

# UF/IFAS Updates on Citrus Nutrient Recommendations

---

Dr. Kelly T. Morgan

Professor, Crop Nutrition

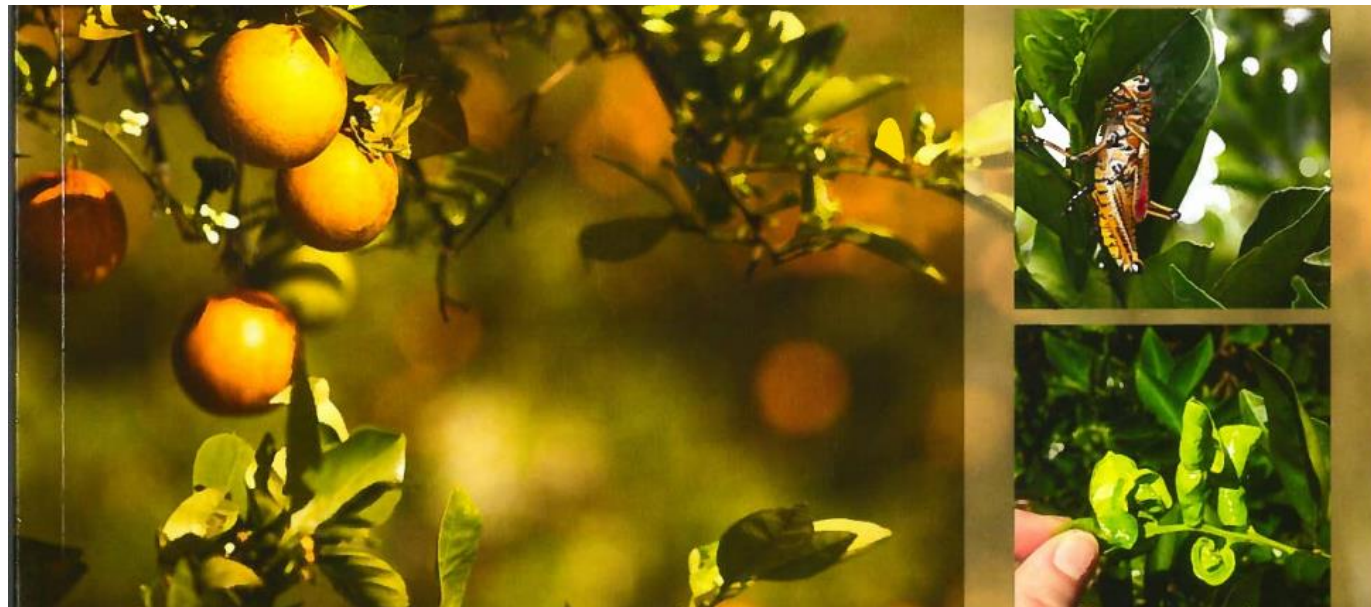
UF/IFAS Soil, Water, and Ecosystem Sciences

[conserv@ufl.edu](mailto:conserv@ufl.edu)

863 289 1910



## Nutrient Recommendation Updates

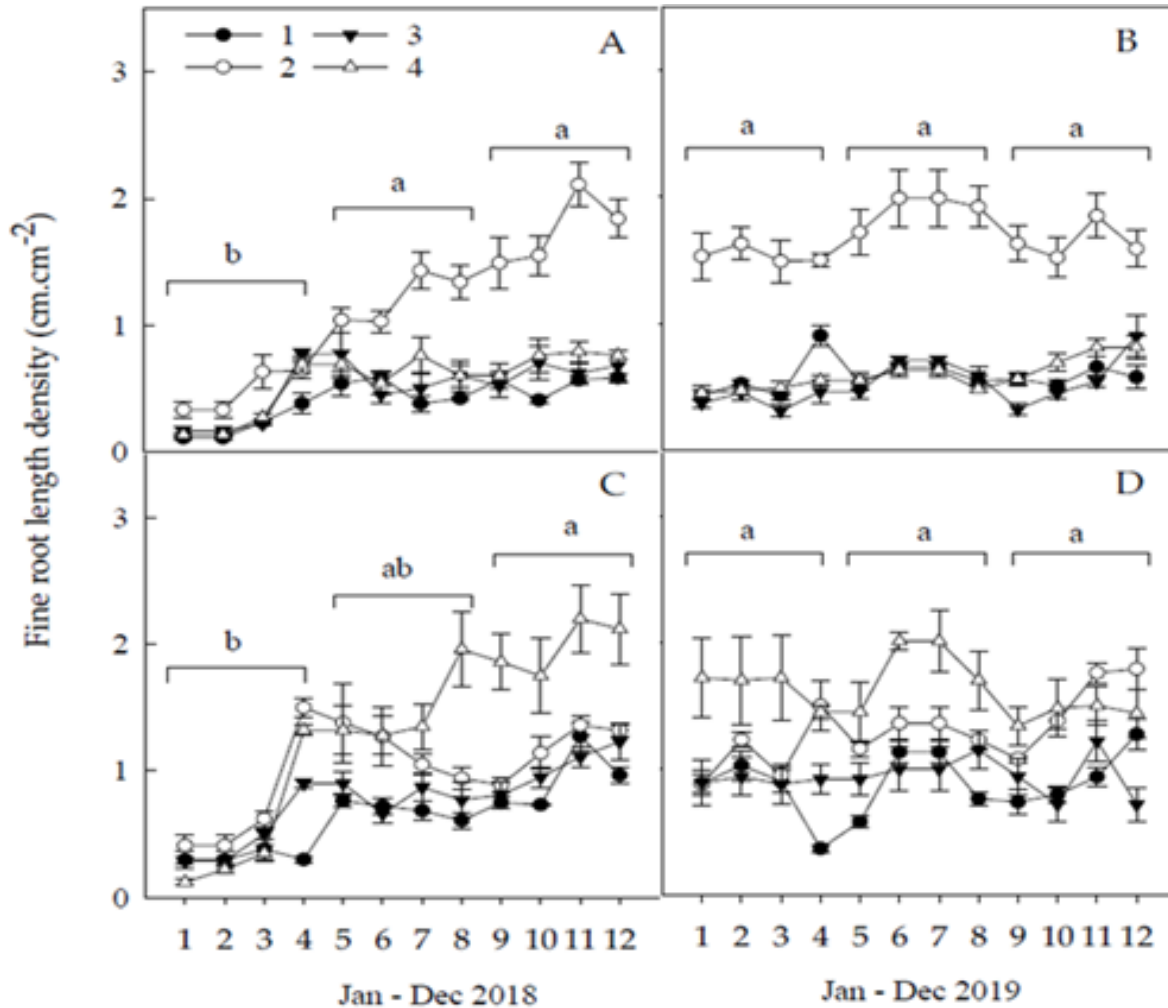


# Citrus Secondary Macronutrient and Micronutrient Studies

---

- Secondary macronutrients Ca and Mg
  - No treatment controls
  - 40 lb/ac/yr Ca only
  - 40 lb/ac/yr Mg only
  - 20 lb/ac/yr of each Ca and Mg
- Micronutrients Mn, and Zn – three split applications per year
  - No treatment control
  - 8 lb/ac/yr Foliar only (8 lb/ac/yr)
  - 8 lb/ac/yr Foliar, 8 lb/ac/yr Ground (16 lb/ac/yr)
  - 8 lb/ac/yr Foliar, 16 lb/ac/yr Ground (24 lb/ac/yr)

# Fine Root Density Response



1 = control  
 2 = Ca only  
 3 = Mg only  
 4 = Ca + Mg

- Initial soil pH of 6.7 – recommendation – no Ca or Mg
- Consistent significant increase in fine root density with Ca for Cleopatra Mandrin, Ca+Mg for Swingle

# Canopy Volume Response

Macro <sup>a</sup>	Tree canopy volume											
	2017				2018				2019			
	Cleo	Swc	Cleo	Swc	Cleo	Swc	Cleo	Swc	Cleo	Swc	Cleo	Swc
	m <sup>3</sup>											
Control	17.1	12.6	16.3	12.4	15.8	11.8	16.9	13.3	22.6b <sup>c</sup>	15.2	23.7b	15.9b
Ca	19.0	11.5	14.4	11.0	15.3	13.2	16.0	13.9	25.1ab	18.3	26.9ab	19.4ab
Mg	18.2	12.8	17.0	13.4	16.6	12.8	17.4	13.5	26.8a	18.9	29.8a	20.1ab
Ca + Mg	18.8	11.4	17.1	12.8	17.0	13.6	17.8	14.3	26.7a	18.7	29.1a	20.6a
Significance	NS <sup>†</sup>	NS	NS	NS	NS	NS	NS	NS	*	NS	**	*

- Significant increase in canopy volume for trees on both rootstocks in third year
- Consistently highest canopy volume increase with application of both Ca and Mg

# Yield and Juice Quality Response

Year	Macro <sup>b</sup>	Fruit yield		Fruit drop		Total fruit <sup>a</sup>	
		Cleo	Swc	Cleo	Swc	Cleo	Swc
kg tree <sup>-1</sup>							
2019	Control	36.9b	35.1	28.0	21.4	64.9b	56.5
	Ca	59.7a	36.6	26.3	18.0	86.0a	54.6
	Mg	58.8ab	36.6	27.0	18.9	85.9a	55.6
	Ca + Mg	63.0a	36.6	32.6	20.5	95.6a	57.1
	Significance	*	NS	NS	NS	**	NS

- **Significant increase in fruit yield and total fruit for trees on Cleopatra rootstock with application of Ca, Mg and Ca+Mg in third year**



# Foliar Nutrient Rates

- Study rates were based on current IFAS recommendations below
- With 1X= IFAS recommendation

Table 8.4. Recommended methods, timing, and rates for micronutrient application to citrus groves.

		Mn	Zn	Cu	B
Method	Foliar	Yes	Yes	Yes	Yes
	Soil	Yes <sup>1</sup>	No	Yes	Yes
Timing	Foliar	When spring flush leaves reach full expansion			
	Soil	Anytime as needed			
Rates	lbs metallic equivalent/acre				
	Foliar	3 to 5	5	3 to 5	¼
	Soil	7 to 10	---	5	1

# Effect Mn and Zn Rate on Leaf Area

	Leaf area index								
	2019			2020			2021		
Micro <sup>z</sup>	168	224	280	168	224	280	168	224	280
0x	3.1 <sup>y</sup>	3.9 a	3.5 ab	3.7	3.7 b	3.2 c	3.0	3.1 a	3.3 a
1x	4.0	4.1 a	3.7 ab	4.4	4.5 a	4.0 ab	3.0	3.0 ab	3.3 ab
2x	4.0	4.0 a	4.1 a	4.1	4.2 a	4.0 a	3.2	3.0 ab	3.1 ab
3x	2.6	2.3 b	2.9 b	3.6	3.4 b	3.4 c	3.0	2.7 b	2.3 b
p-value	0.374	0.0001	0.0101	0.228	0.0082	0.0086	0.1276	0.0361	0.0211

Increased leaf density during first two years of foliar and foliar + 1 x ground application



# Effect of Mn and Zn Rate on Canopy Volume

	Canopy volume (m <sup>3</sup> )								
	2019			2020			2021		
<b>Micro<sup>z</sup></b>	168	224	280	168	224	280	168	224	280
<b>0x</b>	18.2 <sup>y</sup>	19.9	18.2 b	22.0	22.4	20.4 b	20.3	21.1	19.7 b
<b>1x</b>	21.4	21.7	17.5 b	24.3	21.5	21.5 b	24.9	23.5	20.1 b
<b>2x</b>	22.5	20.6	24.9 a	24.5	22.8	26.2 a	24.7	21.5	25.9 a
<b>3x</b>	17.9	21.1	19.7 b	22.5	25.9	21.2 b	24.9	24.3	19.5 b
<b>p-value</b>	0.199	0.905	<.0001	0.887	0.602	0.0064	0.703	0.384	0.0008

Increased tree volume with foliar + 1x ground application

# Changes to Current IFAS Recommendations

---

## Approved Ca and Mg changes

- Currently, IFAS has no set recommendations for Ca or Mg other than pH maintenance
- Recommendations should be set at 40 lb ac<sup>-1</sup> yr<sup>-1</sup> for HLB affected trees.

## Approved Micronutrient changes

- Increase foliar Mn and Zn from 3-5 lb/ac/yr to 15 lb/ac/yr
- Increase soil Mn and Zn from 7-10 lb/ac/yr to 20 - 25 lb/ac/yr