



Tropentag 2008:
Competition for Resources in a Changing World:
New Drive for Rural Development
October 7 - 9, 2008, Stuttgart-Hohenheim, Germany

Cashew Nut Almonds: Nutritional and Market Aspects

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1 Introduction

Having the Brazilian Northeast and North as its origin, cashew trees *Anacardium occidentale* (Linnaeus) are being grown in tropical areas of Asia, Africa and America for several decades, for different purposes, considering its flower, fruit, timber and peel. Its fruit – the cashew nut – looks like a human kidney. After drying and toasting the cashew nuts, its almonds are extracted. Reports of colonizers of Brazilian coast indicate that during maturation of cashew fruits the indigenous nations of the country side used to migrate to the coastal area where they had battles against the tribes living in the coastal area because of the harvest of cashew fruits. These battles were called the ‘guerras do acayu’. During the 16th century Portuguese colonizers brought cashew tree seeds to their colonies in Asia and Africa (Mozambique and Goa). The cashew tree adapted well to India. In Goa the production and consumption of beverages made of its fruit became an important local tradition. At that time, some seeds were brought to Caribbean and Central America by the Spanish colonizers.

From its fruits, the cashew nut almond is being largely used in human nutrition due to its favorable composition. It is rich in proteins, lipids, carbohydrates, phosphorus, iron, zinc, magnesium, fibers and unsaturated fat. The oil extracted from the almonds has similar composition to the olive oil and can substitute it. The positive effects on health are related to its content of mono-unsaturated fatty acid (oleic acid or omega 9) and polyphenols, which represents 60.30% of fatty acids content of cashew nut almonds. The main components of total lipidic content of 48.35% (MELO ET AL., 1988) are shown in Table 1.

Table 1. Fatty acid content in oil of cashew nut almonds.

Fatty acids	%
Palmitic acid (C16:0)	8.77
Palmitoleic acid (C16:1)	0.42
Stearic acid (C18:0)	7.92
Oleic acid (C18:1) (omega 9)	60.30
Linoleic acid (C18:2) (omega 6)	21.53
Linolenic acid (C18:3)	0.49
Araquidic acid (C20:0)	0.57

Source: LIMA ET AL. (2004).

The essentiality of fatty acids has two fundamental characteristics: (a) is essential to the organism; and (b) cannot be synthesized by it. ARON (1918) described the death of animals that

received diets poor in lipids. This effect was reversed by adding butter into feed, suggesting that there are essential fatty acids. Apart from this study, until 1929, the fatty acids were just considered as an efficient way to store energy, which could be synthesized by the organism out of proteins and polysaccharides. During studies on vitamins, particularly vitamin E, the interest on fatty acids started. Diets poor in lipids were prepared to cause vitamin E deficiency. As vitamin E is a lipo-soluble molecule, in some cases a syndrome of deficiency different from the vitamin E deficiency was observed (EVANS AND BURR, 1927). BURR AND BURR (1929, 1930) mentioned papers reporting the essentiality of poli-unsaturated fatty acids, reversible with addition of lard, corn oil and leinseed oil, which are rich in linoleic acid (omega 6).

Considering its nutritional and economic importance, the objective of this study was to analyze the worldwide cashew nut production and cashew nut almonds exports in the last 19 years.

2 Material and Methods

The production data considered in this study are based on cashew nuts (unshelled), looking at the period from 1986 to 2004. The export data refer to cashew nut almonds or cashew nuts shelled (=processed cashew nuts), considering the period from 1986 to 2004. The dataset was obtained from Faostat database (FAO, 2006). This data included production and export data for all countries registered in Faostat. From this data, the countries responsible for 90% of production and exports were identified. The annual growth rate of production and exportation has been estimated for these countries. The annual growth rates were statistically estimated through a linear regression model with functional form $y=ab^t$ where t represents the year and y the annual production and exports. We applying neperian logarithms and obtained $\log y=\alpha + \beta t$ where $\alpha = \log a$ and $\beta = \log b$. The annual growth rate is given by $e^\beta - 1$. The estimated annual growth rates for the considered countries were statistically tested regarding null hypothesis $H_0: b-1=0$ (growth rate equal zero). The standard deviations of the growth rates were determined via delta method through the Taylor expansion (SOUZA, 1998).

3 Results and Discussion

3.1 Cashew nuts production

Figure 1 shows 74.9% of worldwide cashew nut production from 1986 to 2004. As can be seen in Figure 1, only four countries are responsible for the main part of worldwide cashew nut production: Viet Nam, India, Brazil and Nigeria. In 2002 Viet Nam's production surpassed India's production. Currently, Viet Nam is the main worldwide producer with 827,000 tons, followed by India with 460,000 tons, Brazil with 251,268 tons and Nigeria with 213,000 tons (FAO, 2006).

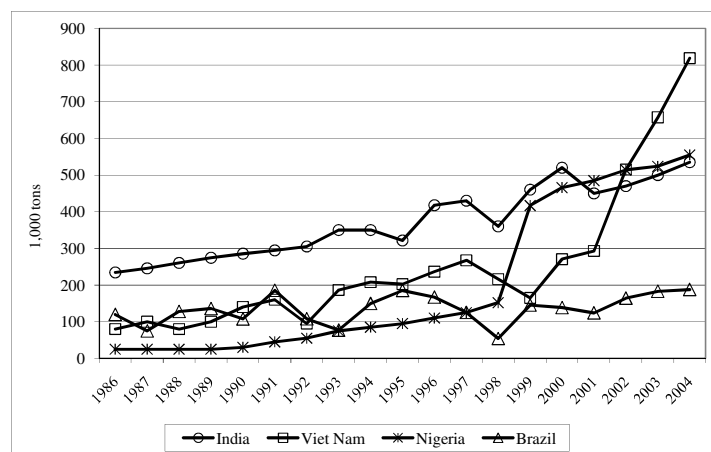


Figure 1. Amount of cashew nut production (1,000 tons) of four main producers, 1986-2004.

Source: FAO (2006).

Production data of main producers and the results statistical adjustment of annual growth rates using ProcReg of SAS 9.1.3 are presented in Table 2. More than 89% of cashew nut production is concentrated in eight countries. India has the highest share in worldwide cashew nut production because when considering the whole period of 19 years. As can be observed in Figure 1, during the last three years of the considered period Viet Nam was main producer. If the growth rates of production are maintained, Brazil will not be the third producer anymore, since Nigeria's production is growing very fast ($14.69\% \pm 0.98\%$). The highest annual growth rates of cashew nut production occurred in Nigeria, Viet Nam and Tanzania, being all above 10% per year. Brazil has had a growth rate different from zero with a marginal significance level (5.2%), obtaining an annual growth rate of 2.99% ($\pm 1.47\%$) during the considered period. The growth rates of production of all considered countries were statistically significant.

Table 2. Share of production and annual growth rate of main cashew nut producing countries, representing 89% of worldwide production, 1987-2005.

Producing country	Share in Worldwide Production (%)	Annual Growth Rate (%)	Standard Deviation (%)	p Value	R ²
India	28.89	3.98**	0.39	<0.001	0.87
Viet Nam	22.33	12.25**	1.33	<0.001	0.85
Brazil	10.83	2.99 ^{n.s.}	1.47	0.052	0.20
Nigeria	8.91	14.69**	1.05	<0.001	0.93
Indonesia	5.68	9.28**	0.97	<0.001	0.85
Tanzania	5.18	12.08**	1.27	<0.001	0.86
Guine Bissau	3.79	10.10**	0.99	<0.001	0.87
Mozambique	3.57	3.79**	1.29	0.007	0.34
Total	89.18	-	-	-	-

Statistical significance: ** different from zero at 1% level; n.s. not significantly different from zero.

Source: Estimation of the authors with original data from FAO (2006).

3.2 Cashew nut almonds exports

The exports of cashew nut almonds are concentrated in three countries, which are responsible for 87% of total exports. Figure 2 shows the evolution of exports in the analyzed period of 1986-2004. In 2004 Viet Nam's exports of 105,100 tons almost reaches India's exports (109,869 tons). Brazil was the third main exporter of cashew nut almonds with 47,442 tons in 2004. Considering export value, as Figure 2 shows, although Brazil is the third worldwide exporter, its main competitors export, both, more than double of Brazilian exports.

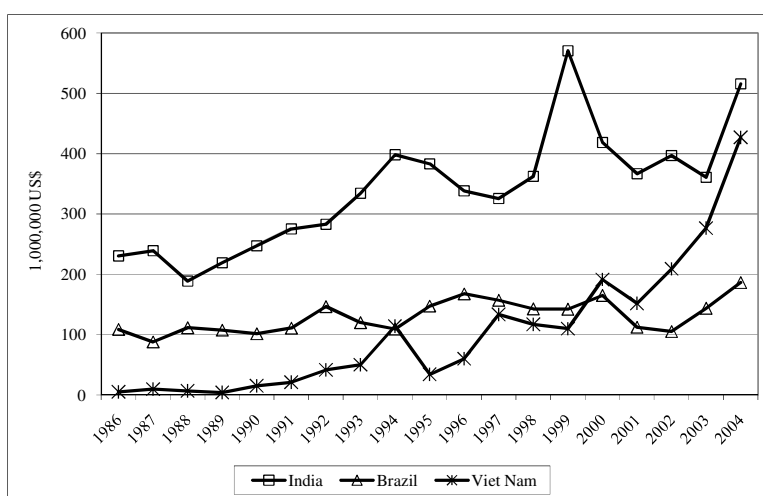


Figure 2. Evolution of cashew nut almonds exports (million US\$) of main exporting countries, 1986-2004.

Source: FAO (2006).

Data on share of worldwide exports of main exporting countries of cashew nut almonds and the results statistical adjustment of annual growth rates using ProcReg of SAS 9.1.3 are presented in Table 3. India, Viet Nam and Brazil are the main exporter and are responsible for 87% of worldwide exports. India was responsible for 44% of exports, followed by Viet Nam with 24% and Brazil with 20%.

Table 3. Share of exports and annual growth rate of exports of main cashew nut almonds exporting countries, representing 87% of worldwide exports, 1986-2004.

Exporting country	Share in Worldwide Exports (%)	Annual Growth Rate (%)	Standard Deviation (%)	<i>p</i> Value	R ²
India	44.24	6.47**	0.55	<0.001	0.90
Viet Nam	23.80	12.35**	2.91	<0.001	0.54
Brazil	19.17	3.32**	0.85	<0.001	0.48
Total	87.21	-	-	-	-

Statistical significance: ** different from zero at 1% level.

Source: Estimation of the authors with original data from FAO (2006).

4 Conclusions

The worldwide cashew nut production is concentrated in eight countries. The exports of cashew nut almonds are even more concentrated. Compared to other main producing and exporting countries, Brazil is disadvantaged and its importance is decreasing.

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