CPDC– Successful Grower Experience Forensics / HLB

Grower interviews by committee team, 20 July-8 Aug

Better managers

Good irrigation management – from fertigation to seepage- Avoid stress
Variable soils --good soil water knowledge --Block by block management
Split applications --Spoon feeding

Balanced fertilizer program Frequent, Hybrid programs of dry, CRF, fertigation & foliar (6x)
N sources from Urea, Ca Nitrate and ammonium 120 – 200 lb/year
Micronutrients in fertigation. 5-0-7 and 5-4-7. K > N 1 : 1.4 N : K
Foliar: something like 14-7-7 or 4-0-8 or triazone Urea
Ca, Mg, Iron, Mn, Zinc (sulfates & nitrates), B, Mo Chelates & Nitrates
No Cl from KCL hydroxide and KSO4 P important for root recovery
Chelated Ca, Mg, B at prebloom Postbloom NO3 minors, Crop set, KNO3
Humates, + OM fulvic acid. Mulch compost 3 T every year
CRF for resets-- ~3 application of hybrid CRF from spring through early winter
CRF is filled in the planting holes. Neonics on young trees and resets
Leaf nutrient sampling early other month— > towards more frequent standards

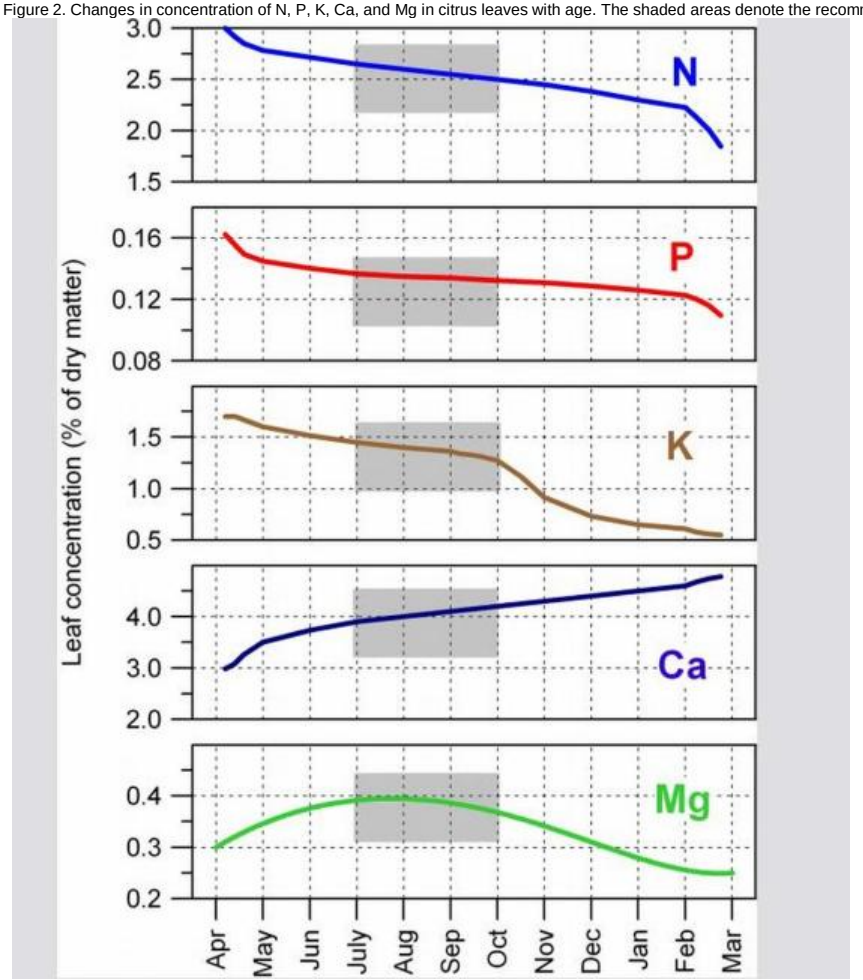
Balanced pest control, Good psyllid control: Movento, Oil, Agromec, frequent parasitic wasps, aerial & ground sprays, often perimeter sprays
Young trees are sprayed & neonics, Ridomil annually

Severe hedge 3 years ago to balance sh/root Hedge and top every middle every year
pH of water decreased from 6.4 to 6.1 using urea/sulphuric acid in fertigation
desired soil pH is 6-6.5. No pH management unless pH is as low as 5.5
Future needs: More Tamarixia wasps, 2 .fertilizer materials and formulation,
insect biology, bactericide delivery, PFD, fruit drop, root health

Towards monthly leaf nutrition standards

SL253.04: Soil and Leaf Tissue Testing for Commercial Citrus Production

Figure 2. Changes in concentration of N, P, K, Ca, and Mg in citrus leaves with age. The shaded areas denote the recommended sampling period and the optimum concentration range for each element.



-- Leaf Age

http://edis.ifas.ufl.edu/pdffiles/ss/ss47800.pdf 2011
SL 253 2008 Nutrition of Florida Citrus Trees Second Edition Edited by Thomas A. Obreza and Kelly T. Morgan
(The first FL edition SP 169, Koo, 1984 Nutrition of Florida Citrus Trees. Visit the EDIS website at http://edis.ifas.ufl.edu.)

TABLE 3. Standards for classification of the nutrient status of orange trees based on concentration of mineral elements in 4- to 7-month-old, spring-cycle leaves from non-fruiting terminals.[1]

Element and chemical symbol		Dry matter basis	Deficient less than	Low range	Optimum range	High range	Excess, more than
Nitrogen	(N)	%	2.2	2.2 to 2.4	2.5 to 2.7	2.8 to 3.0	3.0
Phosphorus	(P)	%	0.09	0.09 to 0.11	0.12 to 0.16	0.17 to 0.29	0.30
Potassium	(K)	%	0.7	0.7 to 1.1	1.2 to 1.7	1.8 to 2.3	2.4
Calcium	(Ca)	%	1.5	1.5 to 2.9	3.0 to 4.5	4.6 to 6.0	7.0
Magnesium	(Mg)	%	0.20	0.20 to 0.29	0.30 to 0.49	0.50 to 0.70	0.80
Sulfur	(S)	%	0.14	0.14 to 0.19	0.20 to 0.39	0.40 to 0.60	0.60
Boron	(B)	ppm	20	20 to 35	36 to 100	101 to 200	260
Iron	(Fe)	ppm	35	35 to 49	50 to 120	130 to 200	250?
Manganese	(Mn)	ppm	18	18 to 24	25 to 49	50 to 500	1000
Zinc	(Zn)	ppm	18	18 to 24	25 to 49	50 to 200	200
Copper	(Cu)	ppm	3.6	3.7 to 4.9	5 to 12	13 to 19	20
Molybdenum	(Mo)	ppm	0.05	0.06 to 0.09	0.10 to 1	2 to 50	100?
Sodium	(Na)	%	*	-----	less than 0.16	0.17 to 0.24	0.25
Chlorine	(Cl)	%	?	?	less than 0.2	0.3 to 0.5	0.7
Lithium	(Li)	ppm	*	-----	less than 1	1 to 5	12

[1] Values are adapted and revised from various sources including Chapman (1960), DeVilliers and Beyers (1961), Reuther *et al.* (1962), and Reuther and Smith (1954).

* These elements are not known to be essential for normal growth of citrus.

? Indicates lack of information regarding value.

--Timing of application

Single N application Smith 1966

April = constant N

Summer = low N in young leaves

Fall/Winter = High N in young leaves

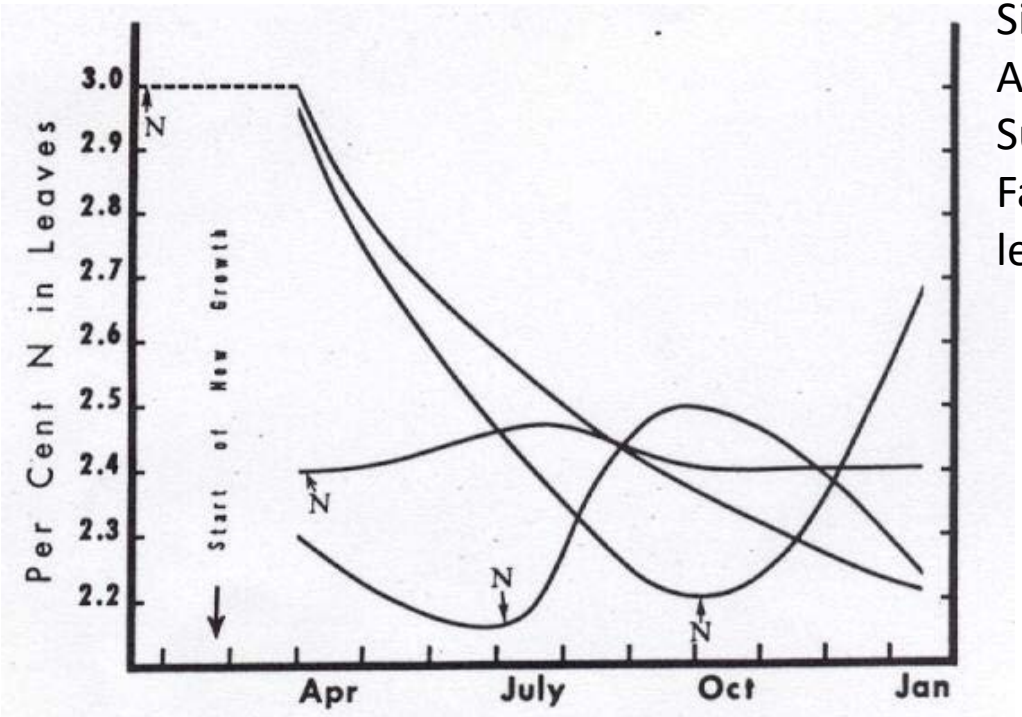


Figure 3. Seasonal trends in leaf N in relation to different times of N application on Marsh grapefruit. Nitrogen is applied only once a year but at a different date for each treatment. Nitrogen applied after the bloom and vegetative flush (April) results in a fairly constant leaf concentration throughout the year. Summer N results in a low leaf level in young leaves, whereas Fall and Winter applications show high concentrations in young leaves. (Unpublished data of Author, from an experiment in progress)

Table 2.
Guidelines for interpreting orange tree leaf analysis based on four- to six-month-old spring flush leaves from nonfruiting twigs (Koo et al. 1984).

Element	Unit of measure	Deficient	Low	Optimum	High	Excess
N	%	< 2.2	2.2 – 2.4	2.5 – 2.7	2.8 – 3.0	> 3.0
P	%	< 0.09	.09 – 0.11	0.12 – 0.16	.17 – 0.30	> 0.30
K	%	< 0.7	0.7 – 1.1	1.2 – 1.7	1.8 – 2.4	> 2.4
Ca	%	< 1.5	1.5 – 2.9	3.0 – 4.9	5.0 – 7.0	> 7.0
Mg	%	< 0.20	.20 – 0.29	0.30 – 0.49	.50 – 0.70	> 0.70
Cl	%	---	---	< 0.20	.20 – 0.70	> 0.70
Na	%	---	---	---	.15 – 0.25	> 0.25
Mn	mg/kg or ppm[2]	< 18	18 – 24	25 – 100	101 – 300	> 300
Zn	mg/kg or ppm	< 18	18 – 24	25 – 100	101 – 300	> 300
Cu	mg/kg or ppm	< 3	3 – 4	5 – 16	17 – 20	> 20
Fe	mg/kg or ppm	< 35	35 – 59	60 – 120	121 – 200	> 200
B	mg/kg or ppm	< 20	20 – 35	36 – 100	101 – 200	> 200
Mo	mg/kg or ppm	< 0.06	.06 – 0.09	0.10 – 2.0	2.0 – 5.0	> 5.0

Limited below 2.5 %

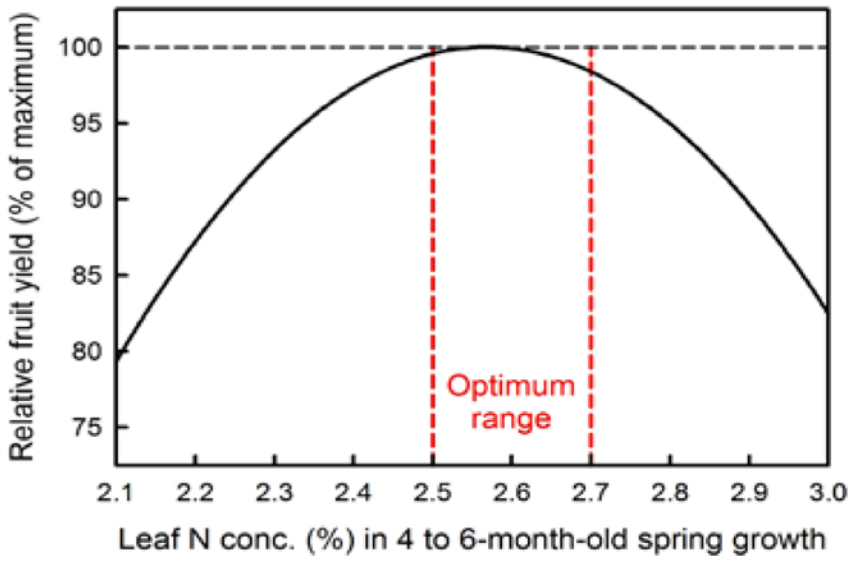
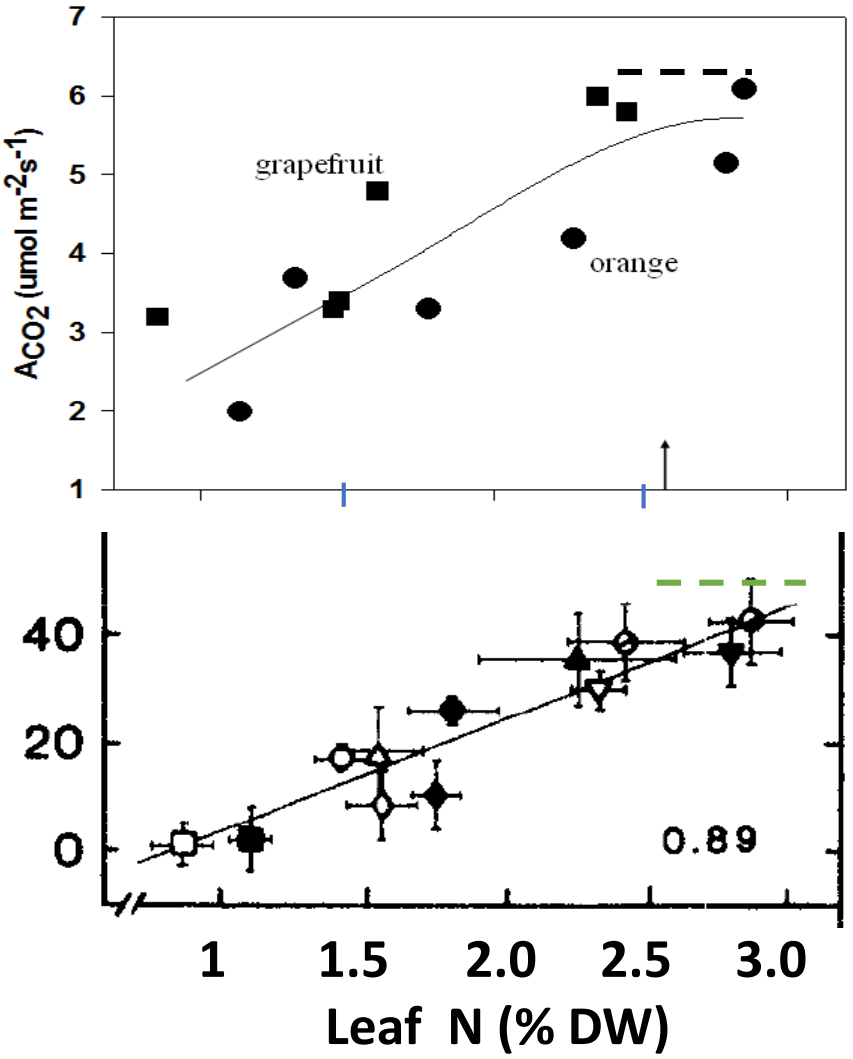


Fig. 8.4. As orange leaf N increases from 2.1% to 3.0%, yield increases to a maximum around 2.6%, then decreases (Alva et al., 2006).



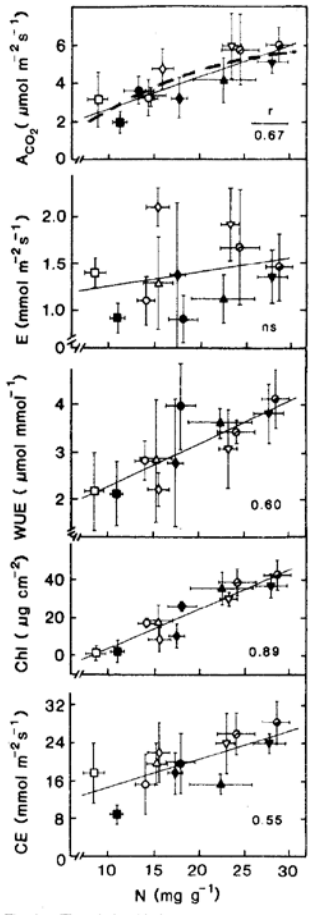
Syv 1987

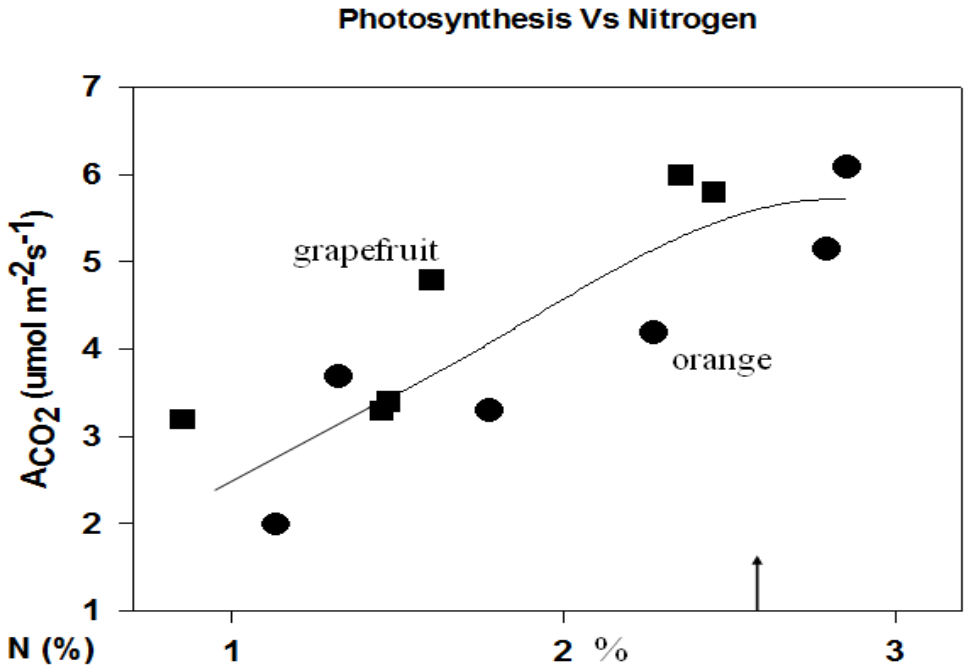
http://edis.ifas.ufl.edu/pdffiles/ss/ss47800.pdf 2011

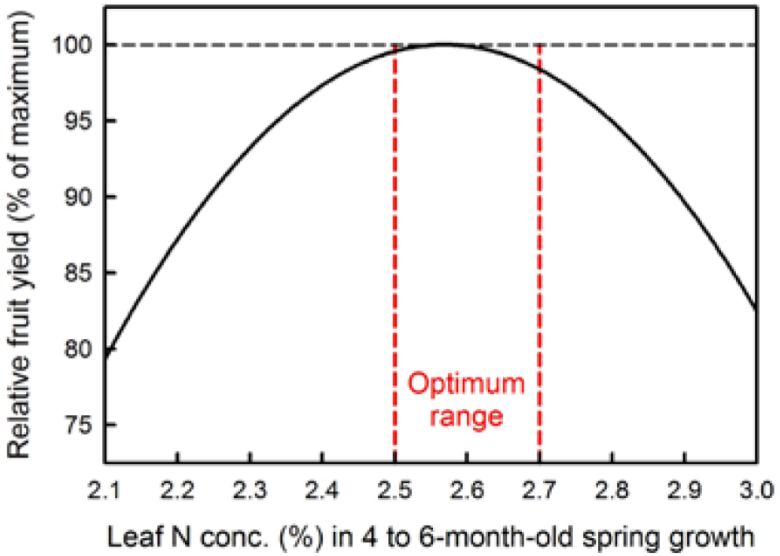
SL 253 Nutrition of Florida Citrus Trees Second Edition Edited by Thomas A. Obreza and Kelly T. Morgan

(The first edition of this document SP 169, Nutrition of Florida Citrus Trees. Visit the EDIS website at http://edis.ifas.ufl.edu.)

"Soil pH affects the availability of plant nutrients including phosphorus (P), calcium (Ca), magnesium (Mg), and the micronutrients. Most Florida soils are acidic in their native state, so they require lime applications before planting and every few years thereafter depending on fertilizer and irrigation water sources. The optimum soil pH range for citrus is 6.0 to 6.5."


A_{CO_2} (µmol $m^{-2}s^{-1}$)
r
0.67
E (mmol $m^{-2}s^{-1}$)
ns
WUE (µmol $mmol^{-1}$)
0.60
Chl (µg cm^{-2})
0.89
CE (mmol $m^{-2}s^{-1}$)
0.55
N (mg g^{-1})


Photosynthesis Vs Nitrogen
A_{CO_2} (umol $m^{-2}s^{-1}$)
grapefruit
orange
N (%)
%



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