Important Considerations and Guidelines for Establishing a New Citrus Grove

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Today's talk

- Site selection
- Planting design & irrigation system
- Purchasing of trees
- Variety & rootstock selection
- Planting method
- Root problems
- Suckering and canopy management
- Fertilization and weed management
- Cold protection and windbreaks
- Citrus research projects at Fruit Physiology Lab

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Site Selection

- Pest and disease history
- Soil fertility (CEC, pH, organic matter, nutrients etc.)
- Well drained
- Water access and quality
- Topography

PC: Steve Futch

Planting Design/Geometry

- A good design results in healthier, productive and long-life span
- Design should support maximum sunlight into the canopies
- Tree row from north to south will capture maximum sunlight
- Tree spacing is associated with scion and rootstock type
- Spacing between the rows based on your equipment
- Planting density depends upon rootstock, scion, and farm machinery
- Currently 145 (20x15), 121 (20 x18) and 110 (22 x 18)
- Using the semi dwarf rootstocks, 242 (18x10), 303 (18 x 8)

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Irrigation System

- Properly designed and installed
  - Uniform moisture availability
  - Improve water and nutrient use efficiency
  - Limit nutrient losses by leaching
  - Less disease attack
  - Efficiently delivers fertilizers or other chemicals
  - Effective irrigate the steep land

PC: Jeremy Giddings

Type of Microsprinklers

- 90- and 180-degree microsprinklers provides more freeze protection
- Water pressure 12 g/h or above is more effective

90 degree

180 degree

360 degree

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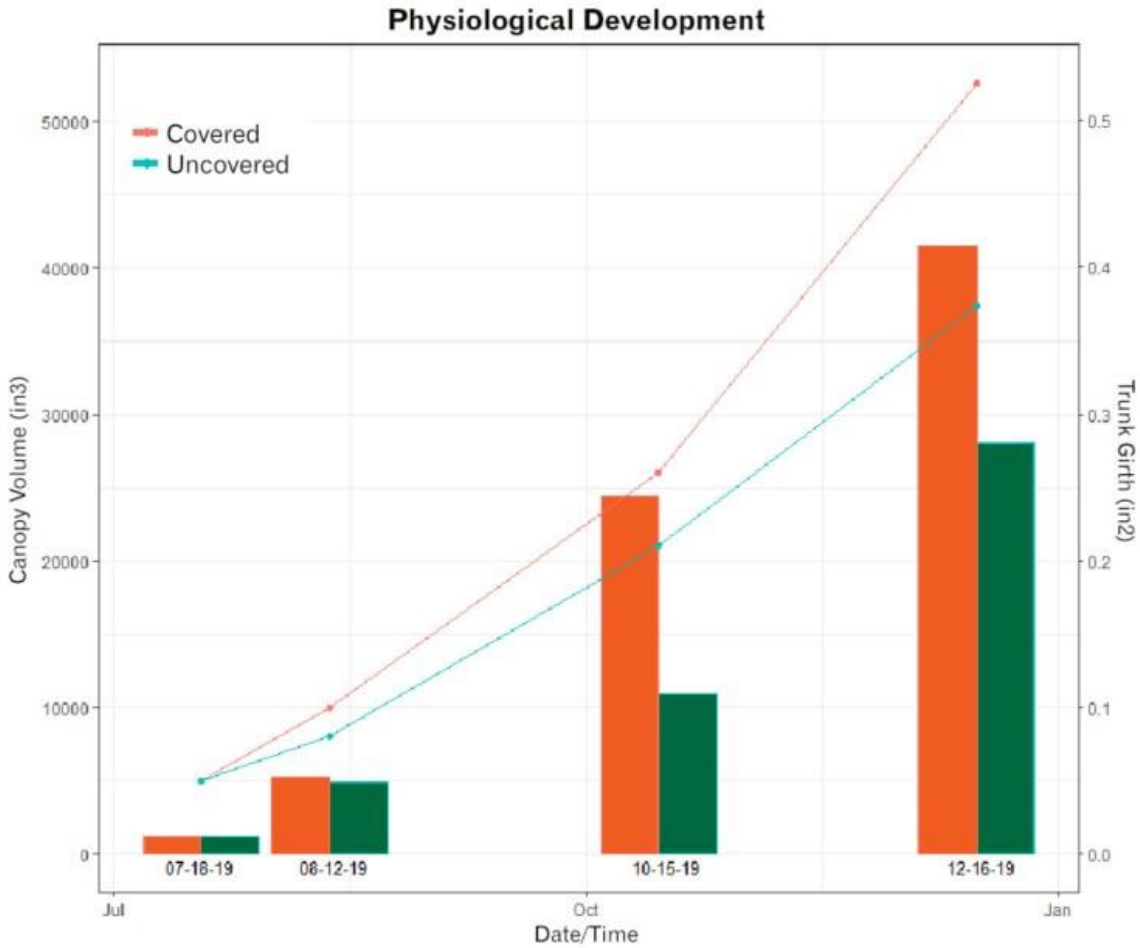
Fabric Mulch Groundcovers



PC: Sandra Guzman

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Purchasing Trees

- Never compromise on quality
- Reputable and registered nursery
- Select scion based on market and demand
- Scion on disease tolerant rootstock

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Cultivars Cold Tolerance Potential

Tolerant

- UF-950
- Owari
- UF-Sunrise
- Xie Shan

Moderately -Tolerant

- Tango
- Bingo
- UF-Dawn
- Brown select
- Early pride
- Red Navel

Sensitive

- UF-Glo
- Nova
- Bud blood
- Sugar Belle

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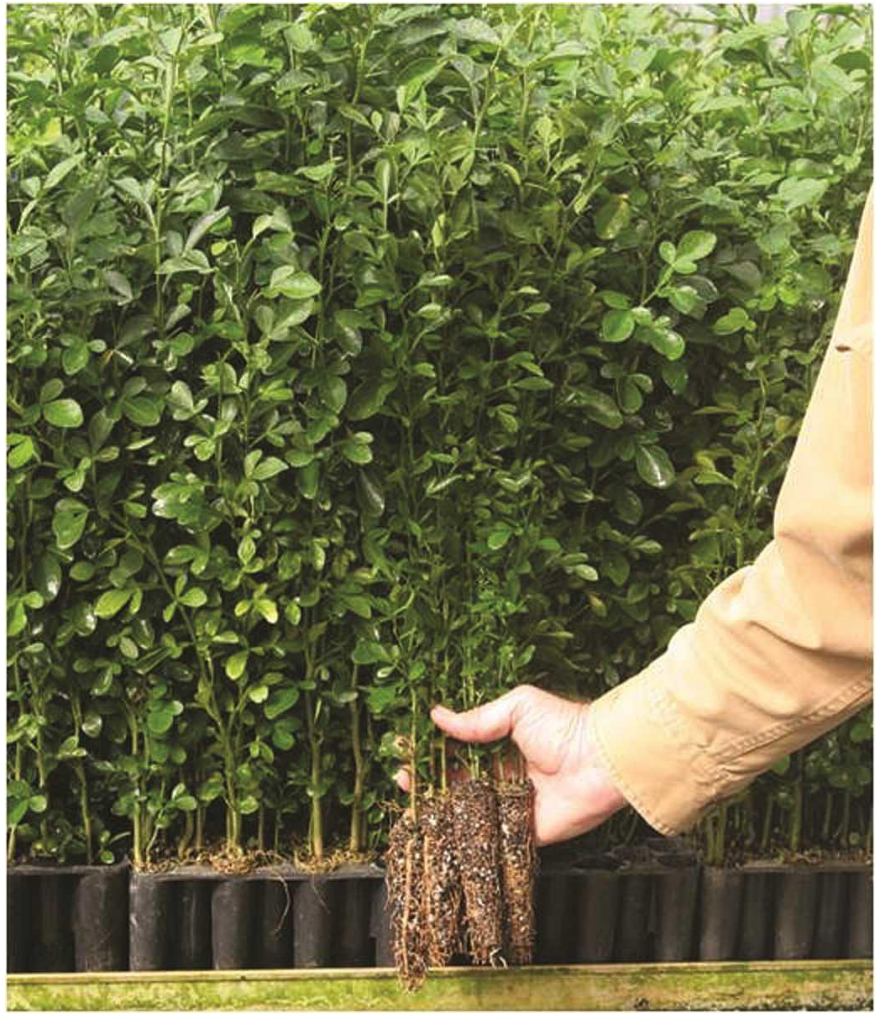
Rootstock type is critical

- Size and growth habit
- Precocity in flowering and fruiting
- Fruit setting and yield
- Fruit size and quality
- Nutrient status of scion
- Winter hardiness
- Disease and pest resistance
- Resistance to abiotic stresses



PC: Peter Chaires

Effect of Rootstocks on Cold Hardiness in UF-950

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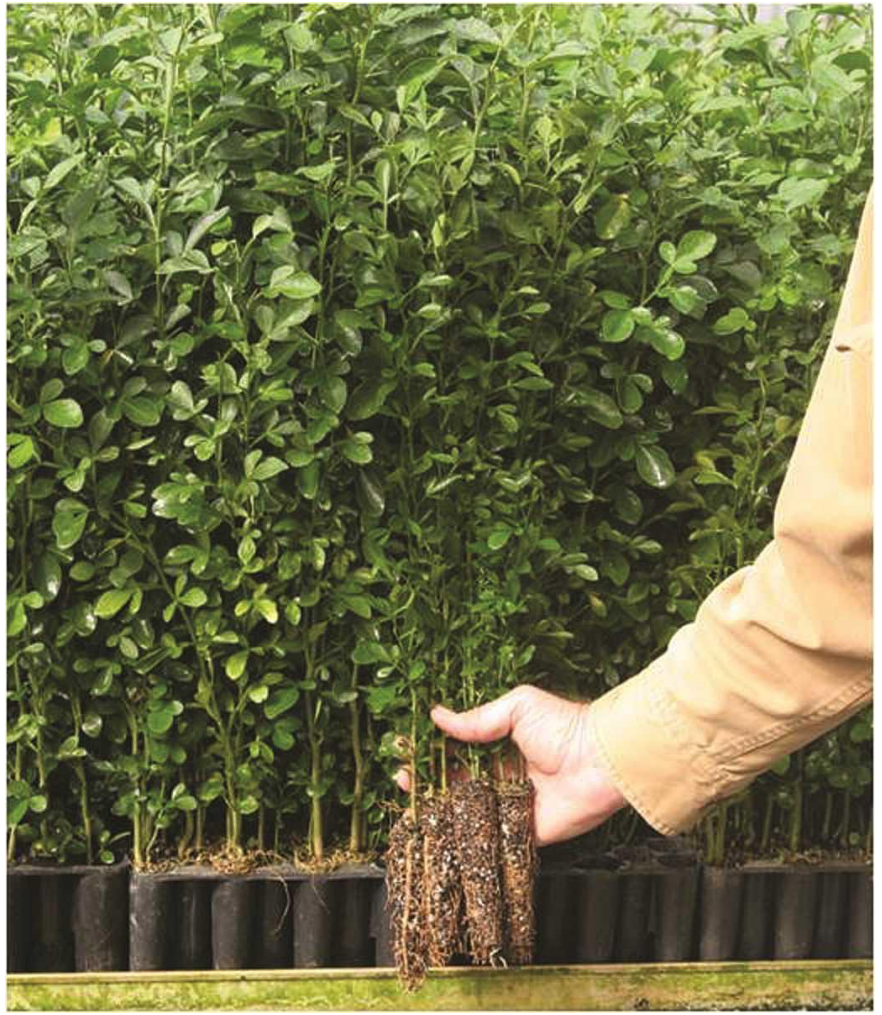
Effect of Rootstocks on Cold Hardiness in UF-950

US897

Swingle

Characteristics of Good Rootstock

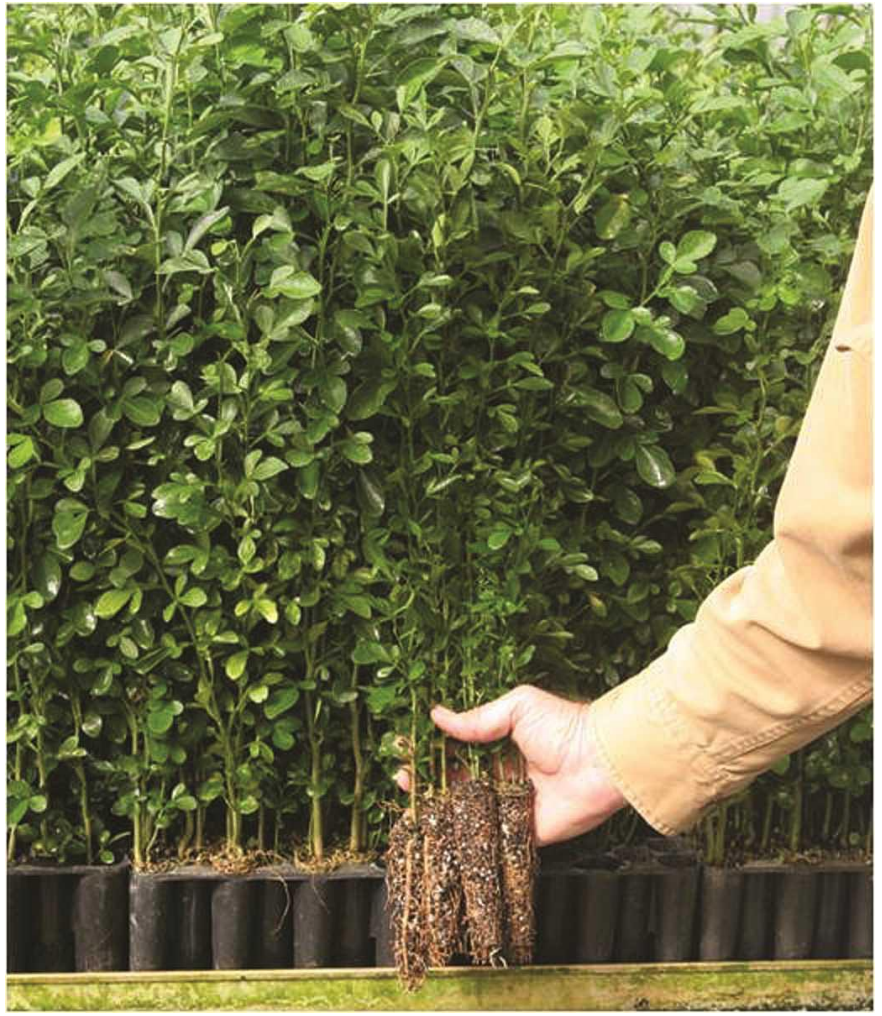
- Compatible with scion
- Well, adopted to agro-climatic conditions
- Resistant to diseases and pest
- Tolerant to adverse soil conditions
- Induce positive effect of bearing and fruit quality



PC: Peter Chaires

Common Rootstocks

- Swingle
- Kuharski
- Carrizo
- Sour orange
- X-639
- Volkameriana Lemon
- Cleopatra
- US 802
- US 812



PC: Peter Chaires

Rootstock Performance in North FL/South GA

Tolerant	Moderately tolerant	Sensitive
UFR5	Swingle	Carrizo citrange
UFR7	Flying dragon	UFR9
UFR 17	Blue-1	C146
US942	Bitters	Sour orange
Rubidoux	US897	C35
US 812	Rich 16-6	

How to plant citrus tree?

- Clear away weeds and grass
- Dig a hole 8-10 inch bigger than root ball
- Fill the whole with water
- Remove tree from the pot and place in water filled hole
- Plant at the level as the top of the root ball
- Add soil back to hole filling air pockets under and around the root ball
- Check next day if there are any air pocket/cracks settle them with soil and water
- New plating should be irrigated regularly for 2-3 month, if rains are inadequate

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How to plant citrus tree?

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Root Girdling : a silent tree killer

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Girdling roots silent tree killer

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Bittenbender and Easton-Smith's (2008)

J Roots

Bittenbender and Easton-Smith's (2008)

Tree Wraps

PC: Clint Thompson

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Suckering

- Shoots which develop from the rootstock below the graft-union are known as suckers
- They should be removed, otherwise they will compete with scion particularly in young trees
- Suckers can emerge in trees of any age

Always!

Remove suckers from the base of the tree, ie rootstock

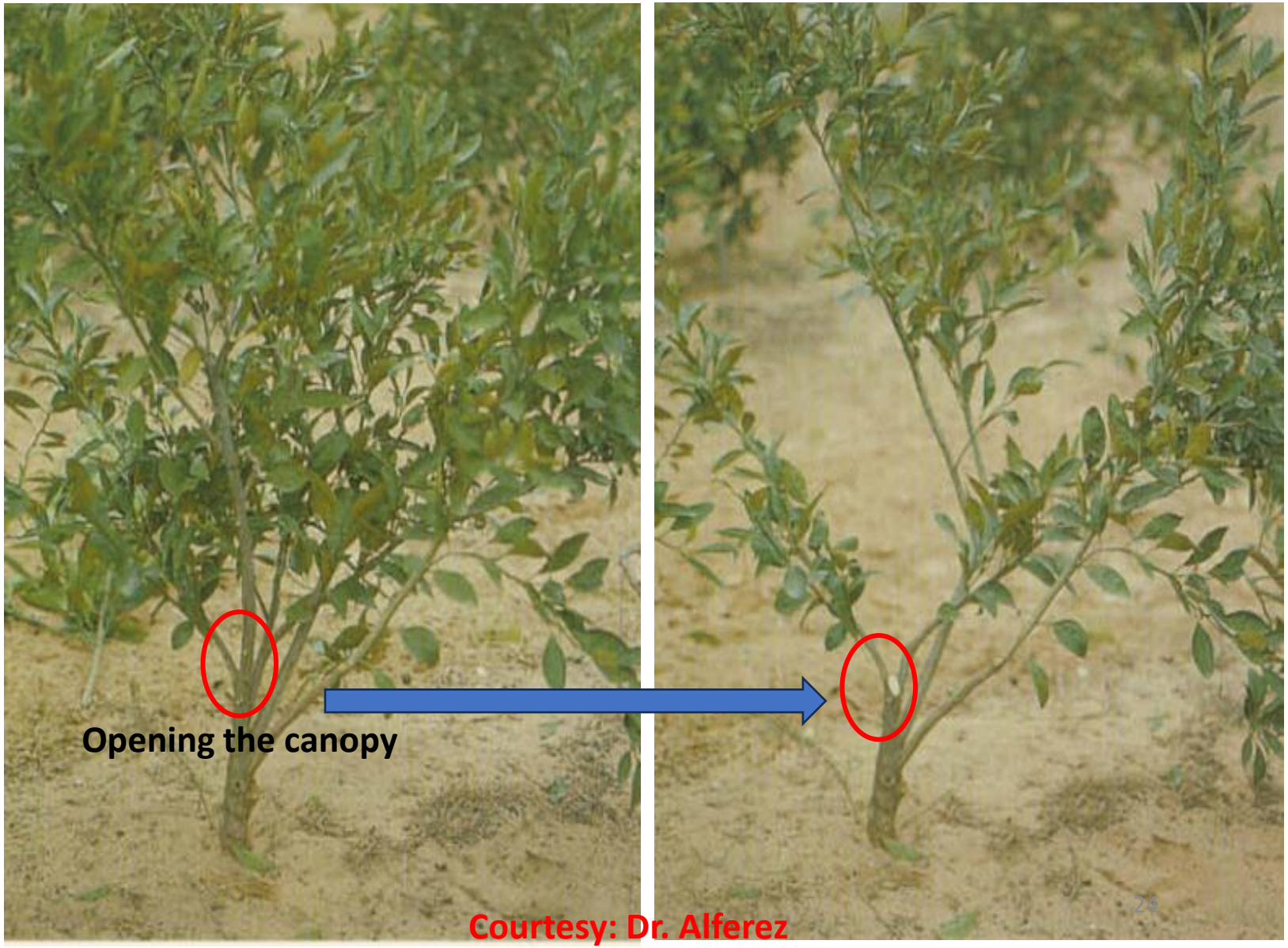
Credit: International Citrus Technologies Pty Ltd, Western Australia

Remove water sprouts (suckers)

Courtesy: Dr. Alferez

Canopy Management

- Shape for strong balanced canopy
  - Light interception
  - Sustain high production
  - Ease in cultural practices
  - Helps in efficient balance and utilization of stored reserves to well positioned-branches
  - Better to do pruning/training in first two years



Canopy Management

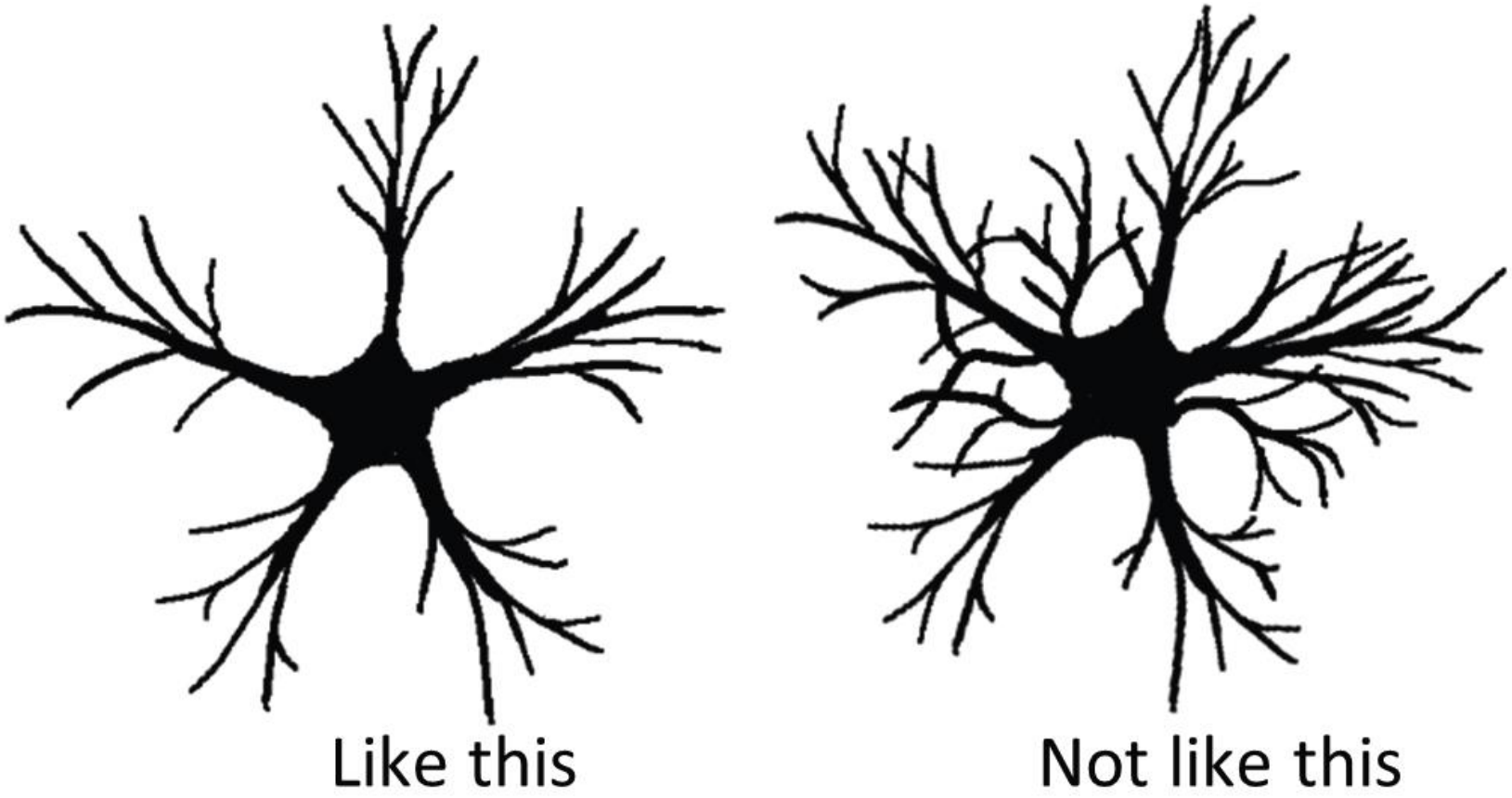


Figure 4. A diagrammatic representation of correct scaffold branch orientation: outward, like the spokes of a wheel, with no crowding from 5 main branches (diagram on left) rather than forming a full and bushy center (diagram on right). Credits: Timothy Ebert, UF/IFAS CREC

Weed Management

- Weed growth is greater in young groves
- Mechanical – tillage
- Chemical – herbicides

- Be careful about rates in young plants

Fertilization

- Important to promote vegetative and root growth
- Start 30 days after planting
- Split application is better
- Water soluble fertilizer or CRF improve nutrient use efficiency
- Take care of nutrient deficiency
- Do not add any granular fertilizer at planting in the hole

Freeze Protection

Tree defenders

Microsprinkler inside the tree-defender

Freeze protection wraps

PC: Florida-Georgia Citrus

Tree-T-PEE

- Tree- T-PEE is effective if high pressure above 10 g/h is used

Banking Dirt

- Banking dirt above the graft union
  - **98% plant survival**

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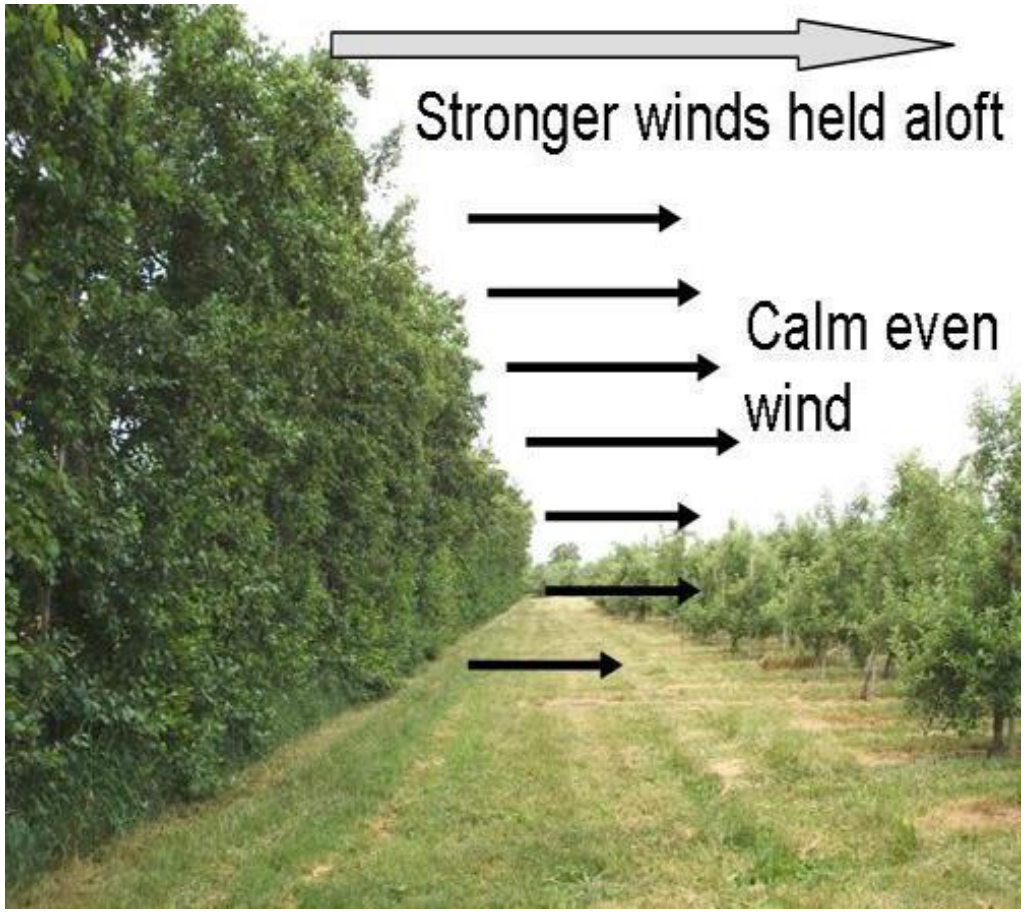
Windbreak

- Reduced wind speed
- Reduced spray drift and improved spray coverage
- Reduced wind scarring of fruit
- Increased yields
- Reduced water loss from evaporation by up to 30%
- Reduced soil erosion
- Slightly higher temperatures in winter
- Reduced dust on plants, thereby increasing photosynthesis



PC: Tang Mot

Windbreaks

PC: Sandra Hardy

Research Program at Fruit Physiology Lab

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Diversification

- Florida Foundation Seed Producers Inc.,
- 20 scion cultivars

Gator bites	N11-7	Lisbon lemon seedless	18-A-4-35	RBB7-34
RES-19-56	1859	Limon hybrid	KE-3-15	C-7-12-9
Grapefruithyb d1924	C2-5-3	UF 950	Greenie	Sugar belle
UF1424	Ice tea lemon	Red gift UF	RS 19-56	Lis D5 1-9-46

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Rootstock Evaluation for Cold Hardiness

- 22 Rootstocks on Tango, Marathon and Pummelo hybrid UF914

UFR-1	UFR-2	UFR-4	UFR-5	UFR-6
UFR-15	UFR-17	Rich 16-6	Swingle	US987
US812	US942	X639	KH	Super Sour 2
US1282	S10xS15-12-25	Super Sour 3	B11R3T53	B11R4T22
B11R3T27	B11R5T60			

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Blood Orange Evaluation

Five blood orange cultivars

Moro

Tarooco

Sangiunello

Budd Blood

PC: Jimmy Schmidt; Melissa Produce

Growth Regulators for Better Acclimation to Freezing Tolerance

- Silicon
- K
- ABA
- Methyl Jasmonate
- Brassinosteriods

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Nutrient Management for Cold Hardy Citrus

Different nitrogen and phosphorus rates

Application time

- Florida Georgia Citrus, Monticello
- Cherokee Satsuma, Mariana
- High Hope, Quincy
- SK Enterprise, Quincy
- NFREC

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Research-based Recommendations: Nutrients, Irrigation

- **Water Management**
  - Effective and efficient irrigation for getting optimum yield

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Degrening &Edible Coatings to Improve Shelflife

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Exploring the Molecular and Physiological Mechanisms of Freezing Tolerance

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Root Pruning in High Density Planting

484 plant/acre (15 x 6)

PC: Phil Brown Welding

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Take Home Message

- Select the best site for planting
- Its better to go more tree/acre than conventional planting design
- Purchase trees from well reputed nursery
- Rubidoux, UFR17, US942, US812, and UFR6 are cold tolerant rootstocks
- Owari, UF950, and UF-sun are cold tolerant scion
- Always take care for J-root or girdling roots at the time of planting
- Suckering and canopy management is critical for better plant structure and tree life
- Weed management is important for insect and disease control
- Windbreaks is beneficial for cold protection

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