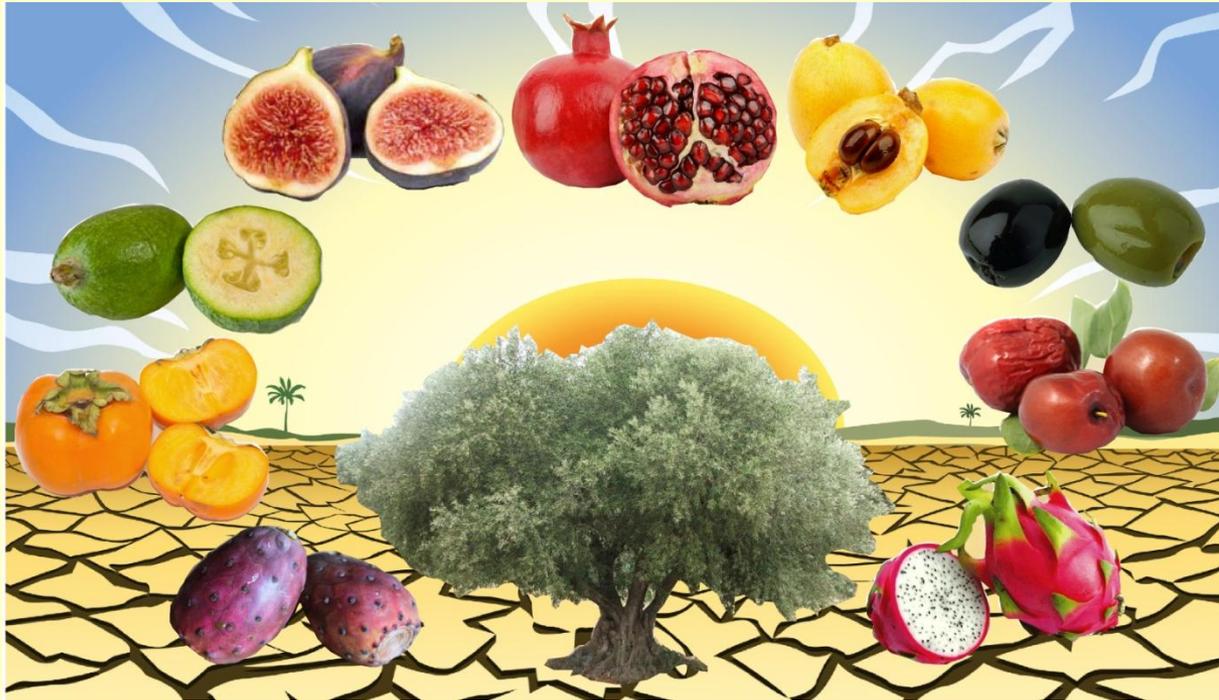
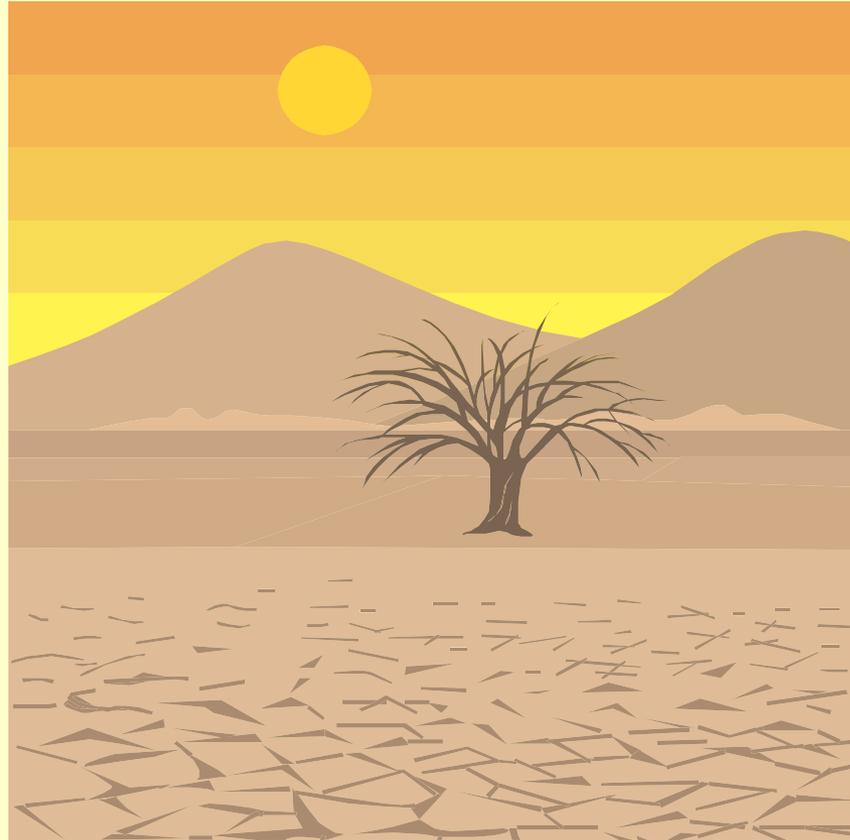


# Drought Tolerant Fruiting Trees, Shrubs and Vines



**Producing Fruit in the Water  
Wise Landscape**

# Extremely Drought Tolerant



- These plants need no supplemental irrigation once established.

# DRAGON EGG (PITAYA)

Cereus peruvianus

- A branching, columnar cactus with moderate growth rate. Height to 15 feet.



# DRAGON EGG (PITAYA)

## Cereus peruvianus

- The variety 'monstrosus' is smaller, bluish in color with ribs irregularly broken up into knobs and crests.



# DRAGON EGG (PITAYA)

## Cereus peruvianus

- Spectacular 5"- 6" white flowers open at night in late spring or summer. Flowering may last for several weeks.
- Flowers remain open until mid-day on cool or overcast days. Each flower only lasts 1 day.



# DRAGON EGG (PITAYA)

## Cereus peruvianus

- The white inner pulp has tiny black seeds. The outer pink-red rind is not eaten.
- Fruit is sweet, pleasant and mild in flavor but somewhat grainy in texture.



# JUJUBE

Ziziphus jujuba

- An attractive deciduous small tree to approximately 15 feet.
- Both very cold hardy and heat tolerant.
- Main grafted varieties are “Li” and “Lang”



# JUJUBE

## Ziziphus jujuba

- The fruit ripen in fall and change in color from green to brown. They can be eaten fresh or dried.
- Fresh fruit are crisp and sweet and resemble a small apple in texture and taste.
- The fruit dries easily and stores well when dried. Dried fruit becomes sweeter and resembles a dried date in texture and flavor.



# Kei Apple

## Dovyalis caffra

- An evergreen large shrub or small tree to 15 feet in height and width.
- Male and female flowers are on separate plants. Only the female plant produces fruit.
- Male plants are required for pollination. Usually 1 male for every 8 female plants for best fruit production.



# Kei Apple

## Dovyalis caffra

- Plants have large, very sharp, woody spines. Plants are used as barriers in Africa to keep animals out of villages and farmland.



# Kei Apple

## Dovyalis caffra

- Fruit are produced in late summer. The fruit are 1-2 inches in size, have a slightly fuzzy skin, and are tart-sweet in flavor.
- The fruit have a few small, edible seeds and are commonly used to make jams and jellies as well as eaten fresh.



# TUNA

## Opuntia ficus-indica

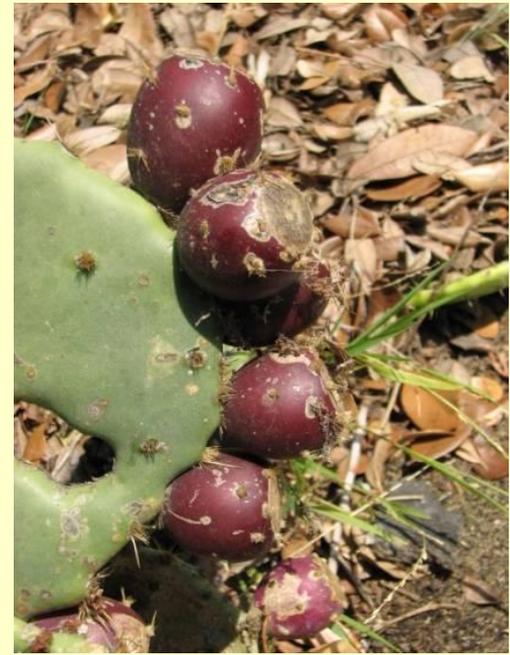
- A cactus that produces lovely yellow flowers.
- Both cactus pads and fruit may have many spines or may be nearly spineless.
- Young pads are often eaten as nopales.



# TUNA

## Opuntia ficus-indica

- Fruit is produced in late summer.
- The fruit may be red, greenish-yellow or pinkish-orange in color and has sweet melon-like flavor.



# Highly Drought Tolerant



- These plants require no supplemental irrigation once established in order to survive.
- For best fruit production as well as for largest fruit size and best fruit quality, occasional supplemental irrigation is beneficial during the fruiting season.

# DRAGON FRUIT

Hylocereus undatus, H. polyrhizus, and other species and hybrids of Hylocereus

- A moderately fast growing climbing cactus from the subtropical regions of Mexico and South America.
- Cold hardy to the mid 20's.
- Although plants prefer partial shade in hot areas, full sun is better for fruit production.



# DRAGON FRUIT

Hylocereus undatus, H. Polyrhizus, and other species and hybrids of Hylocereus

- A trellis, fence or other support system is required. Trials are still underway to determine the best training and pruning system for fruit production.



# DRAGON FRUIT

Hylocereus undatus, H. Polyrhizus, and other species and hybrids of Hylocereus

- Spectacular 8"- 12" wide, white, flowers are open only for 1 night.
- 2-3 waves of flowers are produced during the warm summer months. Each wave of flowers lasts for 2-3 weeks.



# DRAGON FRUIT

Hylocereus undatus, H. Polyrhizus, and other species and hybrids of Hylocereus

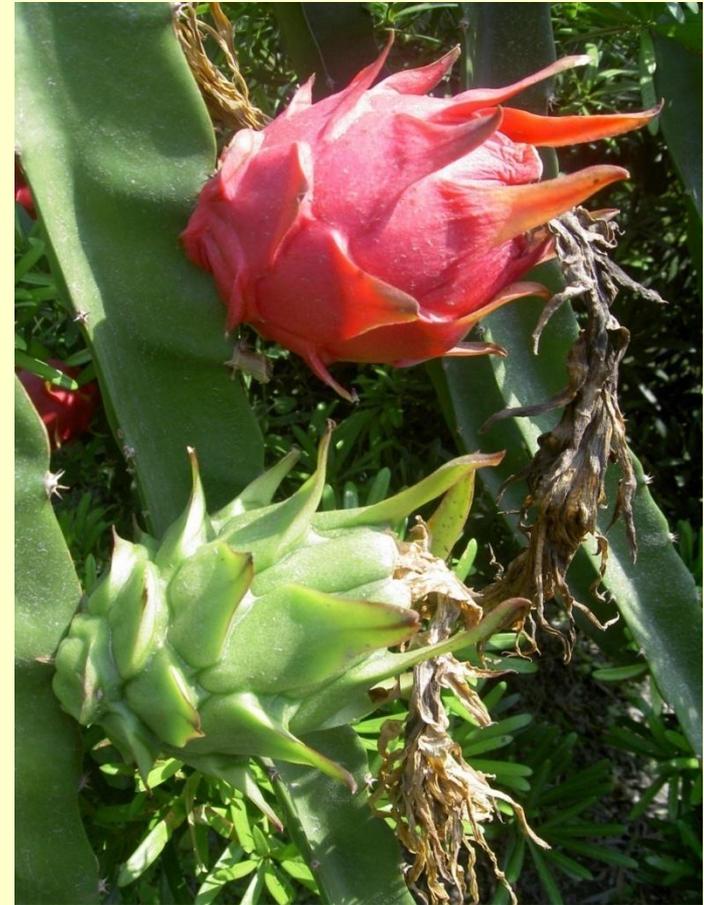
- Many varieties are self-sterile and require cross-pollination to produce fruit.
- Newer varieties being selected are self-fruitful.



# DRAGON FRUIT

Hylocereus undatus, H. Polyrhizus, and other species and hybrids of Hylocereus

- Beautiful hot pink fruit ripens 1 month after flowering.
- Fruit averages ½ - 1 lb in size.
- The outer rind is not eaten.



# DRAGON FRUIT

Hylocereus undatus, H. Polyrhizus, and other species and hybrids of Hylocereus

- Fruit has white, pink or red colored flesh, a smooth texture, and a sweet and pleasant, mild flavor.
- Darker colored fruit have higher antioxidant value.



# YELLOW DRAGON FRUIT

## Selenicereus megalanthus

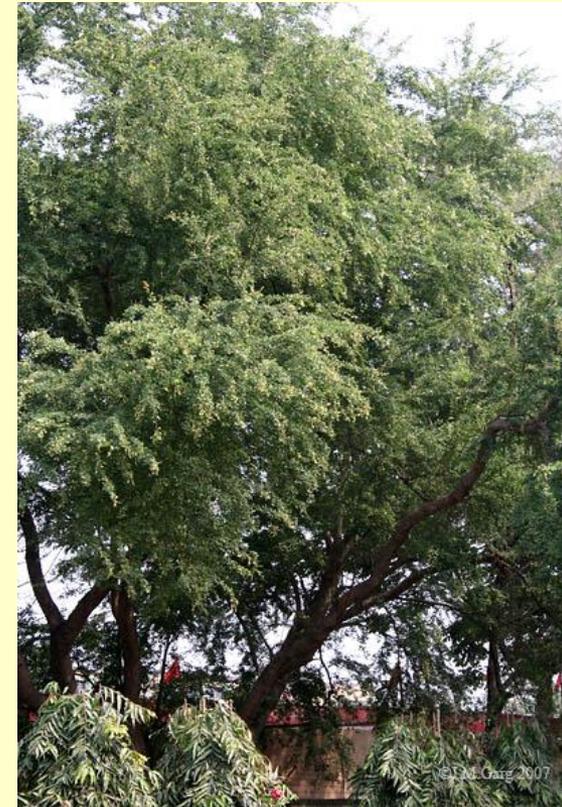
- Fruit is smaller but sweeter than other Pitaya.
- Plants are self-fruitful. Vines and fruit have small, sharp spines. Spines fall off of the fruit when the fruit ripens.



# Guamuchil

## Pithecellobium dulce

- A very hardy deciduous tree to 25' tall X 20' wide. The new leaf growth may coincide with the loss of old leaves, giving the tree an evergreen appearance.
- The tree has sharp thorns and is a nitrogen-fixing tree, able to provide it's own nitrogen.



# Guamuchil

## Pithecellobium dulce

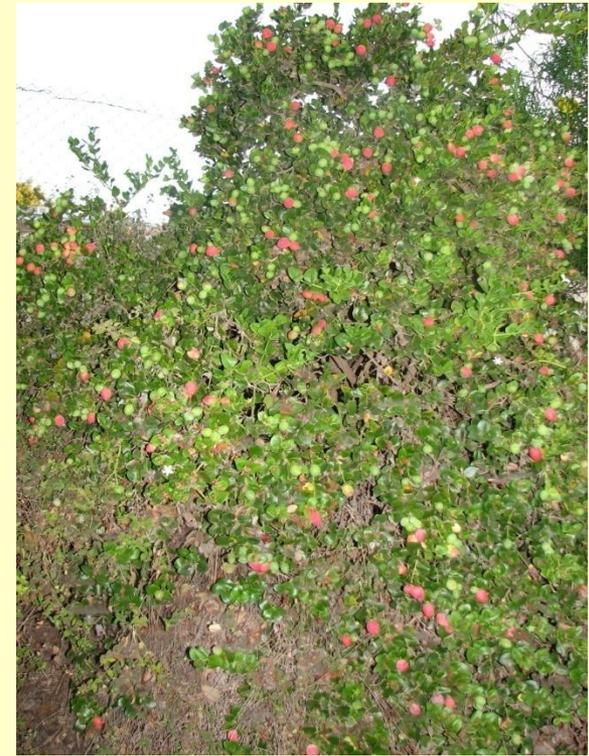
- When the legumes mature they acquire a rosy blush on their exterior, split, and expose a white, pulpy material inside which black, shiny beans are embedded.
- You peel open the pods the way you would a big garden bean and eat the white aril.
- Aril is eaten raw, and some trees produce sweeter pulp than others.
- Fruit is described as tasting like a dried coconut mixed with raisin,
- The seed and pulp are made into a sweet drink and seeds are eaten roasted or fresh.



# NATAL PLUM

## *Carissa grandiflora*

- Hardy, evergreen shrubs. Dwarf and standard sized cultivars are available.
- Plants are very tolerant of pruning or shaping.



# NATAL PLUM

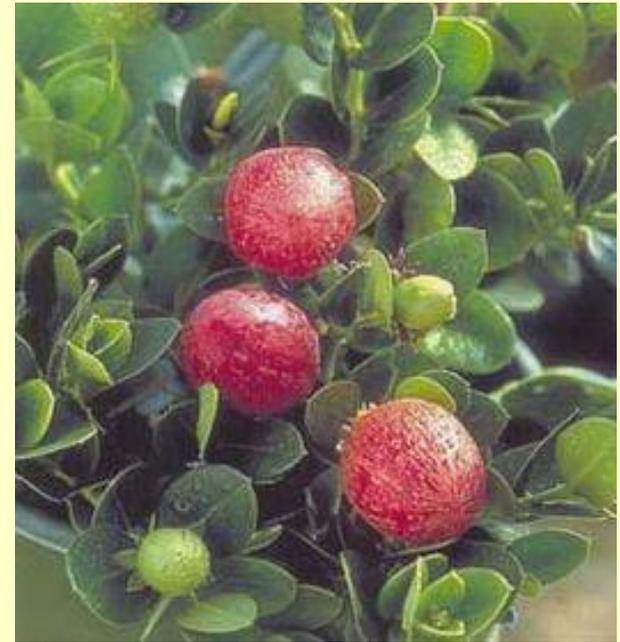
## *Carissa grandiflora*

- Plants have sharp spines making it an excellent barrier plant.
- Attractive fragrant flowers and fruit are produced for many months during the spring, summer and fall.



# NATAL PLUM

## *Carissa grandiflora*



- Fruit is eaten fresh or used to make jams and jellies. Flavor is somewhat cranberry-like.
- The fruit has a white latex sap when unripe that diminishes when the fruit is fully ripe.



# POMEGRANATE

## Punica granatum

- A deciduous single or multi-trunked shrub or small tree to 15 feet.
- New foliage is bright red, fading to green as it matures.
- Plants have sharp spines.



# POMEGRANATE

## Punica granatum

- Flowers are very showy, may be single or double flowers and occur in colors of red, salmon or pink.
- Flowers occur in spring and produce fall ripening fruit.



# POMEGRANATE

## Punica granatum

- Many varieties are available. Skin color as well as inner fruit color may be dark red, pink, or even white.
- Fruit may be quite tart, tart-sweet or quite sweet in flavor. Seeds may be very hard or soft and chewable depending on variety.
- There is no such thing as a “seedless” pomegranate.



# JELLY PALM

## Butia capitata

- Small palm with slow to medium growth rate to 20' in height.



# JELLY PALM

## Butia capitata

- Attractive flower spikes are produced in mid-late summer. Flowers are pink in color.
- Each spike produces hundreds of fruit that ripen approximately 1 month after flowering.



# JELLY PALM

## Butia capitata

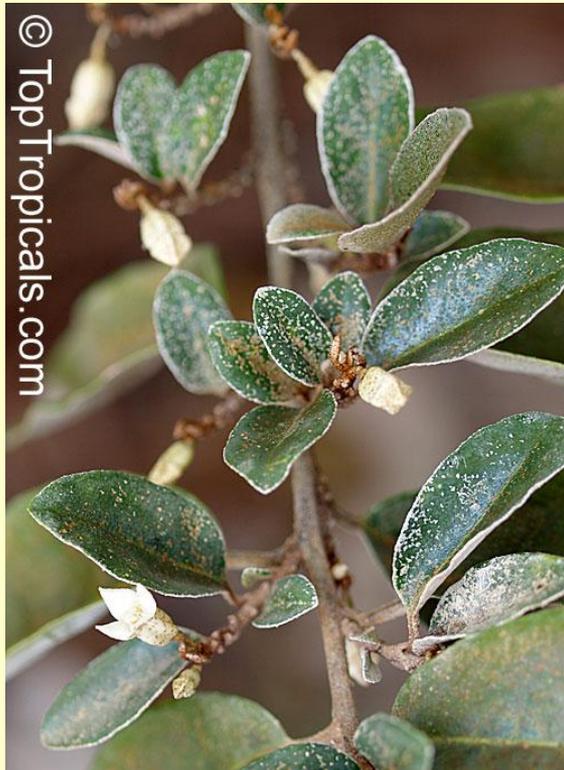
- The fruit has 1 large, hard seed and a sweet flavor that resembles the flavor of apricots and pineapple.
- The delicious fruit can be eaten fresh or used to make jam or jelly.



# Lingaro

## *Elaeagnus philippinensis*

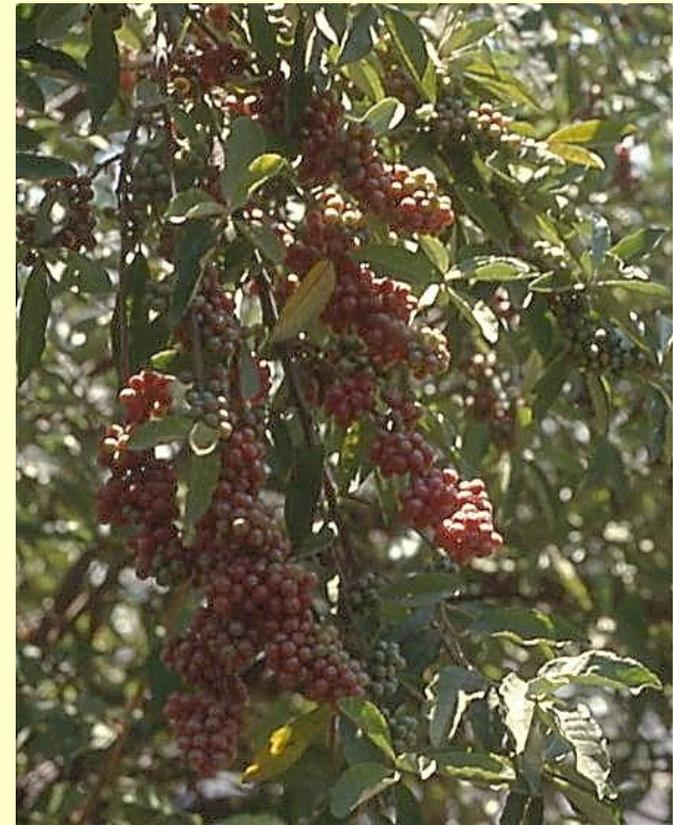
- An evergreen shrub or small tree to about ten feet with an arching habit and silvery leaves.
- White flowers are small but abundant.



# Lingaro

## *Elaeagnus philippinensis*

- Edible shimmering red berries are produced in the fall are small and tart. Flavor is similar to currents.
- Excellent fresh, in a sauce or desert, or made into a jam or jelly. Fruit are a great source of lycopine.



# LOQUAT

## Eriobotrya japonica

- A large evergreen shrub or small tree to 20-25 feet.
- Some varieties require a pollinizer to produce fruit.



# LOQUAT

## Eriobotrya japonica

- Fruit are produce in mid spring.
- Fruit size is increased by hand thinning fruit clusters. Each fruit contains 2-4 large seeds.
- Flesh color of fruit may be white or pale yellow. Flavor is sweet and both flavor and texture somewhat resembles an apricot.



# MACADAMIA

Macadamia integrifolia, M. tetraphylla and hybrids

- A moderately fast growing evergreen tree to 35 feet.
- Leaves may be smooth or have sharp spines depending on species.



# MACADAMIA

Macadamia integrifolia, M. tetraphylla and hybrids

- Fragrant flowers are creamy light brown or pink in color.



# MACADAMIA

Macadamia integrifolia, M. tetraphylla and hybrids

- Nuts drop to the ground when ripe. The thick green outer husk should be removed and the nuts laid in a single layer on a screen in a shaded, dry location to dry.
- Once dried, the nuts can be stored or roasted and then stored for fairly long periods.



# OLIVE

## Olea europaea

- Olives have been cultivated and oil traded since as early as 3000 B.C.
- Olives are a very long lived tree with some tree living for over 1000 years. As they mature their trunks become gnarled and picturesque.



# OLIVE

## Olea europaea

- Height of a mature tree is 30-35 feet. They are cold hardy to approximately 10 degrees.
- A clayey soil is best suited for olive oil production as the moisture content can be controlled during fruiting.



# OLIVE

## Olea europaea

- Olives bloom in late spring and produce thousands of small whitish flowers. Fruit are generally harvested fall to early winter.
- Olives are harvested at the green stage or left to ripen to a rich purple color (black olive). Canned black olives may contain chemicals that turn them black artificially.



# OLIVE

## Olea europaea

- There are thousands of cultivars of the olive, many cultivars are self sterile or nearly so.
- A mill grinds or hammers the olives and pits into a paste. This paste is extruded onto plates that fit into the press. The press squeezes out the olive juice and oil, leaving behind a fibrous "pomace". The oil is separated from the juice using decanters or centrifugal separators. The oil is then bottled and sold.



# OLIVE

## Olea europaea

- With one exception (Thassos Olives), olives are inedible when picked from the tree. The naturally bitter fruit is typically subjected to fermentation or cured with lye or brine to make it more palatable.
- There are several methods via which olives can be cured: lye-curing, salt-curing, brine-curing and fresh water-curing. Lye-curing, an unnatural method, is the one resulting in the worst taste as it leeches much of the fruits' flavor.
- Green olives are allowed to ferment before being packed in a brine solution. American black ("California") olives are not fermented, which is why they taste milder than green olives.



# PERSIMMON

Diospyros kaki

- Deciduous trees to 35 feet or less.



# PERSIMMON

Diospyros kaki

- Foliage turns beautiful fall colors as the tree goes deciduous.



# PERSIMMON

## Diospyros kaki

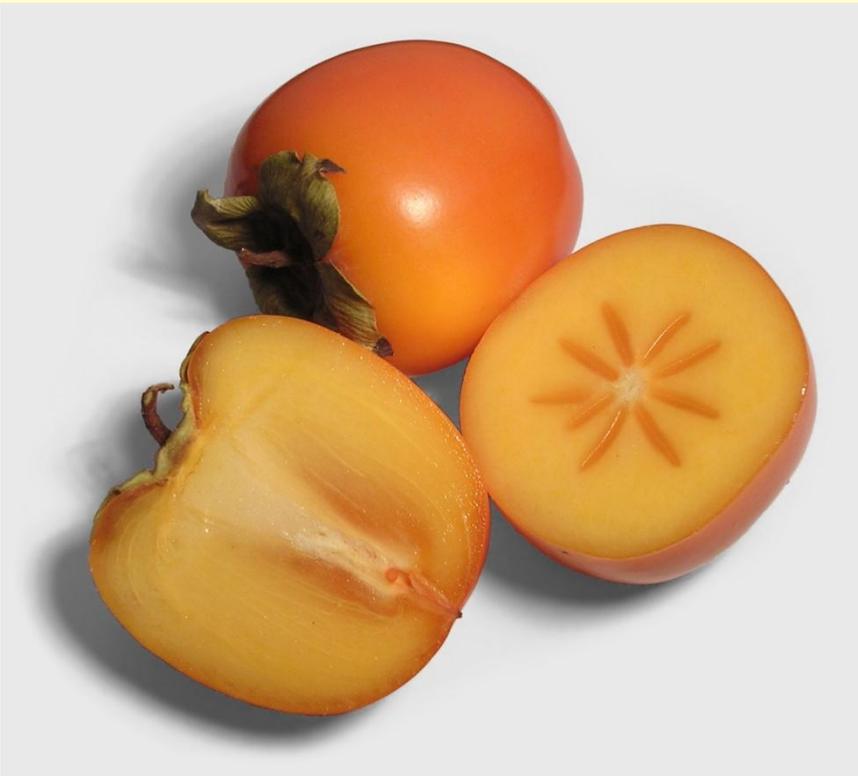
- Ripe fruit hold on the tree long after the tree has lost all of it's leaves.



# PERSIMMON

## Diospyros kaki

- Fruit varieties may be astringent or non-astringent. Astringent fruit must be eaten soft ripe.
- Non-astringent fruit can be eaten firm and crisp or can be allowed to soften and eaten when soft.



# PINEAPPLE GUAVA (FEIJOA)

Acca sellowiana

- A shrub or small tree to 15 feet.
- Can be severely pruned and can be shaped into an informal or formal hedge or screen.



# PINEAPPLE GUAVA (FEIJOA)

*Acca sellowiana*

- Beautiful flowers have edible petals.
- Some varieties require a pollinizer to set fruit.



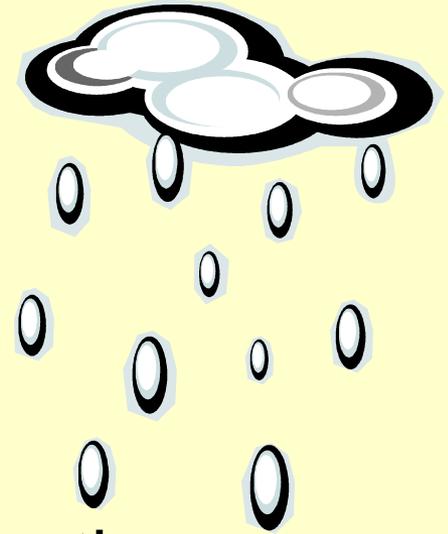
# PINEAPPLE GUAVA (FEIJOA)

*Acca sellowiana*

- Superior varieties have been developed for fruit quality and fruit size.
- Fruit fall to the ground when ripe in late summer or fall. The fruit flesh is scooped out of the rind, is very juicy and has a flavor of pineapple mixed with pear.



# Very Drought Tolerant

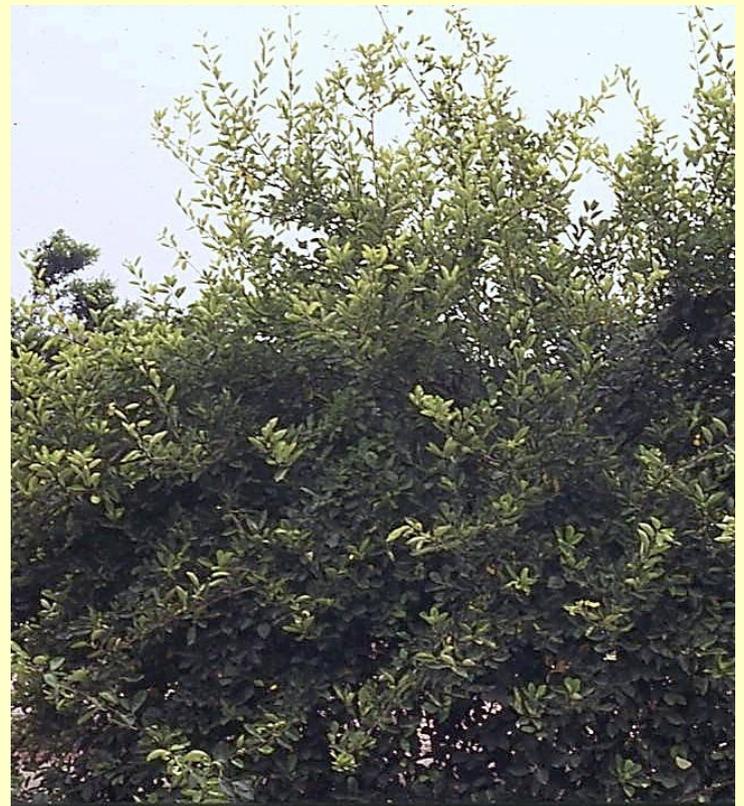


- These plants benefit from occasional irrigation once established in order to perform well and survive in extremely dry climates.
- Best fruit production as well as fruit size and quality is obtained with a regular irrigation schedule during the fruiting season. An average interval of 3-6 weeks between watering cycles would usually be sufficient.

# CHE

## Cudrania tricuspidata

- A deciduous shrub or small tree to 15 feet with a pendulous growth habit.
- Plants usually have male and female flowers on separate trees. Both are needed to produce fruit, however only the female tree actually produces fruit.



# CHE

## Cudrania tricuspidata

- Sweet firm and juicy fruit ripens for a month or more in fall.
- Fruit is related to mulberries and has a watermelon-like flavor.



# Fig

## Ficus carica

- The fig is a picturesque deciduous tree, typically to a height of 10 - 30 ft. and spreading wider than they are tall. Fig trees often grow as a multiple-branched shrub.
- The succulent trunk and branches are unusually sensitive to heat and sun damage, and should be whitewashed if exposed to full sun in hot climates.
- Roots are invasive and greedy, traveling far beyond the tree canopy.
- The sap contains copious milky latex that is irritating to human skin.



# Fig

## Ficus carica

- The skin of the fig “fruit“ is thin and tender, the fleshy wall is whitish, pale-yellow, or amber, or more or less pink, rose, red or purple; juicy and sweet when ripe, gummy with latex when unripe.
- Seeds may be large, medium, small or minute and range in number from 30 to 1,600 per fruit. The edible seeds are generally hollow, unless pollinated. Pollinated seeds provide the characteristic nutty taste of dried figs.



# Fig

## Ficus carica

- Common-type figs develop without pollination and are by far the most prevalent fig grown. The fruit does not have true seeds.
- The “fruit” is primarily produced on current season wood (main crop) and ripen late summer to fall. Some varieties may produce a breba crop on last years growth that ripens in late spring or early summer.
- Over 160 cultivars of common figs are in the University of California at Davis’s germplasm collection.



# Goji Berry (Chinese Wolfberry)

## Lycium barbarum

- The deciduous shrubs of goji berries are native to subtropical regions of Tibet and China.
- They have recently been endorsed as an anti aging wonder herb.
- They are a complete protein source; they contain all 8 essential amino acids and 18 more amino acids.
- They contain up to 21 trace minerals.
- Fresh Goji berries have some of the highest concentration of anti-oxidant of any food in the entire world; 2 to 4 times as much as blueberries.



# Goji Berry (Chinese Wolfberry)

## Lycium barbarum

- Berries have a sweet and mildly tangy taste.
- Goji berries are typically found in dried form and have a raisin like chewy texture.



# Goji Berry (Chinese Wolfberry)

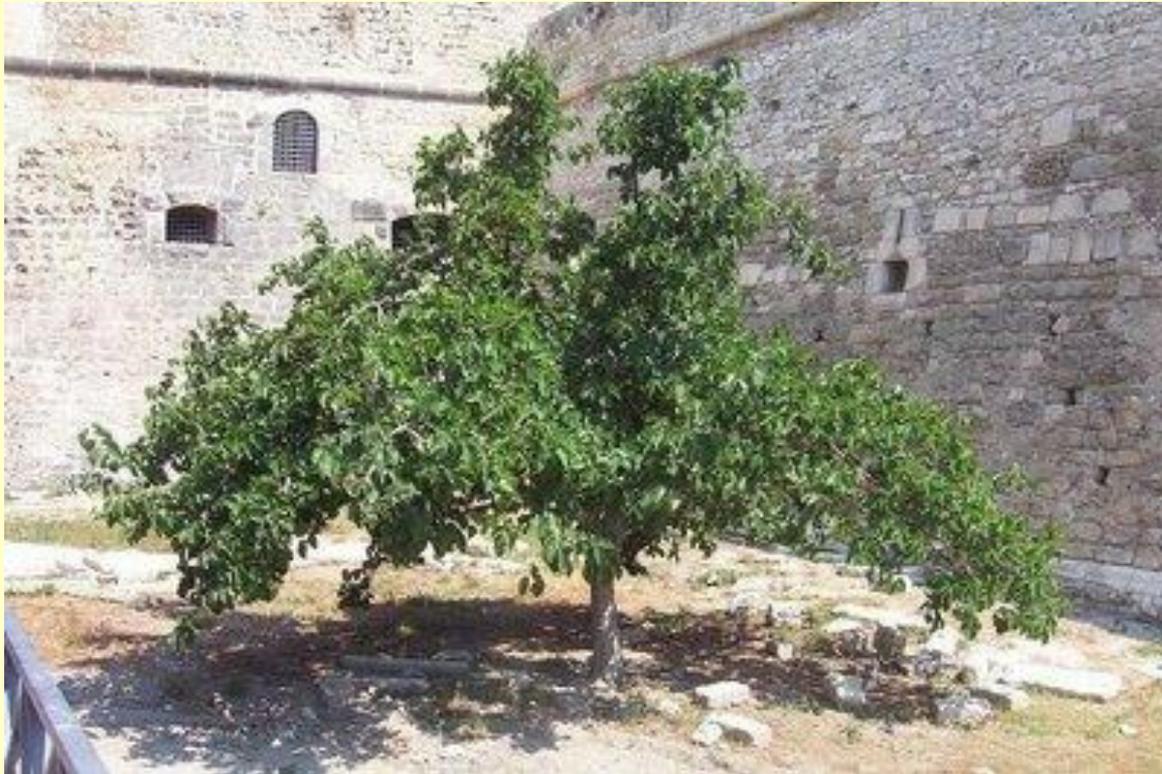
## Lycium barbarum

- Goji contain more Vitamin C than oranges and are one of the rare fruits that contain Vitamin E.
- Goji Berries are the only food known to help stimulate the human body to produce more Human Growth Hormone naturally. Gojis are also a powerful anti-fungal and anti bacterial agent.
- They contain Beta-Sitosterol, an anti-inflammatory agent, lowers cholesterol and treats sexual impotence and prostate enlargement as well as Cyperone which benefits the heart and blood pressure.
- They also contains Betaine, which is used by the liver to produce choline: a composite that calms nervousness, enhances memory, promotes muscle growth, protects against fatty liver disease and protects the DNA.

# Mulberry

## Morus nigra, M. alba, M. rubra and Hybrids

- Mulberries are deciduous, fast growing trees frequently reaching 30-40 feet in height or more. The root systems can be invasive and greedy.
- Pruning can keep these trees smaller in size.



# White or Red Mulberry

## M. alba, M. rubra and Hybrids

- Fruit can be white, lavender, red or very dark purple. Fruit color, size, flavor and season can vary by variety. There are many named varieties available.
- Flavor is typically sugary sweet and is always sweeter than M. nigra fruit.



# PERSIAN MULBERRY

## Morus nigra

- Morus nigra is a smaller tree slower growing that reaches an average height of 25 feet.
- The dark purple fruit is smaller and has more acid than other mulberries giving the flavor more of a boysenberry-like flavor.



# Strawberry Tree

## Arbutus unedo

- A small to medium sized evergreen tree with attractive bark, flowers and fruit.
- Dwarf and full sized cultivars are available as named varieties.



# Strawberry Tree

## Arbutus unedo

- Attractive white or pinkish flowers are produced during the fall and winter months.
- The trees often have flowers and fruit occurring at the same time with the multicolored fruit being produced nearly year-round.



# Strawberry Tree

## Arbutus unedo

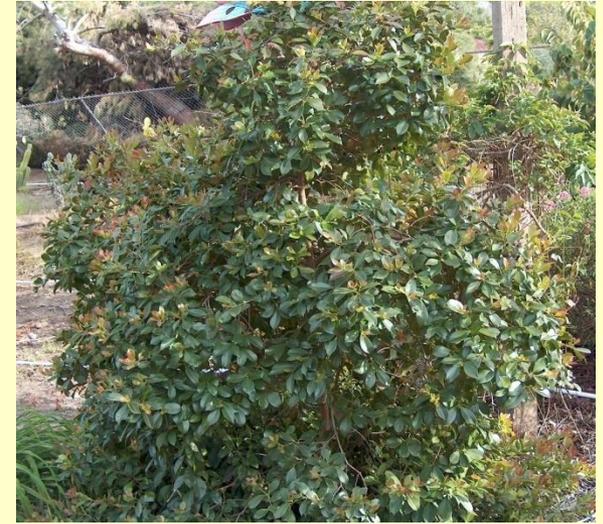
- Fruit are red when ripe and are typically used to make preserve or a liqueur.
- Eaten fresh, the fruit are somewhat mealy in texture and considered bland in flavor.



# STRAWBERRY GUAVA

*Psidium cattleianum* & *P. cattleianum lucidum*

- An evergreen shrub or small tree with new foliage that is copper-red in color. Tolerant of heavy pruning and shaping.



# STRAWBERRY GUAVA

*Psidium cattleianum* & *P. cattleianum lucidum*

- Small white flowers are attractive and abundant.
- Fruit can be dark red or yellow. Yellow varieties are sometimes called lemon guavas.
- Fruit have hard seeds and are either eaten fresh or are made into fruit pastes, jams or jellies.

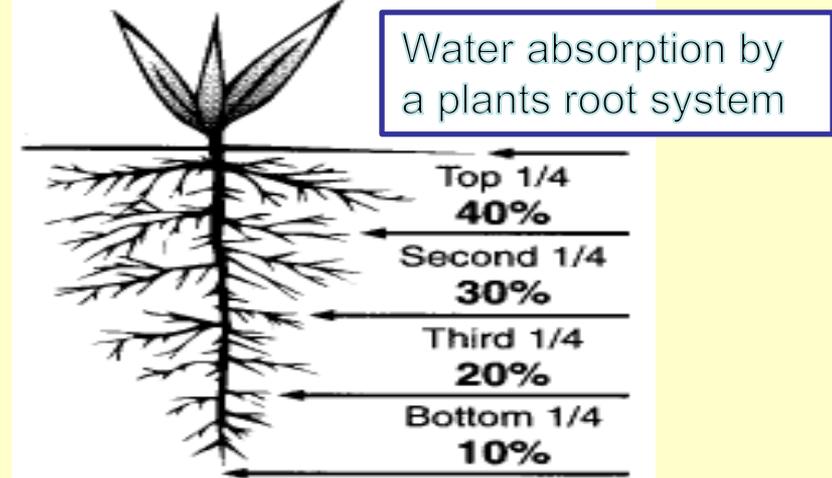
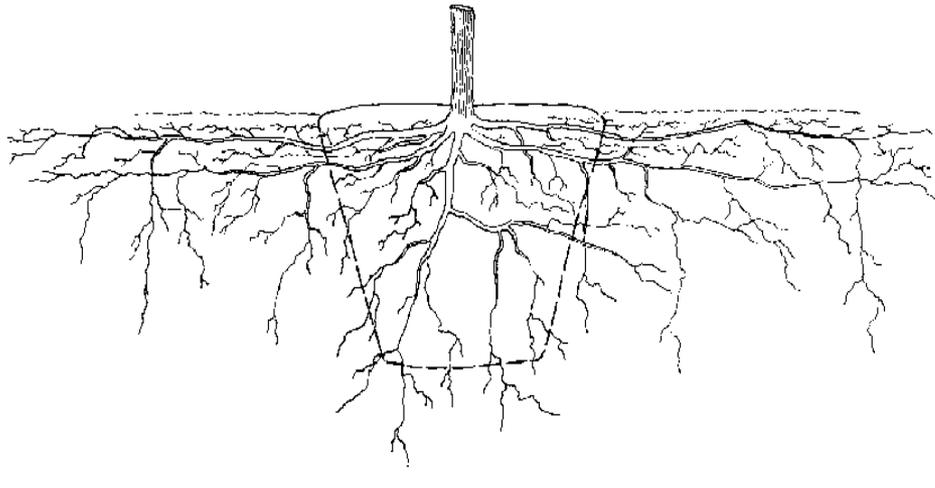


Reducing water use in the landscape is not just about using low water or drought tolerant plant material.

**The 7 Principles of Xeriscape include:**

1. Planning and design
2. Soil Analysis
3. Efficient Irrigation
4. Appropriate turf areas
5. Appropriate plant selection
6. Use of mulches
7. Appropriate maintenance

# KEYS TO PROPER WATERING



- The root systems on plants have 3 functions. 1 is to anchor the plant so that it stays upright in the soil or growing medium. A 2<sup>nd</sup> is to store food and carbohydrates to sustain the plant (Especially on deciduous plants during the period when there are no leaves on the plant.)

**The 3<sup>rd</sup> is to absorb water and nutrients.**

- The roots that absorb water and nutrients are called feeder roots or hair roots and are very fine, delicate roots that are constantly being generated and are dying off due to soil conditions and other factors. **In most soils, 70% of the feeder roots occur in the top 1 foot of soil! 90% of the feeder roots occur in the top 3 feet of soil in most soils, due to water and air availability.**

# KEY TO PROPER WATERING #1

## **Water the proper area – the Feeder Root Zone!**

Water near the trunk or stem on newly planted plants so that you wet the original root ball.

Water at the dripline **and beyond** on plants which are established in the ground. (The plant may take from a few weeks to a one year or more to become established depending on the type and size of the plant, the time of year that it was planted, soil conditions, cultural practices and other variables.)

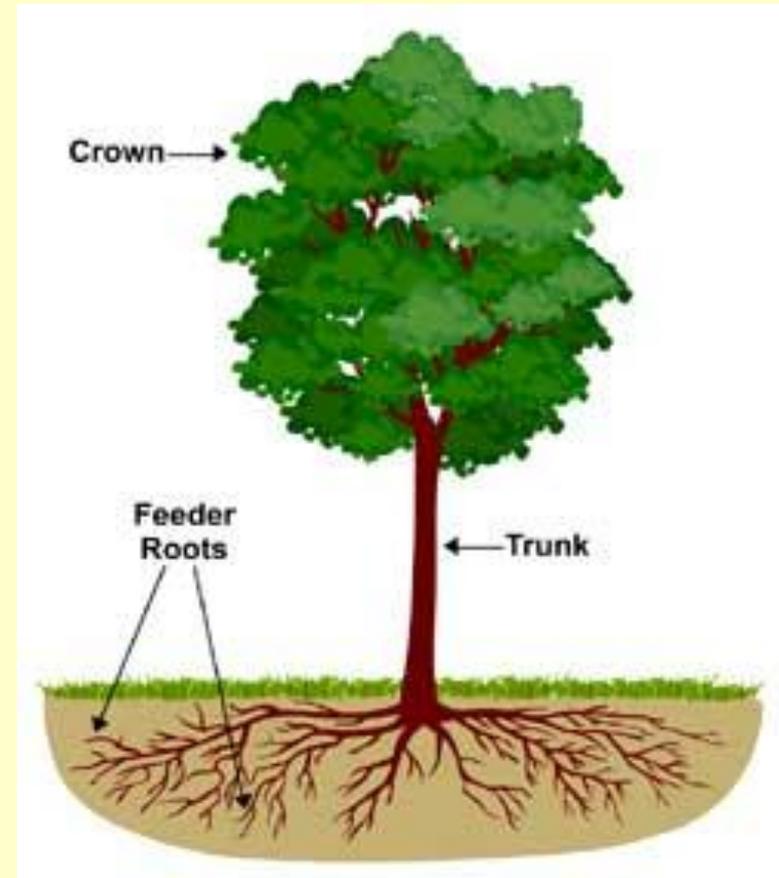
Water further away from the trunk or stem as time progresses and as the plant grows larger in diameter.

# How Plant Roots Grow

- Trees growing in urban areas **seldom** develop taproots. Root systems actually consist of larger perennial roots and smaller, short-lived, feeder roots. Large, woody tree roots and their primary branches increase in size and grow horizontally.

**These roots are usually located in the top 6 to 36 inches of soil.**

- The small feeder roots constitute the major portion of the root system's surface area.
- Feeder roots are located throughout the entire area under the canopy of a tree. **As much as 50 percent of the root system grows beyond the drip line and may extend as far as two to three times the height of the tree.**
- A Tree's **feeder roots** grow out from large woody roots and usually **grow up toward the soil surface**. At the surface, feeder roots mix with lawn and shrub roots and compete for the water, oxygen and minerals that are more abundant near the surface.



Roots on trees have 3 main functions:

1. Anchorage
2. Food Storage
3. Absorption of water and nutrients = Feeder Roots

# **KEYS TO PROPER WATERING #2**

**Apply water to a sufficient area of the Feeder Root Zone to support the canopy of the plant.**

Irrigate as much of the area around all sides of the plant as possible, not just one side or in one area.

Water will spread out to an average of 1-2 feet at a depth of 2-3 feet when applied from a source such as a drip emitter or soaker hose.

If irrigating with a drip system or with soaker hoses, provide enough drip emitters or concentric rings of soaker hose to wet a significant area of the Feeder Root Zone – NOT a few spots or a single line.

Adjust and expand the region irrigated as the plant grows to promote the expansion of the root system in order to support the healthy development of the plant's canopy.

# **KEY TO PROPER WATERING #3**

**Water with sufficient amount of water – enough to thoroughly wet the entire depth of the Feeder Root Zone.**

1” of water penetrates the ground 1’ in sandy soil, it takes 2” of water to penetrate the ground in clay soil.

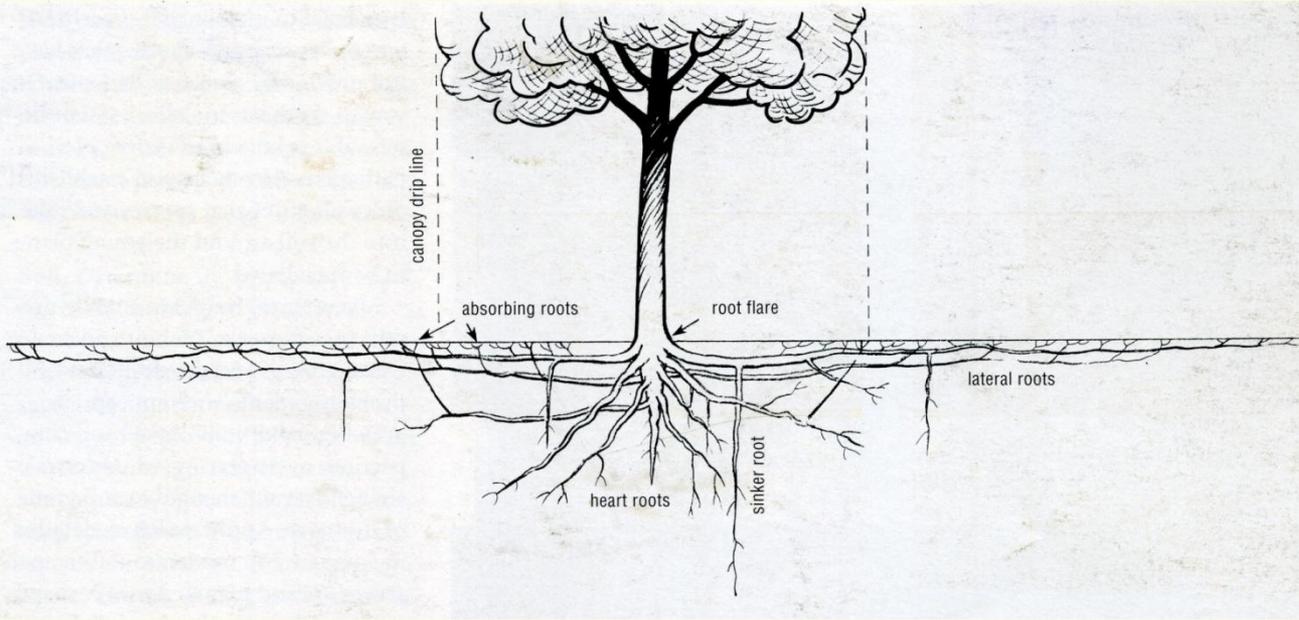
90% of feeder roots are found in the top 3’ of soil! (70% are in the top 1’ of soil.)

Water to an average depth of 1’ to 3’ at each watering for plants that have been established in the ground. Smaller plants generally have shallower root systems than larger plants.

As a general rule, water to a depth of 6” to 1 foot for plants 1’ or less in height, to a depth of 2 foot for plants 1’ to 4-5 feet in height and to a depth of 3’ for plants larger than 5 feet in height.

For plants in containers, water with enough water to leach excess salts out of the container and to thoroughly wet the entire root ball at each watering.

# Depth of Water Extraction by Roots



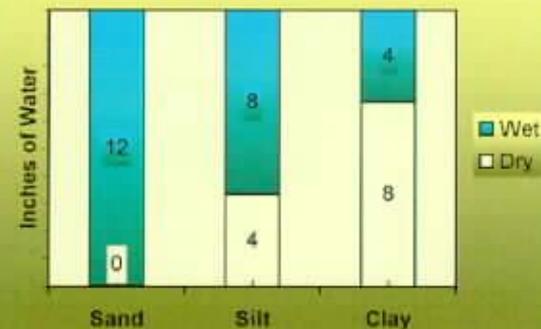
1" of water penetrates the ground 1' in sandy soil.

It takes 2"-3" of water to penetrate the ground 1' in clay soil.

- Most water is taken up by roots from the top 12" of soil (40% - 70% or more).
- Up to 90% of the roots that take up water and nutrients are located in the top 36" of soil.
- Watering methods can determine root depth:
  - Light, shallow watering encourages shallow roots. This results in plants that dry out easily and can blow over in storms.
  - Deep, infrequent watering is best to encourage roots to penetrate deeply in the soil.

## How Soil Holds Water

How far 1" of water soaks into various soils.



# **KEY TO PROPER WATERING #4**

**Water at the correct interval – often enough to keep the plant from wilting, but infrequently enough to allow air to penetrate the soil.**

**Roots can drown if the soil is kept constantly wet!**

Watering frequency will vary with the time of year, location, size of the plants, soil, weather conditions and many other variables.

**On average:**

Water new plants in the ground 1-2 times per week.

Water older established plants in the ground 1 time per week to 1 time per month depending on the variables.

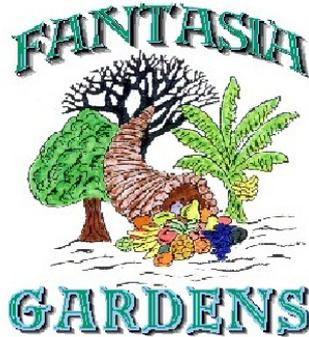
Water plants in containers 1-3 times per week.

**There are very few exceptions where plants should be watered every day! Watering too frequently will exclude oxygen from the soil and cause roots to drown as well as promote diseases!**

# Drought Tolerant Fruiting Trees, Shrubs and Vines



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