



Endogenous, environmental, and
cultural factors influencing
postharvest quality in citrus.
Implications for new varieties.

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Citrus Packinghouse Day

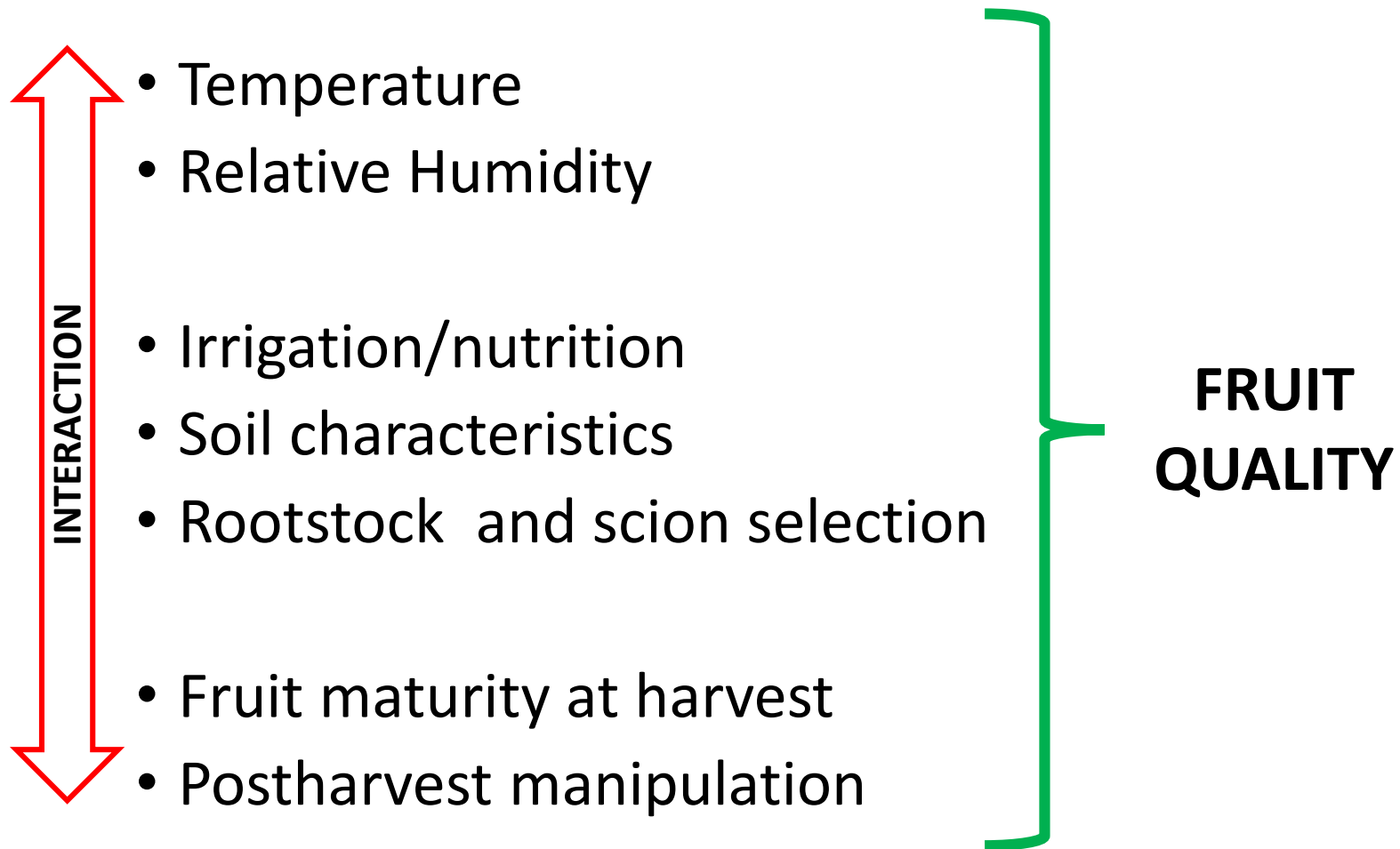
CREC, Lake Alfred

August 23, 2018

**Color and absence of
blemishes are the factors
that determine external
citrus fruit quality**



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



Preharvest environmental factors



Chilling injury
Valencia, Spain 2001



Peel pitting
Valencia, Spain 1996



Varietal differences in susceptibility to chilling injury

Citrus clementina

Loretina



Clemenules



Citrus clementina

Oronules



Fortune



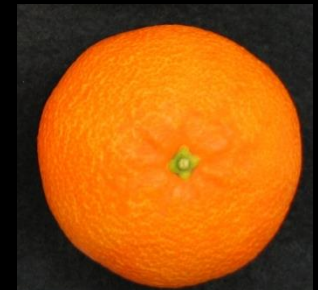
Nova



Ellendale



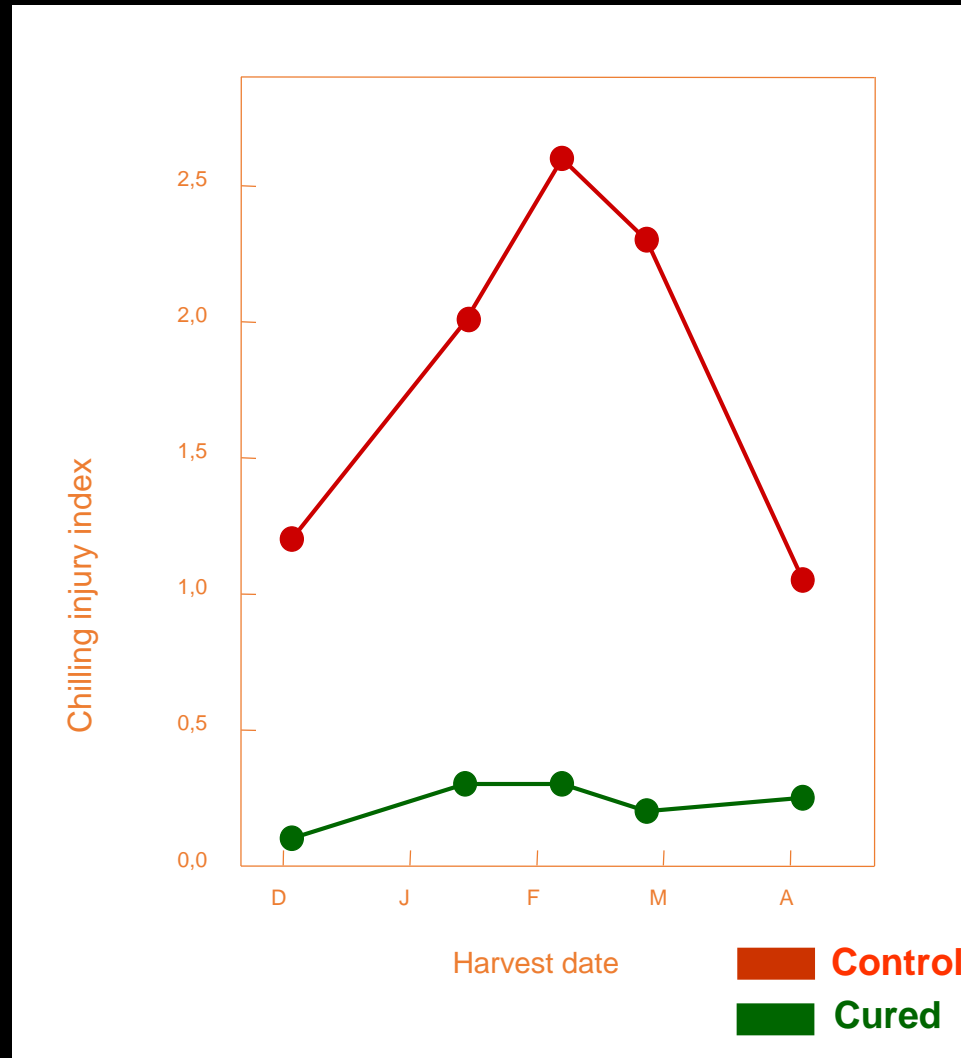
Ortanique



Citrus reticulata **Blanco**

Citrus reticulata **Blanco**

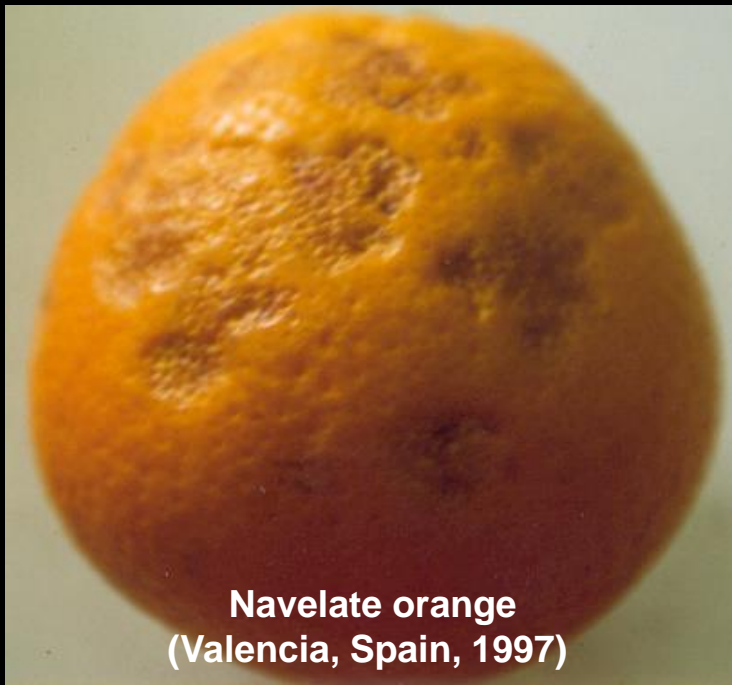
Fruit maturity influence development of chilling injury in Fortune mandarins grown in Spain





Non-chilling peel pitting
as a case study

Increasingly common
in all major Citrus growing areas
around the world



Navelate orange
(Valencia, Spain, 1997)



Fallglo tangerine
(Florida, USA, 2003)

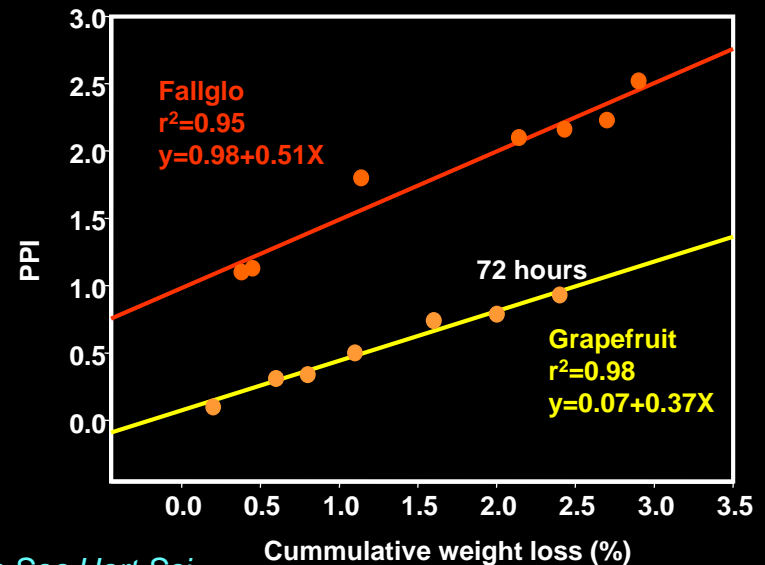
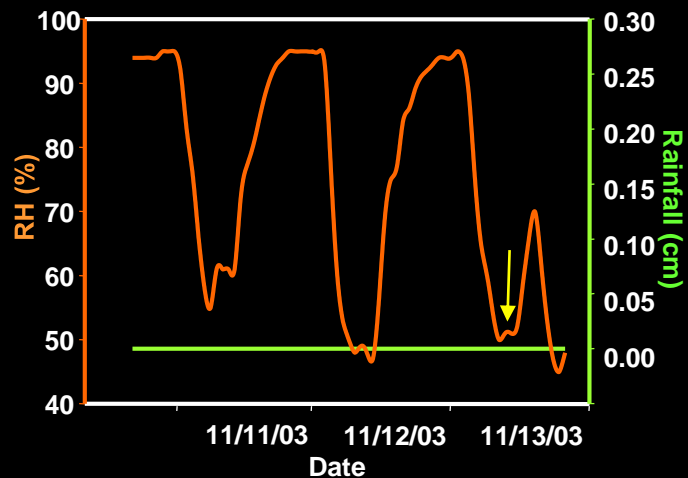
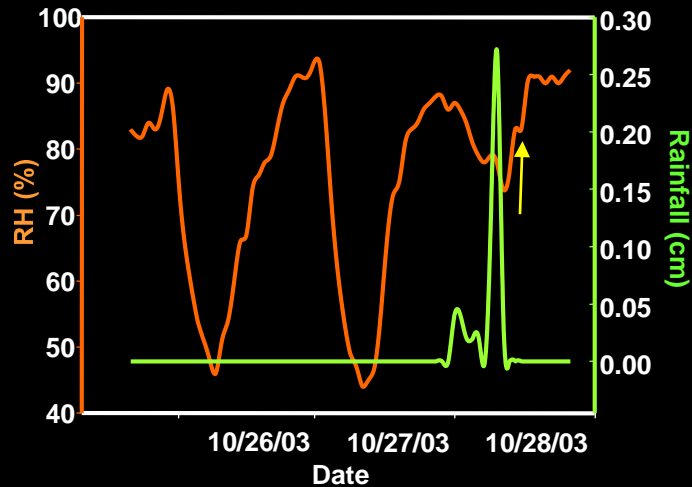


Marsh grapefruit
(Florida, USA, 2001)

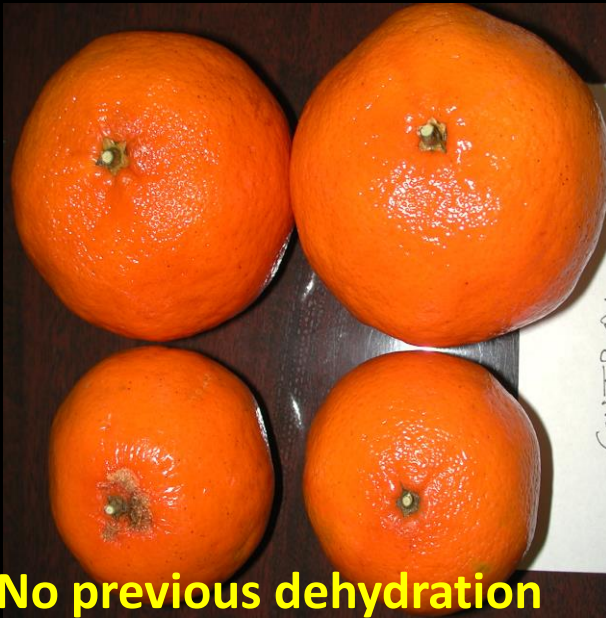


Valencia orange
(Limpopo, South Africa, 2013)

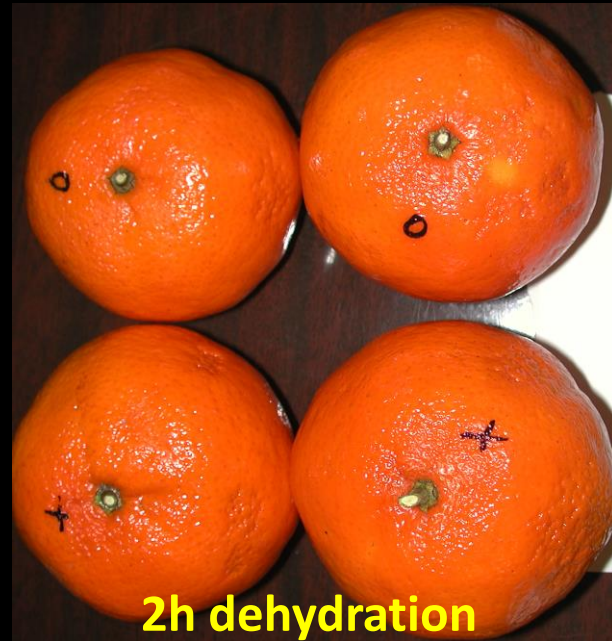
RH before harvest may determine susceptibility to peel pitting



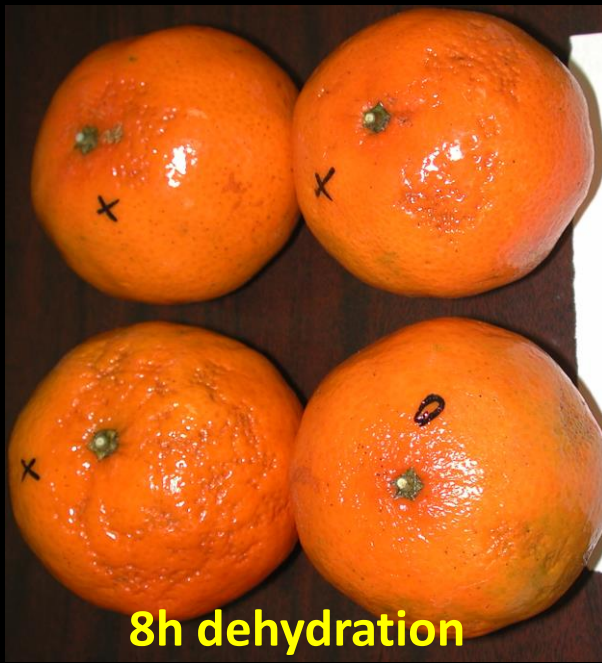
Fallglo tangerines



No previous dehydration



2h dehydration



8h dehydration



16h dehydration



Unwaxed

Waxed

Manually processed

The effect is more pronounced
in packingline-processed fruit

Waxing aggravates
the disorder

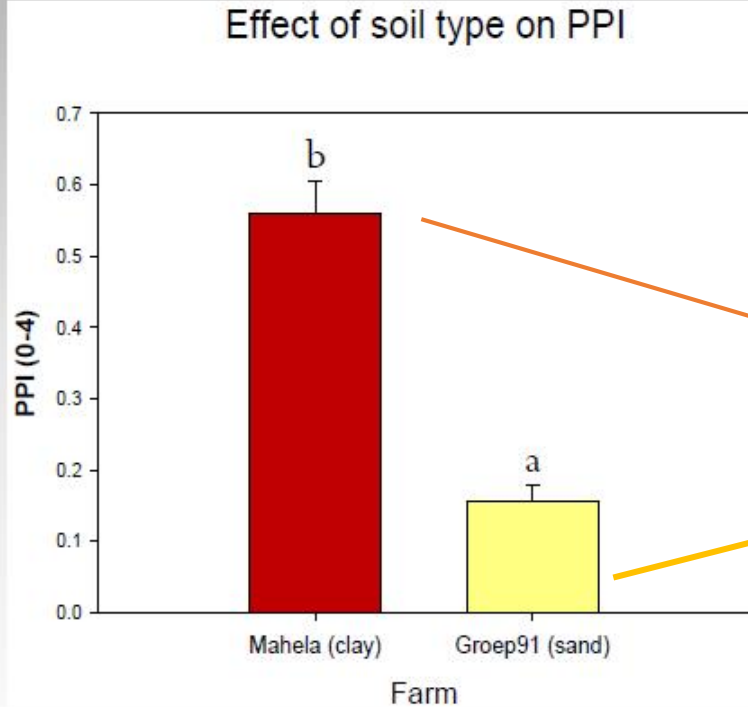


Unwaxed

Waxed

Packingline processed

Cultural factors: soil type



Two orchards with different soil types 5km apart.



p-value	<0.0001	LSD	0.1031
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Valencia sweet orange on Swingle rootstock
Limpopo, South Africa, 2015

Cultural factors: rootstock selection

Rootstock influences the incidence of peel breakdown in Navelate oranges both on the tree and during postharvest

On the tree (% of affected fruit)

Season	Carrizo	Cleopatra	Sour orange
1997/98	65.6	21.5	9.1
1998/99	63.3	47.8	24.1

During postharvest (% of affected fruit)

Storage condition	Carrizo	Cleopatra	Sour orange
12d @ 45% RH	36.4	4.2	20.5
12d @ 95% RH	14.6	2.8	8.1
7d @45%+5d @95%RH	49.2	6.9	27.2

more susceptible

less susceptible

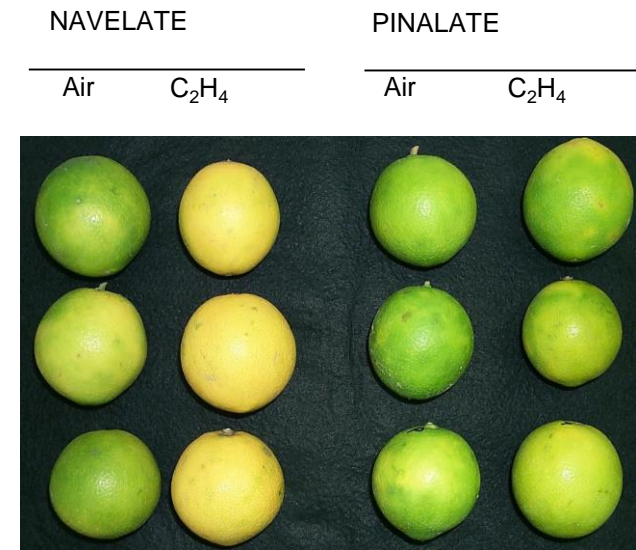
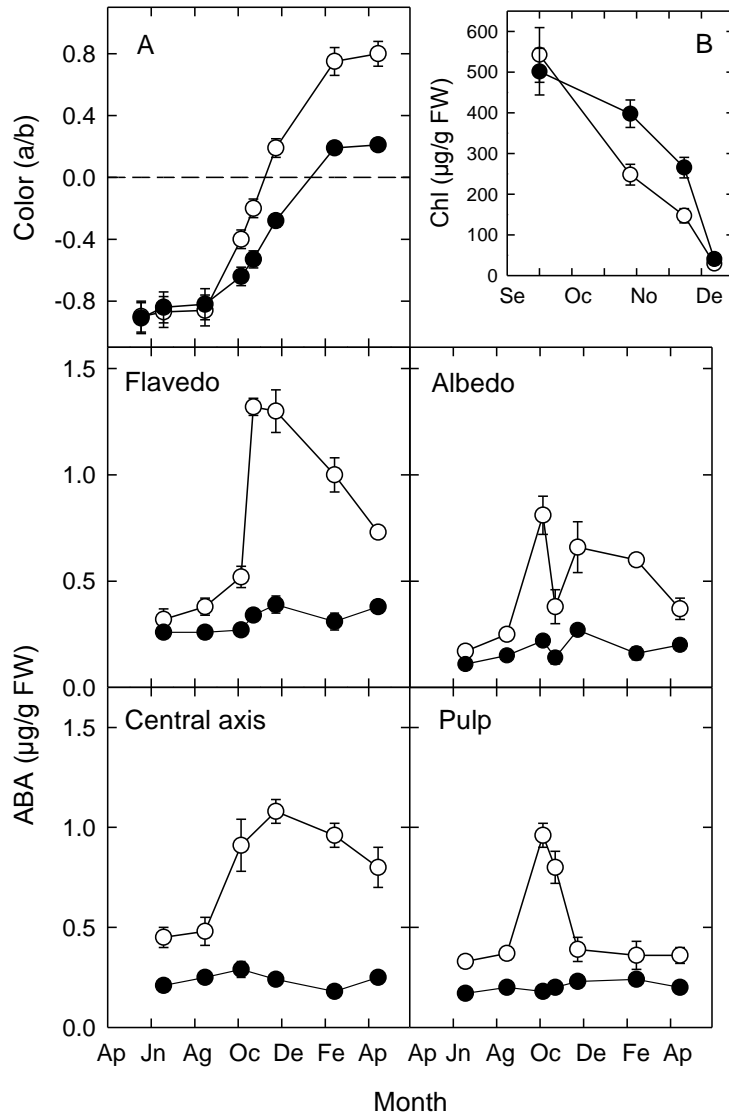
CARRIZO > CLEOPATRA > SOUR ORANGE

Some thoughts on new varieties

- Not all varieties mature equally.
- Not all varieties respond equally to degreening.
- Not all varieties have the same phenology at preharvest and during postharvest.

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- We can only guess why this happens as we accumulate data and experience on new varieties.
 - But we can also think ahead if we know where to look.

Pinalate is a mutant from Navelate and is deficient in ABA

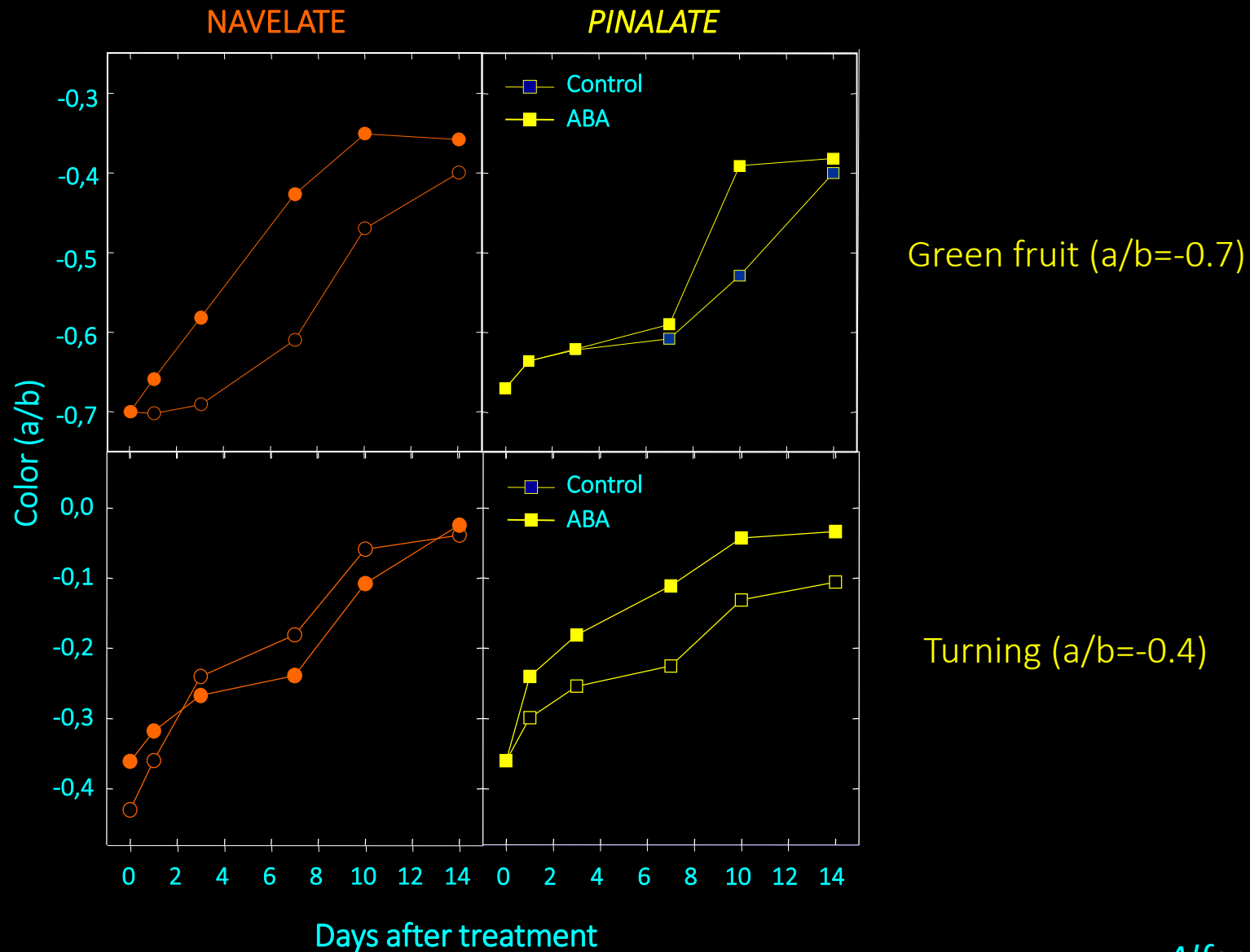


Pinalate is insensitive to ethylene

Alferez, 2001.

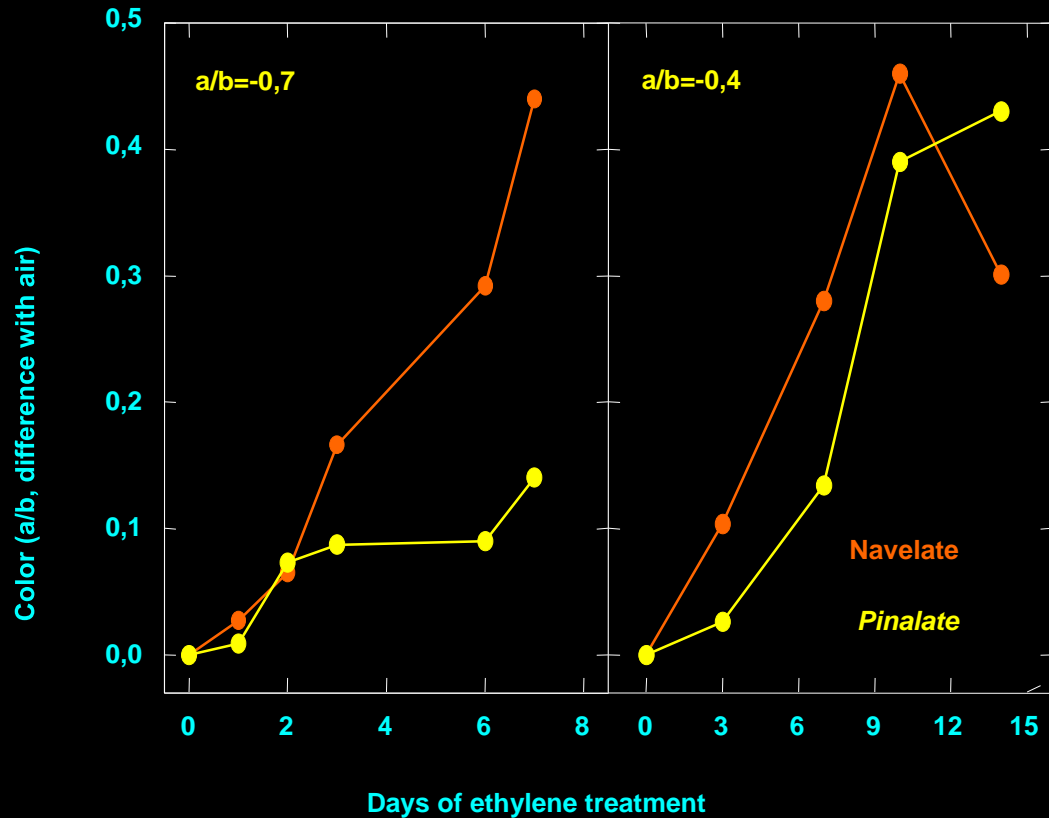
Effect of exogenous ABA on peel fruit maturation

The concept of **hormonal efficacy window**

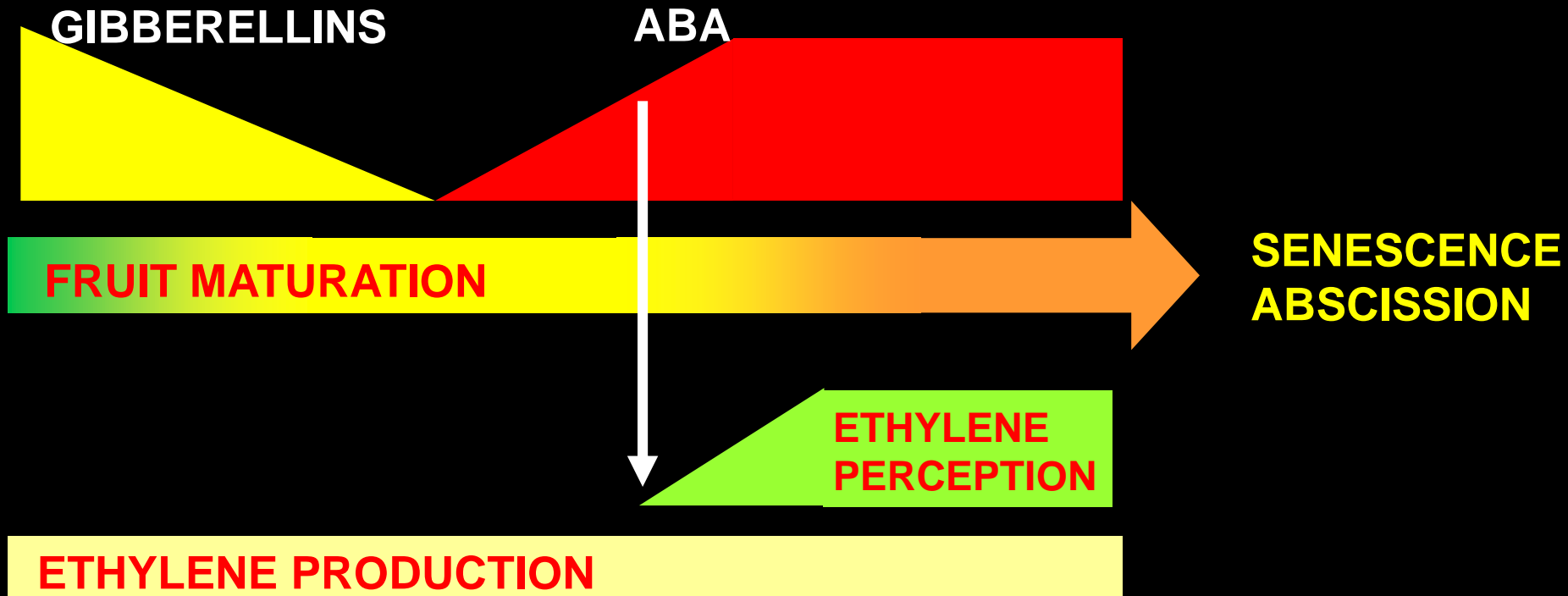


Alferez, 2001.

At the onset of degreening, ABA deficiency reduces flavedo sensitivity to ethylene. Sensitivity is recovered once peel maturation has started. ABA initiates fruit sensitivity to ethylene, and later enhance its action.



HORMONAL INTERPLAY DURING CITRUS FRUIT MATURATION



Gibberellins – ABA – Ethylene
Citrus fruit maturation

Summary

- Environmental factors are important, but is the interaction with genomic background what determines quality.
- Rootstock-scion combinations have a clear effect on fruit behavior in response to environment.
- There is a window of efficacy for hormones in regulating fruit maturation. This depends on the variety.
- Knowing hormonal balances in the fruit will allow to control fruit quality more efficiently.

A close-up, high-angle shot of a lush orange tree. The branches are thick with vibrant green, oval-shaped leaves. Numerous bright orange fruits are visible, some fully ripe and others slightly green, hanging from the branches. The scene is brightly lit by natural sunlight, creating strong highlights and shadows on the foliage. The word "Thanks!" is superimposed in the center in a white, sans-serif font.

Thanks!