[Template:About](/wiki/Template:About" \o "Template:About) [Template:Pp-semi-indef](/wiki/Template:Pp-semi-indef) [Template:Pp-move-indef](/wiki/Template:Pp-move-indef) [Template:Use mdy dates](/wiki/Template:Use_mdy_dates)

[thumb|right|Fruits of four different](/wiki/File:Bananavarieties.jpg) [banana cultivars](/wiki/List_of_banana_cultivars) The **banana** is an edible [fruit](/wiki/Fruit), botanically a [berry](/wiki/Berry_(botany)),<ref name=purdue1/><ref name=Armstrong/> produced by several kinds of large [herbaceous](/wiki/Herbaceous) [flowering plants](/wiki/Flowering_plant) in the [genus](/wiki/Genus) [*Musa*](/wiki/Musa_(genus)).<ref name=MW/> In some countries, bananas used for cooking may be called [plantains](/wiki/Cooking_plantain). The fruit is variable in size, color and firmness, but is usually elongated and curved, with soft flesh rich in [starch](/wiki/Starch) covered with a rind which may be green, yellow, red, purple, or brown when ripe. The fruits grow in clusters hanging from the top of the plant. Almost all modern edible [parthenocarpic](/wiki/Parthenocarpy) (seedless) bananas come from two wild species – [*Musa acuminata*](/wiki/Musa_acuminata) and [*Musa balbisiana*](/wiki/Musa_balbisiana). The [scientific names](/wiki/Binomial_nomenclature) of most cultivated bananas are *Musa acuminata*, *Musa balbisiana*, and *Musa* × *paradisiaca* for the hybrid *Musa acuminata* × *M. balbisiana*, depending on their [genomic](/wiki/Genome) constitution. The old scientific name *Musa sapientum* is no longer used.

*Musa* species are native to tropical [Indomalaya](/wiki/Indomalaya) and [Australia](/wiki/Australia_(continent)), and are likely to have been first domesticated in [Papua New Guinea](/wiki/Papua_New_Guinea).<ref name=apscience/>[Template:Sfn](/wiki/Template:Sfn) They are grown in at least 107 countries,<ref name=fao/> primarily for their fruit, and to a lesser extent to make [fiber](/wiki/Fiber), [banana wine](/wiki/Banana_wine) and [banana beer](/wiki/Banana_beer) and as [ornamental plants](/wiki/Ornamental_plant).

Worldwide, there is no sharp distinction between "bananas" and "plantains". Especially in the Americas and Europe, "banana" usually refers to soft, sweet, dessert bananas, particularly those of the [Cavendish group](/wiki/#Cavendish), which are the main exports from banana-growing countries. By contrast, [*Musa* cultivars](/wiki/List_of_banana_cultivars) with firmer, starchier fruit are called "plantains". In other regions, such as [Southeast Asia](/wiki/Southeast_Asia), many more kinds of banana are grown and eaten, so the simple two-fold distinction is not useful and is not made in local languages.

The term "banana" is also used as the common name for the plants which produce the fruit.<ref name=MW/> This can extend to other members of the genus *Musa* like the [scarlet banana](/wiki/Musa_coccinea) (*Musa coccinea*), [pink banana](/wiki/Musa_velutina) (*Musa velutina*) and the [Fe'i bananas](/wiki/Fe'i_banana). It can also refer to members of the genus [*Ensete*](/wiki/Ensete), like the [snow banana](/wiki/Ensete_glaucum) (*Ensete glaucum*) and the economically important [false banana](/wiki/Ensete_ventricosum) (*Ensete ventricosum*). Both genera are classified under the banana family, [Musaceae](/wiki/Musaceae).

## Contents

* 1 Description[[edit](/index.php?title=(none)&action=edit&section=1)]
* 2 Etymology[[edit](/index.php?title=(none)&action=edit&section=2)]
* 3 Taxonomy[[edit](/index.php?title=(none)&action=edit&section=3)]
* 4 Bananas and plantains[[edit](/index.php?title=(none)&action=edit&section=4)]
* 5 Historical cultivation[[edit](/index.php?title=(none)&action=edit&section=5)]
  + 5.1 Early cultivation[[edit](/index.php?title=(none)&action=edit&section=6)]
  + 5.2 Plantation cultivation in the Caribbean, Central and South America[[edit](/index.php?title=(none)&action=edit&section=7)]
  + 5.3 Peasant cultivation for export in the Caribbean[[edit](/index.php?title=(none)&action=edit&section=8)]
  + 5.4 East Africa[[edit](/index.php?title=(none)&action=edit&section=9)]
* 6 Modern cultivation[[edit](/index.php?title=(none)&action=edit&section=10)]
  + 6.1 Cavendish[[edit](/index.php?title=(none)&action=edit&section=11)]
  + 6.2 Ripening[[edit](/index.php?title=(none)&action=edit&section=12)]
  + 6.3 Storage and transport[[edit](/index.php?title=(none)&action=edit&section=13)]
  + 6.4 Production and export[[edit](/index.php?title=(none)&action=edit&section=14)]
* 7 Pests, diseases, and natural disasters[[edit](/index.php?title=(none)&action=edit&section=15)]
  + 7.1 Panama disease[[edit](/index.php?title=(none)&action=edit&section=16)]
    - 7.1.1 Tropical race 4[[edit](/index.php?title=(none)&action=edit&section=17)]
  + 7.2 Black sigatoka[[edit](/index.php?title=(none)&action=edit&section=18)]
    - 7.2.1 In East Africa[[edit](/index.php?title=(none)&action=edit&section=19)]
  + 7.3 Banana bunchy top virus[[edit](/index.php?title=(none)&action=edit&section=20)]
  + 7.4 Banana bacterial wilt[[edit](/index.php?title=(none)&action=edit&section=21)]
* 8 Nutrition[[edit](/index.php?title=(none)&action=edit&section=22)]
* 9 Culture[[edit](/index.php?title=(none)&action=edit&section=23)]
  + 9.1 Food and cooking[[edit](/index.php?title=(none)&action=edit&section=24)]
    - 9.1.1 Fruit[[edit](/index.php?title=(none)&action=edit&section=25)]
    - 9.1.2 Flower[[edit](/index.php?title=(none)&action=edit&section=26)]
    - 9.1.3 Leaves[[edit](/index.php?title=(none)&action=edit&section=27)]
    - 9.1.4 Trunk[[edit](/index.php?title=(none)&action=edit&section=28)]
  + 9.2 Fiber[[edit](/index.php?title=(none)&action=edit&section=29)]
    - 9.2.1 Textiles[[edit](/index.php?title=(none)&action=edit&section=30)]
    - 9.2.2 Paper[[edit](/index.php?title=(none)&action=edit&section=31)]
  + 9.3 Cultural roles[[edit](/index.php?title=(none)&action=edit&section=32)]
    - 9.3.1 Arts[[edit](/index.php?title=(none)&action=edit&section=33)]
    - 9.3.2 Religion and popular beliefs[[edit](/index.php?title=(none)&action=edit&section=34)]
    - 9.3.3 Unicode[[edit](/index.php?title=(none)&action=edit&section=35)]
  + 9.4 Other uses[[edit](/index.php?title=(none)&action=edit&section=36)]
* 10 Notes[[edit](/index.php?title=(none)&action=edit&section=37)]
* 11 References[[edit](/index.php?title=(none)&action=edit&section=38)]
* 12 Bibliography[[edit](/index.php?title=(none)&action=edit&section=39)]
* 13 Further reading[[edit](/index.php?title=(none)&action=edit&section=40)]
* 14 External links[[edit](/index.php?title=(none)&action=edit&section=41)]

## Description[[edit](/index.php?title=(none)&action=edit&section=1)]

[thumb|upright|alt=Photo of a banana corm growing from loamy soil|A banana corm, about](/wiki/File:Banana_corm.jpg) [Template:Convert](/wiki/Template:Convert) across [thumb|upright|A banana farm in](/wiki/File:Banana_farm_Chinawal.jpg) [Chinawal](/wiki/Chinawal), India [thumb|upright|Young banana plant](/wiki/File:Baby_Banana_Plant.jpg) The banana plant is the largest [herbaceous](/wiki/Herbaceous) flowering plant.<ref name=PicqINIB00/> All the above-ground parts of a banana plant grow from a structure usually called a "[corm](/wiki/Corm)".[Template:Sfn](/wiki/Template:Sfn) Plants are normally tall and fairly sturdy, and are often mistaken for [trees](/wiki/Tree), but what appears to be a trunk is actually a "false stem" or [pseudostem](/wiki/Pseudostem). Bananas grow in a wide variety of soils, as long as the soil is at least 60 cm deep, has good drainage and is not compacted.[Template:Sfn](/wiki/Template:Sfn) The leaves of banana plants are composed of a "stalk" ([petiole](/wiki/Petiole_(botany))) and a blade ([lamina](/wiki/Leaf#General_characteristics_of_leaves)). The base of the petiole widens to form a sheath; the tightly packed sheaths make up the pseudostem, which is all that supports the plant. The edges of the sheath meet when it is first produced, making it tubular. As new growth occurs in the centre of the pseudostem the edges are forced apart.[Template:Sfn](/wiki/Template:Sfn) Cultivated banana plants vary in height depending on the variety and growing conditions. Most are around [Template:Convert](/wiki/Template:Convert) tall, with a range from 'Dwarf Cavendish' plants at around [Template:Convert](/wiki/Template:Convert) to 'Gros Michel' at [Template:Convert](/wiki/Template:Convert) or more.[Template:SfnTemplate:Sfn](/wiki/Template:Sfn) Leaves are spirally arranged and may grow [Template:Convert](/wiki/Template:Convert) long and [Template:Convert](/wiki/Template:Convert) wide.[[1]](#cite_note-1) They are easily torn by the wind, resulting in the familiar frond look.<ref name=Greenearth/>

When a banana plant is mature, the corm stops producing new leaves and begins to form a flower spike or [inflorescence](/wiki/Inflorescence). A stem develops which grows up inside the pseudostem, carrying the immature inflorescence until eventually it emerges at the top.[Template:Sfn](/wiki/Template:Sfn) Each pseudostem normally produces a single inflorescence, also known as the "banana heart". (More are sometimes produced; an exceptional plant in the [Philippines](/wiki/Philippines) produced five.<ref name=ABS\_CBN/>) After fruiting, the pseudostem dies, but offshoots will normally have developed from the base, so that the plant as a whole is [perennial](/wiki/Perennial). In the plantation system of cultivation, only one of the offshoots will be allowed to develop in order to maintain spacing.[Template:Sfn](/wiki/Template:Sfn) The inflorescence contains many [bracts](/wiki/Bract) (sometimes incorrectly referred to as petals) between rows of flowers. The female flowers (which can develop into fruit) appear in rows further up the stem (closer to the leaves) from the rows of male flowers. The ovary is [inferior](/wiki/Ovary_(plants)), meaning that the tiny petals and other flower parts appear at the tip of the ovary.[Template:Sfn](/wiki/Template:Sfn)

The banana fruits develop from the banana heart, in a large hanging cluster, made up of tiers (called "hands"), with up to 20 fruit to a tier. The hanging cluster is known as a bunch, comprising 3–20 [tiers](/wiki/Wikt:tier#noun_2), or commercially as a "banana stem", and can weigh [Template:Convert](/wiki/Template:Convert). Individual banana fruits (commonly known as a banana or "finger") average [Template:Convert](/wiki/Template:Convert), of which approximately 75% is [water](/wiki/Water) and 25% dry matter (nutrient table, lower right).

The fruit has been described as a "leathery berry".<ref name=Smit77/> There is a protective outer layer (a [peel](/wiki/Peel_(fruit)) or skin) with numerous long, thin strings (the [phloem](/wiki/Phloem) [bundles](/wiki/Vascular_bundle)), which run lengthwise between the skin and the [edible](/wiki/Eating) inner portion. The inner part of the common yellow dessert variety can be split lengthwise into three sections that correspond to the inner portions of the three [carpels](/wiki/Carpel) by manually deforming the unopened fruit.<ref name=Wark04/> In cultivated varieties, the seeds are diminished nearly to non-existence; their remnants are tiny black specks in the interior of the fruit.<ref name=Simm62/>

Bananas are naturally slightly [radioactive](/wiki/Radioactive_decay),<ref name=Brod78/><ref name=ChemAbout/> more so than most other fruits, because of their potassium content and the small amounts of the isotope [potassium-40](/wiki/Potassium-40) found in naturally occurring potassium.<ref name=CassWu07/> The [banana equivalent dose](/wiki/Banana_equivalent_dose) of radiation is sometimes used in nuclear communication to compare radiation levels and exposures.<ref name=ETR/>

<gallery> File:Banana Tree 01.jpg|Banana 'tree' showing fruit and inflorescence. File:M. acuminata x balbisiana.JPG|Banana [inflorescence](/wiki/Inflorescence), partially opened File:M. acuminata x balbisiana female flower detail.jpg|Female flowers have petals and other flower parts at the tip of the ovary </gallery>

## Etymology[[edit](/index.php?title=(none)&action=edit&section=2)]

The word banana is thought to be of West African origin, possibly from the [Wolof](/wiki/Wolof_language) word [*banaana*](/wiki/Wikt:banaana), and passed into English via Spanish or Portuguese.<ref name=OEtymD/>

## Taxonomy[[edit](/index.php?title=(none)&action=edit&section=3)]

[right|thumb|The *Musa* 'Nendran'](/wiki/File:Nedravazhakola.jpg) [cultivar](/wiki/Cultivar) grown widely in the [Indian](/wiki/India) state of [Kerala](/wiki/Kerala) is a member of the [AAB cultivar group](/wiki/List_of_banana_cultivars#AAB_Group) The genus [*Musa*](/wiki/Musa_(genus)) was created by [Carl Linnaeus](/wiki/Carl_Linnaeus) in 1753.<ref name=WCSP\_Musa/> The name may be derived from [Antonius Musa](/wiki/Antonius_Musa), physician to the Emperor [Augustus](/wiki/Augustus), or Linnaeus may have adapted the [Arabic](/wiki/Arabic) word for banana, [*mauz*](/wiki/Wikt:موز).<ref name=HyamPank95/> *Musa* is in the family [Musaceae](/wiki/Musaceae). The [APG III system](/wiki/APG_III_system) assigns Musaceae to the order [Zingiberales](/wiki/Zingiberales), part of the [commelinid](/wiki/Commelinid) clade of the [monocotyledonous](/wiki/Monocotyledon) flowering plants. Some 70 species of *Musa* were recognized by the [World Checklist of Selected Plant Families](/wiki/World_Checklist_of_Selected_Plant_Families) [Template:Asof](/wiki/Template:Asof);<ref name=WCSP\_Musa/> several produce edible fruit, while others are cultivated as ornamentals.<ref name=Bail16/>

The classification of cultivated bananas has long been a problematic issue for taxonomists. Linnaeus originally placed bananas into two species based only on their uses as food: *Musa sapientum* for dessert bananas and *Musa paradisiaca* for [plantains](/wiki/Plantain_(true)). Subsequently further species names were added. However, this approach proved inadequate to address the sheer number of [cultivars](/wiki/Cultivar) existing in the primary center of diversity of the genus, [Southeast Asia](/wiki/Southeast_Asia). Many of these cultivars were given names which proved to be [synonyms](/wiki/Synonym_(taxonomy)).[Template:Sfn](/wiki/Template:Sfn)

In a series of papers published in 1947 onwards, Ernest Cheesman showed that Linnaeus's *Musa sapientum* and *Musa paradisiaca* were actually cultivars and descendants of two wild seed-producing species, [*Musa acuminata*](/wiki/Musa_acuminata) and [*Musa balbisiana*](/wiki/Musa_balbisiana), both first described by [Luigi Aloysius Colla](/wiki/Luigi_Aloysius_Colla).<ref name=DRC/> He recommended the abolition of Linnaeus's species in favor of reclassifying bananas according to three morphologically distinct groups of cultivars – those primarily exhibiting the botanical characteristics of *Musa balbisiana*, those primarily exhibiting the botanical characteristics of *Musa acuminata*, and those with characteristics that are the combination of the two.[Template:Sfn](/wiki/Template:Sfn) Researchers Norman Simmonds and Ken Shepherd proposed a genome-based nomenclature system in 1955. This system eliminated almost all the difficulties and inconsistencies of the earlier classification of bananas based on assigning scientific names to cultivated varieties. Despite this, the original names are still recognized by some authorities today, leading to confusion.<ref name=DRC/><ref name=Porc02/>

The currently accepted [scientific names](/wiki/Botanical_name) for most groups of cultivated bananas are ***Musa acuminata*** Colla and ***Musa balbisiana*** Colla for the ancestral species, and ***Musa* × *paradisiaca*** L. for the hybrid *M. acuminata* × *M. balbisiana*.<ref name=WCSP\_Mp/>

[Synonyms](/wiki/Synonym_(taxonomy)) of *M.* × *paradisica* include:

* A large number of subspecific and varietial names of *M.* × *paradisiaca*, including *M. p.* subsp. *sapientum* (L.) Kuntze
* *Musa* × *dacca* Horan.
* *Musa* × *sapidisiaca* K.C.Jacob, nom. superfl.
* *Musa* × *sapientum* L., and a large number of its varietal names, including *M.* × *sapientum* var. *paradisiaca* (L.) Baker, nom. illeg.

Generally, modern classifications of banana cultivars follow Simmonds and Shepherd's system. Cultivars are placed in groups based on the number of chromosomes they have and which species they are derived from. Thus the [Latundan banana](/wiki/Latundan_banana) is placed in the AAB Group, showing that it is a triploid derived from both *M. acuminata* (A) and *M. balbisiana* (B). For a list of the cultivars classified under this system see [List of banana cultivars](/wiki/List_of_banana_cultivars).

In 2012, a team of scientists announced they had achieved a draft sequence of the genome of [*Musa acuminata*](/wiki/Musa_acuminata).<ref name=dHon12/>

## Bananas and plantains[[edit](/index.php?title=(none)&action=edit&section=4)]

In regions such as North America and Europe, *Musa* fruits offered for sale can be divided into "bananas" and "[plantains](/wiki/Plantain_(cooking))", based on their intended use as food. Thus the banana producer and distributor [Chiquita](/wiki/Chiquita_Brands_International) produces publicity material for the American market which says that "a plantain is not a banana". The stated differences are that plantains are more [starchy](/wiki/Starch) and less sweet; they are eaten cooked rather than raw; they have thicker skin, which may be green, yellow or black; and they can be used at any stage of ripeness.<ref name=Chiquita/> Linnaeus made the same distinction between plantains and bananas when first naming two "species" of *Musa*.[Template:Sfn](/wiki/Template:Sfn) Members of the "[plantain subgroup](/wiki/Plantain_(true))" of banana cultivars, most important as food in West Africa and Latin America, correspond to the Chiquita description, having long pointed fruit. They are described by Ploetz et al. as "true" plantains, distinct from other cooking bananas.[Template:Sfn](/wiki/Template:Sfn) The cooking bananas of East Africa belong to a different group, the [East African Highland bananas](/wiki/East_African_Highland_banana),[Template:Sfn](/wiki/Template:Sfn) so would not qualify as "true" plantains on this definition. [thumb|](/wiki/File:Bananas_white_background_DS.jpg)[Cavendish bananas](/wiki/Cavendish_bananas) are the most common dessert bananas sold An alternative approach divides bananas into dessert bananas and cooking bananas, with plantains being one of the subgroups of cooking bananas.[Template:Sfn](/wiki/Template:Sfn) [Triploid](/wiki/Polyploid) cultivars derived solely from *M. acuminata* are examples of "dessert bananas", whereas triploid cultivars derived from the hybrid between *M. acuminata* and *M. balbinosa* (in particular the plantain subgroup of the [AAB Group](/wiki/List_of_banana_cultivars#AAB_Group)) are "plantains".<ref name=StovSimm87p183/><ref name=QiMoorOrch00/> Small farmers in [Colombia](/wiki/Colombia) grow a much wider range of cultivars than large commercial plantations. A study of these cultivars showed that they could be placed into at least three groups based on their characteristics: dessert bananas, non-plantain cooking bananas, and plantains, although there were overlaps between dessert and cooking bananas.<ref name=GibeDufoGiraSanc09/>

In Southeast Asia – the center of diversity for bananas, both wild and cultivated – the distinction between "bananas" and "plantains" does not work, according to Valmayor et al. Many bananas are used both raw and cooked. There are starchy cooking bananas which are smaller than those eaten raw. The range of colors, sizes and shapes is far wider than in those grown or sold in Africa, Europe or the Americas.[Template:Sfn](/wiki/Template:Sfn) Southeast Asian languages do not make the distinction between "bananas" and "plantains" that is made in English (and Spanish). Thus both [Cavendish cultivars](/wiki/#Cavendish), the classic yellow dessert bananas, and [Saba cultivars](/wiki/Saba_banana), used mainly for cooking, are called *pisang* in [Malaysia](/wiki/Malaysia) and [Indonesia](/wiki/Indonesia), *kluai* in [Thailand](/wiki/Thailand) and *chuoi* in [Vietnam](/wiki/Vietnam).[Template:Sfn](/wiki/Template:Sfn) [Fe'i bananas](/wiki/Fe'i_banana), grown and eaten in the islands of the Pacific, are derived from entirely different wild species than traditional bananas and plantains. Most Fe'i bananas are cooked, but [Karat bananas](/wiki/Karat_banana), which are short and squat with bright red skins, very different from the usual yellow dessert bananas, are eaten raw.<ref name=Engl03/>

In summary, in commerce in Europe and the Americas (although not in small-scale cultivation), it is possible to distinguish between "bananas", which are eaten raw, and "plantains", which are cooked. In other regions of the world, particularly India, Southeast Asia and the islands of the Pacific, there are many more kinds of banana and the two-fold distinction is not useful and not made in local languages. Plantains are one of many kinds of cooking bananas, which are not always distinct from dessert bananas.

## Historical cultivation[[edit](/index.php?title=(none)&action=edit&section=5)]

### Early cultivation[[edit](/index.php?title=(none)&action=edit&section=6)]

[Template:See also](/wiki/Template:See_also) [thumb|Original](/wiki/File:Banana_ancestors_(Musa_acuminata_and_Musa_balbisiana)_original_range.png) [native ranges](/wiki/Range_(biology)) of the ancestors of modern edible bananas. [*Musa acuminata*](/wiki/Musa_acuminata) is shown in green and [*Musa balbisiana*](/wiki/Musa_balbisiana) in orange.<ref name=LangMare04/> Farmers in [Southeast Asia](/wiki/Southeast_Asia) and [Papua New Guinea](/wiki/Papua_New_Guinea) first [domesticated](/wiki/Domestication) bananas. Recent [archaeological](/wiki/Archaeology) and palaeoenvironmental evidence at [Kuk Swamp](/wiki/Kuk_Swamp) in the [Western Highlands Province](/wiki/Western_Highlands_Province) of Papua New Guinea suggests that banana cultivation there goes back to at least 5000 [BCE](/wiki/Common_Era), and possibly to 8000 BCE.<ref name=apscience/><ref name=Denh03/> It is likely that other species were later and independently domesticated elsewhere in Southeast Asia. Southeast Asia is the region of [primary diversity](/wiki/Center_of_diversity) of the banana. Areas of secondary diversity are found in [Africa](/wiki/Africa), indicating a long history of banana cultivation in the region.[Template:Sfn](/wiki/Template:Sfn)

[thumb|Actual and probable diffusion of bananas during](/wiki/File:Bananas_Muslim_world.JPG) [Islamic times](/wiki/Muslim_Agricultural_Revolution) (700–1500 CE)<ref name=Wats83/>|alt=Map stating that banana cultivation occurred in pre-Islamic times in India and Southeast Asia, during the 700–1500 CE "Islamic period" along the [Nile River](/wiki/Nile_River) and in [Mesopotamia](/wiki/Mesopotamia) and [Palestine](/wiki/Palestine_(region)), and less-certainly in sub-Saharan Africa during that same period [Phytolith](/wiki/Phytolith) discoveries in [Cameroon](/wiki/Cameroon) dating to the first millennium BCE<ref name=Mbid00/> triggered an as yet unresolved debate about the date of first cultivation in Africa. There is linguistic evidence that bananas were known in [Madagascar](/wiki/Madagascar) around that time.<ref name=Zell05/> The earliest prior evidence indicates that cultivation dates to no earlier than late 6th century CE.<ref name=Lejj05/> It is likely, however, that bananas were brought at least to [Madagascar](/wiki/Madagascar) if not to the East African coast during the phase of [Malagasy](/wiki/Malagasy_people) colonization of the island from South East Asia c. 400 CE.<ref name=Rand09/>

The banana may also have been present in isolated locations elsewhere in the [Middle East](/wiki/Middle_East) on the eve of [Islam](/wiki/Islam). The [spread of Islam](/wiki/Spread_of_Islam) was followed by far-reaching diffusion. There are numerous references to it in Islamic texts (such as poems and [hadiths](/wiki/Hadith)) beginning in the 9th century. By the 10th century the banana appears in texts from [Palestine](/wiki/Palestine_(region)) and [Egypt](/wiki/Egypt). From there it diffused into North Africa and [Muslim Iberia](/wiki/Al-Andalus). During the medieval ages, bananas from [Granada](/wiki/Granada) were considered among the best in the Arab world.<ref name=Wats83/> In 650, Islamic conquerors brought the banana to Palestine. Today, banana consumption increases significantly in Islamic countries during [Ramadan](/wiki/Ramadan), the month of daylight fasting.<ref name=thefinancialexpress-bd/>

Bananas were certainly grown in the Christian [Kingdom of Cyprus](/wiki/Kingdom_of_Cyprus) by the late medieval period. Writing in 1458, the Italian traveller and writer Gabriele Capodilista wrote favourably of the extensive farm produce of the estates at Episkopi, near modern-day [Limassol](/wiki/Limassol), including the region's banana plantations.<ref name=Jenn92/>

Bananas were introduced to the [Americas](/wiki/Americas) by [Portuguese](/wiki/Portugal) sailors who brought the fruits from [West Africa](/wiki/West_Africa) in the 16th century.<ref name=Botgard/>

Many [wild banana species](/wiki/Musa_(genus)#Species) as well as cultivars exist in extraordinary diversity in [India](/wiki/India), [China](/wiki/China), and [Southeast Asia](/wiki/Southeast_Asia). [Template:Quote](/wiki/Template:Quote)

In 1999 archaeologists in London discovered what they believed to be the oldest banana in the UK, in a [Tudor](/wiki/Tudor_period) rubbish tip.<ref name=BBC990616/>

### Plantation cultivation in the Caribbean, Central and South America[[edit](/index.php?title=(none)&action=edit&section=7)]

[Template:Main article](/wiki/Template:Main_article) [thumb|right|Fruits of](/wiki/File:Inside_a_wild-type_banana.jpg) [wild-type](/wiki/Wild_type) bananas have numerous large, hard seeds.|alt=Photo of two cross-sectional halves of seed-filled fruit.

In the 15th and 16th centuries, Portuguese colonists started banana plantations in the Atlantic Islands, [Brazil](/wiki/Brazil), and western Africa.<ref name=Phora/> North Americans began consuming bananas on a small scale at very high prices shortly after the Civil War, though it was only in the 1880s that it became more widespread.<ref name=Koep08/> As late as the [Victorian Era](/wiki/Victorian_Era), bananas were not widely known in Europe, although they were available.<ref name=Phora/> [Jules Verne](/wiki/Jules_Verne) introduces bananas to his readers with detailed descriptions in [*Around the World in Eighty Days*](/wiki/Around_the_World_in_Eighty_Days) (1872).

The earliest modern plantations originated in Jamaica and the related [Western Caribbean Zone](/wiki/Western_Caribbean_Zone), including most of [Central America](/wiki/Central_America). It involved the combination of modern transportation networks of steamships and railroads with the development of refrigeration that allowed bananas to have more time between harvesting and ripening. North America shippers like [Lorenzo Dow Baker](/wiki/Lorenzo_Dow_Baker) and [Andrew Preston](/wiki/Andrew_Preston), the founders of the [Boston Fruit Company](/wiki/Boston_Fruit_Company) started this process in the 1870s, but railroad builders like [Minor C Keith](/wiki/Minor_C._Keith) also participated, eventually culminating in the multi-national giant corporations like today's [Chiquita Brands International](/wiki/Chiquita_Brands_International) and [Dole](/wiki/Dole_Food_Company).<ref name=Koep08/> These companies were monopolistic, [vertically integrated](/wiki/Vertically_integrated) (meaning they controlled growing, processing, shipping and marketing) and usually used political manipulation to build [enclave economies](/wiki/Enclave_economy) (economies that were internally self-sufficient, virtually tax exempt, and export oriented that contribute very little to the host economy). Their political maneuvers, which gave rise to the term [Banana republic](/wiki/Banana_republic) for states like Honduras and Guatemala, included working with local elites and their rivalries to influence politics or playing the international interests of the United States, especially during the [Cold War](/wiki/Cold_War), to keep the political climate favorable to their interests.<ref name=NZH/>

### Peasant cultivation for export in the Caribbean[[edit](/index.php?title=(none)&action=edit&section=8)]

[Template:Main article](/wiki/Template:Main_article)

The vast majority of the world's bananas today are cultivated for family consumption or for sale on local markets. India is the world leader in this sort of production, but many other Asian and African countries where climate and soil conditions allow cultivation also host large populations of banana growers who sell at least some of their crop.[Template:Sfn](/wiki/Template:Sfn)

There are peasant sector banana growers who produce for the world market in the Caribbean, however. The [Windward Islands](/wiki/Windward_Islands) are notable for the growing, largely of Cavendish bananas, for an international market, generally in Europe but also in North America. In the Caribbean, and especially in Dominica where this sort of cultivation is widespread, holdings are in the 1–2 acre range. In many cases the farmer earns additional money from other crops, from engaging in labor outside the farm, and from a share of the earnings of relatives living overseas. This style of cultivation often was popular in the islands as bananas required little labor input and brought welcome extra income.[Template:Citation needed](/wiki/Template:Citation_needed) Banana crops are vulnerable to destruction by high winds, such as tropical storms or [cyclones](/wiki/Cyclone).[Template:Sfn](/wiki/Template:Sfn)

After the signing of the [NAFTA](/wiki/NAFTA) agreements in the 1990s, however, the tide turned against peasant producers. Their costs of production were relatively high and the ending of favorable tariff and other supports, especially in the European Economic Community, made it difficult for peasant producers to compete with the bananas grown on large plantations by the well capitalized firms like Chiquita and Dole. Not only did the large companies have access to cheap labor in the areas they worked, but they were better able to afford modern agronomic advances such as fertilization. The "dollar banana" produced by these concerns made the profit margins for peasant bananas unsustainable.[Template:Citation needed](/wiki/Template:Citation_needed)

Caribbean countries have sought to redress this problem by providing government supported agronomic services and helping to organize producers' cooperatives. They have also been supporters of the [Fair Trade](/wiki/Fair_Trade) movement which seeks to balance the inequities in the world trade in commodities.[Template:Citation needed](/wiki/Template:Citation_needed)

### East Africa[[edit](/index.php?title=(none)&action=edit&section=9)]

[Template:Main article](/wiki/Template:Main_article) Most farms supply local consumption. Cooking bananas represent a major food source and a major [income](/wiki/Income) source for smallhold farmers. In east Africa, [highland bananas](/wiki/East_African_Highland_bananas) are of greatest importance as a staple food crop. In countries such as [Uganda](/wiki/Uganda), [Burundi](/wiki/Burundi), and [Rwanda](/wiki/Rwanda) per capita consumption has been estimated at [Template:Convert](/wiki/Template:Convert) per year, the highest in the world.[Template:Citation needed](/wiki/Template:Citation_needed)

## Modern cultivation[[edit](/index.php?title=(none)&action=edit&section=10)]

All widely cultivated bananas today descend from the two wild bananas *Musa acuminata* and *Musa balbisiana*. While the original wild bananas contained large seeds, [diploid](/wiki/Diploid) or [polyploid](/wiki/Polyploid) cultivars (some being [hybrids](/wiki/Hybrid_(biology))) with tiny seeds are preferred for human raw fruit consumption.<ref name=Cast09/> These are propagated [asexually](/wiki/Asexual_reproduction) from offshoots. The plant is allowed to produce two shoots at a time; a larger one for immediate fruiting and a smaller "sucker" or "follower" to produce fruit in 6–8 months. The life of a banana plantation is 25 years or longer, during which time the individual stools or planting sites may move slightly from their original positions as lateral [rhizome](/wiki/Rhizome) formation dictates.[Template:Citation needed](/wiki/Template:Citation_needed)

Cultivated bananas are [parthenocarpic](/wiki/Parthenocarpy), i.e. the flesh of the fruit swells and ripens without its seeds being fertilized and developing. Lacking viable seeds, propagation typically involves farmers removing and transplanting part of the underground stem (called a corm). Usually this is done by carefully removing a sucker (a vertical shoot that develops from the base of the banana pseudostem) with some roots intact. However, small [sympodial](/wiki/Sympodial) corms, representing not yet elongated suckers, are easier to transplant and can be left out of the ground for up to two weeks; they require minimal care and can be shipped in bulk.[Template:Citation needed](/wiki/Template:Citation_needed)

It is not necessary to include the corm or root structure to propagate bananas; severed suckers without root material can be propagated in damp [sand](/wiki/Sand), although this takes somewhat longer.[Template:Citation needed](/wiki/Template:Citation_needed)

In some countries, commercial propagation occurs by means of [tissue culture](/wiki/Tissue_culture). This method is preferred since it ensures disease-free planting material. When using vegetative parts such as suckers for propagation, there is a risk of transmitting diseases (especially the devastating [Panama disease](/wiki/Panama_disease)).[Template:Citation needed](/wiki/Template:Citation_needed)

As a non-seasonal crop, bananas are available fresh year-round.[Template:Citation needed](/wiki/Template:Citation_needed)

### Cavendish[[edit](/index.php?title=(none)&action=edit&section=11)]

[Template:Main article](/wiki/Template:Main_article) [thumb|alt=Grocery store photo of several bunches of bananas|](/wiki/File:Bananas.jpg)[Cavendish bananas](/wiki/Cavendish_bananas) are the main commercial banana cultivars sold in the world market.

In global commerce in 2009, by far the most important cultivars belonged to the triploid [AAA](/wiki/List_of_banana_cultivars#AAA_Group) [group](/wiki/Cultivar_group) of *Musa acuminata*, commonly referred to as Cavendish group bananas. They accounted for the majority of banana exports,<ref name=Cast09/> despite only coming into existence in 1836.<ref name=Homecooking/> The cultivars [Dwarf Cavendish](/wiki/Dwarf_Cavendish) and [Grand Nain](/wiki/Grand_Nain) (Chiquita Banana) gained popularity in the 1950s after the previous mass-produced cultivar, [Gros Michel](/wiki/Gros_Michel_banana) (also an AAA group cultivar), became commercially unviable due to [Panama disease](/wiki/Panama_disease), caused by the fungus [*Fusarium oxysporum*](/wiki/Fusarium_oxysporum) which attacks the roots of the banana plant.<ref name=Cast09/> Cavendish cultivars are resistant to the Panama Disease but in 2013 there were fears that the [Black Sigatoka](/wiki/Black_Sigatoka) fungus would in turn make Cavendish bananas unviable.<ref name=Holmes/>

Ease of transport and shelf life rather than superior taste make the Dwarf Cavendish the main export banana.[Template:Citation needed](/wiki/Template:Citation_needed)

Even though it is no longer viable for large scale cultivation, Gros Michel is not extinct and is still grown in areas where Panama disease is not found.<ref name=straightdope/> Likewise, Dwarf Cavendish and Grand Nain are in no danger of extinction, but they may leave supermarket shelves if disease makes it impossible to supply the global market. It is unclear if any existing cultivar can replace Cavendish bananas, so various [hybridisation](/wiki/Hybrid_(biology)) and [genetic engineering](/wiki/Genetic_engineering) programs are attempting to create a disease-resistant, mass-market banana.<ref name=Cast09/>

### Ripening[[edit](/index.php?title=(none)&action=edit&section=12)]

Export bananas are picked green, and ripen in special rooms upon arrival in the destination country. These rooms are air-tight and filled with [ethylene gas](/wiki/Ethylene) to induce ripening. The vivid yellow color consumers normally associate with supermarket bananas is, in fact, caused by the artificial ripening process.<ref name=Ding07/><ref name=Ahma11/> Flavor and texture are also affected by ripening temperature. Bananas are refrigerated to between [Template:Convert](/wiki/Template:Convert) during transport. At lower temperatures, ripening permanently stalls, and the bananas turn gray as cell walls break down. The skin of ripe bananas quickly blackens in the [Template:Convert](/wiki/Template:Convert) environment of a domestic [refrigerator](/wiki/Refrigerator), although the fruit inside remains unaffected. [thumb|left|Ripened bananas (left, under](/wiki/File:Banana-fluorescence-081108.jpg) [sunlight](/wiki/Sunlight)) fluoresce in blue when exposed to [UV light](/wiki/UV_light).|alt=Two adjacent photos of bananas. The left is in sunlight; the right is under ultraviolet light. "Tree-ripened" Cavendish bananas have a greenish-yellow appearance which changes to a brownish-yellow as they ripen further. Although both flavor and texture of tree-ripened bananas is generally regarded as superior to any type of green-picked fruit,[Template:Citation needed](/wiki/Template:Citation_needed) this reduces shelf life to only 7–10 days.[Template:Citation needed](/wiki/Template:Citation_needed)

Bananas can be ordered by the retailer "ungassed" (*i.e.* not treated with ethylene), and may show up at the supermarket fully green. [Template:Lang](/wiki/Template:Lang) (green bananas) that have not been gassed will never fully ripen before becoming rotten. Instead of fresh eating, these bananas are best suited to cooking, as seen in Mexican culinary dishes.[Template:Citation needed](/wiki/Template:Citation_needed)

A 2008 study reported that ripe bananas [fluoresce](/wiki/Fluoresce) when exposed to [ultraviolet](/wiki/Ultraviolet) light. This property is attributed to the degradation of [chlorophyll](/wiki/Chlorophyll) leading to the accumulation of a fluorescent product in the skin of the fruit. The chlorophyll [breakdown product](/wiki/Breakdown_product) is stabilized by a [propionate](/wiki/Propionate) [ester](/wiki/Ester) group. Banana-plant leaves also fluoresce in the same way. Green bananas do not fluoresce. The study suggested that this allows animals which can see light in the ultraviolet spectrum ([tetrachromats](/wiki/Tetrachromat) and [pentachromats](/wiki/Pentachromat)) to more easily detect ripened bananas.<ref name=Mose08/> [Template:Clear](/wiki/Template:Clear)

### Storage and transport[[edit](/index.php?title=(none)&action=edit&section=13)]

Bananas must be transported over long distances from the tropics to world markets. To obtain maximum shelf life, harvest comes before the fruit is mature. The fruit requires careful handling, rapid transport to ports, cooling, and refrigerated shipping. The goal is to prevent the bananas from producing their natural ripening agent, ethylene. This technology allows storage and transport for 3–4 weeks at [Template:Convert](/wiki/Template:Convert). On arrival, bananas are held at about [Template:Convert](/wiki/Template:Convert) and treated with a low concentration of ethylene. After a few days, the fruit begins to ripen and is distributed for final sale. Unripe bananas can not be held in home refrigerators because they suffer from the cold.[Template:Citation needed](/wiki/Template:Citation_needed) Ripe bananas can be held for a few days at home. If bananas are too green, they can be put in a brown paper bag with an apple or tomato overnight to speed up the ripening process.<ref name=ChiquitaRipen/>

Carbon dioxide (which bananas produce) and ethylene absorbents extend fruit life even at high temperatures. This effect can be exploited by packing banana in a [polyethylene](/wiki/Polyethylene) bag and including an ethylene absorbent, e.g., [potassium permanganate](/wiki/Potassium_permanganate), on an inert carrier. The bag is then sealed with a band or string. This treatment has been shown to more than double lifespans up to 3–4 weeks without the need for refrigeration.<ref name=Scot70/><ref name=Scot71/><ref name=Scot74/>

### Production and export[[edit](/index.php?title=(none)&action=edit&section=14)]

|  |  |
| --- | --- |
| Production and export of bananas and plantains by country<ref group="Note" name=Note1/> | |
| **Country** | **Millions of tonnes !! Percentage of world total** |
| **Table 1: Production (2012)** | | |
| [Template:IND](/wiki/Template:IND) | 24.9 | 18% |
| [Template:CHN](/wiki/Template:CHN) | 10.6 | 8% |
| [Template:UGA](/wiki/Template:UGA) | 9.8 | 7% |
| [Template:PHL](/wiki/Template:PHL) | 9.2 | 7% |
| [Template:ECU](/wiki/Template:ECU) | 7.6 | 5% |
| [Template:BRA](/wiki/Template:BRA) | 6.9 | 5% |
| [Template:INA](/wiki/Template:INA) | 6.2 | 4% |
| [Template:COL](/wiki/Template:COL) | 5.3 | 4% |
| [Template:CMR](/wiki/Template:CMR) | 4.9 | 3% |
| [Template:GHA](/wiki/Template:GHA) | 3.6 | 3% |
| All other countries | 50.2 | 36% |
| **Total world** | **139.2** | 100% |
| **Table 2: Exports (2011)** | | |
| [Template:ECU](/wiki/Template:ECU) | 5.2 | 29% |
| [Template:CRC](/wiki/Template:CRC) | 1.8 | 10% |
| [Template:COL](/wiki/Template:COL) | 1.8 | 10% |
| [Template:PHL](/wiki/Template:PHL) | 1.6 | 9% |
| [Template:GUA](/wiki/Template:GUA) | 1.5 | 8% |
| All other countries | 6.0 | 34% |
| **Total world** | **17.9** | 100% |

[thumb|Indian Bananas, various varieties sold in a rural shop in South India](/wiki/File:2010_Bananas_in_ChinnaDharapuram,_India.JPG) Statistics on the production and export of bananas and plantains are available from the [Food and Agriculture Organization](/wiki/Food_and_Agriculture_Organization). Some countries produce statistics which distinguish between bananas and plantains, but two of the top three producers ([India](/wiki/India) and [China](/wiki/China)) do not, so comparisons can only be made using the total for bananas and plantains combined. The 2012 statistics (see Table 1) show that India led the world in banana production, producing around 18% of the worldwide crop of 139 million metric tonnes. [Philippines](/wiki/Philippines) was the next largest producer with around 7% of the worldwide crop. Its national data does distinguish between bananas and plantains, and shows that the latter made up over 95% of production. Ten countries produced around two thirds of the total world production.<ref group="Note" name=Note1/>

The statistics for the export of bananas and plantains show a rather different picture (see Table 2). Total world exports at around 18 million metric tonnes amounted to only 12% of total world production; two thirds of the exports were generated by only five countries. The top three producing countries do not appear in this table, and two countries, [Costa Rica](/wiki/Costa_Rica) and [Guatemala](/wiki/Guatemala), do not appear in the table of top producers. Only the Philippines has a consistent position in both tables. Exports were dominated by [Ecuador](/wiki/Ecuador), with 29% of the world total. Statistics for Ecuador distinguish between bananas and plantains; 93% of its exports were classified as bananas.<ref group="Note" name=Note1/>

Bananas and plantains constitute a major staple [food crop](/wiki/Agriculture) for millions of people in [developing countries](/wiki/Developing_country). In most tropical countries, green (unripe) bananas used for [cooking](/wiki/Cooking) represent the main cultivars. Bananas are cooked in ways that are similar to [potatoes](/wiki/Potato). Both can be [fried](/wiki/Frying), [boiled](/wiki/Boiling), [baked](/wiki/Baking), or chipped and have similar [taste](/wiki/Taste) and texture when served. One banana provides about the same [calories](/wiki/Calorie) as one potato.[Template:Citation needed](/wiki/Template:Citation_needed)

Most producers are small-scale [farmers](/wiki/Farmer) either for home consumption or local markets. Because bananas and plantains produce fruit year-round, they provide an extremely valuable food source during the *hunger season* (when the food from one annual/semi-annual harvest has been consumed, and the next is still to come). Bananas and plantains are therefore critical to global [food security](/wiki/Food_security).

Bananas have been an important source of disagreement in the Doha Round of trade talks. A study for [ICTSD](/wiki/ICTSD) showed that the new deal on EU banana import tariffs will be a boon to [Latin American](/wiki/Latin_American) exporters but would trigger a drop in exports of the fruit from African, Caribbean and Pacific ([ACP](/wiki/African,_Caribbean_and_Pacific_Group_of_States)) countries.<ref name=Anan09/>

Bananas are among the most widely consumed foods in the world. [Chiquita](/wiki/Chiquita_Brands_International), [Del Monte](/wiki/Fresh_Del_Monte_Produce), [Dole](/wiki/Dole_Food_Company), and [Fyffes](/wiki/Fyffes) grow their own bananas in Ecuador, Colombia, Costa Rica, [Guatemala](/wiki/Guatemala), and [Honduras](/wiki/Honduras). Banana plantations are capital intensive and demand significant expertise. The majority of independent growers are large and wealthy landowners in these countries. Producers have attempted to raise prices via marketing them as "[fair trade](/wiki/Fair_trade)" or [Rainforest Alliance](/wiki/Rainforest_Alliance)-certified in some countries.[Template:Citation needed](/wiki/Template:Citation_needed)

The banana has an extensive trade history starting with firms such as the Irish [Fyffes](/wiki/Fyffes) and the US [United Fruit Company](/wiki/United_Fruit_Company) (now Chiquita) at the end of the 19th century. For much of the 20th century, bananas and [coffee](/wiki/Coffee) dominated the export economies of [Central America](/wiki/Central_America). In the 1930s, bananas and [coffee](/wiki/Coffee) made up as much as 75% of the region's exports. As late as 1960, the two crops accounted for 67% of the exports from the region. Though the two were grown in similar regions, they tended not to be distributed together. The [United Fruit Company](/wiki/United_Fruit_Company) based its business almost entirely on the banana trade, because the coffee trade proved too difficult to control. The term "[banana republic](/wiki/Banana_republic)" has been applied to most countries in [Central America](/wiki/Central_America), but from a strict economic perspective only Costa Rica, Honduras, and [Panama](/wiki/Panama) had economies dominated by the banana trade.[Template:Citation needed](/wiki/Template:Citation_needed)

The [European Union](/wiki/European_Union) has traditionally imported many of its bananas from former European [Caribbean](/wiki/Caribbean) colonies, paying guaranteed prices above global market rates (see [Lomé Convention](/wiki/Lomé_Convention)). These arrangements have now been largely withdrawn under pressure from other major trading powers, principally the [United States](/wiki/United_States). The withdrawal of these indirect subsidies to Caribbean producers is expected to favour the more efficient banana producers of Central America, in which American companies have an economic interest. In addition, small-scale Caribbean producers are finding it difficult to comply with increasingly strict certification requirements. Some support is being provided to Caribbean countries under the EU's Banana Accompanying Measures (BAM).<ref name=Agritrade/>

The United States produces few bananas. A mere [Template:Convert](/wiki/Template:Convert) were grown in Hawaii in 2001.<ref name=ipmcenters/> Bananas were once grown in [Florida](/wiki/Florida)[Template:Citation needed](/wiki/Template:Citation_needed) and southern California.<ref name=crfg/>

In March 2014 it was announced that Fyffes and Chiquita would merge to create the world's largest banana company, worth about $1bn (£597m). The new firm, named ChiquitaFyffes, is expected to sell about 160 million boxes of bananas annually.<ref name=BBC140310/>

## Pests, diseases, and natural disasters[[edit](/index.php?title=(none)&action=edit&section=15)]

[Template:Main article](/wiki/Template:Main_article) [thumb|upright|Banana bunches are sometimes encased in plastic bags for protection. The bags may be coated with](/wiki/File:BananasBlueBagStLucia.jpg) [pesticides](/wiki/Pesticide).|alt=Photo of bananas in blue plastic bag

While in no danger of outright extinction, the most common edible banana cultivar Cavendish (extremely popular in Europe and the Americas) could become unviable for large-scale cultivation in the next 10–20 years. Its predecessor '[Gros Michel'](/wiki/Gros_Michel), discovered in the 1820s, suffered this fate. Like almost all bananas, Cavendish lacks genetic diversity, which makes it vulnerable to diseases, threatening both commercial cultivation and small-scale subsistence farming.<ref name=NS060613/><ref name=Mont03/> Some commentators remarked that those variants which could replace what much of the world considers a "typical banana" are so different that most people would not consider them the same fruit, and blame the decline of the banana on [monogenetic](/wiki/Mendelian_inheritance) cultivation driven by short-term commercial motives.<ref name=NZH/>

### Panama disease[[edit](/index.php?title=(none)&action=edit&section=16)]

[Panama disease](/wiki/Panama_disease) is caused by a [fusarium](/wiki/Fusarium) soil [fungus](/wiki/Fungus) (Race 1), which enters the plants through the roots and travels with water into the trunk and leaves, producing [gels](/wiki/Gel) and gums that cut off the flow of water and nutrients, causing the plant to [wilt](/wiki/Wilting), and exposing the rest of the plant to lethal amounts of sunlight. Prior to 1960, almost all commercial banana production centered on "Gros Michel", which was highly susceptible.<ref name=Bark08/> Cavendish was chosen as the replacement for Gros Michel because, among resistant cultivars, it produces the highest quality [fruit](/wiki/Fruit). However, more care is required for shipping the Cavendish, and its quality compared to Gros Michel is debated.[Template:By whom](/wiki/Template:By_whom)[Template:Citation needed](/wiki/Template:Citation_needed)

According to current sources, a deadly form of Panama disease is infecting Cavendish. All plants are genetically identical, which prevents evolution of disease resistance. Researchers are examining hundreds of wild varieties for resistance.<ref name=Bark08/>

#### Tropical race 4[[edit](/index.php?title=(none)&action=edit&section=17)]

Tropical race 4 (TR4) is a reinvigorated strain of Panama disease first discovered in 1993. This virulent form of fusarium wilt has wiped out Cavendish in several southeast Asian countries. It has yet to reach the Americas; however, soil fungi can easily be carried on boots, clothing, or tools. This is how TR4 travels and is its most likely route into Latin America. Cavendish is highly susceptible to TR4, and over time, Cavendish is almost certain to be eliminated from commercial production by this disease. The only known defense to TR4 is genetic resistance.<ref name=IBS/>

### Black sigatoka[[edit](/index.php?title=(none)&action=edit&section=18)]

[Black sigatoka](/wiki/Black_sigatoka) is a fungal leaf spot disease first observed in [Fiji](/wiki/Fiji) in 1963 or 1964. Black Sigatoka (also known as black leaf streak) has spread to banana plantations throughout the tropics from infected banana leaves that were used as packing material. It affects all main cultivars of bananas and plantains (including the Cavendish cultivars<ref name =Holmes/>), impeding [photosynthesis](/wiki/Photosynthesis) by blackening parts of the leaves, eventually killing the entire leaf. Starved for energy, fruit production falls by 50% or more, and the bananas that do grow [ripen](/wiki/Ripening) prematurely, making them unsuitable for export. The fungus has shown ever-increasing resistance to treatment, with the current expense for treating [Template:Convert](/wiki/Template:Convert) exceeding [$](/wiki/United_States_dollar)1,000 per year. In addition to the expense, there is the question of how long intensive spraying can be environmentally justified. Several resistant cultivars of banana have been developed, but none has yet received commercial acceptance due to taste and texture issues.[Template:Citation needed](/wiki/Template:Citation_needed)

#### In East Africa[[edit](/index.php?title=(none)&action=edit&section=19)]

With the arrival of [black sigatoka](/wiki/Black_sigatoka), banana production in eastern Africa fell by over 40%. For example, during the 1970s, Uganda produced [Template:Convert](/wiki/Template:Convert) of bananas per hectare. Today, production has fallen to only [Template:Convert](/wiki/Template:Convert) per hectare.[Template:Citation needed](/wiki/Template:Citation_needed)

The situation has started to improve as new disease-resistant cultivars have been developed by the [International Institute of Tropical Agriculture](/wiki/International_Institute_of_Tropical_Agriculture) and the National Agricultural Research Organisation of Uganda (NARO), such as FHIA-17 (known in [Uganda](/wiki/Uganda) as the [Kabana 3](/wiki/Kabana_3)). These new cultivars taste different from the Cabana banana, which has slowed their acceptance by local farmers. However, by adding [mulch](/wiki/Mulch) and [manure](/wiki/Manure) to the soil around the base of the plant, these new cultivars have substantially increased yields in the areas where they have been tried.[Template:Citation needed](/wiki/Template:Citation_needed)

The [International Institute of Tropical Agriculture](/wiki/International_Institute_of_Tropical_Agriculture) and NARO, funded by the [Rockefeller Foundation](/wiki/Rockefeller_Foundation) and [CGIAR](/wiki/Consultative_Group_on_International_Agricultural_Research) have started trials for [genetically modified](/wiki/Genetic_engineering) bananas that are resistant to both Black sigatoka and banana weevils. It is developing cultivars specifically for smallholder and subsistence farmers.[Template:Citation needed](/wiki/Template:Citation_needed)

### Banana bunchy top virus[[edit](/index.php?title=(none)&action=edit&section=20)]

[Banana bunchy top virus](/wiki/Banana_bunchy_top_virus) (BBTV) jumps from plant to plant using [aphids](/wiki/Aphid). It stunts leaves, resulting in a "bunched" appearance. Generally, an infected plant does not produce fruit, although mild strains exist which allow some production. These mild strains are often mistaken for malnourishment, or a disease other than BBTV. There is no cure; however, its effect can be minimized by planting only [tissue-cultured plants](/wiki/Plant_tissue_culture) (in vitro propagation), controlling aphids, and immediately removing and destroying infected plants.[Template:Citation needed](/wiki/Template:Citation_needed)

### Banana bacterial wilt[[edit](/index.php?title=(none)&action=edit&section=21)]

[Banana bacterial wilt](/wiki/Banana_Xanthomonas_wilt) (BBW) is a bacterial disease caused by [*Xanthomonas campestris*](/wiki/Xanthomonas_campestris) pv. *musacearum*.<ref name=Tush04/> After being originally identified on a close relative of bananas, [*Ensete ventricosum*](/wiki/Ensete_ventricosum), in [Ethiopia](/wiki/Ethiopia) in the 1960s,<ref name=Brad68/> BBW occurred in Uganda in 2001 affecting all banana cultivars. Since then BBW has been diagnosed in Central and East Africa including the banana growing regions of [Rwanda](/wiki/Rwanda), the [Democratic Republic of the Congo](/wiki/Democratic_Republic_of_the_Congo), [Tanzania](/wiki/Tanzania), [Kenya](/wiki/Kenya), [Burundi](/wiki/Burundi), and [Uganda](/wiki/Uganda).<ref name=Mwan07/>

## Nutrition[[edit](/index.php?title=(none)&action=edit&section=22)]

[Template:Nutritionalvalue](/wiki/Template:Nutritionalvalue) Bananas are an excellent source of [vitamin B6](/wiki/Vitamin_B6) and contain moderate amounts of [vitamin C](/wiki/Vitamin_C), [manganese](/wiki/Manganese) and [dietary fiber](/wiki/Dietary_fiber) (right table).<ref name=Nutridata/>

Although bananas are commonly thought to supply exceptional [potassium](/wiki/Potassium) content,[[2]](#cite_note-2) their actual potassium content is relatively low per typical food serving at only 8% of the [Daily Value](/wiki/Daily_Value) (right table). A compilation of potassium content in common foods consumed in the United States shows that raw bananas rank 1,611th, supplying 358 mg of potassium per 100 g; some foods with higher potassium content include [beans](/wiki/Beans), [milk](/wiki/Milk), [apricots](/wiki/Apricots), [carrots](/wiki/Carrots), sweet green [bell peppers](/wiki/Bell_peppers) and [potatoes](/wiki/Potatoes).[[3]](#cite_note-3) Banana ingestion may affect [dopamine](/wiki/Dopamine) production in people deficient in the [amino acid](/wiki/Amino_acid) [tyrosine](/wiki/Tyrosine), a dopamine precursor present in bananas.<ref name=Wong11/><ref name=UMM/> Individuals with a [latex allergy](/wiki/Latex_allergy) may experience a reaction to bananas.<ref name=Tayl04/>

Ripe bananas were found to contain [serotonin](/wiki/Serotonin), [dopamine](/wiki/Dopamine) and [norepinephrine](/wiki/Norepinephrine).[[4]](#cite_note-4)

## Culture[[edit](/index.php?title=(none)&action=edit&section=23)]

### Food and cooking[[edit](/index.php?title=(none)&action=edit&section=24)]

[Template:See also](/wiki/Template:See_also)

#### Fruit[[edit](/index.php?title=(none)&action=edit&section=25)]

Bananas are a staple [starch](/wiki/Starch) for many [tropical](/wiki/Tropics) populations. Depending upon cultivar and ripeness, the flesh can vary in taste from starchy to sweet, and texture from firm to mushy. Both the skin and inner part can be eaten raw or cooked. The primary component of the aroma of fresh bananas is [isoamyl acetate](/wiki/Isoamyl_acetate) (also known as *banana oil*), which, along with several other compounds such as [butyl acetate](/wiki/Butyl_acetate) and [isobutyl acetate](/wiki/Isobutyl_acetate), is a significant contributor to banana flavor.<ref name=Fahl00/><ref name=Mui02/><ref name=Salm96/>

During the [ripening process](/wiki/Ripening), bananas produce the gas [ethylene](/wiki/Ethylene), which acts as a [plant hormone](/wiki/Plant_hormone) and indirectly affects the flavor. Among other things, ethylene stimulates the formation of [amylase](/wiki/Amylase), an [enzyme](/wiki/Enzyme) that breaks down starch into sugar, influencing the taste of bananas. The greener, less ripe bananas contain higher levels of starch and, consequently, have a "starchier" taste. On the other hand, yellow bananas taste sweeter due to higher sugar concentrations. Furthermore, ethylene signals the production of [pectinase](/wiki/Pectinase), an enzyme which breaks down the [pectin](/wiki/Pectin) between the cells of the banana, causing the banana to soften as it ripens.<ref name=plantphys/><ref name=newton/>

Bananas are eaten deep fried, baked in their skin in a split [bamboo](/wiki/Bamboo), or steamed in [glutinous rice](/wiki/Glutinous_rice) wrapped in a banana leaf. Bananas can be made into [jam](/wiki/Fruit_preserves). Banana [pancakes](/wiki/Pancake) are popular amongst [backpackers](/wiki/Backpacking_(travel)) and other travelers in [South Asia](/wiki/South_Asia) and [Southeast Asia](/wiki/Southeast_Asia). This has elicited the expression [*Banana Pancake Trail*](/wiki/Banana_Pancake_Trail) for those places in [Asia](/wiki/Asia) that cater to this group of travelers. [Banana chips](/wiki/Banana_chips) are a snack produced from sliced dehydrated or fried banana or plantain, which have a dark brown color and an intense banana taste. Dried bananas are also ground to make [banana flour](/wiki/Banana_flour). Extracting juice is difficult, because when a banana is compressed, it simply turns to pulp. Bananas feature prominently in [Philippine cuisine](/wiki/Philippine_cuisine), being part of traditional dishes and desserts like [*maruya*](/wiki/Maruya_(Filipino_cuisine)), [*turón*](/wiki/Turón_(food)), and [*halo-halo*](/wiki/Halo-halo) or *saba con yelo*. Most of these dishes use the [Saba](/wiki/Saba_Banana) or Cardaba banana cultivar. Bananas are also commonly used in cuisine in the South-Indian state of [Kerala](/wiki/Kerala), where they are steamed (*puzhungiyathu*), made into curries,<ref name=pazhampachadi/> fried into chips (*upperi*)<ref name=Hindu130413/> or fried in batter (*pazhampori*).<ref name=Hindu110228/> [Pisang goreng](/wiki/Pisang_goreng), bananas fried with batter similar to the Filipino *maruya* or Kerala *pazhampori*, is a popular dessert in [Malaysia](/wiki/Malaysia), [Singapore](/wiki/Singapore), and [Indonesia](/wiki/Indonesia). A similar dish is known in the United Kingdom and United States as banana [fritters](/wiki/Fritter).

Plantains are used in various stews and curries or cooked, baked or mashed in much the same way as [potatoes](/wiki/Potatoes), such as the *Pazham Pachadi* prepared in [Kerala](/wiki/Kerala).<ref name=pazhampachadi/>

Seeded bananas ([*Musa balbisiana*](/wiki/Musa_balbisiana)), one of the forerunners of the common domesticated banana,<ref name=CAB49/> are sold in markets in Indonesia.[Template:Citation needed](/wiki/Template:Citation_needed)

#### Flower[[edit](/index.php?title=(none)&action=edit&section=26)]

Banana hearts are used as a [vegetable](/wiki/Vegetable)[[5]](#cite_note-5) in [South Asian](/wiki/South_Asian_cuisine) and [Southeast Asian cuisine](/wiki/Southeast_Asian_cuisine), either raw or steamed with dips or cooked in soups, curries and fried foods.[[6]](#cite_note-6) The flavor resembles that of [artichoke](/wiki/Artichoke). As with artichokes, both the fleshy part of the bracts and the heart are edible.[[7]](#cite_note-7)

#### Leaves[[edit](/index.php?title=(none)&action=edit&section=27)]

[Template:Main article](/wiki/Template:Main_article) Banana leaves are large, flexible, and waterproof. They are often used as ecologically friendly disposable food containers or as "plates" in [South Asia](/wiki/South_Asia) and several [Southeast Asian](/wiki/Southeast_Asia) countries. In [Indonesian cuisine](/wiki/Indonesian_cuisine), banana leaf is employed in cooking method called [pepes](/wiki/Pepes) and [botok](/wiki/Botok); the banana leaf packages containing food ingredients and spices are cooked on steam, in boiled water or grilled on charcoal. In the South Indian states of [Tamil Nadu](/wiki/Tamil_Nadu), [Karnataka](/wiki/Karnataka), [Andhra Pradesh](/wiki/Andhra_Pradesh) and [Kerala](/wiki/Kerala) in every occasion the food must be served in a banana leaf and as a part of the food a banana is served. Steamed with dishes they impart a subtle sweet flavor. They often serve as a wrapping for grilling food. The leaves contain the juices, protect food from burning and add a subtle flavor.<ref name=morton/> In Tamil Nadu (India) leaves are fully dried and used as packing material for food stuffs and also making cups to hold liquid foods. In Central American countries, banana leaves are often used as wrappers for [tamales](/wiki/Tamales).[Template:Citation needed](/wiki/Template:Citation_needed)

#### Trunk[[edit](/index.php?title=(none)&action=edit&section=28)]

The tender core of the banana plant's trunk is also used in [South Asian](/wiki/South_Asian) and [Southeast Asian cuisine](/wiki/Southeast_Asian_cuisine), and notably in the [Burmese](/wiki/Burma) dish [mohinga](/wiki/Mohinga).

<gallery> File:Banana and cross section.jpg|Peeled, whole, and longitudinal section File:Cavendish DS.jpg|A bunch of Cavendish banana File:Bananajf.jpg|*Kilawin na pusô ng saging*, a [Filipino dish](/wiki/Cuisine_of_the_Philippines) using banana flowers File:Nacatamales in steamer.jpg|Nicaraguan Nacatamales, in banana leaves, ready to be steamed File:Kaeng yuak.JPG|*Kaeng yuak* is a northern [Thai curry](/wiki/Thai_curry) made with the core of the banana plant File:Pisang goreng in a basket.jpg|[*Pisang goreng*](/wiki/Pisang_goreng) fried banana coated in batter, popular snack in [Indonesia](/wiki/Indonesian_cuisine) File:YosriPengatPisang.jpg|Banana in sweet gravy, known as *pengat pisang* in Malay. Popular along Malaysia's east coast </gallery>

### Fiber[[edit](/index.php?title=(none)&action=edit&section=29)]

#### Textiles[[edit](/index.php?title=(none)&action=edit&section=30)]

The banana plant has long been a source of [fiber](/wiki/Fiber) for high quality [textiles](/wiki/Textile). In [Japan](/wiki/Japan), banana cultivation for clothing and household use dates back to at least the 13th century. In the Japanese system, leaves and shoots are cut from the plant periodically to ensure softness. Harvested shoots are first boiled in [lye](/wiki/Lye) to prepare fibers for [yarn](/wiki/Yarn)-making. These banana shoots produce fibers of varying degrees of softness, yielding yarns and textiles with differing qualities for specific uses. For example, the outermost fibers of the shoots are the coarsest, and are suitable for [tablecloths](/wiki/Tablecloth), while the softest innermost fibers are desirable for [kimono](/wiki/Kimono) and [kamishimo](/wiki/Hakama). This traditional Japanese cloth-making process requires many steps, all performed by hand.[[8]](#cite_note-8) In a [Nepalese](/wiki/Nepal) system the trunk is harvested instead, and small pieces are subjected to a softening process, mechanical fiber extraction, bleaching and drying. After that, the fibers are sent to the [Kathmandu Valley](/wiki/Kathmandu_Valley) for use in [rugs](/wiki/Carpet) with a [silk](/wiki/Silk)-like texture. These banana fiber rugs are woven by traditional Nepalese hand-knotting methods, and are sold [RugMark certified](/wiki/Rugmark).[Template:Citation needed](/wiki/Template:Citation_needed)

In South Indian state of [Tamil Nadu](/wiki/Tamil_Nadu) after harvesting for fruit the trunk (outer layer of the shoot) is made into fine thread used in making of flower [garlands](/wiki/Garland) instead of thread.[Template:Citation needed](/wiki/Template:Citation_needed)

#### Paper[[edit](/index.php?title=(none)&action=edit&section=31)]

[Template:Main article](/wiki/Template:Main_article) Banana fiber is used in the production of banana paper. Banana paper is made from two different parts: the [bark](/wiki/Bark) of the banana plant, mainly used for artistic purposes, or from the fibers of the stem and non-usable fruits. The paper is either hand-made or by industrial process.

### Cultural roles[[edit](/index.php?title=(none)&action=edit&section=32)]

[Template:Multiple image](/wiki/Template:Multiple_image)

#### Arts[[edit](/index.php?title=(none)&action=edit&section=33)]

* The song "[Yes! We Have No Bananas](/wiki/Yes!_We_Have_No_Bananas)" was written by [Frank Silver](/wiki/Frank_Silver) and [Irving Cohn](/wiki/Irving_Cohn) and originally released in 1923; for many decades, it was the best-selling [sheet music](/wiki/Sheet_music) in history. Since then the song has been rerecorded several times and has been particularly popular during banana shortages.[[9]](#cite_note-9)[[10]](#cite_note-10)\* A person slipping on a [banana peel](/wiki/Banana_peel) has been a staple of [physical comedy](/wiki/Physical_comedy) for generations. An American comedy recording from 1910 features a popular character of the time, "Uncle Josh", claiming to describe his own such incident:[[11]](#cite_note-11)

[Template:Quote](/wiki/Template:Quote)

* The poet [Bashō](/wiki/Matsuo_Bashō) is named after the Japanese word for a banana plant. The "bashō" planted in his garden by a grateful student became a source of inspiration to his poetry, as well as a symbol of his life and home.[[12]](#cite_note-12)\* The cover artwork for [the debut album](/wiki/The_Velvet_Underground_&_Nico) of [The Velvet Underground](/wiki/The_Velvet_Underground) features a banana made by [Andy Warhol](/wiki/Andy_Warhol). On the original vinyl LP version, the design allowed the listener to "peel" this banana to find a pink, peeled phallic banana on the inside.[[13]](#cite_note-13)

#### Religion and popular beliefs[[edit](/index.php?title=(none)&action=edit&section=34)]

[thumb|upright|](/wiki/File:XRF-Tani-.jpg)[*Nang Tani*](/wiki/Nang_Tani), the female [ghost](/wiki/Ghost) of Thai folklore that haunts banana plants In [Burma](/wiki/Burma), bunches of green bananas surrounding a green [coconut](/wiki/Coconut) in a tray form an important part of traditional offerings to the [Buddha](/wiki/Gautama_Buddha) and the [Nats](/wiki/Nat_(spirit)).[Template:Citation needed](/wiki/Template:Citation_needed)

In all the important festivals and occasions of [Hindus](/wiki/Hindu), the serving of bananas plays a prominent part. Traditionally in [Tamil](/wiki/Tamil_culture) marriages, banana plants are tied on both sides of the entrance of houses to bless the newlyweds to be useful to each other.[Template:Citation needed](/wiki/Template:Citation_needed) The banana is one of three fruits with this significance, the others being [mango](/wiki/Mango) and [jack fruit](/wiki/Jack_fruit).[Template:Citation needed](/wiki/Template:Citation_needed)

In [Thailand](/wiki/Thailand), it is believed that [a certain type](/wiki/Musa_balbisiana) of banana plants may be inhabited by a [spirit](/wiki/Spirit), [Nang Tani](/wiki/Nang_Tani), a type of ghost related to trees and similar plants that manifests itself as a young woman.[[14]](#cite_note-14) Often people tie a length of colored satin cloth around the pseudostem of the banana plants.[[15]](#cite_note-15) In [Malay folklore](/wiki/Ethnic_Malays), the ghost known as [Pontianak](/wiki/Pontianak_(folklore)) is associated with banana plants (*pokok pisang*), and its spirit is said to reside in them during the day.[[16]](#cite_note-16)

#### Unicode[[edit](/index.php?title=(none)&action=edit&section=35)]

The [Unicode](/wiki/Unicode) standard includes the [emoji](/wiki/Emoji) character [Template:Unichar](/wiki/Template:Unichar).[[17]](#cite_note-17)

### Other uses[[edit](/index.php?title=(none)&action=edit&section=36)]

* Banana sap from the [pseudostem](/wiki/Pseudostem), peelings or flesh may be sufficiently sticky for adhesive uses.[Template:Citation needed](/wiki/Template:Citation_needed)
* The large leaves may be used as [umbrellas](/wiki/Umbrella).<ref name=morton>[Template:Cite web](/wiki/Template:Cite_web)</ref>
* [Banana peel](/wiki/Banana_peel) may have capability to extract [heavy metal](/wiki/Heavy_metal_(chemistry)) [contamination](/wiki/Contamination) from river water, similar to other [purification](/wiki/Water_purification) materials.[[18]](#cite_note-18)[[19]](#cite_note-19) In 2007, banana peel powder was tested as a means of filtration for heavy metals and [radionuclides](/wiki/Radionuclide) occurring in water produced by the nuclear and fertilizer industries (cadmium contaminant is present in phosphates). When added and thoroughly mixed for 40 minutes, the powder can remove roughly 65% of heavy metals, and this can be repeated.[[20]](#cite_note-20)[Template:Clear](/wiki/Template:Clear)

## Notes[[edit](/index.php?title=(none)&action=edit&section=37)]

[Template:Reflist](/wiki/Template:Reflist)

## References[[edit](/index.php?title=(none)&action=edit&section=38)]

[Template:Reflist](/wiki/Template:Reflist)

## Bibliography[[edit](/index.php?title=(none)&action=edit&section=39)]

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## Further reading[[edit](/index.php?title=(none)&action=edit&section=40)]

* [Harriet Lamb](/wiki/Harriet_Lamb), "Fighting The Banana Wars and other Fairtrade Battles", ISBN 978-1-84604-083-2

## External links[[edit](/index.php?title=(none)&action=edit&section=41)]

[Template:Sister project links](/wiki/Template:Sister_project_links)

* [Kew plant profile: *Musa acuminata* (banana)](http://www.kew.org/science-conservation/plants-fungi/musa-acuminata-banana)
* [Articles on banana trade at *Agritrade*](http://agritrade.cta.int/Agriculture/Commodities/Bananas)

[Template:Agriculture country lists](/wiki/Template:Agriculture_country_lists) [Template:Banana](/wiki/Template:Banana) [Template:Yunnan cuisine](/wiki/Template:Yunnan_cuisine)

[Template:Authority control](/wiki/Template:Authority_control)

[Category:Bananas](/wiki/Category:Bananas) [Category:Fiber plants](/wiki/Category:Fiber_plants) [Category:Staple foods](/wiki/Category:Staple_foods) [Category:Tropical agriculture](/wiki/Category:Tropical_agriculture) [Category:Tropical fruit](/wiki/Category:Tropical_fruit) [Category:Allergenic foods](/wiki/Category:Allergenic_foods) [Category:Cormous plants](/wiki/Category:Cormous_plants)