



Ethnobotanical Leaflets



Passiflora

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The species of the genus *Passiflora* sp. are perennial, shallow rooted, woody vines that climb by means of tendrils (2). Many species are native to South America, primarily southern Brazil through Paraguay to northern Argentina; whereas others are of Old World origin. The Passionfruit, as this genus is commonly called, is not named as one might suppose, for some type of aphrodisiac property. Rather, the plants were given this name by early missionaries in South America on the basis that the flower resembles the different elements of Christ's crucifixion: the crown of thorns (corona); the five wounds (the five anthers); the nails of the cross (divisions of the pistil); the whips and cords (the tendril on the vine); and the spear (leaf). (2)

Passionfruit yields fruit that is both sweet and tart in flavor with a light tropical fragrance. (1) It has been a popular food of the people in the Rainforests for many years, and has recently become popular in the United States and other developed countries where it is not native (4). Although there are in excess of 300 species of *Passiflora*, many of which produce edible fruit, there are only two species that are cultivated for industry-- *P. edulis* Sims and *P. quadrangularis* L.

P. edulis has two recognized forms. The normal form is f. *edulis*, better known as the purple passionfruit. The purple passionfruit is slightly egg shaped, ranging in size from 1 1/2 to 2 1/2 inches in diameter that displays a characteristic purple shade when ripe (2). The yellow passionfruit displays a deep yellow shade when ripe and has an unknown origin. Speculations are that it may have been a mutation from the purple passionfruit or perhaps a hybrid between *P. edulis* and *P. ligularis*. There is a described variety of *P. edulis* in Australia that has a natural range of either purple or yellow fruits, leaving the chance that the yellow variety may have been a mutation from a variety such as that found in Australia (3).

Common properties of the *Passiflora* sp. are an ovoid to nearly round shape. The rind is a tough waxy structure ranging from 1/8 to 1/4 of an inch thick. Inside the rind is a cavity with double-walled sacs, containing an orange-colored, pulpy juice as well as up to 250 very small dark brown to black edible seeds. Common growing environments include light to heavy sandy loams of medium texture at a pH of

6.5 to 7.5.

Besides the color differentiation, the differences between the purple and yellow varieties are few but important. The purple passionfruit is thought to have a more favorable flavor, yielding a more delicious juice and fruit. The purple passionfruit also has a rich aroma that is somewhat lacking in the yellow variety, and has a higher proportion of juice (3). The yellow passionfruit is said to have somewhat more acid content, although not in any way unpalatable. The yellow passionfruit is also generally larger than the purple variety, ranging from 2 to 2 1/2 inches in diameter when ripe. There are growing differences as well; the purple passionfruit is not well suited to the wet lowlands of the tropics whereas the yellow variety thrives in such an environment. (4)

The second cultivated species of Passionfruit is *P. quadrangularis* L., also known as the giant granadilla. It is cultivated in Brazil for local consumption on a limited basis. Its fruit ranges in morphology from round to oblong, reaching from 6 to 12 inches in size. The color is usually pale-yellow to yellow-green when ripe. *P. quadrangularis* grows best in a hot moist climate. (2)

Passionfruit is a perennial. The alternate leaves are evergreen, with 3 deep lobes at maturity, and reach 3 to 8 inches in length. The surfaces of the leaves are deep green and glossy on the adaxial surface, while displaying a pale and dull green color abaxially. The leaves, as well as the stems and tendrils also display a red to purple tinge, most prominently in the yellow passionfruit form. (3) Borne on each node of the new growth is a fragrant flower ranging from 2 to 3 inches wide. Beginning at the purple colored base are 3 large, green, leaflike bracts, 5 greenish white sepals, 5 white petals and a fringelike corona of straight, white-tipped rays. The prominent central structure has 5 stamens with large anthers, an ovary, and a triple branched style. The yellow variety's flower is generally more decorated with more intense coloration.

There are three types of flowers, distinguished by the curvature of the style: totally curved (TC), partially curved (PC), and upright-style (SC), of which TC are the most common. The flowers of the yellow passionfruit are perfect but self-sterile. Carpenters bees have been found to be very efficient pollinators of the TC and PC flowers, whereas honey bees, although usable for pollinators, are much less efficient. The SC flowers do not set fruit, although they do have fertile pollen. The amount of pollen deposited on the stigma is what determines the number of seeds and consequently, the fruit size (2). The ovule pollination is essential for juice formation in the pulp sac. Within the vines are usually placed decaying logs to help assure that there will be carpenter bees present to pollinate the flowers. In areas such as Fiji, where carpenter bees are non-existent, farmers must pollinate the flowers by hand. (3)

Passionfruit vines are propagated by their tiny seeds. It has been found to be especially important with the yellow form of passionfruit to keep a certain amount of seedling variation to prevent self-sterility. The common practice for planting passionfruit seeds are to first allow the fruit to ripen one or two weeks until they slightly shrivel. This guarantees that the fruit is completely ripe. When the seeds are planted soon after being removed from the fruit, they usually germinate within 2 to 3 weeks. Other methods, such as cleaning and storing the seeds before planting, in addition to the often recommended practice of

soaking the seeds, have yielded a lower and slower rate of germination. Methods to quicken the sprouting time of the plants are to allow the fruit to ferment for a few days before removing the seeds. It has also been found that chipping the seeds or rubbing them with sandpaper with expedite germination. The seeds are generally planted 1/2 in. deep and are transplanted to the field when the seedlings reach a height of 10 inches. (3)

Passionfruit is also propagated vegetatively by the use of cuttings, usually matured wood having 3 to 4 nodes. Within 90 days the cuttings are well rooted and ready for planting. Hormones are generally used to hasten the process. The propagation of hybrids such as using the nematode and disease resistant yellow passionfruit rootstock is performed by grafting. The cleft, whip, or side-wedge graft are utilized.

The culturing of the seedlings includes root-pruning two weeks before transplanting the seedlings. The soil is also usually organically fertilized a month prior planting. Plantations use various distances when separating their vines, but it has been found to be most effective when vines are set 10 ft. apart and 6 ft. between rows. Although there has been two year success of the highest yield with 4 feet between the rows, close planting such as that leads to disease upon replanting the third year. The vines are usually supported by trellises of 7 feet in height, which has been found to make the most fruit production as well as making the vines less subject to diseases and pests. (3)

Care of the vines is nearly continuous. When the vine has reached the age of two years, pruning once a year stimulates new growth, leading to more fruit production. Pruning the branches after fruiting also aids in disease control. The vines are watered regularly. This ensures that the vine flowers and produces fruit at a constant rate. Fertilizer (10-5-20 NPK) is applied to each plant 4 times a year in 3 pound allotments. Nitrogen in the amount of 32 to 36 oz. has been said to increase the yield from a vine, however an excess in nitrogen will cause premature fruit drop. The average life of a plantation ranges from only 3 years in Fiji to as long as 8 years in South Africa. (3)

The harvesting season in some areas such as India is year round, but the peak periods are generally August to December having the largest yield, and March to May yielding less fruit. Passionfruits mature from June to January in Hawaii, with the heaviest crops in July and August and October and November. Because of the commercial production of passionfruit on both sides of the equator using different cultivars of passionfruit, supply is relatively constant. (3)

The ripened fruits are collected daily after they fall from the vine. This process is modified in areas such as South Africa, where they are picked from the vine before ripening fully to prevent damage from the sun. The fruits are collected in boxes so that there is proper air circulation to prevent spoilage. Australian yields are generally the highest; averaging a bushel of passionfruits weighing 36 pounds, 13 1/3 of which is pulp, 10.7 pounds of juice, and 2.6 pounds of seeds. Some of the hybrid varieties are known to produce even greater quantities of juice.

Passionfruit are plagued by a variety of pests, including but in no way limited to the passion vine mite, the passion vine bug, the green vegetable bug, the brown stinkbug, the large black stinkbug, the small

black stinkbug, the tobacco white fly, in addition to various beetles, weevils and cutworms. Nematodes such as the root-knot nematode, the spiral nematode, and the lesion nematode also damage purple passionfruit, although the yellow passionfruit is nematode resistant. The main diseases include brown spot, base rot, and various blights and wilts. (3)

Consumption of passionfruit comes in many forms. The fruit can be cut in half and the pulp scooped out with a spoon to be eaten, or the pulp can be pressed to yield the juice, considered a natural concentrate. The juice has various uses, such as dilution with water or other juices for cold drinks, or boiling the juice down to a syrup that can be used in gelatin desserts, candy ice cream, and a variety of other foods. (3)

Passionfruit has also been used in a medicinal capacity for years by Indians in the rainforests of which it is indigenous. The leaves are made into a tea used as a sedative and the juice is used as a type of heart tonic. It is also said that one cup of the leave tea or two glasses of passionfruit juice calms down hyperactive children. Finally the natives use the juice for treatment of asthma, whooping, bronchitis, urinary infections, and as a mild diuretic. At least four studies conducted by researchers have documented the medicinal properties of passionfruit.

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