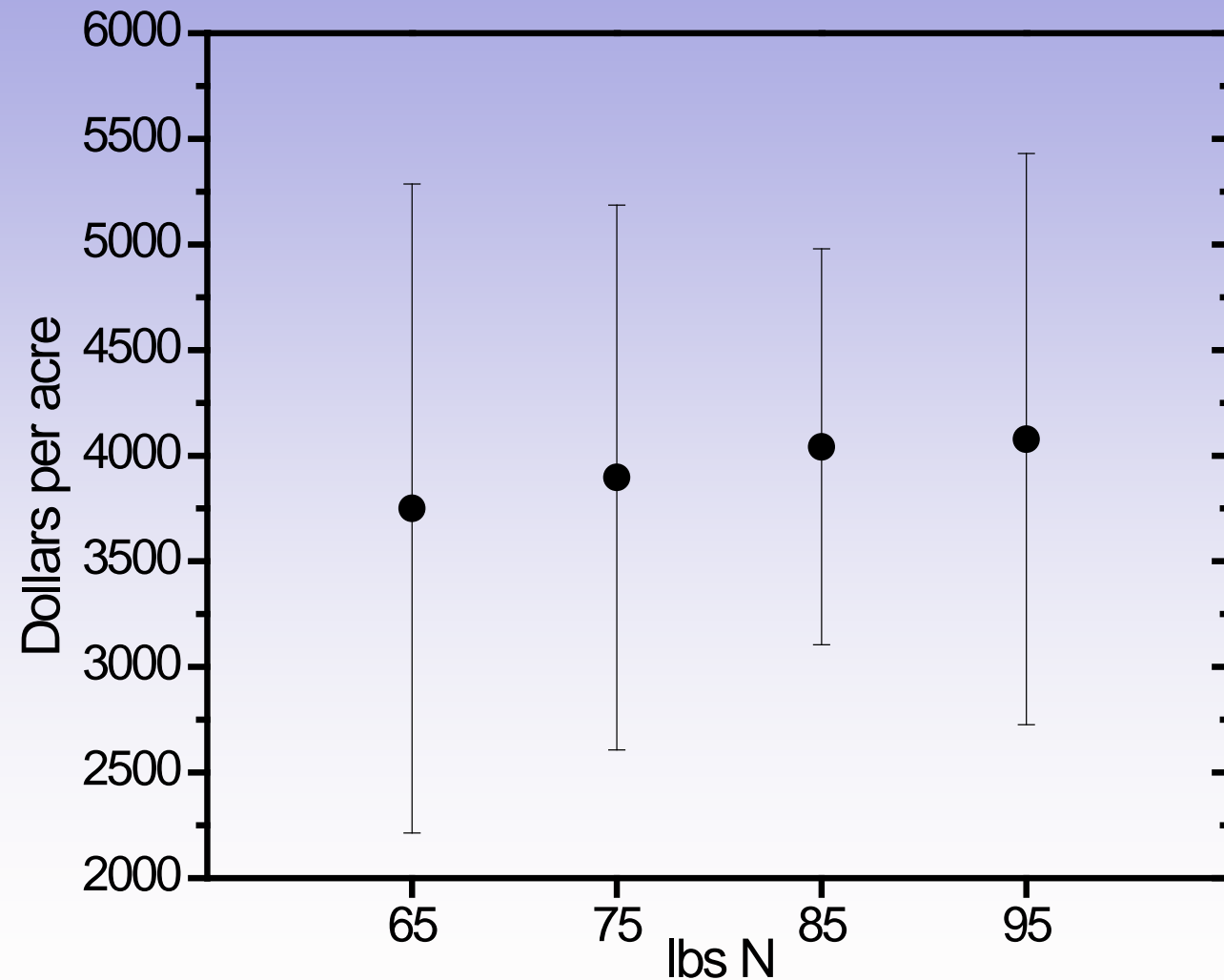
Lbs Cured Leaf/Acre vs N Treatment



N	Average
65	2,377 ± 860
75	2,335 ± 629
85	2,503 ± 637
95	2,474 ± 715

Preliminary Results

Value/Acre vs N Treatment



N	Average
65	3,750 ± 1,537
75	3,897 ± 1,290
85	4,042 ± 937
95	4,078 ± 1,352

Preliminary Results

lbs N/acre	lbs Ca nitrate/acre	\$/acre	Price Diff/acre
65	130	33.80	-18.20
75	200	52.00	-----
85	265	68.90	+16.90
95	330	85.80	+33.80

1 lb $\text{Ca}(\text{NO}_3)_2 = \0.26

Conclusions

- Recommend N rates gave highest quality index
- Higher N rates marginally improved yields but at the cost of quality
- Future Plans
 - Analysis of chlorophyll & spectroradiometer data to correlate leaf quality with irrigation and N applications