

# CUPUASSÚ

**Katalina Muñoz<sup>1</sup>, Julián Londoño<sup>2</sup>, Stella Sepulveda<sup>3</sup>, Melisa Gómez<sup>3</sup>, Ana Isabel Tabares<sup>3</sup>, and Catarina P.P.Carvalho<sup>1</sup>.**

<sup>1</sup>VIDARIUM, Grupo Nutresa

<sup>2</sup>Corporación Universitaria Lasallista (UL)

<sup>3</sup>Colombian agricultural research corporation (CORPOICA)

**Scientific name:** *Theobroma grandiflorum* (Willd. ex Spreng.) K. Schum. (Family Malvaceae);  
*Theobroma macrantha* Bernoulli.



## Common names:

- **English:** wild cacao.
- **Portuguese:** copoasu, cupuaçú, cupuassú, cupuaçu, cacau, cupuacu verdadeiro.
- **Spanish:** copoazú, copoasú, cupassú, cupuarana, kopoazu, copoazú, patas, (FAO, 1999; USDA-ARS, 2013; Varón *et al.*, 2001).

## Origin

Cupuassu is an Amazonian native fruit from the states of southern and southeastern of Pará and Maranhão in Brazil and is one of the most consumed fruits in that region (Duarte *et al.*, 2010; Vasconcelos *et al.*, 1975). These species are incipiently domesticated populations or very recently domesticated populations, rapid pre- or post-conquest dispersal and lack of phylogeographic population structure (Clement *et al.*, 2010).

## Production

The cupuassu is currently one of the most important native fruits in Amazonia, with about 35,000 ha of orchards planted over the last three decades (Souza *et al.*, 2009) and is grown mainly in Brazil from Sao Paulo State in the south to Roraima in the north. It is grown occasionally in Ecuador, Guyana, Martinique, Costa Rica, Sao Tome, Trinidad, Tobago, Ghana, Venezuela and Colombia. Brazil is the most representative in international market share (IBCE, 2010).

Expansion of cultivation to Brazilian Amazonia does not present any serious limitations. With extension into Colombia, Costa Rica, Ecuador, Peru, Venezuela and Mexico, it is likely to become recognized as one of the best tropical fruit-trees (FAO, 1994).

**Varieties**

Cupuassu is incipiently domesticated as it lack of systematic programs of artificial selection and breeding (Varón *et al.*, 2001). The countries that produce this fruit, mainly Brazil, are collecting, identifying and characterizing some creoles, clones and hybrids (Silva *et al.*, 2008).

**Nutrition**

Cupuassu is high nutritional expressed mainly by its higher acid and vitamin C in the flesh and fat and high protein content in the seed (FAO, 1999). The highest concentration of nutrients was observed in the seed (N, P, Ca, Mg and Zn), pod (Zn and Mn) and pulp (K) (Lopes da Costa, 2006).

The Cupuassu seed contains significant levels of total fat and significant concentrations of unsaturated fatty acids oleic and linoleic acids, important in the human diet and other physical attributes for developing processed food (Escobar *et al.*, 2009).

Cupuassu	
Water	86.8 g
Protein	1.92 g
Carbohydrates	8.81 g
Fiber	0.27 g
Calcium	3.10 mg
Iron	1.52 mg
Magnesium	9.31 mg
Phosphorous	0.31 mg
Vitamin C	28.32 mg
<i>Food values on 100g of fresh weight</i>	
Source: Chaar (1980), Berbert, 1981; Aguiar <i>et al.</i> , 1983; Clement <i>et al.</i> , 1984.	

With respect to the daily requirements of children and adults, the amino acid profile of cupuassu proteins presented a better performance than cocoa proteins (Lopes *et al.*, 2008).

The cupuassu peel flour (CPF) is a potential source of dietary fiber (79.81%), mainly insoluble fiber (78.29%), and breads made with added CPF present high dietary fiber content (5.40 and 6.15g/100 for inclusions with 6 and 9% CPF, respectively) and phytochemical values (Salgado *et al.*, 2011).

## **Culinary uses**

The pulp and seeds are the usable parts of the fruit. The first, which constitutes the largest part of economic value, is mainly used in the manufacture of juices, nectar, ice cream, sweets, creams and liquor, while the second is used, although on a small scale, in developing a product similar to chocolate, called "cupulate" (FAO, 1999).

Cupuassu pulp can be extracted directly, frozen or processed as syrup, with water and sugar (Chaar, 1980) or could be used to produce fruit wines with acceptable organoleptic characteristics (Duarte *et al.*, 2010).

The seeds can be used to make chocolate and show a great potential to substitute cocoa in chocolate products. Cupuassu fat is very similar to cocoa butter, although with a different fatty acid profile and its application for confectionery industry is very promising (Medeiros, 2006). On the basis of the high linoleic acid content, the seed "butter" of cupuassu would be expected to have a lower melting point than cocoa butter (Cabral *et al.*, 1990).

## **Phytochemicals and health**

According to Galeano and Paladines (2012), extracts of methanol from cupuassu beans presented high antioxidant activity with interest for the pharmaceutical and cosmetic industry. The results showed that the methanol extract, subjected to the degreasing by pressing, showed a higher DPPH radical scavenging capacity ( $3080.6 \pm 0.004 \mu\text{mol Tx/g}$  dry sample) and a reducing capacity ( $2780.1 \pm 0.006 \mu\text{mol AA/g}$  dry sample); while the total extract showed a higher total phenolic content ( $525.1 \pm 0.003 \text{ mg GA/g}$  dry sample).

Genevise and Lannes (2009) reported that the phenolic contents of cocoa and chocolate powders are more than three times higher than those of cupuassu powder. However, flavonoid contents were significantly lower. The DPPH scavenging capacity varied hugely among the different samples, from 0.5 (white cupuassu "chocolate") to 120 (cocoa powder)  $\mu\text{g}$  of Trolox equivalent per 100 g (FW), and presented a significant correlation ( $r = 0.977$ ) with the total phenolic contents but not with the flavonoid contents ( $r = -0.035$ ).

Böhm *et al.* (1998) reported the following flavonoids for cupuassu: (+)-catechin, (-)-epicatechin, quercetin and kaempferol, and theograndins I (1) and II (2). Theograndin II (2) displayed antioxidant activity ( $\text{IC}(50) = 120.2 \text{ microM}$ ) in the 1,1-

diphenyl-2-picrylhydrazyl (DPPH) free-radical assay, as well as weak cytotoxicity in the HCT-116 and SW-480 human colon cancer cell lines with IC<sub>(50)</sub> values of 143 and 125 microM, respectively.

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#### **On-line additional resources**

- [http://www.ars-grin.gov/cgi-bin/npgs/html/tax\\_search.pl?Theobroma%20grandiflorum](http://www.ars-grin.gov/cgi-bin/npgs/html/tax_search.pl?Theobroma%20grandiflorum) (30 July 2013)
- <http://www.ars-grin.gov/>
- <http://www.plantnames.unimelb.edu.au/>