



## Banana and plantain—an overview with emphasis on Pacific island cultivars

Musaceae (banana family)

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### INTRODUCTION

The plant family Musaceae, composed of bananas, plantains, and ornamental bananas, originally evolved in Southeast Asia and surrounding tropical and subtropical regions (including New Guinea). Africa is a secondary center of diversity.

The two genera *Ensete* and *Musa* in the family Musaceae are covered here.

Please note that this manuscript is not all-inclusive and that much of the complex species and cultivar taxonomy is in the process of revision and expansion. Readers are encouraged to consult with the many excellent online resources listed in the “Bibliography” for current information.



PHOTO: C. ELEWITCH

‘Manini’, a variegated Hawaiian banana.

# Part I: Taxa in the Musaceae

## *Ensete*

The genus *Ensete* ranges throughout Africa and southern Asia. Depending on the authority, the genus *Ensete* contains as many as nine species. They are monocarpic, unbranched herbs that sucker rarely and are used for food, fiber, and as ornamentals. They resemble banana plants, but their wide-spreading and immensely long, paddle-shaped leaves with usually crimson midribs, are unmistakable. Their fruits are similar in appearance to those of banana, but they are dry, seedy, and inedible. The entire plant dies after fruiting.

*Ensete gillettii* (De Wild.) Cheesman

*Ensete glaucum* (Roxb.) Cheesman. Common names: Wild banana, Seeded sweet banana, “Virgin” banana, or Virgin (Philippines)

Synonyms: *M. glauca* Roxb., *M. nepalensis* Wallich in Roxb., *M. troglodytarum* L. var. *dolioliformis* F. M. Blanco, *M. gigantea* Kuntze, *M. calosperma* von Mueller, *M. wilsonii* Tutcher, *E. calospermum* (von Mueller) Cheesman, *E. wilsonii* (Tutcher) Cheesman, *M. agharkarii* Chakravorti, *E. gigantea* (Kuntze) T. Nakai, *E. nepalensis* (Wallich) Cheesman, *err. cal.* Simmonds, *E. agharkarii* (Chakravorti) Hore, Sharma and Pandey

Description: This species has small, oval bananas in a very small, compact bunch, atop a huge bud with green turning to pale brown, persistent bracts producing a “messy” rachis similar to dwarf edible bananas (for example, ‘Dwarf Cavendish’, ‘Prata Aña’). The seeds are about 10 mm diameter x 11 mm deep (0.4 in x 0.43 in). The seeds are strung into necklaces in PNG.

*Ensete homblei* (Bequaert) Cheesman

*Ensete perrieri* (Claverie) Cheesman

*Ensete superbum* (Roxb.) Cheesman

*Ensete ventricosum* (Welw.) Cheesman. Common names: Enset, Ensete, Abyssinian banana or Plantain, Ethiopian, Black, Bruce’s or wild banana

Synonyms: *Musa ensete* Gmel., *M. ventricosa* Welw., *M. buchananii* Baker, *M. schweinfurthii* Schumann and Warburg ex Schumann, *M. arnoldiana* De Wild., *M. holstii* Schumann, *M. ulugurensis* Warburg and Moritz ex Warburg, *M. fecunda* Stapf, *M. laurentii* De Wild., *M. bagsshawei* Rendle and Greves, *M. davyae* Stapf, *M. ruandensis* De Wild., *M. rubronervata* De Wild., *E. edule* Horan., *E. buchanani* (Baker) Cheesman, *E. schweinfurthii* (Schumann and Warburg) Cheesman, *E. arnoldianum* (De Wild.)

Cheesman, *E. holstii* (Schumann) Cheesman, *E. ulugurensis* (Warburg) Cheesman, *E. fecundum* (Stapf) Cheesman, *E. laurentii* (De Wild.) Cheesman, *E. bagsshawei* (Rendle and Greves) Cheesman, *E. davyae* (Stapf) Cheesman, *E. ruandense* (De Wild.) Cheesman, *E. rubronervatum* (De Wild.) Cheesman, *M. africana* Hort.

Description: This is the most important species in the genus. Reaching 5–7 m (16–23 ft) tall, it ranges throughout much of the African continent, and produces a rhizome that is used as a staple food by approximately 8 million people in the Ethiopian highlands. The variety ‘Maurelii’, ‘Red Abyssinian’, or ‘Black banana’ (synonym *E. maurelii*) is the most colorful, with the brightest red midribs, above and below, with rich dark red leaf stalks (petioles) and blackish-red leaf blades. Its flower cluster, embraced in maroon bracts, may reach 3 m (10 ft) long. The seeds are large, about 18 mm diameter x 14 mm deep (0.7 in x 0.5 in). Introduced into Hawai‘i, it is rare or no longer present there.



*Ensete ventricosum*. PHOTO: J. DANIELLS

## *Musa*

The genus *Musa*'s center of origin is Asia (primarily southern and southeastern). A great number of important plants are found in the genus; those that bear edible fruit are the most significant. In addition to fruit, bananas and plantains provide many cultures with medicines, beverages, fibers, edible floral parts, dyes, fuel, steam for cooking, cordage, wrapping materials, etc. With few exceptions, the familiar eating bananas are naturally occurring hybrids among the various subspecies of *M. acuminata* and interspecific hybrids between *M. acuminata* and *M. balbisiana*.

*Musa* taxonomy is confused by several factors including the sterility, ancient domestication, and hybrid origins of the cultivated varieties (cultivars), and the unwillingness of many to adopt newer, correct names. For example, Linnaean binomials such as *M. paradisiaca* ('French' plantain) and *M. sapientum* ('Silk') are still used decades after the cultivars to which these names refer were recognized as *M. acuminata* × *M. balbisiana* hybrids (see Part 2). Constantine summarized the confusion (Constantine, 2004).

Historically, four sections have been recognized in *Musa*, AUSTRALIMUSA, CALLIMUSA, MUSA (formerly known as EUMUSA), and RHODOCHLAMYS. Recent molecular analyses indicate a reduction to two sections, but much further study is required before the above system is abandoned.

### Section AUSTRALIMUSA (chromosome number: x = 10)

Seeds subglobose or compressed, smooth, striate, tuberculate or irregularly angled. Contains the Fe'i bananas, which are important in the Pacific. Their origins are complex and may involve as many as three species, *M. lolodensis*, *M. maclayi* and *M. peekelii*. Also included in the section is an important source of fiber, abacá (*M. textilis*).

Plants in the AUSTRALIMUSA section are generally tall, with seeded fruit, and distinctive green or greenish-yellow buds (if present). Their seed structure is important for classification purposes, viz. either subglobose or compressed, smooth, striate, tuberculate, or irregularly angled.

Section AUSTRALIMUSA ranges naturally from New Guinea and northern Queensland into the western Pacific. However, a principal component, the Fe'i bananas have become famous because of their association with French Polynesia, where they were transported long distances in canoes by Polynesian seafarers as far back as 250 BC (Marquesas Islands) and later in ~800 AD (Tahiti). In 2004, Micronesian Fe'i bananas enjoyed spotlighting in Pacific agricultural circles. 'Karat', 'Utin lap' and other ba-

nanas have been shown to contain the high levels of beta carotene (vitamin A precursor).

Fe'i are robust plants bearing erect bunches of brilliant orange-gold fruit, which are delicious and nutritious when baked or boiled, especially if the slices are swathed in fresh coconut cream. Additional characteristics (also in *M. jackeyi*) are a "bloody" purple-magenta sap and the production of reddish-amber to red urine by those who consume the fruit.

*M. textilis* (abacá or Manila hemp) is particularly important in Philippine culture, and to a certain extent in some traditional islands of Micronesia, as a source of fiber. The translucent, silky shirts (often embroidered) worn by Filipino men on important occasions are woven from paper-thin strips of abacá pseudostem. In the outer islands of Yap, islanders still use hand-loom to weave abacá fiber into women's wrap-around skirts or lavalavas (pareus). Abacá produces a shiny, apple-green bud.

*M. bukensis* Argent

*M. jackeyi* W. Hill. Common name: Johnstone River banana.

This has only a small range in North Queensland, Australia. It greatly resembles a Fe'i, with upright fruit stalk, Fe'i-like bananas, an enormous green bud pointing skyward, and "bloody" sap. May be synonymous with *M. maclayi* subsp. *ailuluai*.

*M. lolodensis* Cheesman

Possible precursor of the Fe'i bananas. Native to the West Sepik region of Papua New Guinea and parts of Indonesia.

*M. maclayi* von Muell. ex Mikl.-Maclay

Possible precursor of the Fe'i bananas. The fruits are rounded, appressed together in tight bunches, and in some varieties, partly joined together laterally.

subspecies *ailuluai* Argent

subspecies *maclayi*

var. *erecta* (Simmonds) Argent

var. *maclayi*

var. *namatani* Argent

*M. peekelii* Lauterb.

Possible precursor of the Fe'i bananas. A very tall plant (>10 m [33 ft]), with a bunch of fruits tipped with a narrow green bud which is pendent, rather than reaching skyward. Its geographical range includes Papua New Guinea, and it was found in the Philippines (Palawan) in 1960. Intro-

duced into Hawai'i, this banana can be seen at the Waimea Valley Audubon Center, O'ahu.

subspecies *angustigemma* (Simmonds) Argent Synonym: *M. angustigemma* Simmonds

subspecies *peekelii*

*M. textilis* Née. Common names: abacá, Manila hemp, amukid, maguindanao (Philippines)

Synonyms: *M. formosana* Hayata, *M. textilis* Née. var. *tashiroi* Hayata

Before the advent of synthetic textiles, *M. textilis*, was the source of one of the world's premier fibers—soft, silky, glistening, and fine-textured. Its fibers were also suitable for other manufactured products such as rayon, cellophane, and newsprint. It was even a constituent in some European paper money. Commercial production was greatest in the Philippines and Central America, but has now all but disappeared. Niche markets now cater to intricately woven floor mats, fancy place mats, and specialty paper.

Abacá is a beautiful, tall plant, typical of the AUSTRALIMUSA section. Introduced into Hawai'i for commercial purposes in the late 1800s, it is now rare. It can be found at the Waimea Valley Audubon Center (O'ahu) and National Tropical Botanical Garden (Kaua'i).

### Section CALLIMUSA (chromosome number: x = 10)

Bracts plain, firm, shiny on the outer surface, rarely glaucous and strongly imbricate when closed. These plants are most important as ornamentals. Most bear upright flower stalks, variously colored buds and flowers, and small seedy fruit.

*M. alinsanaya* Valmayor, sp. nov. Common name: Alinsanay

Its shiny green bud hides purple inner linings, and its small fruit are “long bottle-nosed” and seedy.

*M. beccarii* Simmonds

This species bears a narrow, elliptical, bright scarlet bud, with green-tipped bracts. Fruits are green and skinny.

*M. borneënsis* Beccari

*M. campestris* Beccari

*M. coccinea* Andrews. Common Names: Red (flowering) Thai banana, scarlet banana, Thai red banana, coccinea, Okinawa torch, Okinawan banana flower, red ornamental banana

Synonyms: *Musa uranoscopos* Lour. non Rumph., *Musa uranoscopos* Lour. non Colla.

This species bears a rounder red flower cluster than *M. beccarii*, composed of erect spirals of red bracts, inside which are enclosed tubular yellow flowers. Its orange, seeded fruit are small (ca. 0.8 cm [2 in] long). Native to China and Indochina. Occasionally grown in Hawai'i at commercial heliconia farms, especially on Maui and the island of Hawai'i.

*M. exotica* R. Valmayor, sp. nov.

A species described in 2004, *M. exotica* was originally collected from the Cuc Phuong Forest Reservation, Ninh Binh Province, Vietnam. It has a clear orange, upright bud and male flowers, below which small yellow bananas develop.

*M. flavida* M. Hotta

*M. gracilis* Holttum

A beautiful plant (<2 m [6.6 ft] tall), with narrow, magenta and green striped fruits, and an upright pink-purple bud. Native to Malaysia and Thailand.

*M. salaccensis* Zoll. Common name: Javanese wild banana

*M. suratii* G. C. G. Argent

*M. violascens* Ridley

A fairly short ornamental plant, with mauve bud bracts. Occasionally found in Hawai'i's botanical gardens. This species is often confused with *M. ornata*.

### Section MUSA (former section) EUMUSA (chromosome number: x = 11)

Most cultivated varieties (cultivars) of edible banana originated from two species in this section, *M. acuminata* and *M. balbisiana*.

*Musa acuminata* Colla.

Synonyms: *M. chinensis* Sweet, *M. corniculata* Kurz, *M. rumphiana* Kurz, *M. simiarum* Kurz

A variable species with six to nine subspecies, depending on the authority (eight are described here). Recent genetic studies have identified which subspecies were probable parents of some important edible cultivars worldwide (see Part 2). Recent expeditions have focused on finding, analyzing, and attempting to protect the myriad forms of this species, in the hopes that banana breeders will be able to develop more—and better—strains of disease-resistant bananas. Because of the increasing incidence of debilitating pests and banana diseases, together with increasing world populations, breeders are expending great effort to develop desirable seedless bananas, suitable for growing under a wide range of environmental conditions and appropriate for many cultural food preferences. *M. acuminata*'s native

habitat ranges throughout SE Asia (west to Myanmar) and Papua New Guinea.

**subspecies *banksii*** (F. Muell.) Simmonds. North Indonesian islands, Papua New Guinea, and northern Queensland, eastward to Samoa, where it is called 'Fa'i Taemanu' (rare today).

Synonym: *M. banksii* F. Mueller

This is a key subspecies for those interested in edible, hybrid bananas that arose within the Pacific, since it is considered to be both maternal and paternal parents of Plantain and 'Pōpō'ulu' subgroups, and the maternal parent of the 'Maia Maoli' subgroup. Maoli bananas, characterized in part by 15–20 cm (6–8 in), sausage-shaped fruit with rounded tips, are the primary clone represented in Oceania, ranging from the western Pacific >6400 km (>4000 mi) eastwards to the Marquesas Islands.

**subspecies *burmannica*** Simmonds. Burma, southern India and Sri Lanka.

**subspecies *burmannicoides*** DeLanghe. Southern India.

**subspecies *errans*** Argent. Common names: Fleur de banane des Philippines, saging maching, saging na ligao, saging chongo, agutay (Philippines)

Synonyms: *M. errans* Teodoro, *M. troglodytarum* L. var. *errans*, *M. errans* Teodoro var. *botoan*

Another banana that was significant in the past for its maternal contributions to many AA and AAA dessert bananas. It is a very pretty subspecies, with a blue-violet pendent bud and very pale green immature fruit.

**subspecies *malaccensis*** (Ridley) Simmonds. Peninsular Malaysia and Sumatra.

Synonym: *M. malaccensis* Ridley

Paternal parent of 'Silk' AAB, the "true apple" banana, common in the West Indies (not to be confused with "apple" bananas of Hawai'i). The clone 'Pisang Lilin' is a derivative of this subspecies.

**subspecies *microcarpa*** (Beccari) Simmonds. Borneo.

This subspecies has given rise to the clone 'Veinte Co-hol'.

**subspecies *siamea*** Simmonds. Cambodia, Laos and Thailand.

**subspecies *truncata***. Peninsular Malaysia (highlands)

**subspecies *zebrina*** (Van Houtte) R. E. Nasution. Java. Common Name: Blood banana

Synonyms: *M. acuminata* Colla subsp. *sumatrana* (Becc.) A.N. Other, *M. acuminata* Colla 'Sumatrana' Hort., *M. sumatrana*, *M. sumatrana* 'Rubra'

This subspecies was transported not only eastwards into the Pacific, but west to Africa, where it evidently became the paternal parent of the Mutika/Lujugira subgroup AAA (aka East African Highland Bananas).

This plant has striking dark green leaves spotted with variably sized maroon patches. Thriving under heavy shade, it is also characterized by very slender pseudostems and small, slender, prominently "beaked" fruits full of grape-like seeds.

In Hawai'i, it may be seen only occasionally, primarily in botanical gardens such as Waimea Valley Audubon Center, and Lyon Arboretum (O'ahu), and rarely in private gardens. It is of cultural significance in Hawai'i, because it is possibly the only seeded banana variety introduced as a medicinal plant by pre-Cook Polynesians. As such, it is called 'Mai'a 'Oa', although there has been much local confusion with other seeded bananas, particularly *M. balbisiana*.

***M. balbisiana*** Colla. Common names: Balbisiana, Balbis banana, Starchy banana, Mealy banana, Seedy banana, Wild (starchy) banana, Devil banana and Seeded "apple" banana (Maui, Hawai'i), Pisang Klutuk Wulung, Botohan, and Pacol (Philippines).

Synonyms: *M. brachycarpa* Back., *M. liukiensis* (Matsum.) Makino, *Musa* × *sapientum* var. *liukiensis* Matsum., *M. sapientum* L. var. *liukiensis* Matsum. *M. sapientum* L. var. *pruinosa*

This species is extremely robust, fast-growing, and drought-resistant. The wild, seedy forms are much less variable than *M. acuminata*, although five morphotypes have been described. It is found in Hawai'i (Maui, O'ahu), likely having been introduced from the Philippines into O'ahu in the late 1800s with the fiber plant, abacá (*M. textilis*). It eventually became a useful windbreak. *M. balbisiana* is one of the parents of many edible seedless bananas. It is native to Southeast Asia from Sri Lanka to the Philippines.

***M. basjoo*** Sieb. Common names: Japanese (fiber) banana

Synonym: *M. japonica*

Used for fiber and as an ornamental. Native to Japan (including the Ryuku Islands), this is probably the world's most cold-hardy banana. It is a medium-sized plant (to 5 m [16 ft]) similar to abacá, with a beautiful, rounded, large green and yellow, shiny bud and inedible fruit. It is also used for fiber, elegant fabrics, and as an ornamental.

*M. cheesmani* Simmonds

*M. flaviflora* Simmonds

*M. balabanensis* Meijer. Common name: West Sumatra wild banana

*M. itinerans* Cheesman

*M. nagensium* Prain

*M. ochracea* Shepherd

*M. schizocarpa* Simmonds

*M. sikkimensis* Kurz

Synonym: *M. hookerii* King

### Section RHODOCHLAMYS (chromosome number: $x = 11$ )

Many highly ornamental species are found in this section.

*M. aurantiaca* Mann ex Baker

*M. laterita* Cheesman. Common name: Indian dwarf banana.

Native to Myanmar (Burma) and Thailand, this is an orange-red budded ornamental bearing yellow female flowers.

*M. mannii* H. Wendl. ex Baker. Common name: Mannii, dwarf banana

This little known species from Assam, rare in the wild, has recently been discovered by horticulturalists, propagated, and made available to tropical plant enthusiasts. A dwarf ornamental (ca. 1 m [3.3 ft] tall), its most notable features are bright pink-purple fruiting stems and bud bracts.

*M. ornata* Roxb. Common names: Ornamental banana, flowering banana, ornata

Synonym: *Musa rubra* Wall.

Originally hailing from Bangladesh, Burma and India, this species is probably the most widely planted ornamental banana in the tropics and subtropics. In Hawai'i, *M. ornata* is occasionally grown in botanical and private gardens, particularly along the wet, windward coasts.

*M. rosacea* Jacq.

*M. rosea* Baker

*M. rubra* Wall. ex Kurz

*M. sanguinea* Hook. f.

Synonym: *Musa* × *paradisiaca* L. ssp. *sapientum* (L.) Kuntze var. *sanguinea* Welw.)

Another striking ornamental from northern India, this one (like *M. mannii*) has a pink-purple bud and fruit stalk. The

bud bracts are whitish inside, and immature fruits are pale green.

*M. velutina* H. Wendl. and Drude. Common names: Fuzzy (pink) banana, self-peeling banana, pink banana, hot pink banana, Velutina

Native to northern India, it is widespread in tropical botanical gardens, and is becomingly increasingly available for homegardens. Its upright "hot" pink bud, whose bracts are crowded with bright yellow flowers, produce small, fuzzy, fat, bright pink bananas. Their white inner flesh is packed with black seeds, which germinate readily, although rather slowly. This banana's species name, *velutina*, means "velvety", as indeed it is. When ripe, the banana's flesh bursts through its skin at the apex, then proceeds to "peel itself", true to its alternate common name, "self-peeling banana". In Hawai'i, this species thrives wherever it is planted, especially in wet, windward regions. It can grow at least as high as 1100 m (3600 ft) on Haleakalā, Maui.

### *Incertae sedis* (taxa with uncertain taxonomic positions)

*M. boman* Argent ( $x = ?$ )

A tall plant from New Guinea with a glossy yellow bud, resembling abacá (*M. textilis*).

*M. ingens* Simmonds (chromosome number:  $x = 7$ )

This is the world's largest herb, and can reach 15 m (49 ft) in height and 2.5 m (8 ft) in circumference at the base. It is found on the island of New Guinea between 1000 and 2100 m (3300–6900 ft) in elevation.

## Part 2: Cultivated varieties (cultivars) of edible bananas

Most edible bananas originated from two species in the section MUSA, *M. acuminata* and *M. balbisiana*. The cultivars are either hybrids among subspecies of *M. acuminata* (see Part 1) or between *M. acuminata* and *M. balbisiana*. These hybrids are diploid (two sets of chromosomes), triploid (three sets, the most common and important ploidy), or tetraploid (four sets). A perceptive observer can usually deduce a variety's genome (i.e., its ploidy and relative content from *M. acuminata* and *M. balbisiana*) by observing leaf thickness, size, and orientation, and by using a scoring system that considers 15 morphological characteristics. However, ploidy is best determined by chromosome counts or flow cytometry. These include pseudostem ("trunk") color, leaf stem (petiole) structure, fruit stalk (peduncle) hairiness, shape and size of the male bud, scars left from falling flowers on the lower fruit stalk (rachis), and details of the male flowers. When denoting each cultivar's genome, a lettering system is used. For example, *M. acuminata* and *M. balbisiana* are diploids, with genome AA and BB, respectively, and AA and AB clones are cultivated. Hybrid triploids are classified as AAA, AAB, or ABB. Tetraploid bananas (mostly products of breeding programs) may be AAAA, AAAB, AABB, or ABBB.

*M. acuminata* evolved primarily in tropical rainforests in Southeast Asia, whereas *M. balbisiana* originated in monsoon areas in northern Southeast Asia, and southern Asia. Thus, pure *M. acuminata* cultivars developed first in Southeast Asia and its hybrids with *M. balbisiana* arose where distributions of the two species overlapped. As newly

discovered hybrids were carried by indigenous peoples by land and sea, more opportunities for hybridization arose, especially since not all were completely sterile. However, variation in the crop in its secondary centers resulted primarily from mutations in the cultivars.

Major secondary centers of diversity occur in West Africa (Plantain subgroup), Polynesia (Maoli-Pōpō'ulu and Iholena subgroups, aka Pacific Plantains), and East Africa (Mutika/Lujugira subgroup, aka East African Highland Bananas). With the exception of hybrids from the breeding programs, all cultivars discussed below are natural hybrids. Over thousands of years, they were selected by people and henceforth propagated vegetatively as clones. They can produce fruit without fertilization, which is called "parthenocary." Many cannot interbreed because they are sterile. Bananas produce basal suckers (called *keiki* in Hawai'i, the local word for "children"), which can be used to propagate an individual plant vegetatively. Only recently have the origins of the hybrids begun to be understood (see Part 1).

The edible bananas are highly diverse. Some of the most variable traits include: plant stature and architecture; sucker production; pigmentation; bunch size, orientation, and shape; fruit size, shape, color, and taste. Estimates of the numbers of cultivars that occur worldwide range from 300 to more than 1000. Common names that have been given to some of the cultivars are ambiguous. There are hundreds of duplicate names and close clonal relatives found in every region of every banana-growing country. There are so many names that even compiling lists for specific countries or regions is a daunting task. For example, 'Lady(s) Finger' has been used to name at least four distinct AA, AB, and AAB clones.

In the following list, cultivars and groups of cultivars with an *acuminata/balbisiana* heritage are listed alphabetically within a given genome. Where it first appears, the most widely used common name of a cultivar is listed in boldface type. Other, less commonly used names are listed thereafter, and specific countries or regions in which the names are used are listed in parentheses. Bananas that are hybrids between *M. acuminata* and *M. textilis*, and *M. acuminata* and *M. schizocarpa* are unimportant and not included below. The Fe'i bananas, which arose from a different group of *Musa* spp. in the AUSTRALIMUSA section, are covered separately at the end of Part 2.



Seeded fruit of *M. balbisiana*. PHOTO: R. PLOETZ

### AA GENOME

Cultivars with an AA genome are most abundant in Malaysia, Indonesia, India, and Papua

New Guinea (the only place where AA clones are common). They are cultivated due to their extraordinarily sweet, fine quality fruit. In general, they are less hardy than triploid cultivars.

### **Inarnibal subgroup**

**'Inarnibal'** (Philippines) lit. "syrup"

Other common names: 'Pisang Lemak Manis' (Malaysia); 'Pisang Lampung' (Indonesia); Pisang Berlin (Indonesia)

**Lakatan subgroup** (There is an accession of this cultivar in Australia with an AAA genome.)

**'Lakatan'** (Philippines)

Other names: 'Pisang Berangan Merah/Kuning' (Malaysia), 'Pisang Barangan Merah/Kuning' (Indonesia), 'Kluai Hom Maew', 'Kluai Ngang Phaya' (Thailand); Mapang

A delicious, much-loved cultivar, commonly grown in the Philippines. Not to be confused with the tall Cavendish cultivar 'Lacatan' (AAA).

### **Pisang Lilin subgroup**

**'Pisang Lilin'** (Malaysia, Indonesia)

Other names: 'Lidi', 'Pisang Lidi', 'Pisang Empat Puluh Hari', 'Pisang Lemak Manis Teranganu', 'Pisang Lemak Manis Kelantan', 'Pisang Mas Sagura', 'Pisang Ekor Kuda' (Malaysia); 'Mama-on' (Philippines); 'Pisang Lemak Manis', 'Pisang Muli' (Indonesia); 'Kluai Lep Mu Nang', 'Kluai Thong Ki Maew', 'Kluai Thong Kap Dam' (Thailand), 'Chuai Tien' (Vietnam).

### **Sucrier subgroup**

**'Sucrier'** (Fr. lit. "sugar bowl or basin")

Other common names: 'Lady's Finger' (Hawai'i); 'Amas', 'Caramelo', 'Kamoros' (Philippines); 'Pisang Mas' (Ma-



Left: 'Sucrier'. PHOTO: I. MAGUIRE Right: 'Sucrier' fruit. PHOTO: A. K. KEPLER



aysia, Indonesia); ‘Kluai Khai’ (Thailand); ‘Sagale Nget-Pyaw’ (Burma/Myanmar); ‘Surya Kadali’ (India); ‘Kudud’ (Pohnpei, Federated States of Micronesia); ‘Sucrier’, ‘Sucrier Fig’, ‘Fig’, ‘Datil’, ‘Honey’, ‘de Rosa’, ‘Fig Sucré’ (West Indies); ‘Orito’ (Ecuador); ‘Lady Finger’, ‘Nino’ (Florida); ‘Bocadillo’ (Colombia); ‘Banana Ouro’ (Brazil), ‘Peru’, ‘Fig’, ‘Tinito’ (French Polynesia); ‘Rose’, ‘Golden Early’, ‘Date’, ‘Fig’, ‘Dedo de Dama’, ‘Niño’, ‘Manices’, ‘Guineo Blanco’, ‘Cambur Titiaro’ (Latin America), ‘Parika’ (Guyana).

‘Sucrier’, originating in Malaysia, is the most widely cultivated AA cultivar and is one of the world’s most popular local bananas. Its finger-sized fruit are deliciously sweet. The plant resists Panama disease (*Fusarium* wilt) and thrives when grown in partial shade. Its fruit length depends on soil and climate, reaching 1.6–2 in (4–5 in) under perfect growing conditions. It is rare in Hawai‘i.

### Other AA cultivars

‘Chingan’ (India)

Other common name: ‘Manniyilla Chingan’ (India)

‘Hapai’ (Hawai‘i) lit. “pregnant”

Other names: ‘Hapū’ (Tahiti) lit. “pregnant”

The AA genome has been assigned to this previously unclassified, rare Polynesian banana, based on morphological characters. Occasionally, the bananas of this clone develop within the pseudostem, causing a swelling that is reminiscent of pregnancy, thus the name.

‘Tuu Ghia/Gia’

A variety introduced into several Pacific islands with a distinctive long bud and “messy” rachis is resistant to black Sigatoka disease and is used in breeding.

### Miscellaneous AA cultivars

‘Malaysian Blood’, ‘Pisang Jari Buaya’ (Indonesia, Malaysia), ‘Rose’ (Indonesia), ‘Senorita’ (Philippines), ‘Tapo’, and numerous PNG cooking cultivars.

## AB GENOME

AB cultivars are uncommon. Among these, ‘Ney Poovan’ is grown most widely, due to its exceptional flavor.

### Kamarangasenge subgroup

‘Sukari Ndizi’ (also, ‘Sukali Ndizi’) (Uganda)

Other common name: ‘Kamarangasenge’ (Rwanda)



AA cultivar ‘Peleu’ typical of PNG, growing in Pohnpei.

PHOTO: J. DANIELLS

### Ney Poovan subgroup

‘Ney Poovan’ (India)

Other common names: ‘Safet Velchi’ and ‘Chini Champa’ (India); ‘Kisubi’ (Uganda); ‘Ranel’ (Sri Lanka); ‘Apple’, ‘Farine France’, ‘Lady’s Finger’ (West Indies)

‘Ney Poovan’ produces a sweet, subacid fruit with white flesh. Older reports that indicate that the cultivar resists Panama disease are in error.

### Other AB cultivar

‘Kunnan’ (India)

## AAA GENOME

### Cavendish subgroup

This is a most significant subgroup of edible bananas. The Cavendish cultivars produce fruit that are used in inter-

national commerce; they are major export commodities in Central America, South America, the Caribbean, West Africa, and the Philippines. Local production of these clones is of even greater importance. In total, Cavendish cultivars are the most popular and valuable of the edible bananas; they comprise over 40% of these fruit that are produced worldwide. In equatorial lowlands where the ambient temperatures are high, fruits turn greenish-yellow when ripe, although where temperatures are a bit cooler or when artificially ripened, they turn bright yellow.

The subgroup is resistant to Panama disease in the western tropics, but is susceptible to the Sigatoka leaf spots; management of the latter disease is a major expense in commercial production, especially in areas with high rainfall.

The various clones are similar except for their height and characteristics of the bunch and fruit. In general, the trades have chosen productive cultivars of moderate stature (tall clones lodge in high wind and are difficult to harvest). All but 'Extra Dwarf Cavendish' are productive if they are provided with ample fertilizer and water. The list below is in descending order of the height to which they will grow in a given location (for a given cultivar, height varies greatly with elevation, temperature, and water supply).

**'Pisang Masak Hijau'** (Malaysia) (lit. "green ripe banana")  
Other common names: 'Hamakua' (Hawai'i); 'Bungulan' (Philippines); 'Lacatan' (western tropics); 'Pisang Buai', 'Pisang Embun Lumut' (Malaysia); 'Pisang Ambon Lomoet' (Indonesia); 'Kluai Hom Kiau' (Thailand); 'Thihmwe' (Burma/Myanmar); 'Sapumal Anamalu' (Sri Lanka); 'Bout Rond' and 'Giant Fig', 'Congo' (West Indies); 'Mestiça' (Brazil); 'Monte risto' (Puerto Rico), 'Chuoi Tieu Cao #1' (Vietnam); 'Siaine' (Tonga, also general name for Cavendish Group); 'Amoa Kauare' (Cook Is.); 'Veimama' (Fiji)

This cultivar is usually too tall for commercial production. It is grown in Jamaica and Puerto Rico, and used for coffee shade in Colombia and Ecuador. In Hawai'i, it was recently wiped out on O'ahu by bunchy top disease; the authors have not yet found it elsewhere in the State.

#### **'Giant Cavendish'** cultivars

Other common names: 'Veimama' (Fiji); 'Giant Chinese' (general name); 'Mons Mari', 'Tall Mons Mari' (Queensland); 'Williams', 'Williams Hybrid' (Australia and most Pacific islands, including Hawai'i); 'Harichal' (India); 'Robusta', 'Nain Gánt', 'Giant Governor' (West Indies); 'Nanicó' (Brazil); 'Pisang Cina' (Malaysia); 'Robusta', 'Valery' (Central America, Jamaica, Hawaii); 'Taiwan' (Hawai'i), 'Porto Rique' (Dominica, West Indies); 'Poyo' (Guadeloupe); 'Congo' (Surinam—see also 'Pisang Masak Hijau'); 'Maghrabi', 'Williams' (Egypt); 'Tumok' (Philip-

pines); 'Pisang Ambon Hijau' (Indonesia); 'Kluai Khlong Chang' (Thailand); 'Chuoi Tieu Nho' (Vietnam); 'Siaine' (Tonga, also name for general Cavendish Group); 'Fa'i Palagi' (Samoa, also general name for Cavendish Group); 'Amoa Taunga' (Cook Is.); 'Vaimama Leka' (Fiji); 'Saina' (New Guinea); 'Congo' (Surinam); 'Bijaw' (China); 'Amoa Taunga', 'Amoa Kauare' (Cook Islands); 'Siaine Ha'amo'a' (Tonga); 'Hamo'a' (French Polynesia); 'Utin Wai' (Pohnpei, Federated States of Micronesia).

There are several 'Giant Cavendish' cultivars that are so similar that they cannot be distinguished unless they are planted side by side. Even their male flowers are indistinguishable. Mid-way in stature between 'Pisang Masak Hijau' and 'Dwarf Cavendish', they may differ in height by about 40 cm (1 ft) and exhibit subtle differences in bunch, finger, trunk, and rachis morphology and color.

**'Grande Naine'** (also **'Grand Nain'**) (Fr. lit. "big dwarf")

Other common names: 'Umalog' ('Umalog' is another spelling) (Philippines); 'Pisang Ambon Jepang' (Indonesia); 'Chuoi Va Huong' (Vietnam)

'Grande Naine' is the most important commercial clone worldwide due to its resistance to wind throw and production of large bunches and fingers despite its relatively small stature. It should be understood that these height designations assume that the different clones are being compared side-by-side, i.e., growing simultaneously in the same location. It can be sensitive to drought and other adverse soil conditions. In Hawai'i, it is occasionally seen at high elevations.

#### **'Dwarf Cavendish'**

Synonyms: *M. cavendishii* Lamb., *M. cavendishii* Lamb. & Paxt., *M. cavendishii* Paxt., *M. nana* auct. non Lour., *M. sinensis* Sweet ex Sagot

Other common names: 'Cavendish', 'Chinese', 'Dwarf Chinese', 'Pake' (Hawai'i); 'Poot', 'Tampohin', 'Tampihan', 'Sulay Baguio' (Philippines); 'Jainaleka' (Fiji); 'Fa'i Palagi' (also refers to 'Giant Cavendish' in Samoa) (Samoa); 'Chuoi Duu' (IndoChina); 'Canary Banana', 'Dwarf Cavendish' (general); 'Pisang Serendah' (Malaysia); 'Pisang badak' (Indonesia); 'Kaina Vavina' (Papua New Guinea); 'Dwarf Cavendish' (Australia); 'Ai Keuk Heung Ngar Tsiu' (Hong Kong); 'Kluai Hom Khieo Khom', 'Kluai Hom Kom' (Thailand), 'Wet-ma-lut' (Burma/Myanmar); 'Banan Gabou' (Seychelles); 'Pacha Vazhai', 'Mauritius', 'Vamanakeli', 'Pachawara', 'Basrai', 'Kabulee', 'Bhusawal', 'Jahaji' (India); 'Binkehel', 'Nanukehel', 'Pandi' (Sri Lanka); 'Kinguuruwe', 'Malindi' (Tanzania and Zanzibar), 'Nyoro' (Kenya); 'Giuba' (Somalia); 'Mouz siny', 'Moz Hindi', 'Hindi', 'Indian', 'Basrai' (Egypt); 'Bazrai' (Pakistan); 'Johnson' (Ca-

nary Islands); ‘Camyenne’ (Guinea); ‘Guineo Enano’, ‘Petite Naine’, ‘Governor’ (West Indies); ‘Camburi Pigmeo’, ‘Enano’ (lit. “dwarf”) (Latin America); ‘Ana’, ‘Ananica’, ‘Caturra’ (Brazil); ‘Mei’a’, ‘Meika Kina’, ‘Kira’ (French Polynesia); ‘Chuoï Tieu Lun’ (Vietnam); ‘Siaine Tonga’ (Tonga); ‘Amoa Taunga Potopoto’ (Cook Is.); ‘Park-yuk’ (China)

This is the most widely distributed clone of edible banana worldwide; it is also the shortest used for commercial production. It bears good-quality fruit, with a long transport life if picked at the correct maturity (which is a general character of Cavendish subgroup), and is well suited for homegarden, commercial, and agroforestry cultivation. Short and compact, it is relatively cold-tolerant. However, it is highly susceptible to banana bunchy top virus, and chokethroat (impeded bunch emergence) where temperatures below 15°C (59°F) occur for extended periods. In Hawai‘i, ‘Dwarf Chinese’ is grown everywhere from the

lowlands to the coldest elevations which banana tolerates (approximately 1300 m [4260 ft]).

#### ‘Double’

Sometimes called ‘Māhoe’ or ‘Mahoi’ in error, because it is different from the true ‘Māhoe’ in the Maoli-Pōpō‘ulu Group, is a ‘Dwarf Chinese’ mutant that produces 2–7 bunches per plant (these are surprisingly common in French Polynesia), but evidently occur wherever this clone is grown.

#### ‘Extra Dwarf Cavendish’

Other names: ‘Dwarf Parfitt’ (Australia); ‘Dwarf Nathan’ (Israel)

This clone, less than 1 m (3.3 ft) tall, does not produce acceptable fruit and is used as an ornamental plant.



Left: ‘Williams’, a ‘Giant Cavendish’ cultivar. Ulaino, windward Maui, Hawai‘i. Right: Young ‘Dwarf Cavendish’ bunch. Haiku, Maui. PHOTOS: A. K. KEPLER

## Gros Michel subgroup

Members of this subgroup are listed below in descending order of height. They can be confused with members of the Cavendish subgroup (note common names in Burma and Sri Lanka). Cultivars in the Gros Michel subgroup can be distinguished from those in the Cavendish subgroup by their green/pale pink vs bright red undersheath, bottle-necked fruit, ripening to full yellow color at ambient equatorial temperatures, short pedicels, and extreme susceptibility to Panama disease in the Americas and Africa. These clones produce a few seed when pollinated and have been used in the breeding programs.

### 'Gros Michel' (West Indies)

Other common names: 'Bluefields' (Hawai'i); 'Jainabalavau' (Fiji); 'Au Malie', 'Fa'i Fia Palagi' (Samoa), 'Pisang Embun', 'Pisang Ambon' (Malaysia); 'Pisang Ambon Putih' (Indonesia); 'Kluai Dok Mai', 'Kluai Hom Thong' (Thailand); 'Avabakor', 'Disu' (Papua New Guinea); 'Anamala' (Sri Lanka); 'Thihmwe' (Burma/Myanmar); 'Guineo Gigante', 'Guaran' (Puerto Rico); 'Raimbaud', 'Makanguia' (French Antilles); 'Banano', 'Habano', 'Guineo' (Colombia); 'Plantano Roatan' (Mexico); Jainabalavu (Fiji); 'Siaine Fisi' (Tonga); 'Ambon' (Philippines); 'Chuoitieu Cao #2' (Vietnam)

'Gros Michel' is a vigorous plant, but is tall (7 m [23 ft] or more) and very prone to wind damage. It produces excellent fruit that are more durable than those of the 'Cavendish' cultivars. It was the standard for export until the mid-1900s, but was eliminated from commercial production due to widespread and destructive epidemics of Panama disease. As a result, members of the Cavendish subgroup replaced this clone in most of the affected areas. Isolated pockets of 'Gros Michel' production remain, especially where disease suppressive soils exist. 'Bluefields', the cultivar's name in Hawai'i, is the port in Nicaragua from which the clone was sent to the island.

### 'Cocos' (Honduras), 'Highgate' (Jamaica)

These smaller versions of 'Gros Michel' were used extensively in breeding programs, especially in Jamaica and Honduras. Several hybrid bananas developed in Honduras in the FHIA program have proven to be disease-resistant, highly productive, basically seedless, and of generally acceptable taste. They are currently being introduced to many Pacific islands (e.g., Micronesia, Samoa, Tonga, French Polynesia) to eventually supplement more established bananas that are being weakened and killed by introduced pests and diseases.

### 'Lowgate' (Honduras)

This smallest version of 'Gros Michel' is used in the FHIA breeding program.



'Gros Michel'. Puohokumoa Stream, Maui. PHOTO: A. K. KEPLER

## Ibota subgroup

### 'Yangambi Km 5'

### Mutika/Lujugira subgroup

*Synonym: Musa brieyi* De Wild.

These bananas, known generically as the East African Highland Bananas, are staple foods in the Rift Valley region of East Africa, especially in Burundi, Rwanda, and Uganda. They are found nowhere else in the world, and are an example of secondary diversity in the bananas developing outside Southeast Asia. They are cooked and brewed for beer, and are diverse. Over 200 cultivars are recognized in Uganda, five clone sets of which are recognized: 'Beer', 'Musakala', 'Nakabululu', 'Nakitembe', and 'Nfuuka'.

## Red subgroup

### 'Red'

Other common names: 'Jainadamu' (Fiji); 'Fa'i Suka', 'Fa'i Niue' (Samoa); 'Morado' (Philippines); 'Pisang Raja Udang' (Malaysia); 'Rong Rong' (Papua New Guinea); 'Kluai Nak' (Thailand); 'Shwe Nget-Pyaw' (Burma/Mynamar); 'Chenkadali', 'Lal Kera' (India); 'Rathambala' (Sri Lanka); 'Rouge' (Seychelles); 'Neuse', 'Nyekundu Ya Kisungu', 'Mzungu Mwekundu' (East Africa); 'Morado', 'Colorado', 'Figue Rouge', 'Red', 'Claret' (West Indies); 'Red Dacca' (Queensland); 'Tafetan' (Colombia); 'Banana Roxa' (Brazil); 'Kinaki Tangata' (Cook Islands); 'Akadah Weitahta' (Pohnpei); 'Red', 'Cuban Red', 'Pink banana' (Hawai'i)

A beautifully pigmented plant with deep red trunk, petioles, and midribs. It produces moderately sized bunches of fruit that have a reddish-green to deep maroon skin (depending on age and exposure to direct sunlight), and light orange flesh. They are usually eaten raw before getting mushy and fall apart when cooked or too ripe, although they can be cooked in their jackets.

### 'Green Red'

Other common names: 'Pisang Mundam' (Malaysia); 'Warabia' (Papua New Guinea); 'Green Dacca', 'Red Raja' (Queensland); 'Venkadali' (India); 'Galanamalu' (Sri Lanka); 'Banane Monsieur' (Seychelles); 'Nyeupe Ya Kisungu', 'Mzungu Mweupe' (East Africa); 'Morado Verde', 'Colorado Blanco', 'Figue Rose Blanche', 'Green Red' (West Indies); 'Tafetan Verde' (Colombia); 'Caru Verde' (Brazil); 'Moradong Puti' (Philippines); 'Pisang Telor' (Indonesia); 'Kluia Kung Khieo' (Thailand); 'Tara Puakanio' (Cook Islands); 'Green-Red', 'Colorado Blanco' (old name) (Hawai'i); 'Akadah' (Pohnpei); 'Green Macaboo' (Florida)

The Red/Green Red cultivars are related, in that those in the red series often give rise to a green form (the reverse has not been recorded). They are usually tall plants, although dwarf versions exist. They are moderate producers that are grown primarily for their attractive and unusual fruit. The fruits are usually eaten raw. Plants of the red clones are highly pigmented and produce fruit that have a red to deep maroon skin, and light orange flesh. They are used as ornamental plants in Hawai'i and elsewhere in the Pacific.

### Other AAA cultivar

'Lakatan' (Philippines) (Note that some clones by this name are supposed to be AA.)

Other common names: 'Pisang Berangan' (Malaysia); 'Pisang Barangan' (Indonesia);

## AAB GENOME

The Iholena and Maoli-Pōpō'ulu subgroups together form the "Pacific plantains," the principal Polynesian basic types of bananas from which many similar varieties evolved on different Pacific archipelagos over thousands of years. Their



Top: 'Dwarf Red'. Waip'io Bay, Maui. PHOTO: A. K. KEPLER  
Bottom: 'Dwarf Red' female flowers. PHOTO: C. ELEVITCH

history is closely linked to Polynesian migrations, transported as suckers over relatively short distances (island to island). Their dissemination across the Pacific occurred gradually. Once staple dietary items on high islands from New Guinea to the Marquesas, they have sadly become neglected, rare, and virtually unknown in many cultures. Early visitors to Hawai‘i in the late 1700s and 1800s were amazed at the prodigious numbers of “native” bananas (primarily Maoli-type) which were grown by the Hawaiian people. However, dietary tastes have changed, and the sweeter “dessert” bananas have largely displaced the native bananas since the 1850s. Land clearing, copra plantations, pests and diseases (especially banana bunchy top), plus a market economy, have all contributed to the demise of Polynesian bananas and plantains across the Pacific.

Today, only approximately half of the varieties that are known across Polynesia exist in Hawai‘i, and most are rare. Polynesian high islands such as the Samoas, Tonga, Cook Islands, and French Polynesia still have some of these bananas here and there. Further west, Maoli, Pōpō‘ulu, and Iholena types may still be found abundantly in local markets, e.g., in Vanuatu.

Full descriptions and photographs of Hawaiian (with some Pacific) varieties are being documented (Kepler and Rust, unpublished).

### **Iholena subgroup**

Iholena types are poorly represented in the Pacific these days, but still survive (barely) in Samoa, French Polynesia, Vanuatu, New Guinea, and perhaps elsewhere including Tonga. In Hawai‘i, they are the most common traditional bananas to be found in upland forests and are eaten cooked or raw. Of approximately 50 “native” Hawaiian varieties known historically, at least seven were Iholenas. Most are rare or extinct; five are still found naturalized in reasonable numbers. Three varieties (“Red” and “White” Iholenas, both forms of Mai‘a [Iholena] Lele) and a Dwarf were sent to the mainland USA more than 30 years ago.

Iholena types are graceful plants. Their most outstanding characteristics are: a) new, unfolding (cigar) leaves with striking mauve or coppery undersides; b) fruit pointed at both ends with salmon-colored flesh; c) fruit arranged loosely and at right angles on the bunch; and d) male flowers with long, lavender stamens. Iholenas are characterized by pale yellow-green immature fruits from earliest development.

#### **‘Fa‘i Mamae’ (Samoa)**

Very rare, this clone is characterized by a distinct red petiole rim and bright waxy-purple leaf undersides. Also called ‘Mama‘e Ulu’.

**‘Iholena Iholena’** (lit. “yellow core”) and its possibly extinct dwarf form, **‘Iholena Ha‘a Ha‘a’** (lit. “short-short”)

Extremely rare in Hawai‘i, this banana is a semi-dwarf, with a pale yellow-green pseudostem (blackish in ‘Ha‘a’).

**‘Iholena Kāpua’** (the name refers to the slender, arrow-shaped, beautiful flower bud). Other names: ‘Puapuanui’

This is easily recognized by its extremely long, red, slender fruit stalk (peduncle), and short-tapered fruit tips.

#### **‘Iholena Lele’** (lit. “to fly”)

This short-fruited Iholena was used in religious ceremonies. It was planted at *heiau* (temples), not near houses, because it was said to cause the souls of the house occupants to “fly” away. It also bears a dark red peduncle (up to 1.2 m [4 ft] long) and long pointed fruits with lengthly pointed tips.

#### **‘Ōre‘a’** (Tahiti)

This is the French Polynesian equivalent of Iholena. They appear to have been lost from the Marquesas but two or three rare clones still survive on Tahiti and Raiatea, perhaps also on Huahine.

Other Iholena clones include **‘Mamae Hehefanga’** (Tonga); **‘Uzakan’**, **‘Morpa’**, **‘Yamunamba’**, **‘Numeijo’**, **‘Luba’** (Papua New Guinea)

### **Maoli-Pōpō‘ulu subgroup**

#### **Maoli subdivision**

These distinctive bananas occur throughout Oceania, usually tended by islanders who recognize that they are part of their Polynesian heritage. Like all Polynesian bananas, they are particularly susceptible to pests and diseases, requiring replanting every few years. This subgroup is best recognized by its sausage-shaped fruit with blunt ends. The Maoli types are long, whereas Pōpō‘ulu types are fat and squat, and bluntly square at their tips.

In Hawai‘i, the two subdivisions are easily distinguished. However, in the western Pacific, bananas exist which possess characters of both subgroups: long like a Maoli, but plumper and square-ended like a Pōpō‘ulu. In Tonga the term Hopa means bananas of both Maoli and Pōpō‘ulu types. In Pohnpei (FSM) bananas of this intermediate type exist also such as ‘Peleu’ and ‘Karat en Iap’ (unrelated to the more common ‘Karat’ bananas, which are Fe‘i) (Englberger and Lorens, 2004).

In ancient Hawai‘i, records exist for at least eleven Maoli varieties, together with several subvarieties. Along with new discoveries, there are currently twelve extant cultivars. In the rest of the Pacific, Maoli varieties—the base clone



**‘Iholena Lele’.** Maui Nui Botanical Garden, Kahului, Maui. LEFT PHOTO: C. ELEVITCH, RIGHT PHOTO: A. K. KEPLER

for the majority of Polynesian plantains—have survived a little better than Pōpō‘ulu and Iholena bananas.

**‘Manini’** (lit. “striped surgeon fish”), **‘Koa’e’** (referring to the bold, striped plumage of tropicbirds in juvenile plumage)

Other common names: ‘A‘ea‘e’ (lit. “hair prematurely gray-ing”), ‘Hawaiian Variegated’ (Hawai‘i)

‘Manini’ is a Hawaiian cultivar with green and white variegation that covers the entire plant: leaves, leaf stalks (petioles), immature and ripe fruit, even the male and female flowers. The achlorophyllous tissues have a tendency to sunburn. Grows to height of 6–7 m (20–23 ft), prefers acid soil (<pH 6), will not tolerate neutral or basic soils, and thrives best in cloudy or lightly shaded areas. The fruit are best cooked, but are palatable raw when fully ripe.

**‘Ele‘ele’** (lit. “black-black”)

Other common names: ‘Black Hawaiian’, ‘Hawaiian Black Banana’ (Florida)

An attractive Hawaiian banana, this is extremely uncommon, preferring streambeds and well-watered forested areas. It is immediately recognizable by its shiny, blackish-burgundy trunk, leaf stalks, and midribs (especially in wild, shaded locales). Its fruit is long, meaty, and delicious fried. Its variants, ‘Poni’ (“purple”), ‘Hinupua‘a’ (“shiny like hog grease”) and ‘Puna’ (region on the island of Hawai‘i) are less black overall.

**‘Ere‘ere’** (lit. “black-black”)

Other names: ‘Iri mo‘o’ (“lizard skin”), ‘Iri pa‘o’ (“black skin/bark”)

This Tahitian variety appears to be virtually identical to Hawai‘i’s ‘Ele‘ele’.



Left: ‘Manini’ variegated leaves and fruit. PHOTO: A. K. KEPLER Right: ‘Manini’ leaves of young plant. PHOTO: C. ELEVITCH

**‘Fa’i Samoa’** (lit. “Samoan native bananas”)

This group of plantains is the Samoan equivalent of Maoli and Maoli-Pōpō’ulu types of cooking bananas. Several varieties are still grown in gardens, although they are not common: **‘Fa’i Samoa’** (most often seen), **‘Fa’i Samoa Pau Manifi’** (“thin-skinned” Samoan banana), **‘Fa’i Samoa Au Malie’** (“shark-handle”, with longer fruit than Fa’i Samoa and less even fruit bunches). **‘Fa’i Samoa Puputa’**, **‘Fa’i Samoa Lautele’**, and **‘Fa’i Samoa Lap Lapa’** are all rare.

**‘Hai’/‘Haikēa’** (waxy form of ‘Hai’, meaning “pale”)

Very rare in Hawai’i, this clone has a reddish trunk and very pink flowers.

**‘Hopā’** (Tonga)

As indicated above, the Tongan “Hopas” include Maoli, Maoli-Pōpō’ulu, and Pōpō’ulu types. Two varieties of these sausage-like Maolis still in existence are: **‘Feta’u’** and **‘Feta’u Hina’** (a whiter form). These can usually be seen on Tongan farms in Hawai’i.

**‘Māhoe’**

Other common names: ‘Palua’, ‘Mana-lua’, ‘Hualua’ (Hawai’i)

Appears to be extinct.

**‘Mangaro’** (Aitutaki, Cook Islands)

These are the Cook Island equivalents of Hawai’i’s Maoli types. At least five varieties still exist, only very rarely. **‘Mangaro Torotea’** has a very even, large bunch of fruit of plump fruits, which are perfectly sweet and delicious when still green. Rare (or nearly extinct) Mangaro varieties from the Cook Islands are ‘Mangaro Manii’, ‘M. Aumarei’, ‘M. Taanga’, and ‘M. Akamou’.

**‘Māo’i’** (Marquesas Is.) and **‘Mā’ohi’** (Tahiti)

Māo’i are the French Polynesian equivalents of Maoli, a clone almost revered in some areas because of its ancient cultural associations. Most are rare, but are locally common in a few areas. Selected varieties still in existence (as of 2004) are: **‘Māohi Huamene’**, **‘Māo’i Koka’**, **‘Māo’i**



**Ku'uhua**, **Māo'i Pukiki**, **Mei'a Ma'ohi Hai** (Marquesas, Tahiti), **Mei'a Mao'i Maita** (Fatu Hiva, Marquesas). Dozens of varieties have become extinct.

**'Maoli** (lit. "native")

A very attractive plant with pink coloration especially when young, it has large bunches of even, sausage-shaped fruit. It can be seen in botanical gardens in Hawai'i. Throughout Polynesia there are equivalents to this clone.

Other rare, extant Hawaiian Maoli varieties are: **'Kauaulau'** (with distinctive dark red male flowers), **'Mānai 'ula'** (with tough trunk fibers used for stringing leis), and **'Puhi'** (whose young fruits are complexly oriented like a bunch of young eels).

**'Pacific Plantain'**

This striking Maoli cultivar has an unknown origin in the western Pacific (Solomon Islands?). Beautiful and dark, it resembles the dark 'Ele'ele/'Ere'ere' varieties (black trunk and leafstalks), with dark green, sausage-shaped bananas.

Other cultivars elsewhere include **'Mei'a Ma'ohi Hai'** and **'Mei'a Mao'i Maita'** (French Polynesia); **'Comino'**, **'Pompo'** (Colombia); **'Comino'**, **'Pompo'** and **'Maqueño'** (Ecuador); **'Pacific Plantain'** (Australia)

**'Pōpō'ulu' subdivision (lit. "like the male fruiting structure of breadfruit")**

Like Maoli, Pōpō'ulu is a Hawaiian word; however, this type of banana is found throughout the Pacific, although in ever-decreasing numbers. Historically, Hawai'i harbored at least eight cultivars, of which six are extant. The most famous because of its size is the 'Huamo'a' (see below). Pōpō'ulu cooking bananas range in size from 5–22 cm (2–9 in long), with some 'Huamo'a' in Hawai'i recently found measuring 30 cm (12 in) in circumference. The fruits tend to split when ripe, so they are usually harvested shortly before fully ripening on the stalk. They are delicious sauteed or boiled, especially with coconut cream added.



Left: 'Ele'ele' bunch. Ko'olau Forest Reserve, Maui. Right: 'Fa'i Samoa'. Apia, Samoa. PHOTOS: A. K. KEPLER

**‘Huamene’** (Tahiti) On the verge of extinction, formerly widespread in French Polynesia.

**‘Huamoa’** or **‘Moa’** (lit. “chicken” or “goose egg”)

Other names: ‘Hawaiiano’ (Florida, imported from Hawai‘i)

This clone occasionally forms only a few, extraordinarily large fruit on the bunch; otherwise, the bunch is normal, but with fruit ranging from small eggs to 20 cm (8 in) in length by 6 cm (2.5 in) in diameter. The Samoan **‘Fa‘i Samoa Fua Moa’** is extremely similar and has a name with the same meaning.

**‘Ka‘io’** (lit. “like the round, bitter gourd”)

The smallest of the Hawaiian Pōpō‘ulu fruit, of which only one cluster of plants is known. Its taste varies from inferior to delicious.

**‘Lahi’**, **‘Lahilahi’**, or **‘Ili Lahilahi’** (lit. “thin-skinned”) Hawai‘i

A thin-skinned form of ‘Pōpō‘ulu Pōpō‘ulu’.

**‘Mangaro Akamou’** (Aitutaki, Cook Islands)

This Cook Islands’ Pōpō‘ulu has relatively few fruit.

**‘Pōpō‘ulu Pōpō‘ulu’** (lit. “ball-shaped like a breadfruit”)

Very rare, this clone’s fruit is longer than most Pōpō‘ulu fruit, more resembling the parental Maoli-type.

**‘Putalinga’** (Tonga)

Probably the most red of all the Maoli-Pōpō‘ulu Group, this beautiful “hopa” is associated with Tongans, either in their homeland, Hawai‘i, or elsewhere. With a predominantly red trunk, red, purple, and yellow leaf stalks (petioles), and a broadly oval bunch of chubby fruit that project out perpendicularly to the axis. This is a notable Polynesian specialty with several greener variants than the popular ‘Putalinga Kula’.

### **Mysore subgroup**

Synonyms: *M. × paradisiaca* L. ssp. *sapientum* (L.) Kuntze var. *champa*, *M. sapientum* L. var. *champa* Baker.

Other common names: ‘Liganimarama’ (Fiji); ‘Misiluki’ (Samoa); ‘Pisang Keling’ (Malaysia); ‘Kluai Kai Ferang’ (Thailand); ‘Nget-pyaw Chin’ (Burma/Myanmar); ‘Poovan’, ‘Mysore’, ‘Champa’, ‘Lal Velchi’ (India); ‘Embul’, ‘Honderawala’ (Sri Lanka); ‘Kikonde’ (Zanzibar); ‘Mysore’, ‘Thousand Grain’, ‘Fillbasket’ (West Indies); ‘Mysore’ (Australia); ‘Pang’, ‘Kahiki Hae’, and ‘Dwarf Waimea’ (Hawai‘i)

This widely spread dessert clone is vigorous and resists Panama disease and the Sigatoka leaf spots. Most acces-



**‘Huamoa’**. Waipi‘o Bay, Māui. PHOTO: A. K. KEPLER

sions of it are infected with, and display symptoms caused by, *Banana streak virus* (BSV).

### **Pisang Raja subgroup**

**‘Pisang Raja’**

Synonym: *M. regia* Rumphias

Other common names: ‘Pisang Raja’ (Malaysia and Indonesia); ‘Larip’, ‘Houdir’, ‘Kalamanawudu’ (Papua New Guinea); ‘Grindy’ (Windward Islands); ‘Biu Raja’ (Java)

### **Plantain subgroup**

Synonym: *M. discolor* Horan.

This diverse group of “true” plantains is not to be confused with Pacific plantains or with other cooking bananas with an ABB genome. Plantain fruit are often longer and far more pointed. They comprise 21% of annual *Musa* production worldwide, assuming their greatest dietary importance in West Africa and Latin America. In these regions they are a major source of dietary carbohydrates. Four subsets



**'Putalinga Kula'. Tongan-owned farm, Waihe'e, Maui.** PHOTO: A. K. KEPLER

of cultivars are recognized based on the size and shape of the bunch and fruit. Within the different sets are numerous cultivars.

Members of the plantain subgroup are characterized by long, curved, very starchy bananas. Some particularly large horn plantains are the size and shape of bull horns, and are named thus in different languages, e.g., 'Kerepiha/Kerepifa' or "beef's horn" (Marquesas) and 'Tara puatoro' or "bull's horn".

French plantains are generally differentiated from Horn plantains by their retention of bud bracts on the stalk (rachis) below the fruit, whereas Horn plantains develop a small or nonexistent bud (putting all their energy into the huge fruit). In other words, French plantains have a very "messy" rachis and big bud below the fruit, whereas the Horn plantains have a "clean" rachis, with little or no bud on the end. Intermediate inflorescence characteristics are found in the French Horn and False Horn subsets of cultivars. Below are listed some prominent members in each.

### 'French'

Synonym: *M. paradisiaca* L., *M. paradisiaca* L. var. *viridis* De Wild., *M. purpureo-tomentosa* De Wild., *M. × paradisiaca* auct. non L.

Many ill-defined forms of French plantain exist, some overlapping with the next two clonal clusters: 'Green French', 'Pink French', 'Wine', 'Black French', 'Tiger', and 'Giant'.

Some common cultivars: '**Obino l'Ewai**' (Nigeria); '**Njock Kon**', '**Bobby Tannap**' (Cameroon); '**Nendran**' (India); '**Dominico**' (Colombia); '**Tarapuakanio**' (Cook Is.). French

plantains are known only in India, Africa, Egypt, and the Americas.

### 'French Horn'

Some common cultivars: '**Mbang Okon**' (Nigeria); and '**3 Vert**' (Cameroon)

### 'False Horn'

Synonyms: *M. decrescens* de Brieu

Some common cultivars: '**Agbagba**' and '**Orishele**' (Nigeria); '**Dominico-Hartón**' (Colombia); '**Cuerno**' (Central America); '**Barragante**' (Ecuador) '**Batard**'

### 'Horn'

Synonyms: *M. corniculata* Rumphias, *M. corniculata* Lour., *M. emasculata* de Brieu ex De Wild., *M. protractorachis* De Wild.

Some common cultivars: '**Ishitim**' (Nigeria); '**Pisang Tandok**' (Malaysia)

## Pome subgroup

The Pome subgroup, prominent in places such as Brazil, India, Hawai'i, Cameroon, and Australia, is characterized by fruit stalks that emerge at an angle until the fruit develop, whereafter the rachis falls vertically. Fruit are distinctly "beaked" or "bottle-nosed" and have a particularly subacid or "apple-like" taste. Because of this piquant flavor, various cultivars have been named "apple" thereby confusing these cultivars with 'Silk', the more widely recognized "apple" banana.

### 'Pome'

Other names or similar clones: 'Apple', 'Tall Apple', 'Brazilian', 'Brazilian Tall' (Hawai'i); 'Pisang Kelat Jambi' (Malaysia); 'Vannan', 'Virupakshi', 'Sirumalai' (India); 'Puwalu' (Sri Lanka); 'Kijakazi' (Zanzibar); 'Bakweri' (West Africa); 'Pome' (Canary Islands); 'Brazilian' (Florida); 'Lady's Finger' (Queensland) and a newer variety 'Improved Lady's Finger' (Australia, western Pacific islands, see 'Pacha Naadan', below); 'Rio' (Tahiti, Marquesas); 'Pime' (Nuku Hiva, Marquesas); 'Krishna Vazhai' (black-trunked sport, India); 'Pime pukiki' (red-stemmed sport, slightly smaller fruit), 'Brazilian Red', 'Rio 'Ute'ute', 'Rio Rouge', 'Rio Pukiki' (French Polynesia); 'Preisihl' (Pohnpei, Federated States of Micronesia).

These plants are sturdy, vigorous, highly productive and can be quite tall. In Hawai'i and French Polynesia, local Pome-type clones are favored above all others. They are the most common home-grown and island-grown commercial banana.

### **'Prata Aña'**

Other names: 'Dwarf Apple', 'Dwarf Brazilian', 'Santa Catarina' (Hawai'i); 'Prata Santa Catarina' (Brazil)

In Hawai'i, this clone ranks second in cultivated area, yield, and production. Its delicious fruit command high prices due to their sweet-acid flavor and long shelf-life. The plants are sturdy, vigorous and relatively tolerant to pests and diseases.

### **'Pacovan' (Brazil), 'Pacha Naadan'**

Other names: 'Pachanadan' (India); 'Improved Lady Finger' (Queensland); 'Lady's Finger' (Western Pacific islands)

This dessert cultivar represents about 5% of Australian production. It is drought hardy and resists strong winds.

### **Silk subgroup**

#### **'Silk'**

Synonyms: *M. sapientum* L., *M. paradisiaca* L. ssp. *sapientum* (L.) Kuntze var. *cubensis*, *M. berteri* Colla, *M. berteroi* Colla, *M. berteroniana* von Steudel

Other names: 'Amorosa', 'Manzano', 'Manzana', 'Lady Finger' (Hawai'i), 'Apple' (Florida); 'Letondal', 'Latundan', 'Tordan', 'Tundan', 'Turdan', 'Cantong', 'Amorosa', 'Katungal' (Philippines); 'Silk Fig', 'Manzana', 'Manzano', 'Figue Pomme', 'Apple' (West Indies); 'Rasthali', 'Sonkel', 'Mutheli', 'Morthoman', 'Sabari' (India); 'Kolikutt' (Sri Lanka); 'Pisang Rastali' (Malaysia); 'Worodong', 'Maramba', 'Avundumong' (Papua New Guinea); 'Sugar' (Queensland, Australia); 'Pukusa' (Zanzibar); 'Kipukusu', 'Kipungusu' (East Africa); 'Manzano', 'Manzana' (Latin America); 'Maça' (Brazil); 'Hta-bat' (Burma/Myanmar); 'Kluai Nam' (Thailand); 'Chuoï Goong' (Vietnam); 'Miti Ruki', 'Tiki'



Left: 'Pome'. Papeete, Tahiti. Right: 'Silk'. Kipahulu, Maui. PHOTOS: A. K. KEPLER

(Cook Islands); 'Utin Kuam', 'Utin Menihle', 'Uht Tikitik' (Pohnpei, Federated States of Micronesia)

Only 'Dwarf Cavendish' is found more widely than this cultivar. It produces exceptionally flavorful fruit with a sub-acid, apple-like taste. The fruit peel splits and the flesh is white when ripe, and is astringent when not. It has declined in importance there and elsewhere due to its pronounced susceptibility to Panama disease. In Hawai'i, it is found almost exclusively within Filipino communities, who perhaps introduced it to Hawai'i, bringing with it their Philippine name, 'Amorosa'. Grown at elevations above 500 m (1640 ft) or in poor soils, especially those deficient in calcium and boron, a common occurrence in tropical and subtropical regions, the fruit's flesh becomes hard, tasteless, and dry.

### Other AAB cultivars

'Pisang Seribu' (Malaysia)

Synonym: *Musa chiliocarpa* Backer.

Other common names: 'Kluai Roi Wi' (Thailand), 'Thousand Fingers' (Florida)

'Pisang Kelat' (Malaysia)

Other names: 'Taiwang' (Pohnpei)

This is an important clone in Pohnpei, where it has been found to have fairly high levels of beta carotene.

## ABB GENOME

These cultivars produce relatively starchy fruit, primarily used for cooking. The plants are drought resistant and generally resist the Sigatoka leaf spot diseases.

### Bluggoe subgroup

These are vigorous clones. They produce widely spaced, large, angular, straight fruit that have long peduncles; usually, only four to seven hands are produced on a bunch. The various cultivars are distinguished by stature, bunch size and the fruit skin (green, silver, or waxy). They are susceptible to race 2 of Panama disease and Moko disease.

#### 'Bluggoe'

Other common names: 'Largo' (Hawai'i); 'Jamani' (Fiji); 'Fa'i Pata Samoa', 'Puataelo' (Samoa); 'Pisang Abu Keling' (Malaysia); 'Pisang Batu' (Java); 'Nalla Bontha' (India); 'Hpi Gyan' (Burma/Myanmar); 'Mondan' (Sri Lanka); 'Mkojosi', 'Bokoboko', 'Kproboi', 'Muskat', 'Punda', 'Kidhozi', 'Kivivu' (East Africa); 'Matavia' (Philippines); 'Kluai Som' (Thailand); 'Square Cooker', 'Mondolpin' (Australia); 'Burro', 'Chato', 'Cachaco', 'Cuatrofilos', 'Largo', 'Majoncho',

'Apple Plantain', 'Horse Banana', 'Hog Banana' (Americas); 'Burro', 'Orinoco' (Cuba); 'Horse Plantain' (Jamaica, Dominican Republic, Trinidad and Tobago); 'Poro'ini', 'Poro'ini Pa'afa'afa'a', 'Poro'ini Hima'a umu', 'Largo' (French Polynesia); 'Pata Tonga' (Tonga); 'Tarua Matie' (Cook Islands); 'Chuo'i Ngop Lun' (Vietnam); 'Whitehouse Plantain', 'Chamaluco', 'Poteau', 'Cacambou', 'Moko', 'Bluggoe', 'Buccament', 'Mafoubay' (West Indies)

'Bluggoe' is grown in many countries due to its excellent taste, bountiful productivity, and resistance to drought.

#### 'Dwarf Bluggoe'

Other common name: 'Chamaluco Enano', 'Cachaco Enano' (Puerto Rico)

#### 'Silver Bluggoe'

Other common names: 'Katsila' (Philippines); 'Silver Bluggoe', 'Silver Moko' (West Indies); 'Kluai Hakmuk' (Thailand); 'Thella Bontha' (India); 'Pisang Nipal' (Malaysia); 'Poro'ini hinuhinu', 'Poro'ini Pa'amanina', 'Poro'ini rehu' (Tahiti); 'Poro'ini pivai', 'Poro'ini blanc' (Marquesas Is.); 'Cenizo' (tropical America); 'Pata Sina' (Samoa); 'Tarua Teatea' (Cook Is.); 'Inahsio Pehsehs' (Pohnpei, Federated States of Micronesia)

'Silver Bluggoe' is an attractive plant, commonly named in local languages for its silvery fruit coating.

### Monthan subgroup

'Nalla Bontha Bathees' (India)

'Monthan' (India)

Other names: 'Monthan' (India); 'Maduranga' (Philippines); 'Pisang Abu Bujal' (Malaysia); 'Kluai Nom Mi' (Thailand); 'Chuo'i Ngop Cau' (Vietnam)

Not considered prime quality, this Indian variety is nonetheless widespread in SE Asia. Its characteristic fruits bear large bulbous tips, resembling 'Bluggoe' but larger.

'Sambrani Monthan' (India)

'Pacha Monthan Bathees' (India)

### Kluai Teparod subgroup

'Kluai Teparod'

Other common names: 'Pisang Abu Siam', 'Pisang Batu', 'Pisang Siam' (Malaysia); 'Tiparot', 'Balongkaue' (Philippines); 'Kluai Teparod', 'Kluai Sangkivo', 'Kluai Plihai' (Thailand); 'Pya-ye San' (Burma/Myanmar)

Formerly, this cultivar was thought to have an ABBB genome.

## Ney Mannan subgroup

### 'Ney Mannan' (India)

Other names: 'Ice Cream' (Hawai'i, Florida); 'Blue Java', 'Java Blue', 'Vata', 'Pata' (Fiji); 'Blue Java', 'Blue Lubin'



Top: 'Bluggoe' female flowers. PHOTO: A. K. KEPLER 'Bluggoe'.  
PHOTO: I. MAGUIRE

(Australia); 'Alukehel', 'Ash Plantain' (Sri Lanka); 'Ney Mannan' (India); 'Pata Hina', 'Pata Lahelahe' (Tonga); 'Fa'i Pata Sina', 'Pata papalagi' (Samoa); 'Tarua Teatea' (Cook Is.); 'Dukuru' (Pohnpei, Federated States of Micronesia)

The fruit is named for its flavor and texture, sweet and smooth. When fully ripe, the flesh can be eaten with a spoon. Externally, the fruit is colored a beautiful silver-green, due to a heavy coating of wax.

## Pelipita subgroup

### 'Pelipia' (Central America)

Other common name: 'Pilipia' (Philippines)

This clone tolerates Moko disease, due to its persistent bracts. It was offered as a resistant replacement for 'Bluggoe' in the Americas where that clone was decimated by Moko disease.

## Pisang Awak subgroup

### 'Pisang Awak' (Malaysia)

Other common names: 'Katali' (Philippines); 'Kluai Namwa' (Thailand); 'Pisang Klotok' (Indonesia); 'Choui Tay' (Vietnam); 'Karpuravalli' (India); 'Kayinja' (East Africa); 'Ducasse' (Australia); 'Yakhine' (Burma/Myanmar); 'Pey Kunnan', 'Kostha Bontha', 'Monohar', 'Sail Kola' (India); 'Nyeupe' (Kenya); 'Balaliki', 'Paradaika' (Egypt)

This is the most widely disseminated ABB cultivar; 70% of all bananas that are grown in Thailand are of this clone. It is vigorous and tolerates adverse conditions, especially drought, but is susceptible to race 1 of Panama disease. A dwarf version, 'Kluai Namwa Khom', comes from Thailand and is now being widely distributed in the Pacific islands including Samoa and the Cook Islands.

## Saba subgroup

### 'Benedetta'

'Inabaniko', 'Uht Kapakap' (Pohnpei); 'Praying Hands' (Florida); 'Ripping' (Philippines)

### 'Cardaba'

A Philippine cooking banana. With 'Saba', it was classified erroneously as having a BBB genome.

### 'Saba' (Philippines)

Other common names: 'Pisang Kepok' (Indonesia); 'Pisang Abu Nipah' (Malaysia); 'Kluai Hin' (Thailand)

The male bud of this clone is a popular vegetable in the Philippines.

## AAAA, AAAB, AABB AND ABBB GENOMES

There are no natural AAAA and very few natural AAAB, AABB, and ABBB bananas, none of which are important. Tetraploids that are most common in cultivation are products of the breeding programs. In general, they have resulted from crosses between triploid female and diploid male parents. A few promising varieties are found in cultivation (including some Pacific islands) in those areas where banana diseases are rampant. Most notable among the bred tetraploids are those from the FHIA program in Honduras: dessert AAAA, 'FHIA-02' (aka 'Mona Lisa'), 'FHIA-17' and 'FHIA-23'; dessert AAAB, 'FHIA-01' (aka 'Goldfinger') and cooking and dessert 'FHIA-18'; plantain-like AAAB, 'FHIA-20' and 'FHIA-21'; and cooking or dessert AABB, 'FHIA-03'.

## BB GENOME

Parthenocarpy did not evolve in *M. balbisiana* as it did in *M. acuminata*. Thus, edible diploid cultivars of the species do not exist. BB clones that are cultivated, such as 'Tani' (Thailand), are grown for their leaves and for animal feed.

## BBB GENOME

Philippine ABB clones such as 'Cardaba' and 'Saba' were classified previously as BBB. Whether an uncommon clone in Thailand, 'Kluai Lep Chang Kut', is BBB is unclear.

## FE'I BANANAS

The Fe'i cultivars range naturally from the Moluccas to French Polynesia. Particularly associated with the Marquesas and Society Islands (French Polynesia), Fe'i were staple and ceremonial foods since the Marquesas were first settled from the Samoa-Tonga region (~250 BC)



Left: 'Benedetta'. PHOTO: I. MAGUIRE Right: Saba type 'Utin Ruk' in Pohnpei. PHOTO: J. DANIELLS



Left: 'FHIA-03', an experimental AABB cooking or dessert banana. Right: 'FHIA-01' (aka 'Goldfinger'), an experimental AAAB dessert banana. Both photos: Nu'u Agricultural Station, 'Upolu, Samoa. PHOTOS: A. K. KEPLER

and Tahiti around 700–800 AD. Unfortunately their prevalence has declined drastically in recent decades. In addition to their erect bunches, they also can be recognized by their bright magenta to dark purple sap, heavily ridged, squarish red/coppery fruit, and near-iridescent orange or yellow fruit flesh. The fruit of some clones is exceptionally high in beta carotene (see e.g., Englberger and Lorens 2004). Although they can be quite sensitive during the establishment phase and some are susceptible to Panama disease, they are generally vigorous, tolerate most diseases and pests, and require little care once established.

These bananas are unique and distinct from the *acuminata balbisiana* cultivars in the section MUSA. Although they are clearly in the section AUSTRALIMUSA, their precise origins are poorly understood. *M. maclayi* (based on morphology) and *M. lolodensis* (based on DNA studies) were suggested as probable parents of the extant clones. Recent genetic work indicated that they are closest genetically to

these plus an additional species, *M. peekelii*. Thus, the Fe'i bananas may be interspecific hybrids. Genetic diversity among the Fe'i cultivars is as great as that that is found in the entire section AUSTRALIMUSA (see Part 1). Sharrock (2001) provided a recent summary of the history of and taxonomic work on this group.

Relationships and common names for the various clones in different areas are unclear. Prominent clones on different islands are listed below as distinct although some may be synonymous.

**'Pisang Tongkat Langit'** (eastern Indonesia) and **'Pisang Tongkat Langit Papua'** (Irian Jaya)

Synonym: *M. troglodytarum* L.

**'Daak'** (New Caledonia)

Synonym: *M. fehi* Bert. ex Vieill.





Top left: 'Fe'i 'A'ata'. Papeari, Tahiti. Top right: 'Fe'i 'Auir'. Papeari, Tahiti. Bottom left: 'Fe'i Tati'a'. Papeari, Tahiti. Bottom right: All Fe'i have bright magenta sap, some clones brighter than others. PHOTOS: A. K. KEPLER

**‘Soaqa’** (Fiji)

Synonym: *M. seemanii* F. v. Muell.

**‘Fe’i’** (Society Islands)

Synonym: *M. aiori* Sagot

The most common cultivars in home gardens today are **‘Fe’i Aiuri’** and **‘Fe’i Tatia’**.

Some common cultivars and synonyms elsewhere include **‘Borabora’**, **‘Polapola’**, **‘Mai’a Ha’i’** (Hawai’i); **‘Menei’**, **‘Rimina’**, **‘Utafan’**, **‘Sar’**, and **‘Wain’** (Papua New Guinea); **‘Chongk’** (New Hebrides); **‘Fe’i’** and **‘Soanga’** (Tonga); **‘Soa’a’** (Samoa); **‘Utu’** (Cook Islands); **‘Huetu’** (Marquesas); **‘Utin Iap’** and **‘Karat’** (Pohnpei, Federated States of Micronesia); and **‘Kulasr’** and **‘Kolontol’** (Kosrae, Federated States of Micronesia)

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## Banana and plantain—an overview with emphasis on Pacific island cultivars

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