Tatura SmartFarm – Introduction to the Sundial experimental orchard

Ian Goodwin
Agriculture Victoria Research

**Six science units**
- Genomics and Cellular Sciences
- Microbial Sciences, Pests & Diseases
- Plant Sciences
- Plant Production Sciences
- Animal Production Sciences
- Agriculture Resources Sciences

**Innovation clusters with ‘hub and spokes’ model and ‘SmartFarms’**

**Achieving step change improvements in agriculture through research and innovation for enduring profitability**
SmartFarms - Horticulture

Experimental Orchards
Pear
Stone fruit
Sundial
Temperate nuts (Mildura)

Demonstration Orchards
New pome fruit cultivars
High density almonds

Technology Hub
Fruit Analytics Facility
Fruit grader and lab
CA and DCA chambers
Fumigation containers
SmartFarms - Horticulture

Experimental Orchards
- Pear
- Stone fruit
- Sundial
- Temperate nuts (Mildura)

Demonstration Orchards
- New pome fruit cultivars
- High density almonds

Technology Hub
Fruit Analytics Facility
- Fruit grader and lab
- CA and DCA chambers
- Fumigation containers
SmartFarms - Horticulture

Experimental Orchards
- Pear
- Stone fruit
- Sundial
- Temperate nuts (Mildura)

Demonstration Orchards
- New pome fruit cultivars
- High density almonds

Technology Hub
- Fruit Analytics Facility
- Fruit grader and lab
- CA and DCA chambers
- Fumigation containers
Experimental Orchards
  Pear
  Stone fruit
  Sundial
  Temperate nuts (Mildura)
Demonstration Orchards
  New pome fruit cultivars
  High density almonds
Technology Hub
  Fruit Analytics Facility
  Fruit grader and lab
  CA and DCA chambers
  Fumigation containers
Sundial Orchard
Sundial Orchard

Objectives

- Study the effects of lights on yield, fruit quality and ecophysiology
- Evaluate sensors and sensing platforms, robotics and automation
- Explore techniques for traceability of fruit
- Demonstrate best practice IPDM
Sundial Orchard

**Design**
- N-S, E-W, NE-SW, NW-SE row orientation
- **Apple**
  - ‘ANABP 01’ apple (marketed as Bravo™)
  - 337 M9, B9 and M26 rootstocks (randomised)
  - Slender spindle
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated
- **Nectarine**
  - ‘Majestic Pearl’ nectarine
  - Nemaguard rootstock
  - Vertical, cantilever and Tatura Trellis architectures
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated

Each row orientation will alter the seasonal and diurnal exposure of fruit to the sun and the shading from foliage both within and between trees.
**Sundial Orchard**

**Design**
- N-S, E-W, NE-SW, NW-SE row orientation
- **Apple**
  - ‘ANABP 01’ apple (marketed as Bravo™)
  - 337 M9, B9 and M26 rootstocks (randomised)
  - Slender spindle
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated
- **Nectarine**
  - ‘Majestic Pearl’ nectarine
  - Nemaguard rootstock
  - Vertical, cantilever and Tatura Trellis architectures
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated
Sundial Orchard

**Design**

- N-S, E-W, NE-SW, NW-SE row orientation
- Apple
  - ‘ANABP 01’ apple (marketed as Bravo™)
  - 337 M9, B9 and M26 rootstocks (randomised)
  - Slender spindle
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated
- Nectarine
  - ‘Majestic Pearl’ nectarine
  - Nemaguard rootstock
  - Vertical, cantilever and Tatura Trellis architectures
  - 3.5 m row x 1 m tree spacing
  - Drip irrigated
Sundial Orchard

Research themes
- Thresholds and risk of fruit sun damage
- Fruit colour response to light
- Fruit initiation (and set) response to light
- Measuring light in tree canopies
- Photo-inhibition and water use efficiency

<table>
<thead>
<tr>
<th>Air Temperature (deg C)</th>
<th>Browning</th>
<th>Necrosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-netted</td>
<td>34.1</td>
<td>37.9</td>
</tr>
<tr>
<td>Netted</td>
<td>38.7</td>
<td>unknown</td>
</tr>
</tbody>
</table>

FST = 46 – 49°C for 60 min
FST = 52°C for 10 min
Sundial Orchard

Research themes

• Thresholds and risk of fruit sun damage
• Fruit colour response to light
• Fruit initiation (and set) response to light
• Measuring light in tree canopies
• Photo-inhibition and water use efficiency
Sundial Orchard

Research themes

• Thresholds and risk of fruit sun damage
• Fruit colour response to light
• Fruit initiation (and set) response to light
• Measuring light in tree canopies
• Photo-inhibition and water use efficiency
Sundial Orchard

Research themes

• Thresholds and risk of fruit sun damage
• Fruit colour response to light
• Fruit initiation (and set) response to light
• Measuring light in tree canopies
• Photo-inhibition and water use efficiency
Sundial Orchard

Research themes
- Thresholds and risk of fruit sun damage
- Fruit colour response to light
- Fruit initiation (and set) response to light
- Measuring light in tree canopies
- Photo-inhibition and water use efficiency
Sundial Orchard

Opportunities

• Visiting scientists (sabbaticals)
• Universities (PhD students)
• TAFE
• Secondary schools
• Collaborative projects (e.g. IoT)
• AgTech companies (e.g. Green Atlas)
• Investment from governments
Thank you

ian.goodwin@agriculture.vic.gov.au

Questions