



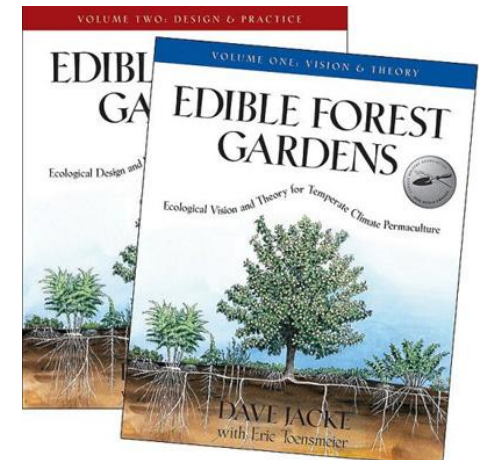
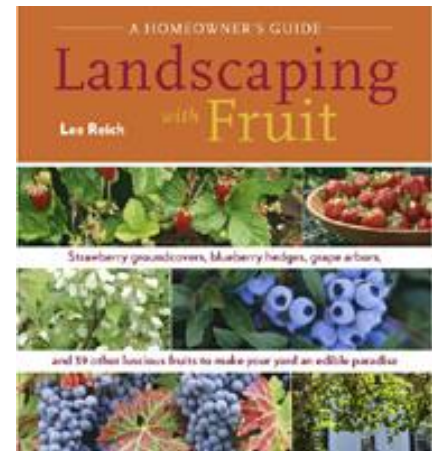
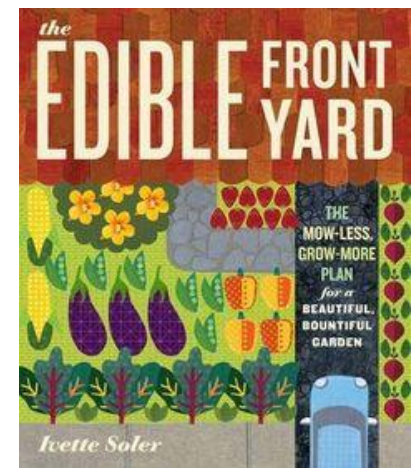
# Growing Fruit in Small Spaces





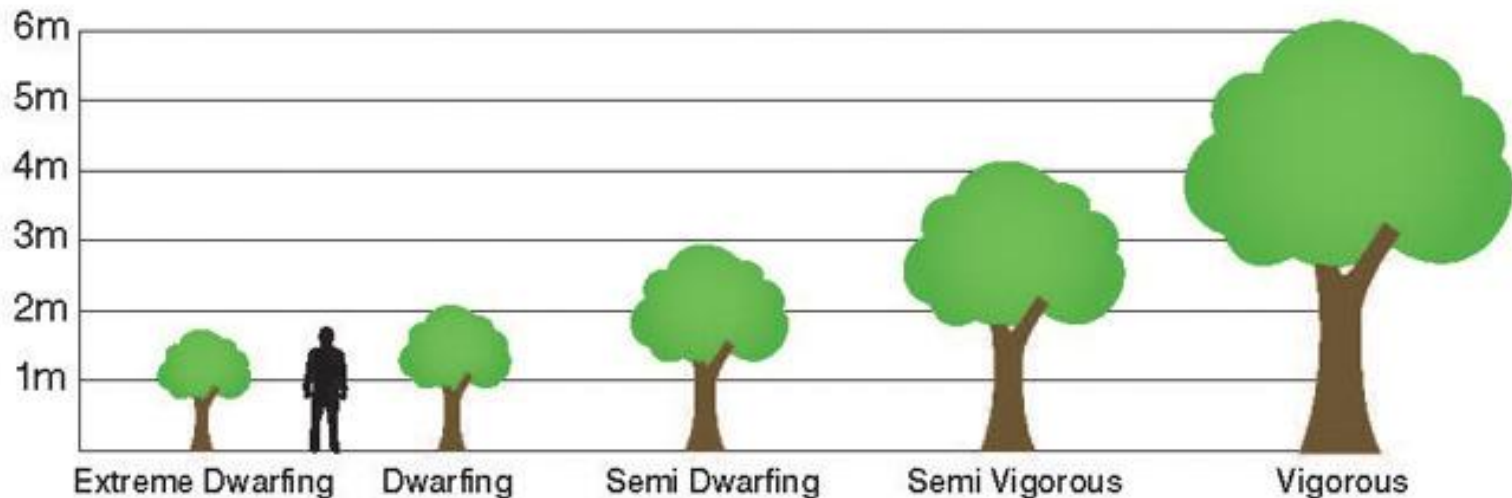
# Growing Fruit in Small Spaces

- Rootstocks to keep trees small
- Multigrafted fruit trees
- Espaliers
- Planting multiple trees in 1 hole
- Planting in containers
- Pruning to Keep Plants Small
- Genetically Small Fruiting Trees and Plants
- Small Fruiting Plants



# Rootstocks to keep trees small

- The height of a fruit tree can be limited by grafting it onto a dwarfing rootstock which will allow it to be grown in a smaller space than if it were grown on its own roots. Such dwarf fruit tree rootstocks will reduce the ultimate size of the tree to such an extent that they can even be grown in large (60cm/2ft diameter) containers on your patio.
- However, it is worth noting that the container itself will also restrict the growth of a patio fruit tree. Therefore most miniature fruit trees will reach an approximate height of just 1m, but will grow into taller trees if they are not grown in containers.
- One great advantage of dwarf rootstocks is that they have no influence upon the size of fruit itself, so a dwarf patio fruit tree will produce the same sized fruits as a large orchard sized tree.



# Rootstocks to Keep Trees Small

- Not all types of fruit trees have rootstocks that will dwarf the mature size of the tree.
- Fruit trees grafted onto dwarfing rootstocks will often bear fruit at a younger age and will bear more fruit per foot of height than if they were grafted onto rootstocks that produced larger trees.
- Partial graft incompatibilities are sometimes seen at the graft union.



## Apple:

M27 (Similar to: P9) -Extreme dwarf-1.2m (48")  
M9 (Similar to: Pajam 2, Pajam 9, P2)-Dwarfing-1.8-2.4m (6-8ft)  
M26-Dwarfing-2.4-3m (8-10ft)  
M6-Semi Dwarfing-3m (10ft)  
MM106-Semi Dwarfing-3-4m (10-13ft)

## Peach, Plum, Apricot and Nectarine

St. Julien-Semi Vigorous-4.5 (14ft)  
VVA1-Semi Dwarfing-2.5m (8ft)  
Torrinel 24- Semi-dwaring-2.4-3m (6-10ft)  
Myrobalan-Semi Vigorous-5m (16ft)  
Ferlenain-Semi Dwarfing-3m (10ft)  
Mont Clare-Semi Dwarfing-3m (10ft)  
Citation — Semi-dwaring-2.4-3m (6-10ft)

## Pear

Quince A-Semi vigorous-3-4m (10-13ft)  
Quince C-Semi Dwarfing-2.4-3m (8-10ft)  
Quince Adams-Semi Dwarfing-2.4-3m (8-10ft)

## Citrus

Flying Dragon-True Dwarf-1.2-2.5m (4-8ft)  
Trifoliate Orange- Dwarfing-2.4-3m (8-12ft)



# Espaliers

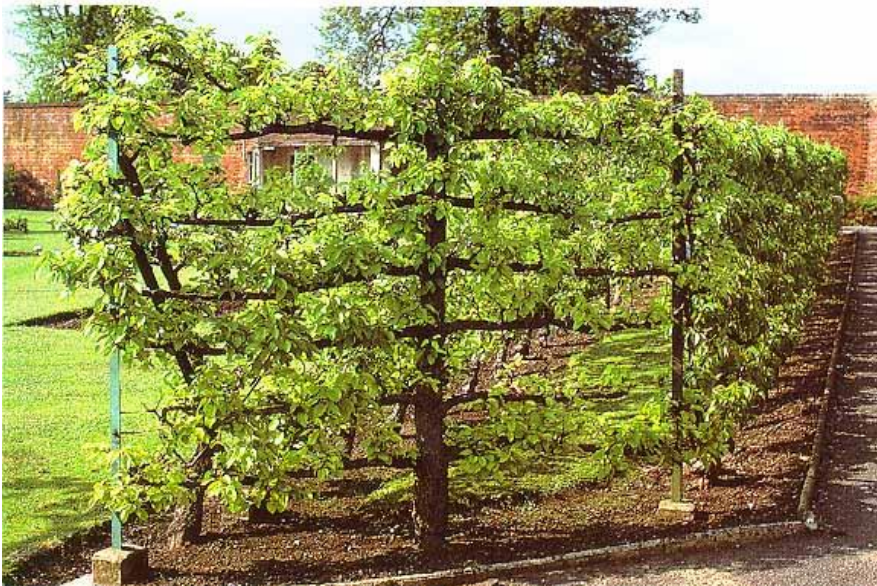
- An "espalier," is any plant trained to grow in a flat plane against a wall, fence, or trellis.
- Almost any plant can be espaliered by continually directing growth along a flat plane and removing growth in undesired directions.
- Plants that produce many flexible lateral branches and fruit on fruiting spurs are excellent choices for espaliers.
- Some of the easiest types of fruit trees to espalier include: apples, pears, cherries and plums





# Espaliers

- The word *espalier* also may be used to describe the technique of training a plant to this flat plane.
- High yields of high-quality fruit grow on thin fruiting walls, with much less labor devoted to pruning, training, and harvesting





# Informal Espaliers

- Citrus trees and other fruit trees that bear fruit on current seasons growth or on last years growth will produce more fruit if grown as an informal espalier—that is, one without a precise pattern.
- The tree is planted in front of a structure and allowed to branch naturally. Any growth is removed that juts out too far.





# Fruit Tunnels

- Creating Fruit tunnels along pathways using espalier techniques along a framework can produce beautiful and productive walkways that keep fruit within easy reach.





# Multi-Grafted Fruit Trees

- Grafting more than one variety of fruit onto a single tree can give more variety in the space of a single tree.
- A tree can be grafted to have types of fruit or can have the same type of fruit but with different ripening seasons to extend the harvest season.
- The fruit varieties must be of the same or a closely related genus.
- The fruit varieties should be of similar vigor and of similar chilling requirements if a type of fruit that requires chill.





# Multi-Grafted Fruit Trees

- Each variety of fruit grafted onto the tree should be pruned to have approximately equal size and equal space in the tree.
- Careful attention must be given to keep the fruit varieties in balance so that the more vigorous varieties do not dominate and take over the tree, killing off the less vigorous varieties.





# Planting multiple trees in 1 hole

- Planting 2, 3 or 4 fruit trees in a single hole with the root balls and trunks very close together has many of the same benefits of multi grafting a single fruit tree.
- The fruit varieties must be of the same or a closely related genus.
- The fruit varieties should be of similar vigor and of similar chilling requirements if a type of fruit that requires chill.
- Multi plantings often give more options for variety selection than do multi grafted fruit trees.
- Trees planted in multi plantings can also be multi grafted.

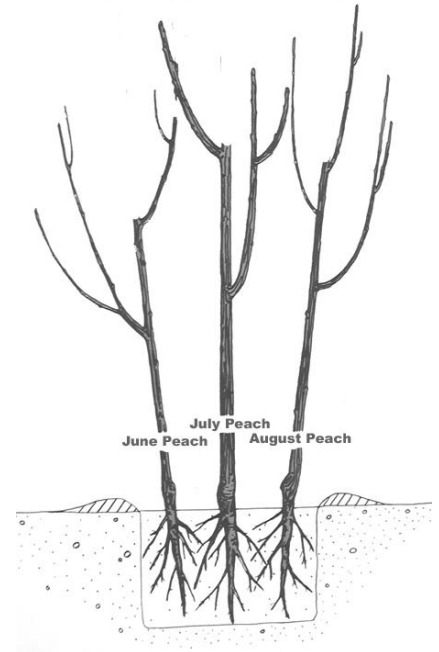
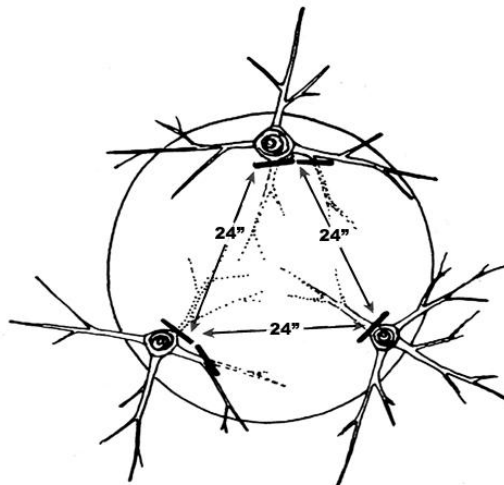




# Planting multiple trees in 1 hole

- The trees should be planted angled slightly outward at about 30 degrees from vertical.
- Each tree should be pruned to have approximately equal size and equal space in the tree planting so that the multi planting takes up approximately the same space as a single fruit tree.
- Careful attention must be given to keep the fruit trees in balance so that the more vigorous trees do not dominate and take over the entire space, stunting or killing off the less vigorous trees.

**After planting, prune out branches growing towards the center or crossing with other branches.**

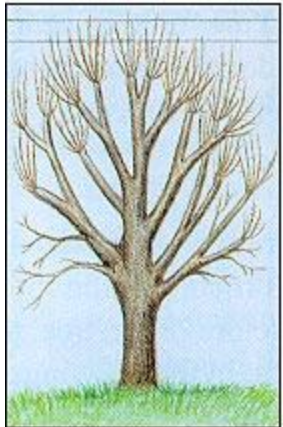




# Pruning to Keep Plants Small



- When a tree or shrub grows too large for a given space, the tree's canopy can be reduced in both height and width through a pruning technique called **crown reduction pruning or drop-crotch pruning**.
- Crown reduction is not the same as topping. The tree care industry does not condone topping or **heading** cuts back to stubs or weak lateral branches because this creates large wounds and can increase potential decay for the tree as well as potential structural risk and defects.
- Topping or heading has many harmful effects on tree growth and tree health. The results include excessive, poorly attached branch growth, disease and decay, and starvation among others and never results in reducing the size of the tree long term!
- Never top or head branches or trees!**



A. Topping



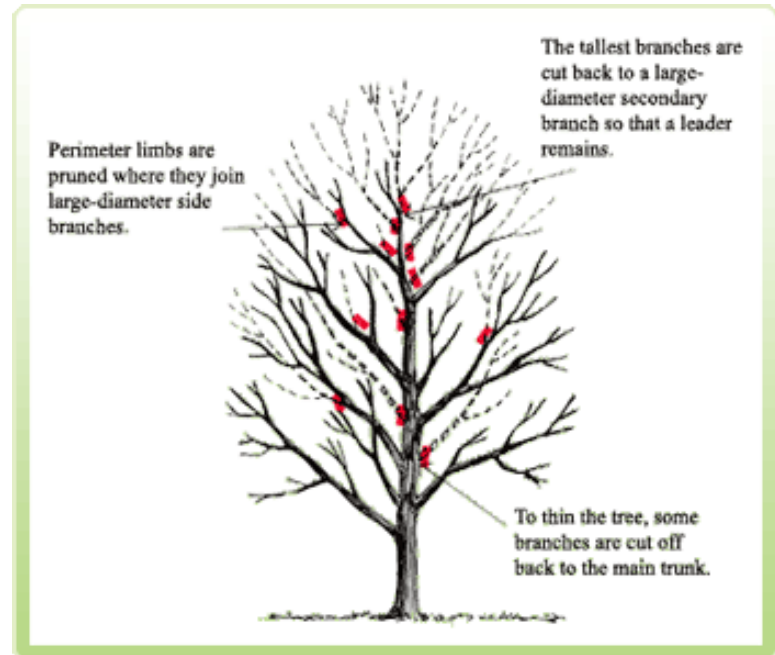
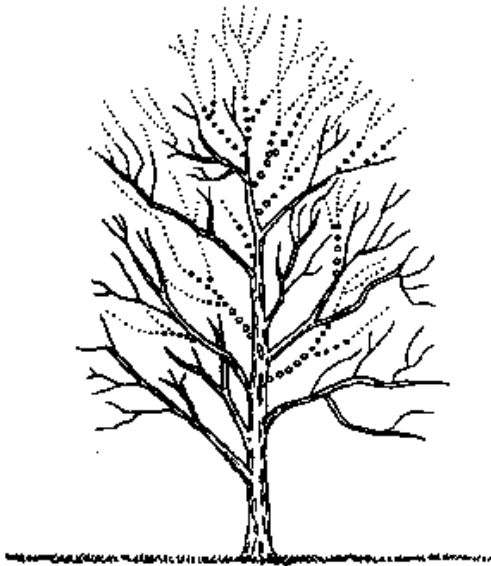
B. Tipping





# Pruning to Keep Plants Small

- Crown reduction (drop-crotch pruning) is the cutting of limbs back to their point of origin or back to a lateral branch capable of sustaining the remaining limb and assuming apical dominance of the limb. Reduction is used to reduce the size of a tree by decreasing the length of one or many stems and branches.
- Crown reduction cuts to smaller laterals. **The remaining lateral branch should ideally be at least one-third the diameter of the removed portion.**
- This rule can vary with species, age, climate, and the condition of the tree. Properly executed, this technique ensures subsequent wound closure and reduces the risk of long-term damage from decay.

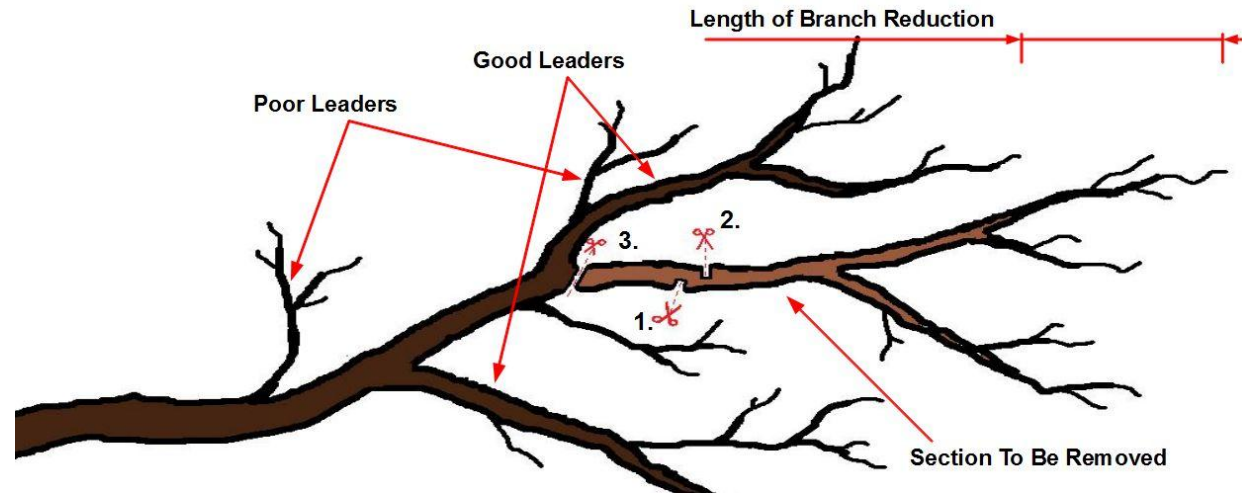
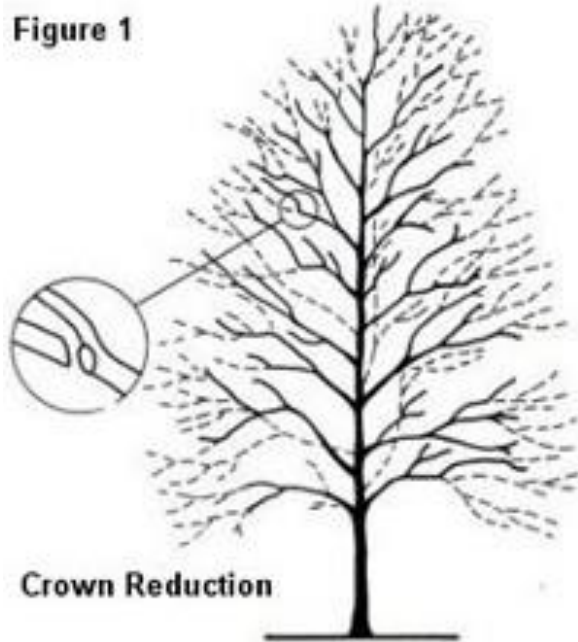




# Pruning to Keep Plants Small

- Crown reduction cuts to smaller laterals. The remaining lateral branch should ideally be at least one-third the diameter of the removed portion.

Figure 1



- The goal of any responsible pruner is to reduce the harmful effects of their pruning wounds. This is done by pruning in such a way as to facilitate the closure and compartmentalization of these wounds as quickly as possible by following the principles of natural target pruning.
- **Do not:**
  - make flush cuts behind the branch bark ridge.
  - leave living or dead stubs.
  - injure or remove the branch collar.
  - paint cuts.





# Growing Fruit Trees in Containers

- All fruit trees can be grown in containers for a period of time.
- The length of time a fruit tree can remain in a container depends upon:
  - The size of the container
  - the type of fruit tree
  - the rootstock,
  - pruning (both of the tree above ground and root pruning)
  - type and condition of the potting soil.





# Planting in Containers

- All growing containers **MUST** have drainage holes to provide adequate water drainage and aeration.
- Potting or container soils are mixtures of organic and inorganic components designed to provide optimum water, air and nutrients for plant root growth.
- All container soils decompose and compact over time and should be considered as **temporary**. These soils need to be refreshed and replenished as the soil decomposes and compacts. Always add fresh soil to the bottom of the root ball, never on top of the original soil unless the roots of the plant are exposed..
- Use container or potting soils that are low in organic material or that have organics that decompose slowly to reduce the frequency of repotting.
- Container soils must be watered more frequently due to the limited root area of the plant in the container.
- Container soils leach nutrients more rapidly than soils in the ground and must be fertilized more frequently due to the nutrients leaching out of the container.
- Container soils are generally sterile and plant health can benefit from the addition of mycorrhiza or other beneficial soil organisms to the growing medium.



# Container Soils

- Commercially available “cactus soils” are low in organic materials. They decompose less and they decompose more slowly than soils with a high wood and bark content.
- Mix cactus soil 50-50 with a potting soil that has rice hulls (which decompose much more slowly than wood and bark products) and organic nutrients, such as Kellogg’s ‘Patio Plus’, for a long lasting container soil.





# Mycorrhizae:

- Mycorrhizae have formed associations with plant roots for over 400 million years.
- Mycorrhizae are present in 92% of plant families (80% of species).
- **Mycorrhizae MUST come into direct contact with a plant's root to form a symbiotic association with the plant!**
- Present in most undisturbed soils, mycorrhizae may be missing from areas where the top layers of soil have been removed, where soils have been compacted, where fungicides or excess fertilizers have been applied or in container (soiless) soil mixes.
- **Benefits of Mycorrhizae include:**
- Enhanced plant efficiency in absorbing water and nutrients (**especially phosphorous**) from the soil.
- Reduces fertility and irrigation requirements.
- Enhances plant health, vigor and drought resistance and minimizes stress.
- Increased pathogen resistance/protection.
- Enhances seedling growth, rooting of cuttings, and plant transplant establishment.



# Root Pruning Containerized Plants

- Keeping plants in containers can cause the plant to become root bound.
- In addition to the container soil decomposing, containerized plants need to be root pruned periodically to keep the plant healthy and vigorous.



- Root pruning can allow you to keep the plant in a pot for many years. It consists of taking the plant out of its pot and cutting the outside roots by 20-30%.
- The remaining roots are loosened, new soil is added and the plant is then repotted by adding container soil to the bottom and sides of the pot.





# Genetically Small Fruiting Trees and Plants

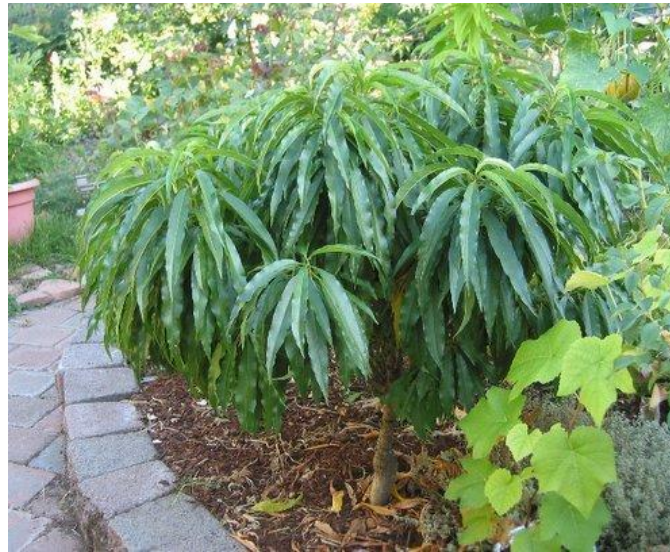
- Miniature (Genetic Dwarf)  
Peaches and Nectarines
- Some Citrus varieties
- Some Papaya varieties
- Some Banana varieties
- Berries
- Pineapple





# Miniature (Genetic Dwarf) Peaches and Nectarines

- Miniature peaches and nectarines are short, shrubby trees, rarely growing more than six feet tall and six to ten feet wide. The drastically shortened internodes account for the small size of the tree.
- Chilling requirements vary by variety and care must be taken to select varieties that will receive sufficient chill hours in your growing area.





# Genetically Small Citrus varieties

- Some citrus varieties are genetically small trees. Their ultimate size is dependant of the rootstock on which they are grafted, however they will be much smaller than normal and are roughly  $\frac{1}{2}$  the size of other citrus varieties.
- Citrus varieties which are genetically small include the Improved Meyer Lemon, the Mexican Lime, Kumquats and Kumquat Hybrids, and Kishu and Satsuma Mandarins.



# Genetically Small Papaya

- There are many varieties of dwarf papaya that are well suited to growing in containers or in small spaces.
- All papaya demand soils with excellent drainage. They enjoy frequent watering and fertilizing during the warm weather, but will develop root and crown rot if the soil stays too moist during the colder months.
- Papaya love heat, and fruit will be sweeter and better quality in hot areas or against a South facing wall.
- Trees are cold hardy to about 28 degrees F.





# PAPAYA

## *Carica papaya*

- Trees are frequently dioecious, having male and female flowers on separate trees.
- Some papaya varieties may also be monoecious (such as the solo types which frequently produce both male and female flowers on one tree).



Male Flowers



Female Flowers

# BABACO PAPAYA

*Carica pentagona*

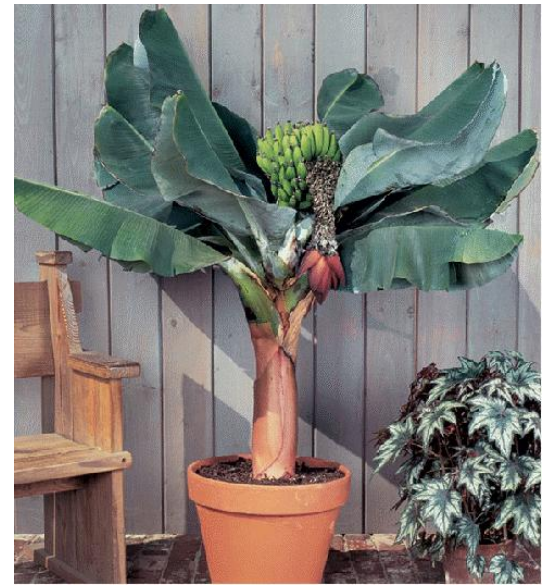
- A dwarf, cold hardy, self-fruitful papaya. Female plants are parthenocarpic and produce seedless fruit without pollinization.
- Fruit is very juicy and has the taste of a honeydew melon with lemon-lime.





# Genetically Small Banana

- Many dwarf banana varieties are well suited to growing in containers or small spaces.
- Plants enjoy heavy fertilizing and watering during the warm months of the year. Discontinue both during the colder months of winter.
- Plants leaves will be killed by temperatures below 32 degrees. However pseudostems and corms can survive temperatures well below freezing.
- Each “tree” or pseudostem fruits only once in it’s life. Flowers are produced after the final leaves are formed (somewhere between 38-45) and can occur any time of year.
- The first flowers formed are female and develop into fruit. After the last “hand” of fruit are formed, Male flowers occur on the lower portion of the fruit stem. All edible bananas are sterile.





# Types of Garden Strawberries

## *Fragaria × ananassa*

- Everbearing (Day Neutral) – Produce lightly most of the year. Plants do not produce many runners.
- Spring (June) Bearing - Produces one main heavy crop.  
Early, mid & late season varieties.  
Plants produce many runners.





# Alpine Strawberries *Fragaria vesca*



- Plants produce small, intensely flavored fruit throughout the spring, summer and fall.
- Plants often propagated by seed. No runners are produced.
- Fruit color may be red or yellow (white).

# Musk Strawberries (Fragaria moschata)



- Also called hautbois or hautboy strawberries, they are native to parts of Europe where they are more common than they are here in North America. Musk strawberries are hexaploid, they are not self-pollinating and a male and a female plant are required to get a crop. It is recommended that you get two varieties.
- Musk plants are large, even larger than garden variety strawberries. At maturity they stand about 18" tall. They will tolerate shade but do best in full sun with rich soil. They are strong growers and put a lot of their energy into producing runners, though not all varieties produce the same quantity of runners.
- It is hard to describe the taste of a musk strawberry. I some describe it as the tastes of strawberry, pineapple and raspberry all at the same time. One thing is for sure. You will never forget it once you've tasted it. Fruit are generally produced in early June and it is possible in some areas to get a small fall crop.



# Pineberry Strawberries

*(Fragaria chiloensis X  
F. virginiana)*



- Pineberry plants are albino strawberry cultivars that yield fruit with white- to pinkish-hued fruits that start out green, and have red seeds. The pink blush may be more prominent on fruit that gets more sun exposure.
- The fruit has a pleasantly pineapple aroma and taste, and is smaller than most modern domestic garden strawberries.
- Plants have an everbearing fruiting habit.
- Plants are partially self-pollinating. Cross-pollination between a red strawberry variety and a Pineberry will likely increase fruit yield in both plants.

# Bramble Berries



Both Raspberries and Blackberries are now available as either primocane or floracane fruiting varieties. Primocane fruiting - bear fall crop on current season growth. Floricane fruiting – bear fruit on 2<sup>nd</sup> year wood.

## Blackberries

- Fruit has a solid central core when it is picked.
- Vines can have thorns or be thornless. Thorns are fewer and larger than raspberry thorns and are very sharp.
- Fruit is black or deep purple-red.

## Raspberries

- Central core of fruit remains on stem when fruit is picked.
- Vine has numerous, fine thorns.
- Red, yellow or black colored fruit.
-



# Raspberry Shortcake® Raspberry

## Rubus idaeus 'NR7' Plant Patent #22,141

- Raspberry Shortcake® is a revolutionary thornless raspberry. This dwarf Raspberry variety with full-size berries grows to a height of 3' with a compact nature and rounded growth habit, making it perfect for compact spaces and container gardening.
- Plants are self-pollinating and require no staking.



# BLUEBERRIES

## Types of Blueberries for Southern California

### Rabbiteye

- Most adaptive
- Most productive
- Most pest tolerant



### Southern Highbush

- Best quality and flavor
- Most self-fruitful





# Blueberries require a soil pH of 4.8 to 5.4 and rarely grow well in the ground in most soils in S. CA.

For best results grow blueberries in:

- Containers
- Raised Planter Beds or Mounds or Mounded Rows



One recommendation for a container or raised bed soil mix is to add 60-80% peat moss to a good cactus potting soil or to the ground soil if planting on a mound or in a raised bed.



# POHA (Cape Gooseberry)

(*Physalis peruviana*)



- An herbaceous perennial. Hardy to 28 degrees.
- Grow in full sun or partial shade.
- Propagate by seed.
- Rich in vitamin A, C, and some B vitamins. Also high in protein and phosphorous.
- Fruit can be stored for 3 months!



# PINEAPPLE

*Ananas comosus*

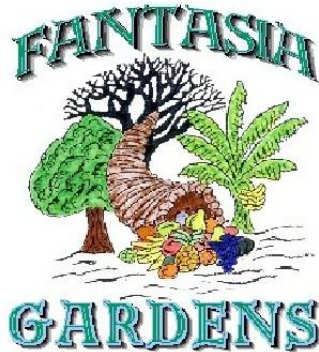
- A terrestrial bromeliad, each plant produces only one fruit and then dies.
- Offshoots or “pups” are produced by the mother plant to produce a spreading clump of pineapple plants.
- Many varieties and cultivars.



By selecting appropriate fruit varieties and by utilizing options for rootstock selection, multi grafting or multi planting techniques, espaliers, pruning for size control and container growing, the variety of fruit that can be grown in small spaces is almost endless.



# Growing Fruit in Small Spaces



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