UF/IFAS Nutrient Management Renaissance

Tom Obreza
Soil, Water, and Ecosystem Sciences Dept.
Univ. of Florida/IFAS

2024 Citrus Growers’ Institute
Topics

- Overview of statewide nutrient management project.
- Review slow and controlled release fertilizer work with citrus.
Renaissance

A revival or rebirth, especially of culture and learning.
Why now?

1. Producer concerns to IFAS.
2. Update the research base:
   • Commercial production practices.
   • Modern crop varieties.
   • Site-specific recommendations.
3. Recommendations becoming regulations???
   (SB 712)
4. Common support from producers, legislators, and IFAS leadership.
Nutrient management funding

• Legislative allocations to UF/IFAS:
  2021: $1.6 million
  2022: $8.76 million
  2023: $6.2 million
  2024: $4 million

• Goal: New generation of IFAS recommendations
Legislative intent

• HB 5001
  • Fertilizer rates: tomato, potato, citrus, corn, snap beans… plus “any other crop.”
  • Normal and economical crop production.
  • Maximize crop yield and quality.
  • Minimize nutrient inefficiencies.

• SB 1000
  • Develop recommendations for site-specific nutrient management.
68 UF/IFAS Faculty
Gainesville campus – 23
RECs – 25
County Agents – 20
Plans of work

• Focus on N, P, and fertilizer 4Rs “plus one”
  • Rates
  • Sources
  • Timing
  • Placement
  • Water

• Advanced concepts
  • Soil testing, site-specific recs, artificial intelligence
A few observations

• Grain corn yield increase above max. IFAS N rate.
• Vegetable response to P fertilizer where soil test P is “high.”
• Row distance from ditch affected fertilizer response.
• Banding = better fertilizer efficiency.
• CRF + proper irrigation = greater watermelon yield, less N/K leaching, lower N rates.
November 1, 2022 (70 days after planting – first harvest)

$P_2O_5$ application rate

0 lb/acre  |  50 lb/acre  |  100 lb/acre  |  150 lb/acre  |  200 lb/acre
Watermelon at 150 lbs N/acre

- All CRF: 683 cwt/acre
- Soluble dry + liquid: 724 cwt/acre
- All liquid: 739 cwt/acre
- CRF + liquid: 725 cwt/acre
Slow and Controlled-Release Fertilizers for Citrus
CRF/SRF has come a long way

<table>
<thead>
<tr>
<th>Era</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1960s</td>
<td>Manure and other “natural” materials</td>
</tr>
<tr>
<td>1960s</td>
<td>Sulfur-coated urea (SCU)</td>
</tr>
<tr>
<td></td>
<td>Urea formaldehyde (UF)</td>
</tr>
<tr>
<td>1970s</td>
<td>Isobutylidene diurea (IBDU)</td>
</tr>
<tr>
<td></td>
<td>Methylene urea (MU)</td>
</tr>
<tr>
<td>1980s</td>
<td>Plastic-coated urea (PCU)</td>
</tr>
<tr>
<td>1990s</td>
<td>Polymer-coated, S-coated urea (PCSCU)</td>
</tr>
<tr>
<td></td>
<td>Resin-coated N-P-K</td>
</tr>
<tr>
<td>2000s</td>
<td>Polymer-coating technologies</td>
</tr>
<tr>
<td>Interests</td>
<td>Concerns</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>------------------------------------</td>
</tr>
<tr>
<td>Lower application frequency</td>
<td>Will it work?</td>
</tr>
<tr>
<td>New plantings and resetting</td>
<td>Correct release pattern?</td>
</tr>
<tr>
<td>Increased nutrient use efficiency</td>
<td>Can I trust it?</td>
</tr>
<tr>
<td>Less leaching</td>
<td>Can I afford it?</td>
</tr>
<tr>
<td>Alternative to fertigation</td>
<td></td>
</tr>
</tbody>
</table>
Progression of SRF/CRF use on citrus since 1980s

• Young-tree fertilizers: Water-soluble N + IBDU or MU.
• Bearing tree fertilizers: Blend in SCU to extend N availability.
• New plantings: Put coated CRF in planting hole.
• Some dabbling with CRF applied to mature groves.
• Advent of HLB. Continuous supply of nutrition from CRF?
Soluble/SRF mixtures, Hamlin/Carrizo
No. of applications in 7 years

Amm Nit 31
AN/IBDU 16
AN/MU 14
Conventional vs. coated, new grove
No. of applications in 6 years:

- Conventional: CR = 76%
- Escote: CR = 94%
- Meister: CR = 100%
- Sierra: CR = 84%
- Nutricote: CR = 100%
- Prokote: CR = 100%
Conventional vs. coated, bearing grove
No. of applications in 6 years

WSN  18
Resin coated  6
Poly S coated  6
Resin/PS mix  6
Do we have evidence to answer citrus grower questions?

- Increased N fertilizer efficiency? **Yes.**
- Fewer applications per year? **Yes.**
- Environmental advantage? **Yes.**
- Worked in the real world? **Yes.**
- Release pattern matched citrus need? **Yes.**
- One application per year worked? **Yes.**
- Can I afford it? ????
Citrus nutrition recommendations – Last 60 yrs

1964
Reitz
Leonard
Stewart
Koo
Calvert
Anderson
Smith
Rasmussen

1984
Koo
Anderson
Stewart
Tucker
Calvert
Wutscher

1995
Tucker
Alva
Jackson
Wheaton

2008
Obreza
Morgan

2020-current
Morgan
Kadyampakeni
Thank you!