ADOPTION OF FIELD PRACTICES TO ASSIST IN EXPANDING AVOCADO MARKETS

Tony Whiley, Queensland Horticulture Institute

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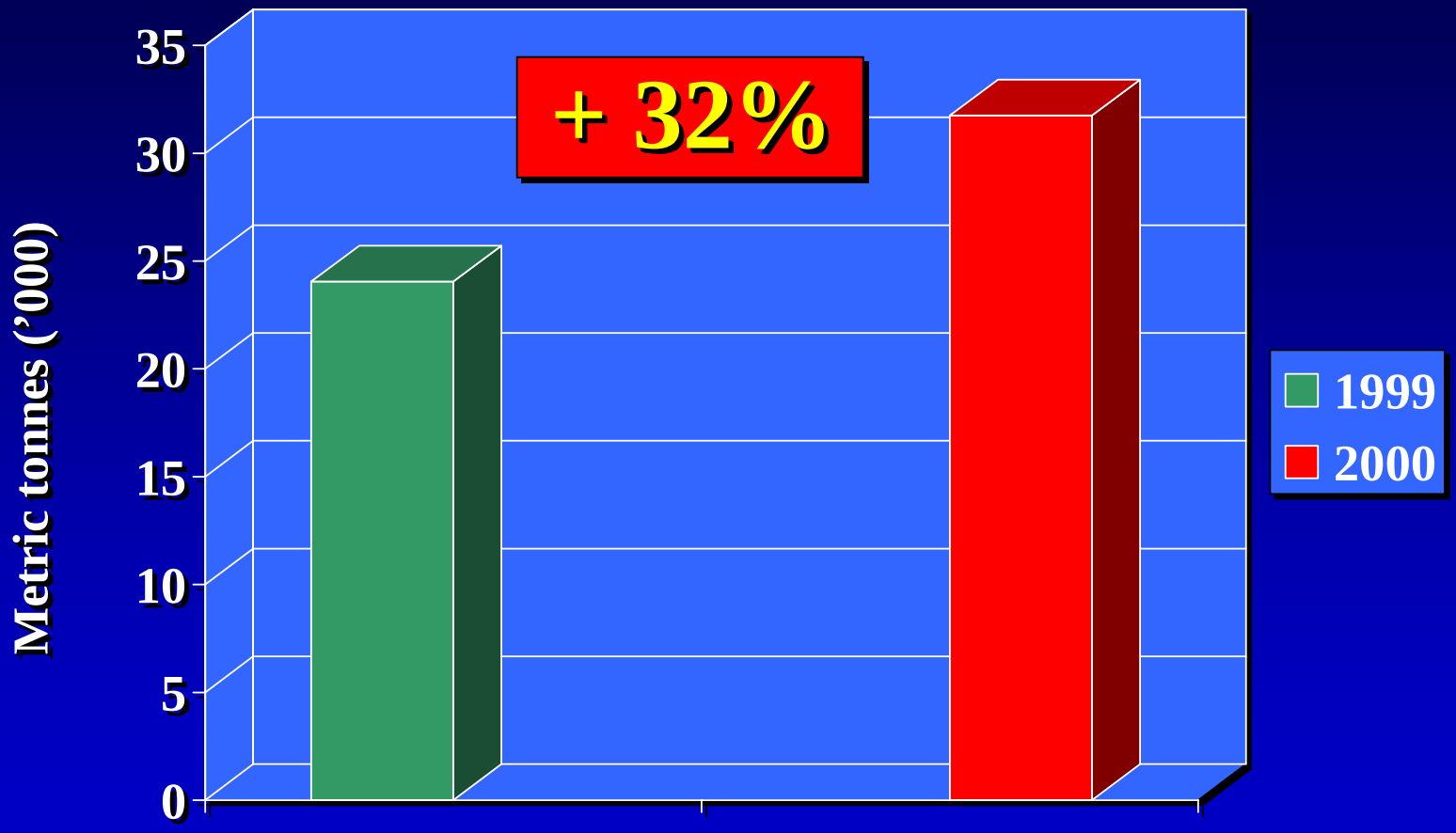
Growth in Australian Production



Source: Horticulture Australia

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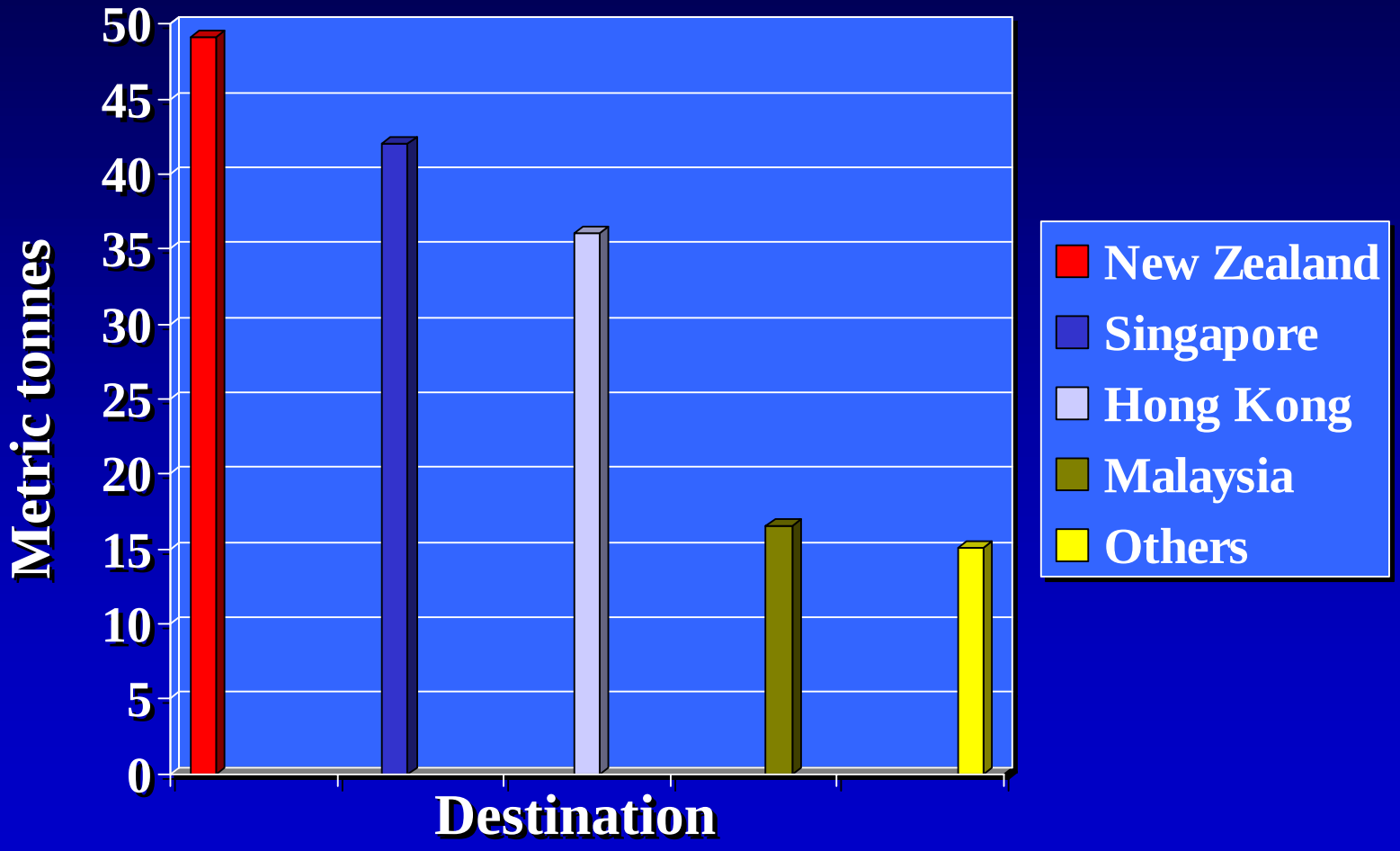
Australian Avocado Exports - 2000



Source: Horticulture Australia

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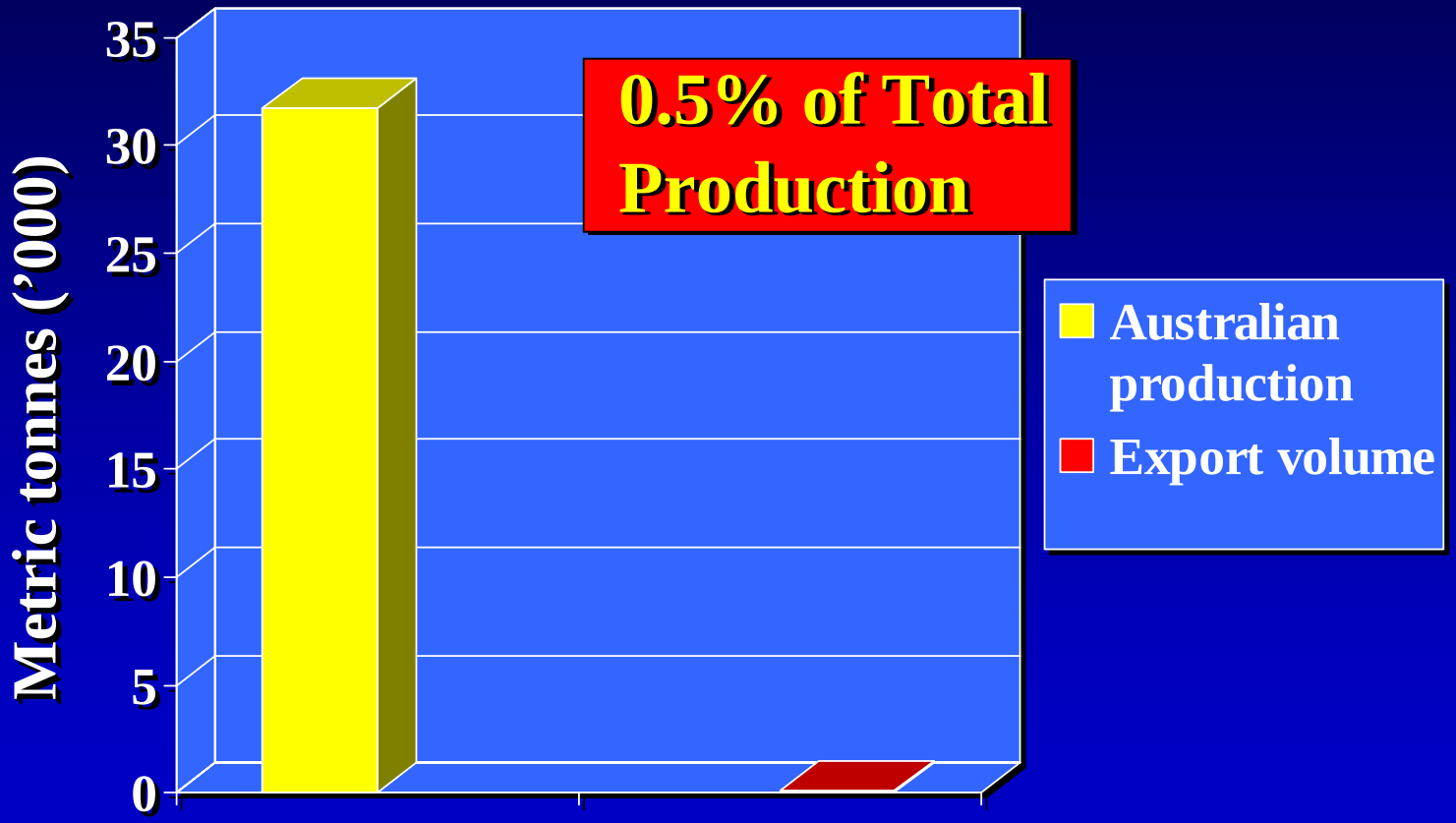
Australian Exports in Relation to Production in 2000



Source: Horticulture Australia

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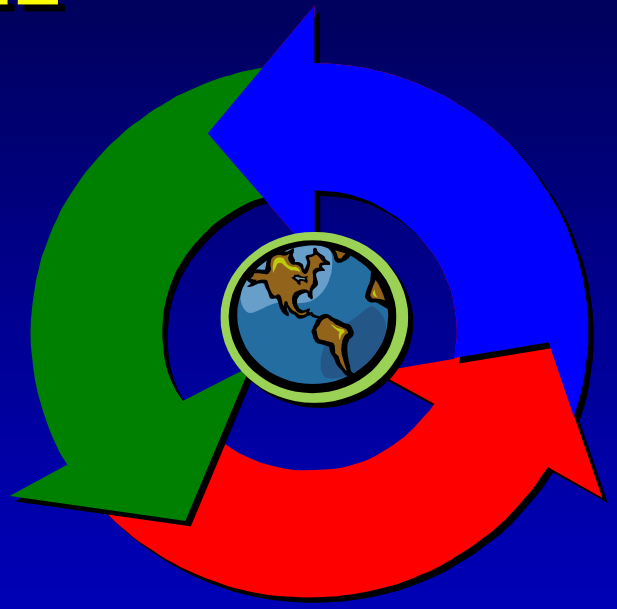
Globalisation of Markets



Increased competition in either domestic or international markets

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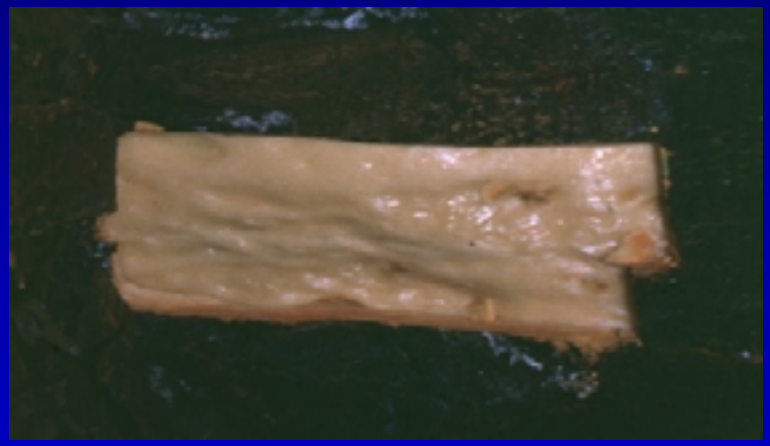
Domestic Markets...

…are currently protected by Quarantine barriers although the situation is constantly under review….

Sunblotch



Stem-pitting

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Where are our future markets

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Where are our future markets?

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Where are our future markets?

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Where are our future markets?

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Where are our future markets?

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Opportunities on the Domestic Market!

Australia - 1.6 kg/capita

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Our Quality Record

- 40-50% of consumers are dissatisfied with avocados they have bought
- 1 in 4 avocados bought at retail are unacceptable due to fruit rots

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Fruit Rots

Anthracnose

Stem-end rot

- Poor orchard hygiene
- Poor fungicide application
- Inappropriate postharvest fungicide use
- Harvesting immature fruit

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Our Quality Record

- 40-50% of consumers are dissatisfied with avocados they have bought
- 1 in 4 avocados bought at retail are unacceptable due to fruit rots
- 2 in 4 avocados bought at retail are not consumed due to unacceptable quality
- The problem is greatest with Hass as the black skin disguises defects

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Improving Fruit Quality to the Consumer

- The supply chain
  - Handling (bruising)
  - Temperature management
  - Age of fruit on offer (retail)

- **Growing the fruit**

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Growing Quality

- Fruit size
- Fruit shape
- Shelf life
- Internal disorders
- Insect damage
- Anthracnose

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Growing Quality

- Nutrition
- Irrigation
- Plant Growth Regulators
- Other Management Practices
- Rootstocks

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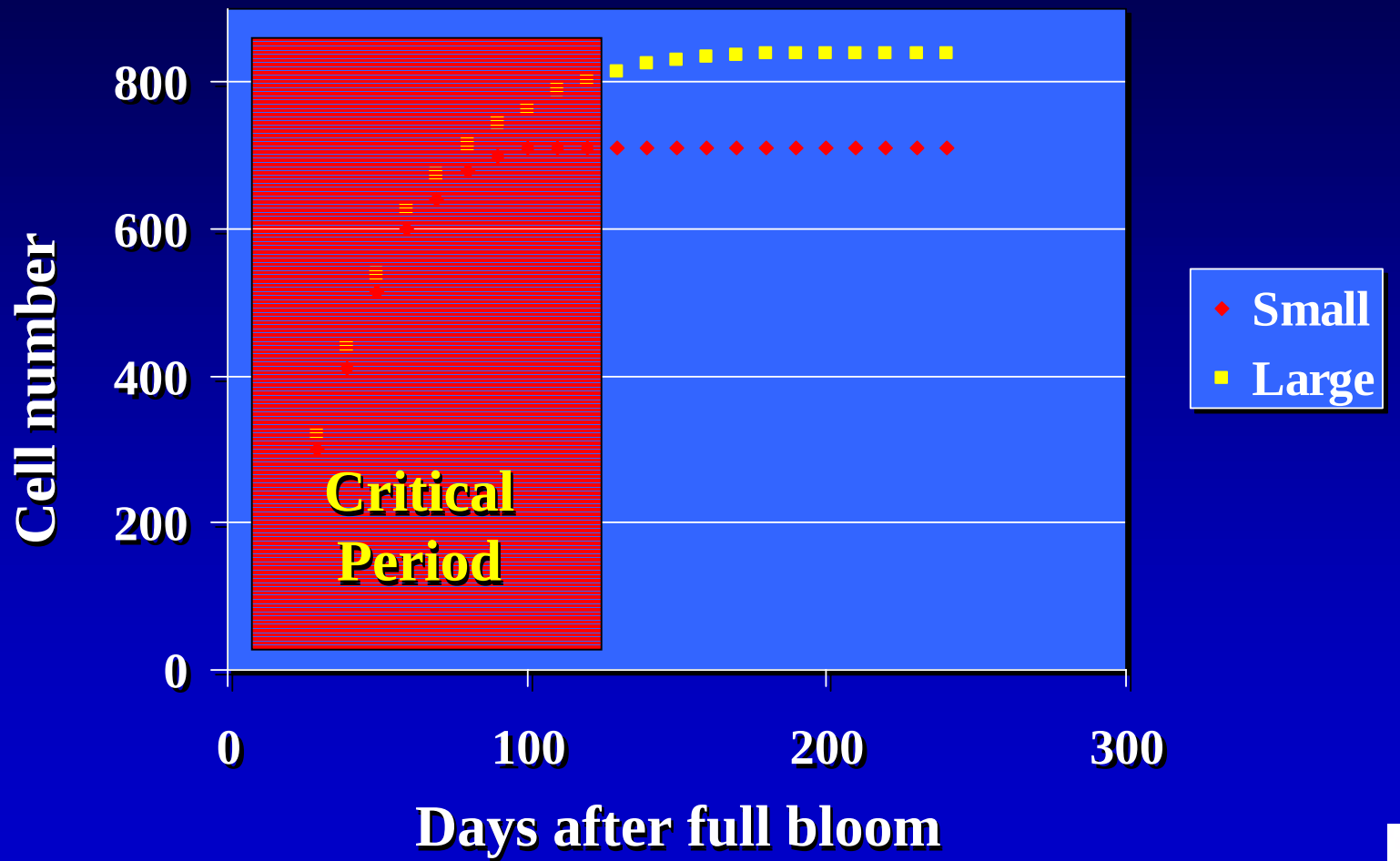
Cell Numbers and Hass Fruit Size



Source: Cowan *et al.* (1997)

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Management During the Critical Period

- **Phytophthora root rot control**

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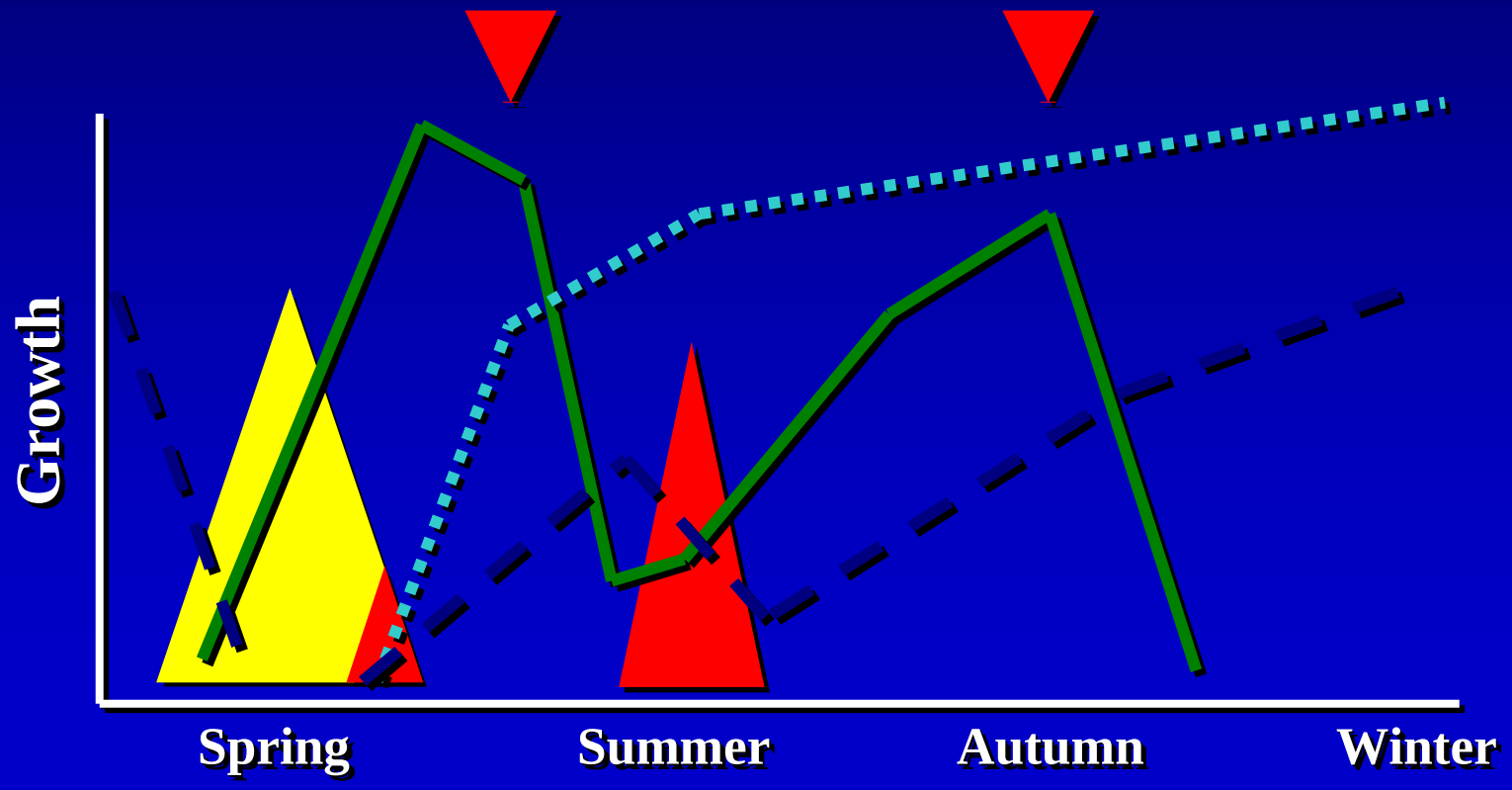
Management During the Critical Period

- **Phytophthora root rot control**



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Management During the Critical Period

- Phytophthora root rot control
- Nutrition

Boron

Zinc

} Both are needed where cells are actively dividing

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Low Boron Reduces Size and Distorts Fruit Shape

18-25 mg/kg

- 4-15%

Sharwil from Boron deficient tree

Source: Smith *et al.* (1997); Bard & Wolstenholme (1997)

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Low Zinc Reduces Size and Distorts Fruit Shape

Less than 20 mg/kg

Smaller fruit

Hass from Zinc deficient tree

Source: Crowley *et al.* (1996)

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Management During the Critical Period

- Phytophthora root rot control
- Nutrition

Calcium

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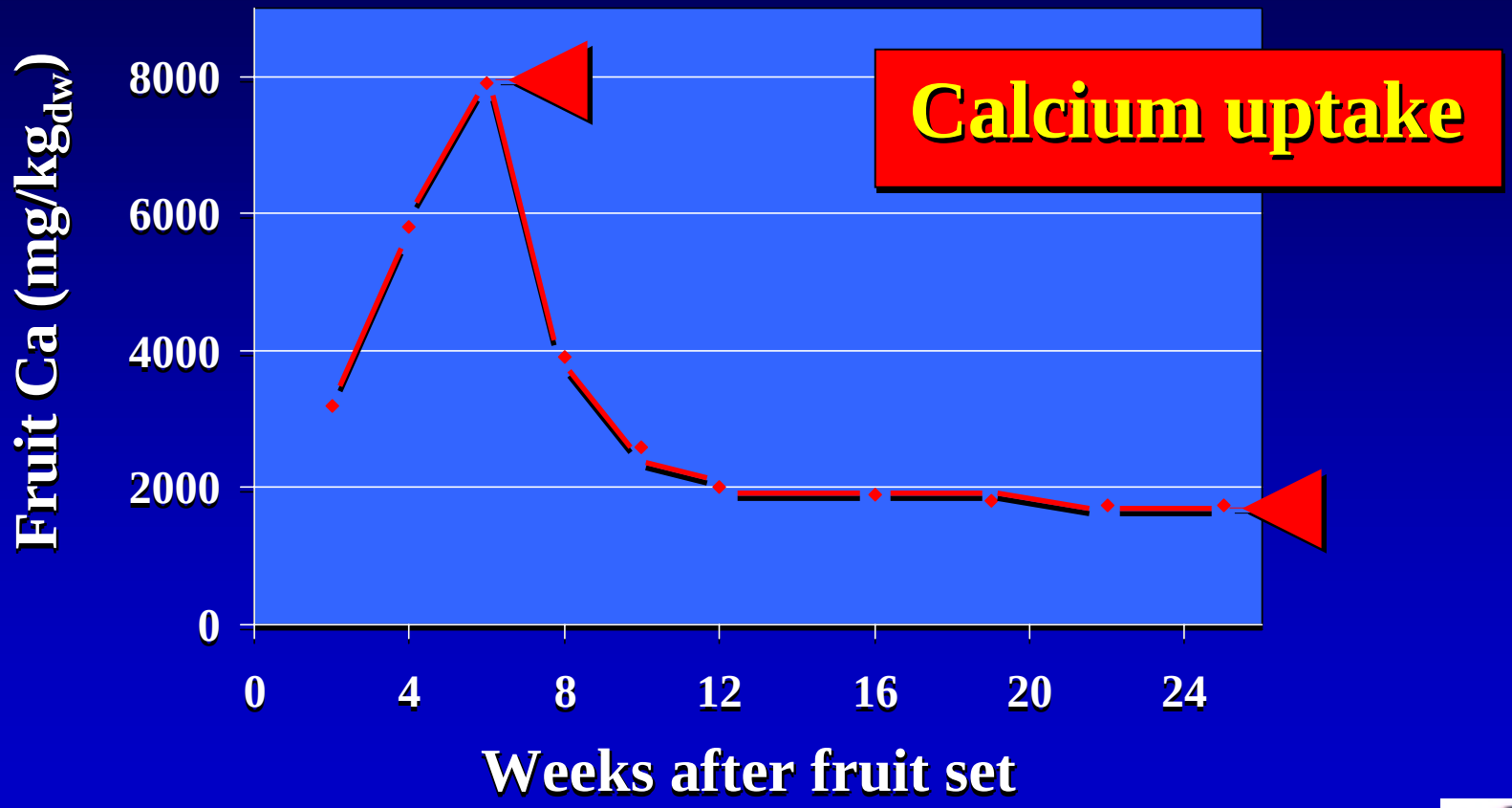
Management During the Critical Period



Source: Witney *et al.* (1990)

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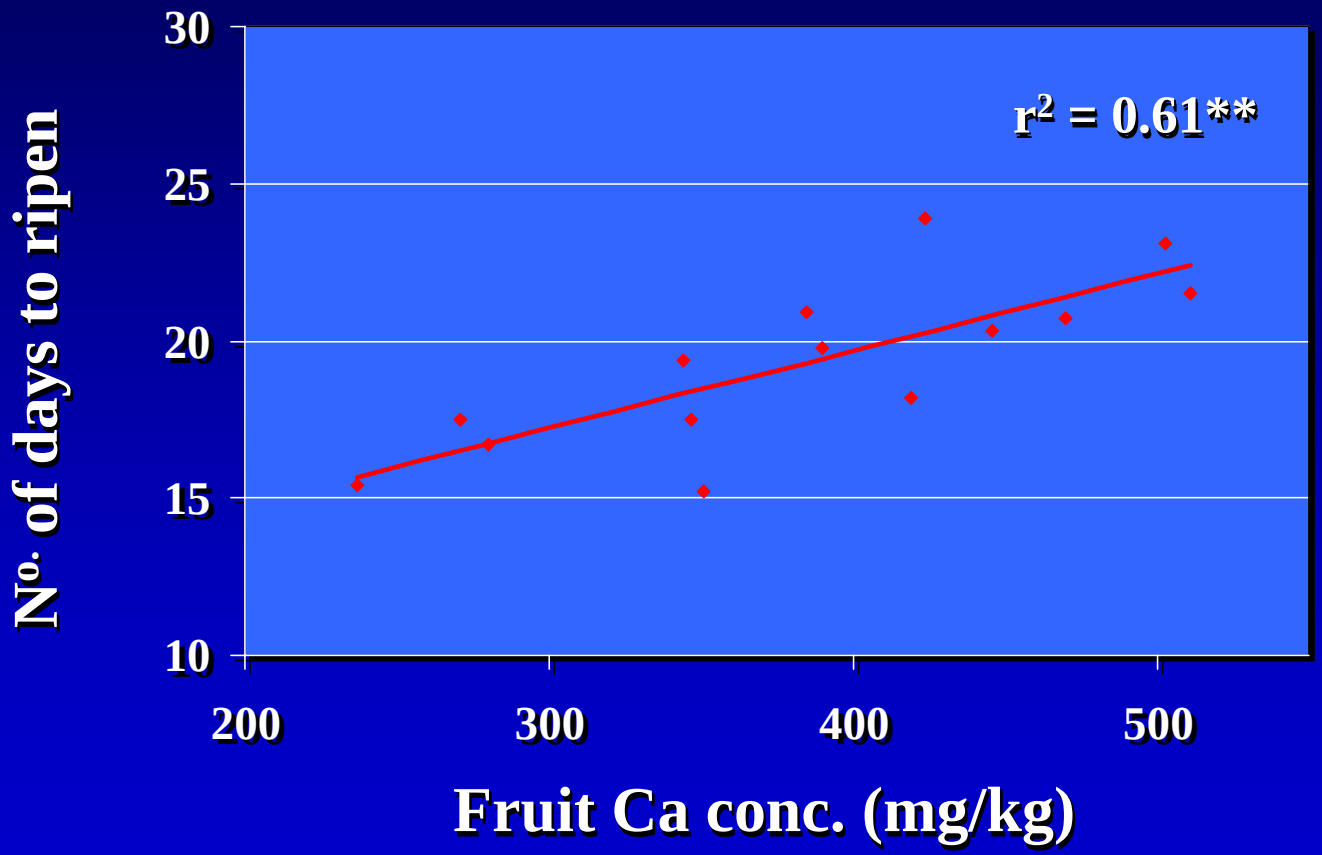
Calcium and Fruit Quality

- **Shelf life**



Source: Hofman *et al.* (2001)

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Calcium and Fruit Quality

- **Shelf life**

Other nutrients that can affect shelf life are:

Nitrogen & Boron

Source: Arpaia *et al.* (1995)

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Calcium and Fruit Quality

- Shelf life
- Internal fruit disorders

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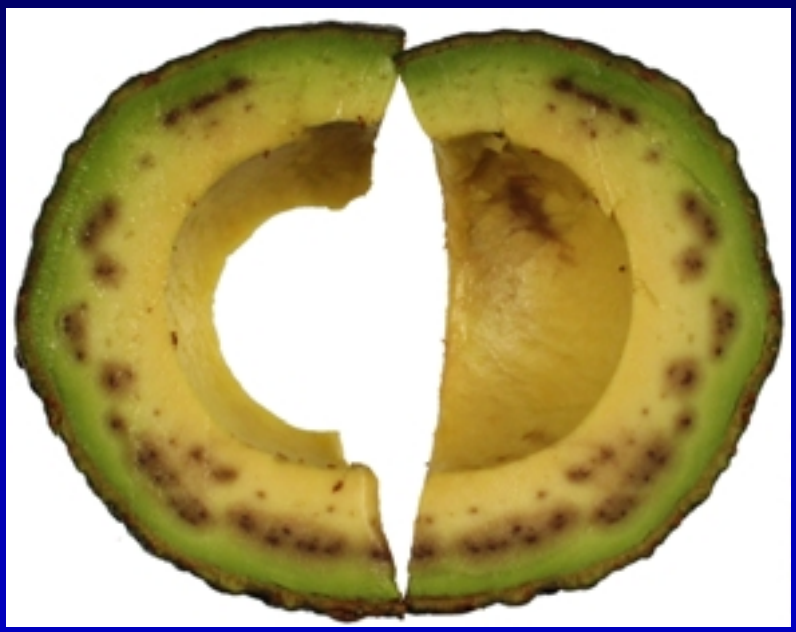
Calcium and Fruit Quality

- **Internal fruit disorders**

Flesh discolouration



Vascular browning

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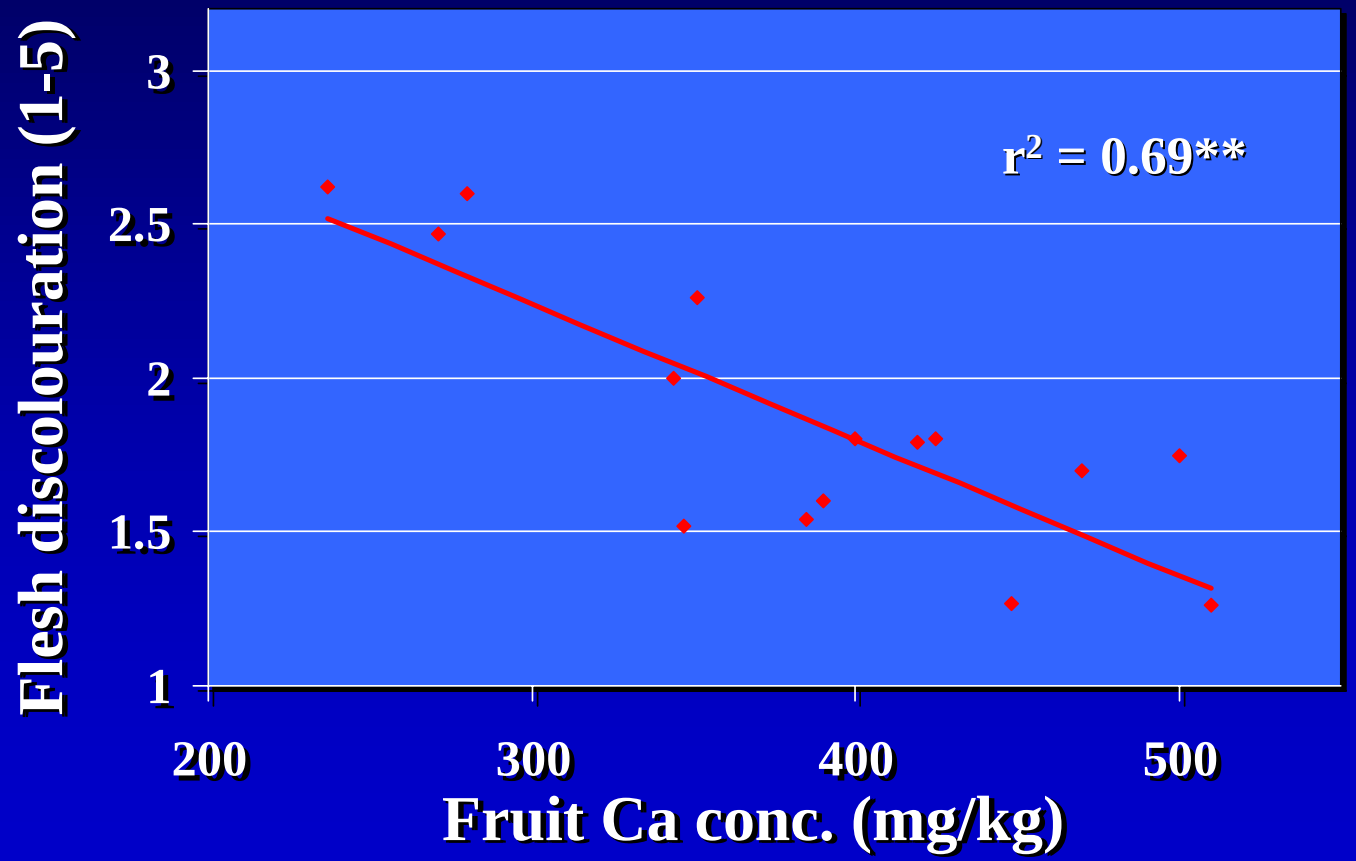
Calcium and Fruit Quality

- **Internal fruit disorders**



Source: Hofman *et al.* (2001)

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Calcium and Fruit Quality

- Shelf life
- Internal fruit disorders

Mg, K and N may also be implicated in the development of flesh disorders

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Calcium and Fruit Quality

- Shelf life
- Internal fruit disorders
- Anthracnose

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Calcium and Fruit Quality

- Anthracnose
  - The most serious issue affecting fruit quality, particularly when grown in the humid subtropics
  - Infects fruit at all stages of development by penetrating the skin then remains latent until ripening

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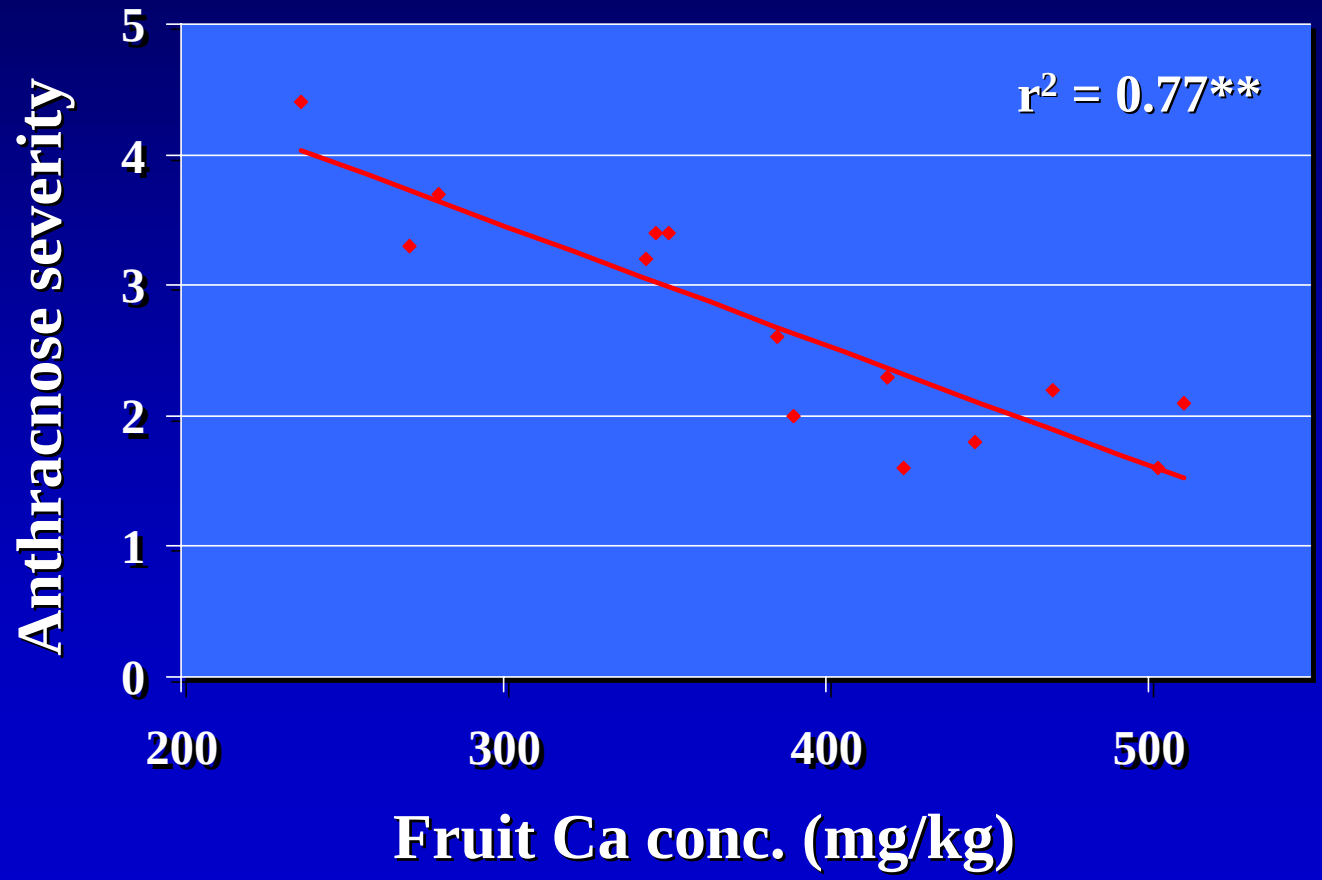
Calcium and Fruit Quality

- **Anthracnose**



Source: Hofman *et al.* (2001)

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Managing Calcium in Avocados

- Not simple to increase fruit Ca content
- Foliar applications have not worked in the past
- Soil applications are most effective (gypsum)
- Do not over-stimulate shoot growth
- Mid-bloom applied PGR's increase fruit Ca content

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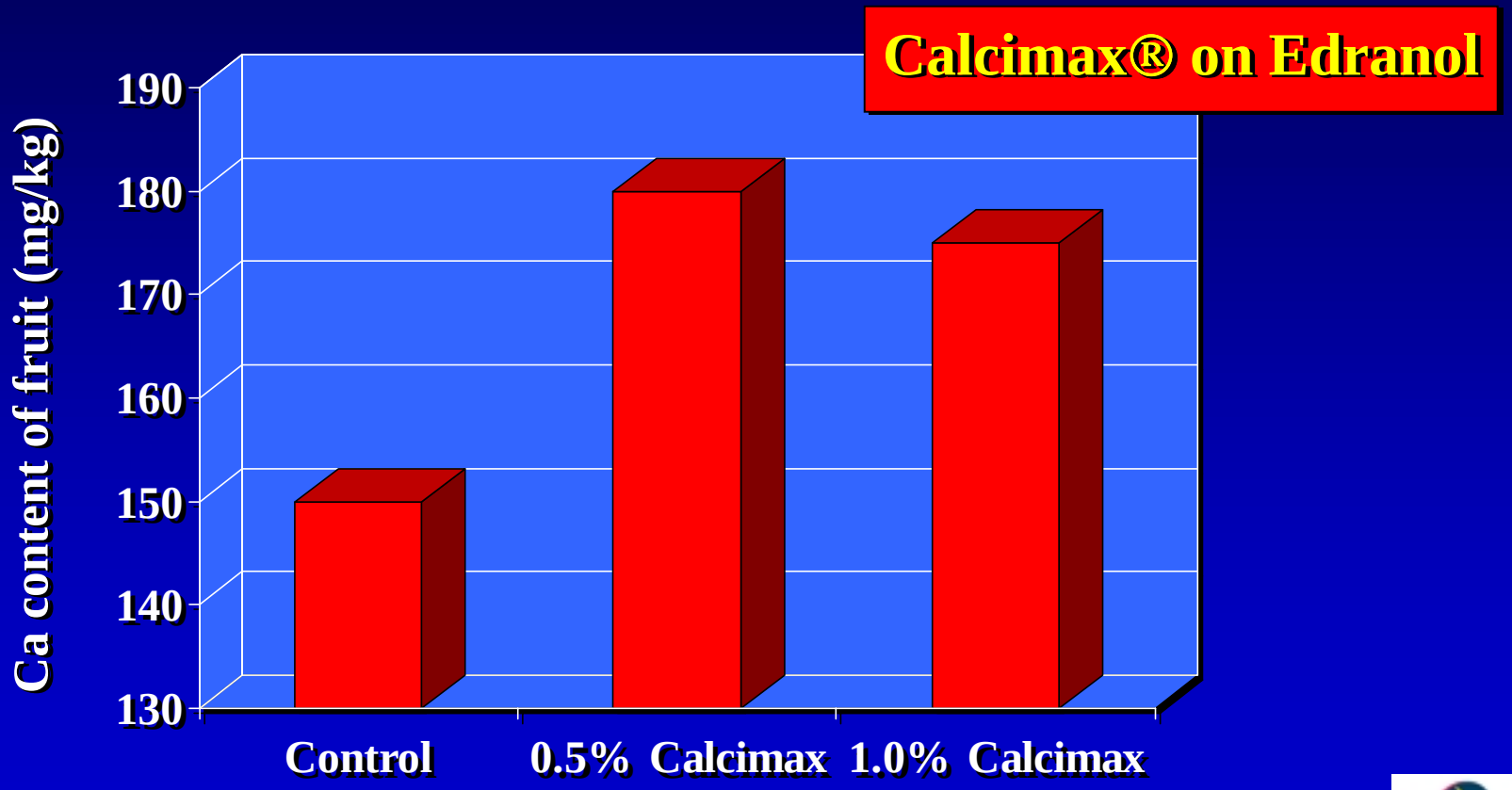
Managing Calcium in Avocados



Source: Penter and Stassen (1999)

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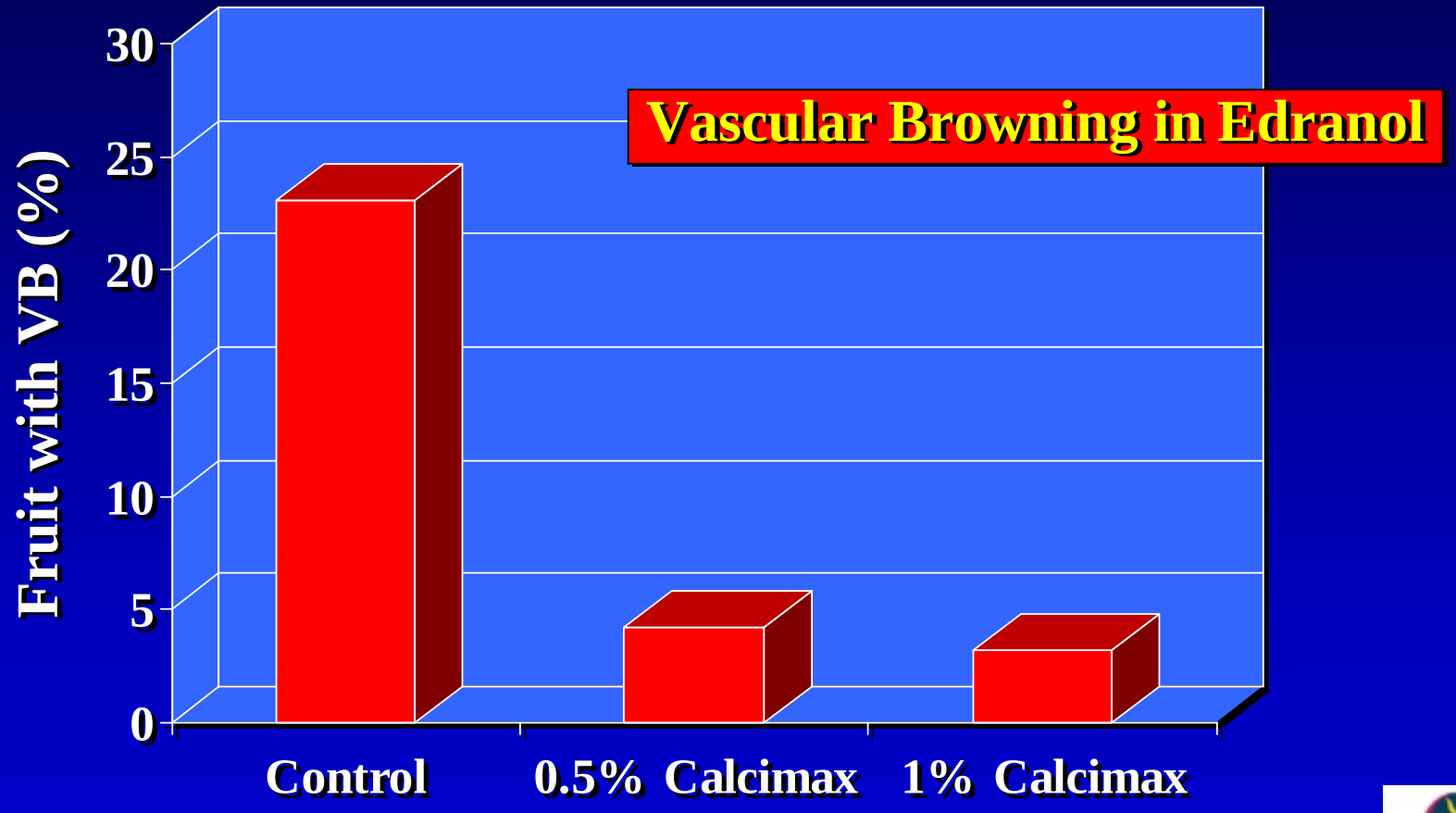
Managing Calcium in Avocados



Source: Penter and Stassen (1999)

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Management During the Critical Period

- Phytophthora root rot control
- Nutrition
- Plant Growth Regulators

Cultar®
Sunny®

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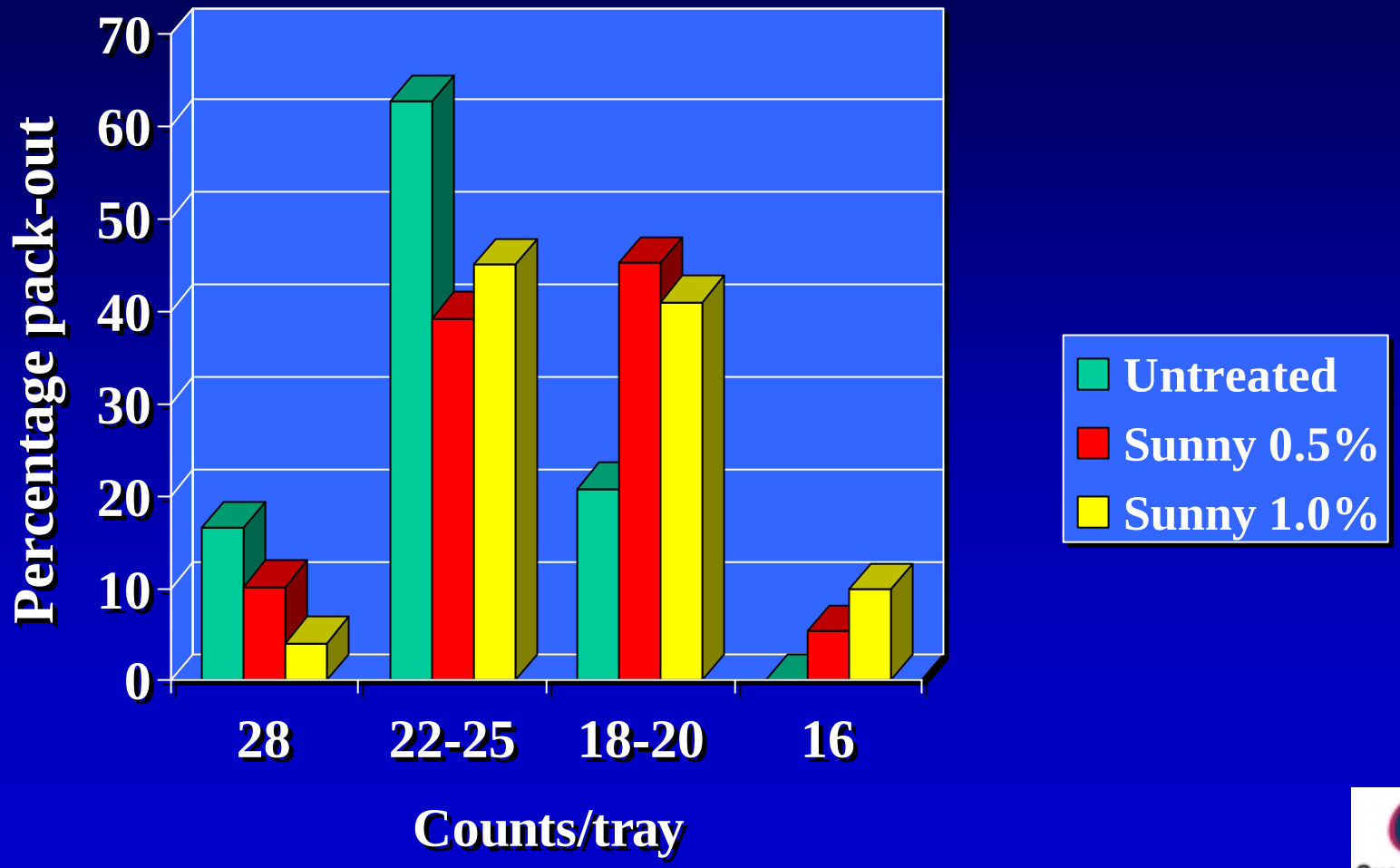
Effect of Sunny® on Size Distribution of Hass at Walkamin



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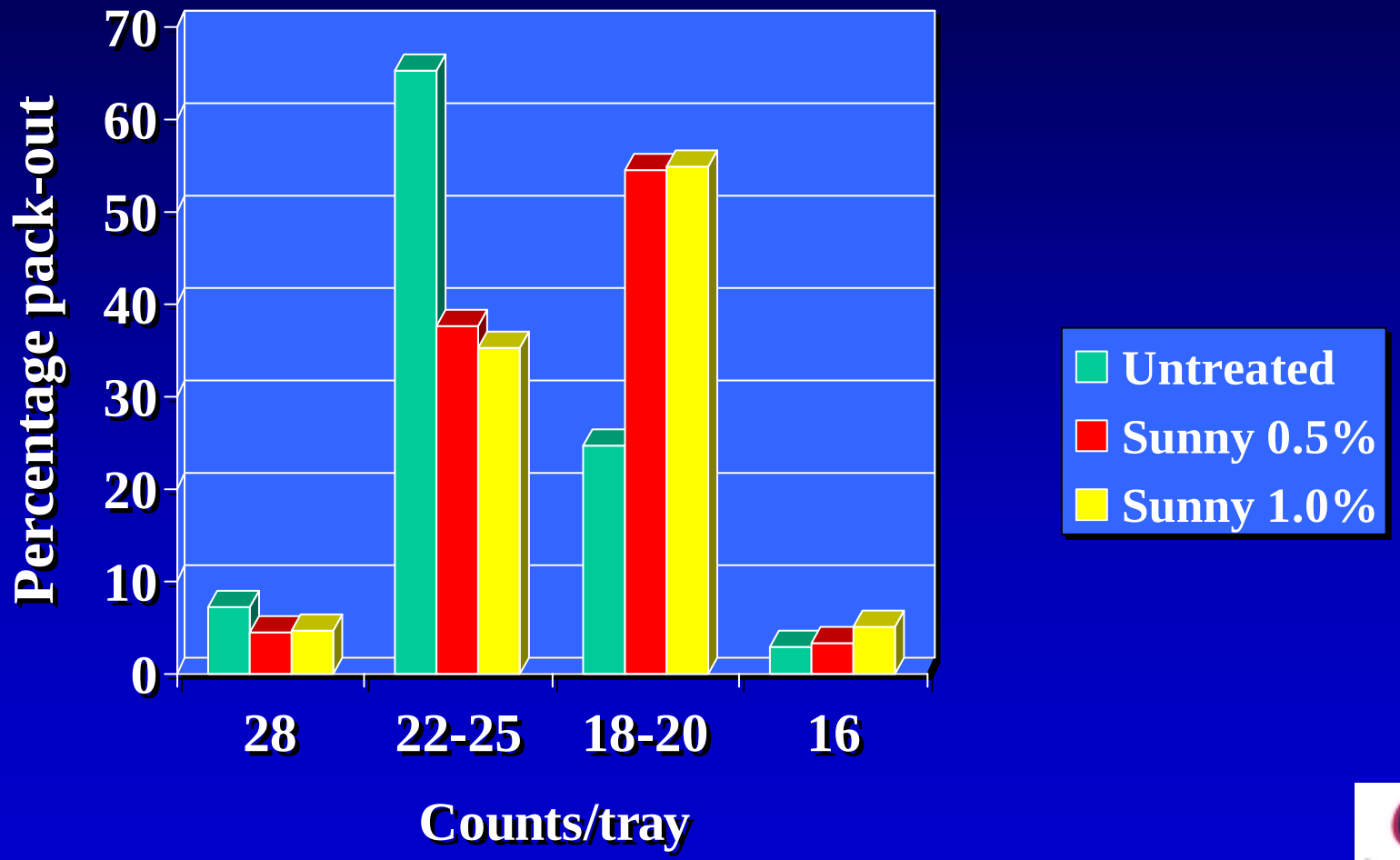
Effect of Sunny® on Size Distribution of Hass at Glasshouse Mountain



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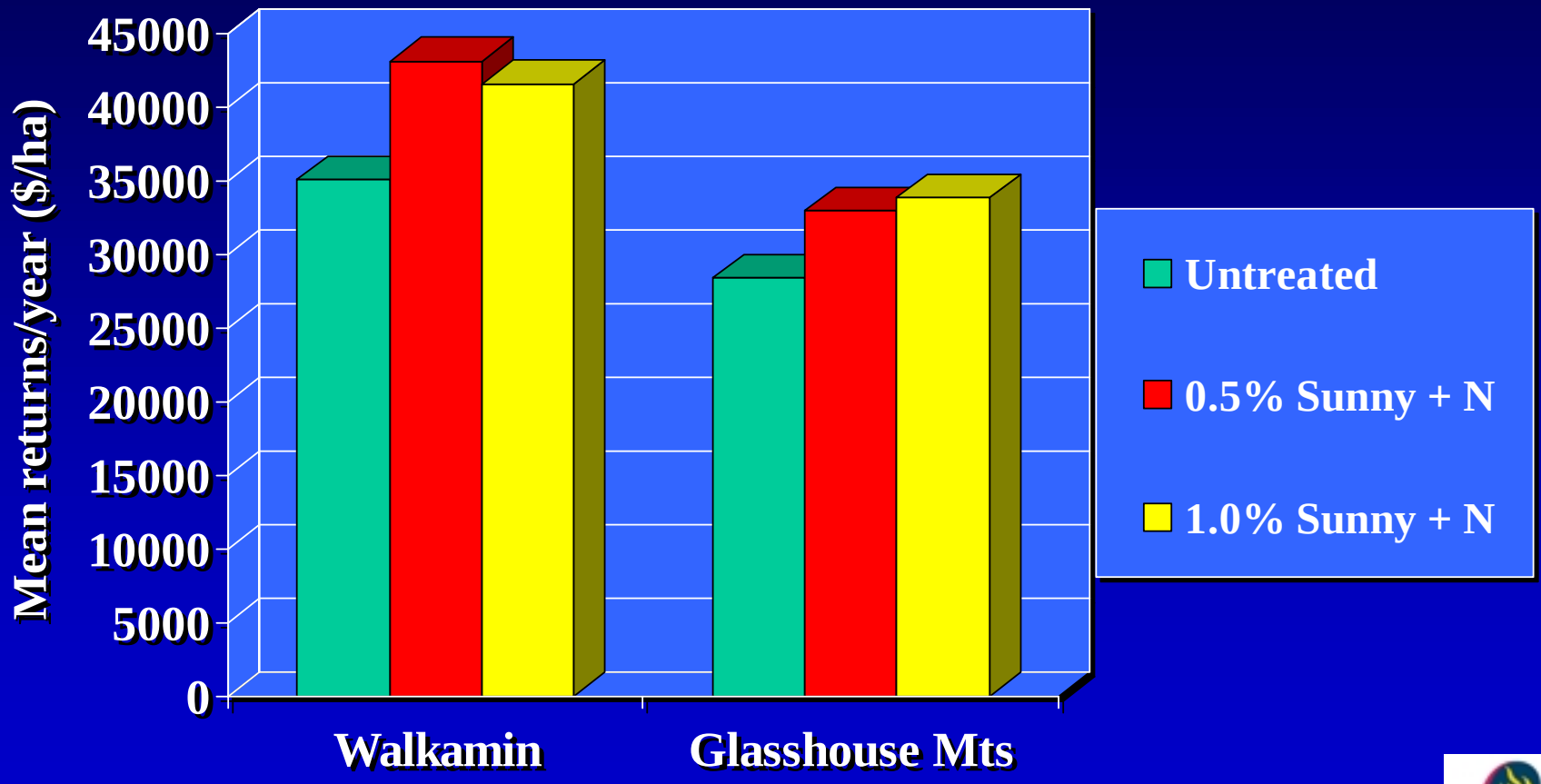
Effect of Sunny® on Returns ($/ha) from Hass over Two Years



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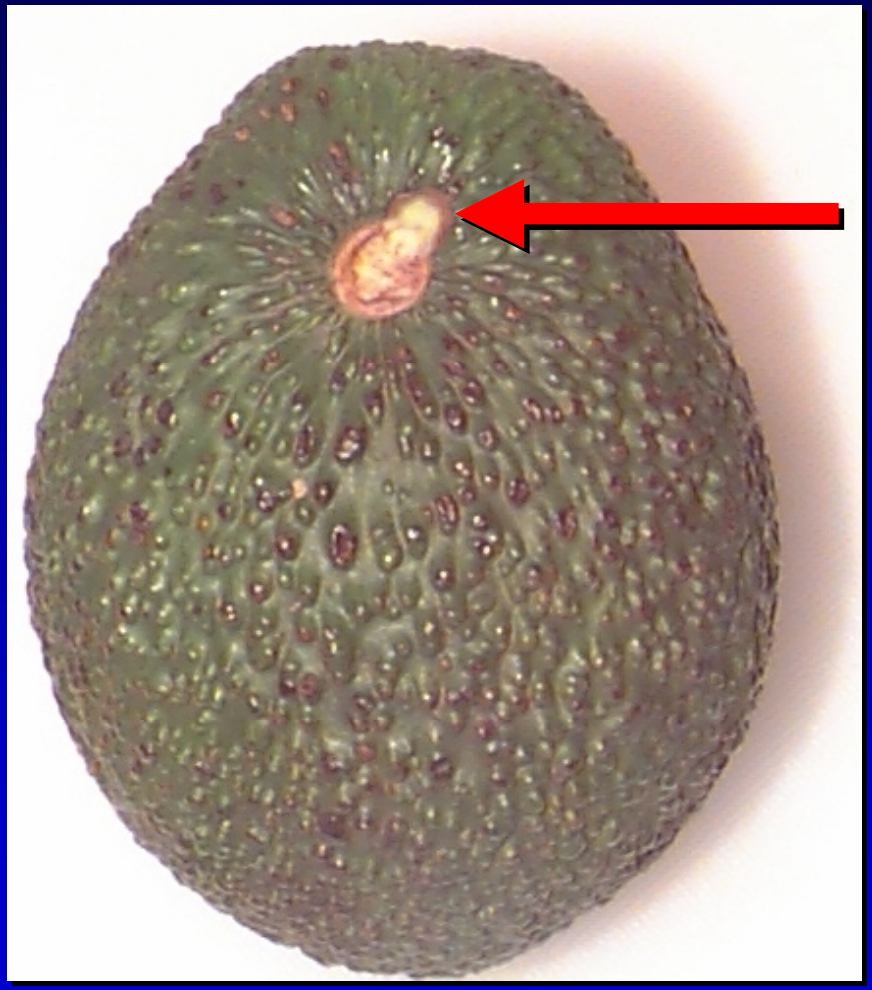
Potential Skin-tear Problem Following Use of Sunny® on Hass



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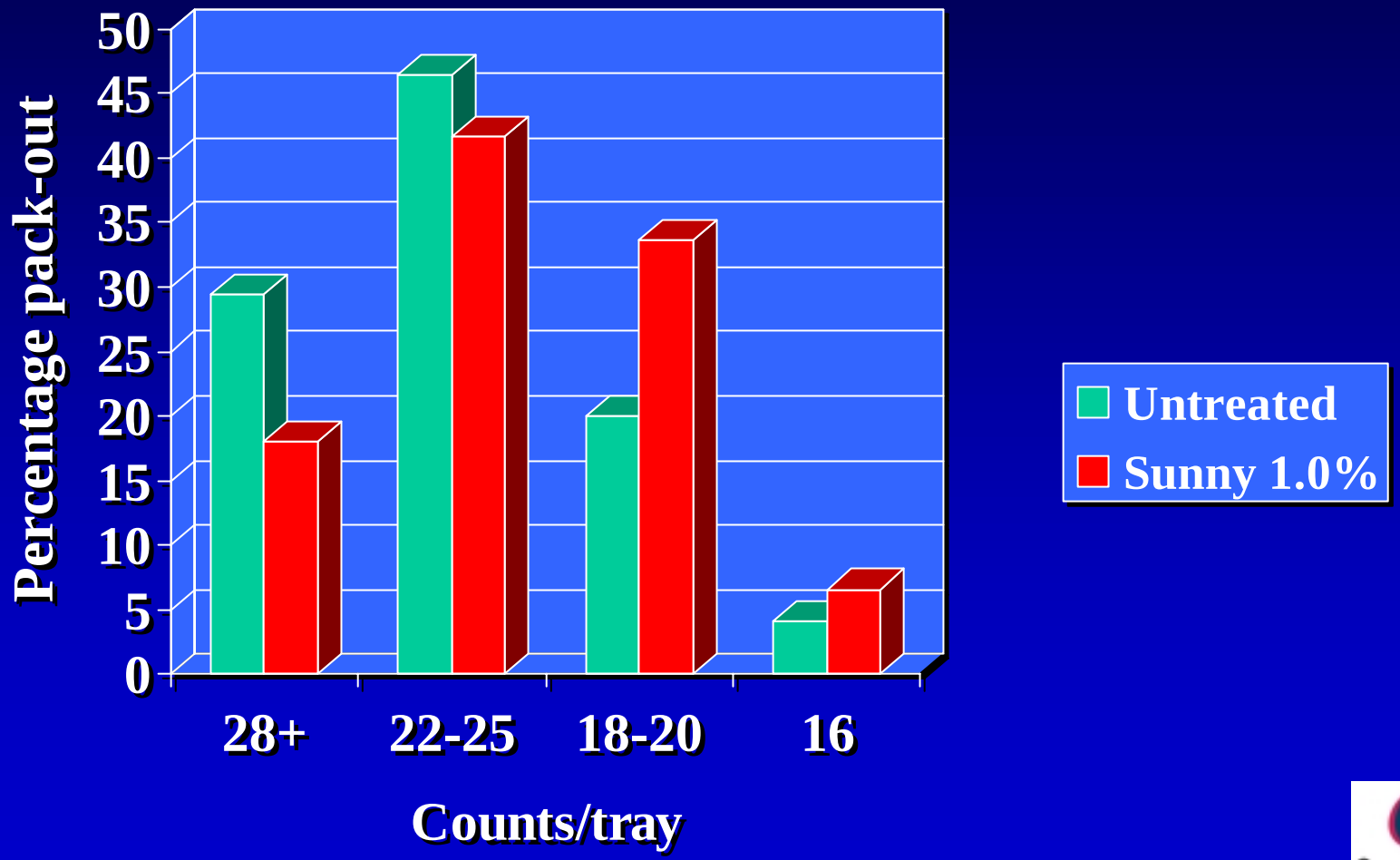
Effect of Sunny® on Size Distribution of Shepard at Childers



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Effect of Sunny® on the Fruit Shape of Shepard

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Effect of Sunny® on Returns ($/ha) from Shepard over Two Years

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Management of Fruit Quality

- Phytophthora root rot control
- Nutrition
- Plant Growth Regulators
- Other Management Practices

Includes - girdling
mulching

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Management of Fruit Quality

- Phytophthora root rot control
- Nutrition
- Plant Growth Regulators
- Other Management Practices
- Rootstocks

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The ~~jeans~~ genes make the difference!

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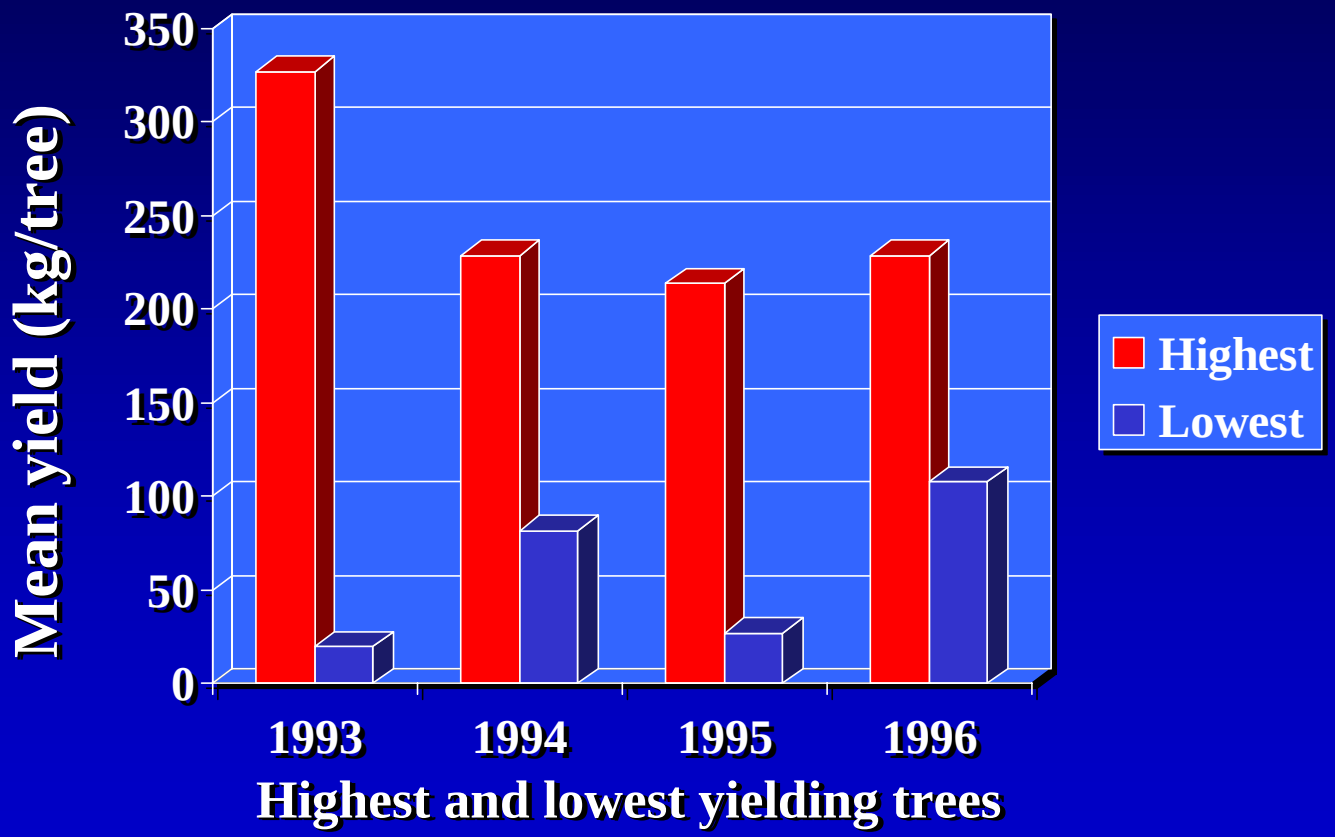
Comparison between Highest and Lowest Yielding Trees in Orchard Block



Source: Thomas (1997)

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Physiology of Scion/Rootstock Combinations

Are we dealing with Racism?

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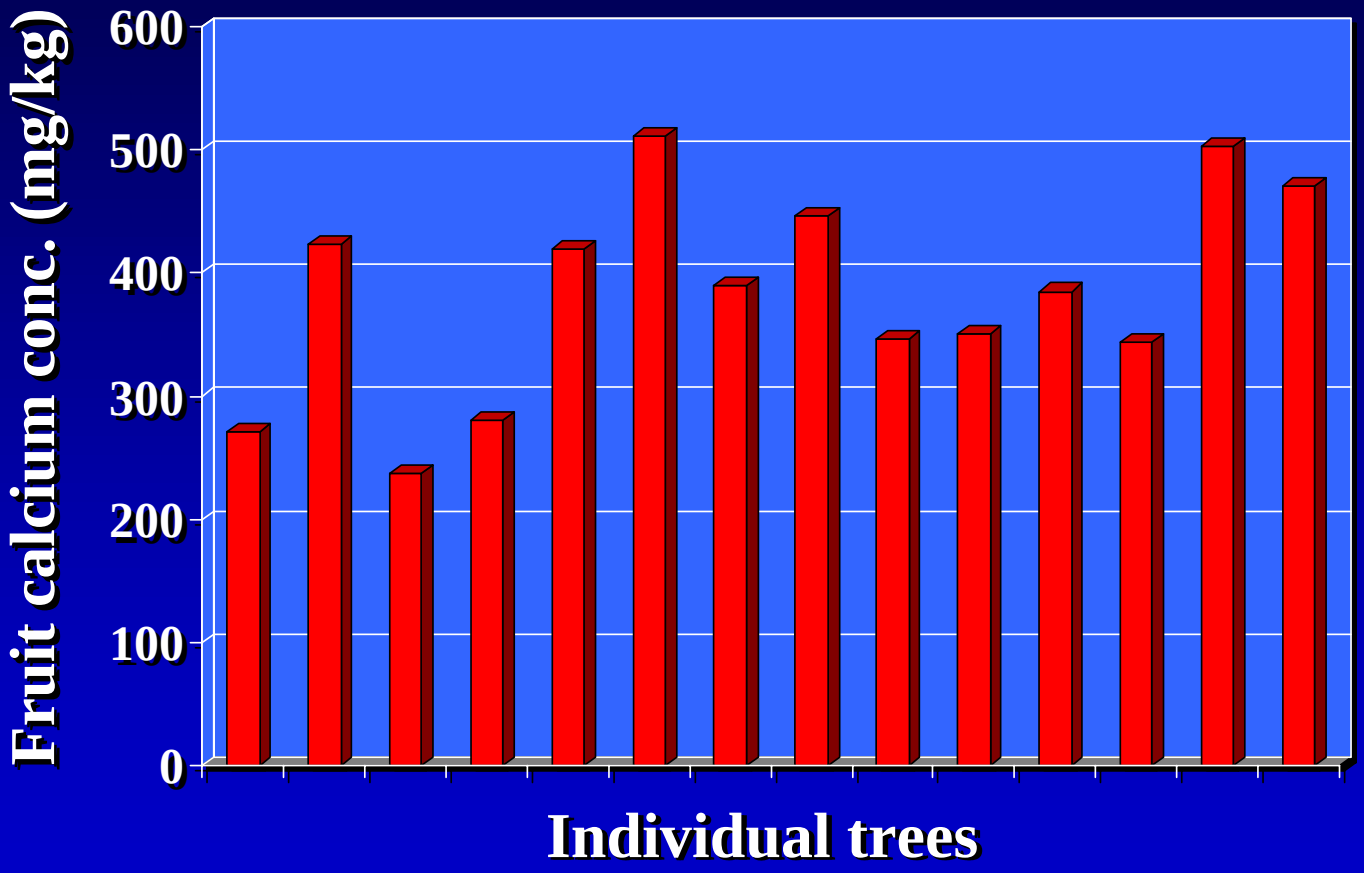
Differences in Ca Concentration in Fruit from Adjacent Trees



Source: S. Vuthapanich, P.J. Hofman & A.W. Whiley, unpublished results (1998)

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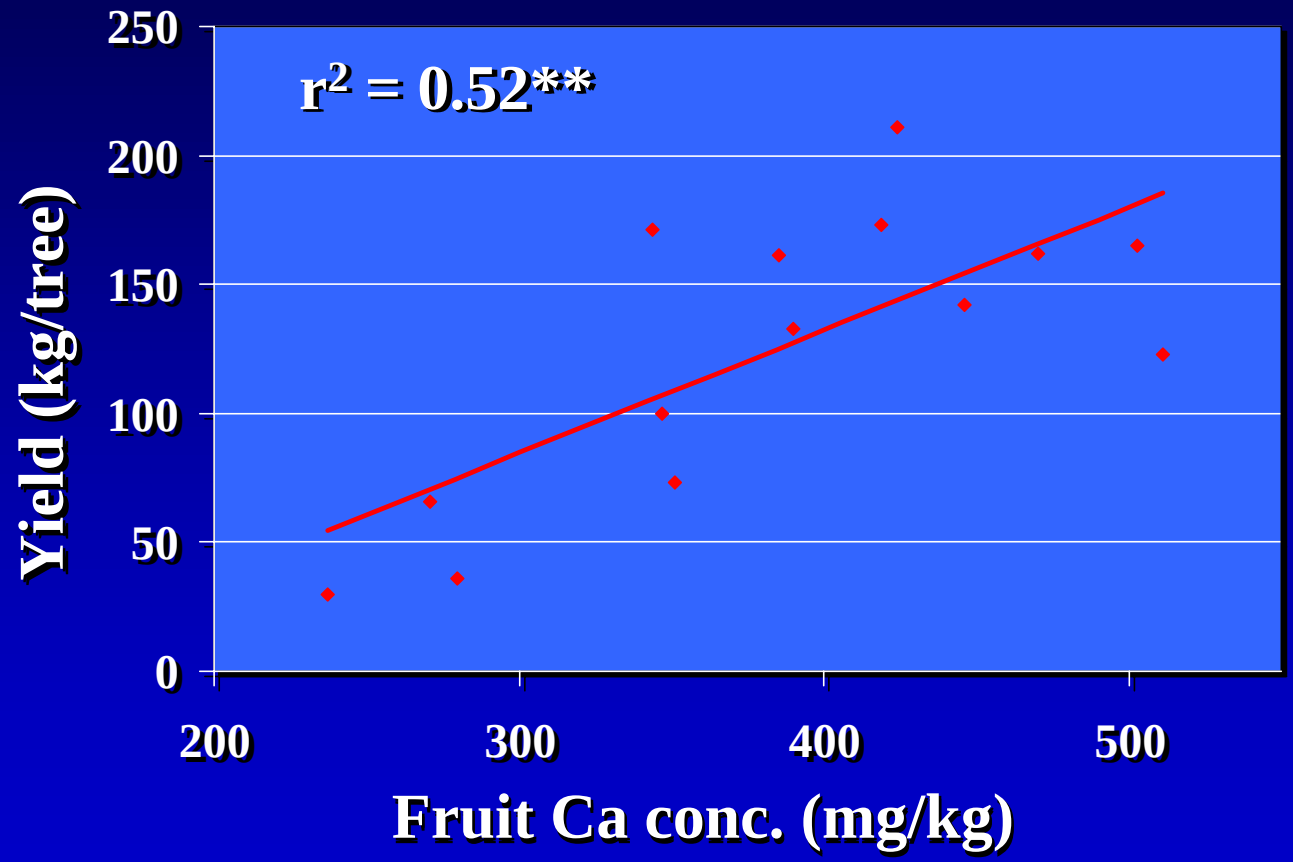
Relationship Between Yield and Fruit Ca Concentration



Source: Hofman *et al.* (2001)

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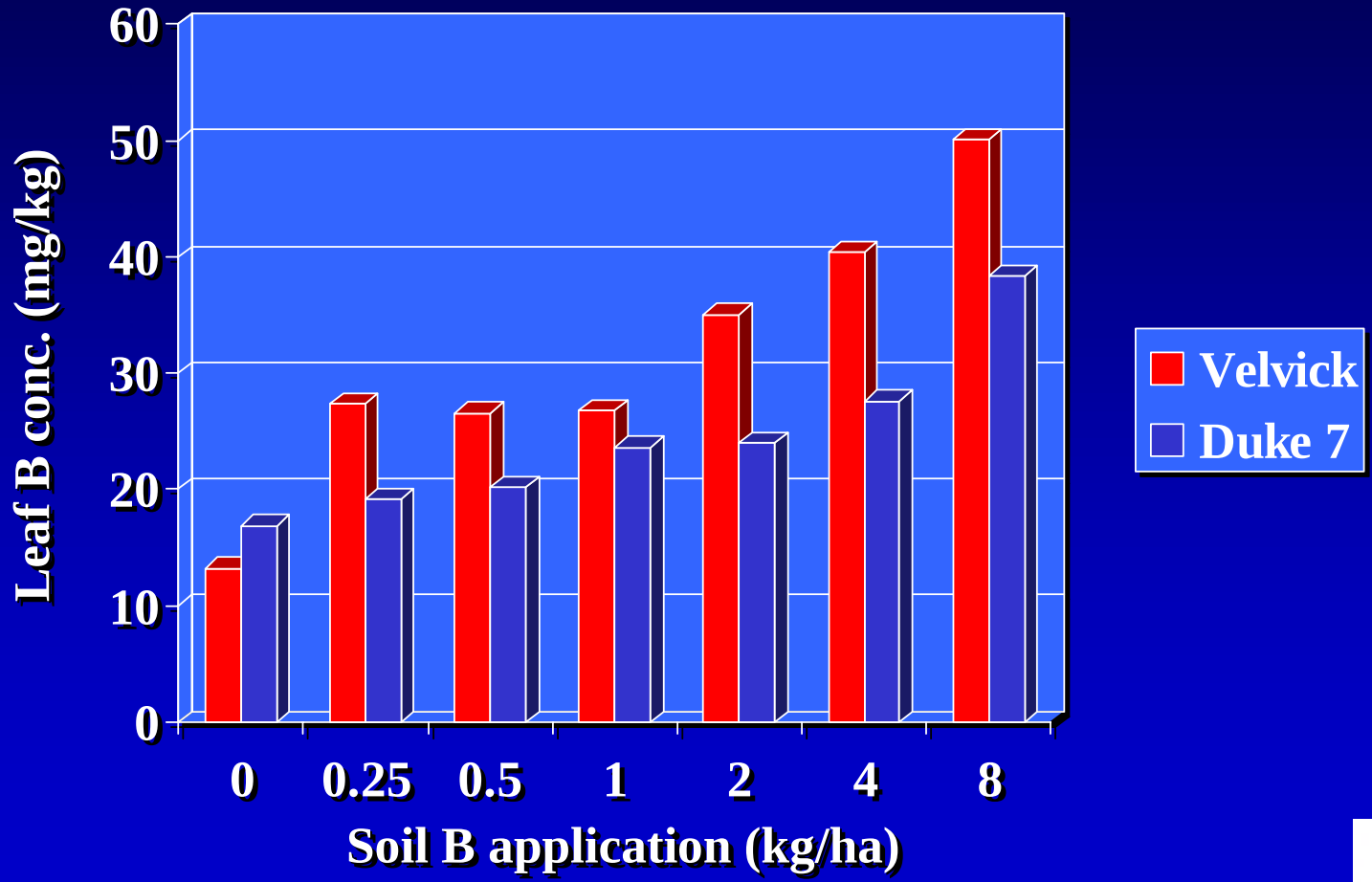
Effect of Rootstock on Boron Uptake in Hass



Source: Whiley *et al.* (1996)

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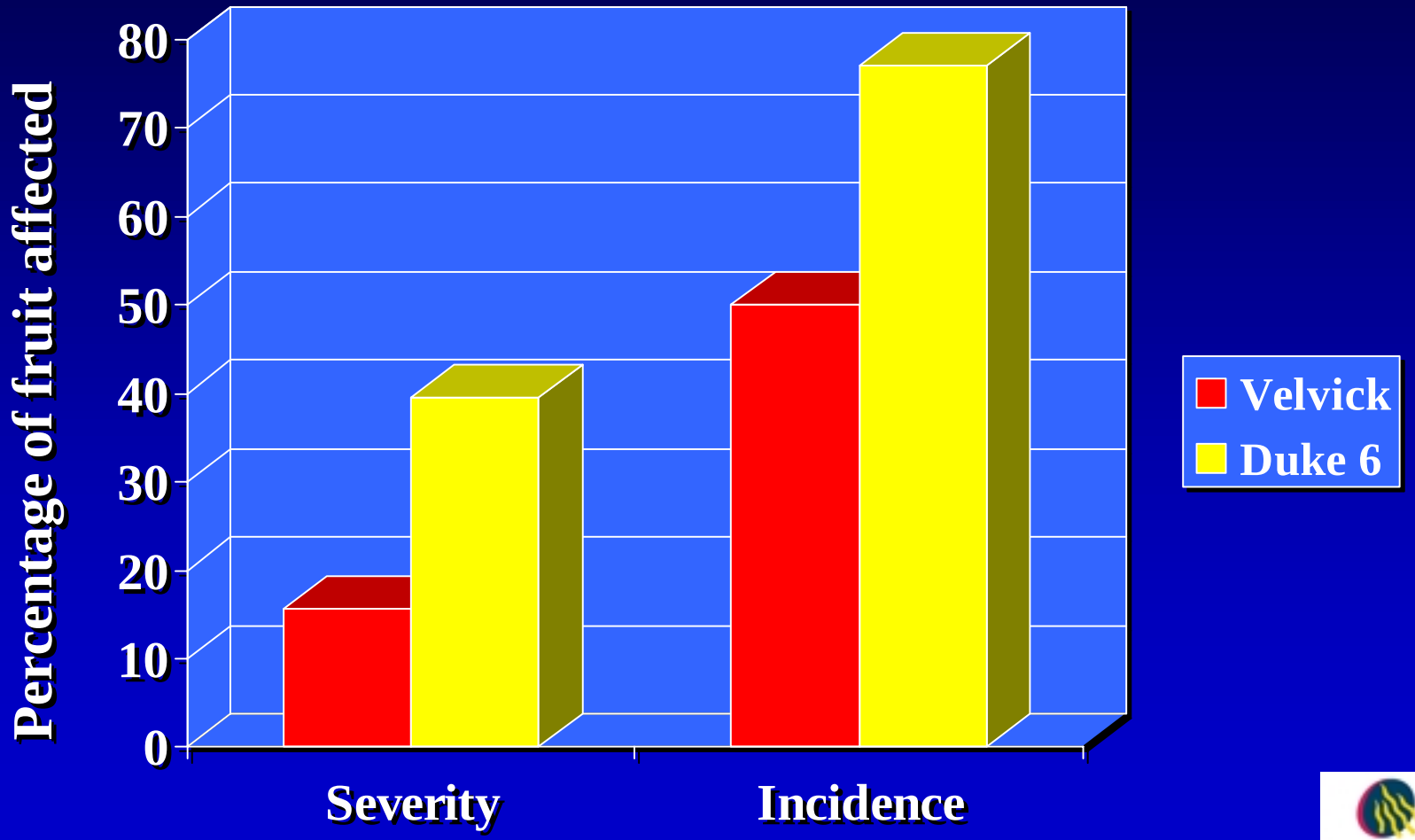
Effect of Rootstocks on Anthracnose



Source: Willingham *et al.* (2001)

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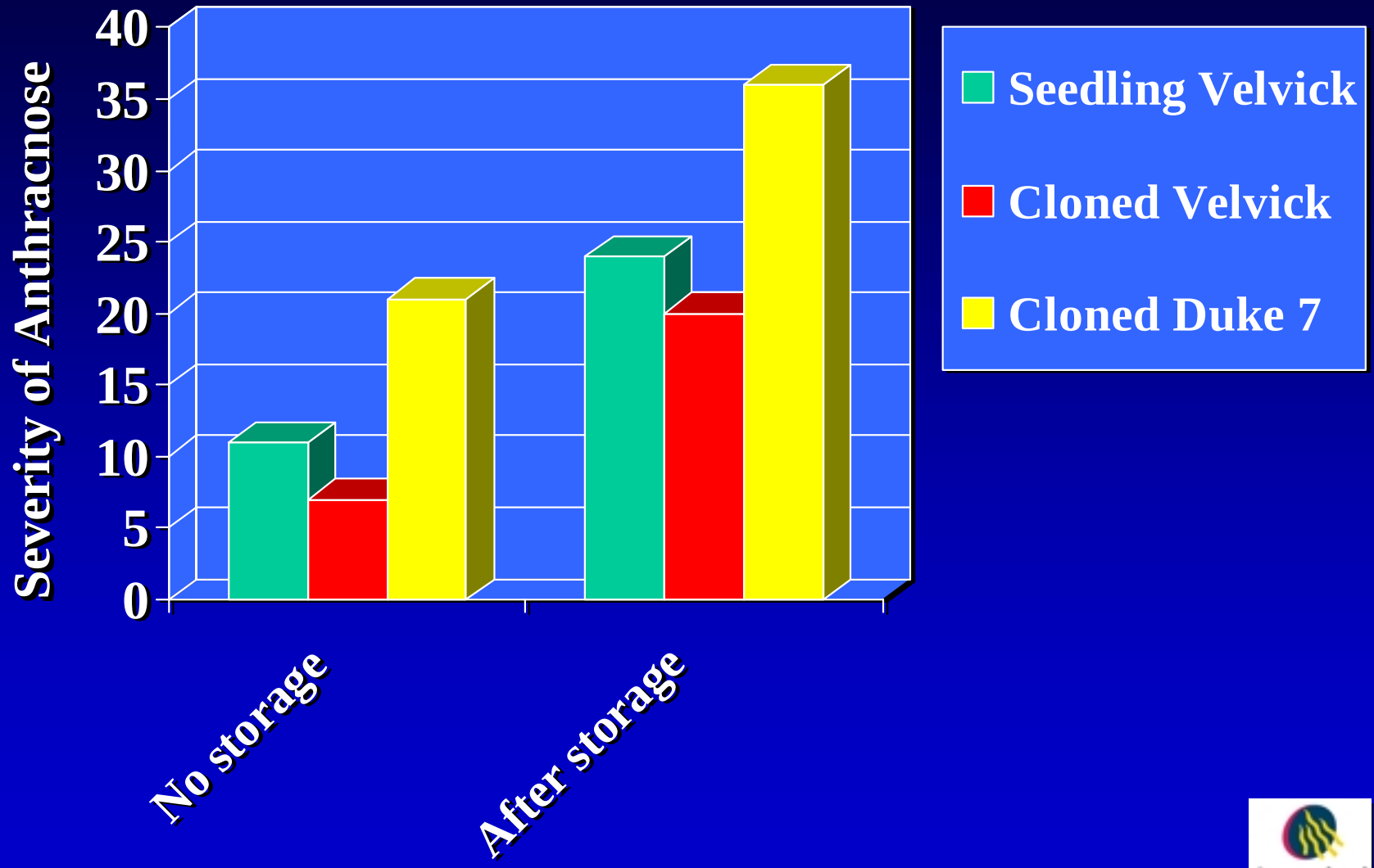
Effect of Rootstocks on Anthracnose



Source: Marques *et al.* (2001)

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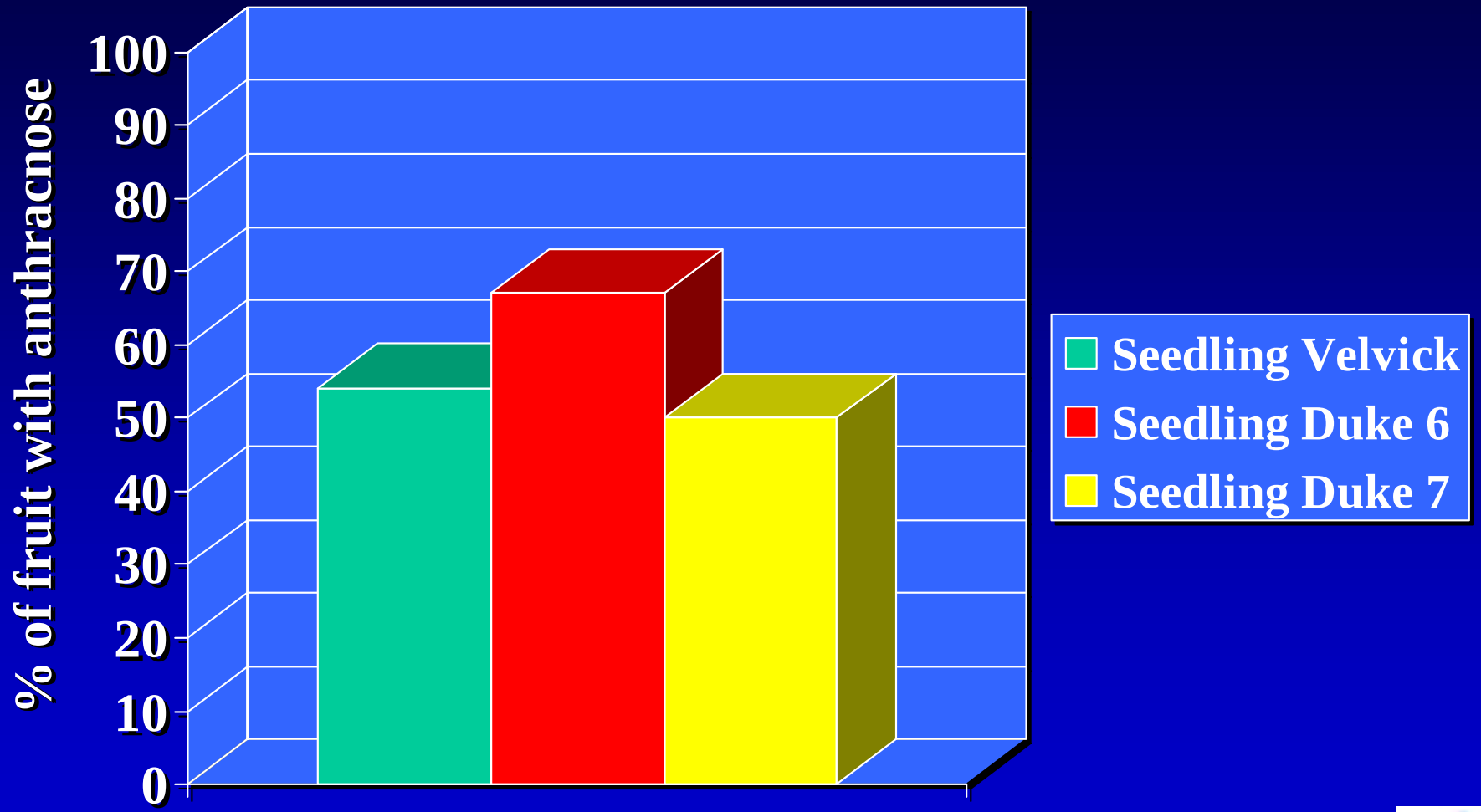
Effect of Rootstocks on Anthracnose



Source: J.R. Marques, unpublished results (2000)

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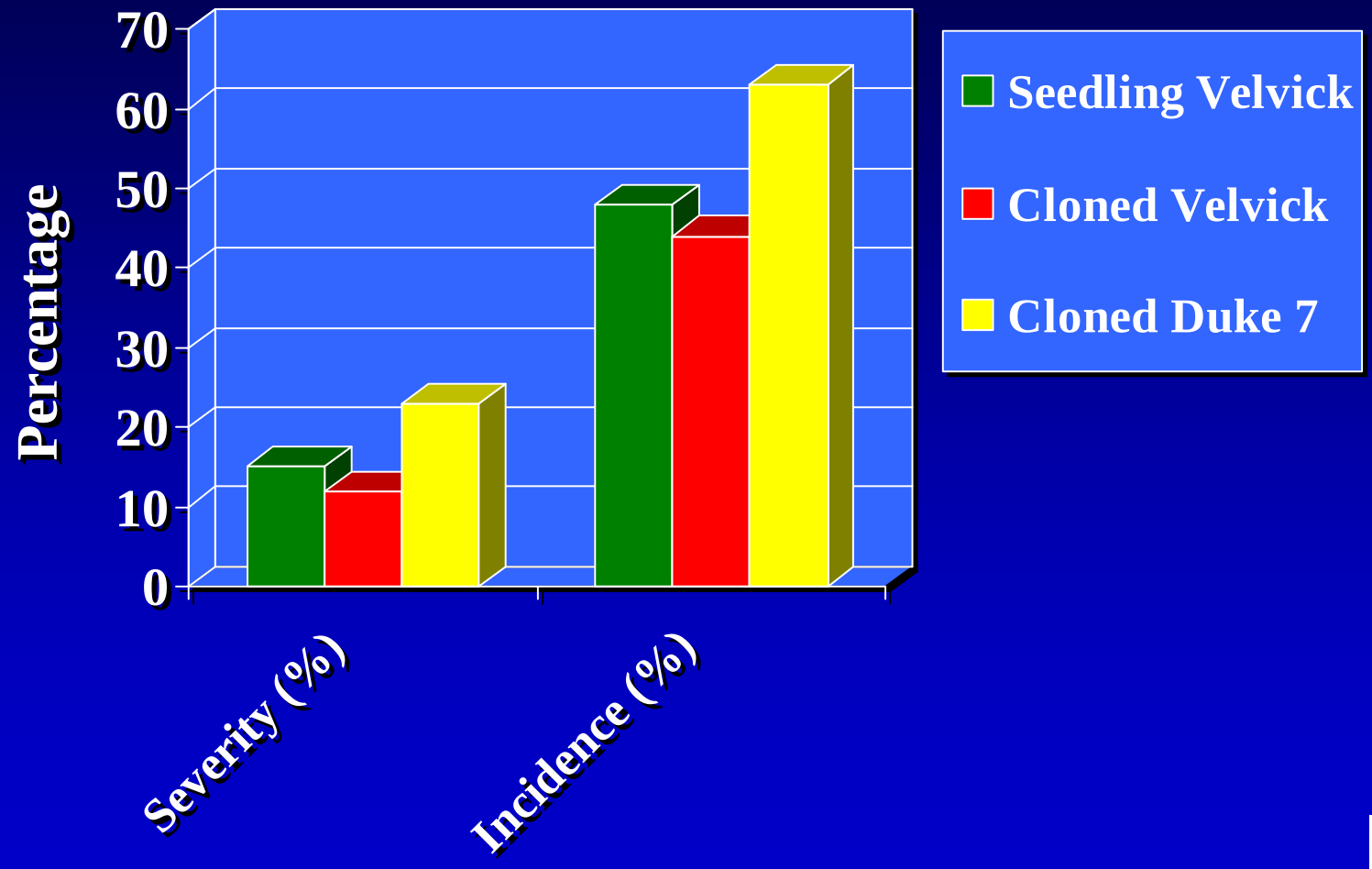
Effect of Rootstock on Flesh Discolouration Following Storage



Source: Marques *et al.* (2001)

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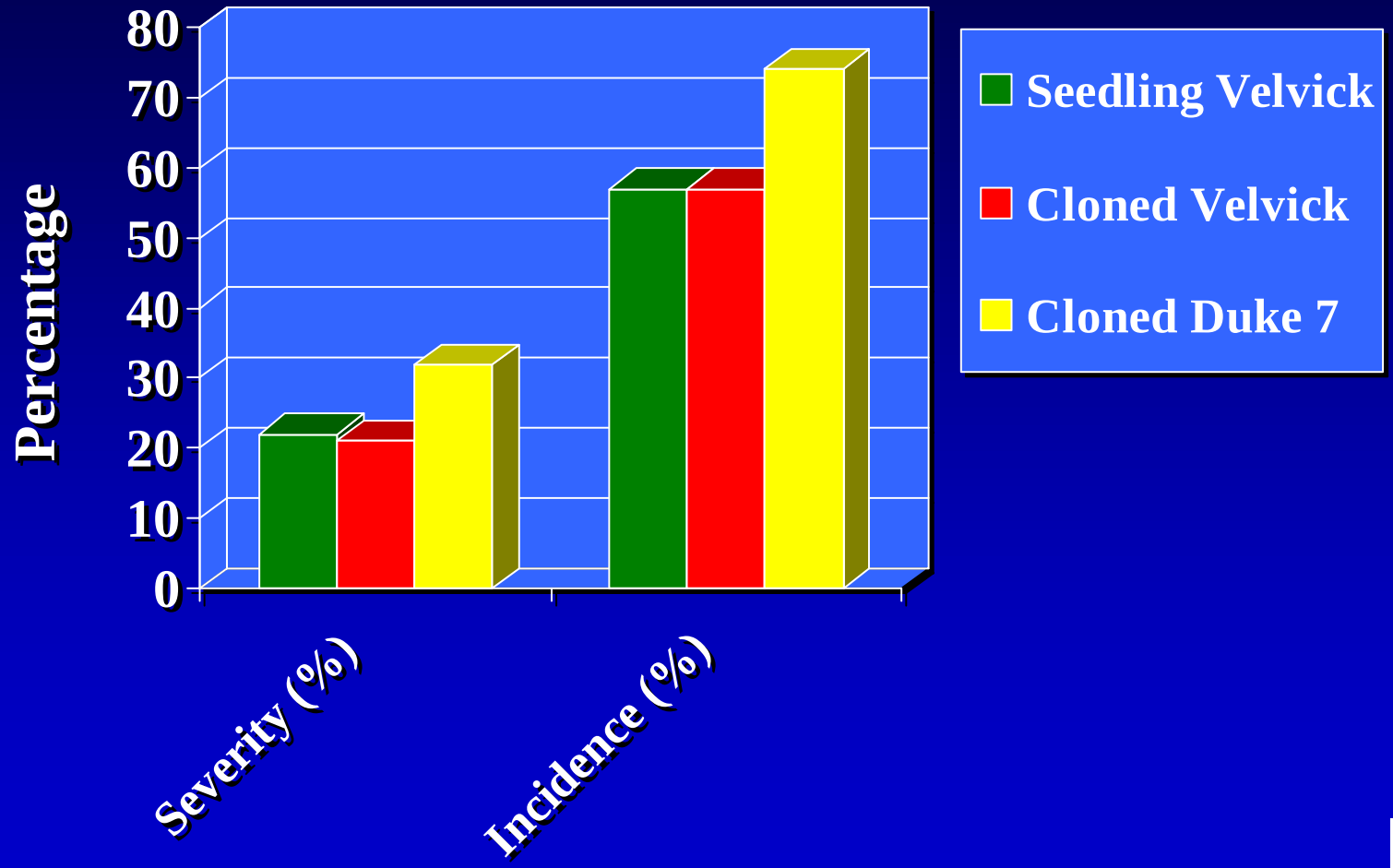
Effect of Rootstock on Vascular Browning Following Storage



Source: Marques *et al.* (2001)

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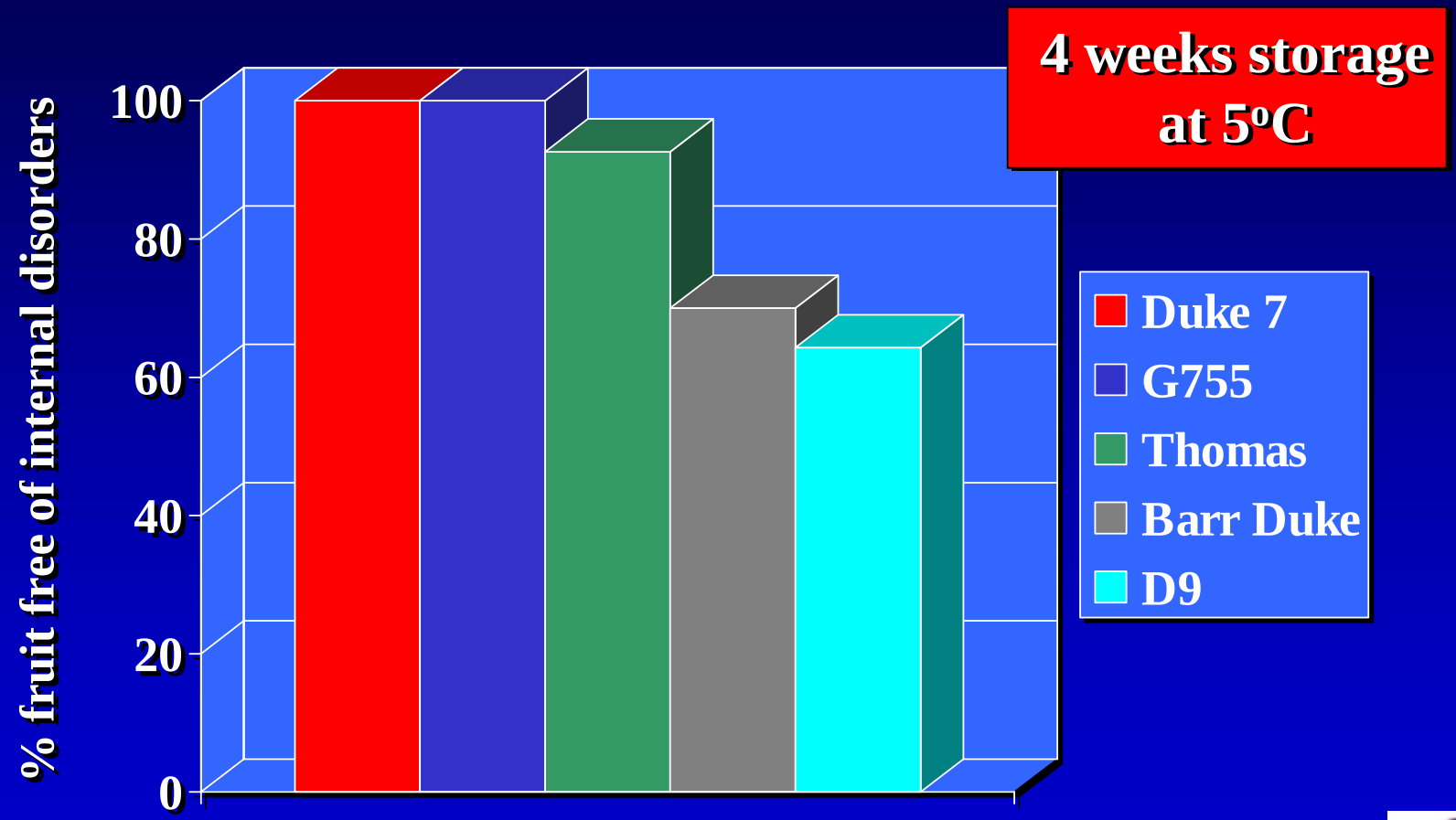
Effect of Rootstocks on Internal Fruit Disorders in Hass



Source: Smith (1993)

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Vision 2020

"A journey of a thousand miles must begin with a single step"

Source: Lao-Tzu, Chinese philosopher (300 BC)

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Vision 2020

I trust with the advantage of "2020 Vision" your industry will move forward in this direction and take the first step!

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Acknowledgments

I wish to thank the following for support to progress the ideas developed in this presentation:

Australian Avocado Growers Federation

Horticulture Australia

Queensland Horticulture Institute

Sumitomo Chemicals Australia