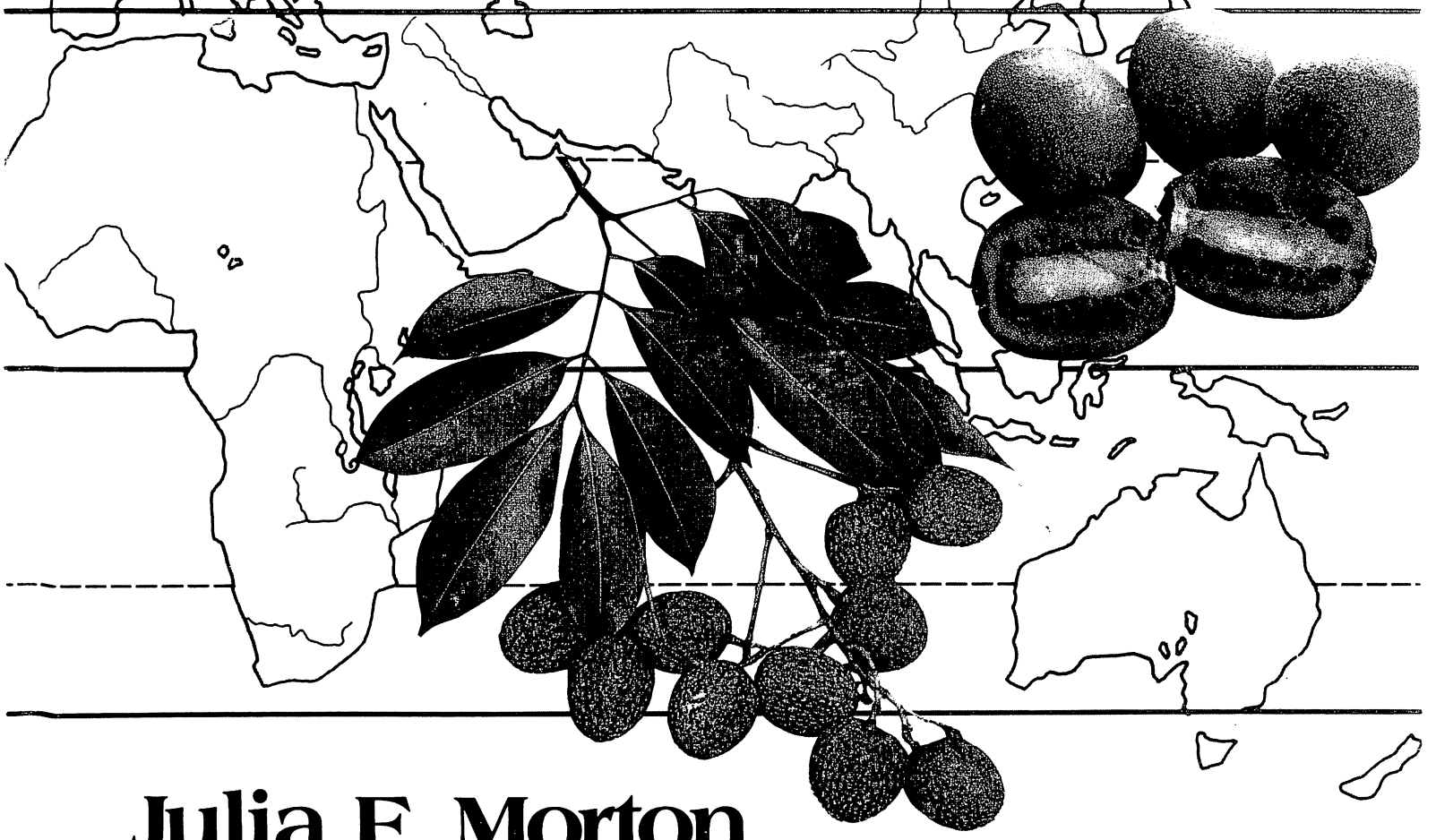
FRUITS OF WARM CLIMATES



Julia F. Morton

Food Value Per 100 g of Edible Portion*		
	Fresh	*Dried*
Calories	80	274
Moisture	77.5-86.8 g	23.0 g
Protein	1.2-1.3 g	4.3 g
Fat	0.14-0.30 g	1.3 g
Carbohydrates	17.1-20.3 g	69.1 g
Fiber	1.2-2.2 g	5.6 g
Ash	0.48-0.85 g	2.3 g
Calcium	35-78.2 mg	126 mg
Phosphorus	22-32.9 mg	77 mg
Iron	0.6-4.09 mg	3.0 mg
Sodium	2.0 mg	34 mg
Potassium	194 mg	640 mg
Carotene	0.013-0.195 mg	—
as Vitamin A	20-270 I.U.	80 I.U.
Thiamine	0.034-0.06 mg	0.10 mg
Riboflavin	0.053-0.079 mg	0.10 mg
Niacin	0.32-0.412 mg	0.7 mg
Ascorbic Acid	12.2-17.6 mg	0 mg
Citric Acid	0.10-0.44 mg	

Note: There are small amounts of malic, boric and oxalic acids.

*According to analyses made in India, Hawaii, Central America, and by the U.S. Department of Agriculture in Washington, D.C.

Toxicity

The latex of the unripe fruits and of any part of the tree may be severely irritating to the skin if not removed promptly. It is an occupational hazard not only to fig harvesters and packers but also to workers in food industries, and to those who employ the latex to treat skin diseases.

Other Uses

Seed oil: Dried seeds contain 30% of a fixed oil containing the fatty acids: oleic, 18.99%; linoleic, 33.72%; linolenic, 32.95%; palmitic, 5.23%; stearic, 2.18%; arachidic, 1.05%. It is an edible oil and can be used as a lubricant.

Leaves: Fig leaves are used for fodder in India. They are plucked after the fruit harvest. Analyses show: moisture, 67.6%; protein, 4.3%; fat, 1.7%; crude fiber, 4.7%; ash, 5.3%; N-free extract, 16.4%; pentosans, 3.6%; carotene on a dry weight basis, 0.002%. Also present are bergaptene, stigmasterol, sitosterol, and tyrosine.

In southern France, there is some use of fig leaves as a source of perfume material called "fig-leaf absolute"—a dark-green to brownish-green, semi-solid mass or thick liquid of herbaceous-woody-mossy odor, employed in creating woodland scents.

Latex: The latex contains caoutchouc (2.4%), resin, albumin, cerin, sugar and malic acid, rennin, proteolytic enzymes, diastase, esterase, lipase, catalase, and peroxidase. It is collected at its peak of activity in early morning, dried and powdered for use in coagulating milk to make cheese and junket. From it can be isolated the protein-digesting enzyme *ficin* which is used for tenderizing meat, rendering fat, and clarifying beverages.

In tropical America, the latex is often used for washing dishes, pots and pans. It was an ingredient in some of the early commercial detergents for household use but was abandoned after many reports of irritated or inflamed hands in housewives.

Medicinal Uses: The latex is widely applied on warts, skin ulcers and sores, and taken as a purgative and vermifuge, but with considerable risk. In Latin America, figs are much employed as folk remedies. A decoction of the fruits is gargled to relieve sore throat; figs boiled in milk are repeatedly packed against swollen gums; the fruits are much used as poultices on tumors and other abnormal growths. The leaf decoction is taken as a remedy for diabetes and calcifications in the kidneys and liver. Fresh and dried figs have long been appreciated for their laxative action.

Breadfruit

One of the great food producers in its realm and widely known, at least by name, through its romanticized and dramatized history, the breadfruit, *Artocarpus altilis* Fosb. (syns. *A. communis* J.R. and G. Forst.; *A. incisus* L.f.) belongs to the mulberry family, Moraceae. The common name is almost universal, in English, or translated into Spanish as *fruta de pan* (fruit), or *arbol de pan, arbol del pan* (tree), or *pan de pobre;* into French, as *fruit à pain* (seedless), *chataignier* (with seeds), *arbre à pain* (tree); Portuguese, *fruta pão,* or *pão de massa;* Dutch, *broodvrucht* (fruit), *broodboom* (tree). In Venezuela it may be called *pan de año, pan de todo el año, pan de palo, pan de ñame, topán,* or *tŭpan;* in Guatemala and Honduras, *mazapán* (seedless), *castaña* (with seeds); in Peru, *marure;* in Yucatan, *castaño de Malabar* (with seeds); in Puerto Rico, *panapén* (seedless), *pana de pepitas* (with seeds). In Malaya and Java, it is *suku* or *sukun* (seedless); *kulur, kelur,* or *kulor* (with seeds); in Thailand, *sa-ke,* in the Philippines, *rimas* (seedless); in Hawaii, *ulu.* The type with seeds is sometimes called "breadnut", a name better limited to *Brosimum alicastrum* Swartz, an edible-seeded tree of Yucatan, Central America and nearby areas. Its Spanish name is *ramon* and the seeds, leaves and twigs are prized as stock feed.

Fig. 13: Ripe breadfruit (*Artocarpus altilis*). In: K. & J. Morton, *Fifty Tropical Fruits of Nassau,* 1946.

Description

The breadfruit tree is handsome and fast-growing, reaching 85 ft (26 m) in height, often with a clear trunk to 20 ft (6 m) becoming 2 to 6 ft (0.6-1.8 m) in width and often buttressed at the base, though some varieties may never exceed ¼ or ½ of these dimensions. There are many spreading branches, some thick with lateral foliage-bearing branchlets, others long and slender with foliage clustered only at their tips. The leaves, evergreen or deciduous depending on climatic conditions, on thick, yellow petioles to 1½ in (3.8 cm) long, are ovate, 9 to 36 in (22.8-90 cm) long, 8 to 20 in (20-50 cm) wide, entire at the base, then more or less deeply cut into 5 to 11 pointed lobes. They are bright-green and glossy on the upper surface, with conspicuous yellow veins; dull, yellowish and coated with minute, stiff hairs on the underside.

The tree bears a multitude of tiny flowers, the male densely set on a drooping, cylindrical or club-shaped spike 5 to 12 in (12.5-30 cm) long and 1 to 1½ in (2.5-3.75 cm) thick, yellowish at first and becoming brown. The female are massed in a somewhat rounded or elliptic, green, prickly head, 2½ in (6.35 cm) long and 1½ in (3.8 cm) across, which develops into the compound fruit (or syncarp), oblong, cylindrical, ovoid, rounded or pear-shaped, 3½ to 18 in (9-45 cm) in length and 2 to 12 in (5-30 cm) in diameter. The thin rind is patterned with irregular, 4- to 6-sided faces, in some "smooth" fruits level with the surface, in others conical; in some, there may rise from the center of each face a sharp, black point, or a green, pliable spine to ⅛ in (3 mm) long or longer. Some fruits may have a harsh, sandpaper-like rind. Generally the rind is green at first, turning yellowish-green, yellow or yellow-brown when ripe, though one variety is lavender.

In the green stage, the fruit is hard and the interior is white, starchy and somewhat fibrous. When fully ripe, the fruit is somewhat soft, the interior is cream-colored or yellow and pasty, also sweetly fragrant. The seeds are

irregularly oval, rounded at one end, pointed at the other, about ¾ in (2 cm) long, dull-brown with darker stripes. In the center of seedless fruits there is a cylindrical or oblong core, in some types covered with hairs bearing flat, brown, abortive seeds about ⅛ in (3 mm) long. The fruit is borne singly or in clusters of 2 or 3 at the branch tips. The fruit stalk (pedicel) varies from 1 to 5 in (2.5-12.5 cm) long.

All parts of the tree, including the unripe fruit, are rich in milky, gummy latex. There are two main types: the normal, "wild" type (cultivated in some areas) with seeds and little pulp, and the "cultivated" (more widely grown) seedless type, but occasionally a few fully developed seeds are found in usually seedless cultivars. Some forms with entire leaves and with both seeds and edible pulp have been classified by Dr. F.R. Fosberg as belonging to a separate species, *A. mariannensis* Trécul. but these commonly integrate with *A. altilis* and some other botanists regard them as included in that highly variable species.

Origin and Distribution

The breadfruit is believed to be native to a vast area extending from New Guinea through the Indo-Malayan Archipelago to Western Micronesia. It is said to have been widely spread in the Pacific area by migrating Polynesians, and Hawaiians believed that it was brought from the Samoan island of Upalu to Oahu in the 12th Century A.D. It is said to have been first seen by Europeans in the Marquesas in 1595, then in Tahiti in 1606. At the beginning of the 18th Century, the early English explorers were loud in its praises, and its fame, together with several periods of famine in Jamaica between 1780 and 1786, inspired plantation owners in the British West Indies to petition King George III to import seedless breadfruit trees to provide food for their slaves.

There is good evidence that the French navigator Sonnerat in 1772 obtained the seeded breadfruit in the Philippines and brought it to the French West Indies. It seems also that some seedless and seeded breadfruit plants reached Jamaica from a French ship bound for Martinique but captured by the British in 1782. There were at least two plants of the seeded breadfruit in Jamaica in 1784 and distributions were quickly made to the other islands. There is a record of a plant having been sent from Martinique to the St. Vincent Botanical Garden before 1793. The story of Captain Bligh's first voyage to Tahiti, in 1787, and the loss of his cargo of 1,015 potted breadfruit plants on his disastrous return voyage is well known. He set out again in 1791 and delivered 5 different kinds totalling 2,126 plants to Jamaica in February 1793. On that island, the seedless breadfruit flourished and it came to be commonly planted in other islands of the West Indies, in the lowlands of Central America and northern South America. In some areas, only the seedless type is grown, in others, particularly Haiti, the seeded is more common. Jamaica is by far the leading producer of the seedless type, followed by St. Lucia. In New Guinea, only the seeded type is grown for food.

It has been suggested that the seeded breadfruit was carried by Spaniards from the Philippines to Mexico and Central America long before any reached the West Indies. On the Pacific coast of Central America, the seeded type is common and standard fare for domestic swine. On the Atlantic Coast, seedless varieties are much consumed by people of African origin. The breadfruit tree is much grown for shade in Yucatan. It is very common in the lowlands of Colombia, a popular food in the Cauca Valley, the Choco, and the San Andres Islands; mostly fed to livestock in other areas. In Guyana, in 1978, about 1,000 new breadfruit trees were being produced each year but not nearly enough to fill requests for plants. There and in Trinidad, because of many Asians in the population, both seeded and seedless breadfruits are much appreciated as a regular article of the diet; in some other areas of the Caribbean, breadfruit is regarded merely as a food for the poor for use only in emergencies. Nowadays, it is attracting the attention of gourmets and some islands are making small shipments to the United States, Canada and Europe for specialized ethnic markets. In the Palau Islands of the South Pacific, breadfruit is being outclassed by cassava and imported flour and rice. For some time breadfruit was losing ground to taro (*Colocasia esculenta* Schott.) in Hawaii, but now land for taro is limited and its culture is static.

The United States Department of Agriculture brought in breadfruit plants from the Canal Zone, Panama, in 1906 (S.P.I. #19228). For many years there have been a number of seedless breadfruit trees in Key West, Florida, and there is now at least one on Vaca Key about 50 miles to the northeast. On the mainland of Florida, the tree can be maintained outdoors for a few years with mild winters but, unless protected with plastic covering to prevent dehydration, it ultimately succumbs. A few have been kept alive in greenhouses or conservatories such as the Rare Plant House of Fairchild Tropical Garden, and the indoor garden of the Jamaica Inn on Key Biscayne.

Varieties

An unpublished report of 1921 covered 200 cultivars of breadfruit in the Marquesas. The South Pacific Commission published the results of a breadfruit survey in 1966. In it, there were described 166 named sorts from Tonga, Niue, Western and American Samoa, Papua and New Guinea, New Hebrides and Rotuma. There are 70 named varieties of seeded and seedless breadfruits in Fiji. They are locally separated into 8 classes by leaf form. The following, briefly presented, are those that are recorded as "very good". It will be noted that some varietal names are reported under more than one class.

Class I: Leaf entire, or with one or two, occasionally, three lobes.

'Koqo' — round; 4 in (10 cm) wide; seedless; does not deteriorate quickly.

'Tamaikora' — gourd-shaped (constricted around middle); to 4½ in (11.5 cm) long, 3 in (7.5 cm) wide; with many seeds. Can be eaten raw when ripe. Highly perishable. Tree to 40 or 45 ft (12-13.5 m).

Class II: Leaf dissected at apex.

'Temaipo'—round; 3½ in (9 cm) long; seedless. Can be eaten raw when ripe. There is also an oblong form with many seeds.

Class III: Leaf moderately deeply dissected at apex.

'Uto Kuro'—round; 5 in (12.5 cm) long; does not deteriorate quickly.

Class IV: Leaf moderately deeply dissected on upper half.

'Samoa' ('Kasa Balavu')—round; 4 to 6 in (10-15 cm) long; seeds sparse to many.

'Uto Yalewa'—oblong; to 8 in (20 cm) long and 6 in (15 cm) wide; seedless.

'Kulu Dina'—oblong; to 16 in (40 cm) long and 13 in (33 cm) wide; seedless. Need not be peeled after cooking. Tree bears all year.

'Sogasoga'—oblong; to 9 in (23 cm) long and 6½ in (16.5 cm) wide; seedless.

'Uto Dina'—oblong; to 6 in (15 cm) long and 3 to 3½ in (7.5-9 cm) wide; seedless; need not be peeled after cooking. Tree 60 to 70 ft (18-21 m) high.

'Buco Ni Viti'—oblong; 11 to 14 in (28-35.5 cm) long, 6 to 7 in (15-18 cm) wide; seedless; one of the best cultivars.

'Tamaikora'—oblong; 7 to 9 in (18-23 cm) long, 5 to 6½ in (12.5-16.5 cm) wide; seeds sparse; pulp eaten raw when ripe. Tree to 75 or 85 ft (23-26 m) high; bears 2 crops per year.

'Kulu Mabomabo'—oval; 6 to 8 in (15-20 cm) long, 4 to 5½ in (10-14 cm) wide; seedless.

Class V: Leaf moderately deeply dissected; shape of leaf base variable.

'Uto Dina'—round; 4½ to 5 in (11.5-12.5 cm) wide; seedless. Highly recommended. Tree is 25-30 ft (7.5-9 m) tall.

'Balekana Ni Samoa'—round; 4 to 5 in (10-12.5 cm) long; seeds sparse. Best of all Samoan varieties. There is an oval form by the same name; seedless; deteriorates very quickly.

'Balekana Ni Vita'—round; 3½ to 4 in (9-10 cm) long; seedless. Does not deteriorate quickly.

'Balekana Dina'—oval; 6 to 8 in (15-20 cm) long, 3 to 5 in (7.5-12.5 cm) wide; seeds sparse. One of the best, especially when boiled.

'Tabukiraro'—round; 8 in (20 cm) long; seedless; skin sometimes eaten after cooking.

'Sici Ni Samoa'—oval; 5 to 6 in (12.5-15 cm) long, 3 to 3½ in (7.5-9 cm) wide; seedless. One of the highly recommended Samoan varieties.

'Uto Me'—oval; 5 to 6¾ in (12.5-17 cm) long, 4½ to 5 in (11.5 cm) wide; with many seeds; does not deteriorate quickly.

'Uto Wa'—oval; 6 to 7½ in (15-19 cm) long, 5 to 5½ in (12.5-14 cm) wide. The variety most recommended.

'Kulu Vawiri'—oval; 9 to 12 in (22-30 cm) long, 8 to 9 in (20-22 cm) wide; especially good when boiled.

Class VI: Leaf deeply dissected.

'Kulu Dina'—round; 3 to 4 in (7.5-10 cm) long; seedless. Need not be peeled after boiling. Highly recommended.

'Balekana'—oval; 4 in (10 cm) long, 3 in (7.5 cm) wide; of the best quality. Tree 70 to 80 ft (21-24 m) high.

'Balekana Ni Samoa'—round; 3 in (7.5 cm) long; seeds sparse. Best of all Samoan varieties.

'Balekana Ni Viti'—oblong; 5 to 6 in (12.5-15 cm) long, 3 to 4 in (7.5-10 cm) wide; seedless. The best native-type variety.

Fig. 14: Breadfruit is borne singly or in 2's or 3's at the branch tips of this handsome, large-leaved tree.

'Uto Dina' ('Kasa Leka')—round; 4 in (10 cm) long; seedless.

'Uto Matala'—round; 3 to 4 in (7.5-10 cm) long. Especially fine when boiled. Tree bears 3 times a year.

Class VII: Leaf deeply dissected; apex pointed.

'Balekana Ni Samoa'—round; 5 to 5½ in (12.5-14 cm) long; seeds sparse. Best of all Samoan varieties.

'Kulu Dina' ('Kasa Balavu')—oval; 6 to 7 in (15-18 cm) long, 4 to 5 in (10-12.5 cm) wide; seedless.

'Uto Dina' (Large)—oval; 8 to 9 in (20-22 cm) long, 4 to 7 in (10-18 cm) wide; seedless. Also, by the same name, a form with only moderately dissected leaves.

'Bokasi'—round; 4 in (10 cm) long, 3 in (7.5 cm) wide.

Class VIII: Leaf deeply dissected, wide spaces between lobes.

'Savisavi Ni Samoa'—oval; 4 to 5 in (10-12.5 cm) long, 3 to 3½ in (7.5-9 cm) wide. Ranks with best Samoan varieties.

'Savisavi Ni Viti'—oblong; 6 to 8 in (16-20 cm) long, 4 to 6 in (10-15 cm) wide; seedless; especially good when boiled.

'Savisavi'—round; 3 to 3½ in (7.5-9 cm) wide; especially good when boiled.

'Balawa Ni Viti'—oval; 6 to 7 in (15-18 cm) long, 3½ to 4 in (9-10 cm) wide; seedless.

'Uto Kasekasei'—round; 4 to 5 in (10-12.5 cm) long; seeds sparse.

'Via Loa'—oblong; 6 to 7 in (15-18 cm) long, 4 to 5 in (10-12.5 cm) wide; seedless; does not deteriorate quickly.

Koroieveibau provides a key to the 8 classes illustrated

by leaf and fruit outline sketches.

P.J. Wester, in 1928, published descriptions of 52 breadfruit cultivars of the Pacific Islands. In the book, *The Breadfruit of Tahiti,* by G.P. Wilder, there are detailed descriptions and close-up, black-and-white photographic illustrations of the foliage and fruit of 30 named varieties, and of the foliage only of one which did not have mature fruit at the time of writing. One 'Aata', an oblong fruit, is described as of poor quality and eaten by humans only when better breadfruits are scarce, but it is important as feed for pigs and horses. The tree bears heavily. Among the best are:

'Aravei'—fruit ellipsoidal; large, 8 to 12 in (10-30 cm) long, 6 to 9 in (15-22 cm) wide; rind yellowish-green with brown spots on the sunny side; rough, with sharp points which are shed on maturity. Pulp is light-yellow, dry or flaky and of delicious flavor after cooking which takes very little time. Core long, slim, with many abortive seeds.

'Havana'—fruit oval-round; the rind yellowish-green, spiny; pulp golden-yellow, moist, pasty, separates into loose flakes when cooked; very sweet with excellent flavor; core oval, large, with a row of abortive seeds. Very perishable; must be used within 2 days; cooks quickly over fire. Fruit borne in 2's and 3's. Popularly claimed to be one of the best breadfruits.

'Maohi'—fruit round; 6 in (15 cm) wide; rind bright yellow-green with patches of red-brown; rough, with spines, and often bears much exuded latex. Pulp cream-colored and smooth when cooked; of very good flavor; slow cooking, needs even heat. Core is large. Fruit is borne in 2's and 3's. Tree a heavy bearer. This is the most common breadfruit of Tahiti.

'Paea'—ellipsoidal; very large, to 11 in (28 cm) long and 9 in (22.8 cm) wide; rind yellowish-green, spiny; core oblong, thick, with a row of brown, abortive seeds; pulp bright-yellow, moist, slightly pasty, separating into flakes when cooked; agreeable but only one of its forms, 'Paea Maaroaro', is really sweet. Formerly, 'Paea' was reserved for chiefs only. Needs one hour to roast on open fire. The tree is tall, especially well-formed and elegant.

'Pei'—broad-ellipsoidal; large; rind light-green, relatively smooth; pulp light-yellow and flaky when cooked, aromatic, of sweet, delicious "fruity" flavor; cooks quickly. Ripens earlier than others. When the breadfruit crop is scant, the fruits of this cultivar are stored by burying in the ground until needed, even for a year, then taken up, wrapped in *Cordyline* leaves and boiled.

'Pucro'—fruit spherical or elongated; large; rind yellow-green with small brown spots, very rough, spiny, thin; pulp light-yellow and smooth, of excellent flavor. Cooks quickly. Highly esteemed, ranked with the very best breadfruits. There are two oblong forms, one with a large, hairy core.

'Rare'—fruit broad-ovoid; to 7 in (17.5 cm) long, rind bright-green, rough, spiny; pulp of deep-cream tone, fine-grained, smooth, flaky when cooked; of very sweet, excellent flavor. Core is small with a great many small abortive seeds. Must be cooked for about one hour. There are 3 forms that are well recognized. Fruits are borne singly on a tall, open, short-branched tree.

'Rare Aumee'—fruit round; 6½ in (16.5 cm) across; rind bright-green with red-brown splotches, fairly smooth at the base but rough at the apex; pulp deep-ivory, firm, smooth when cooked; not very sweet but of excellent flavor. Cooks quickly. Highly prized; in scarce supply because the tall, few-branched tree bears scantily.

'Rare Autia'—fruit round; 6 in (15 cm) across; rind dull-green with red-brown markings. Pulp light-yellow when cooked and separates into chunks; has excellent flavor. Core is large with small abortive seeds all around. This cultivar is so superior it was restricted to royalty and high chiefs in olden times.

'Tatara'—fruit broad-ellipsoid; very large, up to 10 lbs (4.5 kg) in weight; rind has prominent faces with long green spines; pulp light-yellow, smooth when cooked and of pleasant flavor. Core is oblong. This variety is greatly esteemed. The tree is found only in a small coastal valley where there is heavy rainfall. It is of large dimensions and high-branching and it is difficult to harvest the fruits.

'Vai Paere'—fruit is obovoid; 10 to 12 in (25-30 cm) long, 7 to 8 in (17.5-20 cm) wide; rind is yellow-green with red-brown splotches and there is a short raised point at the center of each face; pulp light-yellow, firm, smooth, a little dryish when cooked, with a slightly acid, but excellent flavor. Core is oblong, large, with a few abortive seeds attached. Fruit cooks easily. Tree is very tall, bears fruit in clusters. Grows at sea-level in fairly dry locations.

There are at least 50 cultivars on Ponape and about the same number on Truk. In Samoa, a variety known as **'Maopo',** with leaves that are almost entire or sometimes very shallowly lobed, is very common and considered one of the best.

'Puou' is another choice and much-planted variety since early times. It has deeply cut leaves and nearly round fruits 6 in (15 cm) long. 'Ulu Ea', with leaves even more deeply lobed, has oblong fruits to 6⅛ in (15.5 cm) long and 5 in (12.5 cm) wide; is a longtime favorite.

In the past three decades there has been an awakening to the possibilities of increasing the food supply of tropical countries by more plantings of selected varieties of seedless breadfruit. In 1958, many appealing varieties (some early, some late in season) were collected around the South Pacific region and transferred to Western Samoa, Tahiti and Fiji for comparative trials. Two years later, plans were made to introduce Polynesian varieties into Micronesia, and propagating material of 36 Micronesian types was distributed to other areas.

Climate

The breadfruit is ultra-tropical, much tenderer than the mango tree. It has been reported that it requires a temperature range of 60° to 100°F (15.56°-37.78°C), an annual rainfall of 80 to 100 in (203-254 cm), and a relative humidity of 70 to 80%. However, in southern India, it is cultivated at sea-level and up humid slopes to an altitude of 3,500 ft (1,065 m), also in thickets in dry regions where it can be irrigated. In the "equatorial dry climate" of the Marquesas, where the breadfruit is an essential crop, there is an average rainfall of only 40 to 60 in (100-150 cm) and frequent droughts. In Central America, it is grown only below 2,000 ft (600 m).

Soil

According to many reports, the breadfruit tree must have deep, fertile, well-drained soil. But some of the best authorities on South Pacific plants point out that the seedless breadfruit does well on sandy coral soils, and

seeded types grow naturally on "coraline limestone" islands in Micronesia. In New Guinea, the breadfruit tree occurs wild along waterways and on the margins of forests in the flood plain, and often in freshwater swamps. It is believed that there is great variation in the adaptability of different strains to climatic and soil conditions, and that each should be matched with its proper environment. The Tahitian 'Manitarvaka' is known to be drought-resistant. The variety 'Mai-Tarika', of the Gilbert Islands, is salt-tolerant. 'Mejwaan', a seeded variety of the Marshall Islands, is not harmed by brackish water nor salt spray and has been introduced into Western Samoa and Tahiti.

Propagation

The seeded breadfruit is always grown from seeds, which must be planted when fairly fresh as they lose viability in a few weeks. The seedless breadfruit is often propagated by transplanting suckers which spring up naturally from the roots. One can deliberately induce suckers by uncovering and injuring a root. Pruning the parent tree will increase the number of suckers, and root-pruning each sucker several times over a period of months before taking it up will contribute to its survival when transplanted. For multiplication in quantity, it is better to make root cuttings about 1 to 2½ in (2.5-6.35 cm) thick and 9 in (22 cm) long. The ends may be dipped into a solution of potassium permanganate to coagulate the latex, and the cuttings are planted close together horizontally in sand. They should be shaded and watered daily, unless it is possible to apply intermittent mist. Calluses may form in 6 weeks (though rooting time may vary from 2 to 5 months) and the cuttings are transplanted to pots, at a slant, and watered once or twice a day for several months or until the plants are 2 ft (60 cm) high. A refined method of rapid propagation uses stem cuttings taken from root shoots. In Puerto Rico, the cuttings are transplanted into plastic bags containing a mixture of soil, peat and sand, kept under mist for a week, then under 65% shade, and given liquid fertilizer and regular waterings. When the root system is well developed, they are allowed full sun until time to set out in the field.

In India, it is reported that breadfruit scions can be successfully grafted or budded onto seedlings of wild jackfruit trees.

Culture

Young breadfruit trees are planted in well-enriched holes 15 in (40 cm) deep and 3 ft (0.9 m) wide that are first prepared by burning trash in them to sterilize the soil and then insecticide is mixed with the soil to protect the roots and shoots from grubs. The trees are spaced 25 to 40 ft (7.5-12 m) apart in plantations. Usually there are about 25 trees per acre (84/ha). Those grown from root suckers will bear in 5 years and will be productive for 50 years. Some growers recommend pruning of branches that have borne fruit and would normally die back, because this practice stimulates new shoots and also tends to keep the tree from being too tall for convenient harvesting.

Standard mixtures of NPK are applied seasonally. When the trees reach bearing age, they each receive, in addition, 4.4 lbs (2 kg) superphosphate per year to increase the size and quality of the fruits.

Season

In the South Seas, the tree fruits more or less continuously, fruit in all stages of development being present on the tree the year around, but there are two or three main fruiting periods. In the Caroline Islands and the Gilbert Islands, the main ripening season is May to July or September; in the Society Islands and New Hebrides, from November to April, the secondary crop being in July and August. Breadfruits are most abundant in Hawaiian markets off and on from July to February. Flowering starts in March in northern India and fruits are ready for harvest in about 3 months. Seeded breadfruits growing in the Eastern Caroline Islands fruit only once a year but the season is 3 months long—from December to March. Seedless varieties introduced from Ponape bear 2 to 3 times a year. In the Bahamas, breadfruit is available mainly from June to November, but some fruits may mature at other times during the year.

Harvesting and Yield

Breadfruits are picked when maturity is indicated by the appearance of small drops of latex on the surface. Harvesters climb the trees and break the fruit stalk with a forked stick so that the fruit will fall. Even though this may cause some bruising or splitting, it is considered better than catching the fruits by hand because the broken pedicel leaks much latex. They are packed in cartons in which they are separated individually by dividers.

In the South Pacific, the trees yield 50 to 150 fruits per year. In southern India, normal production is 150 to 200 fruits annually. Productivity varies between wet and dry areas. In the West Indies, a conservative estimate is 25 fruits per tree. Studies in Barbados indicate a reasonable potential of 6.7 to 13.4 tons per acre (16-32 tons/ha). Much higher yields have been forecasted, but experts are skeptical and view these as unrealistic.

Keeping Quality

In Jamaica, surplus breadfruits are often kept under water until needed. Fully ripe fruits that have fallen from the tree can be wrapped in polyethylene, or put into polyethylene bags, and kept for 10 days in storage at a temperature of 53.6°F (12°C). At lower temperature, the fruit shows chilling injury. Slightly unripe fruits that have been caught by hand when knocked down can be maintained for 15 days under the same conditions. The thickness of the polyethylene is important: 38- or even 50-micrometer bags are beneficial, but not 25-micrometer.

Some Jamaican exporters partly roast the whole fruits to coagulate the latex, let them cool, and then ship them by sea to New York and Europe. Various means of preserving breadfruit for future local use are mentioned under "Food Uses", q.v.