

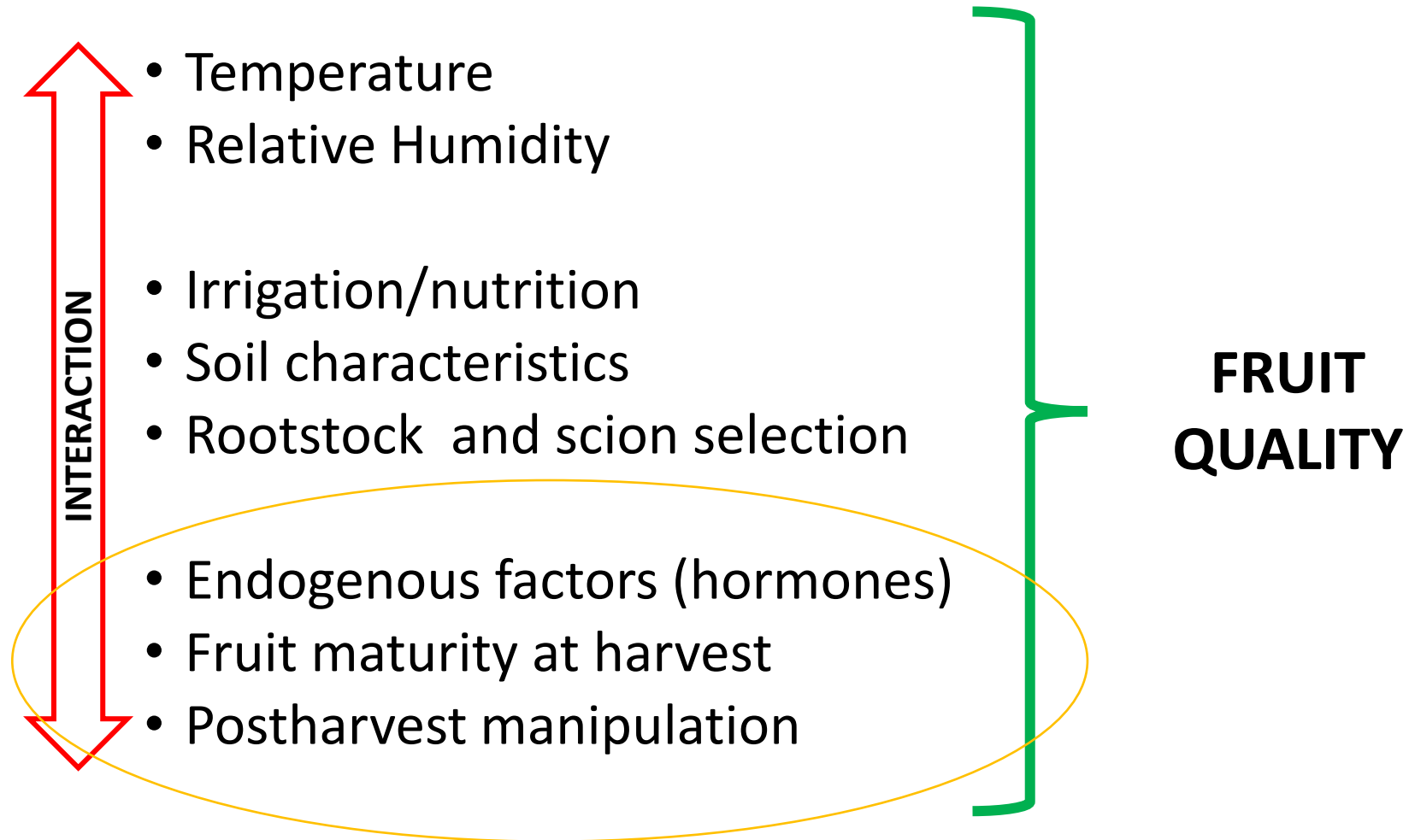
Exploring the use of brassinosteroids to advance maturation in citrus fruit

Fernando Alferez

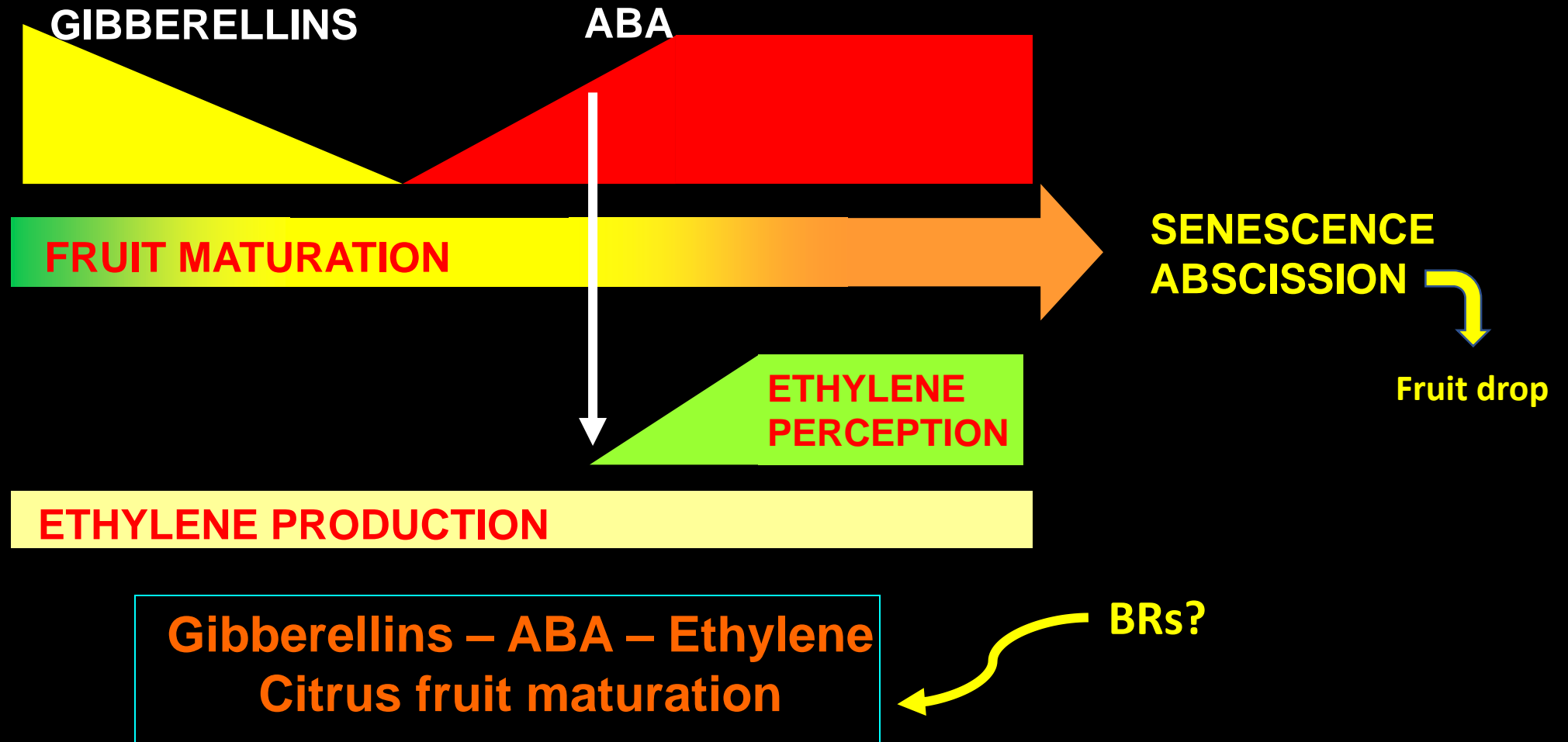
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2022 Packinghouse Day

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

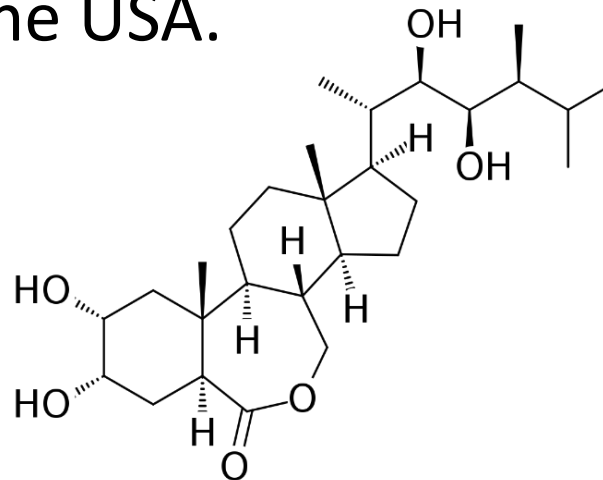


HORMONAL INTERPLAY DURING CITRUS FRUIT MATURATION

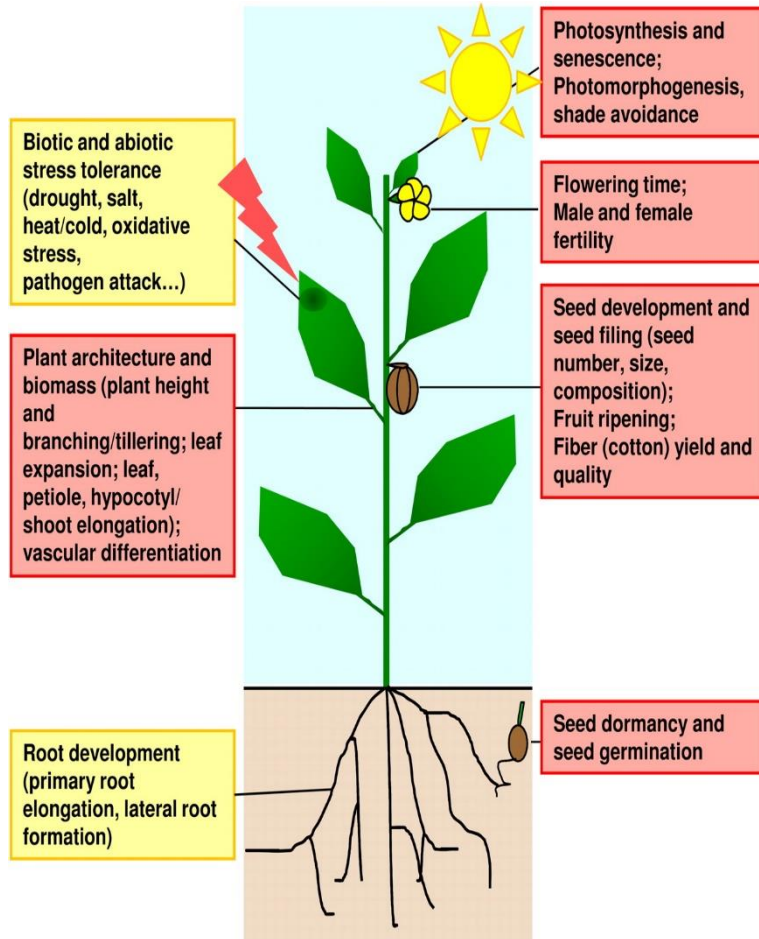


Brassinolides

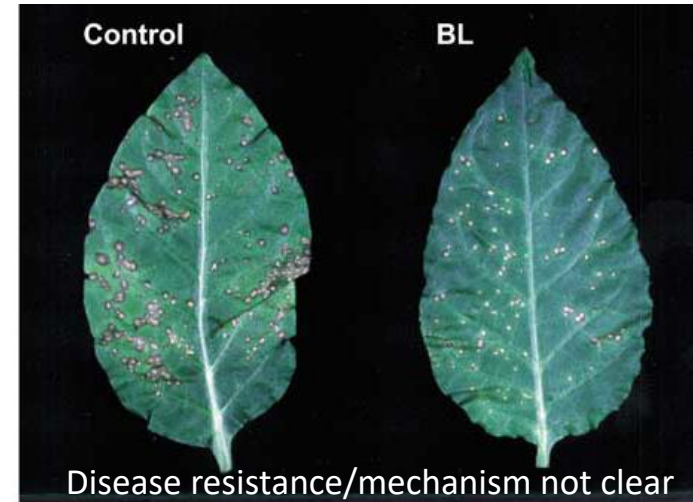
- Brassinolides (BRs) are a class of growth-promoting steroidal phytohormones.
- BRs control almost all aspects of plant growth and development, and also play significant role in plant adaptation to biotic and abiotic stresses.
- BR analogs (Epi and Homobrassinolide, HBr) are easy to produce and commercially available. Both are now available in the USA.



Effects on other crops

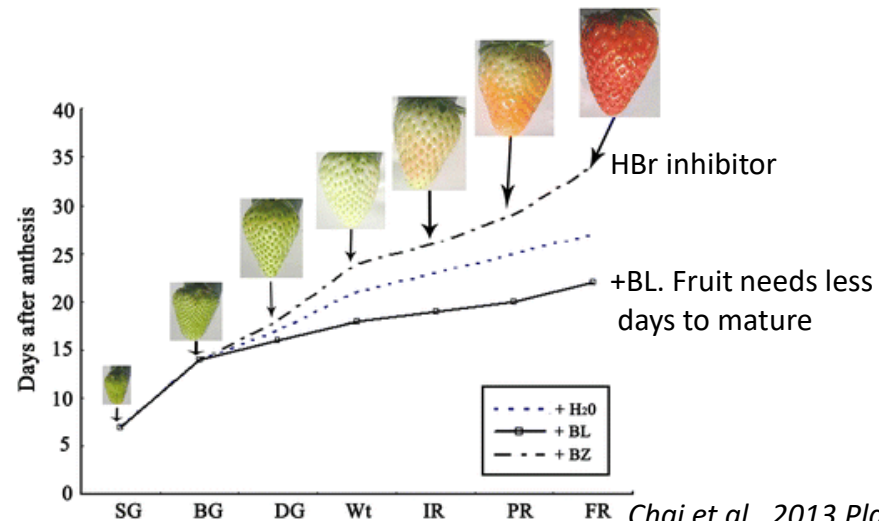


Vriet et al., 2012 Plant Cell



Nakashita et al., 2003 Plant Journal

Advances maturation in strawberry



Chai et al., 2013 Plant Growth Reg.

Mature trees



On-tree treatments

Postharvest treatment

Control



$a/b = -0.4$

HBr



$a/b = 0.05$



$a/b = 0.18$
HBr

$a/b = -0.25$

$a/b = -0.25$
Control

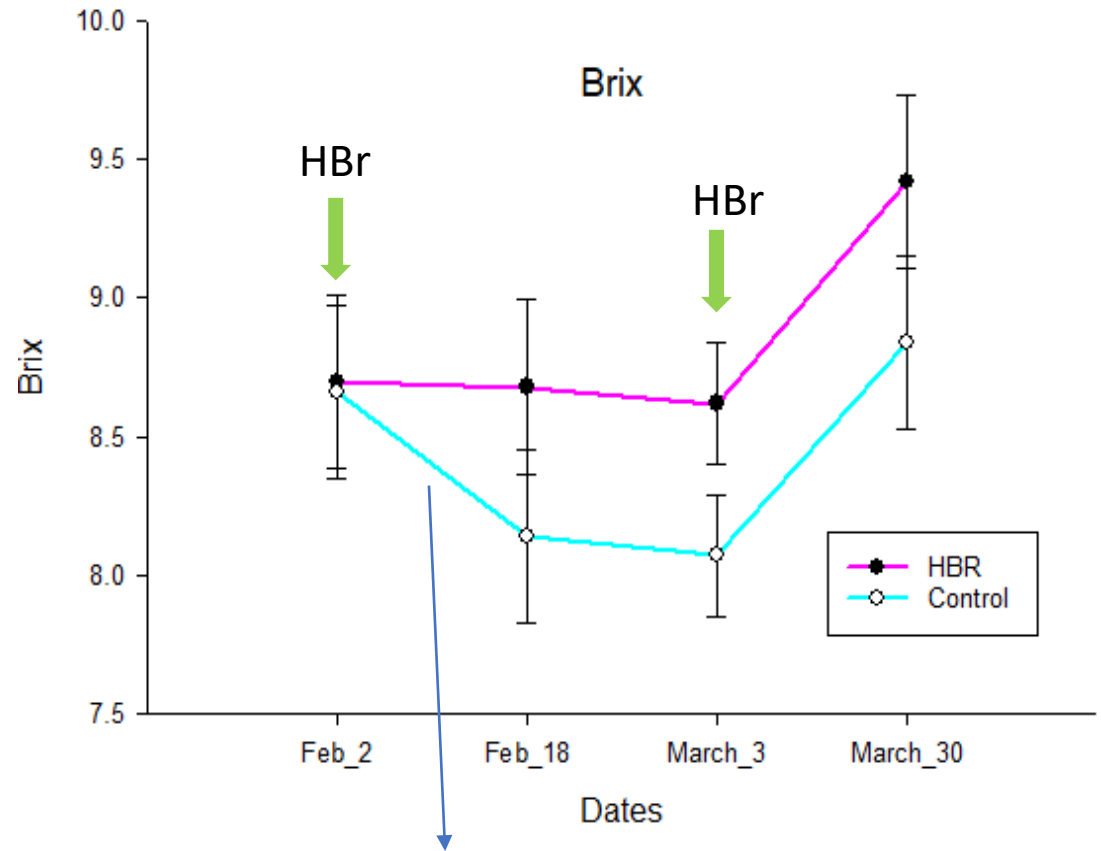
$a/b = 0.1$



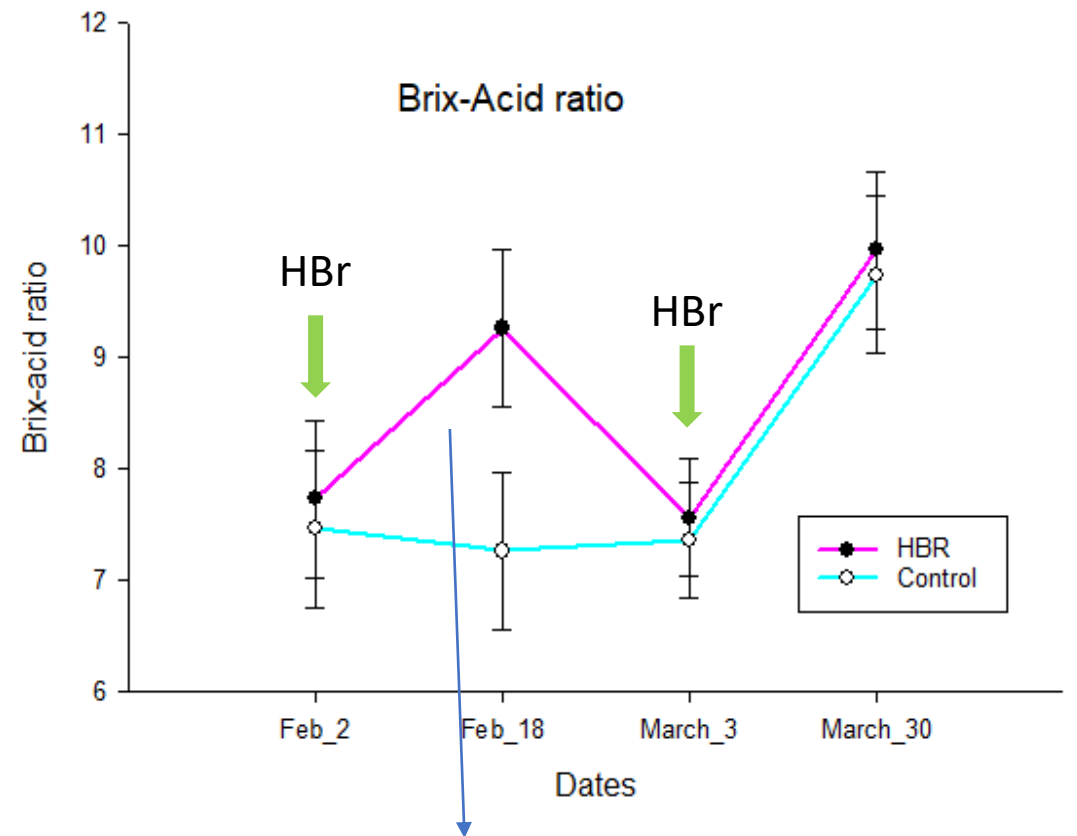
Postharvest Application of 24-Epibrassinolide Reduces Chilling Injury Symptoms and Enhances Bioactive Compounds Content and Antioxidant Activity of Blood Orange Fruit

Fariborz Habibi^{1,2}, María Serrano³, Lorenzo Zacarías⁴, Daniel Valero^{2} and Fabián Guillén²*

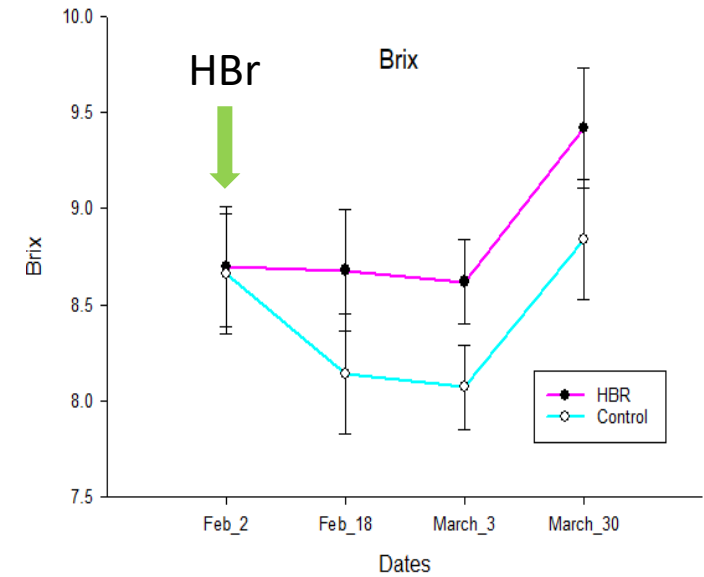
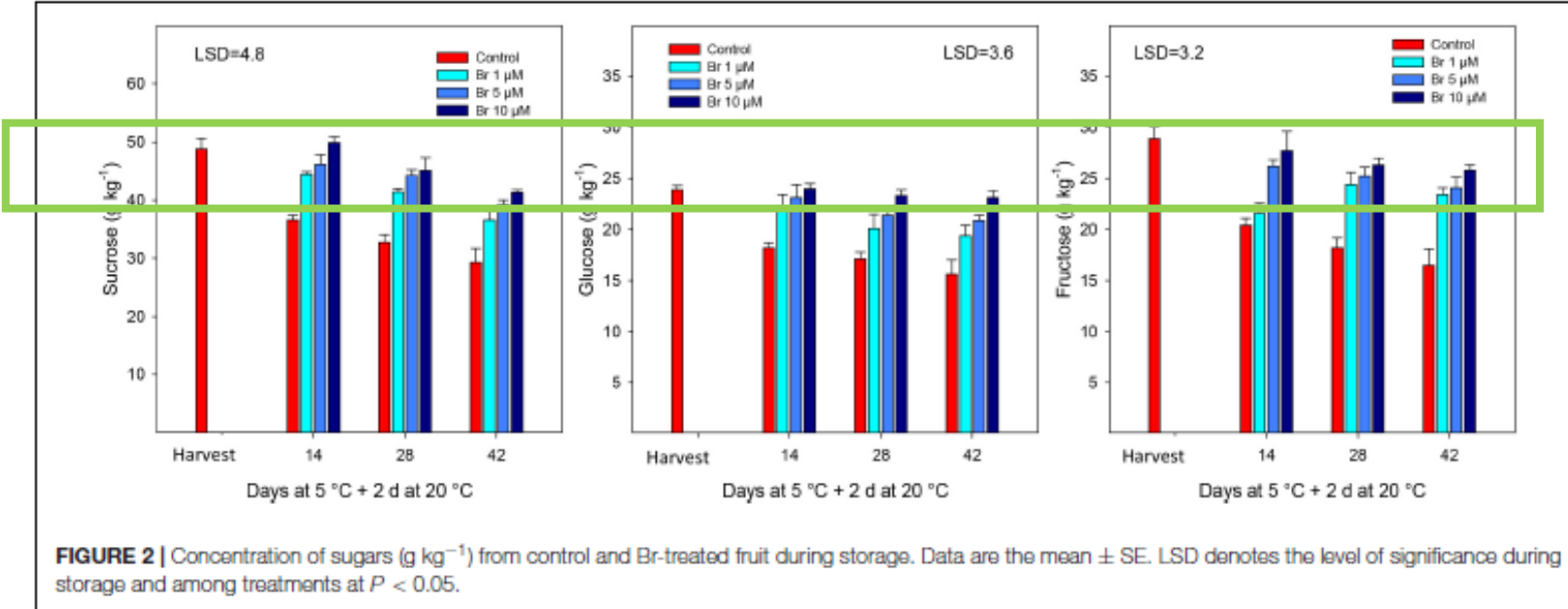
Internal quality was improved in Valencia fruit after just one HBr application @ 186mL/100 gallons of water



We believe that this decrease in sugars in the control is due to new flower/fruit set induction triggering competence for photoassimilates. HBr maintains levels of sugars.



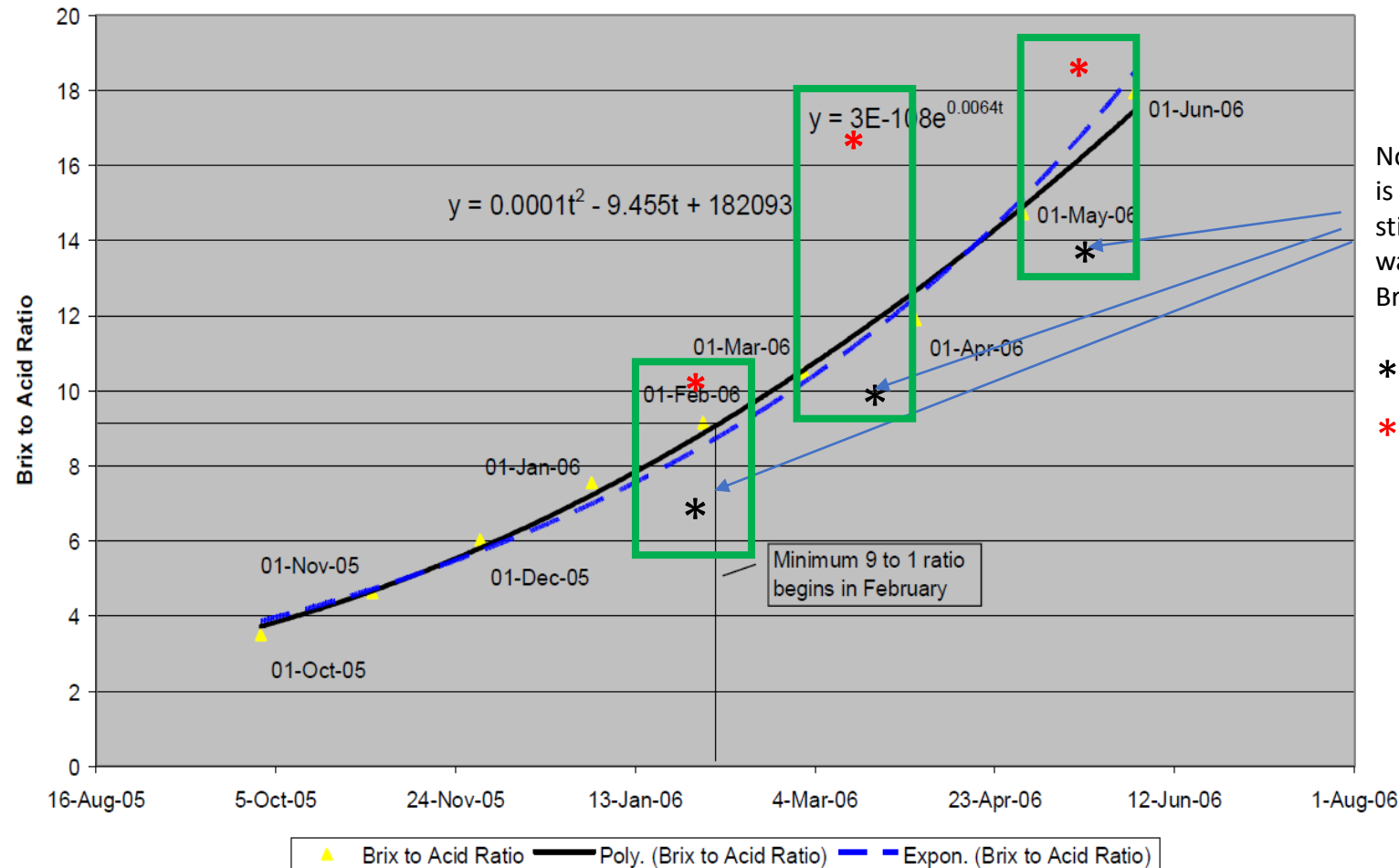
One single application increased the ratio to commercial levels by February. We need to try earlier apps because once the fruit starts natural maturation (late Feb/ early March) the effect is lost



Postharvest Application of 24-Epibrassinolide Reduces Chilling Injury Symptoms and Enhances Bioactive Compounds Content and Antioxidant Activity of Blood Orange Fruit

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Internal maturation in 'Valencia' oranges was advanced by Brs (applied every other week)



Notice how now normal maturation * is delayed and interestingly still parallel to what was normal 15 years ago Brs increase ratio

* Control
* HBr

Ongoing research, CRDF Project 22-003

- Determining the right time for:
 - **Hamlin.** Starting by mid-September, apply every other week at 6.2 fl oz/ 100 gallons of water. Check fruit quality 2 weeks later. This will be done until the end of the season.
 - **Valencia.** Same approach, starting in December.
- Analysis of internal and external quality. Also, yield assessment at harvest.
- Continue studies on **Tango mandarins** to determine the right time of application in open field and in CUPS. Starting applications in September.

Take home messages

- Brs may potentially advance fruit maturation in citrus
- We have identified a concentration of 6.2 fl oz/ 100 gallons of water as one that gives the most consistent results
- We still need to define the best timing of application for each variety and the number of applications
- Work is ongoing on Hamlin and Valencia oranges and Tango mandarins
- Postharvest applications may have potential, but this needs to be researched in earnest