Williams Grove at THE FAIRCHILD FARM

Grafting Tropical Fruits

By Noris Ledesma
Curator of Tropical Fruit

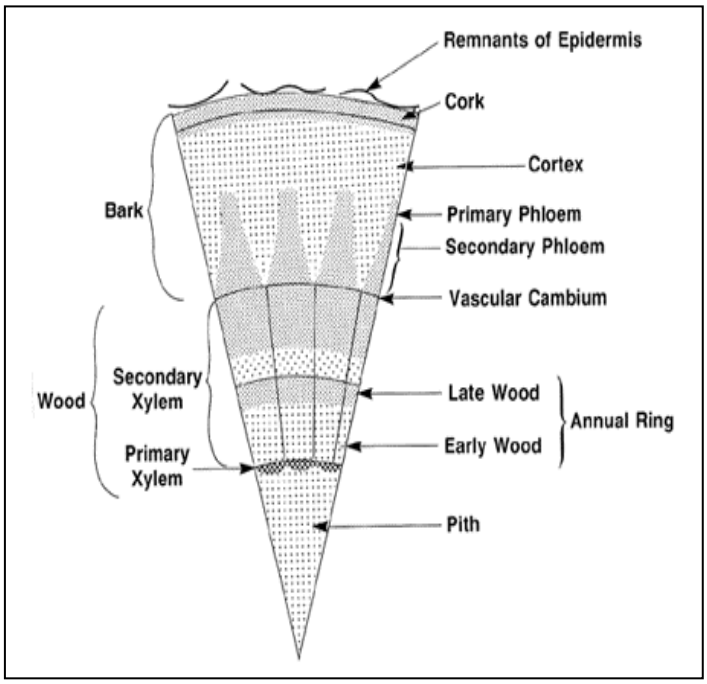


Figure 1. Cross section of a woody plant stem.

Grafting is a horticultural practice of uniting parts of two plants so that they grow as one.

Grafting does not produce new varieties, since both stock and scion retain their characteristics.

Grafting is an asexual or vegetative method of propagation. The new plant that grows from the scion or bud will be exactly like the plant it came from.

Reasons for Grafting:

- Change varieties or cultivars
- Take advantage of particular rootstocks
- Perpetuate clones
- Repair damaged plants or saving a plant
- Optimize cross-pollination and pollination
- Horticultural advantages: rootstock, scion, growth, precocity, uniformity, disease, resistance, fruit quality, novelty, etc.
- Renovate the cultivar
- Historical reasons

When to Graft:

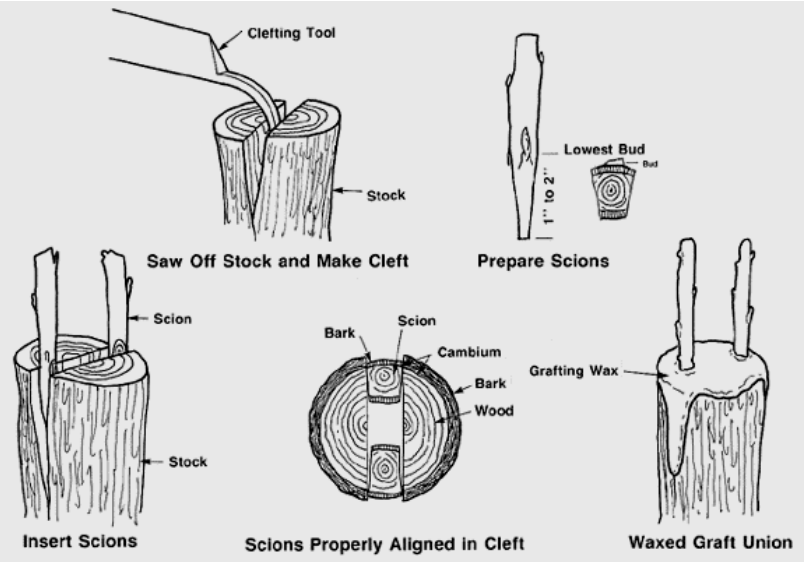
- When the material is available
- Depending on plant considered: Warm season: 70F: Mango, citrus.
  Cool season: Avocado, ornamental, persimon
  Intermediate season (March): Jackfruit, mamey, sapodilla

Materials

Preparations

- **Rootsocks:** Healthy, active and pest and disease free. Fertilize a month before, watered
- **Scions:** Active, healthy, plastic bags, 50-60F, do not freeze or expose to heat. With leaves do not refrigerate. Add a touch of moisture to bag.
- No treatments to scions or rootstocks (fungicides, paints, etc)
- Match species and size of rootstocks and scion

Grafting Techniques:



1. Cleft:

- Versatile
- Easy
- Use: Avocados
  Sapodilla
  canistel

2. Veneer

- Versatile
- Easy
- Fast
- Use: Mango
  Mamey
  Jackfruit
  Sapodilla
  Anonas
  Black sapote

3. Top working

- Can use all above methods
- Perfect to renovate the cultivar
- Can be use to save a tree
- Use: Mango
  Avocado
  Citrus

4. Budding

- Efficient in material
- versatile
- Can be done when young
- Use: Citrus
  Mango
  Rambutan

- Remove terminal bud of rootstock
- Keep grafted tree moist, shade
- Should break bud in 2 to 6 weeks. Can force if not
- Remove the plastic
- Check the tree constantly

Mango Propagation

From the Book Tropical Mangos "How to grow the Word's mos delicious fruit" By Richard J. Campbell,Ph.D and Noris Ledesma

Seeds. There are two distinct seed types among mango cultivars. Mangos originating on the northern plains of India, in Florida, Israel and South Africa generally have seeds with a single embryo and are called monoembryonic. The single embryo is the result of cross-pollination, a sexual process, and combines the traits of the male and female parents. Seedlings of monoembryonic mangos will differ from the parent tree. Mangos originating in Southeast Asia generally have seeds with multiple embryos, and are called polyembryonic. One embryo is of sexual origin, while the other embryos come from the maternal tissue and are identical to the mother tree. Polyembryonic cultivars have traditionally been grown from seed in many countries.

Regardless of the seed type, a seedling tree will take longer to produce fruit and usually will be more difficult to manage, compared to a grafted tree. Therefore, it is generally not recommended to grow mango trees from seed, unless one wants to produce hybrids for purposes of cultivar improvement. We recommend as a rootstock 'Turpintine' (for South Florida).

Grafting. Grafting is the most reliable and economical means of propagating the mango. The scion forms the canopy of the tree, while the rootstock forms the lower trunk and roots.

Healthy, vigorous and uniform seedlings from polyembryonic seed should be used as rootstocks. Monoembryonic seeds are not recommended for use because their sexual embryos produce non-uniform seedlings. The seed should be removed from the leathery husk and planted at a depth of 12.5 mm (½ in) in nursery trays for later transplanting, or directly in a 3.8l (1 gal) growing container. A standard nursery soil mix can be used provided that it has good drainage. The rootstock should be fertilized, watered and grown to the diameter of a pencil prior to grafting.

Scions can be collected when the trees are in active growth. Scions are obtained by removing the terminal 5 to 7.6 cm (2 to 3 in) of a twig whose terminal bud is beginning to enlarge. Tender terminal shoots can be used for specialized grafting and budding techniques. Scions are removed from the tree and for veneer grafts all of the leaves are removed. For cleft grafts and other specialized techniques, a few of the leaves may be left on the scion. The scions can be placed in a plastic bag and stored at a temperature of 10C (50F) for up to 10 to 14 days. Scions can be stored in a home refrigerator, but they must not be allowed to freeze.

Grafting techniques. Grafting should be done in the warmest months of the year with night temperatures above 18C (64F). Many grafting methods are successful with mango, including cleft grafting, chip budding and whip grafting; however, one of the most versatile and reliable is the veneer graft.

Grafting height on the rootstock will not influence success or failure. The terminal bud of the rootstock is removed and on both the scion and the rootstock a veneer cut is made. The veneer cut is shallow and exposes the cambium, the active growth region of both the scion and the rootstock. A short flap of bark is left on the bottom of the veneer cut on the rootstock to secure the scion in place.

The two cut surfaces are brought together and then wrapped with plastic grafting tape. Generally the terminal bud is left unwrapped to allow for growth of the bud. Under extremely dry conditions, the terminal bud may be completely covered to reduce water loss, but the plastic must be removed later. The newly grafted tree should be placed in the shade and not exposed to direct sunlight. The graft should begin to grow in 10 to 21 days. The rootstock is cut immediately above the graft following the second vegetative flush of the scion. Following grafting, any shoots from the rootstock must be removed, as these shoots may overcome the developing scion.

Jackfruit Propagation

From the Book The Exotic Jackfruit By Richard J. Campbell,Ph.D and Noris Ledesma

Jackfruit grafted trees will bear fruit in 2 to 3 years after planting and have a more spreading and open canopy than seedling trees. Jackfruit grafting is only now becoming a viable method of propagation. Today, grafted jackfruit cultivars are common in India, Indonesia, Malaysia and Thailand and increasingly in South Florida.

Rootstock: The proper rootstock provides a tree with a healthy root system and can influence growth and fruit traits such as tree vigor, size, and fruit quality. There has been little investigation into preferred rootstocks for jackfruit in the Western Hemisphere. Locally collected seed can be used, given that they form healthy and vigorous seedlings with a strong root system. Seedlings for rootstock should be grafted when less than one year old. They should be healthy and not rootbound, which will permanently weaken the jackfruit tree, resulting in poor growth and fruiting, and susceptibility to diseases. A rootstock can be grafted when the stem reaches the diameter of a pencil, or even smaller if budding techniques are used.

When to graft. Grafting is most successful when daytime temperatures are 70 to 85F and nighttime temperatures are 55 to 65F, keeping in mind that the key to successful grafting of the jackfruit is the maintenance of vigorous growth. Veneer Graft. The modified veneer graft, with or without the retention of leaves is among the most successful techniques for grafting the jackfruit. This method requires active scions of 10 to 15 cm (4 to 6 in) with a swollen terminal bud.

The last fully expanded leaf is retained. Long, shallow veneer cuts are made on both the rootstock and scion, exposing the cambium of both. The veneer cut stops short of the terminal bud of the scion. A short flap of bark is left at the base of the veneer cut on the rootstock to secure the scion during wrapping. The cut surfaces of both the scion and the rootstock are then joined and wrapped with plastic grafting tape or a rubber band, leaving the terminal bud uncovered.

The grafted tree and container are covered with a clear plastic bag and placed in a bright, but shaded location and thoroughly watered. The terminal bud on the scion will unfold its leaf and continue to grow. Rootstock sprouts from below the graft should be removed. The bag can be removed after the scion begins to grow in 2 to 4 weeks. The height of the graft on the rootstock is not critical. The same method can be used with leaf removal on the scion, and these scions can be stored in a plastic bag at 12C (54F) for up to a week. Other successful techniques include chip budding, cleft and forkert grafts. The key to all of these methods is the vigor of the rootstock and scion, and the preparation of the budwood.

Sapodilla (Chiku) as a delicate dessert

A combination of peach, pear, cinnamon, honey and just a touch of brandy best describe the alluring flavor of the sapodilla. Sapodilla fruit are soft and sweet, with a delicate aroma hinting of the beauty to come.

The sapodilla is native to Central America, but its unique appeal carried it centuries ago to Southeast Asia, where it has undergone a wonderful transformation. The Maya described it as dainty, fragrant and well tasting - a delicate fruit indeed. Sapodilla is delicious to eat out of hand, and can also be made into a great dessert sauce or mousse. The texture when eaten fresh should be that of a good ripe pear. Elite selections from Asia and the Americas can be eaten skin and all.

The sapodilla was probably introduced to Florida from the Bahamas in the 1800s. The sapodilla tree is an attractive, slow-growing evergreen tree. In Florida, trees mainly bear from May to September, but fruit may mature throughout the year. Sapodilla trees can be grown from seed, but may take six to 10 years to produce fruit and there is considerable variability among seedling trees. There have been a number of new cultivars developed in Florida, with various fruit sizes, flavors, colors, and maturity dates.

'Makok' is long, pointed, and one of the best tasting of the sapodillas. It is native to Thailand, and is a recent introduction to Florida. This is an excellent variety for homeowners because the tree is a true dwarf, forming a small and compact tree perfect for limited spaces. The fruit should be thinned to increase fruit size. The pulp is smooth and brown with a sweet aroma and each fruit will have a single, small seed. It ripens from May to November.

'Alano' is an oval shaped fruit native to Thailand, and it is arguably the finest sapodilla in the world. The fruit is sweet and the texture is that of an ultra fine pear. The trees are heavy regular producers of medium sized fruit typically weighing about nine ounces. In addition to the fruit's superior quality the tree tends to be less brittle and have a much smaller habit than other cultivars. The fruit ripens from November to June.

'Hasya' is a football shaped fruit native to Mexico where it is the number one commercial cultivar grown. The fruit is of excellent eating quality and it has a reddish hue throughout the pulp. The tree is a large upright grower, and it is a prolific producer of large fruit that typically weigh thirteen ounces. The fruit ripens from November to June.

'Molix' is another football shaped fruit native to Mexico. This fruit is similar to Hasya in many ways, but it tends to be darker brown outside, less red inside, and the tree has curly leaves. The pulp is exceptionally sweet with a fine pear texture and pleasant aroma. The fruit are large typically weighing thirteen ounces. The season differs slightly from that of Hasya, beginning in February and ending in May.

'Tikal' was selected in Florida. The fruit are ovoid in shape, but are fat at one end like a top. This variety was one of the first superior commercial varieties planted in Florida, but its popularity has diminished with the introduction of larger more productive cultivars. Fruit size can vary, but they can get as large as eleven ounces. The fruit ripen from December to March.

Where to grow sapodilla: The sapodilla plant grows well in a warm and sunny and preferably frost free location. Sapodilla trees prefer well-drained, sandy soil with regular applications of water to young trees. Once established they are very drought- and salt- tolerant. Sapodilla trees are tolerant of windy conditions and young trees generally do not have a problem with establishment on windy sites if they are pruned properly.

Addition of plant mulch to the soil surface will improve water-holding capacity, nutrient retention and availability and soil structure. Fertilization is best done with three applications per year (March, July and September) of an 8-3-9 or other fruit tree formulation. Most mature sapodilla trees receive no watering, but irrigation in dry season may increase productivity.

Sapodilla trees respond favorably to pruning and shaping. Each year after harvest trees should be pruned, removing the upright branches and keeping the tree 6 to 8 feet tall.

Harvest: It is hard to tell when the sapodilla is ready to pick. However, the fruit do have their own subtle indicators. By knowing the season that a particular variety ripens, a grower can narrow the time frame down to an eight to ten week period. The best way to determine maturity for harvest is to scratch the skin. The color of the flesh should be a cinnamon brown. Immature fruit will be green.

To ripen sapodillas keep them at room temperature for 5 - 10 days. The fruit should be eaten when still slightly firm, not mushy. Firm-ripe sapodillas may be kept for a week in good condition in the home refrigerator. They are best served fresh and chilled, and then they can be halved or cut into wedges.

Tamarind

Each person born on tropics has a story to tell about the tamarind. As tamarind season approaches on the Eastern plains of Colombia, women start the harvest to make "tamarindada" to offer the thirsty farmers following an intense day of work. In Trinidad and Jamaica, tamarind is a popular refreshing snack. Asians, particularly in Thailand and India, have a long tradition of eating and cooking with tamarind. So many people it seems use this fruit to create delicious salsas, chutneys and sauces.

The tamarind fruit is actually a pod, being smooth and brittle to the touch; inside the pasty flesh clings tightly to the hardened dark-brown seeds. The tamarind tree grows easily in South Florida and requires little care. The fruiting season in Florida is February to May but there is often a tree here or there with fruit out of the normal season. Tamarind paste is also available year-round in Asian specialty stores. Tamarind is adapted to a wide range of ecological conditions, reflecting its wide geographical distribution in the semi-arid tropics.

Where to plant. Tamarind should be grown in the full sun**.** The twigs and branches of Tamarind are resistant to wind, making it especially useful as a shade or street tree for breezy locations and of course locations prone to tropical cyclones. Tamarind does not have special soil requirements and thrives in the poor soils of South Florida. However the tree is not tolerant of water-logged conditions, so if your home garden is reminiscent of the Everglades all efforts should be taken to raise the planting area.

The tamarind is ease to grow. Fertilization can be done three times a year (March, July and September) with an 8-3-9 or other fruit tree formulation. Young trees are pruned to allow three to five well spaced branches to develop into the main scaffold structure of the tree. Contrary to popular belief, the tamarind is not salt-tolerance and will be hurt by both salt spray and salt on its roots.

Propagation. Trees grow easily from seed and usually take four to five years before they begin flowering and fruit production. However, seedlings will be of unknown quality. If a specific variety is desired a grafted or air-layered tree should be purchased from a reputable nursery. Local nurseries will sell sweet and sour tamarind varieties and they are not usually more specific. The tart varieties are generally more suited for cooking and for drinks. The sweet varieties come from Thailand and are perfect eaten out-of-hand.

Season. In most years tamarind fruit ripen before the rains begin in the spring. If we have an early rainy season much of the crop will be lost to decay. When there are several days of rain on the ripening fruit many fungi will attack the fruit and there will also be a heavy loss to weevils that bore into the hardened brown seeds, rendering the pulp of the fruit inedible.

Harvest. Tamarinds can be harvested by shaking the branches and collecting the pods on a mat or sheet beneath the tree. This will only work if the fruit are fully ripened on the tree and the rains have not started. If the later is so then the fruit must be hand-picked to sort ripe and unripe fruit to remove decayed fruit. The fruit of sweet types are harvested at two stages, half-ripe and ripe. At the half ripe stage the pulp is yellowish green and has the consistency and taste of a 'Granny Smith' apple. Many here in Florida are unaccustomed to eating a tamarind in this manner, but it is a true delight and should be tried.