

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

- Auxins: 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

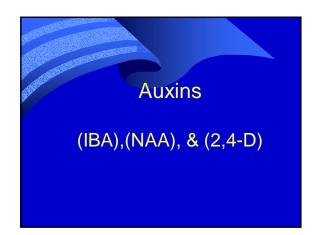
## Examples of PGR'S (Mimic and/or Stimulate) Plant Hormones

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

- Gibberellins: GA<sub>1</sub>, GA<sub>3</sub>, GA<sub>4/7</sub>, 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 = GA<sub>3</sub> 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<sub>3</sub> for delay fruit senescence.





#### Retention of Stem End-Calyx Attachment on

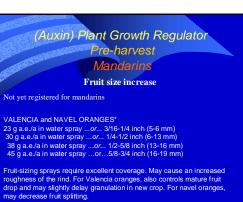
Lemons differ from other citrus in that they may be subjected to lengthy packinghouse storage.

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.

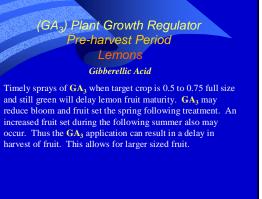
This treatment will slightly delay the loss of chlorophyll.

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

# (Auxin) Plant Growth Regulator Pie-harvest Mandarins Enhancement of early fruit drop on NAA is thought to enhance early fruit drop by increasing competition between fruitlets and increasing production of abscission-inducing ethylene, both encouraging greater physiological-drop (Usually in May). Only groves which are expected to have excessively large numbers of fruit per tree should be thinned with NAA. Alternate bearing cultivars such as 'Kinnow' in the "on" (high crop) year are obvious candidates, but other cultivars also may be profitably thinned. Perhaps 'Minneola'? •Apply 100 to 500 ppm •Spray when temperatures are less than 95F •http://www.anwac-chemical.com/lmages\_two/PDF\_Files/Label\_MSDS/ksaltFF200.pdf



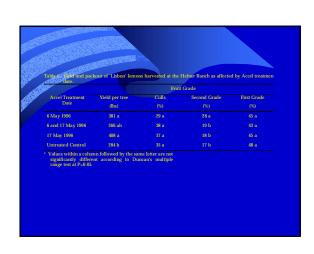


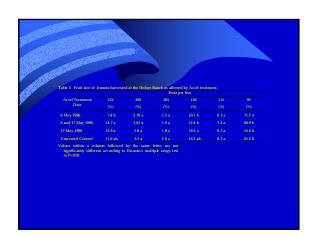


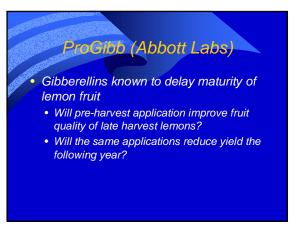


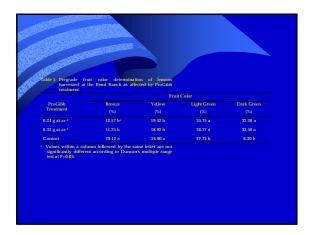


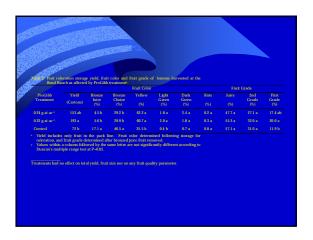




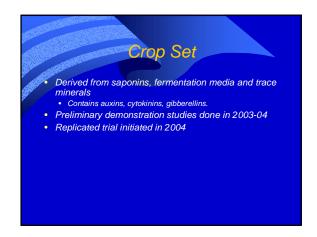


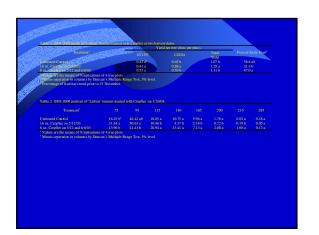


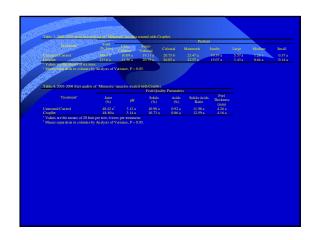












Mew Potendal Uses for Plant Growth Regulators in CA Citrus Gibberillic Acid

Tangelos and \*\*tangerines

There is a registration for  $GA_3$  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 Californi

\*\*SLN exception for Clementine Mandarin=tangerin