



# Cashew Fruit Usage in Brazil

DRAFT Field Study



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## 1. Introduction

Africa produces more than 6 million MT of cashew apples per year. Cashew is the most versatile fruit on the planet. Although highly nutritious and full of vitamin C, most of Africa's cashew apples are disposed at harvest. This study will highlight opportunities for the usage of the cashew apple and analyze harvesting, storage and processing techniques practiced in Brazil.

## 2. Background on Cashew in Brazil

Brazil is the origin of the cashew tree. Portuguese traders and slave ships brought the nut to India and Africa from the 16<sup>th</sup> century. Today, Brazil produces between 300-330,000MT of raw cashew nuts (equivalent to about 2.7 million MT cashew apples) per year. 12 mechanical processing plants process the bulk of the raw cashew nuts into kernels. About 12 per cent of Brazilian cashew apples are processed, including juice extraction (8 per cent). Other usages include fresh and dried fruit, jams, wines, candies and animal feed made out of waste products.

## 3. Harvest and Storage

The cashew apple is ready for harvesting when it has developed a strong red or yellow color. Brazil's cashew harvest takes place between late September and early January. Each harvest step is important:

**Picking not Plucking:** The cashew fruit should be picked from the ground or collected in nets hung under the trees, rather plucked from the trees. It is not easy to assess the ripeness of the fruit when it is still on the tree.

Cashew fruits that have fallen to the ground but and remain undamaged are sought after. EMBRAPA, the Brazilian Agricultural Promotion Agency, has developed a cashew tree variety that produces apples that can remain on the ground for one day without being damaged or beginning to ferment.

**Timing and Transport:** Cashew fruit juice processing plants source from cashew plantations within a radius of up to 40km. The apples need to arrive at a storage site within 24 hours. If the nut is separated from the apple, this time reduces to six hours maximum. Harvest workers keep the apples on plastic trays. Transport to a storage facility is done in 20kg buckets. It is important to avoid exposure to the sun.



**Storage:** Cashew plantations are usually located within a radius of up to 40km. If the nut is removed from the fruit, this time is reduced to six hours. Arrived at the processing plant, the apples are stored on plastic trays and deep frozen at -17°C. They can be kept all year-long for processing.

Source: EMBRAPA

EMBRAPA

Cashew apples are also sold into the fresh fruit market together with the nut (to preserve the apple). Street vendors carry bundles of cashew apples attached with a string. For the wholesale and retail market, cashew apples are kept on small trays of four or five (500-800g per tray) and packaged with polythene plastic in a passive modified atmosphere. This packaging and cooling at 5°C with relative humidity ranging between 85 and 90 per cent, increases the shelf life of the apple from four to 21 days. As a result, fresh apples can be sold on the urban markets of Sao Paulo and Rio de Janeiro, more than 3,000km away from the harvesting area.

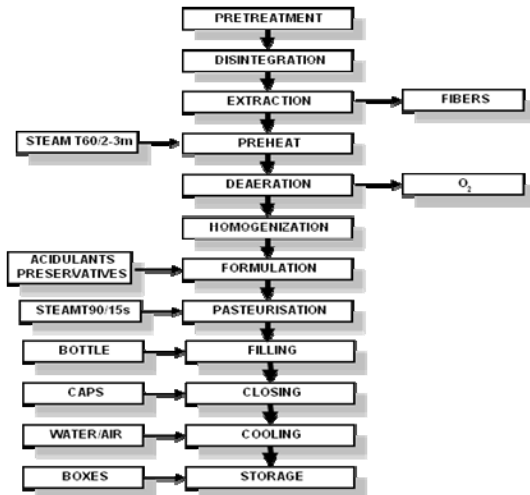


Cashew apples are displayed in open cardboard boxes of five of such trays (about 1.7kg) Source: EMBRAPA

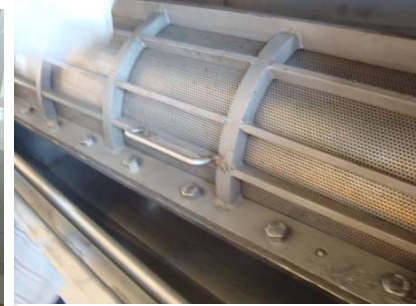
## 4. Cashew Apple Processing

**Juice extraction** consists of a number of stages as illustrated in the diagram.

Cashew apples are mechanically washed and cut into small pieces before the juice is extracted by squeezing the pieces in a tube. See picture. Other treatment phases include heating, homogenization and pasteurization.



Cutting cashew apples



Tube for squeezing cut pieces

Source: EMBRAPA

Production of *Cajuina*, the clarified cashew apple juice differs slightly in the processing stages after the squeezing out of the juice.

**Volumes and Capacities:** Juice plants typically have a capacity of 80-150MT per day. Since Brazil's twelve major cashew apple juice plants freeze apples they can process cashew apples almost the entire year, but most also produce other fruit juices.

**The waste** of the juice extraction, the dry cashew apple fibers can be used for the production of animal feed (see below).



Cashew apple waste

## 5. The Market for Cashew Apple Products

Volumes: In 2007, 12 juice factories in Brazil processed more than 200,000MT of cashew apples into the following products:

Juice	125.000MT	
Cajuina	2.000 MT	
Candy	6.500 MT	±10%
Fresh Fruit	20.000 MT	
Animal Feed	45.000 MT	

The domestic market is the prime destination for all of these products. Cashew juice exports have seen a more than ten-fold increase between 1999 and 2004 (see table) in the main cashew region of Ceara (see table). *Cajuina* is also developing from a domestic-only to an exported product.

Prices: Cashew apples are sold for around US\$1.20 per tray of six to distributors who package and market them for US\$5-6 per tray in Sao Paulo, Rio de Janeiro and Brasilia's fresh fruit and supermarkets. Cashew juice factories pay between US\$0.10-0.20 per kilo apples for the juice production.

## 6. Apple Waste Usage

EMBRAPA is conducting experiments mixing fermented cashew apples with manioc powder for animal feed however in limited volumes, since juice extraction produces a significant amount of waste products used for animal feeds (see video on EMBRAPA's website [www.embrapa.br](http://www.embrapa.br)).

EMBRAPA has patented a process of extracting pigments for the use as natural colorant. Cashew apple fibers can also be used for making bread, snack bars and meat-like products.

EMBRAPA has also developed a natural colorant made of the apple waste (after juice extraction). The process is patented and market prospects are positive.



The McCaju