

# Impacts of fruit disease management on quality

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## Topics covered

- Overview of anthracnose and stem-end rot
- Experimental results
  - Rootstocks, including nutrition
  - Crop load, including nutrition
- Integrated control
  - Field fungicides, including strobilurin group

# Postharvest diseases



anthracnose

stem-end rot



# Anthracnose (*Colletotrichum gloeosporioides*)

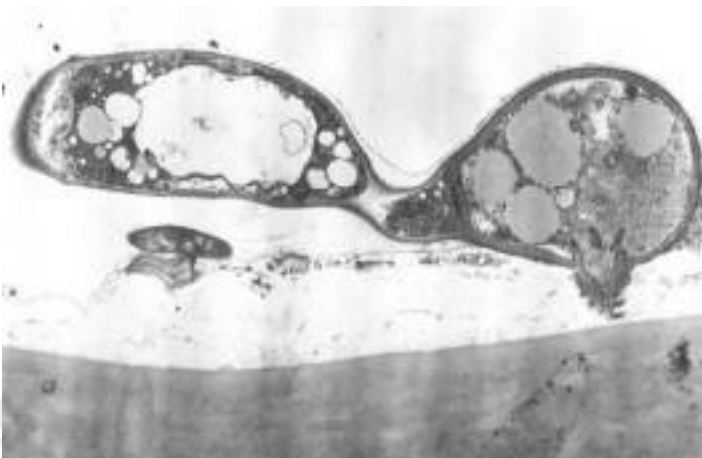
Infection occurs in field from fruit set to harvest

**dormant**



**period**

Symptoms develop during fruit ripening



## Stem-end rot (many fungi)

- *Botryosphaeria* spp
- *Lasiodiplodia theobromae*
- *Colletotrichum gloeosporioides*
- *Phomopsis perseae*
- *Thyronectria pseudotrichia*

Stem-end rot (SER) fungi colonise the stem tissue of avocado trees without causing disease

Symptoms develop during fruit ripening



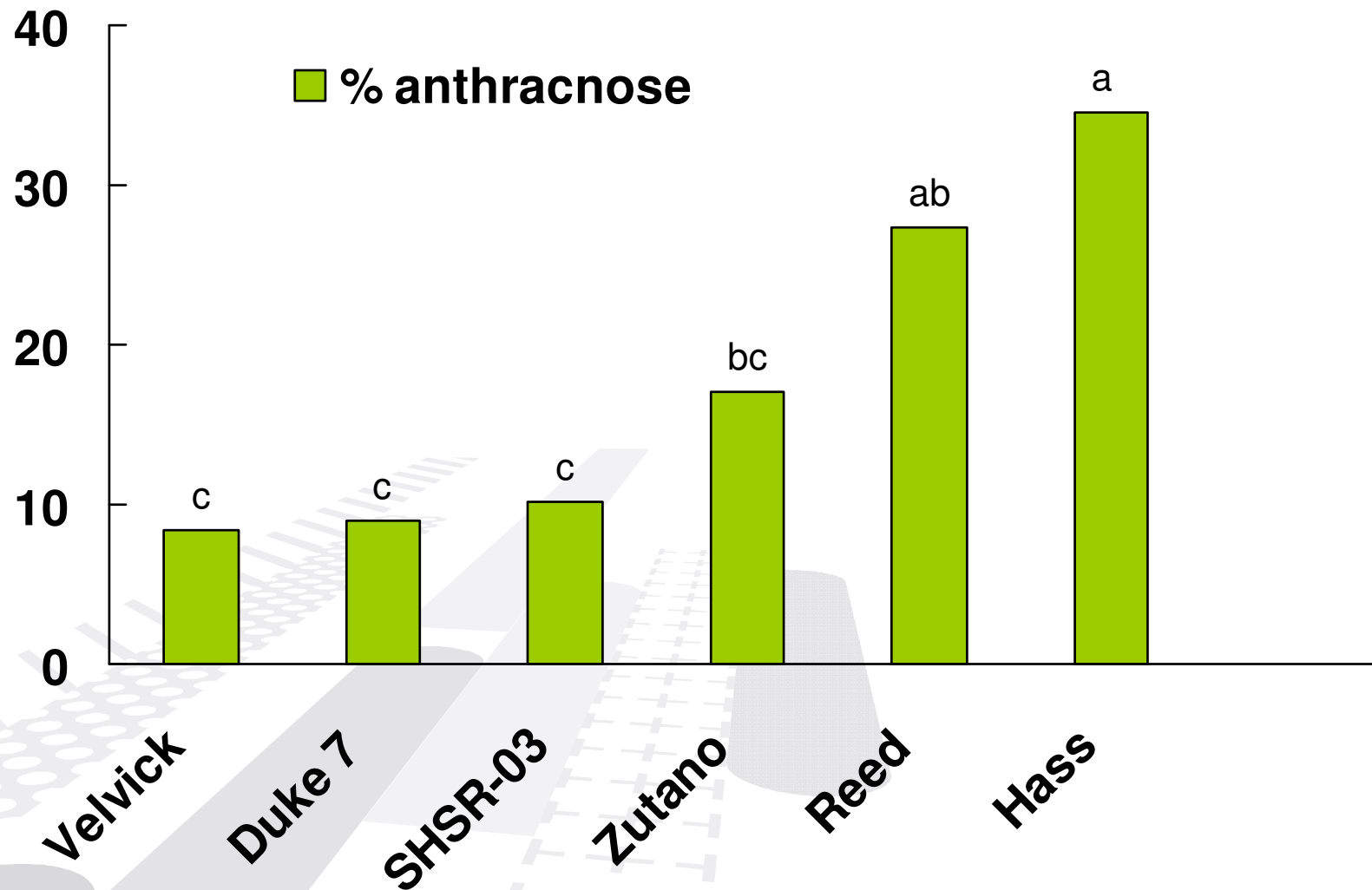
# Effect of rootstock on fruit quality & major nutrients



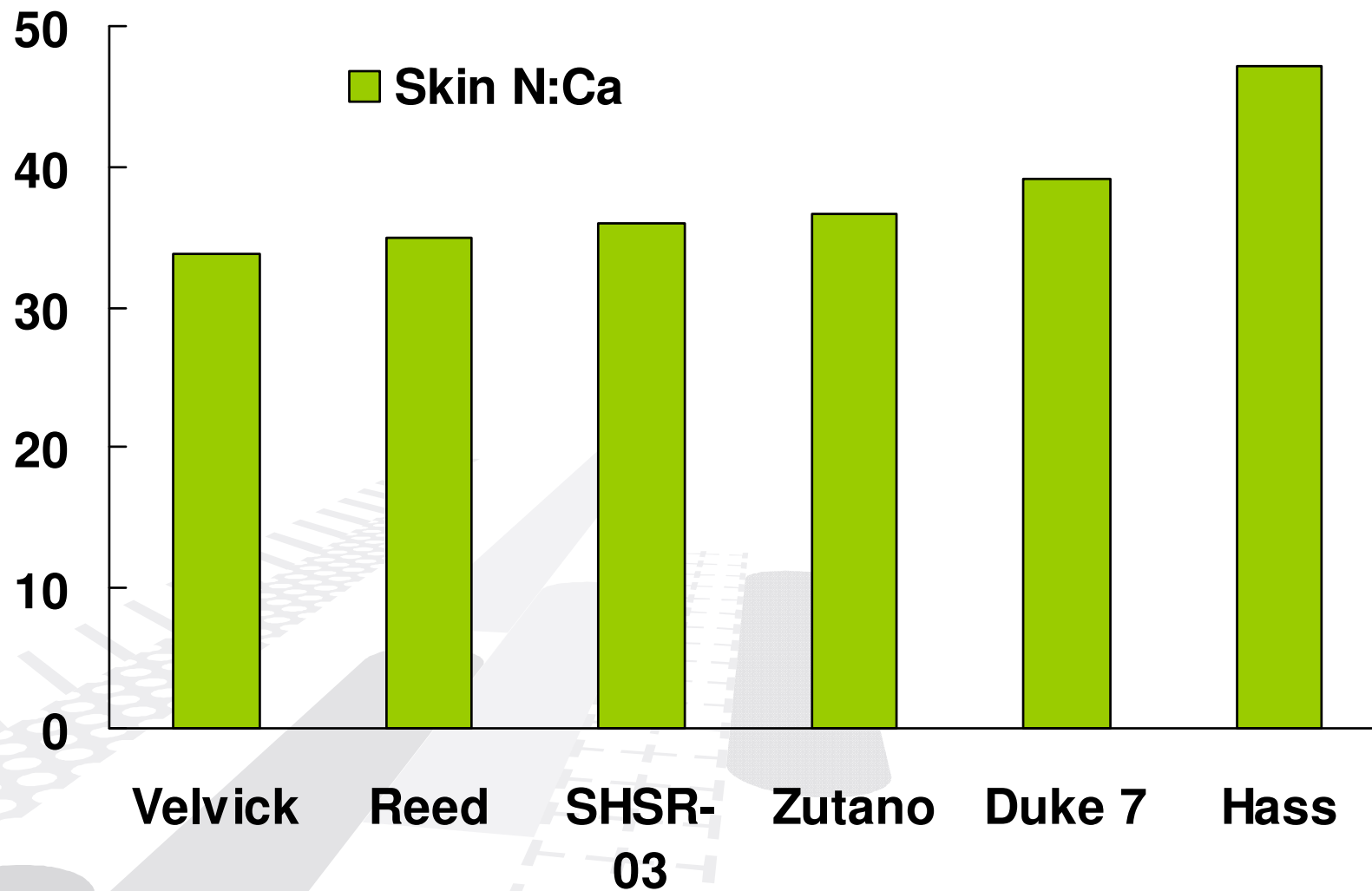
## Rootstock affects postharvest disease

- Fruit harvested from T. Whiley's rootstock trials at
  - Childers, QLD ('Hass' in 2008 and 2009)
  - Walkamin, QLD ('Shepard' in 2009)
  - Pemberton, WA ('Hass' in 2008)
  - Hampton, QLD ('Hass' in 2007 and 2008)
- Ripened at 23 °C & 65% RH (Indooroopilly)
- Stored 5 weeks at 5.5 °C, then ripened 20 °C (Maroochy)
- Assessed for postharvest disease

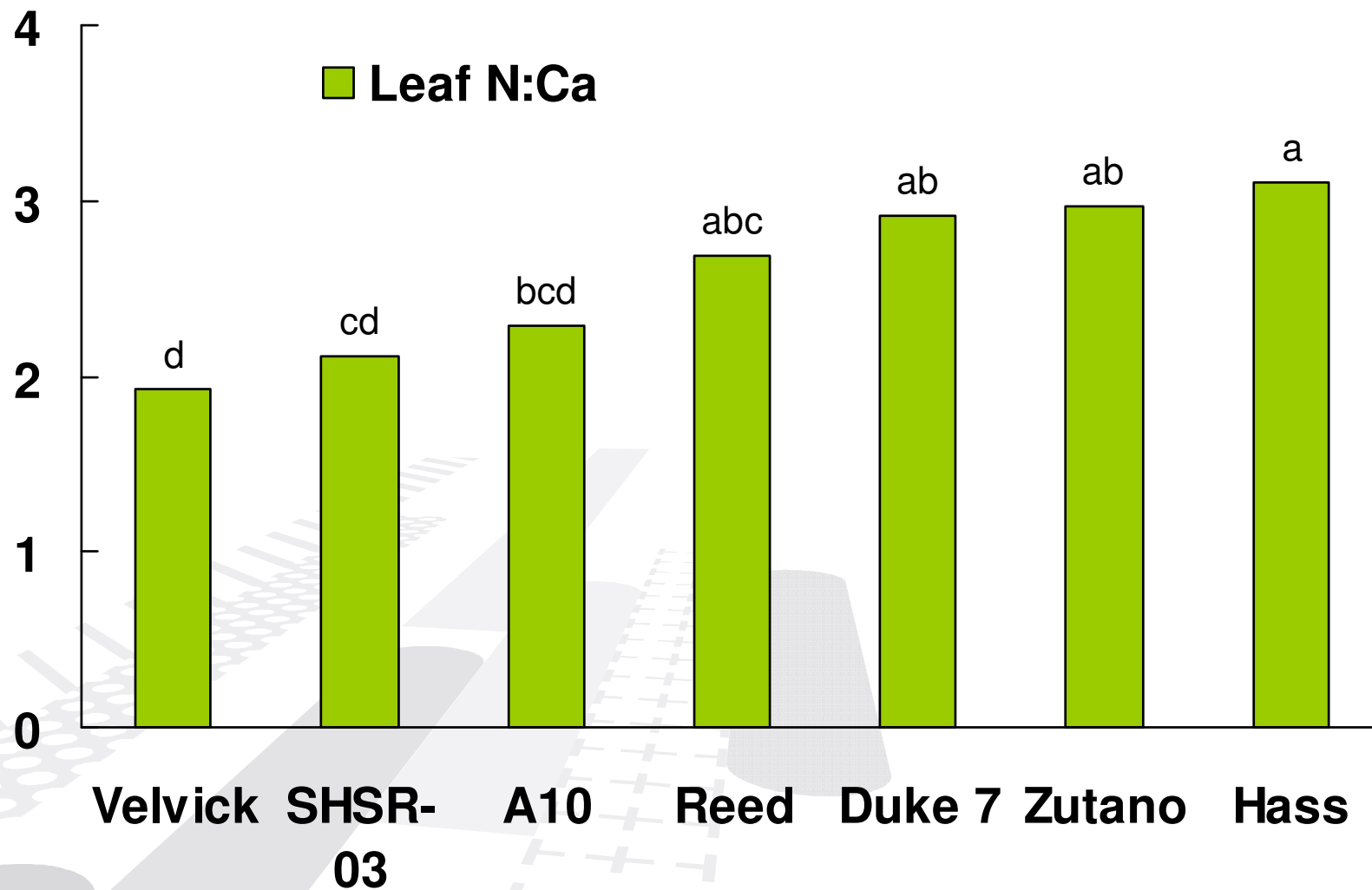
# Effect of rootstock on anthracnose, Hampton 2008



## Effect of rootstock on fruit skin N:Ca ratio, Hampton 208



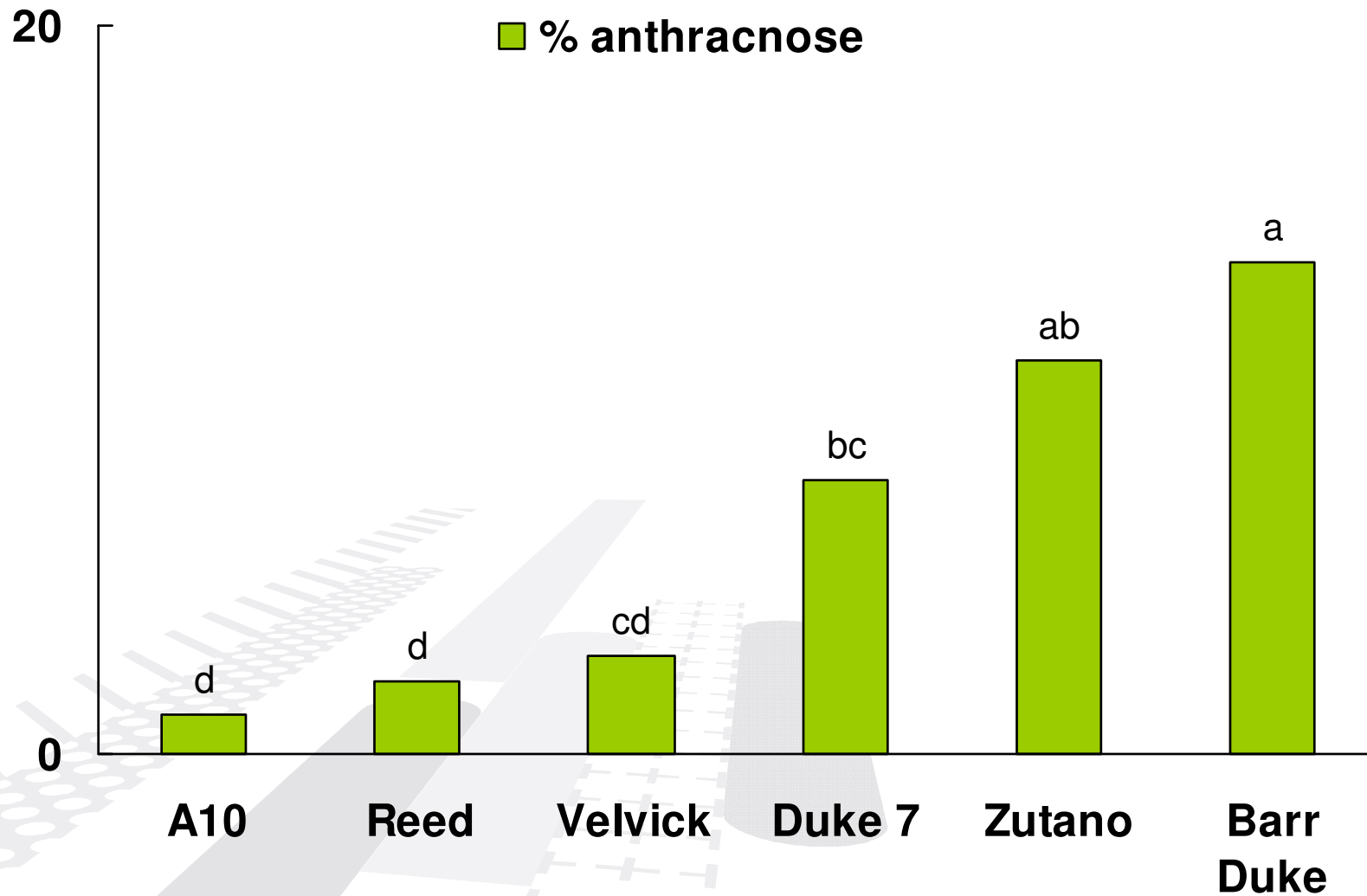
## Effect of rootstock on leaf N:Ca ratio, Hampton 2009



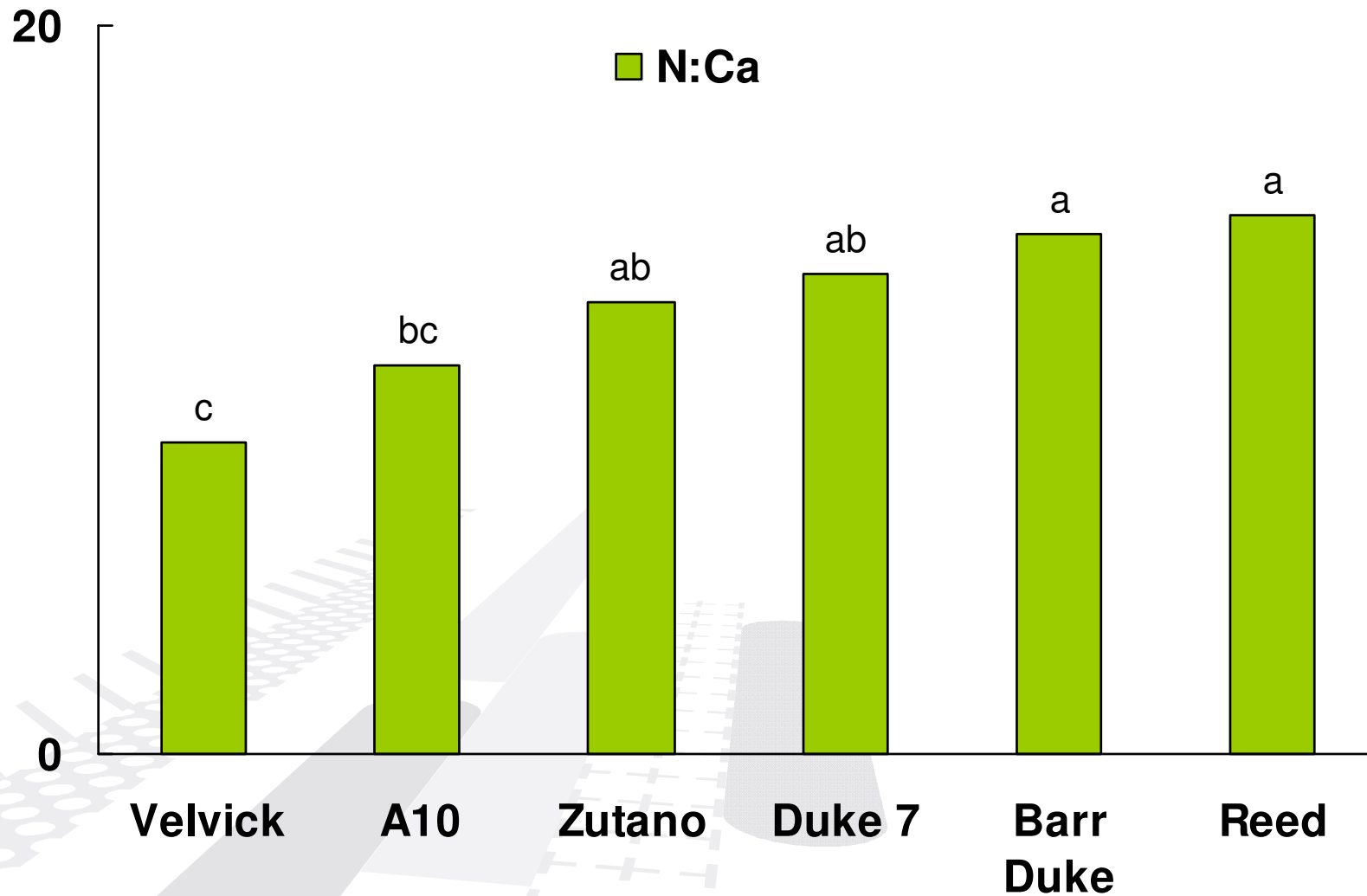
## Correlations between disease, yield & nutrient balance – Hampton 2008

Variable 1	Variable 2	P	r (correlation coefficient)	Relationship
Anthracnose severity	Yield per tree	0.044	0.30	-
Anthracnose severity	Fruit skin N:Ca	0.011	0.39	+
Stem-end rot severity	Fruit skin N:Ca	0.013	0.38	+

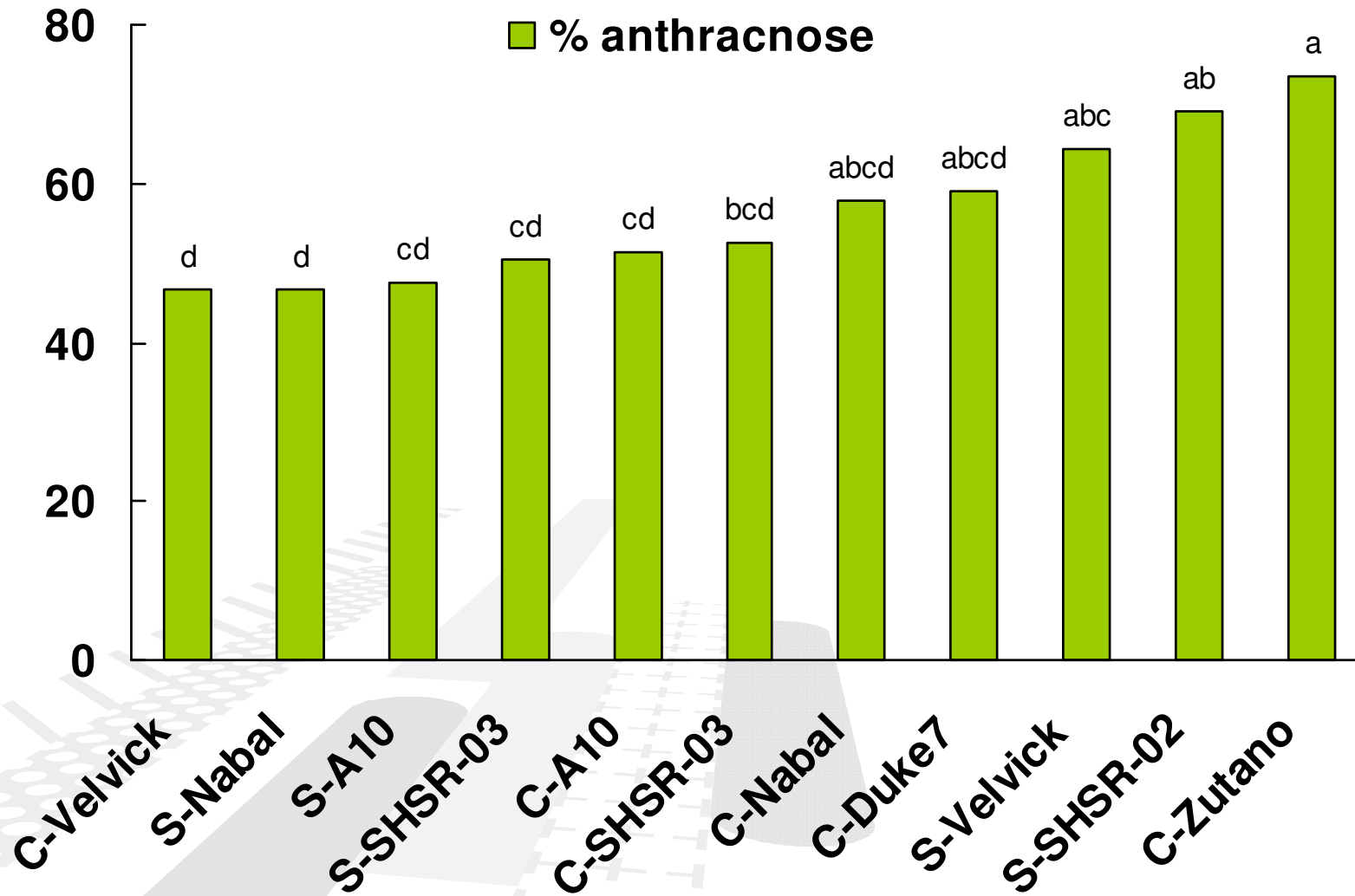
# Effect of rootstock on anthracnose, Pemberton 2008



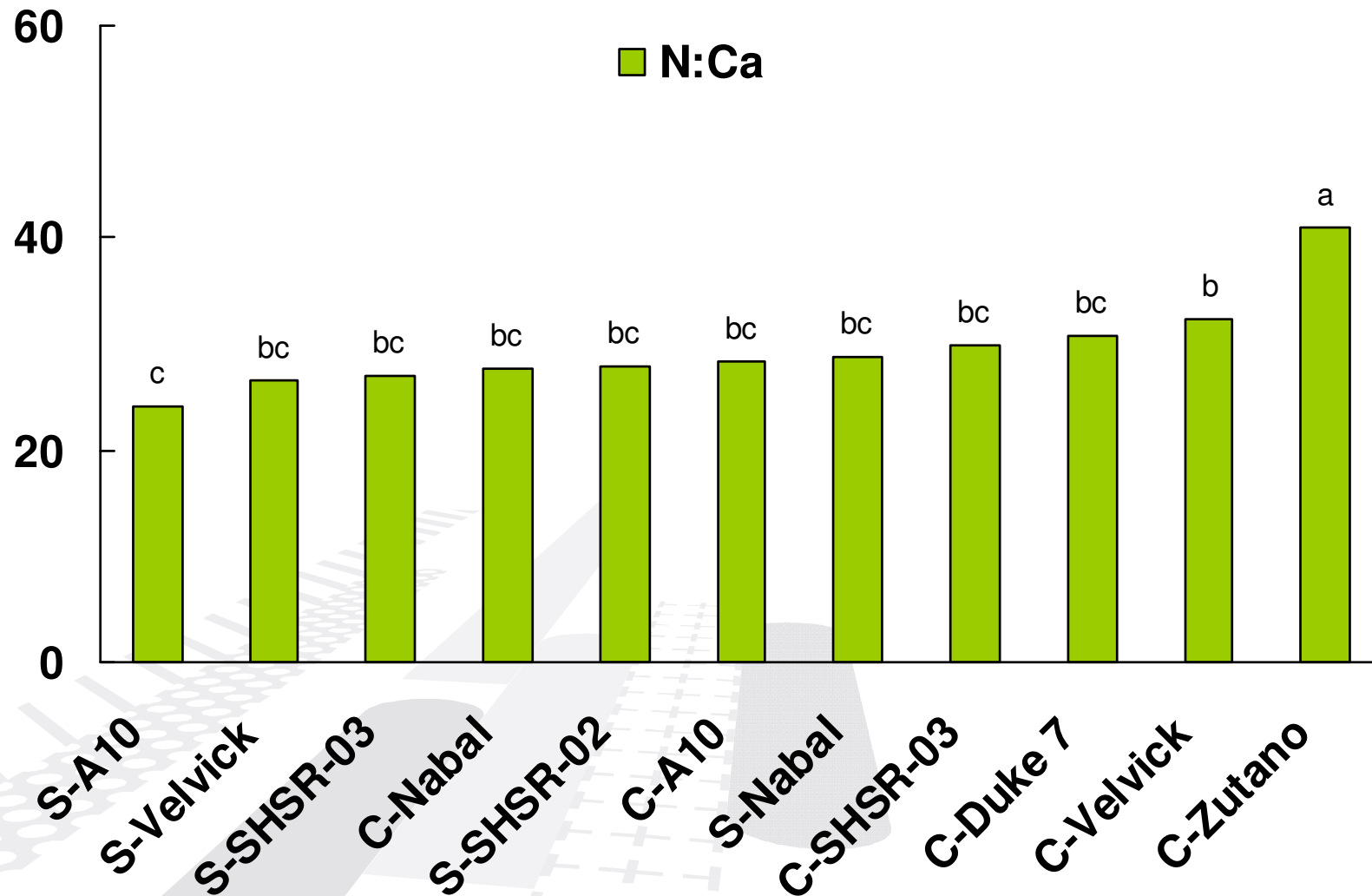
## Effect of rootstock on fruit skin N:Ca ratio, Pemberton 2008



# Effect of rootstock on anthracnose, Childers 2009



# Effect of rootstock on N:Ca ratio, Childers 2009



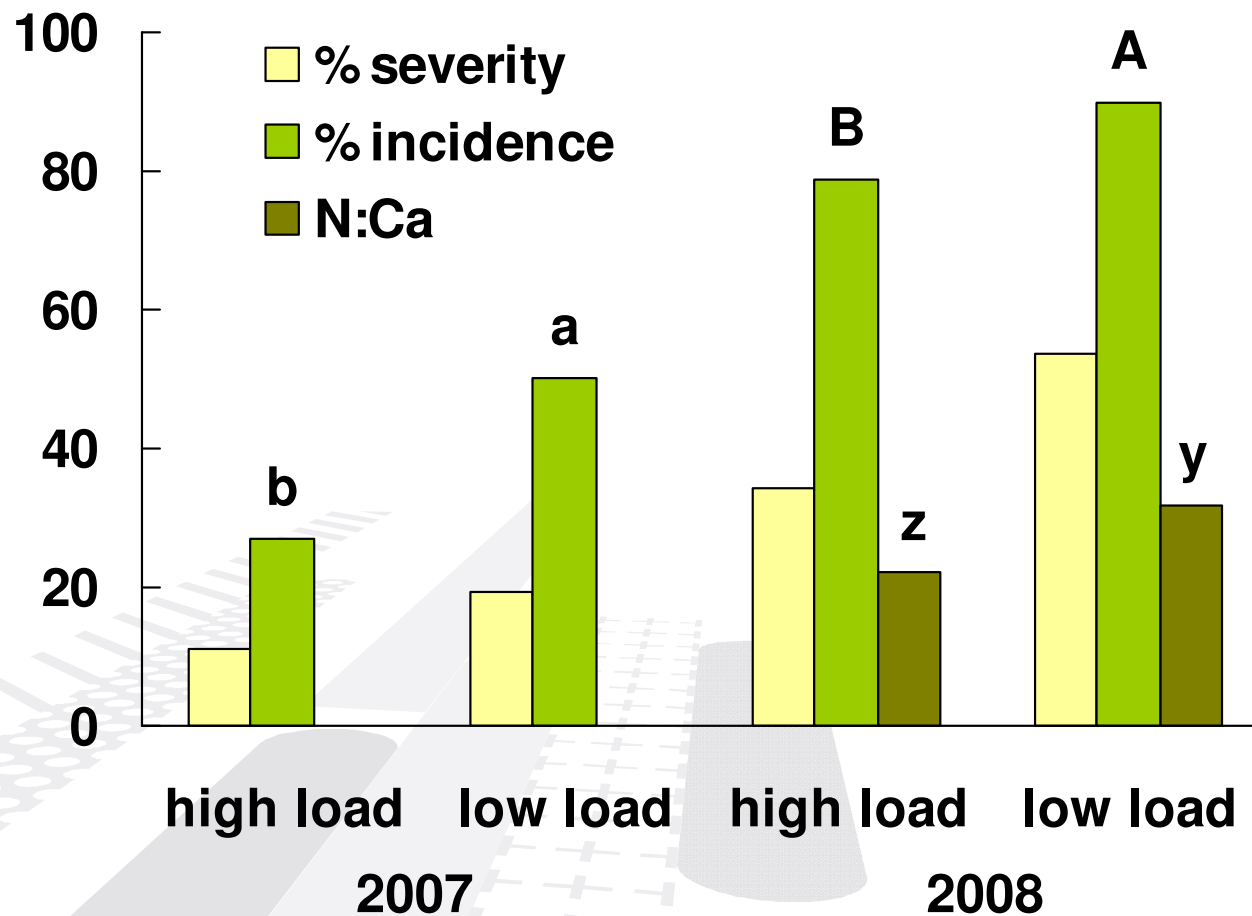
## Significant trends

- **Rootstock affects fruit quality**
  - All locations
- **yield ↓ as anthracnose severity ↑**
  - Childers and Hampton 2008
- **anthracnose severity ↑ as N and/or N:Ca ↑**
  - All locations

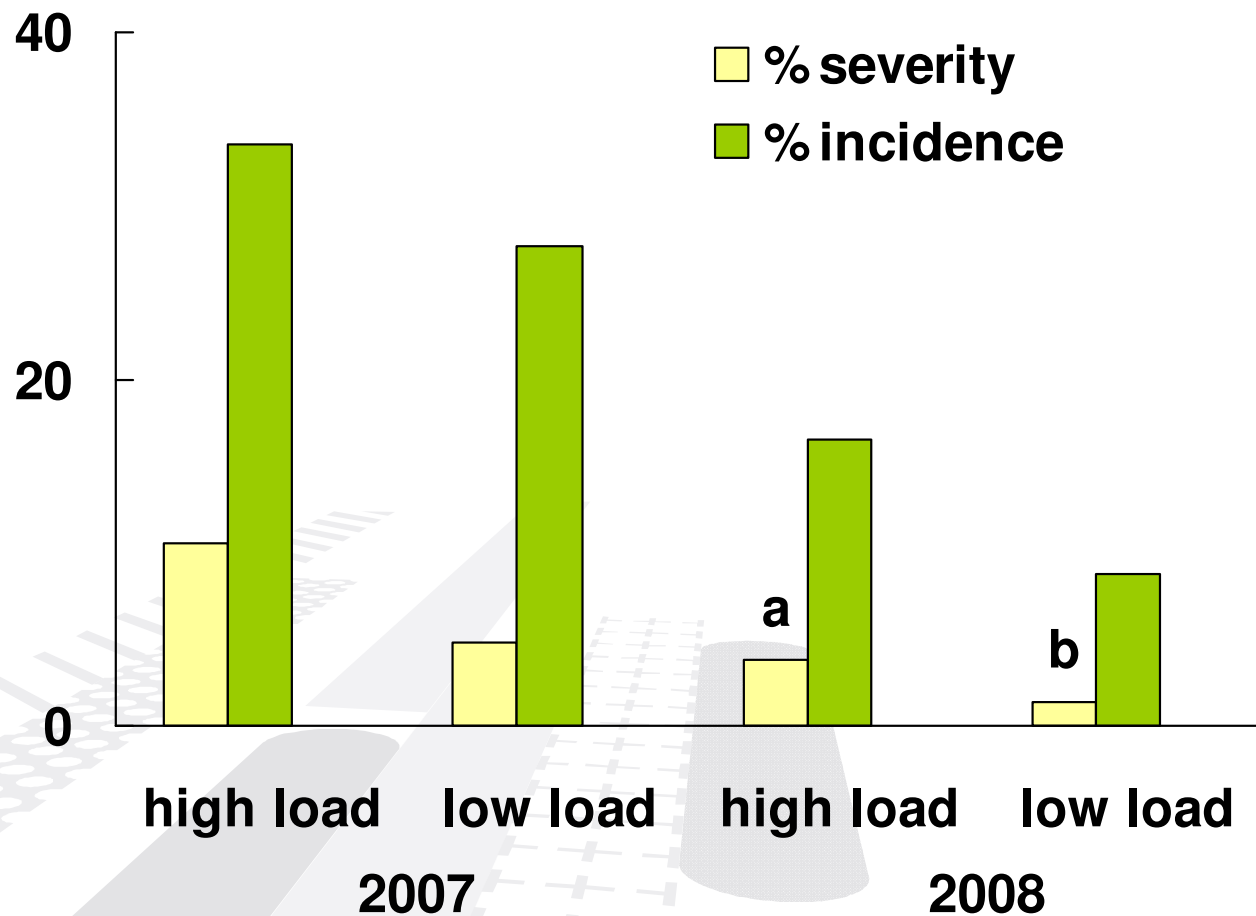
# Effect of crop load on fruit quality



# Effect of crop load on anthracnose disease



# Effect of crop load on stem-end rot disease



## Crop load affects quality

- ↓ anthracnose & ↓ N:Ca with ↑ crop load
- But, ↑ stem-end rot with ↑ crop load
  - Stem-end rot more severe when trees are stressed
  - Optimum irrigation and nutrition critical for control

# Using fungicides to improve fruit quality

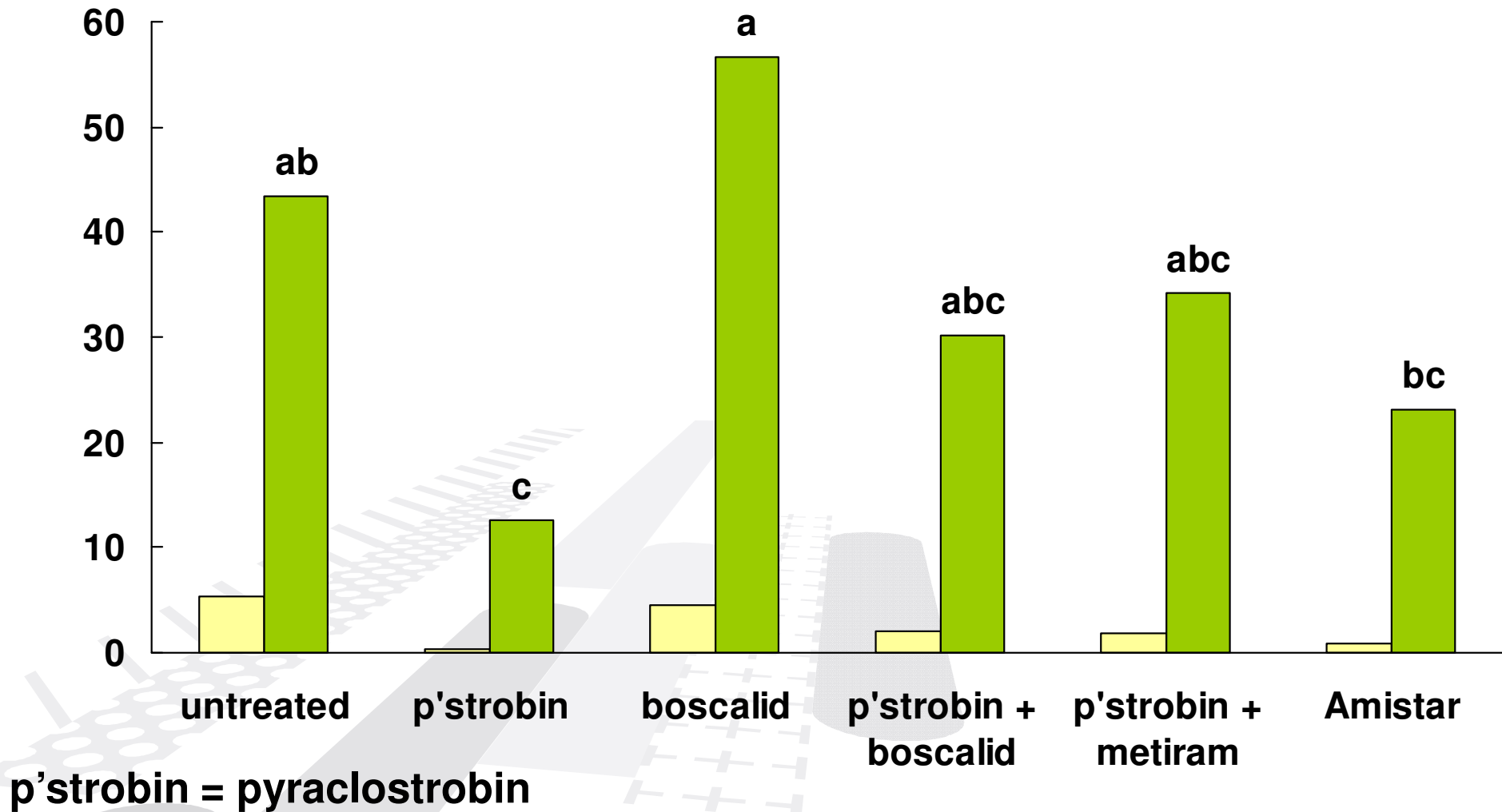


## Assessment of new strobilurin products

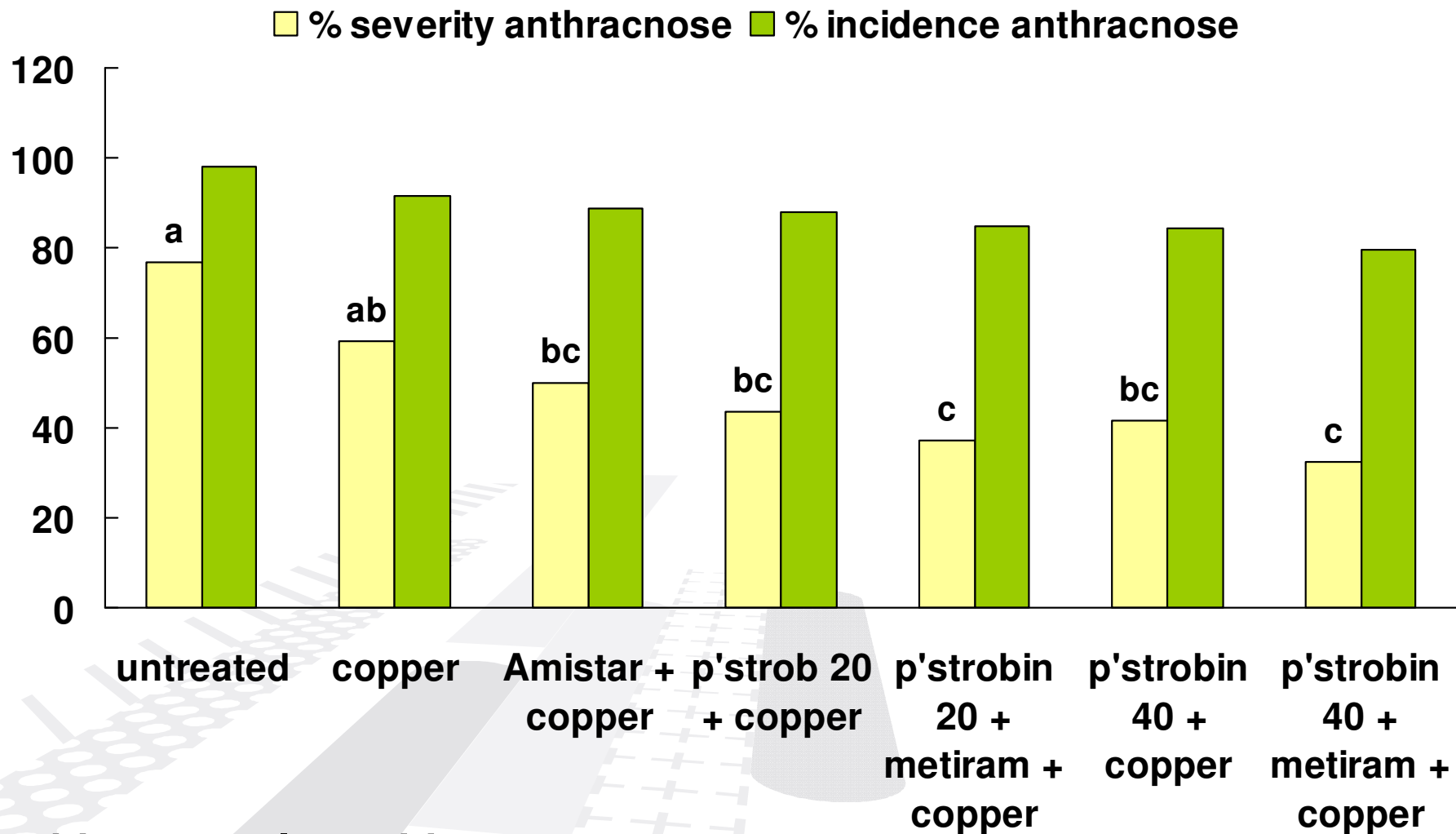
- Initially a product screening trial (2008)
  - pyraclostrobin – Group 11 (previously Group K)
  - metiram – zinc based protectant fungicide
  - boscalid – locally systemic f'cide with wide activity
  - pyraclostrobin + boscalid
  - pyraclostrobin + metiram
- Then as part of an anti-resistance program (2009)
  - Pyraclostrobin  $\pm$  metiram

# Product screening trial, Duranbah 2008 (cv. Reed)

□ % severity anthracnose    ■ % incidence anthracnose



# Anti-resistance trial, Glasshouse Mtns 2009 (cv. Hass)

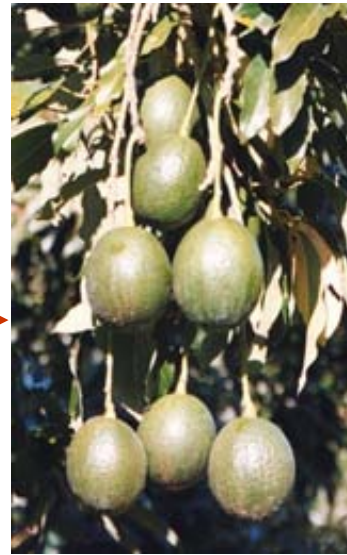


**p'strob = pyraclostrobin**

## Most effective and responsible use of fungicides

- ***Always follow label directions***
- Protectants – no “short-cuts” in copper spray program (every 28 days in fine weather, every 14 days if wet)
- Strobilurins – only Amistar® registered in avocado
  - post-infection activity
  - use with copper sprays in an anti-resistance strategy
  - effective when applied close to harvest and after extended periods of wet weather
- Postharvest – apply prochloraz within 24h after harvest
  - use in conjunction with field spray program
  - can't be used on fruit destined for Europe

# Integrated control – the complete picture



**Tree husbandry**

- nutrition (N, Ca)
- canopy mgt
- mulching
- root health
- irrigation

**Strategic fungicides**

- protectants and post-infection
- phosphorus acid
- postharvest

**Careful harvest**

- maturity %DM
- wet weather

**Postharvest care**

- cool chain
- pre-condition
- CA, ethylene

## Acknowledgements

Thank you to the many growers  
and collaborators for supporting  
our research!



*Know-how for Horticulture™*

