Managing fruit yield and quality of ‘Valencia’, ‘SugarBelle’ and ‘Tango’ with PGRs

Fernando Alferez
UF-IFAS SWFREC
alferez@ufl.edu

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Environment, cultural factors, varietal background, manipulation, and quality

- Temperature
- Relative Humidity
- Irrigation/nutrition
- Soil characteristics
- Rootstock and scion selection
- Endogenous factors (hormones)
- Fruit maturity at harvest
- Postharvest manipulation

INTERACTION

FRUIT QUALITY
HORMONAL INTERPLAY DURING CITRUS FRUIT MATURATION

GIBBERELLINS → ABA → ETHYLENE PERCEPTION → ETHYLENE PRODUCTION → FRUIT MATURATION → SENESCENCE ABSCISSION

Gibberellins – ABA – Ethylene
Citrus fruit maturation

HBRs?

Alferez and Zacarias, 1999.
Hormonal studies on ‘Tango’ mandarins
Tango mandarins. On-tree treatments performed on 11/16/2018

PGR grove application

Shelf-life starts

Days after treatment

Color (a/b)

a/b=-0.25

Water

ABA

HBr

GA3
Postharvest Time Course

- 6d Cold storage
- 48h Ethylene at 84F
- 48h after ethylene effect (shelf-life conditions)

- Degreening room

- PGR treatment

- Graduate student Daniel Boakie
- Special thanks to Prof. Mark Ritenour
"Priming" effect of ABA application on color development

PGR (ABA) treatment

6d cold storage

PGR (ABA) Treatment at (a/b=-0.4)

6d cold storage

48h ethylene
Shelf-life

Water
ABA
Studies on ‘SugarBelle’
peel maturation
No effect of ABA application on color development (endogenous ABA content is already high)
Studies of HBr effects on ‘Valencia’ fruit maturation

Can HBr cure HLB-affected trees?
Our approach

• Experiments started in January 2018.
• ‘Valencia’ mature trees (6 year-old trees) on Swingle.
• 45 trees, 5 reps of 3 trees each.
• Biweekly application of two concentrations of Brassinosteroid
# Fruit Yield

(totals per 15 trees)

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Total fruit weight (Kg)</th>
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<tbody>
<tr>
<td>water</td>
<td>86.95Kg</td>
</tr>
<tr>
<td>HBr 0.084M</td>
<td>95.3Kg</td>
</tr>
<tr>
<td>HBr 0.5M</td>
<td>110Kg</td>
</tr>
</tbody>
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Year 1
May 31, 2018*

Year 2
March 27, 2019

*Irma effect?
Advancing harvesting may have a great impact in yield
Fruit drop was significantly reduced after 2 years.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>% Fruit drop</th>
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<tbody>
<tr>
<td>Water</td>
<td>30</td>
</tr>
<tr>
<td>HBr 0.1mM</td>
<td>*</td>
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<tr>
<td>HBr 1 mM</td>
<td>*</td>
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</tbody>
</table>
Internal fruit quality in ‘Valencia’ oranges

Adapted from Searcy, Roka and Spreen, 2007
Conclusions

• Application of ABA seems to prime Tango peel to achieve better coloration. There is a time-window (-0.25 to -0.4 a/b) for this effect.
• ‘SugarBelle’ fruit did not respond to ABA application.
• HBr application increased ‘Valencia’ yield in two consecutive seasons.
• HBr advanced internal maturation in ‘Valencia’ fruit.

• The use of HBr for advancing ‘Valencia’ maturation has the potential of avoiding fruit drop and advance harvesting before March. This merits further investigation.