SELECTION & PLANTING

Deciduous Fruit Trees
Citrus Trees

December 2010 Edition             Walter Miller MG
Acknowledgements

Technical Assistance: Robin Cleveland
Photography: Kathryn Hall
Goal

To have successful plantings of desired fruit trees

Some desired fruit may not be productive in a particular location

Our focus will be on Backyard Orchards
Index

Part 1: Deciduous Fruit Trees

Part 2: Citrus Trees
Part 1

Deciduous Fruit Trees

*Temperate Zone* Trees

Cold Hardy for our area.
Basic Requirements

Sunlight:
   a minimum of 8 hours direct
Water:
   the trees must be irrigated
Space:
   tree size at maturity

Other challenges can be overcome
(They will be addressed as they arise)
Space & Size limitations?

Plan
Choose a mature size of tree; this drives spacing.
Is space limited? Determines number of trees. Size dictates ease or not in “tending” tree.

Tending includes: pruning, netting, thinning, harvesting – all processes necessary to produce fruit.

All trees require pruning!
Selection

Two parts:
- **Cultivar** *(what will be eaten)*
- **Plant Stock** *(what will be grown)*
Terminology

Variety is type of tree, e.g., Apple

Cultivar is a named variety, e.g., Fuji
Homework

Preparation before purchase
   (an impulse buy at the nursery may not work)
Have an awareness of the site of the planting
   (Site considerations will be discussed in the Planting section)
Variety/Cultivar selection

Known and Desired
New and Experimental
  determined by word of mouth
  or taste test
  or researching catalogs
Research at Home

Use of catalogs, websites; there are many suppliers

Recommendation  Dave Wilson  Nursery

  It supplies most if not all of the local retail stock.

  Out of region suppliers require consideration on compatibility of soils and climate.

ANR publications
REFERENCE PUBLICATIONS

Dave Wilson Publications
   Description of Varieties and Rootstocks
   Fruit and Nut Harvest Dates
Local Nursery Handouts
Taste Test Results
UCANR Publications: The Home Orchard
   The Master Gardener Handbook

Note: Dave Wilson Website ; davewilson.com
   UC website; home orchard.ucdavis.com
Considerations

Pollination:
   Is cultivar self fertile (not require a pollinator) or self sterile (require a pollinator)?

Chill Hours:
   Is winter cold and long enough to overcome dormancy?
      (Generally in our community, this is not an issue. But it could be for high or low chill requirements.)

Bearing Time:
   When in the season, fruit is desired. This is relative and based on yearly conditions.
Pollination

Apple: SS, PSF
Apricot: PSF, SF
Cherry: SS, ?
Peach/Nectarine: SF
Pear: SS
Plum: SF, PSF, SS

SS = self sterile
SF = self fertile
PSF = partially self fertile (a pollinator helps)
Chill Hours Defined

Basically: an hour at temperatures < 45 deg. F and >60 deg. F
(<45 = + hour ; >60 = - hour)

It’s a complex issue with different measurement systems
Chill Hours

Hours produced by typical winter weather. The county is in Zone 4 (900 to 1100 hours) with the exception of the lower West Slope, Zone 3 (700 to 900 hours).
<table>
<thead>
<tr>
<th>Fruit</th>
<th>Typical Chill Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td>500-1000</td>
</tr>
<tr>
<td>Apple (low chill)</td>
<td>400-600</td>
</tr>
<tr>
<td>Apricot</td>
<td>300-800</td>
</tr>
<tr>
<td>Cherry</td>
<td>700-800</td>
</tr>
<tr>
<td>Peach/Nectarine</td>
<td>500-800</td>
</tr>
<tr>
<td>Pear</td>
<td>700-800</td>
</tr>
<tr>
<td>Plum</td>
<td>250-700</td>
</tr>
</tbody>
</table>
Bearing Time

Most cultivars bear in one relatively short period. This is generally the case. (Determinant)
Some cultivars bear over a longer period. (Indeterminant)

Extended Harvest: a number of cultivars of the same variety bearing over a longer (extended period)

Ref. Dave Wilson Harvest Chart
And Now: the *Fruit and Nut Harvest Dates* chart! Plan for an extended harvest!

For almost immediate gratification, [here's a big, web-based version at near 1MB](#).

Or...here are 6 large .pdf files you can download.

You'll need scissors & tape...and some patience...
Other Characteristics of tree

Size at maturity:
[This is relevant to the available space]
  - genetic dwarfs
  - dwarf root stock
  - “semi-dwarf” rootstock
  - standard trees

Years to Bear

Multiple cultivars

N.B. All trees will require pruning!
# Size at Maturity

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Height (ft)</th>
<th>Spread (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Apples</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>dwarf</td>
<td>6 - 10</td>
<td>8 - 10</td>
</tr>
<tr>
<td>semi-dwarf</td>
<td>10 - 14</td>
<td>14 - 18</td>
</tr>
<tr>
<td>standard</td>
<td>25 - 30</td>
<td>18 - 20</td>
</tr>
<tr>
<td><strong>Apricot</strong></td>
<td>20 - 25</td>
<td>18 - 20</td>
</tr>
<tr>
<td><strong>Cherry</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>genetic dwarf</td>
<td>6 - 8</td>
<td>~6</td>
</tr>
<tr>
<td>semi-dwarf</td>
<td>14 - 20</td>
<td>14 - 18</td>
</tr>
<tr>
<td>standard</td>
<td>25 - 35</td>
<td>20 - 25</td>
</tr>
<tr>
<td><strong>Peach/Nectarine</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>genetic dwarf</td>
<td>3 - 6</td>
<td>5 - 8</td>
</tr>
<tr>
<td>standard</td>
<td>8 - 18</td>
<td>18 - 20</td>
</tr>
</tbody>
</table>
## Years to Bear

<table>
<thead>
<tr>
<th>Tree</th>
<th>Years to Bear</th>
</tr>
</thead>
<tbody>
<tr>
<td>Apple</td>
<td></td>
</tr>
<tr>
<td>dwarf</td>
<td>2-3</td>
</tr>
<tr>
<td>semi-dwarf</td>
<td>4-5</td>
</tr>
<tr>
<td>standard</td>
<td>5-7</td>
</tr>
<tr>
<td>Apricot</td>
<td>4-5</td>
</tr>
<tr>
<td>Cherry</td>
<td>4-6</td>
</tr>
<tr>
<td>Peach/Nectarine</td>
<td>2-4, possibly 1</td>
</tr>
<tr>
<td>Pears</td>
<td>3-7</td>
</tr>
</tbody>
</table>
Navigating Dave Wilson

First approach by slides

Second by web search
  With time and if the web cooperates
Fruit, Nut and Shade Tree Growers
for the Commercial and Retail Nursery Industry since 1938

Fruit Trees ~ Deciduous Trees ~ Shade Trees ~ Ornamentals

The Commercial Grower
We grow Orchard Stock for
- almond & walnut growers
- growers of packing fruit
- farmer’s market & fruit stand growers
- cling peach & prune growers

The Retail Nursery
We grow for
- garden centers & the retail trade
- wholesale buyers of landscape trees

We offer a complete program of retail sales aids and other assistance for our customers

The Home Fruit Tree Grower
Advice for the backyard orchard grower
- where to buy our trees
- how to plant a fruit tree
- photos of backyard orchards
- Backyard Orchard Culture!
### Fruit Trees

- Apples
- Apricots
- Asian Pears
- Blueberries
- Cherries
- Citrus
- Grapes
- Multi-Budded Fruit Trees
- Nectarines
- Peaches
- Pears
- Plums & Prunes
- Pluots®
- Aprium®
- Peach x Plum hybrid
- Plumcots
- Cherry Plums
- Fruiting Mulberry
- Figs
- Jujubes
- Kiwis
- Pawpaws
- Persimmons
- Pomegranate

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### Introducing:

Dave Wilson Nursery FORUMS for Fruit, Nut & Ornamental Trees

And:

Dave Wilson Nursery on Facebook

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**Where to Buy Our Trees**

- All around the USA
- See a variety of Solutions!

**DWN Recommended Fruit Tree Selections**

- for the Northwest and Colder Climates: USDA Hardiness Zones 5 to 9

**Tom Spellman**

- **Tom's Picks:** Fruit Tree Selections for the Southwest

**Multiple Planting**

- of Fruit Varieties for Successive Varieties Harvest

**Master Fruit Tasters**

- can help select the best suited, best tasting varieties for your backyard.
The Fruit Catalog

We Sell at Wholesale to Retail Nurseries & Garden Centers Farmer's Market & Fruit Stand Growers Container Growers & Commercial Orchardists

We Do Not Sell Individual Trees

To purchase Dave Wilson Nursery-grown trees, please contact one of our many customers.

Our Special Order Fruit Tree Program may be an option at your local nursery.
Of all the fruits, the apple appeals to the widest range of tastes. Dave Wilson Nursery continues to collect both old and new varieties that are considered the best in the U.S., though our collection is only a small representation of this wonderful fruit.

Items accompanied by this symbol are Edible Ornamentals: decorative trees that are perfectly complimentary to your edible landscape.

**Akane**
Especially nice red dessert apple derived from Jonathan - sweet, rich, spicy flavor. Resists scab and powdery mildew. Harvest in early season (August in Central Calif). 800 hrs. Pollenized by Fuji, Gala, Granny Smith or Golden Delicious.

**Anna**
Remarkable fruit for mild-winter climates in So. Calif., So. Ariz. Heavy crops of sweet, crisp, flavorful apples even in low desert. Fresh/cooked. Keeps 2 months in refrigerator. 200 hrs. Self-fruitful or pollenized by Dorsett Golden or Einshemer.

**Apple Babe genetic dwarf**
Crisp, sweet, red apple - excellent quality even in hot inland climates. Glossy, russet-free skin. Heavy bearing 8-10 ft compact tree. August. 700 hours. Pollenized by Garden Delicious or other apple. (Zaiger)

**Garden Delicious genetic dwarf**
Sweet, crisp, superb flavor, even in hot climates. Greenish-yellow with red blush to full red. Dessert/cook. good keeper. September. 8-10 ft. tree. smaller with
Go to DWN website
At the Nursery

What to look for and at:
Labels on trees
identification
cultivar
root stock
size
The Tree
cultivar diameter
branches
graft union
roots
Labels on nursery stock

These supply all basic information:
  description of fruit
  pollination requirement or not
  chill hour requirement
  bearing time
(This may cause or help in an impulse buy.)
IF THE TREE DOES NOT HAVE
COMPLETE LABELS, DO NOT
PURCHASE THE TREE!
Example of labels
Plant Stock – The Tree

Trunk diameter: 5/8 – ¾ inches

Branches:
  height above the graft union/roots spread
    vertically
    horizontally

Graft Union:
  is it “healing” or damaged

Roots:
  spread
  for damage and disease
Graft Union or Bud Union
Roots
Post Purchase

Pruning at nursery (or not)

Transportation (protect roots)

Storing at home (protect roots)
Planting

Site considerations:

Macro-environment
  Chill hours (generally)
  Topography
Micro-environment
  Chill hours (specifically)
Soil/Ground conditions
Layout
  Spacing (dictated by tree size)
  Row spacing & direction
Site Specifics

Factors influencing chill hours:
  Topography (cold air settles down hill)
  Impediments to chill hours

Soil conditions:
  DRAINAGE
    “Digability” (rocks are not your friends)
    (for options, See “Alternative Planting”)
  Texture (soil reservoir)
Site Specifics cont’d

Layout:
Tree spacing (suggestions)
  Small trees (6-8’ high) ~7-8 feet apart
  Large trees (8-12’ high) ~15 feet apart
Row direction
  North to South
Row spacing for maintenance (10-15 feet)
  Depends on tree size
Planting the tree (finally)

Digging the hole
  “the hole fits the tree”
Placing the tree
  “protecting the crown”
Post planting details
  initial pruning
  sunburn protection
  avoiding compaction and competition
Planting step 1

The Ground Level is the basic reference factor.
Planting step 2

Test for Drainage

Fill hole with water
It should drain in 3 hours.
If not, consider alternative planting methods

Ground level

Drainage hole
12 " deep
Planting step 3

Dig hole for tree

Ground Level

Note: Hole is wider than spread of roots.
Hole is no deeper than roots.
“The hole fits the tree not vice versa.”
Plant Stock reference points

Crown: where trunk joins roots
Soil line: point on trunk where it grew in ground
Graft or Bud Union: location where cultivar was grafted
Crown
Soil Line
Graft Union or Bud Union
Planting step 4

Crown is 3-4” higher than ground level.
There will be settling of soil.
Graft Union points to N or NE.
Planting step 5

Fill (mound) soil to “soil line”.  
(Notes to follow on:  
   Amendments, if any  
   How to fill)
Fertilizer is not necessary, is not recommended. Possible exceptions are: Super phosphate or Weak organic fertilizer (Dr. Earth)

Amendments are not necessary. But depending on the soil texture may be added. Any amendment should be organic and totally decomposed.
Filling the hole

Use native soil or good soil mix.
Use soil to achieve proper level of tree in hole. Proper level should be 3-4” high as soil will compact naturally.
Be gentle.
Do not vigorously compact soil.
Fill to soil line, “mound” soil to ground level.
If soil is damp from recent rains, do not water. Any irrigation should be gentle, like a soft rain.
Initial pruning at planting

Heading cut is determined by training method or the desired height at maturity. And/or by existing branches or buds. The recommendation is at “knee height” about 15 – 18 inches. Head back side branches to two or three buds. Do not thin out side branches below the heading cut. See which grows best to achieve desired training method.
Headed to 2 or 3 buds

For this purpose, use white interior or latex paint diluted to half strength with water. Apply the paint mixture from 2 inches (5 cm) below the soil surface up the entire trunk, including the dormant buds.

Figure 3. Larger trees often have lateral branches that can be headed back, leaving stubs 3 inches (7.5 cm) long with two or three lateral buds.
Initial Heading Cut

Double Jewel Peach
Planted 12.28.09
Headed at 30”, tree had no lower branches. Kept 6 stubs.
Later removed top 2; kept 4
Same Tree

Picture taken 09.22.10
Height 8 feet.
Note: Tree will be a test for a new training technique for peach/nectarine trees. By author; not in UCCE literature
Final Overview

Head at 24-30” for tree height of 10-12’. Head lower for 6-10’ tree. (Height depends on stock.)*

Avoid having roots or crown immersed in water for any length of time.

Typically, the leader is removed.
Post Planting

Whitewash entire tree with 50% dilute interior white latex paint.
Mulch tree but not within 12’ of trunk. (optional)
Staking is not necessary, if tree was “headed”.
Prevent weeds from competing with tree;
remove all within three feet of trunk.
Alternative Planting

Raised Beds or Boxes
Planting on the ground

Note: These alternatives insure the crown is well-above the ground line. These methods are the solution to drainage problems in the orchard.
Raised Bed
4’ X 4’ x 12”
Harcot Apricot
Planted 2009.
Taken 03.04.10.
Part 2

Citrus Trees

Subtropical Zone Trees

The subtropical nature requires a consideration of climate conditions and their limitations.
Basic Requirements

Suitable Climatic Environment
Sunlight
Water
Space
Wind Protection

(Plant protection will be discussed, *supra*).
Climatic Environment

Cold-hardiness varies with variety as follows: (from most tender to hardiest)
- citron
- Mexican Lime
- lemon
- grapefruit = pummelo
- sweet orange = tangelo = tangor
- sour orange
- Satsuma mandarin = Meyer lemon
- Kumquat

Note: temperature effects tree and fruit.
### Table 1. Relative frost sensitivity of selected citrus trees

<table>
<thead>
<tr>
<th>Common name</th>
<th>Scientific name</th>
<th>Sensitivity to frost*</th>
<th>Sensitivity to frost (F)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>TREES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>citron</td>
<td>Citrus medica</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>grapefruit</td>
<td>Citrus × paradisi</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>kumquat</td>
<td>Fortunella spp.</td>
<td>L 18-20F</td>
<td></td>
</tr>
<tr>
<td>lemon</td>
<td>Citrus limon</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>lime</td>
<td>Citrus aurantiifolia</td>
<td>H 32F</td>
<td></td>
</tr>
<tr>
<td>mandarin orange hybrids</td>
<td>Citrus reticulata ssp.</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>orange</td>
<td>Citrus sinensis</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Satsuma mandarins</td>
<td>Citrus reticulata ssp.</td>
<td>L</td>
<td></td>
</tr>
<tr>
<td><strong>ROOTSTOCKS</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>rough lemon or Alemow</td>
<td>Citrus macrophylla</td>
<td>H</td>
<td></td>
</tr>
<tr>
<td>trifoliate orange</td>
<td>Poncirus trifoliata</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Troyer and Carrizo citrange</td>
<td>× Citronicus Webberi</td>
<td>M</td>
<td></td>
</tr>
</tbody>
</table>

*H = high sensitivity; M = moderate sensitivity; L = low sensitivity. Trees with a high sensitivity are more easily damaged by frost than trees with a low sensitivity. For information on frost sensitivity of particular cultivars in your area, consult reliable nursery staff or your local University of California Cooperative Extension county office.
### Table 2. Critical frost damage temperatures for selected citrus fruits

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Critical temperature *&lt;br&gt;°F</th>
<th>Critical temperature *&lt;br&gt;°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>lemon buds and blossoms</td>
<td>27.0</td>
<td>-2.8</td>
</tr>
<tr>
<td>lemons, button, &lt;½ inch (13 mm) diameter</td>
<td>29.5 to 30.5</td>
<td>-1.4 to -0.8</td>
</tr>
<tr>
<td>lemons, green, &gt;½ inch (13 mm) diameter</td>
<td>27.0 to 29.5</td>
<td>-2.8 to -1.4</td>
</tr>
<tr>
<td>lemons, tree-ripe</td>
<td>26.0 to 30.5</td>
<td>-3.3 to -0.8</td>
</tr>
<tr>
<td>oranges, green</td>
<td>28.5 to 29.5</td>
<td>-1.9 to -1.4</td>
</tr>
<tr>
<td>oranges, grapefruits, and mandarins, half-ripe</td>
<td>27.0 to 29.0</td>
<td>-2.8 to -1.7</td>
</tr>
<tr>
<td>oranges, grapefruits, and mandarins, tree-ripe</td>
<td>25.0 to 29.0</td>
<td>-3.9 to -1.7</td>
</tr>
</tbody>
</table>

*Note: *Critical temperature is affected by relative humidity and duration. Fruits can withstand the lower temperature ranges in drier air and shorter durations of cold.*
Research at Home

Websites:
  four wind growers nursery
  homeorchard.ucdavis.com

Publications:
  Master Gardner Handbook
  “Citrus”, Lance Waldheim
Selection

Review Publications and Websites
Suggest:
Walheim, “Citrus”
Four Wind Growers website
Dwarf citrus from Four Winds Growers: bringing smaller trees with delicious, full-sized fruit to your garden

Four Winds Growers is a family owned and operated citrus nursery in California. In the late 1940s, our founder developed the world’s first Dwarf Citrus trees. Today, we offer more than 60 varieties of fine Citrus trees online. These include a selection of rare and unusual Citrus varieties, some of which are not yet available at retail nurseries in California.

Evergreen Dwarf Citrus produce fragrant flowers, followed by full-sized citrus fruit, making them a welcome addition to your garden and table. Carefully hand-grafted, our trees are well suited to growing in containers or as houseplants. They can also be planted in the ground in suitable climates. One of our most popular varieties is the Dwarf Meyer Lemon, which is also well suited for indoor growing. Other favorites are Kaffir Lime, Bearss Lime, Mexican (Key) Lime and Sweet Lime.

Our Edible Ornamentals available in California nurseries and garden centers

These include not only Citrus, but also Avocado, Blueberry, Cane Berry, Fig, Grape, Jujube, Multi-grafted Deciduous fruit trees, Olive, Persimmon, and Pomegranate. See Fruits and Berries to learn more about the varieties we have available and their care.

Online citrus problem solver

New: Organic Meyer Lemons!
We are excited to announce our first organic citrus trees.

Featured Trees
What’s new at Four Winds Growers?
Yuzu
Gold Nugget Mandarin
Australian Finger Lime
Four Winds Citrus Variety List

Most everyone knows the basic citrus varieties, but many are surprised to learn just how many different forms the citrus fruit can take. Below we list all varieties we sell, from the everyday to the otherworldly.

For specific information by variety on cold hardiness, heat requirements, suitability for indoor growing, and bloom/fruit seasons, be sure to visit our [Citrus Variety Information Chart](#)

Special Order Options: Is there a variety of citrus that you are interested in purchasing that you do not see in our collection? We may be able to help. Contact Aaron Dillon in the Four Winds Growers Special Orders Department at [specialorders@fourwindsgrowers.com](mailto:specialorders@fourwindsgrowers.com)

- **Sweet Oranges**
- **Blood Oranges**
- **Sour Oranges**
- **Mandarins**
- **Lemons**
- **Mediterranean Lemons**
- **Lime**
- **Kumquats**
- **Citrons**
- **Grapefruits**
- **Other Interesting Varieties**
Sweet oranges have been cultivated and enjoyed by people around the world for thousands of years. Varieties have been adapted to suit numerous climatic conditions and local taste preferences.

- **Washington Navel Orange [IN]** - California’s famous winter-ripening variety. Sweet, seedless fruit ripens in ten months. See photo.

- **Trovita Orange [IN]** - Spring ripening. Good in many locations from coastal areas to desert. Few seeds, thin skinned fruit, heavy producer and excellent flavor.

- **Cara Cara (Pink) Navel Orange** - Early-ripening Navel Orange with medium red colored flesh. Fruit has rich sweet flavor. Venezuelan introduction. See photo.

- **Lane Late Navel Orange** - Spring/summer ripening seedless Navel Orange with fine, rich flavor. A Washington Navel hybrid developed in Australia. A new choice for oranges to peel and eat or juice in the summer. See photo.


- **Shamouti Orange (Jaffa/Palestine)** - Fabled orange from Middle East. Very few seeds. Spring to summer ripening. Good Flavor. See photo.

- **Valencia Orange** - Summer-ripening juice or eating orange. Fifteen months to ripen. Grow your own orange juice. See photo.
Growing Citrus in the Ground

Growing dwarf citrus trees in the ground can be immensely rewarding, and it naturally produces the biggest and most vigorous specimens. However, before planting a citrus tree in the ground, you must determine whether or not the location you have in mind will provide a suitable home for your new dwarf citrus tree.

On this page:

- How Will It Look?
- Climate
- Location
- Soil
- Planting
- Watering
- Fertilizer
- Mulches
- Suckering
- Thorns
- Pruning
- Pollination
- Espaliering
- Beneficial Insects
- Pest Insects
- Frost

How Will Citrus Look In My Yard?

Sometimes people aren't quite sure about using citrus as a landscape plant. In fact, citrus work extraordinarily well in most any landscape, offering beautiful evergreen foliage, lovely (and fragrant) blossoms, and colorful fruit. If you'd like to see some examples of successful landscape plantings, take a look at our landscaping slide show.

Climate

In general, ground-planted citrus trees are happiest in warm, temperate areas. Some varieties are much more frost-tolerant than others. For information on a specific variety, please refer to our hardiness table.

Location
Citrus Variety Information Chart

For each variety we sell, the following table lists that variety’s suitability for indoor growing; its minimum tolerable temperature for winter; its bloom and fruiting seasons; and its recommended summer heat level to produce good fruit. Lemons, limes and citrons are most sensitive to frost, while sweet oranges, grapefruit, tangerines and calamondins are intermediate. Kumquats and Owari Mandarin Satsuma are the most frost-tolerant, tolerating temperatures in the low twenties.

Trees grown as houseplants or indoor/outdoor plants are not necessarily subject to these zone limitations. See our heat requirements page for more information on ripening.

<table>
<thead>
<tr>
<th>VARIETY</th>
<th>BEST FOR INDOOR GROWING</th>
<th>PROTECT BELOW THESE TEMPS</th>
<th>USUAL BLOOM SEASON</th>
<th>USUAL FRUIT SEASON</th>
<th>NEEDS SUN/HEAT TO SWEETEN FRUIT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SWEET ORANGES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Washington Navel Orange</td>
<td>X</td>
<td>28</td>
<td>Spring</td>
<td>Winter</td>
<td>X</td>
</tr>
<tr>
<td>Trovita Orange</td>
<td>X</td>
<td>28</td>
<td>Spring</td>
<td>Spring</td>
<td></td>
</tr>
<tr>
<td>Cara Cara (Pink) Navel Orange</td>
<td>28</td>
<td>Spring</td>
<td>Fall/Winter</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lane Late Navel Orange</td>
<td>28</td>
<td>Spring</td>
<td>Spring/Summer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Robertson Navel Orange</td>
<td>28</td>
<td>Spring</td>
<td></td>
<td>Winter</td>
<td>X</td>
</tr>
</tbody>
</table>
FWG website

Navigating online
Planting Site

Suitable site determined by climatic conditions.

Macroenvironment:
  elevation
  slope

Microenvironment (plant location):
  In ground

Note:
  Other options are movable containers or indoors.
Site (elevation & exposure)

Generally the higher the elevation the lower the temperature readings.
Exposure (or not) to the winter sun is important.
  Site should face south (not sun blocked).
  Building(s) to the north are beneficial.
Wind screens not blocking sun are beneficial
Locations on a ridge is best – cold air drainage. Locations in a depression are troublesome - cold air settles.
Site (size of mature tree)

Time to Bear

Mature standard-sized Orange and Grapefruit trees can grow to 20 – 30 feet.

Time to bear depends on tree purchased.
  In container with roots developed, first season.
  In sleeve, 3 – 4 years.
Planting

Note:

Stock will be available in pots or sleeves. The soil level in either container determines the level in the hole; one inch higher than the ground level.
Planting (sleeve)

Note:
Slide sleeve out gradually. Fill hole partially and then slide sleeve up to next level until it is removed entirely.
Remember 1” rule.
Planting (irrigation)

Avoid watering the trunk of plant. Irrigate root ball but not trunk. Use dams.
Plant Protection

Changing the microenvironment for both:
    trunk (by insulating)
    fruit and foliage.

Techniques:
    irrigation, wet soil produces heat
    lights, incandescent, e.g., Christmas
    covers, permeable, e.g., row cover

Reference:  ANR Publication 8100 (for
discussion of frost and protection.)
Navigating HO for ANR 8100

Pages as follows:
Home Page
The California Backyard Orchard
Citrus
Scroll to “Frost Protections, etc.”
The California Backyard Orchard
Includes gardening calendars, general orchard preparation and maintenance tips, specific ... Please e-mail your comments to UC Statewide Master Gardener Program ...
homeorchard.ucdavis.edu - Cached

Pomegranate - The California Backyard Orchard
Pomegranate Links, UC Fruit and Nut RIC. Pomegranate, California Rare Fruit Growers ... Please e-mail your comments to UC Statewide Master Gardener Program ...
homeorchard.ucdavis.edu/pomegranate.html - Cached

Lake County - Master Gardener Links - Master Gardener
http://homeorchard.ucdavis.edu - This site includes information for backyard ... UC Davis Arboretum ... UC Davis Ornamental Horticulture Research and ...
celake.ucdavis.edu/Master_Gardener/Master_Gardener_Links.htm - Cached

September 17, 2004 — College of Agricultural and ...  
Chancellor retired from UC Davis in 1994, but remains active in ... UC Davis Web site, a ... The site homeorchard.ucdavis.edu is an encyclopedia on growing ...
www.aes.ucdavis.edu/NewsEvents/currents/september-17-2004 - Cached

UC Davis News & Information :: New Web Site for Backyard ...  
UC Davis Experts. Seminars/Events. Printable version ... called “The California Backyard Orchard.” located at <http://homeorchard.ucdavis. ...
Why Have an Orchard?

- Joys and considerations as you plan your orchard.

The Big Picture

- Concepts and processes you’ll want to consider when developing your orchard.

Fruits & Nuts

- Growing recommendations and links for 24 fruit and nut trees.

Master Gardeners

- Need local help? Find it here.

Calendars

- You’ll find maintenance and event calendars here.

Glossary

- Explanations of terms used on this site.
Fruits & Nuts

→ Almond
→ Apple
→ Apricot
→ Avocado
→ Berries (includes blackberry, blueberry, raspberry, and strawberry.)
→ Cherry
→ Chestnut
→ Citrus (includes grapefruit, lemon, mandarin, and orange.)
→ Fig
→ Filbert (Hazelnut)
→ Loquat
→ Nectarine
→ Olive
→ Peach
→ Pear
→ Pecan
→ Persimmon
→ Pistachio
→ Plum & Prune
→ Pomegranate
Citrus

UC IPM RESOURCES

- Citrus Pests in Gardens and Landscapes
- Site Selection
- Planting
- Watering
- Training, pruning, & thining
- Fertilizing
- Sanitation
- Harvesting & storage

OTHER RESOURCES

- Citrus Links, UC Fruit and Nut RIC
- Cold Wet Weather May Cause Oranges To Drop, Ed Perry, Stanislaus Co. UCCE
- Store Navel Oranges In A Cool Place, Ed Perry, Stanislaus Co. UCCE
- Oranges: Safe Methods to Store, Preserve, and Enjoy, Jennifer Snart, Mary Lu Arpaia, Linda Harris
- Growing Backyard Citrus in Kern County, Craig Kallsen, Kern Co. UCCE
- Budding & Grafting Citrus & Avocados in the HomeGarden, Pam Elam, Fresno Co. UCCE
- Frost Protection for Citrus and Other Subtropicals, Pamela M. Geisel and Carolyn L. Unruh, Fresno County
Frost Protection for Citrus and Other Subtropicals

PAMELA M. GIESEL, University of California Cooperative Extension Farm Advisor, Environmental Horticulture, Fresno County. CAROLYN L. UNRICH, staff writer, University of California Cooperative Extension Fresno County.

In many areas of California, winter temperatures can pose a threat to the fruit and foliage of citrus and other subtropical trees such as avocado (Persea americana), guava (Psidium spp.), and macadamia (Macadamia spp.). Susceptibility to frost depends on the health and vigor of the plants, the characteristics of individual species or cultivars, the rootstock on which the individual trees are grown, and the intensity and duration of the cold.

TYPES OF FROST

Frost injury to plants from temperatures below freezing can be called "frost" or "freezing"; in this publication it is referred to as "frost." Plants can also be injured by cold temperatures above freezing, this is called "low-temperature injury" or "chilling injury" and is not covered in this publication (for more information on low-temperature injury, see Abiotic Disorders of Landscape Plants: A Diagnostic Guide, ANL Publication 2430, 2001).

There are two types of frost: radiation frost and advective frost. Radiation frost occurs on cold nights when the air is clear and dry and heat is lost, or radiated, from the earth’s surface into the atmosphere. Soil, buildings, plants, and other objects at the earth’s surface act as a heat reservoir by absorbing heat during the day. Plants are damaged when enough heat is lost from this reservoir to lower the temperature at the surface to below critical temperatures. Radiation frost is the most common type of frost in California.

Advection frost occurs when a mass of cold air displaces a mass of warmer air at the earth’s surface. This displacement can be caused by a temperature inversion, which forms when a layer of warm air creates a low ceiling that traps cold air close to the ground. Advection frost can also occur when masses of cold, polar air move into warmer areas. Advection frost is relatively uncommon in California.

SYMPTOMS OF FROST INJURY

Frost injures plants by causing ice crystals to form in plant cells, making water unavailable to plant tissues and disrupting the movement of fluids. Frost-damaged leaves or twigs appear water-soaked, withered, and turn a dark brown or black. Unprotected, sensitive young trees or plants may die, but frost-sensible trees may survive. In cold winter areas, highly frost-sensible trees rarely live to maturity before being killed by frost.

Citrus fruit can be damaged by frost as well. Within a few hours after a frost, the parenchyma inside the fruit ruptures as ice crystals form inside them. This results in water loss, causing the fruit to dry out. Frost-damaged fruit can be useful after the frost, but they break down quickly and are subject to decay by bacteria and fungi. Deterioration of frost-damaged fruit usually occurs within a few days to 2 weeks, depending on storage conditions, temperature, and other environmental factors.
Trunk Insulation

Materials:
  Thermal wraps, layers of newspaper, corrugated cardboard, cylinder of sawdust (6” diameter). Protect from ground to 6-12” above bud union.
Heat/Sun considerations

Sunburn: exposed limbs should be painted with a whitewash.
Heat: fruit needs heat to ripen some more than others, e.g., grapefruit. Excessive heat may cause splitting.
Closing Remarks

This was a UCCE Eldorado County Master Gardener production.