Nutrición de cultivos Frutales en la EEAD – CSIC
Fisiopatías en manzana y melocotón
Active role in cell growth and integrity of cell wall and plasma membrane

Cell division and new cell structures

Cofactor and modulator in a large number of enzymes

Alleviates stress and protects against ROS

Makes easier uptake of other nutrients and regulates sugar and protein movement within the plant

Regulates water flow

Corrects soil acidity, improves soil properties, corrects soil salinity in saline-sodic soils

Gives consistency and quality to fruits for conservation during storage

Important in human nutrition by fruit consumption
La pared celular: animal vs. vegetal
Transporte de Ca en plantas

Ca: acropetal

Auxin: basipetal

Other hormones...

de Freitas, Mitcham (2012)
Hortic Reviews
Alteraciones relacionadas con Ca más comunes

- Bitter pit (apple)
- Tip burn (lettuce, Brassica)
- Blossom end rot (tomato, pepper, melon, etc.)
- Corky brown spot (pear)
- Lenticel blotch spot (apple)
- Jonathan spot (apple)
- Vitrescent dark spot (peach)
- Translucent flesh and gamboges (mangosteen)
- Senescence in flowers
Physiological alterations due to Ca disorders

Bitter pit
Trabajo desarrollado en la EEAD-CSIC

Summary

- Procedures for modelling bitter pit development (i.e. Mg infiltration, oxalate injection)
- Methods for the prognosis of bitter pit in apple: Mg infiltration
- Proteomics of bitter pit tissues  Val et al. (2006) Food Sci Technol Int
- Image analysis
- In-season Ca treatments to prevent bitter pit in apple  Val et al. (2008) J Plant Nutr
  Blanco et al. (2010) Sci Hortic
- In-season Ca treatments to prevent vitriscnt spot in peach  Fernández et al. (2009) J Food Sci Agric
Procedures for causing bitter pit development

Mg (II) infiltration (0.12%)

Vacuum 1 min
Immersion 24 h
Procedures for causing bitter pit development

**Mg (II) infiltration**

MgCl₂

8 días tras la infiltración

9 de febrero de 2005
Procedures for causing bitter pit development

Injections of Ammonium oxalate
Image analysis
Bitter pit incidence during 3 months of cold storage

- Control
- 1% CaCl2 + Tween 20
- 1% CaCl2 + AUA
- 0.5% Ca-organic_salt + AUA
- 1% Ca-organic_salt + AUA

% BP incidence

0 5 10 15 20 25 30 35 40

15-9-08 30-9-08 15-10-08 30-10-08 14-11-08 29-11-08 14-12-08 29-12-08
In-season Ca sprays in peach
Vitriscnt dark spot

PEACH
Ca-related Physiological disorders

New Ca-treatments

- Bagged
  - Ca-sprays
    - Before July
  - Non-bagged
    - Ca-sprays
- Calanda late season cultivars
  - Pesticides-free fruits
- Other cultivars
  - Pesticides

Increase fruit quality and postharvest shelflife
Allergy to apple Golden Delicious is common among individuals with allergy to birch pollen.

Pathogenesis protein Mal d 1 (18 kD) structurally related with Bet v1 of birch pollen.

Other apple proteins with allergenic characteristics are at 9, 14 (Mal d 2), 30 (thaumatin), 40, 60 and 67 kDa.