1 🌳 **Rootstocks**

2 🌳 **Seedling Trees**
   • Problems
     – Protracted Juvenility
     • Thorns
     • Non-precocious
     – Soil related

3 🌳 **Advantages of Budlings**
   • Best scion and best stock
   • 20 horticultural characteristics
     – Tree vigor
     – Rooting depth
     – Freeze tolerance
     – Soil adaptation to high salinity

4 🌳 **More Rootstock Influences**
   – Resistance to nematodes, foot rot, citrus blight
   – Fruit yield, size, texture, internal quality
   – Maturity date
   • Study Table 4.1

5 🌳 **Rough Lemon**
   • Citrus jambhiri - NE India
   • Polyembryony
   • For deep infertile sand (FL ridge)
   • Susceptibility to blight
   • Lack of freeze tolerance
   • High yields (80 - 100 tons / Ha)

6 🌳 **More Rough Lemon**
   • Root depth 4.6 m (drought tolerant)
   • Wide range of pH.
   • Tolerant to
     – Tristeza (CTV)
- Citrus exocortis viroid (CEV)
- Citrus xyloporosis viroid

7 More Rough Lemon
- Highly susceptible to
  - foot rot
  - burrowing nematodes
  - blight (unknown cause)
- Poor quality fruit
  - ‘Valencia’/ RL = 11.4 %
  - ‘Valencia’/ SO = 13.2 %

8 More Rough Lemon
- Fruit characteristics
  - Thick Peel
  - “Puffy”
  - Regreening
  - Not good enough for fresh mkt.
  - Higher prodn of kg-solids

9 Kg Solids (Pounds-solids)
- Function of
  - Yield
  - Juice content
  - Total Soluble Solids (TSS)

10 Sour Orange (C. aurantium)
- Most widely planted stock in the world.
  - Scions of SO - moderate vigor
  - Slower than scions of RL but not dwarfed.

11 More Sour Orange
- Higher TSS per fruit, but kg-solids are lower than RL, CM, and CV on sandy soils.
- Produces deep, moderately branched root system.
- Scion vigor better on fertile soils.
- Used on heavy poorly drained soils. Does well on high pH soil.
SO Freeze Hardiness
- Cultivars on SO equal to:
  - Cleo, trifoliata, and citrumelo
- Superior to lemon types and citranges.
- Does not regrow as rapidly as lemon types after freeze.

Sour Orange and Soil Prob.
- No problem with
  - Xyloporosis
  - Phytophthora foot rot
- Susceptible to
  - Burrowing nematodes
  - Citrus nematodes

Fruit Quality on SO
- Fruit size smaller than on RL, but larger than on Cleo.
- TSS and TA are high thus preferred stock in:
  - LRGV, Indian River, and Spain.
- Grapefruit Lower height/diameter ratio than on Cleo.

More Fruit Quality - SO
- High TA may delay maturity.
- If TSS limiting (like in ‘Hamlin’) then SO advances maturity.
- TSS may by 1.5% higher than RL.
- High TSS + phytophthora resist. makes SO popular in tropics.

Splitting AO
- Scions on SO have smooth, thin peel.
- Thus excessive splitting can occur more frequently than on Cleo.
- Problem on sw oranges and mandarins - not on GF, Temple.

Sour Orange Selections
- ‘Bittersweet’
  - More tolerant to phytophthora
- C. taiwanica tolerant to CTV ??
- ‘Bittersweet’ higher yields than C. taiwanica.

‘Cleopatra’ Mandarin
• C. reticulata - minor importance in world.
• Large and mod. vigorous trees
• Deep, densely branched root sys
• Yield sw oranges intermediate between RL and SO.
• Comparable yields of SO.

19  More Cleo
• Less precocity - takes 10 - 15 yr
• As freeze hardy as most and better than the lemons or ‘Carrizo’ Citrange.
• Adapted to wide variety of soils. Resistant to high salinity, high pH, and calcareous soils.

20  Cleo’s BIG Advantage
• Tolerant of CTV, CEV, and Xyloporosis.
• But it is susceptible to:
  – Burrowing and Citrus Nematodes.
• Reaches 12 - 15 yrs before blight kills it.

21  Cleo Fruit Quality
• Fruit size smaller.
• Fruit quality between SO and RL.
• Peel smooth and thin - more splitting in oranges but not important in grapefruit.
• Excellent stock for: ‘Temple’ and mandarin hybrids.

22  Citrus macrophylla
• Very similar to lemons and limes.
• Lemons and limes do very well on this stock.
• Big problem - freeze sensitive.
• Sw oranges and GF very large but thick peel.
• Adapted to cool, dry climates.

23  Trifoliate Orange
• Widely used for satsumas and oranges in Japan, China, Argentina, and Australia.
• Dwarfing has been due to CEV.
• CEV inoculations induces dwarf
24 Freeze Hardiness of Trifoliate Orange
- Stock very hardy.
- But scions become quiescent later than on SO and RL.
- Scions not affected by CTV or CEV, but taken out by blight.
- Better on heavy poorly drained soil.

25 Fruit Quality on Trifoliate
- Usually small fruit prob because large crops and smaller root sys.
- Excellent quality, similar to those on SO and RL.
- Fruit peel smooth and thin.

26 Citranges
- Sw. orange x trifoliate hybrids.
- Several tested:
  - ‘Troyer’ in CA & ‘Carrizo’ in FL
- Scion over grows stocks.

27 ‘Swingle’ Citrumelos
- ‘Swingle’ citrumelo is most widely grown stock in FL.
- Released in 1974 - now world.
- Not affected by CTV, CEV, or xyloporosis.
- More freeze hardy than RL or ‘Carrizo’. Same as SO.