Getting New Orchard Plantings to Perform

John Wilton
Deciduous Fruit Specialist
AgFirst Consultants (Hawke’s Bay) Ltd
New Zealand
Getting New Orchard Plantings to Perform

Objective:

To fill the tree canopy volume with efficient fruiting wood rapidly.

60% mid season light interception.

Tree height needs to match between row spacing TCA/ha > 50,000 cm²
# Tree Row Volumes

<table>
<thead>
<tr>
<th>Orchard Type</th>
<th>Trees/ha</th>
<th>TRV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intensive</td>
<td>&gt; 1,900</td>
<td>10,000 to 12,000 m³/ha</td>
</tr>
<tr>
<td>Semi-intensive</td>
<td>1,000 to 1,900</td>
<td>12,000 to 15,000 m³/ha</td>
</tr>
<tr>
<td>Extensive</td>
<td>&lt; 1,000</td>
<td>18,000 to 20,000 +m³/ha</td>
</tr>
</tbody>
</table>
**Individual Tree Size at Various Tree Densities**

<table>
<thead>
<tr>
<th>Tree density/ha</th>
<th>50,000 cm²</th>
<th>60,000 cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Rows</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>666 (5 x 3 m)</td>
<td>75 cm²</td>
<td>90 cm²</td>
</tr>
<tr>
<td>1250 (4 x 2 m)</td>
<td>40 cm²</td>
<td>48 cm²</td>
</tr>
<tr>
<td>1500 (3.7 x 1.8 m)</td>
<td>33 cm²</td>
<td>40 cm²</td>
</tr>
<tr>
<td>1900 (3.5 x 1.5 m)</td>
<td>26 cm²</td>
<td>32 cm²</td>
</tr>
<tr>
<td>2020 (3.3 x 1.5 m)</td>
<td>25 cm²</td>
<td>30 cm²</td>
</tr>
<tr>
<td>2424 (3.3 x 1.25 m)</td>
<td>21 cm²</td>
<td>25 cm²</td>
</tr>
<tr>
<td>3030 (3.3 x 1.0 m)</td>
<td>16.5 cm²</td>
<td>20 cm²</td>
</tr>
<tr>
<td><strong>Double Rows</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2222 6 m x (1.5) twice</td>
<td>22.5 cm²</td>
<td>27 cm²</td>
</tr>
<tr>
<td>2667 5 m x (1.5) twice</td>
<td>19 cm²</td>
<td>22 cm²</td>
</tr>
<tr>
<td>3333 6 m x (1) twice</td>
<td>15 cm²</td>
<td>18 cm²</td>
</tr>
<tr>
<td>4000 5 m x (1) twice</td>
<td>12.5 cm²</td>
<td>15 cm²</td>
</tr>
</tbody>
</table>

A poor tree nursery will have to grow its TCA by 15 to 100 fold. A well grown tree by 6 to 40 fold.
Limiting Factors – Identify and Correct

1. Those needing attention before planting.
2. Those affecting tree growth after planting.
Pre-Planting Preparation

The trees:
- tree health status.
- trueness of type.
- tree size.

The Site:
- Soil surveyed to determine depth, structure, pH and nutrient status, drainage characteristics, previous cropping history, nematode and disease problems.
- Soil related limiting factors can only be dealt with prior to planting.
Replanting Old Orchards

Specific Apple Replant Disease (SARD):

Severity of SARD depends on soil type, previous tree root density, length of fallow.

Causes of SARD are not well understood.

Effective treatments are:
- pre-plant soil fumigation with cloropicrin, formalin drenches or other fungi controlling soil fumigants.
- Removal of apple or pear crop root debris.
- Fallowing the soil.
- Increasing tree density by 50%.
- Maintaining soil fertility in the root zone.
- No water stress.
Planting
- Open friable soil.
- Ridge shallow soils.
- In heavy clays make provision for drainage.
- Do not plant into wet soil.
- Do not allow tree roots to dry out.
- Planting into dry soil, irrigate immediately.
- Avoid scion rooting. Scion rootstock union > 10 cm above soil level.

Once Planted
- Secure trees to support structure.
- Irrigation ready to go before trees leaf out.
The Support Structure

- Support to 0.5 m of final tree height.
- Posts seven to eight trees apart.
- Trees must be firmly attached to their support structure from day one.
- First year trees need three wires for support.
- Alternate wires either side of tree trunk.
- As trees grow, add further wires once tree height passes the new wire height.
Making the Trees Grow

- Establishing tree height quickly is the key to early/high productivity.

Balancing the Tree

- Remove feathers below 0.8 to 1 metres height.
- Remove strong side branches.
- Where feather development poor, bring the tree back to a rod.
Irrigation Management

• Water stress stops growth.

• Maintain optimum soil moisture in the 0-30 cm soil layer.

• Water requirement 2 to 2.5 times the potential evaporation of the area covered by their mid-day shadows.
# Estimated Available Water per m² to 30 cm Depth

<table>
<thead>
<tr>
<th>Soil Texture</th>
<th>Litres</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fine sand</td>
<td>21 – 24</td>
</tr>
<tr>
<td>Sandy loam</td>
<td>30</td>
</tr>
<tr>
<td>Fine sandy loam</td>
<td>39 – 42</td>
</tr>
<tr>
<td>Loam</td>
<td>45 – 48</td>
</tr>
<tr>
<td>Silt loam</td>
<td>48 – 50</td>
</tr>
<tr>
<td>Light clay loam</td>
<td>50 – 54</td>
</tr>
</tbody>
</table>
Irrigation Management

- Trickle systems are the most efficient and cost effective watering systems.
- Do not position emitters directly over the tree trunk.
- Sprinkler systems management needs to be driven by soil moisture levels within the effective rooting zone.
- Minimise evaporation losses.
- Do not use more often than at four to five day intervals.
- Water requirement will increase as the trees grow.
Mulching

- Thick mulch will conserve moisture, cool the soil down.
- Reduces both water and heat stress with improved tree growth.
Fertilisers

- Young orchards need regular fertiliser applications.
- Fertigation is the most effective.
- Fertiliser programme determined by the natural fertility.
- Side-dressing programme to make the trees grow well.
- Nitrogen is main fertiliser requirement – 100 kg N/ha (about 50 g N per tree).
Fertilisers

• Magnesium, potassium and certain trace elements where deficiencies are known to exist.

• Potassium nitrate, magnesium sulphate.

• Apply trace elements as foliar applications.

• Alternative to fertigation

• Side-dressings monthly 20 to 25 kg N/ha per application.
Weed Control

• Weed free strip of at least one metre width.
Pest and Disease Control

Critical diseases to be controlled include:
- Apple scab  *Verturia inaequalis*
- Pear scab  *Verturia pirina*
- Powdery mildew
- *Phytophthora* root rots

Insect pests
- Woolly Apple Aphid
- Mites
- Other leaf damaging insects

Mammalian and Avian pests
- Rabbits/hares
- Various Australian indigenous species
Cropping

- Trees on dwarfing rootstocks such as M9 and M26 will make better growth with a light crop, eg, 7 fruit per cm² TCA, than with no crop at all.