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Pre- and Postharvest Quality Problems Associated with Greening in Sweet Orange Fruits

How to take care of the soft, green/pale colored, and decay susceptible fruits

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Decay and pre-harvest fruit drop

1. Increased pre-harvest fruit decay (Stem-end rot as an example)



2. Increased postharvest stem-end rot - degreening with ethylene exacerbates decay

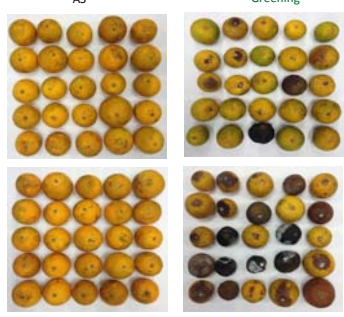
At harvest

AS Greening

Non-ethylene

Ethylene treated

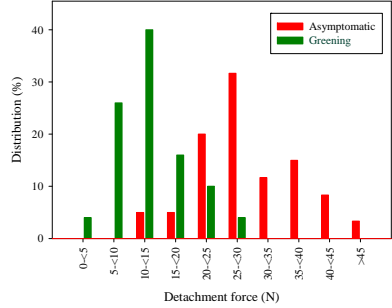
14 days after ethylene treatment at room temperature



3. Distribution of fruit detachment force

- GREENING fruit have loose connection with stems

11/18/2013 Hamlin




Distribution (%)

Detachment force (N)

Legend: Asymptomatic (red), Greening (green)

Hamlin
 11/18/2013
 12/02/2013
 12/16/2013
 01/04/2014

Valencia
 Four harvests from February 2014

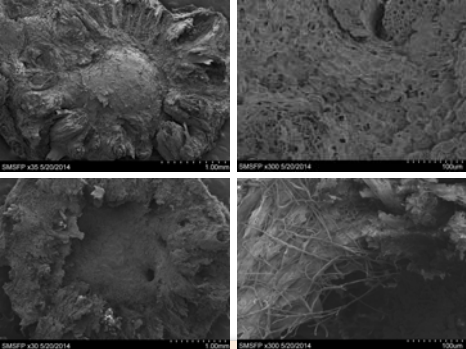
 Pull force gauge for detachment force measurement

4. Evidence that *Diplodia* entered the calyx area before harvest which cause postharvest stem-end rot and may exacerbate pre-harvest fruit drop

Scanning electron microscope


Diplodia negative
 In AS and some greening fruits

Diplodia positive
 In many greening fruits



5. More decay related microorganisms in GREENING orange peel

Peel frit (OJ byproducts) were stored at 40°F for 3 months. Then cold press was applied to collect peel oil.



Frit from greening fruit turned to sludge without separation or separated to sludge and clear liquid.

Frit from AS fruit turned to separated to three layers - bottom fiber layer, middle clear liquid layer and top plug containing peel oil.

Decay and pre-harvest fruit drop

Challenges of postharvest decay carried by GREENING fruits

Our efforts:

Spray fungicides (Strobilurin) to control Diplodia at different growth stages:

From petal fall to pre-harvest for multiple applications
Using Mash grapefruit, Midsweet orange, Earlygold orange, Navel orange and Murcott

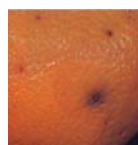
* Copper may not work on this disease (Diplodia)



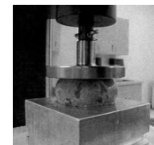
Physio-mechanical properties

Physical properties of GREENING fruits

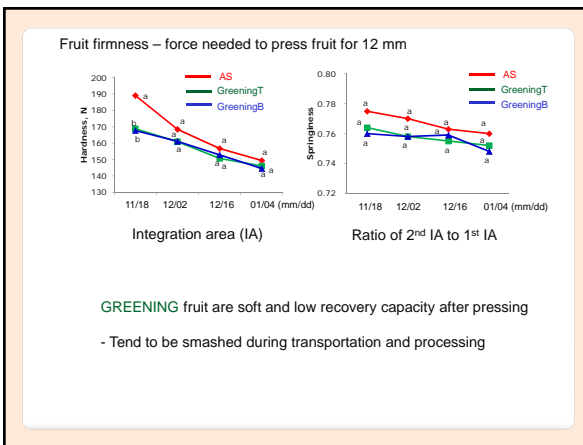
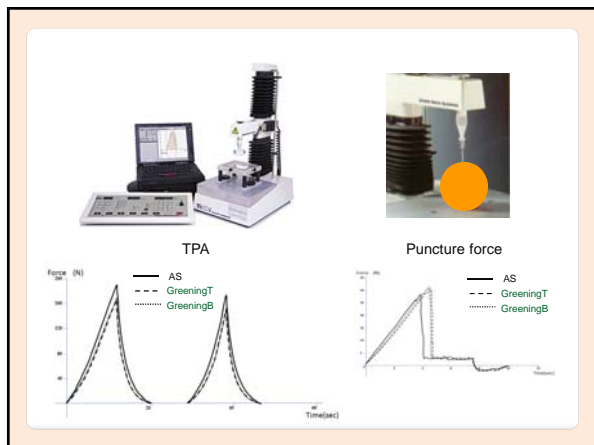
- > Puncture force
- > Pressure force – Texture Profile Analysis (TPA)



Puncture caused pre-harvest and postharvest loss

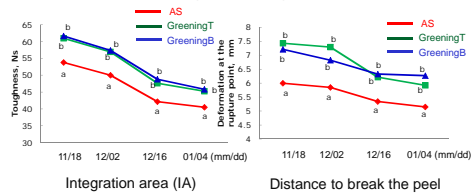


Burst test



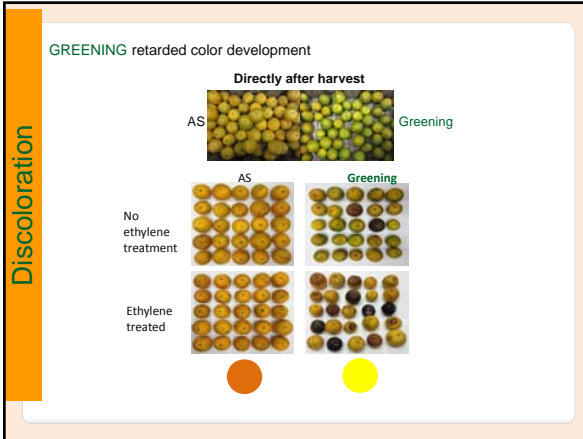
Physio-mechanical properties



Puncture force – force needed to puncture the peel



GREENING fruit have higher resistance to against puncture (good!)


- Peels of **greening** fruit are tougher because of the stress, but fruit are softer and lower recovery capacity once pressed, indicating segment development was retarded .





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Take home message

1. Enhance your postharvest fungicide application
2. Reconsider/re-evaluate your degreening program



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Thank you

