Breeding New Pears for the Modern Consumer

Lester Brewer
New Zealand Apple and Pear Cultivar Breeding Locations

- Havelock North (Hawke’s Bay region)
- Motueka (Nelson region)

- Stage 1 Apple
- Stage 1 Pear
- Stage 2 & 3 Apple/Pear
Breeding Pears for the Modern Consumer

1. Germplasm - what are we breeding with?
2. Traits - what are we breeding for?
2. Approach - how are we breeding?
4. ‘PremP009’
5. ‘PremP009’ - consumer responses
Germplasm - what are we breeding with?

P. communis

P. communis x P. pyrifolia

P. x bretschneideri

P. ussuriensis x P. pyrifolia

P. pyrifolia

P. pyrifolia x P. pyrifolia
Traits - what are we breeding for?
New Pears should be convenience to eat

‘Ready-to-eat, any time, anywhere’

From harvest through to after cold storage

No chill induction, no ripening

Ready to eat at time of purchase

Extended storage and shelf life

A consistently great eating experience
Post-storage fruit quality

Fruit appearance
- Bright colours
- Even shape
- Blemish-free
- Large size

Post-storage eating quality
- Crisp & juicy flesh texture
- No stone cells
- High sweetness/ flavoursome
- Non-offensive skin
- Free from disorders
- Scuff free
Fruit Scuffing Tolerance

All fruit selected must pass the scuff test

Source of resistance

Scuff breeding value (eBV)

(from Brewer et al. 2011)
Interspecific Pear Breeding – Flavours identified in generation 2&3

<table>
<thead>
<tr>
<th>Flavour</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tropical</td>
<td>6-10%</td>
</tr>
<tr>
<td>Plum</td>
<td>0-1%</td>
</tr>
<tr>
<td>Nutty</td>
<td>1-2%</td>
</tr>
<tr>
<td>Melon</td>
<td>0-2%</td>
</tr>
<tr>
<td>Citrus</td>
<td>1-2%</td>
</tr>
<tr>
<td>Apple</td>
<td>1-2%</td>
</tr>
<tr>
<td>Peach</td>
<td>0-3%</td>
</tr>
<tr>
<td>Canned Pear</td>
<td>5-12%</td>
</tr>
</tbody>
</table>

23-25% seedlings with distinctive flavours
Pest and Disease Resistance Targets

Fire blight

Pear scab (*Venturia pirina*)

Psylla (not present in New Zealand)
Multi species breeding provides massive variation
Approach – How are we breeding?
Conventional Apple/Pear Breeding Cycle

- **Generation interval:** ~ 4 - 5 years
- **Commercial cultivar development:** ~ 13 years
Apple/Pear Commercialisation - the Prevar model

International Cultivar Licensees

NZ Industry Cultivar Licensees

APAL

Pipfruit NZ

Plant & Food Research

Plant & Food Research Breeding Programme

AIGN (New Zealand Fruit Tree Nursery = NZFTC)
‘PremP009’
‘PremP009’ Growth Habit
Multiple trees at Multiple Commercial Orchard sites
‘PremP009’ - Rethinking Training Systems (Future Orchard Planting Systems)
‘PremP009’ - Defining and Validating Harvest Parameters

- Skin colour changes during maturity = major harvest index for ‘PremP009’

Harvest timing: 10-14 days after ‘Bartlett’
‘PremP009’ - Flavour Increases with Cold Storage and Shelf Life

- Canned pear flavour score
- Time in cold storage (weeks)

![Bar chart showing canned pear flavour score across different storage times and conditions.]

- Harvest:
  - 7 day ambient: slight
  - 1 day ambient: none

- 4 weeks:
  - 7 day ambient: mod.
  - 1 day ambient: high

- 12 weeks:
  - 7 day ambient: high
  - 1 day ambient: high

- 24 weeks:
  - 7 day ambient: high
  - 1 day ambient: high
‘PremP009’ - Production and Fruit Size Distribution

Yield (MT/ha)

Proportion of fruit (%)

Fruit weight (g)

Trees 3rd leaf; Quince BA29/BH interstock

Fruit No. /18.3kg box
‘PremP009’ - consumer responses
‘PremP009’ Potential Market Value

• Evaluation in public forum constrained by US Plant Patent Laws

• Information that predicts ‘added-value’ of a selection

• Comparison of new selections with ‘similar’ standard

Dr Sara Jaeger
‘PremP009’ – Response of New Zealand Chinese Consumers

Proportion of consumers (%)

Unripe 'PremP009'
1=Dislike extremely
2=Dislike very much
3=Dislike moderately
4=Dislike slightly
5=Neither like nor dislike
6=Like slightly
7=Like moderately
8=Like very much
9=Like extremely

Proportion of consumers (%)

Ripe 'PremP009'
1=Dislike extremely
2=Dislike very much
3=Dislike moderately
4=Dislike slightly
5=Neither like nor dislike
6=Like slightly
7=Like moderately
8=Like very much
9=Like extremely
PremP009’ - Taste Descriptors used by Consumers

- Sweet
- Floral
- Tropical
- Coconut
- Bland
- Canned Pear

Consumers (%)

- ‘Hosui’
- Ripe ‘PremP009’
- Unripe ‘PremP009’
- Ideal Pear
The New Fruit Brand

piqa®
Individual PIQA® fruit cultivars will be identified using a suffix in conjunction with the PIQA word
‘PremP009’ Piqa boo packed for export
In Greek mythology, Gaia, or Mother Earth, presented a tree with golden apples and a serpent under the tree. These golden apples became involved with many tales of love and were the cause of the overthrow of the gods by the serpents. In the tale of the Golden Apples, the serpent tempted Eve to eat the apple, which led to the creation of the human race. The Golden Apples were seen as symbols of the divine and were imbued with mystical properties. They became the most sought-after fruit on earth. They have taken their rightful place in the history of food and have become a symbol of the power of nature and the beauty of the divine.
Meet the team

Brett Ennis  Richard Volz  Rosemary Weskett  Marlene Aldsworth  Bridie Carr  Jason Johnston  Shona Seymour
Sara Jaeger  Natalie How  Biff Kitson  Ken Breen  Daya Dayatilake  Stuart Tustin  Vincent Bus