



Acai Berry (Acai Palm Fruit) – Nutritional Supplement Health Benefits

Acai (pronounced as ah-sah'-ee) is rapidly becoming famous, now known as the one of the most powerful and tasty **antioxidants** available in the world of vegetables and fruits.

The amazing **health** benefits of **Acai** have been touted as a "Super Food" by authorities such as Dr. Nicholas Perricone and many others.

You may have seen it described on "Oprah" and many other popular TV shows. **Acai** is relatively new to the North American USA market, but it has been consumed by millions in South America for hundreds of years, perhaps for thousands of years. Like the **Mangosteen** from Southeast Asia, and **Noni** from Polynesian Islands, the **Acai berry** is a hot product in today's **health** food stores. It is available in many online **health** food stores and you may find it among the fruit juices in your local grocery store.



The juice and pulp of **Acai** fruits are frequently used in various beverages and smoothies. In northern Brazil, **Acai** is traditionally served in cuias with tapioca and some times sugar. There, people drink it rather than eating it. **Acai** has become some kind of fad in southern Brazil, where people consume impure **Acai** derivatives with consistency varying from water-like to almost ice-cream like (but never the right one), often of poor quality and mixed with residues as granola and Guarani½ syrup. **Acai** fruits deteriorate rapidly after harvest, so outside its growing region it is generally only available as juice or frozen fruit pulp. The frozen fruit pulp is very deep purple and is reminiscent of a **blueberry** sorbet or ice cream with a hint of **chocolate**. It can also be eaten raw or used as a condiment, most commonly with shrimp or manioc. It is considered one of the most nutritious fruits of the Amazon, second perhaps to the Brazil Nut. The leaves of the tree are often used in weaving and basket making.

Acai Palm (IPA [asa'i] or [ah-saw-eee]) or Euterpe is a genus of 25-30 species of palms native to tropical Central and South America, from Belize south to Brazil and Peru, growing mainly in floodplains and swamps. They are tall slender attractive palms growing to 15-30 m tall, with pinnate leaves up to 3 m long. The fruit is a small, round, black-purple drupe similar in size to a grape. They are produced in branched panicles of 700-900 fruits. Its appearance is similar to that of a grape, but it has a smaller amount of pulp and a single large seed about 7½x10 mm in diameter. The genus is named after the muse Euterpe of Greek mythology. The vernacular name is also sometimes spelled Assai Palm in English.



Health Benefits and Medicinal or Folk Remedy Uses

Acai are used (particularly Euterpe edulis) for their 'palm heart' eaten as a steamed dish, and (particularly Euterpe oleracea) for their highly-prized fruits that are rich in **B vitamins**, minerals (particularly iron), fibre, **proteins**, **Omega-3 fatty acids**, and **anthocyanin**, a member of the **flavonoid** class of antioxidants. The extraction of the palm's heart (the soft inner growing tip) involves the inevitable death of the palm as its growing tip is removed, and it cannot recover. Some species are self suckering, not single stem, and produce multiple stems, sometimes up to 40 on one plant, so harvesting palm heart is not such an environmental problem as the original stock plant can live on. Given that harvesting is still a costly and labour intensive task, palm heart dishes are regarded as a delicacy more than a staple diet - palm's heart is sometimes called 'Millionaire's Salad' due to the high price.

More Background on The Acai Palm Tree

Acai Palm (pronounced as ah-sah'-ee) is a member of the genus *Euterpe*, which contains 7 species of palms native to tropical Central and South America, from Belize south to Brazil and Peru, growing mainly in floodplains and swamps. The genus is named after the muse Euterpe of Greek mythology. Euterpe are tall slender attractive palms growing to 15-30 meters tall, with pinnate leaves up to 3 meters long. Many of the palms that were once in the genus *Euterpe* have been reclassified into the genus *Prestoea* (Riffle, 2003). The species *Euterpe oleracea* is usually called **Acai** Palm, after the Portuguese name for the beverages made from its fruit. The vernacular name is also sometimes spelled Assai Palm in English.

The fruit, a small, round, black-purple drupe about 1 inch in diameter, similar in appearance and size to a grape but with less pulp, is produced in branched panicles of 700 to 900 fruits. Two crops of fruit are produced per year. The fruit has a single large seed about 7â–10 mm in diameter. The exocarp of the ripe fruits is a deep purple color, or green, depending on the kind of **Acai** and its maturity. The mesocarp is pulpy and thin, with a consistent thickness of 1 mm or less. It surrounds the voluminous and hard endocarp which contains a seed with a diminutive embryo and abundant endosperm.[citation needed] The seed makes up about 80% of the fruit (Schauss, 2006c).

Acai Harvesting and uses

Acai Stems

Heart of palm (the soft inner growing tip of the palm, particularly from *Euterpe edulis* but also from *Euterpe oleracea*) is consumed, often in salads. The extraction of the palm's heart involves the inevitable death of the entire palm tree, as no new branches will grow after its growing tip is removed. Given that harvesting kills the tree and is a costly and labour intensive task, palm heart dishes are regarded as a delicacy more than a staple diet; heart of palm is sometimes called "Millionaire's Salad" due to its high price. The Wall Street Journal published an article in 2002 stating that palmiteiros, or palm poachers, are illegally cutting down 5,000-10,000 palm trees per week for these hearts of palm [1]. **Acai** berries after removal from the panicle **Acai** berries after removal from the panicle

Acai Fruit

An alternative to the indiscriminate harvesting of the hearts of palm is the use of the berries which yield a crop biannually. **Berry** harvesting contributes to the local economy of the rainforest while saving the life of the trees.

In a study of three traditional Caboclo populations in the Amazon region of Brazil, **Acai** palm was described as the most important plant species because the fruit makes up such a major component of diet (up to 42% of the total food intake by weight) and is economically valuable in the region (Murrieta et al., 1999).

The juice and pulp of **Acai** fruits (*Euterpe oleracea*) are frequently used in various juice blends, smoothies, sodas, and other beverages. In northern Brazil, **Acai** is traditionally served in cuias with tapioca and sometimes sugar. **Acai** has become a fad in southern Brazil where it is consumed cold as **Acai** na tigela ("**Acai** in the bowl"). **Acai** juice, blends and pulp powder are no longer limited to the Amazon region, but are now part of the worldwide industries of functional foods and nutraceuticals for which **Acai** is often categorized as a superfruit[2][3].

As **Acai** deteriorates rapidly after harvest, its raw material is generally only available outside the immediate growing region as juice or fruit pulp that has been frozen, dried, or freeze-dried.

Recently, exceptionally high values for calories, total fat, dietary fiber and ORAC (antioxidant strength) in **Acai** skin and fruit pulp were revealed when freeze-drying was used for preservation (Schauss, 2006c)[4] (see Nutritional Content and Antioxidant sections below).

Other Acai Uses

Apart from its berries as food, **acai** palm has other purposes. Leaves may be used for making hats, mats, baskets, brooms and roof thatch for homes, and trunk wood, resistant to pests, for building construction (Silva, 2005).

Comprising 80% of the **berry** mass, seeds may be ground for livestock food or as a component of organic soil for plants. Planted seeds are used for new palm tree stock which, under the right growing conditions, requires only months to form seedlings, although **Acai** palm has not been successfully cultivated outside of South America (Schauss, 2006c). Seeds are also used to make a variety of jewelry and souvenirs.

In traditional medical practices, fruit and roots have been used for treating gastrointestinal problems and sap as an astringent[citation needed]. An extraordinary source of polyunsaturated and saturated fatty acids (see below; Plotkin, 1984; Silva, 2005; Schauss et al., 2006a), fruit oil has undeveloped industrial potential.

Nutritional content of Acai

Several early **studies** done on the nutritional composition of **Acai** were summarized by Rogez in a 2000 book in Portuguese entitled "**Acai**: Preparo, ComposiçÃo e Melhoramento de ConservaçÃo" (Schauss et al. 2006a). Other previous **studies** dating back to the 1930s and 40s were not always in agreement on nutritional contents.

A recent study using modern procedures and a standardized freeze-dried **Acai** fruit pulp and skin powder found nutrient analysis results from 100 g of powder to equal 533.9 calories, 52.2 g carbohydrates, 8.1 g protein and 32.5 g total fat. The carbohydrate portion includes 44.2 g of fiber (Schauss et al. 2006a). Having nearly one-third of its mass as dietary fiber, **Acai** is an exceptional source of this valuable macronutrient: a 100 g serving of the powder would provide all the recommended fiber needs for adults (30 g per day).

Acai is particularly rich in fatty acids, feeling oily to the touch. It contains high levels of the monounsaturated fatty acid oleic acid (56.2% of total fats). It is also rich in palmitic acid (24.1% of total fats, a saturated fat) and the polyunsaturated omega-6 fatty acid linoleic acid (12.5% of total fats). (Schauss et al. 2006a). Î²-sitosterol (beta-sitosterol), a phytosterol that competes with dietary cholesterol for absorption and so may reduce blood cholesterol levels, is also unusually rich (78-91% of total sterols) (Lubrano, 1994; Schauss 2006a).

Preliminary analyses of **Acai** freeze-dried skin and pulp powder show significant richness of vitamins and minerals. Vitamins B1, B2, B3, C and E are present[5]. Vitamin C content was measured at 17 mg per 100 g (about the same as blueberries) and vitamin E at 45 mg per 100 g[6], is an extraordinary content for fruits of whole foods of any kind, so is questionable[7]. A later study found vitamin C content was negligible, calcium levels of 260 mg, iron to be 4.4 mg and vitamin A equal to 1002 IU per 100 g of dry weight (Schauss et al. 2006a).

Potassium content is high in **Acai** (932 mg per 100 grams)[8]. Other minerals isolated included sodium, magnesium, copper, zinc, phosphorus and sulphur[9]. A recent study found 19 amino acids in pulp and skin powder, with especially high contents of aspartic acid and glutamic acid. The amino acid content totalled 7.59% of the total dry weight (Schauss et al. 2006a).

Due to the large amount of waste that accumulates during the harvesting of the hearts of palm (which kills the entire tree for the top growth shoot), sawdust from the left-over trunks of the **Acai** palms have been analyzed for possible uses including energy utilization. The inner layer of the trunk is mineral rich, and is significantly higher in all the minerals that were tested including sodium, potassium, calcium, magnesium, and iron compared to the outer layer of the tree. This inner layer could potentially be used as a source for these minerals. Ash content (often used as an alkaline source for saponification or in plant fertilizers) was also higher in the inner section of the tree. Levels of lignins, cellulose, holo-cellulose and gross heat production were slightly higher in the outer trunk layers, and cellulose levels were fairly high overall (Dyer, 1996).

Antioxidant phytochemicals in Acai

The dense pigmentation of **Acai** has led to several experimental **studies** of its anthocyanins, a group of polyphenols that give the deep color to fruits and vegetables and are high in antioxidant value. A recent study using a standardized freeze-dried **Acai** fruit pulp and skin powder found the total anthocyanin levels to be 319 mg per 100 grams (Schauss et al., 2006a). Cyanidin 3-glucoside and cyanidin 3-rutinoside were the major anthocyanins determined in this study as well several other **studies** including one by Lichtenthaler in 2005.

Twelve other flavonoid-like compounds were additionally found in the Schauss et al. 2006a study, including homoorientin, orientin, taxifolin deoxyhexose, isovitexin and scoparin, as well as several unknown flavonoids. Proanthocyanidins, another group of polyphenolic compounds high in antioxidant value, totalled 1,289 mg per 100 grams of the freeze-dried pulp/skin powder, with a profile similar to that of blueberries (Schauss et al., 2006a). Resveratrol was additionally found to be present in **acai** in this study, although at low levels of 1.1 microgram per gram.

A number of **studies** have measured the antioxidant strength of **Acai**. Unfortunately, the sources of **Acai** and preparations (e.g., whole fruit, juice, extract or soluble powder) for reporting the results vary. A recent report using a standardized oxygen radical absorbance capacity or ORAC analysis on a freeze-dried **Acai** powder found that this powder showed a high antioxidant effect against peroxy radical (1027 micromol TE/g). This is approximately 10% more than lowbush blueberry or cranberry on a dry weight basis (Wu, 2004). The ORAC value for this freeze-dried powder was significantly higher than when other methods of drying the fruit were tested (Schauss, 2006c). Other powders with ORAC values this high include cinnamon (2675 micromol TE/g), cloves (3144 micromol TE/g), turmeric (2001 micromol TE/g) and dried oregano (1593 micromol TE/g) (Wu, 2004).

The freeze-dried powder also showed very high activity against superoxide, with a SOD assay level of 1614 units/g. Superoxide is thought to be the initial producer of other more potent reactive oxygen species, and thus protection against it is very important as a first line of defense for the body. Antioxidant activity against both peroxynitrite and hydroxyl radicals was also observed, although effects were milder than that seen against peroxy radical and superoxide. Additionally, antioxidant molecules from the freeze-dried powder were shown to actually enter freshly obtained human neutrophils and inhibit oxidation induced by hydrogen peroxide, even at very low concentrations of the **Acai** powder including 0.1 part per trillion (Schauss et al., 2006b). A previous report using a total oxygen scavenging capacity assay also found that **Acai** has extremely high antioxidant effects against peroxy radical, as well as a high capacity against peroxynitrite, and a moderate capacity against hydroxyl radical when compared with other fruit and vegetable juices. (Lichtenthaler et al, 2005).

Interestingly, the Lichtenthaler et al. study determined that only 10% of **Acai**'s high antioxidant effects could be explained by its anthocyanin content. Schauss et al. similarly found that that ratio of the hydrophilic ORAC levels to the total phenolics in the freeze-dried fruit was 50, which is quite a bit higher than the average fruit and vegetable ratio of 10. This suggests that either there are other unknown antioxidants present contributing to this high antioxidant activity and/or the antioxidants that **Acai** contains are especially strong.

Schauss et al. (2006b) also utilized the "Total Antioxidant" or TAO assay to differentiate the "fast-acting" (measured at 30 seconds) and "slow-acting" (measured at 30 minutes) antioxidant levels present in freeze-dried powder. **Acai** was found to have a higher "slow-acting" antioxidant components, suggesting a more sustained antioxidant effect compared to "fast-acting" components.

Although it is unknown exactly how these in vitro antioxidant levels will translate into **health** potentials for humans in vivo, it is likely that **Acai** fruit imparts **health** benefits associated with consumption of foods high in antioxidants, such as reduced risk or prevention of chronic and oxidative stress related disorders.

Antioxidant values of the seeds of the **Acai** fruit have also been reported (Rodrigues, 2006). Similarly to the berries, the antioxidant capacity of the seeds were strongest against peroxy radicals, at a concentration in the same order of magnitude as the berries. The seeds had a stronger antioxidant effect than the berries for peroxynitrite and hydroxyl radicals, although still less than its effects against peroxy radical. The results of this study were not linear based on the concentration of the seeds that were used. The authors suggest the future use of the seeds (a by-product of juice making) for antioxidant benefits such as prolonging shelf-life of foods.

Other Research About Acai

Acai, in the form of a specific freeze-dried fruit pulp, has been shown to have mild ability to inhibit cyclooxygenase enzymes COX-1 and COX-2, with more effect on COX-1 (Schauss et al., 2006b). These enzymes are important in both acute and chronic inflammation, and are targeted by many of the anti-inflammatory medications (NSAIDs). Additionally, lower concentrations (but not higher concentrations) of the freeze-dried pulp were found to be slightly stimulating to macrophages in vitro. Macrophages are white blood cells that are an important part of the immune system of the body. Also in macrophages, freeze-dried **Acai** pulp was found to inhibit the production of nitric oxide that had been induced by the potent inflammatory inducer lipopolysaccharide (LPS), which is part of the cell membrane of certain bacteria (Schauss et al. 2006b). This effect increased as the concentration of the **Acai** increased. This suggests again the potential for an anti-inflammatory effect of **Acai**, although requires more research.

In 2006, a study performed at the University of Florida showed that **Acai** fractions containing polyphenolics could reduce proliferation of HL-60 leukemia cells in vitro. This was most likely due to increased rapid cell death (apoptosis) as fractions were also found to activate caspase-3 (an enzyme important in apoptosis) which was inversely correlated to cell death. (Pozo-Insfran et al., 2006). This is a very preliminary study, but indicates a need for more research on the possible anti-cancer effects of **Acai**.

Due to its deep pigmentation, orally-administered **Acai** has been tested as a contrast agent for magnetic resonance imaging of the gastrointestinal system (Cordova-Fraga et al., 2004). Its anthocyanins have been characterized for stability as a natural food coloring agent (Del Pozo-Insfran et al., 2004).

Acai Safety

Acai has been consumed by humans for an unknown amount of time, even before the arrival of the Europeans. Schauss et al. have conducted safety **studies** on a freeze-dried **acai** fruit pulp. It was not found to be mutagenic in the bacterial reverse mutagenicity assay (Ames test). Additionally, no adverse effects were seen at acute doses up to 2,000 mg per kilogram body weight in laboratory animals (similar to a human consumption of 140 grams at one time) (Schauss, 2006c).

Read More About Acai

- [Nature Conservancy](#) article about **Acai** and sustainable agriculture in the Amazon, with pictures of **Acai** fruit.
- [Sambazon.com](#) - The leading USA Importer, supported by the Nature Conservancy

Scientific Research About Acai

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2. **A pilot of audio computer-assisted self-interview for youth reproductive health research in Vietnam.**
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16. [Kew Checklist](#) (enter 'Euterpe' in search box)
17. [Acai information and photos](#)
18. Read about the [Nutritional Contents of Acai Berries](#) from a major [Acai](#) importing company.
19. [Acai nutrient data comparisons](#) with wolfberry ("goji") and blueberry
20. [Pictures of Acai palms trees and fruit from an article by The Nature Conservancy.](#)

21. [University of Florida study](#) showed that [Acai](#) berries contain phenolic antioxidants inhibiting proliferation of cultured human cancer cells[10]
22. English-language abstract of [Brazilian Acai Study](#): "The descending order of antioxidant capacity was acerola> mango> strawberry> grapes> Acai> guava> mulberry> graviola> passion fruit> cupuacu> pineapple."

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