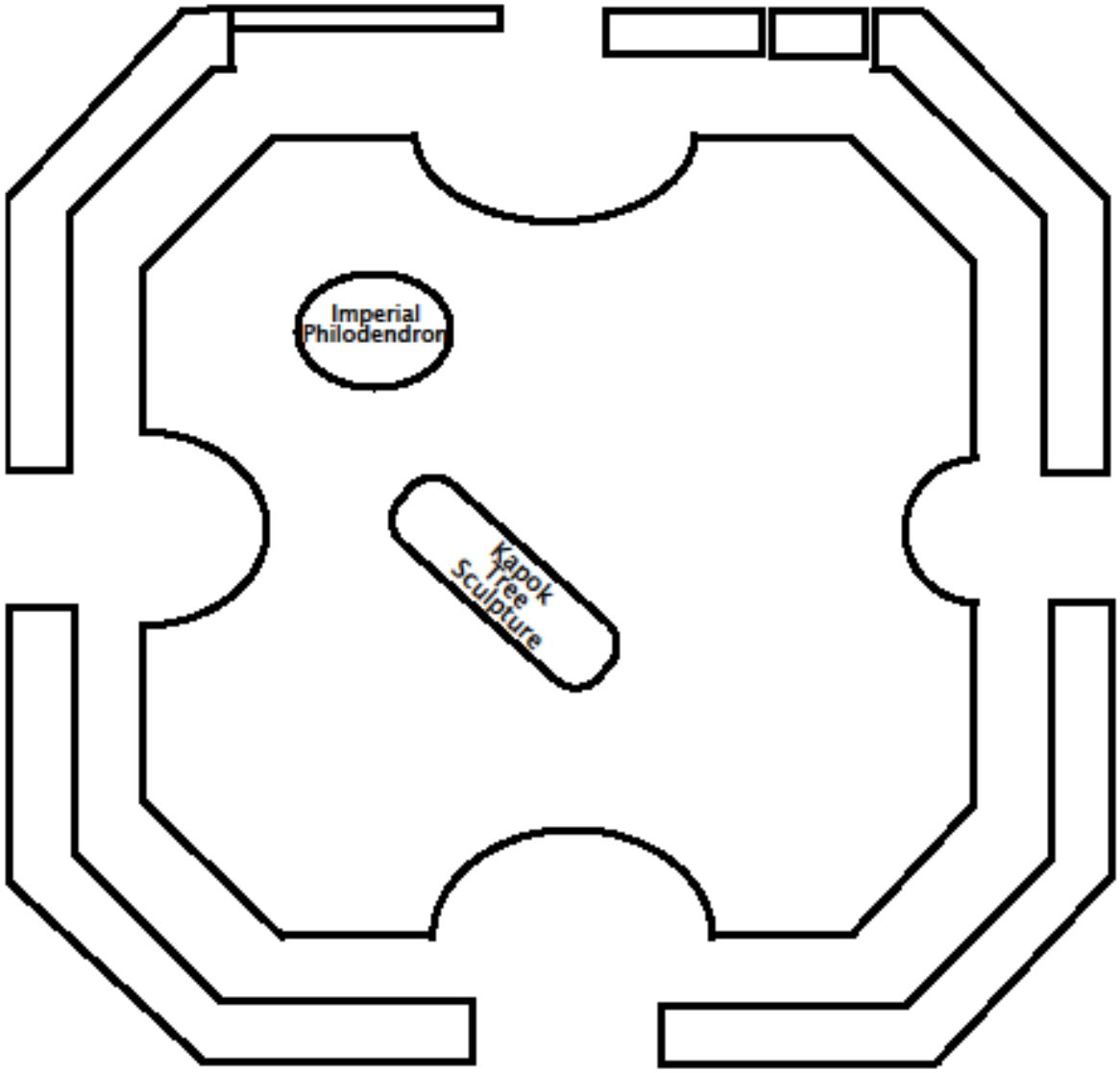
Lowlands Gallery



Lowland Gallery

When you enter Lowland Gallery under the dome, there is no mistaking that the world inside the Conservatory of Flowers is significantly different from the cool, gray city outside its doors. The air is humid and warm. High overhead rain falls on the canopy of palms and creeping vines. The stump of an enormous kapok tree (actually a sculpture) lies on the ground while falling water cascades through the lush foliage around it. Large and colorful fruits hang heavily from branches, and sweet fragrances mingle in the air.

Covering less than 5% of the earth's land area, these lush forests hug the equator where temperatures stay balmy, rarely dipping below 70 degrees. Rainforests are drenched by at least 100 and up to 400 inches of rain per year. Some, like the Amazon, are so wet and humid they frequently generate their own rain clouds. These forests support an extraordinary diversity of species. Over half of the world's plants and animals live here.

For a plant, there are plenty of benefits to living in the rainforest. Foremost of these is year round living. The rainforest does not experience any significant temperature difference between summer, fall, winter and spring. So with no seasonal cycle, no danger of frost and steadily warm temperatures, plants have no need to go dormant or protect themselves in other ways from climatic change and are free to grow year round. Along the equator, the length of the day hardly changes throughout the year, so sunlight is also available for the same number of hours from day to day and month to month.

Jungle living, however, is no bowl of mangoes. The same things that make it such an ideal environment also make it a very crowded and competitive one. Thousands of plants vie to find nutrients, light and space to grow. To be successful here, plants have carved out very specific ecological niches for themselves.

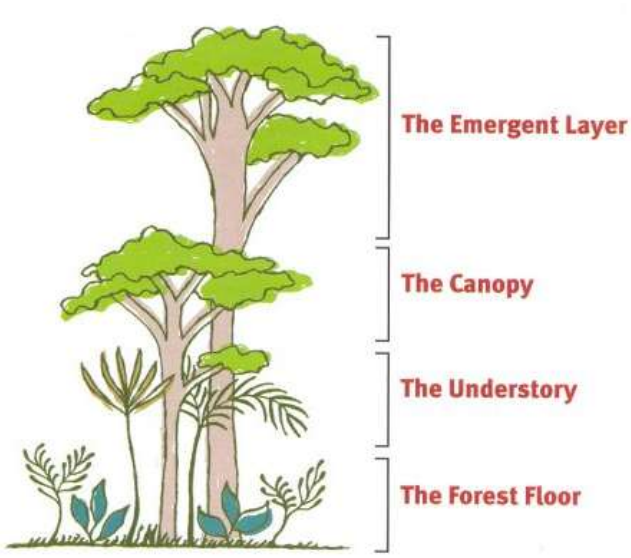
The above was excerpted from Treasures of the Conservatory of Flowers by Nina Sazevich.

GEOGRAPHY / CLIMATE / COUNTRIES

Tropical rainforests are found in South America, Central America, Hawaii, Puerto Rico, Southeast Asia and Central Africa. Plants in this gallery come from many tropical countries including: Brazil, India, Hawaii, Caribbean Islands, Seychelles Islands, Southeast Asia, Cameroon, and more.

- The lowland tropics are one of the most prolific of all plant communities in the world with the highest density of tree species compared to other forest biomes. They are found between sea level and 3,000 feet.

- The lowland tropical forest is comprised of layers: herbaceous layer comprised of leaf litter and ground covers, under-story comprised of smaller and younger plants, lianas and epiphytes, and canopy which reaches upwards of 150 feet with a few emergent trees pushing through the canopy nearing 200 feet. A quarter r of all plant species in lowland rainforests are epiphytes.



- Light is a major factor in forest growth and density. In clearings and along river edges, dense vegetation has an opportunistic chance to "grow-up," but once in the interior of the forest, the amount of light reaching the floor is very limited and prevents much from growing close to the ground.

- In areas with very thin soils, which provide little physical support as well as few nutrients, some trees get added support through buttress trunk bases and stilt root structures.

- Tropical rainforests cover less than 5% of the earth's land surface (about 2.4 million square miles), yet they are home to over half this planet's plant species. Tropical rainforests are found along the equator in a zone between the Tropic of Cancer in the northern and the Tropic of Capricorn in the southern hemisphere. They receive anywhere from 80 to 400 inches of rain annually (San Francisco receives approximately 21 inches per year), maintaining a warm, wet climate year-round, perfect growing conditions for many plants.

- The tropical forests of the world, which include rainforests, are being cut down, bulldozed and burned at an incredibly rapid rate—39,000 square miles every year, data from 1990-2005. That's an area a bit bigger than the size of San Francisco destroyed every twelve hours!

- The forests are being destroyed primarily by timber, cattle, oil and mining interests. Much of what is produced from the rainforests, such as coffee, beef, paper, furniture and gasoline are exported and sold in the United States. We can help save the rainforests by becoming conscientious consumers.

ARCHITECTURE / DESIGN / ARTWORK

- The central planting bed contains a fallen kapok tree (a *Ceiba pentandra*). The tree sculpture cantilevers above a jungle pool gently fed by a stream flowing from a sculpted rock-face dripping wall beside the timber bamboo. The fallen tree sculpture is equipped with planting pockets and drainage to support the epiphytes perched on the trunk representing a decomposing tree trunk overgrown with epiphytes and primary succession invaders.

- The upper dome of the Conservatory weighs about 29,000 pounds without glass and the dome is 56 feet in diameter and 55 feet tall. The finial atop the dome is 13 feet tall and weighs about 800 pounds. 90% of the colored glass pieces were salvaged before the 1998-2003 restoration and reused. The Conservatory's dome has burned twice, in the1883 and 1918 fires.

- The Goldman Fund, founded by San Francisco philanthropists Richard and Rhoda Goldman, contributed $5 million dollars to the renovation efforts after the Conservatory was damaged in the 1995 wind storms. Rhoda loved San Francisco, the environment and flowers, all of which are symbolized by the conservatory. To honor her memory, this grant had one major condition: The Conservatory had to retain its current name to ensure that the building won't be named after a corporation or other donor. In 1990, the Goldmans established the Goldman Environmental Prize, which annually awards $150,000 each to six grassroots environmental heroes, one from each of the world's inhabited regions. Thought of by many as the "green Nobel," the Prize. Since its inception, the Prize has awarded $13.2 million to 139 recipients from 79 countries. As a thank you to the Goldman Fund, and because the awards align with COF's conservation mission, the winners of the annual prize are displayed in the Lowland Gallery.

Plant Families in the Lowland Gallery
The following pages detail some of the most popular found in our collection. Many economic plants are found in our Lowland Gallery. They are detailed in a separate section. The plants we will discuss in detail are:

1. Imperial Philodendron “Phil”, *Philodendron speciosum*
2. Anthurium, *Anthurium spp.*
3. Pipe Vine, *Aristolochia elegans*
4. Cycads, *Dioon spinulosum* and *Zamia poeppigiana*
5. Splendid Stilt Palm, *Verschaffeitia splendida*
6. Crepe Jasmine, *Tabernaemontana coronaria*
7. Spanish Moss, *Tillandsia usneoides*
8. Kapok, *Ceiba pentandra*
9. Scarlet Flame Bean, *Brownea coccinea*
10. Japanese Lantern, *Hibiscus schizopetalus*
11. Prayer Plant, *Maranta*
12. *Calathea warscewiczii*
13. Travelers Palm, *Ravenala madagascariensis*
14. Economic Plants

PLANT INFORMATION SHEET

Family: Araceae. The Arum Family, also called Aroids.

Botanical Name: *Philodendron speciosum*

Common Name(s):
Imperial Philodendron

Country of Origin:
Southeastern Brazil

Native Habitat: Vines and climbers

Galleries where found: Lowland

This plant is noteworthy because...

- It is one of the largest leaved philodendrons. The leaves at the top of the dome reach up to 6 feet long and the lower, shaded leaves four feet long. This particular plant is the largest in cultivation and is also uncommon in cultivation.
- More than 100 years old, it was the only plant to remain in the ground during the Dome's 2003 restoration. It was equipped with a custom made greenhouse while open-air reconstruction occurred around it.
- Araceae contains many kinds of house plants including different species of philodendrons; other genera are *Caladium*, *Calocasia*, *Monstera* and *Alocasia*.

An interesting adaptation of this plant is…

- Its ability to produce extra roots.
- It has large leaves for catching sunlight that filters through the rainforest canopy.

General Plant Description & Characteristics: A huge climbing vine which starts on the ground floor and finds a large tree to climb; eventually sending roots down to the ground. Roots become woody. Flowers in the canopy. Flowers have a large yellow spadix with a red spathe around it.

PLANT INFORMATION SHEET

Family: Araceae

Botanical Name: *Anthurium spp.*

Common Name(s): Anthurium Lily, Flamingo flower

Country of Origin: Neotropical distribution (mostly central and south America)

Native Habitat: wet tropical mountain forests, some in semi-arid places

Galleries where found: All

This plant is noteworthy because.... A large genus of possibly 600-1,000 species, it is possibly the largest genus of this family and probably the most complex. Many species not yet described and many new ones found each year. Not thought to be found naturally in Asia but some species have been now introduced.

An interesting adaptation of this plant is…

- Like most aroids, the adventitious roots can hang all the way from the canopy to the forest floor to get extra nutrition and moisture.
- The leaves have a “geniculum,” which allows the plant to swivel its leaves towards the sun like a sunflower does.

General Plant Description & Characteristics: The Flower: the spathe, which is NOT the flower but a colorful, leathery bract that surrounds the spadix. The spadix the spike, an inflorescence of many flowers with the male flowers separated from the females flowers.

PLANT INFORMATION SHEET

Family: Aristolochiaceae

Botanical Name: *Aristolochia elegans*

Common Name(s): Dutchman's Pipe, Calico Flower, Pipe Vine

Country of Origin: Western and Central South America. Introduced to Australia and the Pacific.

Native Habitat: Species occur in rain forests. High climbing vines.

Galleries where found: Lowland Gallery, growing around the door leading into Highland Gallery.

This plant is noteworthy because... The flower of this vine is very unique with its flesh-colored, petaloid calyx. A member of the Birthwort Family: a small family of about 6 genera and 400 species. The family has long been associated with traditional medicines concerning childbirth and abortion.

An interesting adaptation of this plant is…
The highly developed flowers of *Aristolochia* are adapted to fly pollination and look like rotting meat. The swollen base often has a translucent window that attracts the flies down into the gynostemium (tube). The inside wall of the tube bears stiff, downward facing hairs that prevent the flies from escaping until pollination is effected. The hairs then relax and permit the flies to escape.

.

General Plant Description & Characteristics: This is a long, twining vine with heart-shaped, alternate leaves. Flowers are solitary, large, bisexual and maroon with white spots.

PLANT INFORMATION SHEET

Dioon Spinulosum with cone

Family: Zamiaceae; also Cycadaceae

Botanical Name:
Dioon spinulosum and *Zamia poeppigiana*

Common Name(s): Cycads or the Cycad family

Country of Origin:
Zamia: Colombia, Ecuador & Peru. Dioon: Mexico

Galleries where found: Lowlands, Potted, Aquatic

This plant is noteworthy because... Cycads are primitive gymnosperms that first appeared in the geological record about 170 to 200 million years ago. They were present before the rise of dinosaurs and today small populations survive naturally in limited areas of the world. Our Zamia and Dioon are over 100 years old.

An interesting adaptation of this plant is…

- Their asexual (nonsexual) reproduction- they make lots of “pups.”
- Young leaves have spines on the edge making it difficult to eat by predators.

Is this plant or its native habitat endangered or threatened? These “living fossils” are so sought after that poaching is a problem and also suffer from habitat destruction.

General Plant Description & Characteristics: Cycads resemble palms or tree ferns due to their leaves. Cycads, however, differ greatly in almost all botanical ways. They are cone bearing, dioecious (male and female reproductive structures are on separate plants) and usually pollinated by beetles or the wind.

PLANT INFORMATION SHEET

Family: Arecaceae

Botanical Name:
Verschaffeltia splendida

Common Name(s):
Splendid Stilt Palm

Country of Origin:
Seychelles Islands

Native Habitat: Tropical climate with good moisture and protection from the wind; Grows on steep forested hillsides from 1,000-2,000 feet in elevation.

Galleries where found: Lowland

This plant is noteworthy because... One of the most spectacular palms around which has the three things that palm collectors look for: entire leaves (especially in young plants), spiny trunk, and well developed stilt roots. Monotypic, which means that it is the only species of this genus.

An interesting adaptation of this plant is…

- The trunk and petioles are covered with spines especially on juvenile trees
- The stilt roots are important for stability in high winds.

Is this plant or its native habitat endangered or threatened? This is a threatened plant, as it suffers from habitat loss. Also collectors poach these plants from their native habitat.

General Plant Description & Characteristics:
Can grow to be 50 feet tall. Leaves are undivided and pinnate.

PLANT INFORMATION SHEET

Family: Apocynaceae

Botanical Name: *Tabernaemontana coronaria*

Common Name(s): Crepe Jasmine

Country of Origin: India, China and Thailand

Native Habitat: Full sun to partial shade.

This plant is noteworthy because...
Extremely fragrant flowers - scent resembles gardenia.

An interesting adaptation of this plant is…
The scent of its white, waxy flowers is strongest at dusk and after dark to attract nocturnal pollinators.

PLANT INFORMATION SHEET

Family: Bromeliaceae

Botanical Name: Tillandsia usneoides

Common Name(s): Spanish Moss

Country of Origin: Southeastern US to Argentina and northern Australia.

Native Habitat: Hangs from tree branches. Grows wherever the climate is warm with a relatively high average humidity.

Galleries where found: All

This plant is noteworthy because...

Its namesake is Usnea or beard lichen; however it is not biologically related to

mosses or lichens rather it shares its family with the bromeliads. It is an airplant that gets moisture and nutrient from the air and rainfall. It has been used for various purposes including building insulation, mulch, packing material, mattress stuffing and fiber.

An interesting adaptation of this plant is…
The chains of *T. usneoides* can be up to 20 feet in length. The plant has no aerial roots. It propagates both by seed and vegetatively by fragments that blow on the wind and stick to tree limbs, or are carried by birds as nesting material.

General Plant Description & Characteristics:
Slender stem bearing thin, heavily scaled leaves. The flowers are tiny and inconspicuous.

PLANT INFORMATION SHEET

Family: Malvaceae

Botanical Name: Ceiba pentandra

Common Name(s): Kapok

Country of Origin: Mexico, Central America, the Carribean, northern South America. Other species in the genus are native to tropical West Africa.

Native Habitat: Hot, wet and sunny tropical areas.

Galleries where found: Lowland

This plant is noteworthy because...

Young trees have thorns on the trunk leading one native culture to name it a phrase that translates to "monkey no climb". The thorns prevent animals from eating the bark. The thorns fall off as the tree grows to adulthood.

General Plant Description & Characteristics:

This is an emergent tree in the rainforest that can grow to over 200 feet tall with a trunk up to 10 feet in diameter. The seed pods contain a light, buoyant and water resistant fiber used by many cultures as insulation, stuffing for mattresses, sleeping bags, and pillows and, up until the middle of the last century, used in life jackets.

PLANT INFORMATION SHEET

Family: Fabaceae; sub-family caesalpinioideae

Botanical Name: Brownea coccinea

Common Name(s): Scarlet Flame Bean

Country of Origin: Guyana, Venezuela, Brazil, Trinidad, Tobago; cultivated in India

Native Habitat: Moderate rainfall regions of tropics and sub-tropics.

Galleries where found: Lowland

This plant is noteworthy because...
Striking red-orange inflorences that look like giant crepe paper balls.

An interesting adaptation of this plant is…
Unlike most plants, the new growth looks dry and dead - discouraging animals or insects from eating it and acting as sunscreen. The lack of clorophyl means the new leaves don't absorb harsh rays from the sun.

PLANT INFORMATION SHEET

Family: Malvaceae

Botanical Name: Hibiscus schizopetalus

Common Name(s): Chinese Lantern, Japanese Lantern, Skeleton Hibiscus

Country of Origin: Hawaii, Florida, India, widely cultivated in the tropics.

Native Habitat: Tropical East Africa

Galleries where found: Lowland

This plant is noteworthy because...

The showy flower resembles a hanging lantern.

An interesting adaptation of this plant is…
Hummingbirds flock to this plant because of the red color (an attraction to birds) and the hanging stigma with bottlebrush stamen arrangement easily transfers pollen from the anther to the pollinator.

General Plant Description & Characteristics:
Perennial. Evergreen. A weeping tree hibiscus. Grows rapidly and blooms freely. Coral colored flowers look like parachutes and can be recognized by the fringed and lacy petals, which are bent backward. The long central staminal column has a 5-branched style and anthers near the tip of the column. The plant has slender and gracefully curved stems. The leaves have a short petiole and are green, hairless, alternate, sharply toothed, and elliptic to oblong in shape.

PLANT INFORMATION SHEET

Family: Marantaceae
Botanical Name: Maranta (various species)
Common Name(s): Prayer Plant
Country of Origin: Southwest Asia and the West Indies; the Tropical Americas
Native Habitat: The understory of the tropical rainforest.
Galleries where found: Lowland, Potted Plants
This plant is noteworthy because...
The leaves turn up at night, resembling hands in prayer - hence the common name.

An interesting adaptation of this plant is…
The underside of the leaves of some species of Maranta is dark red, almost purple/black to help the plant collect reflected sunlight.

Botanical Name: *Calathea warscewiczii*
Country of Origin: Endemic to Costa Rica and Nicaragua
Native Habitat: The understory of the tropical rainforest.
Galleries where found: Lowland
An interesting adaptation of this plant is…
Calathea warscewiczii is pollinated by long-tongued Euglossine bees. The ivory bracts protect cocoon like flowers that emerge only one or two at a time.The bee forces the flower open to get to the nectar. While being forced open, the flower's spring mechanism is tripped and forces pollen onto the bee, which is deposited on the next flower it visits.

Many Calathea plants produce leaves that have a dark green background and an attractive fishtail pattern on the top of the leaves. The dark color on the underside of the leaves help them absorb more sunlight, an important adaptation for plants in the darkness of the forest floor.

PLANT INFORMATION SHEET

Family: *Strelitziaceae* family, it's not a palm at all. Once classified under in the same family, the resemblance to the banana is clear when comparing the leaves. A comparison of flowers shows obvious relation to the bird of paradise (Strelitzia). Both have a distinctive beak-shaped spathe from which the flowers emerge.

Botanical Name: *Ravenala madagascariensis*

Common Name: travelers palm, fan palm

Country of Origin: Endemic to forests in Madagascar

Galleries where found: Lowland

This plant is noteworthy because...
The leaves are enormous – the largest of all the plants in the Conservatory. The traveler's palm gets its name from the fact that thirsty travelers may find water that accumulates in many parts of the plant such as leaf folds, flower bracts, and the hollow leaf bases. *Ravenala* make suckers rapidly which eventually results in a huge mass of trunks. In cultivation, it is more desirable to allow just one of the trunks to grow since this best displays the striking fan-like arrangement of its leaves. This arrangement gives the tree its other common name of "fan palm".

An interesting adaptation of this plant is…
It is believed that the main pollinator of the *Ravenala* is black and white ruffed lemur. As the lemur feeds on nectar in the flower it collects pollen on its muzzle and fur and then transports it to the next flower. Given the structure of the inflorescence, as well as the lemur's selectivity, method of feeding, and long muzzle, this relationship is thought to have co-evolved.

Economic Plants in the Lowland Gallery

Banana *Musa* sp. Musaceae

- Southeast Asia
- Bananas are grown for their fruit, fiber and foliage. They are grown extensively in all tropical countries.
- These monocots may be pollinated by bats, sunbirds, or may be self-pollinating. They can also be parthenocarpic, meaning that they produce fruit without fertilization.
- Wild bananas have lots of large seeds, but the cultivated varieties are seedless.
- The banana isn't really a tree, it's a giant herbaceous plant with an above ground pseudostems (similar to a trunk) made up of tightly wrapped leaf sheaths. Each of these pseudostems arise from an underground corm. What can look like hundreds of banana trees may actually be one plant with a huge underground stem sprouting many pseudostem 'trunks.'
- Each spike produces 200-300 individual bananas depending on the cultivar it is.
- The banana is included in Asian Buddhist texts dating from 2,600 years ago; the first known banana plantation was in China (200 AD). By 650 AD Arabic merchants had distributed the banana all over Africa. Europeans brought the banana to the Americas approximately 500 years ago.

Cacao, *Theobroma cacao,* Sterculiaceae

- Central and South America
- The flowers and fruits of this plant are cauliflorous, meaning that they are produced from the woody trunks and limbs. The flowers are pollinated by biting midges.
- The Sterculiaceae contains our native flannelbush (*Fremontodendron californicum*).
- The seeds of this tree's fruit are the source of cocoa and cocoa butter, the primary ingredients in chocolate.
- The Mayans began making a cocoa drink approximately 1,500 years ago, in the Yucatán. The Mayans cultivated the earliest known cacao plantations.
- The Aztec emperor, Montezuma, drank thick chocolate that was dyed red, which was served in golden goblets that were thrown away after only one use. He liked it so much that he was said to drink 50 goblets every day.
- The cacao beans were used as currency in both of these empires. For example, ten cacao beans would have bought one rabbit.
- The average person in the United States eats 11 pounds of chocolate a year.

Coffee, *Coffea arabica,* Rubiaceae

- Tropical Africa, It is cultivated in Latin America, Africa, India and Indonesia.
- Coffee flowers smell similar to gardenia, which is also a member of the Rubiaceae.
- Coffee plants are pruned to 2 to 4 feet in height, encouraging a dense, bushy habit for easier hand harvesting. If left to their natural habit, these plants would grow to 20 feet.
- Coffee is native to Africa, but it was in Arabia that coffee became a domesticated crop. In Ethiopia, the Galla tribe used coffee, but not as a drink. They would wrap the beans in animal fat as their only source of nutrition while on raiding parties. The Turks were the first to process coffee into a drink, often adding spices to the brew.
- Coffee plantations are a major source of oxygen in many parts in the world, it is estimated that each hectare (100 acres) of coffee produces 86 pounds of oxygen a day.
- As coffee is among the three most traded commodities in the world, making the coffee plant one of the most common plants in the world.

Allspice, *Pimenta dioica*, Myrtaceae

- West Indies and Central America
- Allspice comes from this tree whose leaves and fruit smell like a combination of cloves, black pepper, nutmeg and cinnamon. Other members of this plant family are eucalyptus and metrosideros.
- It is used in North and South American, Caribbean and European cuisine; the spice plays a central role in Jamaican “jerked” meat recipes.
- As a medicinal plant it is a digestive and carminative. The oil increases the flow of blood to make the skin feel warmer. The tannins in allspice provide a mild anesthetic that, with its warming effect, make it a popular home remedy for arthritis and sore muscles, used either as a poultice or in hot baths.
- In the Napoleonic war of 1812, Russian soldiers put allspice in their boots to keep their feet warm and the resultant improvement in odors is carried into today’s cosmetic industries, where the oil is usually associated with men’s toiletries (especially products with the word “spice” on the label).

Cardamom, Elettaria cardamomum, Zingiberaceae

- India
- Cardamom is from the same family as ginger, galangal and turmeric.
- It is commonly used in Indian cooking and Scandinavian baking.
- The seed pods are green. They are used dried, whole or ground.
- In traditional medicine, Cardamom was used to treat infections in the mouth, throat troubles, digestive disorders, congestion of the lungs and inflammation of eyelids.

Miracle fruit, Synsepalum dulcificum, Sapotaceae

- Tropical West Africa
- This unusual African shrub produces sweet, red berries that temporarily block the sour receptors on your tongue, making sour fruits & drinks taste sweet. The effect remains for some 30 minutes or more.
- Miracle fruit has been used as an appetite stimulant for people undergoing chemotherapy.

Hibiscus, Ke' oke'o, *Hibiscus arnottianus,* Malvaceae

- Endemic to Hawaii
- *Hibsicus arnottianus*, subspecies *immaculatus* is endangered in Hawaii.
- Cotton (*Gossypium* spp.) and *Abutilon* spp.are also members of the Malvaceae.
- This hibiscus' petals were used by the Hawaiians as a source of dye.
- The flowers are edible and can also be made into a tea.
- The flowers have an exquisite fragrance, with delicate white petals, surrounding a fused column of red stamens.

Calabash tree, *Crescentia cujete,* Bignoniaceae

- Tropical America
- The Bignoniaceae also contains Paulownia, Jacaranda and Chilopsis.
- Flowers and fruits are cauliflorous (they grow directly from this tree's trunks and limbs). The huge fruit takes up to seven months to ripen. The flowers have nectaries that attract ants, and the ants protect the trees from herbivores.
- This plant is pollinated by bats.
- The Taíno of the Caribbean cut eye holes into the "gourds" and fitted them over their heads. The hunters then waded out into lakes or the ocean. What looked like a floating gourd did not frighten birds as they were being closed in on. The disguised hunters would easily grab the fooled birds by their legs.
- Calabashes are used to make storage containers, cups, bowls, maracas, and many other tools, musical instruments and utensils.

Cinnamomum cassia

- Cinnamomum cassia, also identified as Cinnamomum aromaticum is an evergreen tree.
- It is a close relative of Cinnamomum verum, also known as "Ceylon cinnamon". The bark of both plants is used to make the spice, however, Ceylon has a more delicate flavor, and is considered "true" cinnamon by most countries.