Stonefruit mealiness – the quiet destroyer

Suzie Newman

Postharvest Horticulturist

Gosford Horticultural Institute

NSW DEPARTMENT OF **PRIMARY INDUSTRIES**

Australian Springfruit/Summerfruit

- Consumption 1-2 pieces per week during the season
- Peach and nectarine production largely static, some increase in plum production
- Variable quality – poor eating experience early in the season may lead to less repeat purchases
- Main complaints are no flavour, not juicy, floury (mealy)

Stonefruit mealiness – the quiet destroyer

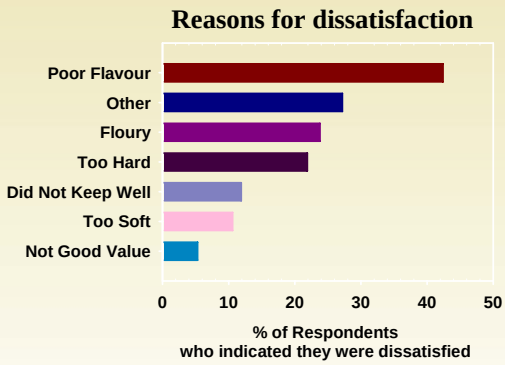
- **Why** Australian consumers are sometimes dissatisfied with stone fruit?
- **What** are the major physiological disorders of stone fruit?
- **What** are the main causes of mealiness or internal breakdown?
- **How** we might reduce the incidence of these disorders?

What do consumers think?

- In-store supermarket survey of 10 stores in NSW and SA
- Survey took place in February 2003 and 2004
- 900 consumers were interviewed
- Asked about their
  - purchasing habits
  - likes and dislikes
  - what they thought of a ‘Ready to Eat’ product

Consumer response

- 83% of customers were satisfied with their stone fruit purchases
- 2003 was a good season
  - Good fruit quality
  - High level of soluble solids



Major reasons for poor eating quality

- Low fruit sugars
- Fruit that fail to ripen properly
- Fruit that are ‘mealy’, ‘floury’ or ‘leathery’

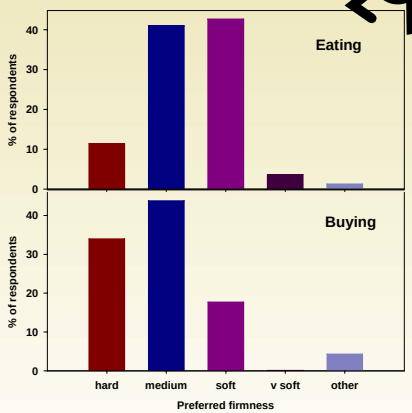
Quality - what do consumers really want?

- Taste
  - Flavour (sweetness, acidity, balance)
    - 11º Brix yellow-flesh high acid
    - 12 º Brix white-flesh low acid
  - Aroma (smell)
- Texture
  - Softness, 'Ready to Eat'?
  - Typical of type
  - Juicy, not mealy
- Appearance
  - Colour (external and internal)
  - No defects
- Nutritive value
- Shelf life
  - Ripens normally
  - No rots or internal breakdown

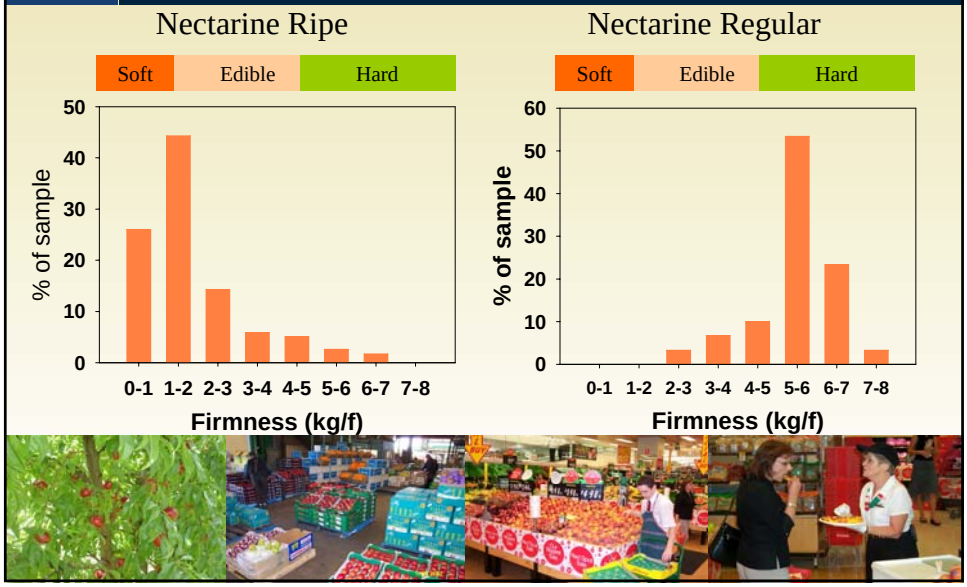
Preferred firmness

Results from an in-store survey in Sydney and Adelaide in 2003 and 2004

(900+ respondents)



So what softness are fruit sold at? (NSW)

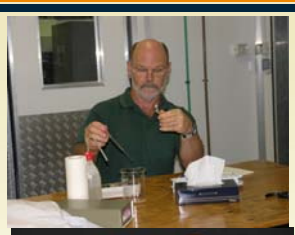


Mealiness – 'the unseen problem'

- Mealiness develops during the supply chain
- The quality of the fruit is good when it leaves the farm
- No easy tests for determining if a fruit is mealy
- Consumer who discovers the problem at the point of eating
- Makes the fruit inedible

Major physiological disorders

- ‘Dry’, ‘mealy’ or ‘floury’ fruit that lack juice *or* ‘leathery’ fruit that are hard textured with no juice
- Internal browning
- Flesh bleeding or internal reddening



What are the causes?

- Chilling injury
  - Occurs when fruit are stored in the ‘danger zone’ between 2ºC and 7ºC
  - Does occur at lower temperatures but the rate of onset is much slower
  - For some varieties chilling injury may develop within 1-2 weeks for fruit stored at 5ºC, compared to 3 or more weeks for fruit stored at 0ºC

So how long in the 'danger zone' is too long?

- For chilling sensitive varieties 3-7 days
- Time spent at temperatures in the 'danger zone' is cumulative
- We need to look at temperatures right along the entire supply chain

Grower → **Transport** → **Wholesaler** → **Distribute** → **Retailer**

What factors increase susceptibility?

- Variety
  - In general, early season yellow fleshed peaches and nectarines tend to be less susceptible to chilling injury than late season varieties
  - However this is not the case for white fleshed varieties
  - Varieties may be ranked as
    - Highly (Flavorcrest, Elegant Lady)
    - Moderately (Summer Fire, Snow Giant)
    - Slightly (Summer Grand, Spring Lady

    Susceptible to chilling injury
  - Some varieties have not been evaluated

Factors that increase susceptibility

- Maturity
- Crop load
  - High crop load – low incidence
  - Commercial crop load – intermediate
  - Low crop load – highest incidence
- Canopy position and pruning
  - Inner canopy – higher incidence
  - Outer canopy – lower incidence
- Plant Growth Regulators
  - Gibberellins and AVG (ReTain)?????

Preventing mealiness from developing

- Storing and handling fruit at the right temperature (0ºC - 2ºC) **throughout** the supply chain
- Using forced air cooling to cool fruit as quickly as possible to minimise the amount of time spent in the 'danger zone'
- Controlled ripening program – 'Ready to Eat'
- Intermittent warming during storage

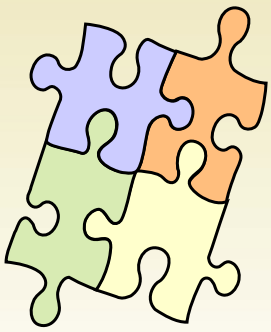
Preventing mealiness from developing

- Controlled atmosphere storage – only really economic for export or long term storage
- Ethylene added to the storage environment in some cases reduced the incidence of chilling injury
- Ethylene inhibitors (1-MCP) may increase the incidence of chilling injury by interrupting the normal ripening process but more research is required
- Long term solution – developing varieties that are resistant to chilling injury

Further work

- Testing the susceptibility of varieties to chilling injury
- Developing a test that would enable fruit to be easily checked for mealiness development
- Further research on the effects of preharvest factors (irrigation, plant growth regulators, fertilisers) and postharvest factors (storage environment, controlled ripening, ethylene inhibitors) on mealiness development

The Quality Jigsaw



- Preharvest
  - Canopy position
  - Irrigation
  - Crop load
  - Nutrition
  - Training system
  - Variety and rootstock
- Postharvest
  - Maturity
  - Storage conditions (temperature, humidity, atmosphere)
  - Conditioning or ripening treatment
  - Postharvest treatments