

The Ins and Outs of Container Production of Tree Fruit

Todd Einhorn, Ph.D.

Associate Professor and Tree Fruit Specialist

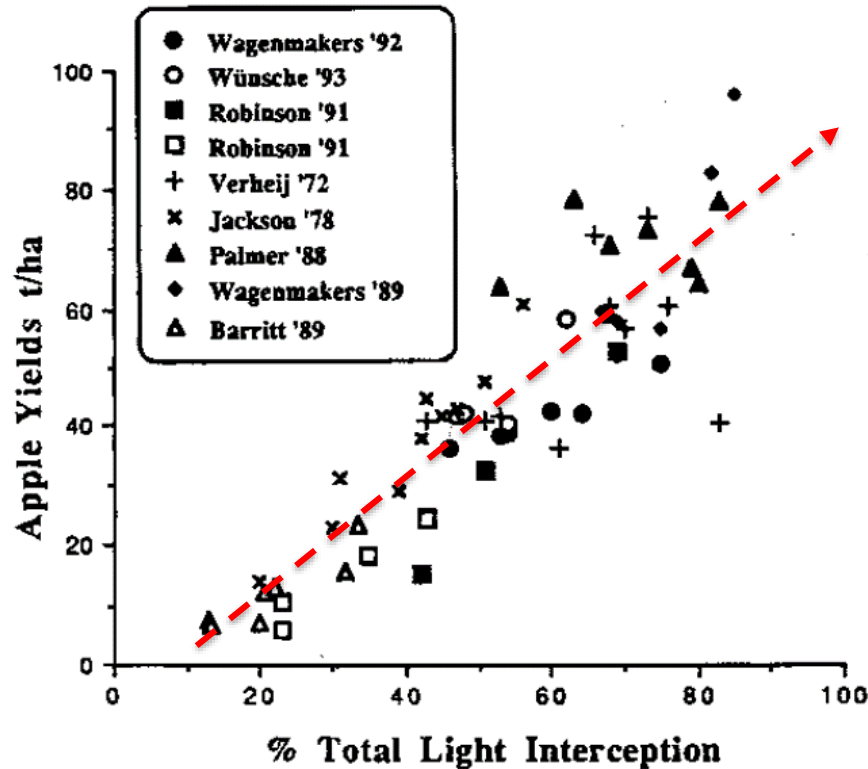
Michigan State University

einhornt@msu.edu



Why Containers?

- New plantings need to fill orchard space rapidly and then be shifted to cropping



Lakso, 1994

Why Containers?

- Planting density is steadily increasing (900 to 1,500 trees/acre)
- High density plantings are very expensive (\$15,000-\$25,000/acre)
- They require intensive horticultural management to balance cropping and canopy development for fruit size and quality



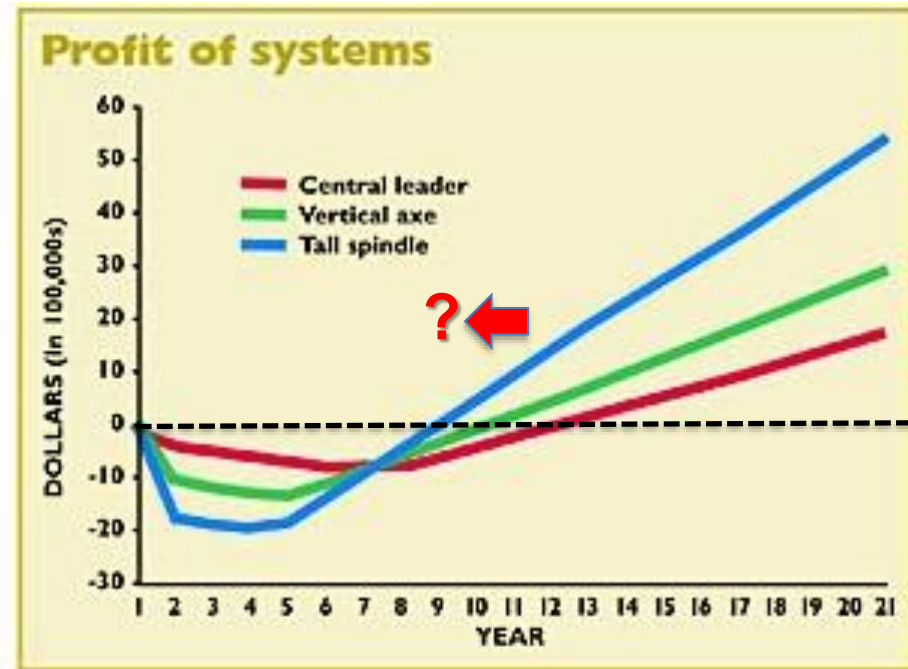
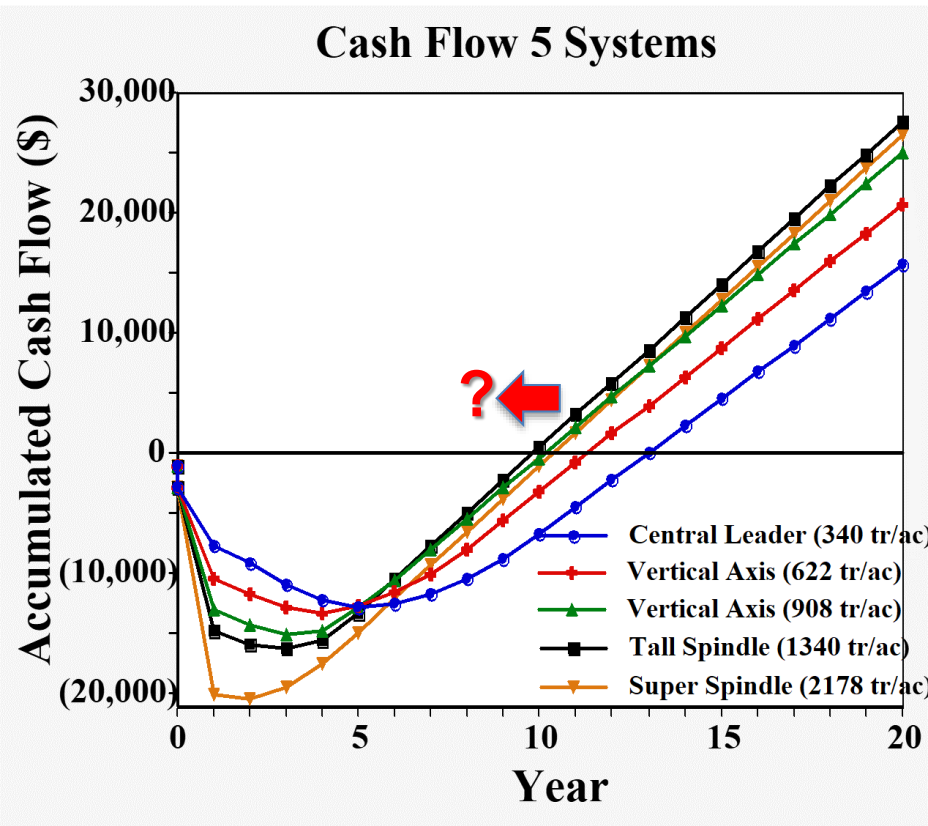
Why Containers?

- With cultivars such as Honeycrisp, inherent dwarfing and precocity markedly limit canopy development
- Returns of \$500-\$800/bin don't aid the decision to drop fruit in the 2nd or 3rd leaf in lieu of canopy growth



Why Containers?

- The objective is to pay off the investment as soon as possible



Why Containers?

- Traditional bare-root nursery stock is inherently prone to transplant shock



First year growth



Established spring, 2016

October, 2016

Container Attributes

- By contrast, containers offer minimal disruption of the rhizosphere at planting
- Balance between above and below-ground growth is maintained
- Carbohydrate and nutrient reserves are available for establishment



Courtesy Dr. Bert Cregg

Container Diversity

- Containers differ widely in construction and principle
 - Plastic containers
 - Injection-molded materials
 - Paper liner/membranes



<http://www.acwsupply.com/index.php/downloadable-catalog>



Rootmaker products rootmaker.com



Ellepot products Ellepot.com



Container Root Systems

- Potential issues with container production
 - Circling roots
 - J-roots
 - Future Girdling
 - Poor spreading after established in field



*Courtesy Drs. Bert Cregg MSU
& Alison Stoven O'Conner, CSU*

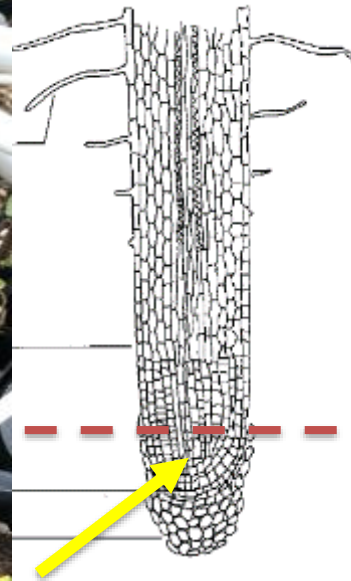


Air Pruning

- Air pruning pot systems
 - Encourage root branching by removing inhibitory signal for lateral root initiation
 - Increase root length density of fibrous (feeder) roots
 - Eliminates root circling and future girdling



Courtesy Lars Jensen



Removal of apical meristem



Air Pruning



Courtesy Lars Jensen

Management Considerations

- Containers offer planting Flexibility
 - Spring planting vs. Fall planting
 - Opportunities to take advantage of H2A 'down time' between harvests
 - Planting when soil and climatic conditions are favorable
 - Paper liners (Ellepot systems) increase flexibility in the timing of planting since containers can be planted before roots have filled pot volume



Cost Considerations

- Containerized trees have additional production costs
 - Media, molded trays, etc.
 - Freight/Shipping costs depend on origin, tree size and state (i.e., green or dormant) and may all affect price
 - Do the benefits outweigh the costs?



*Courtesy Cliff Beumel
Sierra Gold Nurseries*

2017 MSU Ellepot Production Trial

- Starting material: Nic29 Bench grafts (Honeycrisp, Gala, Fuji)



Ellepot System

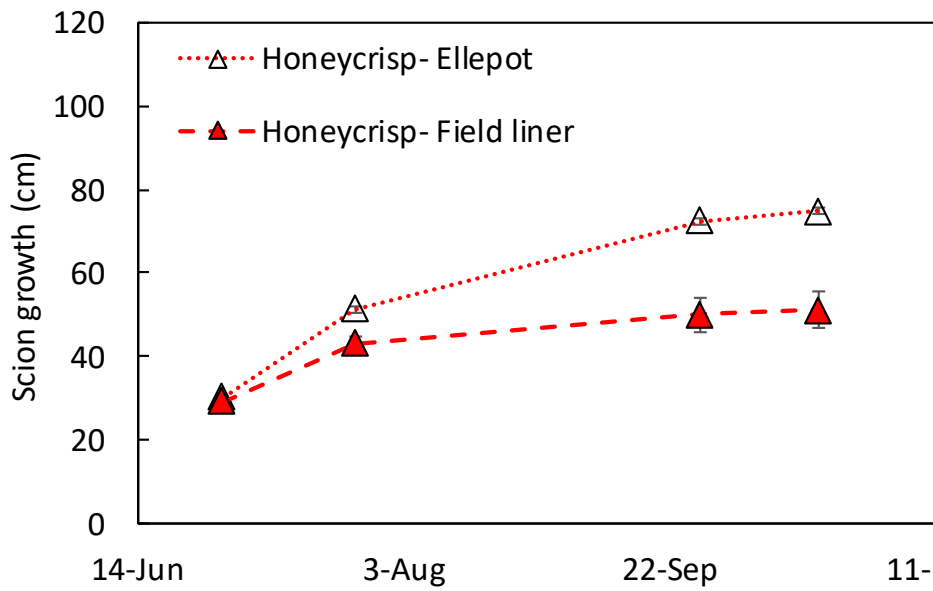
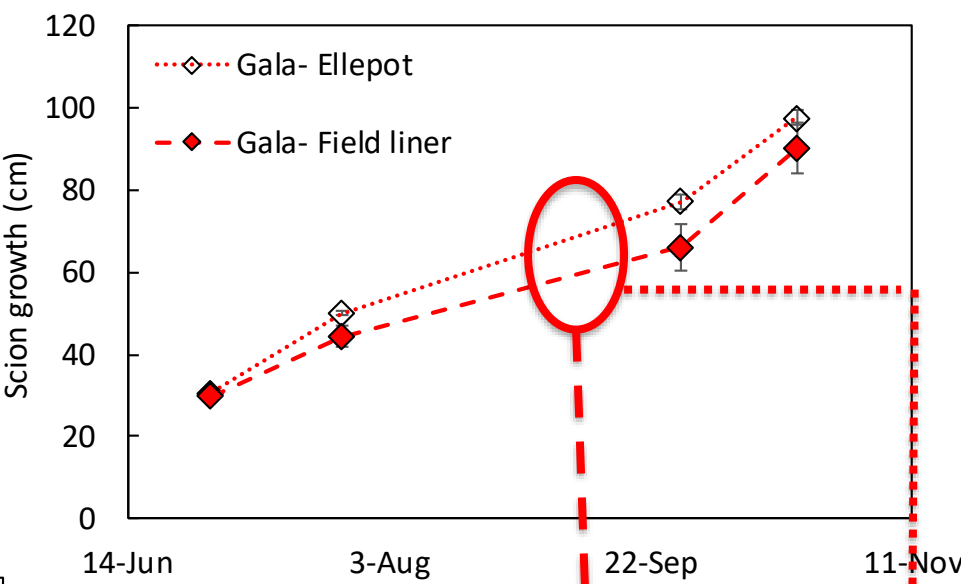
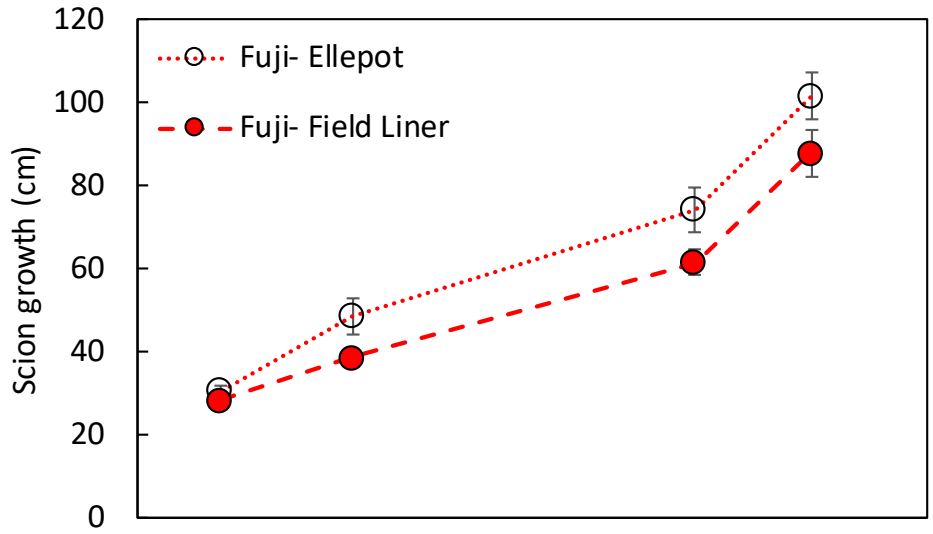


2017 MSU Ellepot Production Trial

- Experiment: Comparison of Bare root or Ellepot production systems for apple trees (Honeycrisp, Gala, Fuji)



• Scion Growth



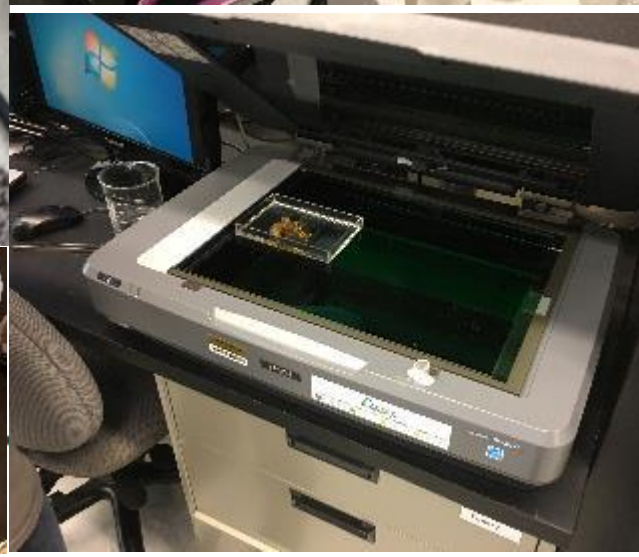
- Above-ground growth

Total Above-ground DM (g)	
Ellepot	Field
56.3	51.7
45.6 a	34.8 b
45.9 a	36.1 b

Key: Gala Honeycrisp Fuji



2017 MSU Ellepot Trial







Front to back: Rep 1, Gala, Fuji, HC; Rep 2, HC, Fuji, Gala



Rep 3, Gala



Rep 3, Honeycrisp



Rep 3, Fuji



Challenges of Container Production

- Given the small rooting volume, containers are unforgiving of horticultural errors
 - Water use/irrigation
 - Media offers relatively no buffering capacity
 - Water quality
 - Nutrition
 - Light/Temperature (i.e., receiving green plants)





Courtesy Cliff Beumel, Sierra Gold Nurseries

Planting Containerized Trees



Courtesy Cliff Beumel, (Planting May 3, 2017 Yakima, WA)



Courtesy Cliff Beumel, (Same Planting October, 2017 Yakima, WA)

“Quick Start” Fuji on Bud 10
Side By Side with 2 Year Nursery Tree on M9
Planting Date June 1



Courtesy Cliff Beumel, Sierra Gold Nurseries

Summary

- Container produced trees offer planting flexibility and **reduce transplant shock** by maintaining tree balance and necessary reserves
- Container systems with air pruning stimulate production of fine roots practically eliminating poor root development
- These benefits plausibly improve canopy growth development in the formative years
- Early and higher production would be expected to easily compensate for increased costs associated with products



Acknowledgements

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