



‘APE

Sometimes called "Elephant's Ear, ‘ape (pronounced ah-pay), is related to and resembles a large taro plant. The shiny green leaves can grow up to 2-4 feet long by 2 feet wide. ‘Ape thrives in a slightly moist and shady location with well composted soil.

Similar to taro, the underground stem and corm is edible, and as with taro, is only safe to eat after lengthy cooking which breaks down the irritant of the uncooked crystals of calcium oxalate which is formed by high levels of oxalic acid. Because calcium oxalate can injure internal human tissue, ‘ape was eaten only in times of famine when other foods were scarce.

Originating in southern Asia, ‘ape (*Alocasia macrorrhiza*, *Xanthosoma robustum*) grows throughout the Pacific. Beyond its practical uses, the plant figures in Hawaiian legends and was used in different Hawaiian ceremonies such as healing practices, spiritual protection, and dye-making to color ipu/gourds.

In the old days, the leaves of ‘ape and of ti were used to wrap a fevered person for comfort and it was also said that the bitter sap of ‘ape would frighten away negative spirits.



‘AWAPUHI KUAHIWI

The tropical ‘awapuhi are a glorious exotic family, commonly known as native wild shampoo ginger or ‘ōpuhi, with the botanical name of *Zingiber zerumbet*.

This plant originated in India, was distributed eastward through Polynesia and introduced to these islands in the canoes of early settlers. The leaves and leaf stalks, which are fragrant, were used in baking in the imu, underground oven, to enhance the flavor of pork and fish as they cooked. Traditionally, the aromatic underground roots/rhizomes were sliced, dried and pounded to a powder, then added to the folds of stored kapa/tapa cloth. The spicy-smelling fresh roots were pounded and used as medicine for indigestion and other ailments.

The most common use of ‘awapuhi kuahiwi is as a shampoo and conditioner for the hair. The clear slimy and sudsy juice present in the mature flower heads is excellent for softening and brings shine to the hair.

‘Awapuhi kuahiwi is a perennial, so from autumn until spring it becomes dormant above ground as the leaf stalks die away. In the spring the plant springs up anew.

The ‘awapuhi is said to be one of the kinolau, multiple forms, of the Hawai‘i deity Kane.



‘AWA

‘Awa (*Piper methysticum*, pronounced ah-vah with the "w" as a "v" sound), a member of the pepper family, grows in the wild and is also cultivated. This plant grows well at low elevations where there is constant moisture and partial sun. More than a dozen varieties of ‘awa were known in old Hawai‘i.

The sparingly branched, erect shrub is very hardy and grows up to 12 feet high. The black ‘awa is the rarest one. Generally, it needs to grow for 2 to 3 years minimum to achieve usable potency. It is valued as an intoxicating drink and as a medicine. ‘Awa is also a sedative, used as a sacred plant for prayer, as well as appreciated for pleasure. It assists in opening communication channels with others and with the elements.

As a medicine, the roots - as well as the leaves, stems and bark - are used for the following: general debility, weary muscles, chills, colds, headaches, lung and other respiratory diseases such as asthma, displacement of the womb, diabetes, congestion of the urinary tract as well as for rheumatism.

To make feverish or restless young children go to sleep, the leaf buds are given to the child after being chewed by the mother. The plant is also used during teething and in rituals at the time of weaning.

‘Awa is used principally as a sedative to induce relaxation and sleep, especially when combined with lomi lomi massage. It is also used as a tonic when people feel weak, as it is stimulating and refreshing, unless drunk in large quantities. Over indulgence in ‘awa use for a period of time can adversely (but temporarily) affect the skin and eyes. The word ‘awa means bitter.

In the old days, it is said that the chiefs and priests were the principal users of ‘awa, but in more recent times it has been taken to use by all the people. Spiritual leaders use ‘awa ceremonially at appointed times.

To prepare the ‘awa root, it is sometimes used fresh, sometimes sun-dried. It is washed clean, chopped into small pieces, and then pounded — or in modern times, blended — with water to create a suspension of kavalactones, which are lipid-soluble. Traditionally, the root pieces were chewed, usually by a young maiden. Now powdered and packaged root is often available.

An ‘awa drink, good for migraines or P.M.S., can be prepared for one's personal use in the following way. Put a few small pieces of the clean root in the mouth and chew them. Add a few more, until a cud the size of the thumb is formed. When three of these are ready, put them in a bowl and mash with about a cup of fresh water. Strain the liquid through a cloth to remove woody material. This will provide you with a drink that can be used for headaches or cramps. Sugar cane juice or honey can be added to sweeten.

Sometimes a spoonful of noni juice is added as a chaser, to counter any unpleasant effects.

In the traditional manner, the chewed 'awa is mixed with water or with coconut water, sometimes warmed by putting it in a kanoa, calabash, with hot stones. It is then stirred and strained with a fibrous plant bundle and drunk when it is cool.

Special cups ('apu 'awa), made from coconut shell cut lengthwise, are often reserved for this brew, and for the ceremony of 'awa drinking. Distinctive bowls are also made and set aside for 'awa ceremonies throughout Polynesia. 'Awa/kava seems to be more widely used outside these Hawai'i islands.

When 'awa cups are filled, a prayer of gratitude is offered. 'Awa is usually gulped rather than sipped, with some of the liquid being left in the container and poured upon the earth, with thanksgiving. A chaser or pupu is sometimes used to offset the bitter taste: a piece of sugar cane, a bite of sweet potato, banana or fish. A numbness in the mouth may be noticed after 'awa ingestion.

It is best to harvest the 'awa root when the ground is moist from rain, so that it can be easily removed. For propagation, the stalk can be cut into sections that include the top of one knob and the bottom of the next one down. These can be planted right side up, with most of the cane being beneath the moist earth, in a shady place. Another method of planting is to lay a long piece of stem within the earth, allowing several plants to sprout from the knobby sections laid down.



HAU

Hibiscus tiliaceus is the scientific name of hau. The leaves are heart-shaped and round, from 2 to 12 inches in diameter. Hau is a true hibiscus. In the old days this plant was so highly

valued that permission to cut it was required of the village chief.

Seeds and cuttings of hau were brought by early Polynesian voyagers to Hawai'i Nei, and planted by the settlers to yield a light-weight tough white wood with a brown heart. Hau is found and used throughout tropical and subtropical Polynesia, Melanesia and Micronesia and is held in high regard for its usefulness to the traditional life of oceanic people.

Traditionally, hau branches were piled near the shoreline to indicate fishing was kapu, because spawning was occurring in that area.

Cork-like hau wood pieces were used as floats on fishnets. The soft wood was also helpful in making fires. A pointed piece of hau was rubbed in a groove of a harder wood, such as kukui. The dust particles of hau that rubbed apart would smolder as the rubbing

increased. Then small pieces of coconut fiber or bits of tapa bark cloth were ignited from the hau, and the fire was put next to grasses, sticks and finally to wood.

Adze handles were most often made of hau, as were light-weight practice spears, massage sticks, brooms, and the cross-beams for kites.

Hau cordage, called 'ili hau, provided tying material used daily. The cordage is made by cutting off stems and younger smooth branches, making a slit lengthwise and removing the bark with the hands. The bark strips are then soaked. When the outer bark is slipped off, remaining are cream-colored smooth fibers for braiding and twisting into cordage. For some uses the outer bark isn't removed, eventually falling off with use. Hau cordage provided ropes for hauling and many other needs: slings; canoe lashing; strings for bows; net bags; carrying handles for water-gourds; fasteners for lauhala baskets; shark nooses; strands for lei making; sewing material to piece together tapa cloth for clothing and bedding; and hula skirts and sandals.

Hau grows well near the ocean, streams, and in moist sloping areas up to the 2000 foot elevation. This shrub spreads to form a creeping jungle of interwoven, curved and twisted springy arching branches.

A slimy juicy sap found in the dome of the flowerbud and in the bark was used as a mild laxative. The buds were also chewed and eaten for dry-throat. Slime from soaking the bark of the stems was medicine for congested chests.

One Hawai'i legend says that hau is a sister of the goddess Hina, changed into a tree. Some people equate the brief span of the hau flower as representative of the transitory nature of human life.



IPU

Kanaka Maoli, the original Hawai'i people, used no pottery. For containers, they grew the beautiful and functional hard-shelled and thick-walled hue/gourd, better known as ipu, which is related to the squash, watermelon and cucumber.

Lageneria siceraria and *vulgaris* is a native of tropical Asia and Africa. Brought by seed in the canoes of migrating Polynesians, ipu were used during the voyages as water bottles (hue'wai or 'olowai), as canoe bailers and as receptacles in which to store fish hooks, fish line, bait, medicine and food.

A climbing vine, ipu is traditionally planted after the rainy season. As the vine grows, it needs support, such as a rock wall, a tree, or home-made trellis. During the 6-9 months that the ipu fruit takes to mature, they must be carefully tended and protected from stinging and biting insects that like to lay their eggs in the young developing fruit. Sometimes green, sometimes white or mottled, the gourds vary in shape and size,

according to their variety. They can also be shaped by wrapping or tying them with cord, while they are maturing. More varieties have been grown in Hawai'i than elsewhere in Polynesia. The Hawaiians used gourds for more functions than any other indigenous people.

A sunny site on the leeward side, below the 1500 foot elevation, is the best growing place for ipu, although adequate rainfall or irrigation, good drainage and shelter from the wind are all necessary ingredients for fruitful growth.

The gourd is harvested when the stem is dry, by cutting several inches of stem with a sharp implement. Curing and preserving techniques are being explored and relearned these days. Many months are necessary for the process of curing. Most growers leave the gourd intact until it is dry and the seeds rattle inside when shaken. Other growers open the ipu at the top and scrape out the pulp and seeds, traditionally with an opihi shell, then filling the ipu with a saltwater solution, or with sand.

Traditional gourds were called 'umeke pohue. Most were simply left their natural color, which is golden brown when dry, but some were decorated with geometric designs and stained. This decorating process found only in Hawai'i, called "Ipu pawehe," is a detailed and intricate technique of tattooing the gourd with dyes. These dyes can be made from manmade or plant dyes, such as those with tannic acid, like kukui root bark, kukui leaves mixed with alae dirt, coffee or tea, or the oxalic acid of kalo. These later stages of gourd preparation can often be tricky and varied, and some "failures" do occur in the process.

Water gourds with long necks were closed off with a stopper, made from a shell, carved wood, coral or a folded leaf. Larger gourds, ipu nui, were used to store food and bigger objects, such as folded tapa cloth and feather regalia. These had lids made from the curved bottom of another gourd. Where a gourd needed to be carried or lifted, cordage was used, made of hau, olonā, coconut, and other fibers. With a carry net, koko, they could be carried and swung on 'auamo mamaka, a shoulder pole.

Ipu were used as dippers and as eating utensils such as dishes, bowls and mugs. They were also used to store dye, and as burial receptacles for bones.

A small pear-shaped nose whistle called ipu hokiokio is unique to Hawai'i. It is softly played by one lover to another.

In hula, the 'uli'uli is used. These are rattles made of small ipu filled with pebbles or the seeds of the canna lily, called ali'ipoe. With an attached handle, these rattles are usually capped with a disc of cloth, and fringed with feathers. Ipu hula, pa'ipu, and ipu heke are all names for the hula drum. This musical implement is made by joining a smaller ipu at its top end to the top end of a larger ipu with kepau, the sticky latex sap of breadfruit/ulu. Looped at the juncture of the ipu is a braid of cordage of wauke, which can be placed around the wrist of the performer. The ipu bottom is thumped on the ground, usually on

a cloth, and slapped with the hand to create a resonance and beat for the dancers or chanters.

Gourds were a part of ancient legends, myths and rituals. The cosmology of an ipu is said to be that it spreads and puts forth fruit, like humankind over the earth.

The spirit of fertility that is the god Lono is embodied in the ipu, which is considered kinolau, body form, of Lono.



KALO

The life of Kanaka Maoli, the indigenous Hawai'i people, is linked closely with kalo, also known as the taro plant. Kalo is believed to have the greatest life force of all foods. According to the Kumulipo, the creation chant, kalo grew from the first-born son of Wakea (sky father) and Papa (earth mother), through Wakea's relationship with his and Papa's daughter, Ho'ohokulani. Haloa-naka, as the son was named, was stillborn and buried. Out of his body grew the kalo plant, also called Haloa, which means everlasting breath. Kalo and poi (pounded kalo) are a means of survival for the Hawai'i people. By eating kalo as poi, one at a time as a ritual around the poi bowl ('umeke) at the center of dinners, the protocol of Hawai'i is maintained. This is a ceremony of life that brings people together and supports a relationship of 'ohana (family) and of appreciation with the 'aumakua (ancestors).

From early times, kalo was the primary food of the Hawai'i people, supplemented by other principal and traditional foods: breadfruit ('ulu), sweet potato ('uala), yams, greens, ferns, fruit, fish and seaweed (limu).

Taro came to Hawai'i Nei with the earliest Polynesian settlers in their canoes and has been cultivated as a staple of life from ancient times in the tropical and subtropical latitudinal band around the earth. Taro grows in tropical Africa, the West Indies, the Pacific nations and in countries bordering the Indian Ocean in South Asia. In Hawai'i, where cultivation has been the most intense, in the early days there were more than 300 varieties of taro. Approximately 87 of these varieties are still recognized today, with slight differences in height, stalk color, leaf or flower color, size, and root type. Some of the local varieties are Mo'i, Lehua, Ha'akea and Chinese.

Taro, whose scientific name is *Colocasia esculenta* (or *antiquorum*) is cultivated both in the uplands as high as 4,000 feet, and in marshy land irrigated by streams.

Depending on the variety, all parts of this sturdy and vital plant are eaten. The leaves are cooked as greens, similar to spinach. The tubers are eaten baked, boiled or steamed, or cooked and mashed with water to make poi. Most important is the starchy root with enough glutinosity to make quality poi. The stiffest poi is called locally "one finger" and the most liquid "three finger". "Two finger" poi is considered the best by

some. The planters know which kind of taro makes the best poi, which variety has the most tender leaves and which has the necessary medicinal properties.

Taro is often fed to babies as their first whole and natural healthy food, as well as to the elderly, for its ease of digestion and high vitamin content. Poi is eaten fresh or allowed to ferment for a few days, often for longer, creating a sour taste considered pleasant, acidic, but not alcoholic. In the old days, a person might consume up to five pounds of poi per day. Several kinds of kalo had such special flavor and color that they were reserved only for the chiefs.

In the kalo and poi-based agricultural society, the people of ancient Hawai'i were dependent on wetland taro. Great skills were needed to terrace, cultivate and irrigate the land along streams, as well as the social and political skills to maintain it. The planters of wetland taro were practicing engineers, building walls of earth reinforced with stone to enclose the lo'i (pond field). Along the banks of the lo'i were planted mai'a (banana), ko (sugarcane), ki (ti), and wauke (paper mulberry) for kapa cloth, also known as tapa. An acre of wet lo'i could produce 3 to 5 tons of food per year. Dryland taro was grown in the lower forests where the soil was rich and the rainfall sufficient. Stone borders surrounded these gardens and can still be found on a forest hike.

In planting both wetland and dryland taro, the huli, the planting material, consists of a 1/2 inch thick slice of the top of the kalo (corm, from which derives the plant's name) attached to 6 to 10 inches of the leaf-stem. These protrude above the water or dryland where planted.

The bottom of the corm/root is saved for cooking and eating, making taro a recyclable plant. In 6 to 12 months, depending upon plant variety along with soil and water conditions, the taro should be ready to harvest. Each parent tuber produces from two to 15 'oha, side tubers of corms, up to 6 inches in diameter. 'Oha means specifically the suckers or shoots concentrically growing from the corm of the kalo/taro plant. Knowing this, it is easy to understand why the Hawai'i family as a group is termed 'ohana, which literally means "all from the shoots".

Before kalo can be eaten, all parts of the plant must be cooked, in order to break down the needle-like calcium oxalate crystals present in the leaves, stem and corm. These could be extremely irritating to the throat and mouth lining, causing an acrid burning and stinging sensation.

Lu'au is the name of the edible taro leaf, from the word lau, leaf. The lu'au leaf is another kinolau of Lono. The cooked corm and poi have fewer vitamins, but are an excellent carbohydrate source and have the ability to balance the pH factor in the body, as they are an alkali producing food.

The following are a few of the medicinal uses of poi and the kalo plant. Poi is used to settle the stomach. Mixed with ripe noni fruit, it can be applied topically for boils. Poi can be mixed with pia (arrowroot starch) and taken for diarrhea. Undiluted poi is sometimes

used as a poultice on infected sores. A piece of taro stem, haha, can be touched to the skin to stop surface bleeding. Some infections respond to the use of taro leaves mashed with Hawai'i salt. This poultice can be applied to an injury, covered and wrapped with a large taro leaf. For a sting from an insect, the stem can be cut and rubbed on the afflicted area.

Mud from the taro patch was used as a black dye for lauhala and kapa cloth, while some leaf-stem juice yielded red dye. Also, diluted poi was used as a paste to glue together pieces of kapa cloth.

The kalo plant is said to be the hiapo, the number one sibling. It is also said to be the kinolau, the body form, of Kane, the procreator. The small round depression where the taro stalk meets the leaf surface is called the piko, from whence comes the name for the human belly button.

If we want to learn more about kalo and how to grow it, it is a good idea to talk to the farmers who already grow it.



KAMANI

A member of the mangosteen family with the scientific name of *Calophyllum inophyllum*, kamani was brought north to Hawai'i from the South Pacific islands in early migrations of Polynesian settlers. Also called Alexandrian laurel, true kamani was probably introduced by seed, which is how it is propagated. This native of the Pacific and of tropical Africa, grows slowly along sandy shores and in lowland forests. It was cultivated in villages, near houses and in groves away from villages.

Kamani is a large, attractive spreading tree up to 60 feet high. A reddish-brown hardwood is derived from the trunk. From this was carved many objects including canoes; homes; 'umeke la'au, wooden containers or calabash, specifically 'umeke kamani, food bowls and trays called pa kamani. As with milo and kou wood, there is no bad-tasting taste or odor in kamani wood, so it is perfect for vessels that will be contacting or containing food.

A lamp oil for light was produced from the kernel and was used at times instead of kukui nut oil. Sometimes this oil is useful for lomi lomi, massage, especially when enhanced with coconut oil or flower fragrances. The oil may have been useful in waterproofing tapa cloth. Kamani (or tamani) oil from other Polynesian nations is now being imported to Hawai'i for use as an oil to heal the skin. It contains caprylic acid and calophyllolide acid which are rich fatty acids with healing compounds.

The seed, leaves, gum and bark are said to have medicinal properties. In the old days an extract from the fruit was used to make a brown dye to color tapa cloth.



KO

Ko, sugar cane, began its life here in Hawai'i, brought by Polynesian settlers in their canoes. This plant travels well, plants easily, and is a pleasant addition to life.

Ko (*Saccharum officinarum*) is a perennial grass that grows best at low elevations, but can be cultivated up to nearly the 3000 foot level. Ko probably originated in Southeast Asia.

In earlier times, the people of Hawai'i grew nearly 40 varieties of ko. Some of them were grown in clumps near their homes. These giant grasses were also planted on the embankments of the lo'i, taro ponds.

A few varieties were used for medicines. Ko sweetens many medicinal concoctions, and the juice of pan-toasted sugar cane can be used as a tonic for babies.

One of the few varieties used medicinally is ko kea, white cane, a native cane with yellowish-green stem and a thin skin that can be easily removed or crushed. This juice is popular as an ingredient in herbal combinations. It helps to make bad-tasting medicine taste better. Honua'ula, red cane, and the dark-colored ko lahi are also considered to have particular healing properties.

Young ko shoots were used for lacerations and cuts. Along with other plants and salt, the shoots were wrapped in ti leaves and baked over charcoal. The juice was then squeezed and placed on a cut.

The juices of ko are used to sweeten haupia and kulolo desserts, made of coconut and taro, respectively. The leaves of ko were used for inside house thatching, or for outside if pili grass wasn't available. The flower stalks of sugar cane were used to fashion a dart, sometimes used during the Makahiki games for the Hawai'i New Year.

This plant makes an effective windbreak, and is also planted as a hedge or border.

For a treat, have a chew on a joint of ko, the garden variety which has a thin rind and is easy to chew because of its soft pulp. Ko is a kinolau of Kane.



KĪ

Kī, the Ti plant, is a member of the lily family and scientifically named *Cordyline terminalis*. It grows abundantly, cultivated and wild, throughout the tropical Pacific and Southeast Asia. It is common from sea level in the lower wetlands, up to the 4,000 foot elevation. Ti is found in shady moist gardens, as a landscaping background plant or

as a hedge. The people of Hawai'i plant it around their homes and churches for good luck. In the old days Ki was planted around the lo'i, taro ponds.

Introduced to Hawai'i by the earliest Polynesian settlers, Kī is considered sacred to the Hawai'i god Lono and to the goddess of the hula, Laka. It is also an emblem of high rank and divine power. The Hawai'i feather kahili is said to have been inspired by this plant. The leaves are also worn or carried as protection to ward off so-called evil spirits and to call in good. The kahuna priests wore ti leaves either as lei or as garments when they conducted ancient ceremonial rituals.

The ti's versatile leaves have many uses, including: as wrappings for offerings; for roof thatching; as fly whisks or fans; wrappings for cool food storage, preservation and protection; for wrapping of food to be cooked, especially for laulau; as plates or cups; as fishing lures on hukilau nets; as wearing apparel, such as rain capes, sandals and as hula skirts called pa'u.

This versatile plant has many medicinal uses, either alone or as a wrapping for other herbs needing to be steamed or boiled. For fever, the entire body of an unclothed prone person was covered from the neck down with large green ti leaves. After the patient sweat and fever was broken, the leaves were removed. Hot stones are wrapped in ki leaves and used to soothe sore back muscles.

A drink from boiled green ti leaves is used to aid nerve and muscle relaxation. Steam from boiled young shoots and leaves makes an effective decongestant.

The root is thick, white and sweet, growing very large in older plants. The baked roots are also an emergency famine food and have been eaten as a confection.

Children of old Hawai'i (and modern times, too) enjoyed sliding down steep grassy slopes on ti leaf sleds, holding onto the stem towards the front. Whistles can also be made from the plant's leaf.

The kī plant is common, we see and recognize it everywhere throughout this Hawai'i Nei. It is common, yet it is very special. It speaks to us of strength and survival, and the abundance of blessings we receive daily here in Hawai'i.



KOU

Because of the beauty of its grain and the ease with which it can be cut and carved, true kou is one of the best timber trees in Hawai'i. *Cordia subcordata* is the botanical name of this plant. Kou is widespread throughout Polynesia and the entire Pacific region, tropical Asia and East Africa, and was probably

introduced by seed to Hawai'i in the canoes of the earliest settlers as a useful plant they wished to cultivate.

A member of the Heliotrope family (Boraginaceae), kou is a small to medium-sized erect evergreen tree that grows to a 30-40 foot height at maturity. This plant grows easily and quickly from seed, preferring sunny warm coastal lowlands in the islands' leeward areas. It was cultivated near settlements, and is only occasionally found in the wild forests. Because of its thick wide crown of leaves, kou was a favorite shade tree near home sites. Beneath its cool shelter, the women beat the kapa cloth or would string lei, as they shared the day together.

Within the trunk can be found a heartwood with beautiful colored markings that are reddish dark brown, sometimes with a hint of purple. The sapwood is straw color, with a tint of pink. The wood is long-lasting, and has little shrinkage. Therefore, large and stable vessels can be made. These were usually carved by the same men who made the wa'a, canoes. These men knew how to season and how to gracefully shape the woods they used for the best and most practical purposes, and how to finish them so that a fine patina was achieved and their beauty would endure. Because of the good workability of kou, it is fashioned into `umeke la`au, containers of wood, crafted with great skill, as well as being aesthetically pleasing. `Umeke kou, food bowls, and specifically poi bowls called `umeke `ai, platters called pa kou, cups and serving dishes of kou were all preferred, because there is no unpleasant taste in the sap that would flavor food. Also made from kou wood were canoes and paddles.

In the old days kou leaves were used to make a brown dye that was applied in designs on kapa.

The showy orange flowers of kou are still used as a lei flower today.

Kou occurs in ancient legends of Polynesia, one of which suggests that kou was one of the first trees created.



KUKUI

The tree is a symbol of enlightenment, protection and peace. Kukui was considered to be the body form of Kamapua'a, the pig god. On the altar of Lono was placed a wooden carving shaped like a pig's head.

The seeds of this plant were brought to Hawai'i by the first Polynesian voyagers. This member of the Spurge family commonly grows wild in the lower mountain forest areas. Its scientific name is *Aleurites moluccana*.

The kukui nut has many uses. Originally it was most valued for its light, the oil of the white kernels being extracted for its use in stone lamps and in ti leaf sheath torches.

The shelled nuts were skewered on a coconut frond mid-rib and lit one by one, from the top to bottom, as they sat in a container of sand or dirt, or in the earth itself. Often children were given the responsibility for keeping the "candles" lit. The tree is sometimes called the Candlenut Tree.

The nuts are widely used as a traditional lei, both the hard shells of the polished black, tan or brown, and immature white, which are more rare. The bark, flowers and nuts are all used for medicine. As food, a small amount of the pounded roasted nuts, plus salt and sometimes chili peppers, is used as a relish and is called 'inamona.

The small, five-petaled white flowers were chewed by the parents of a young child and given to the child to aid in healing of e'a (thrush) sores inside the mouth and upon the tongue. Also used for this problem was the juicy sap that fills up the depression left when the stem is pulled off the green fruit. This is applied with the finger and rubbed inside of the child's mouth and on the tongue. The green fruit is the part of the plant that contains the nut. This sap is also a healing application for chapped lips, cold sores and mild sunburn.

One mashed nut (sometimes the raw kernel, sometimes the roasted) or the sap of the green nut was often used in combination with other traditional Hawai'i medicinal plants, particularly when a purgative for constipation was needed.

For bad cases of ulcers and other skin sores, the baked meat of ripe kukui nuts was pounded and mixed with other plants, such as ripe noni fruit.

The inner bark provided a red-brown dye for tapa cloth and `olona cordage, while the gum from the bark strengthened the tapa. The soot (pau) of burned nuts provided a black dye for tattooing and for painting canoes and on tapa cloth. The soft light-colored wood of the tree trunk was fashioned into canoes. The oil provided a varnish similar to linseed oil.

Roasted kernels, pulverized by fishermen, were strewn upon the ocean surface. The film increased underwater visibility by creating a lens on the water's surface. Fishing nets were preserved by a coating of kukui oil.

The kukui tree is a classic example of the wisdom of ancient voyaging Polynesians.



MAI'A

The banana is an essential to Pacific island life. It is a staple food brought to Hawai'i by the earliest canoes of Polynesian settlers. Although it is said to have originated in India, it is at the heart of myth and stories world-wide.

Hawai'i legend tells that a brother of Pele brought the banana to Hawai'i from Tahiti. Mai'a is kinolau, the body form of Kanaloa, the Hawaiian god of healing.

There are more than 50 varieties of *Musa paradisiaca*. Descendants of the early plants are now growing wild in protected valleys, stream gullies and mountain slopes. This common edible fruit native to the tropics ripens all year. Diseases and pests are rare.

Bananas are not really a tree, but are a gigantic herb, being a member of the grass family, like wheat, rye and barley.

To harvest the fruit the entire trunk is cut down. This can occur when the first banana skin turns yellow, or earlier if the bananas are to be used for cooking, rather than eating while ripe. Fruit varies in size, shape, color, quality and quantity. The pulp may be white, yellow or shades of pink. Some are known as plantain. The raw mature fruit is a sugar and an easily digested source of carbohydrate. The cooked fruit becomes starch. Green unripe bananas can be boiled or baked in their skins, and are usually eaten as a starch, replacing potatoes, bread or taro.

Except for two varieties, the yellow fleshed mai'a iho lene and mai'a popo'ula, bananas were kapu, forbidden for women of Hawai'i to eat under penalty of death until the early 1800's.

New plants develop quickly from underground stems, usually forming clumps of plants. Traditionally, mai'a was planted in clumps around the taro lo'i, pond fields, as well as near dwelling sites.

In addition to food, every part of this plant is useful. Leaves: for house roofs, umbrellas and rain hats, as a truce flag, bowl covers, table cloths and temporary mats, clothing and temporary sandals, dyes and as covering for the earth oven, imu, to hold in the heat. Leaf buds: as a vegetable. Leaf sheaths: for water runways, and as containers for lei and plants being transported. Leaf sheath fiber: thatching, stringing lei, tying, plaiting into clothing, cloth and thread. Trunks: to aid canoes as rollers enroute from the shore to the sea; the stalks of a mature felled tree are placed in the imu to add moisture and to create steam in the cooking process; and a dried trunk could be used as support for a person's fractured limb.

Medicinally, the ripe fruit of mai'a is used for asthma. Boiled ripe banana fruit can be mashed and taken for constipation, especially when mixed with other recommended plants. For strengthening babies, vitamin-rich nectar sap is pinched from the flower bud. Bud juice is used for stomach problems in people of all ages. In the old days, this juice was also used to dye tapa cloth. Perhaps the most popular use of mai'a medicinally is as a poultice for wounds. This can be made of the pounded peels of ripe bananas. There are antibiotic properties in the inside of the peel that are said to be effective against bacteria. Wrap the peel, inside out, around a cut or wound in an emergency.

Bananas teach us patience as they grow and ripen slowly.



MILO

Although rare today, in old Hawai'i milo was a commonly found tree, cultivated as a shade plant around homes near sunny coastal areas with loose soil. It does not grow in the high inland forests.

Brought to these islands by early Polynesian settlers who carried the seeds, it is a widespread species throughout Polynesia and Micronesia, as well as in tropical Africa.

Milo's scientific name is *Thespesia populnea*, and it is also known as a portia tree. A member of the Hibiscus family, the malvaceae, it is a close relative of hau, 'ilima, and ma'o, Hawai'i cotton.

The tree also yields tannin, dye, oil, medicine and gum, from various parts of the plant. The milo wood was skillfully crafted into poi bowls called 'umeke 'ai, and into plates, too.

'Umeke 'ai is an honored implement in a Hawai'i home and is typically filled with kalo (taro) which is considered the means of survival of the people of Hawai'i Nei.

'Umeke la'au is the Hawaiian name for these containers or calabashes of wood, which were used for the storage, transport and serving of food in various stages of preparation. Milo wood is flavorless, since it is lacking in any unpleasant-tasting sap that could contaminate stored food.

The milo tree is a small to medium-sized one, growing to less than 40 feet high.

Milo wood has an attractive grain that takes to a high polish and, in addition to food utensils and containers, was fashioned into paddles and other carved objects, as well as for an occasional canoe, although koa was considered to be the most popular material for canoes.



NIU

Often considered as the tree of life, Niu is probably the most easily recognized and best known palm tree in the world. This tree is strong, resilient and can provide us with our most basic need for life - water! I am told that the most sterile water on earth is from this nut. There are stories of island and coastal people surviving months of drought with this the only drinking water available. Coconut water and fish can provide sustenance.

Cocos nucifer, niu's scientific and botanical name, is slender and tall, up to 100 feet. The trunk is very strong and elastic, and is able to bend in heavy winds. In times of hurricanes the coconut palm has been a life saver.

Hawai'i is on the edge of the coconut belt. The coconut bears better nearer the equator, where it is more widely used than here. In Hawai'i there are other plants, native and introduced, that provide as well for people's needs. Niu was valued cargo on the sailing canoes of the original Polynesian voyagers to Hawai'i Nei. Our coastlines have the remnants of many ancient groves. Niu is the kinolau of Ku.

This palm is the most useful plant of the tropics. It is said that more uses are made of it than any other tree in the world. Besides drink, food and shade, niu offers the possibilities of housing, thatching, hats, baskets, mats, cordage, clothing, brooms, fans, ornaments, musical instruments, containers, implements and oil for fuel, light, and ointments.

Traditionally, a coconut palm is planted at the birth time of a kama'aina. The tree bears fruit around the seventh birthday, for up to 70-100 years, providing food for a human lifetime. There may be up to 50 fruit a year. A he'e, octopus, was often planted in the bottom of the hole, furnishing fertilizer and giving the plant the idea of roots that spread and grip, and a body that is fat and round.

Nectar-producing fountaining flowers, in a spathe, bloom at any time of year. The budding flower sprays are tapped for their sap, which can yield sweet syrup, vinegar or wine. Left untrimmed, the tree continually produces a prodigious number of nuts, with mature fruit constantly available. It takes 15 months from flower to mature fruit, but the nut (drupe) is usable at about 5 months.

The perfect drinking nut is full-sized, yet immature.

Coconut water, like the taro, is an alkali producer in the digestive system and therefore helps in the important balancing of pH in the human body.

As food, the niu flesh or meat is used for different purposes, depending upon the maturity of the nut. The jelly-like spoon meat of a green nut is called 'o'io. The next stage is haohao, when the shell is still white and the flesh soft and white. Half ripe, at the ho'ilikole state, it is eaten raw with Hawai'i red salt and poi. At the o'o stage, the nut is mature, but the husk is not dried. The flesh of a mature nut at the malo'o stage is used to make coconut cream, which when mixed with kalo/taro makes a dish called kulolo; with 'uala/sweet potato it is called poipalau; and paipaiee with ripe 'ulu/breadfruit. These delicious dessert-like foods were traditionally cooked in the imu, underground oven. Haupia is made with niu cream mixed with pia/Polynesian arrowroot, traditionally wrapped in ti leaves and baked in the imu. The mature meat of coconut is also grated, squeezed or scraped to be cooked in main dishes with fish, chicken or greens.

Medicinally, a small piece of coconut meat was chewed following the ingestion of disagreeable tasting medicines. Fishermen also chewed the meat and spit the oil onto

the water, to produce a glossy calm place, smooth enough to spot the fish below the surface.



NONI

Of all the two-dozen canoe plants that Hawaiians brought on their migrations, noni was the only one that was primarily or exclusively used for medicinal purposes. It is used both as a regular tonic for health maintenance, and it's said that this plant food is to be used when we are feeling really ill or really old.

The noni, also known as Indian Mulberry, with the scientific name of *Morinda citrifolia*, is a small evergreen shrub or tree, usually less than 10 feet high, occasionally rising to 20 feet.

Hawai'i's healers pick the fruit before ripening, letting it ripen within the home. When soft, place it in a blender with a little fresh water and make into a sauce. Then mash and strain through a sieve. This concoction can be refrigerated in a clean glass jar, and the person who wishes the medicine can take a clean straw and slurp two sucks from the jar, in the morning and in the evening.

As a medicine, the fruit and its juices have been used in the treatment of diabetes, heart troubles and high blood pressure, with different portions prescribed for different illnesses.

The young unripe noni fruit can be pounded thoroughly with salt and the mixture placed carefully on deep cuts and on broken bones. The ripe fruit can be used as a poultice for facial blemishes, rubbed until the oil disappears, and also to draw out the pus and core from an infected sore or boil, such as with a staph infection. In the old days, this was tied on with a bandage of tapa bark cloth.

The fruit can be used in recipes as a reputed remedy against tuberculosis, arthritis, cancer, rheumatism and the changes of old age. The leaves and bark of the stem can be pounded and strained, resulting in a liquid drunk as a tonic or for urinary disorders, muscle and joint pain. The leaf can also be heated over a fire or with an iron to bring out the oils, and then wrapped as a type of poultice for areas of skin that are inflamed, bruised, burned or otherwise in need of healing.

Other uses for this ancient Polynesian plant: the bark yields a red dye, while a yellow dye can be prepared from the root. Both colors were used to dye the tapa cloth of the chiefs of ancient Hawai'i. Noni is a kinolau of the god Ku.



‘OHE

‘Ohe is one of the "canoe plants" brought to Hawai‘i Nei by early Polynesian settlers in their oceanic navigation. This plant may have originated in India or Java.

There are two types of ‘Ohe or "Hawaiian Bamboo". One is *Schizostachyum glaucifolium* and the other is a green *Bambusa vulgaris*. Both are clumping bamboos.

(1) *Bambusa vulgaris*, the most familiar, was the larger of the two and is a timber bamboo that grows to 50 ft. and larger. Early Polynesian settlers likely were well aware of this and as they had been used for water containers they were probably also aware of being able to start culm sections growing - especially if they were filling them with water and keeping them in shade.

(2) *Schizostachyum glaucifolium* - (3 in. x 40 ft.) another clumper, although smaller, is reported to set viable seed every 30 years or so. *S. glaucifolium* is a very unusual bamboo having extremely thin walls, and long internodes.

Most bamboo flower, but only once in 60-120 years, with large heads much like those of sugar cane. After blooming, all of the bamboo plants of the same species die back. This happens worldwide at the same time!

Bamboo wood has silica in its cell walls and is hard, straight, strong, flexible, light and easily split.

Upon Maui's Haleakala slopes above Keanae in an area called Waikamoi, it is said that the Polynesian goddess Hina planted a grove of ‘ohe brought from Tahiti.

Bamboo's usefulness takes many forms. People of ancient Hawai‘i used ‘ohe to kindle fires, blowing air through hollow tubes onto the embers. This tool was called ‘ohe puhiahi.

To irrigate their crops, kanaka would cut the ‘ohe in half lengthwise, then cut out the middle of the node walls, allowing water to flow down these irrigation troughs from the stream into the different levels of the taro pond fields.

A traditional knife for cutting the umbilical cord of a newborn was fashioned of bamboo, as were skewers to string kukui nuts for candles, lama or kali kukui.

In the tapa cloth-making process, women used lapa, bamboo sticks, to apply dye. Also, ‘ohe sticks were cut out to create designs that were then stamped with dye into intricate geometric patterns on the kapa. The stamps of bamboo were called ‘ohe kapala.

The ‘ohe stem is a valuable plant for hula accompaniment. A three-holed nose flute, ‘ohe hano ihu, is made from the hollow stem of the thin-walled bamboo, as well as

percussion instruments, including the pu'ili, fringed split bamboo tubes about two feet long that rattle when hit. Other sounds can emanate from the 'ohe ka 'eke'eke, tubes of the thick-walled bamboo, with closed nodes on the bottom end. These are alternately struck on the ground to make tones. Another instrument using bamboo is the 'ohe kani, somewhat like a Jew's harp.

Lengths of 'ohe with closed ends can be used as a water carrier. Surely, these vessels of water would have been invaluable on ocean voyages. Along with the gourd, ipu, the need for water vessels was well met. Other uses for the bamboo stems are for building, vessels, flutes, masts, utensils, agricultural tools, ladders, toys and fishing poles. If the bamboo is dried correctly, the esthetic smooth beauty of bamboo stalks can be maintained for years. Otherwise, rot and mildew can occur.

Split bamboo were made into parts of the sleds of old Hawai'i, called holua.

As food, the young shoots are eaten, as are seeds of some varieties.

'Ohe is said to be the kinolau, body form, of the Polynesian creator god Kane, along with kalo/taro and ko/sugar cane.



ŌHI'A 'AI

A member of the myrtle family, Ōhi'a 'Ai, *Eugenia malaccensis* grows in groves or alone in protected shady valleys where there is plentiful rainfall. The tree may be as tall as 50 feet or only a small shrub. It is said to have originated in India and Malaysia and that the seeds were brought to Hawai'i by early Polynesian settlers.

'Ōhi'a 'ai is a relative of the yellow rose apple and the crimson flowered 'Ōhi'a lehua. The blossoms all secrete sweet nectars that attract birds and insects. 'Ōhi'a 'ai is also related to guava, eucalyptus, Java plum, Surinam cherry and allspice. This plant is considered the kinolau of Ku. The 'ōhi'a 'ai was perhaps one of the few fruits of the people of Hawai'i before others were introduced by Europeans and other later settlers.

The trunk of the mountain apple tree was used by the people of old to build beams for their hale, house. The leaves are used for medicine. It is said that young leaves from saplings and the bark from mature trees are made into a warm drink for the mother of a newborn baby. This is to assist in expelling the afterbirth and to cleanse the mother's body after giving birth or even after a miscarriage. Remedies using pounded bark have been placed in the mouth for lesions and also for lacerations. The leaves can be processed for a tonic, and the old fruit of this plant was considered a helpful remedy for sore throats.

A reddish brown dye for making patterns on tapa bark cloth was processed from the bark and the root of 'ōhi'a 'ai.

Usually, the fruit is eaten raw, but sometimes it is dried and eaten later.

O Hinaia'ele'ele ka malama, 'aluka ka pala a ka 'ōhi'a. Hinaia'ele'ele is the month when the mountain apples ripen everywhere.



‘ŌLENA

This humble little root, about the size of an adult thumb, was one of the two dozen or so plants brought to Hawai'i by early Polynesian settlers on voyaging canoes. 'Ōlena's scientific botanical name is *Curcuma domestica*. It's best known throughout the world as Turmeric, and is a member of the ginger family.

'Ōlena naturally goes dormant as part of its seasonal cycle even in tropical places like Hawai'i. In March, many turmeric plants are still in their dormant phase because of how the plant responds to rainfall, daylight, and its own energy storage cycle.

'Ōlena is rarely found in Hawai'i today.

It is 'ōlena's rhizome which is precious. The root is thick and orange or yellow-colored on the inside. It is this bright color that is characteristic of turmeric, the cooking spice. In the language of Hawai'i, 'ōlena means yellow. Dyes from these roots were used to color tapa cloth. Young roots were steamed to provide a light yellow dye and the steamed older mature roots provided a golden or a deep orange dye.

Traditionally, this root can be used medicinally. The roots are pounded and pressed to extract a juice that, when mixed with water, is helpful in earaches and to clear the sinuses through nasal application. The astringent qualities of 'ōlena are also useful in cases of consumption, tuberculosis, bronchitis, colds and asthma, the root being lightly cooked and then eaten. Its use enhances the immune system by purifying the blood. At times 'ōlena has been taken as a diuretic, and topically it can be helpful with pimples or to stop bleeding. Turmeric is anti-bacterial. Also, when taken daily, as a teaspoon or powder in food, tea or encapsulated, this plant offers relief from a variety of diseases. It alleviates inflammation in the blood, often considered to be a cause of our human diseases.

Ceremonially, the traditional use for 'ōlena is as a purifier, containing much mana, spiritual power. Pieces of the crushed root mixed with sea water are sprinkled to remove negative influences from places, persons and things. Typically, when someone is ill, or when a home or other place is to be newly occupied and needing blessing, a ceremony is held. To sprinkle, a ti leaf is dipped into a calabash or bowl containing the 'ōlena and sea water. The sprinkling is accompanied by prayers.



OLONĀ

In a society without nails or man-made fibers, olonā fibers were a true blessing to the life of the people.

One of the plants thought by some to have been brought to Hawai'i long ago by voyaging Polynesian settlers, olonā is found only in these Hawai'i islands, especially in windward Maui and in east Moloka'i. There are other researchers who believe olonā to be an endemic plant rather than an introduced one.

The scientific name of this fiber plant is *Touchardia latifolia*. Although it is not common today, this stout-stemmed rainforest shrub of the nettle family can still be found in the gullies of lower elevation forests, near the 2,000 foot level, or in very wet boggy interior valleys near streams.

With 4 to 8 foot tall stems in the wild, the bark of olonā slips off easily, revealing the inner bark or bast, which is made up of fine quality fibers that are durable and said to be many times stronger than hemp fiber. When young, the outer bark is green, turning brown as the plant ages.

The large dark green serrated ovate leaves are 9 to 16 inches long with broad bases, 5 to 9 inches wide. The leaves have netted veins that are more prominent on the underside, due to their reddish-brown color.

Olonā has multiple flowers that turn to clustered flesh-orange colored fruit at the ends of the branches. These resemble the "mulberry" of Māmaki, a close relative.

Propagation is from rooted stem cuttings, root shoots and occasionally from seeds, all of which were thickly planted in previously cleared areas. Although seldom cultivated these days, in ancient Hawai'i olonā was widely cultivated in very wet interior valleys upland.

Some olonā plantation patches were as large as two to three acres. The cuttings were planted close together to encourage straight unbranched stems. The few branches that did grow were removed regularly. In a year's time the plants were mature enough to harvest. They were 6 to 10 feet tall, and the bark could be easily stripped at this young age.

Temporary crude shelters for hanging the drying strips of olonā were built near the olonā patch. The leaves were removed, and the stems cut at soil level, so shoots would regrow. The stems (with a few leaf nodes) which were taken were ripped into strips, usually 6 feet long and 1 to 2 inches wide. The outer bark was carefully stripped off with 'opihi/limpet shells, usually over hardwood boards or large flat stones. The strips were then rolled inside out, and soaked for a few short days in a shallow place in a nearby stream. The next step was to scrape off the remaining pulp with seashell or turtle shell scrapers. The strips were then hung to dry in the shed. At the same time workers were

separating the clean strong fibers into various widths, and bundling them into rolls for the return to the village. There they were bleached in the sunlight and later twisted by the village women into fine cordage of varying thicknesses.

The white cordage was highly valued for its light weight and its exceeding great strength under duress.

After Captain Cook's arrival, later traders prized and purchased olonā cordage for ships' rigging and for whalers' harpoon lines. Word reached Europe of the superior qualities of Hawai'i's olonā cordage, such as it does not kink nor stretch, and Swiss climbers began to import it for their use in the mountains of the Alps.

The pliable whitish cordage and twine from olonā remains soft and resists breaking down from exposure to sea water, so here in Hawai'i Nei it was the main fiber used for aho, fishing line, where the no-kink and no-stretch factors were also useful. Fishnets with large mesh, 'upena, as well as finer fishnets, and net bags for carrying containers, kōkō, were also crafted from olonā fiber. To prolong its life, it was often treated with kukui oil.

Carefully crafted olonā fibers made up the net base that provided backing for the exceptionally fine feather cloaks, ahu'ula, as well as for some of the feather helmets, mahiole, and for ti leaf capes, ahu la'i. Olonā cordage was superior for tying adz heads to hau wood handles.

Other uses for olonā in ancient Hawai'i were as threads for stitching together tapa bark cloth, into garments, for stringing and wrapping all manner of lei, to tie off the umbilical cord after a birth, for canoe lines and for every possible purpose that we today might use rope, twine, string or thread.



PIA

Originating most likely in Southeast Asia, the Polynesian arrowroot plant migrated to Hawai'i Nei in the canoes of early Polynesian settlers. Pia grows throughout tropical Asia and Polynesia, as well as in Australia and Africa.

Pia is best known for its fine nutritious starch, which is extracted from the round tuber, the underground root. *Tacca leontopetaloides* is Pia's scientific name. Pia is sometimes called tapioca root, but is not to be confused with *Manihot esculenta*, which is Manioc Cassava.

The tuber/hua of pia is white and nearly round. The highly starchy carbohydrate was traditionally grated or pounded and put into a calabash with water, where the starch settled to the bottom.

Each day, the water was poured off and fresh water was added. This was done to release the bitterness of the root. When the bitterness was gone, the starch was spread on flat rocks to dry in the sun.

Later, the sheet of starch was scraped off and ground into a powder using a stone mortar and pestle. Starch that was not immediately needed was stored, often in the shape of small cakes.

Traditionally, prepared pia is mixed with coconut milk or cream and steamed, boiled or baked into the dessert pudding called haupia.

Medicinally, the raw dry starch was added to water and taken several times a day to cure diarrhea. For severe cases, such as dysentery, the pia was mixed with alae, red clay, to provide iron for rehabilitation, being careful to know the right quantities to ingest so as not to cause constipation. This combination was also used to stop internal hemorrhaging in the stomach and colon.

Pia's leaves die in winter, while the underground tubers remain dormant until springtime. In the spring, the slender, finely grooved leafstalks are sent up 1 to 3 feet high, with broad leaves.



‘UALA

‘Uala is a member of the morning glory family and is thought to be of tropical South American origin, and was brought to Hawai‘i by early Polynesian settlers as an important staple in their diet. There are many varieties of *Ipomoea batatas*, most maturing in 3-7 months from time of planting.

‘Uala is planted in mounds, ridges or flat ground, from sea level to 5,000 feet elevation. These plants will grow in areas of poor soil with limited rainfall, but thrive in loamy soil, producing larger tubers where the soil is loose and more porous. They are a drought-resistant vegetable, enjoying plenty of sunshine. One hundred well-tended plants produce about 150 pounds of tubers.

Propagation is from stem cuttings or slips, not from the tubers. It is a good idea to plant ‘uala near the periphery of a garden, as the plants tend to take over the area in which they grow, and to wander on and on.

The leaves may be steamed, boiled or baked. The tuber is a carbohydrate. A good source of Vitamin A, calcium and phosphorus, most of the nutrients are near the skin. Therefore, it is nutritionally best to steam or bake the potatoes in their scrubbed skins in an oven or in an imu, rather than to boil them. If mixed with water, the cooked, skinned and mashed ‘uala makes a sweet potato poi. The tubers and greens are also used as food for livestock, especially pigs.

In addition to providing food, some varieties in ancient days were used medicinally. 'Uala was used as a tonic during pregnancy and to induce lactation. Other varieties were said to cure asthma. 'Uala was also used as a laxative, and could be prepared as a gargle for sore throat and to reduce phlegm. Raw 'uala mixed with ti stem was used when it was necessary to induce vomiting. One variety was used as fish bait, while old vines and leaves of 'uala were placed beneath floor mats as padding.

Kamapua'a is said to be the god of the sweet potato. This god has a pig-like snout, making it possible for him to root up the tubers.



UHI

The common name for the edible Hawai'i yam is uhi. Uhi is also the specific name of *Dioscorea alata*, one of at least three yams brought to Hawai'i by migrating Polynesian peoples in their canoes.

The people of ancient Hawai'i usually ate the delicious starchy carbohydrate uhi after cooking it in an imu, underground oven, eating it while still warm, as it is said to be fit only for pigs when cold. It does not make good poi, because it is not sticky and is too mealy. Uhi never did become as popular here as a staple food, as it did in other Pacific societies. New vine shoots appear at the beginning of the spring rainy season, which is the best time to dig up the yams to eat. It takes a full year's cycle to grow a crop. For food to be produced, the plants need a warm moist growing place with loose soil, and can be planted anytime of the year by propagation from pieces of the tuber, which will bear sprout .

Two of the varieties are ke'oke'o, which is white inside and outside, and 'ula'ula, with red skin and white flesh. The 'ula'ula was also used as medicine and is said to have healing properties useful for coughs, constipation, dysentery, appendicitis and for counteracting vomiting blood.

In the post-Cook contact days, the yams of these islands were widely cultivated in fields, and were procured by the tons for shipboard use, where they were preferred to sweet potatoes which germinated more rapidly.



'ULU

This distinctively attractive food-bearing tree produces abundantly from late summer into winter. The 'ulu (fruit) grows on a smooth gray-barked tree that may attain heights of 40 to 60 feet and is found at elevations lower than 1000 feet. Coming upon a grove of these large trees usually signifies an area of ancient settlement and

cultivation in this mother nation Hawai'i. 'Ulu was one of the plants considered important enough to the life of the culture for earliest Polynesian settlers to have brought it in their canoes, traveling to Hawai'i Nei from Oceania. It is widespread throughout Asia and the South Pacific.

'Ulu belongs to the Moraceae (fig or mulberry) family. Its scientific name is *Artocarpus altilis*, *Artocarpus incisus* or *Artocarpus communis*. Its ripe fruit is yellowish or brownish. The fruit is actually thousands of little fruit growing together around a core to form a ball with polygonal markings at each fruit boundary. Its flesh is a mealy sweet pulp, similar to the potato. 'Ulu fruit is usually picked while still firm and will soften in a few days. If not picked before it softens on the tree, it often falls and smashes. Pick 'ulu with the aid of a "picker" as the branches are brittle and can break easily.

Breadfruit, the name for which 'ulu is well-known, is a high carbohydrate vegetable, not a fruit as we generally use the term.

It may be steamed, baked, boiled, marinated or stir-fried. It is also mashed into an 'ulu poi.

When cutting a green breadfruit to prepare it for cooking, a milk-like, extremely sticky sap is released. It can stain clothing. It is a good idea to keep your hands, the knife and the breadfruit wet with running tap water, or at least to oil your utensil with vegetable oil. One of the most basic cooking methods is to remove the stem and core, cut the breadfruit into large sections and to simmer it in lightly salted water in a big pot from 30 minutes to an hour to the consistency of a cooked potato. Drain and cool it, remove the skin, and prepare to use it as you would a white or sweet potato. Delicious alone with seasonings or combined with other vegetables into another dish or a salad.

The breadfruit tree has many uses other than for food. All parts of the plant give off the milky sticky sap. When the sap is used alone or when mixed with other plants, it can be applied to the skin to heal cuts, scratches and various skin diseases. It is also used as a moisturizer for wind-cracked or scaly skin. Mouth sores can be treated with the sap and the leaf buds. The sap can also be used as a chewing gum, and more importantly was used in ancient days as a glue and caulking material, for such as canoe building. In the old times, a bird-lime made from the sap was used to catch nectar-feeding birds for their brightly-colored feathers. These were collected for their service as warm and colorful capes for the chiefly ones.

The wood of the tree's trunk is light in weight. Hawai'i's craftsmen used it for making canoes, woodwork for homes, drums, surfboards and for papa kui'ai or poi boards. A low grade tapa cloth was made from the inner bark of young branches. The rough sheath, maloulu, was used as a dry abrasive in the final polishing of bowls and utensils. It was also used to sand kukui/candlenut before they were strung into lei.

Traditionally, 'ulu is planted to provide a life-time of food at the birth of a keiki 'o ka 'aina, a child of the land, kaulana na pua 'o Hawai'i Nei, the glorious children of this Hawai'i.



WAUKE

The paper mulberry tree, Wauke, is also known as *Broussonetia papyrifera*, and is a member of the fig (Moraceae) family. It is the principle plant used in the making of kapa, or tapa cloth. Kapa means the beaten thing. One of the principle plants introduced by early voyaging Polynesians who settled here in Hawai'i, wauke is thought to have been carried in the canoes as root shoots, but can also be grown from cuttings and occasionally by seed.

The ancient practice of making bark cloth and bark paper likely began in Asia, where other species of *Broussonetia* are known; yet, in Polynesia, *Broussonetia papyrifera* reigns supreme. The quality of its cloth is prized and valuable, warm, water resistant, long lasting, washable, soft, mothproof, flexible and white. In Polynesia, the loom and weaving of fibers did not occur, possibly because there were no mammals of size to provide hair. Cotton, flax, hemp and silk were not produced.

Usually a small tree or shrub, wauke can grow as tall as 50 feet, but in cultivation, the plants were kept small. Nurtured and carefully tended by both men and women, wauke was grown around the lo'i, taro pond fields, and near home sites in thick stands of 8-9 foot tall trees. Keiki grow from roots of established plants, so the wauke grove extends outwards naturally.

As the wauke tree grew, planters cut off the side branches, so a straight trunk stalk without branch holes could later be stripped. In 6-10 months the trunk shoots were cut down and the roots and tops removed. The trunks were stripped of bark, as thick as a finger and about 4 feet long. The outer bark was slit and peeled off. The inner bark fibers, called bast, were then soaked in running water, such as a high tide pool, with stones placed on top of the fiber pile. This part of the process breaks down the woody fibers and washes away the starch. A complicated process of soakings and fermentation followed, leaving the fine fibers of the moist inner bark still tough and resilient when finally removed from the waters. At this time in the process, the women of Hawai'i would often twist cordage out of the fibers, for use as fish nets, 'upena, and as carrying nets, kokō, from which to hang calabashes of wood and gourds.

The women then spread the strips of inner bark to be used for cloth into several layers, all of the same thickness. After the water was drained away, the fibers began to stick together and the entire bundle could be lifted as one mass. This was called mo'omo'o. It was beaten on smooth rocks and sun dried. Mo'omo'o was then often stored until enough material had accumulated to make a large piece of kapa cloth. When enough mo'omo'o bundles were accumulated, these were soaked for half a day, then pounded gently to loosen the fibers. They were then laid between layers of mai'a, banana leaves, for a week to mature and ferment, making the fibers softer, almost like the leavening process in bread making. These cakes of wauke were then kneaded until elastic. When

ready, the women laid the bundle on a long piece of wood with a flat even surface, an anvil called kua kuku. Then the women beat the pulp with a simple heavy mallet, a wooden beater called hohoa, until a solid strip formed. The beating established a rhythm with resonating sounds, which often sent secret codes rapidly from village to village. After this, the strips were soaked again. The cloth expanded greatly with each beating. It was often doubled over and beaten again. The first beating was called ho'omo'omo'o, the second kuku, and the third ho'oki.

Most wooden beaters, i'e kuku, used in the final stage, were four-sided, made from 'ōhi'a wood, carved and incised with stamps in intricate geometric designs and patterns. The kapa maker left her "watermark" imprinted on both sides of the kapa she made. These can be seen by holding the kapa up to the light.

At this point in the process, the cloth was hung in the sun to dry and to bleach whiter. The quality of the kapa varied according to the bark quality and the skills of the maker. Most i'e kuku were made from kolea wood.

After the kapa was completed, intricate designs were added to some of the cloth with dyes and a high quality of colored stamped patterns. These were unique to Hawai'i and are considered a lost art form, although in the last 15 years a few people have resumed the making and stamping of kapa in the old way, renewing this lost art.

The beaters, anvils and stamps were made by the men of the village. The dyes came from varied natural plant sources. Pigmentation comes in many colors, predominantly black, from burying the cloth in the mud of a kalo lo'i, brown from such as kukui root bark and red from its bark, yellow and orange from the tuber of 'ōlena, red from noni's bark and yellow from its root. The dyes, waiho'olu'u, were fixed to the cloth with mordants of salt/pa'akai, urine/mimi, mud/lepo, and coral/ko'a. Some dyeing was by immersion/ho'olu'u. Geometric designs with inherent symbolism, such as lines, triangles, circles and chevrons were imprinted using stencils and stamps usually carved in 'ohe, bamboo. The printers were called 'ohe kapala. 'Ohe was also used for brushes, as were dried hala drupes (fruit). Sticky adhesives were used to waterproof kihei, capes. Some kapa was scented, usually that which was to be stored. Aromatic oils, seeds and flowers of such as maile, mokihana, 'awapuhi, 'iliahi/sandalwood, hinano and kamani flowers were applied.

The clothing made were a wrap, kikepa; a knee length wrap-around skirt called pa'u (pareau, sarong, lava lava), the principle garment for women of early Hawai'i; loin cloth, malo, for men; sandals, hula costumes, and the kihei, or cape.

Bed clothes were kapa moe, single sheets of kapa, placed together for warmth, a modern double-bed size. Also, kapa ku'ina, several layers stitched along one side with wauke cordage, was used in colder climates. The top layer was called kilohana, usually decorated and/or dyed.

There are two existing forms of paper mulberry. Wauke, of superior quality, and po'a'aha, which produces very thin sheets of kapa. The plants are similar, except for the leaves. Those of wauke are thick and rough on top, woolly underneath and are lobed. The leaves of po'a'aha are velvety soft and rounded. The leaves of both plants are heart shaped with serrated edges, and are 4-6 inches long by 3-5 inches wide. The flowers are rare and sparse, fuzzy, one inch round with hairy bracts and long stigmas. Fruit are rare, and are orange and one inch round.

Other sources for kapa fibers are mamake, a species of pipturus, which produces a dark fiber. Ma'aloa also produces brown fibers. Other occasional sources are po'ulu and mamane.

Medicinally, the slimy sap of wauke is a mild laxative. 'Ea, thrush, a mouth disease, is said to be improved when the ash from burned kapa made from wauke is applied to the mouth.

Kapa figured in several Hawai'i legends, one of which is about the god Maui and his mother, the goddess Hina, and how he lassoed the sun from Haleakala to slow down the day, so it would be warm long enough to dry his mother's kapa cloth.

There were a great abundance of wauke plants grown in Hawai'i prior to the introduction of foreign fabrics, but now this once cherished plant is rarely to be found.