The Tall-Spindle critical steps to success

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First

- Terence Robinson, Cornell University
- “The tall spindle system is the path to becoming fabulously wealthy”
The basics

• High tree density
• Fully dwarfing rootstocks
• High quality, feathered trees at planting
• High planting depth
• Minimal pruning
• Branch bending in 1st leaf
• Superior support system
• Trickle irrigation/fertigation
High tree density

• High planting density = 1,200 trees per acre (3 ft X 12 ft)
• Can go as low as 900 trees per acre
Fully dwarfing rootstocks

- Bud 9, M.9 clones, Geneva 11, 16, 41
- Ottawa 3, Vineland 3
High quality trees

• Preferably 5-10 (or more) feathers
• ½” minimum caliper
  5/8” better
• Branches not too low
• High graft union
• Order early, do your best...
High planting depth

- Graft union needs to be 4 to 6 inches above ground
- Caution: burr knots attract borers
- Mouse-guards?
Minimal pruning at planting

• Trees are not headed
• Remove low branches (less than knee height)
• And those breaking the 50% rule (diameter-based pruning) are removed
• Leave as many feathers as possible w/o compromising growth of leader
• Results in 2\textsuperscript{nd} leaf crop
Branch bending

- Remaining branches bent below horizontal at planting
- 1\textsuperscript{st} leaf only
- Use wire or string
- Very important to get 2\textsuperscript{nd} leaf yield
Superior support system

• Based on Pressure Treated (or alternative) end and line posts with hi-tensile wire
• 5-6 inch for end posts, 4-5 inch for line posts
• ‘Driven’ 3 feet in ground
• Line posts every 40 to 45 feet (no farther!)
• 12.5 gauge hi-tensile wire
• U-Hooks
I repeat: superior support system

**support**

- 4–5 in. by 12 ft. PT end and in-line posts
- 12.5 gauge hi-tensile wire
- 1st wire in ASAP
- U-hooks
U-Hooks

• Large size (3 inch)
• oescoinc.com
• peachridge.com

*Tree stabilizer wires?
fingerlakestrellissupply.com
Trickle irrigation

- Netafim ‘RAM’ tubing
- 24-inch emitter spacing, 0.4 gallons per hour
- Add fertigation if possible (it’s really not that hard)
How much per acre?

<table>
<thead>
<tr>
<th>Item</th>
<th>Number/acre</th>
<th>Material Costs ($/acre)</th>
<th>Labor Costs ($/acre)</th>
<th>Total Cost ($/acre)</th>
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</thead>
<tbody>
<tr>
<td>Trees</td>
<td>1320</td>
<td>$8,580</td>
<td>$100</td>
<td>$8,680</td>
</tr>
<tr>
<td>Anchor poles (6 ft)</td>
<td>20</td>
<td>$120</td>
<td>$100</td>
<td>$220</td>
</tr>
<tr>
<td>Inline poles (12 ft)</td>
<td>110</td>
<td>$1,100</td>
<td>$550</td>
<td>$1650</td>
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<tr>
<td>Wire</td>
<td>12,000 ft</td>
<td>$280</td>
<td>$100</td>
<td>$380</td>
</tr>
<tr>
<td>Staples, tighteners and crimps</td>
<td></td>
<td>$50</td>
<td>$100</td>
<td>$150</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>4,460</strong></td>
<td><strong>$10,130</strong></td>
<td><strong>$950</strong></td>
<td><strong>$11,080</strong></td>
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</tbody>
</table>
What does this get you?

• High early yields!
• Target yields per acre
  – 2\textsuperscript{nd} leaf = 200 bushels
  – 3\textsuperscript{rd} leaf = 500 bushels
  – 4\textsuperscript{th} leaf = 1,000 bushels
  – 5\textsuperscript{th} leaf = 1,400 bushels
• 3,100 bushels total
• You do the math: 3,100 X $40 retail = $124,000
“Fabulous yields in early years”
4 rules of mature tree pruning

1. Limit tree height to no more than row width
2. Remove 2 to 3 of largest branches
3. Simplify remaining branches
4. Cut back pendant wood
Rule 1 - mature tree pruning

• Limit tree height to no more than row spacing
  – Preferably a little shorter
  – Don’t cut leader until tree reaches optimum height
  – Cut leader to fruitful side branch
1. Limit tree height
Rule 2 - mature tree pruning

• Remove 2-3 largest branches per year
  – These are typically greater than \( \frac{3}{4} \) inch diameter (quarter-size) or longer than 3 feet
  – Prune lower branches first, then upper; but don’t leave large branches in top of tree!
  – Resist the urge to over-prune...

“Large branches create large trees.” Terence Robinson
2. 2-3 cut rule
Bevel (renewal) cut
Rule 3 - mature tree pruning

• Simplify remaining branches
  – No forks ("forks belong on the dinner table")
  – Single axis, typically somewhat pendant
3 – simplify complex branches
Rule 4 (optional) – mature tree pruning

• Optional: cut back pendant, weak wood
  – Gala, Fuji

• Or, remove entirely

• Pencil size (diameter) is ideal

• Prevents over-cropping and small fruit
4 – cut back pendant, weak wood
Summary of tall-spindle

- Optimum economic tree density

Figure 8. Effect of tree density on orchard profitability after 20 years (Net Present Value/acre).

New York Fruit Quarterly, Vol. 14 No. 2
Summary of tall-spindle

- High early production (assuming feathered trees)
Summary of tall-spindle

- High light interception (70-75%)
- Tree height = 0.9 X row width
Summary of tall-spindle

• Good light distribution
  – Thin, conical canopy
  – No permanent branches
  – Columnar/simple fruiting branches

• High fruit quality
Summary of tall-spindle

• Improved labor efficiency
  – Simplified pruning
  – Partial mechanization of pruning and harvest

photo Terence Robinson
MOPUP – Massachusetts Orchard Production Upgrade Program

• 10 orchards
• One acre, 1,000 trees per orchard
• All planted 3 ft. X 12 ft.
• Mac, Cortland, Macoun, Honeycrisp, Gala, Fuji, Golden Delicious
2009 planting
Decent nursery trees
2008 planting, 2009 flowers
2\textsuperscript{nd} leaf Honeycrisp
2\textsuperscript{nd} leaf Gala
MA MOPUP orchards

estimated 2nd leaf yields

<table>
<thead>
<tr>
<th>Orchard 1</th>
<th>Orchard 2</th>
<th>Orchard 3</th>
<th>Orchard 4</th>
<th>Orchard 5</th>
<th>Orchard 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>60</td>
<td>180</td>
<td>60</td>
<td>120</td>
<td>180</td>
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</tr>
</thead>
<tbody>
<tr>
<td>4500</td>
<td>1500</td>
<td>3000</td>
<td>3000</td>
<td>3000</td>
<td>4500</td>
</tr>
</tbody>
</table>
MA MOPUP Orchards

by variety (one orchard)

2\textsuperscript{nd} leaf fruit yield

- Buckeye Gala
- Gale Gala
- Auvil Early Fuji
- Rising Sun Fuji
- Golden Delicious
- Honeycrisp
- Macoun
- Redcort
- Lindamac*
Tall-spindle = happy grower
What’s next?

- Plant ½ to one acre (600 – 1,200 trees)
- Order trees ahead of time
- Prepare site
- Plant early
- Build superior support structure
- Irrigate/fertilize
- Pick fruit in following year
- Make money $$$$$$
Tall Spindle Apple

All about the tall-spindle apple

Links to resources for growing a tall-spindle apple orchard -- "the way to fabulous riches"*

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*Terence Robinson, Cornell University

Publications

The Tall Spindle Apple Production System - T. Robinson, New York Fruit Quarterly (PDF)
The Tall Spindle Planting System for Apples in the Northeast - T. Robinson, New England Vegetable & Fruit Conference Proceedings (PDF)
Tall spindle system sends NY apple yields skyward - americanagriculturist.com (PDF)
The Tall Spindle: Apple Orchard System Design for the Future - fruitgrowersnews.com
Different Approaches to Tall Spindle Establishment in Apple - R. Perry, cherries.msu.edu
The Tall Spindle Planting System - T. Robinson, fruit.cornell.edu