

Gitrus Production Glenn C. Wright University of Arizona Plant Growth Regulators Old and New Uses for Citrus"

Credit to Lance W. Beem, Charles Coggins, and Ed Stover

Plant Hormone Classes

- Auxins
- Cytokinins
- Ethylene
- Gibberellins
- Abscisic Acid (ABA)

Multiple effects of Plant Hormones

- Apxins: Primary regulator-Promote growth through cell enlargement, cause apical dominance, rooting promotion, fruit thinning, fruit drop prevention
- Gibberellins: Promote growth through cell enlargement, cause fruit set, flower induction, flower reduction (thinning), break of dormancy, increase seed germination, delay of senescence, modify sex expression
- Cytokinins: Promote growth through cell division, counteract apical dominance, branching agent, delay of senescence, cause fruit abscission
- Ethylene: Ripening agent causes leaf & fruit abscission, promotes radical growth
- Abscisic Acid: Promotes leaf & fruit abscission, regulates dormancy in perennials, controls hydric status through stomata opening control

Examples of PGR'S (Mimic and/or Stimulate) Plant Hormones

Auxins: IAA, IBA, 2,4-D, NAA, Carbryl, etc.

- Gibberellins: GA₁, GA₃, GA_{4/7}, etc.
- Cytokinins: 6BA, CPPU, Zeatin, etc.
- Ethylene: Ethylene Gas, Ethephon,
- Abscisic Acid: ABA

Plant Growth Regulators Commonly used in AZ

Citrus

- Preharvest PGR's of highest importance: • Auxins = 2,4-D & (NAA) for fruit thinning and
- sizing in mandarins

 Gibberellic Acid = GA₃ for delayed aging of navel
- orange fruit.
- Postharvest PGR's of highest importance
 - Auxins = 2,4-D for "Button" retention in Lemons
 - Ethylene = Ethylene Gas "Sweating the Fruit"
 - Gibberellic Acid = GA_3 for delay fruit senescence.





Lemons differ from other citrus in that they may be subjected to lengthy packinghouse storage.

The Postharvest application of **isopropyl ester of 2,4-D** can be applied as a final step in the washing or waxing procedure just prior to the storage period.

This treatment will slightly delay the loss of chlorophyll.

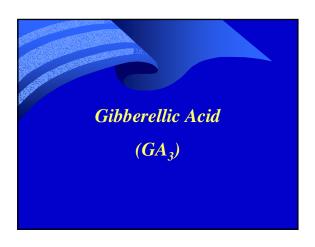
However, the major benefit is the resulting increase vigor and persistence of the "button" retards the entry of Alternaria fungi = Alternaria Rot



•Spray when temperatures are less than 95F

+http://www.amvacchemical.com/Images_two/PDF_Files/Label_MSDS/ksaltFF200.pdf (Auxin) Plant Growth Regulator Pre-harvest Mandarins Fruit size increase Not yet registered for mandarins VALENCIA and NAVEL ORANGES* 23 g a.e./a in water spray ...or... 3/16-1/4 inch (5-6 mm) 30 g a.e./a in water spray ...or... 1/2-5/8 inch (16-13 mm) 38 g a.e./a in water spray ...or.... 5/8-3/4 inch (16-19 mm) 45 g a.e./a in water spray ...or.....5/8-3/4 inch (16-19 mm) Fruit-sizing sprays require excellent coverage. May cause an increased

Fruit-sizing sprays require excellent coverage. May cause an increased roughness of the rind. For Valencia oranges, also controls mature fruit drop and may slightly delay granulation in new crop. For navel oranges, may decrease fruit splitting.





(GA3) Plant Growth Regulator Special Local Needs Use Bloom Period

Clementine Mandarins

Gibberellic Acid (GA₃) spray at full bloom to increase set of fruit.

Bloom applications of **GA**₃ has been a standard in Florida, Spain and South Africa for fruit set and is a very effective tool for **Clementine Mandarins**.

Currently registered in California under a Special Local Needs use (SLN).



Gibberellic Acid (GA₃) applied in storage wax to lemons, the result is delayed senescence, which maintains natural resistance to "Sour Rot" (*Geotrichum candidum*) and otherwise provides for a longer storage life.

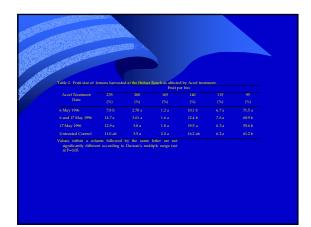
There can be some undesirable post-harvest delay in coloring of regreened Valencia oranges, but other delays in coloring of citrus fruits are considered to be beneficial.

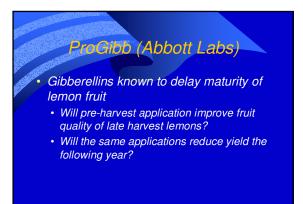
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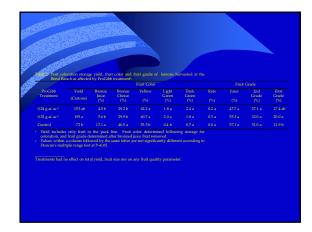
- Commonly used to thin apples
- May also reduce fruit abscission in citrus
 - Promoting cell division and enlargement
- Application rate of 30 g ai in 100-150 gallons of water per acre.

Table 1 Yield and pac date.	wout of 'Lisbon' lemons harvested at the Heiner Ranch as affected by Accel treatm Fruit Grade					
Accel Treatment Date	Yield per tree	Culls	Second Grade	First Grade		
	(lbs)					
6 May 1996	381 a	29 a		45 a		
6 and 17 May 1996	366 ab					
17 May 1996						
Untreated Control	284 b					
 Values within a columnia significantly differences and the state of th	ent according to Dur					

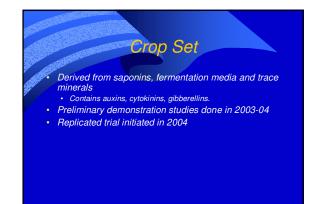


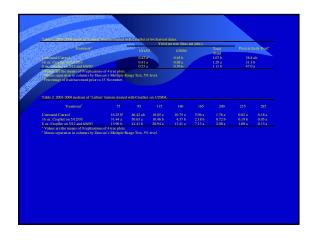


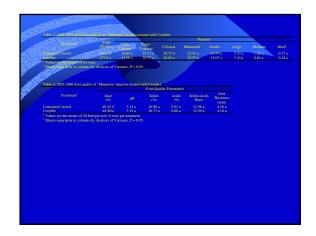
	able 1. Prograde fruit color determination of lemons harvested at the Bond Ranch as affected by PioCabb treatment.						
ProGibb Treatment	Bronze Yellow Light Green Dark Green						
	(%)	(%)	(%)	(%)			
0.24 g ai-ac-1							
0.32 g ai-ac-1							
Control				6.30 b			
significantly differ test at P=0.05.	ent according to Dunca	n's multiple range					











New Potential Uses for Plant Growth Regulators in CA Citrus Gibberillic Acid

Tangelos and **tangerines

There is a registration for GA₃ for increasing fruit set and yield on tangelos and tangerines resulting from beneficial results obtained in Florida and around the world.

Currently not registered for use in California

****SLN exception for Clementine Mandarin=tangerine**