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A REVIEW OF THE CASHEW SUB-SECTOR IN GUINEA BISSAU

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A REVIEW OF THE CASHEW SUB-SECTCR IN GUINEA-BISSAU

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ACRONYMS, ABBREVIATIONS AND DEFINITIONS

C. & F.	-	Cost and Freight
C.I.F.	-	Cost, Insurance and Freight
F.O.B.	-	Free On Board
GB	-	Guinea-Bissau
GOGB	-	Government of Guinea-Bissau
GP	-	Guinean Peso
KG	-	Kilogram
MRDA	-	Ministry of Rural Development and Agriculture
OAR	-	Office of the A.I.D. Representative
USAID	-	United States Agency for International Development

Definitions

1US$	-	GP 2,100
Cashew nuts	-	The whole undecorticated nut.
Cashew kernel	-	The decorticated, ready-to-eat portion of the nut.
Cashew Canna	-	The drink made by distilling cashew wine.
Cashew Aquadente	-	The drink made by distilling cashew wine.

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EXECUTIVE SUMMARY

Production. Data on area cultivated and yields of cashew fruit and nuts per hectare in Guinea-Bissau (GB) are very limited. The yield per hectare in mature, well managed groves in GB appears to approach one ton of nuts and 4,000 liters of juice per hectare. However, the yields in most groves may be well below these yields since the trees are often planted too close together to maximize production.

The long-term trend in production is upward. This prediction is based on the observation of large areas of young (3-5 year-old) groves of cashew trees in several regions of the country. The total production for the nation this year is widely expected to be greatly reduced with respect to last year's production. There are numerous theories as to the cause of the drop in production but no scientific evidence.

Economics of Production. Under relatively conservative assumptions, one can assume that the farm-level value of the cashew juice is twice that of the cashew nuts. The production from a hectare of cashew yielding 500 kg of nuts and 2,000 liters of juice has a market value of 750,000 GP, assuming prices of 450 GP/kg and 250 GP/liter for cashew nuts and juice, respectively. As the 1990 marketing season progressed, farm-level prices for cashew nuts doubled, in barter terms, in major growing areas near Bissau. With a doubling of the price of nuts, the per hectare value of cashew production increases to 950,000 GP. Both of these values compare favorably with the value of the production of one hectare of rice yielding 1,500 kg with a value between 450,000 GP and 750,000 GP.

Importance of Cashew to Women. Guinea-Bissauan women, assisted by their children, are the primary harvesters of cashew and are the primary marketers of cashew juice and wine. They are also the major producers and marketers of domestically produced cashew kernels. Most of the women who discussed the question of the importance of the cashew harvest with the study team said that the revenue from the cashew harvest represented more than half of their yearly earnings. The women often migrate to gain access to the cashew harvest.

Marketing of Cashew Juice/Wine. Cashew juice and wine are generally sold by the liter cupful to predominately male clients by the women who produced the drinks or by intermediary women merchants. Since cashew juice very quickly ferments into cashew wine without additional effort, that which is not sold as juice is sold as wine. Larger producers of juice, such as plantation owners, may sell the juice/wine to large "canna" distillers. Prior to 1974, a cashew juice bottling facility was in operation on the island of Bolama.

The major problem experienced by juice and wine sellers is the lack of storage containers. This often leads them to utilize used steel or plastic drums. Using second-hand drums may present a health problem. Perhaps the only winery in GB to store its wine in glass bottles exists near Cumura on the road from Bissau to Prabis.

Marketing of Cashew Nuts. The collection and exportation of cashew nuts is primarily in the hands of six large trading organizations. These merchants operate through "delegations" or satellite shops which they own and operate

through employees or through independent, intermediary merchants. Intense competition among these merchants contributed to the farm-level price increases mentioned above.

There is a tendency for the major merchants to depend less and less on their delegations and intermediary merchant/clients in favor of dealing directly with the producer. Under this system, the producers receive higher prices for their product and the major merchants, through better organization, receive a higher profit on their merchandizing transactions. Such an evolution is expected in a market-directed economy when roadways and other transportation systems are improved.

The merchants sell the cashew nuts to various international buyers (agents of international commodity merchandizing firms) at prices set through direct negotiation between the agent and seller. The amount of competition between international buyers was difficult to observe. In fact, at least two of the major merchants indicated that only one buyer did most of the business in GB. This buyer maintains an agent in the country on a permanent basis. Other firms only visit the country on a routine basis.

Profitability of Marketing Operations. It is difficult to comprehend how the marketing operations of the major merchants can be profitable under a barter ratio of "one for one (kg rice for kg cashew)," unless the merchants disregard financing costs which approach a real rate of interest of 14% per annum. An analysis of the costs, implies that the business can be marginally profitable if, by combining different barter ratios, the average ratio could approach 1-to-1.1. The electronic spreadsheet model used to analyze the costs is presented in Section IV and may be useful for policy makers and business managers.

Governmental Regulations and Programs. The Government of Guinea-Bissau (GOGB) obtains a significant percentage of its nationally generated revenue from a 35 percent tax on the free-on-board (f.o.b.) value of cashew nuts exported from the country. Regional governments, such as that of Biombo, place a 5 GP/kg tax on all cashew nuts exported from their regions. Regional ports, such as that at Bolama, charge a 3 percent tax on the value of the cargo in addition to a per-ton unloading/loading charge for each ton moved through the port.

At the time of the study, the Ministry of Rural Development and Agriculture (MRDA) had no programs of research or extension specifically devoted to the improvement of cashew product production or marketing. However, a research project to begin the selection of superior cashew plants was in the planning stages. An additional study, funded by the European Economic Community, to develop "in vitro" propagation techniques was in its initial year. The GOGB owns two cashew plantations: a ten hectare plantation on the state research farm at Prabis and a 200 hectare plantation on Bolama.

Under the guidance of the Ministry of Economics and Finance, the GOGB has laid the legal and institutional foundation for a revolving fund to provide a supplemental source of income for cashew nut exporters during periods of low international prices. The fund had not begun operating at the time of the study visit.

One international project, the Ajuda Desenvolvimentos Povo o Povo (ADPP), was found to be devoted to the culture of cashew. The project is located at Bissora and expects to plant nearly 1,000 hectares of cashew. In June 1990, the project had planted approximately 475 hectares of this total.

Relation of Cashew Exportation to Domestically Produced Rice. Cost estimates based on a previous study of the rice market in Guinea-Bissau and the present study reveal the conditions under which domestic rice is competitive with imported rice for use in the cashew trade. Under these conditions, the use of rice in the cashew trade encourages the production of domestic rice.

International Market Trends. International cashew nuts prices are quite variable. There appears to be some cyclical pattern to these prices; and, it appears that prices are nearing the bottom of the typical "cycle".

The major events in the international market include:

1. the emergence of Brazil as a major producer of cashew nuts and major supplier of cashew kernels,

2. the reduction in the quantities of cashew nuts and kernels supplied by such East African countries as Mozambique and Tanzania, and

3. the increase in the proportion of Indian cashew nut imports being imported from Guinea-Bissau.

Conclusions and Recommendations. Guinea-Bissau has a substantial investment in the production and marketing of cashew products and receives substantial levels of tax revenue, foreign exchange and domestic incomes from this investment. In spite of the importance of the cashew industry to the nation, the GOGB provides very little assistance to the industry through research and extension programs.

While the export tax on cashew nuts is important sources of government revenue and foreign exchange, it may reduce the competitiveness of Guinea-Bissauan cashew nuts and distort the allocation of national resources. Additionally, it places the nation in a less-than-desirable position of relying on one commodity for a significant proportion of its tax revenue. Efforts to reduce the impact of this tax include a reduction in the tax and a revolving loan fund to assist exporters during periods of relatively low international prices.

The marketing of cashew nuts, from village-level producer to Bissau merchant, appears to be evolving into an increasingly efficient system under the pressure of increased competition. However, government programs and taxes tend to place the Guinea-Bissauan industry at a comparative disadvantage with its international competitors.

If Guinea-Bissau is going to increase its international market share in raw cashews and penetrate the cashew kernel market successfully it will have to adopt measures that will lead to (1) improved production technologies and national marketing activities resulting in competitive (lower) f.o.b. prices for raw cashew nuts, (2) improved processing technologies and international trade activities to minimize the domestic price of processed cashews, and (3) minimize

export disincentives in terms of taxes, export duties, and access to foreign exchange earnings. A set of recommendations to assist the country in bringing about these beneficial changes are included in SECTION VIII of this report.

SECTION I

INTRODUCTION

The Importance of Cashew to the Guinean Economy

The importance of cashew to the Republic of Guinea-Bissau (GB) can be appreciated through an understanding of the commodity's contribution to rural incomes, foreign exchange earnings and tax revenues. Although the lack of data prevents an accurate evaluation, the annual cashew crop is probably the nation's largest source of farm-level cash revenue. Under conservative assumptions, an annual crop of approximately 10,000 metric tons of cashew nuts implies approximately US$ 6.9 million of farm-level revenue when the value of the juice is included.[1] Domestically, the juice of the cashew apple is worth more per hectare than the associated nuts. It is also significant that most of the harvesting of the cashew nuts and apples and the production of cashew juice is done by women, thereby providing them with a substantial source of personal income.

Cashew's importance to the nation is also seen in its growing contribution to the nation's foreign exchange earnings. The value of exported cashew nuts represented 28 percent of the value of the nation's total exports in 1984 and 58 percent in 1988. A major importance of these foreign exchange earnings lies in their use in servicing the nation's external debt. In 1990, the foreign exchange generated for government use from cashew exports is expected to be equal to 59 percent of the amount needed to service the nation's foreign debt.[2]

An export tax of 35 percent, levied on the f.o.b. value of cashew exports, generates a significant amount of the nation's total fiscal revenues. In 1990, approximately 22 percent of the nation's total tax revenue is expected to be generated by this tax. Expressed in terms of total budgetary revenue, which includes substantial non-tax revenues from the sale of fishing licenses, the export tax on cashew is expected to amount to 12 percent of total budgetary revenue.

In spite of the importance of this crop, very little attention, in terms of research and extension programs, has been accorded to the crop by the Government of Guinea-Bissau (GOGB) through its Ministry of Rural Development and Agriculture (MRDA). The top priority of the GOGB and the MRDA has been to promote the

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[1]10,000 tons (450 GP/kg) (1US$/GP2,100) + (40,000 liters of juice) (250 GP/liter) (1US$/GP2,100) = 6.9 million dollars. The next largest source of farm-level income may be rice. Assuming 25% of an estimated 100,000 ton annual crop is sold off the farm for 450 PG/kg, the rice crop produces US$ 5.3 million in revenue to farmers.

[2]Projected cashew export value for 1990 is 11.8 million dollars. This will provide 7.97 million dollars of foreign exchange, 4.13 million from the 35% tax and 3.84 from foreign exchange retained from exporters. The interest on the national debt and a 15% payment on the principle amounts to approximately 13.6 million dollars. 7.97/13.6 = 0.586.

cultivation of cereal crops, such as rice, sorghum, and maize, as a means of achieving a high level of self-sufficiency in basic food crops. Accordingly, very little is known and documented on cashew production, internal trade, exports, and impact of government policies and programs.

Objectives of the Study

Under its Agricultural Sector Assistance Program, the United States Agency for International Development (USAID), Office of the Aid Representative in Bissau (OAR/Bissau) is engaged in an on-going policy dialogue with the GOGB to review current agricultural policy issues and develop a definitive agricultural development policy focusing on cereals with particular emphasis on rice. Rice is the staple food of the nation. Cashew is related to rice in that rice is used as the primary barter item in the internal cashew trade. A substantial portion of domestic rice which is marketed is purchased to be used in the cashew trade. Similarly, the first use of a major proportion of the rice imported into the country is in the cashew nut trade. Thus a major reason for the existence of off-farm sales of rice and for the importation of rice is the cashew nut trade.

Since no prior studies existed on the production and internal trade and export of cashew products[3], OAR/Bissau commissioned this study to overcome the apparent lack of information as a component of its effort to assist the GOGB adjust its agricultural policies to its changed policy environment.[4] The study was undertaken during the cashew harvest season. A team visited the country from June 4 through June 22, 1990.

The study provides a description of the structure and conduct of the internal market for cashew apple products and cashew nuts. The performance of the internal cashew nut market is addressed through a model of a hypothetical enterprise which assembles, stores and exports cashew nuts, reflecting the major commercial activity involving the nuts and the GOGB's primary interest in the cashew market. A second portion of the study addresses the international market for cashew nuts, with particular emphasis on the evolution of cashew prices.

Finally, due to the lack of information within the country on cashew research, cashew processing equipment manufacturers, and sources of statistical information on international cashew trade, the study was expanded to compile as much information as possible on these areas as well. This additional information is presented in the annexes.

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[3]Rice production and marketing and related policy issues were reviewed and documented in Technical Assistance Report No. 118, Food and Feed Grains Institute, Kansas State University, Manhattan, Kansas, 66506, U.S.A.

[4]See Annex 1 for complete terms of reference.

SECTION II

CASHEW NUT AND JUICE PRODUCTION

Production Levels and Trend

Data on area cultivated and yields of cashew fruit and nuts per hectare in GB are very limited. The Ministry of Rural Development and Agriculture's (MRDA) annual statistical publication, Anuário Estatístico, for 1986 and 1987 report total production for the nation but provide no data on the areas cultivated. The MRDA's survey of agriculture for 1988 provides some information on the areas devoted to cashew by region. However, the data are incomplete. No data is presented for the Region of Biombo, for example. The total for the eight regions reported is 329.36 hectares (MDRA, 1988, p. 51). The MRDA plans to correct these deficiencies in their statistical base in the next annual survey. The major cashew growing areas have historically been in the administrative regions of Biombo, Bolama, and Cacheu. National production figures are presented in Table II-1.

TABLE II-1

NATIONAL PRODUCTION OF CASHEW NUTS BY YEAR

YEAR	1983	1984	1985	1986	1987
THOUSAND TONS	4.7	6	8	7	9

Source: MDRA, Anuário Estatístico, 1987, p. 8.

The yield per hectare in mature, well managed groves in GB appears to approach one ton of nuts and 4,000 liters of juice per hectare. However, the typical cashew nut yield per hectare in the country appears, from casual observation, to be below its potential with improved management. This is based on the observation that in most cashew plantations the trees are planted so close together that their canopies intermingle. It is well known that cashew production is reduced when the canopies of neighboring trees grow to be become intermingled (Ohler, p. 137). Thus, it is possible that cashew production could be increased through the selective removal of trees within existing plantations.

This suggestion should be tempered with the cavot that the utility of densely growing cashew trees is that most underbrush is shaded out (killed by through the lack of sunlight). The lack of underbrush helps prevent fires in the plantations which could destroy the cashew trees, especially in plantations less than 10 years old. Thus, there is a trade-off between weed and fire control and yield which should be studied.

Production per hectare may also be increased through the use of agricultural chemicals such as fertilizers or pesticides. It has been shown that cashew trees growing on poor soils respond very well to the application of selected fertilizers. One experiment showed that the kg/ha yield of nuts from fertilized trees was up to 87% greater than unfertilized trees used for comparison (Ohler, p. 153). This response to fertilizer may be reduced in cases where the trees are adequately spaced on fertile soils (Ohler, p. 153). Thus, there is a need for

controlled experimentation before recommendations can be made regarding fertilizer use.

The total production for the nation for 1990 is widely expected to be greatly reduced with respect to production in 1989. Many of the growers the study team spoke with expected production to be one-half or even one-third of the level of 1989. Often the growers blamed the reduced production on the increased level of dust in the air at the time of the flowering of the trees. A horticulturist, on home leave from his work in Portugal, doubted that the dust itself was the cause of the reduction in production and rather suspected a fungal or viral disease might be the cause. It is significant that no publicly employed scientist was assigned to monitor the health of the nation's cashew trees.

The survey team found no evidence of the use of agricultural chemicals such as fungicides, herbicides, insecticides, or inorganic fertilizers in the production of cashew. Thus, it is possible that appropriate use of such agricultural chemicals may increase production from the existing stock of trees and may be economical. However, careful, controlled experimentation should be carried out to assess the socio/economic and environmental aspects of such chemical use before its use is recommended.

The long-term trend in production is definitively upward. This prediction is based on the observation of large areas of young (3-5 year-old) groves of cashew trees in several regions of the country. For example, new plantations were observed in Quínara, Bafatá, Óio, Cacheu, and Biombo. As the average age of all trees in the nation increases, it is expected that national production will also increase.

Economics of Production

Under relatively conservative assumptions, one can assume that the value of the juice of the cashew apple produced per hectare is twice that of the cashew nuts. One authority fixes the relation between the weight of nuts and fruit produced between 1-to-8 and 1-to-10. The same authority asserts that the fruit is 85 percent juice having a sugar content of 10 percent (Arango et al., p. 17). Thus, the production from a hectare of cashew yielding 500 kg of nuts and 2,000 liters of juice has a market value of 225,000 GP from the nuts and 500,000 GP from the juice, assuming a price of 250 GP/liter for the juice and 450 GP/kg for the nuts. Note that these calculations assume that less than 65% of the juice is extracted.[1] This value compares quite favorably with the value of the production of one hectare of rice yielding 1,500 kg with a value between 450,000 GP and 750,000 GP.

The cost of establishing a hectare of cashew is not well known. However, certain operations are essential. Acquisition of unoccupied land is a relatively cost - less legal matter in which the GOGB grants the farmer the right to use the land.

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[1]Using a ratio of 1-to-8 between nut and fruit weight and assuming a liter of juice weighs one kilogram, 500 kg of nuts implies 4,000 kg of fruit. The available juice (85% of 4,000 kg) is 3,200 kg. The figure used, 2,000 kg is 62.5% of the total juice available in the fruit.

The land must be cleared of existing trees, bushes, and tall grasses. Then the land is marked for the sowing of cashew seeds. Generally, the planting is done in rows with varying distances between rows. Some planters leave 6 or 8 meters between rows while others leave 10 to 12 meters. The space between the trees within a row is practically nil. The plan is to quickly establish enough foliage to shade-out or kill by shadow the unwanted plants between the rows.

During the time between planting and the establishment of full shade, the areas between the rows of trees should be kept clear of trees and tall grasses and bushes. This is necessary partially to reduce the competition between the young cashew trees and unwanted species of plants, but primarily to prevent fire from gaining entry to the plantation and damaging or destroying the cashew trees. An initial clearing of the land may require 100 man-days (assuming a man can clear an area 100 meters square per day) at 3,000 GP per man-day for a cost of 300,000 GP per hectare.

Maintenance of the cleared areas after the initial clearing may require 60,000 GP per hectare (assuming a man can do maintenance clearing on 200 square meters per day) for three years. Thus, the total cost of establishing a hectare of cashew can be estimated to be as low as 500,000 GP per hectare. This figure compares favorably with that published in a 1981 (Santareno) study which estimated that 85 man-days would be required to establish a hectare of cashew. It should be pointed out that some MRDA officials felt that these figures were much too low, however; the figures do reflect labor costs given to the study team by a farmer who regularly hires labor for these tasks. Clearly, this implies a need to document cashew production costs under different management practices.

Reducing the number of trees within the rows to the desired number is expected to be cost effective since the removed trees can be sold as firewood. After the establishment of the grove the only annual expenses are those associated with harvesting and the maintenance of the cleared areas.

The cashew fruit with its attached nut are harvested by women after the fruit and kernel drop from the trees. The nut is manually separated from the fruit and the fruit is squashed and squeezed to extract the juice. Usually, the juice extraction is done by hand. However, some mechanical, hand powered fruit crushers and juice presses are in use on some plantations. The fact that most of the juice is squeezed out of the fruit by hand, implies the need for research into the socio/economic reasons for this situation.

Although there are several systems of payment in existence for the harvesting operation, the most predominant is for the women to keep one-half of the juice as payment. The owner of the plantation keeps the other half of the juice, produced by the women, and all of the nuts. It is generally recognized that it is possible that the women retain some of the nuts in spite of their contract to deliver them all to the owner. With harvesting expenses provided by the 50% share of the juice, the owner of a well managed, mature plantation can expect revenue from the sale of 500 to 1,000 kg of nuts and 1,000 to 2,000 liters of juice. This revenue is nearly 100% "profit" (return to management) since the other expenses of operating the established plantation are virtually nil under current farming practices.

Thus, cashew production provides some owners with a relatively easy method of earning a livelihood. One owner of a ten hectare, 27-year-old plantation told the study team that he normally sold 10 tons of cashew nuts plus his share of the juice per year[2]. Assuming he sold 20,000 liters of cashew juice in addition to the 10 tons of nuts, his annual income from his cashew grove can be estimated to be 9.5 million Pesos. Although he probably shared this income with various members of his family, it compares quite favorably to the 6.0 million annual wage of a well-paid business manager. As a comparison, well-paid laborers earn 1.4 million pesos per year.

TABLE II-2 presents a series of figures representing the cash investment and expenses or "out-go" and the revenue or "income" relating to one hectare in a hypothetical cashew plantation. The figures in the "investment/expenses" column reflect the costs of establishing a hectare of cashew mentioned above. The "management expense" column reflects the assumption that ten percent of the expected maximum or potential production will be withdrawn as a payment to management.

The "net profit" column is the difference between revenue and the sum of the two expense columns. The "net profit" column can be used to determine how many years will be required to "pay back" the cost of establishing the plantation. In the case shown, the pay back period is six years. Also, the "net profit" column can be used to calculate the internal rate of return (IRR) for the investment, under the assumption that no residual value can be obtained from the sale of the plantation at the end of the 25-year investment period. In this case, the IRR is 43%.

TABLE II-2

CASH FLOW PER HECTARE FOR A HYPOTHETICAL CASHEW PLANTATION

YEAR	INVESTMENT/ EXPENSES	MANAGEMENT EXPENSES	REVENUE		NET PROFIT
			PERCENT OF POTENTIAL	PESOS	
1	300,000	95,000	0	0	(395,000)
2	60,000	95,000	0	0	(155,000)
3	60,000	95,000	10	95,000	(60,000)
4	60,000	95,000	20	190,000	35,000
5	0	95,000	40	380,000	285,000
6	0	95,000	80	760,000	655,000
7	0	95,000	100	950,000	855,000
8	0	95,000	100	950,000	855,000
9	0	95,000	100	950,000	855,000
10	0	95,000	100	950,000	855,000
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
25	0	95,000	100	950,000	855,000

[2]He estimated his juice production in liters at four times the weight of his nut production--the same assumption that has been used elsewhere in this report.

SECTION III

THE INTERNAL MARKET FOR CASHEW PRODUCTS

Cashew Juice and Wine

Cashew juice very quickly ferments into cashew wine without additional effort, thus at some point in the wine's journey to the final consumer the juice becomes wine. Before it becomes wine, it is sold as juice, afterwards, as wine. Significantly, there is no difference between juice and wine prices during the harvest season. The women who harvest the fruit often transport the juice to urban areas and sell it either to small-scale retailers (often women) or directly to consumers by the liter. In Bissau, for example, there is a well-known market for cashew juice and wine at Caracao. There, women dispense the juice or wine from 25 liter containers into liter cups from which it is consumed directly by their predominately male clientele. In June 1990, the juice was selling for 250 GP per liter at the farm level and 500 GP per liter at the Caracao market. Larger producers of juice, such as plantation owners, may sell the juice/wine to large "canna" or "aquadente" distillers. Cashew "canna" or "aquadente" is the drink made by distilling cashew wine.

The major problem experienced by juice and wine sellers is the lack of storage containers. This often forces them to sell the juice/wine at reduced prices, such as 150 GP per liter, at the height of the season. Storing the wine beyond the season can be quite lucrative as the price of wine often reaches 1,000 GP per liter in the months following the harvest. At present, the most commonly used containers for long-term storage are steel drums having a capacity of approximately 200 liters. These containers are less than perfect since the wine reacts with the metal after a period of time and the wine losses some of its quality and value. For this reason, the most highly sought-after item in the wine business is the 200 liter plastic drum. It is said that wine can be stored in such plastic containers for "more than a year."

That the utilization of used steel or plastic drums can present a serious health problem is not widely recognized in Guinea-Bissau. Any drum can contain residues of the material it contained during its first use. Careful cleaning can remove most if not all of this residue from steel drums. However, this process is much more difficult in the case of plastic drums because plastic can absorb some chemicals during the drum's first use. These chemicals can then mix, through the process of osmosis, with the material (wine in this case) stored in the drum during its second use. The public and public health officials in GB should investigate the advisability of indiscriminately using used drums for the storage of wine.

Perhaps the only winery in GB to store its wine in glass bottles exists near Cumura on the road from Bissau to Prabis. The wine is bottled in liter bottles with a metal cap as a seal. Only a small amount of the wine is bottled during the season, stored and sold after the end of the harvest season. Excess juice/wine is sold to canna distillers. In 1989, approximately 12 million pesos worth of juice were sold to distillers.

An alternative to the storage of wine, is to convert the wine into aquadente or canna through distillation. The distillation process converts 200 liters of wine into 30 liters of canna. Since the price of canna ranges between 3,000 to 5,000 GP per liter it is generally more profitable to sell the wine at 1,000 GP per liter than to sell it as canna at 5,000 GP per liter. Hence, the high demand for plastic storage containers. However, the conversion to canna does conserve valuable storage space. It is significant that most of the juice produced on Bolama is converted to canna, presumably because this not only conserves storage space but also reduces the cost of transporting the juice (as canna) to the mainland markets.

At the time of the study, fresh juice, wine, or canna represented the only market uses for cashew juice. However, there appears to be some potential for the development of an additional use for cashew juice. The study team heard reports that a group of investors were considering refurbishing and reopening a cashew juice bottling facility on the island of Bolama, which has been lying idle since the War of Independence. This facility once produced a non-alcoholic drink based on cashew juice derived from cashew plantations on Bolama. Unfortunately, no further information was obtained on the status of this project.

Cashew Kernels

A portion of the cashew nuts are decorticated and sold on the local market at prices ranging from 10,000 to 20,000 GP/kg. Near ferry landings and other public places where people gather, women and young girls typically sell the kernels in small units measured with a tomato sauce tin or the cap from a plastic bottle. In market places, the kernels are sold by the "mound" which is about 50 grams in weight for 500 GP. Ambulant women sell larger quantities of the decorticated kernels near markets frequented by well-to-do shoppers. Women also sell the kernels to customers at their homes. No data is available on the significance of this market outlet nor on the quantity of cashew sold as decorticated kernels.

The decortication process is done manually. First, the nuts are roasted until the cashew shell liquid is extracted and burns away and the shell becomes brittle. Then the shell is broken with a wooden mallet or similar object. Finally, the thin membrane surrounding the kernel is removed by hand. Thus, there may be some justification for introducing hand-operated, cashew processing equipment and training to assist these women in their cashew processing efforts.

Although the market outlets just described were the only domestic outlets for raw cashew nuts at the time of the study, it should be mentioned that two decortication factories were being built at that time. The largest, being built by Geta/Bissau, is reported to have a capacity of 2,000 tons per year, working 24 hours per day for 288 days per year. The second, being built by Langtinianos, was reported to have a capacity of 200 tons per year, working one shift per day for 288 days per year. These factories will provide an additional domestic outlet for raw cashew nuts within the next two to three years.

Importance of Cashew to Women

The women who harvest the cashew fruit and nuts benefit by selling the juice they extract from the fruit. These women often migrate from other regions of the

country to gain access to this employment. On the state farm at Prabis, 60 to 70 percent of the women participating in the harvest were from outside the region of Biombo. Similarly, on the island of Bolama most of the women harvesters were from regions other than Bolama. The revenue gained through the sale of juice and associated products during and after the cashew harvest is very important to the women participating in it. Most of the women who discussed this question with the study team said that the revenue from the cashew harvest represented more than half of their yearly earnings. The cashew harvest fits into the seasonal pattern of work done by women since it occurs during the dry season when other agricultural work is unavailable.

A rough estimate of the number of women required to harvest a 15,000 ton crop, such as occurred in 1989, can be obtained as follows. The study team often heard that a woman could extract 30 to 60 liters of juice per day. On a ratio of four kilograms or liters[1] of juice per kilogram of cashew nuts, 25 to 60 liters of juice would imply the harvest of 7.5 to 15 kilograms of nuts. Dividing one ton by 7.5 and 15 kg would imply the harvest of one ton of nuts would require 66.7 to 133.33 woman-days of labor. Over a season lasting approximately six months, these figures would imply the need for 5,500 to 11,000 women to harvest a crop of 15,000 tons.

A woman's earnings during the season can be based on the same assumptions relating to the amount of juice a woman can be expected to produce plus an assumption that she only works 15 days per month and the assumption that the juice can be sold for 250 GP/liter. Thus, the revenue from 30 to 60 liters per day becomes 7,500 GP to 15,000 GP per day or 675,000 to 1,350,000 GP per six-month season. These figures may appear more realistic when one considers that such women are often assisted by their children.

As previously mentioned, women are also the primary marketers of cashew kernels. However, the significance of this market outlet could not be analyzed due to lack of data.

Due to the culturally defined division of responsibilities for the care of children between men and women in some traditional societies of Guinea-Bissau, the ability of women to earn income and control its expenditure may have special importance for the welfare of these societies and the nation. This implies the need for a better understanding of the importance of women's earnings when developing policies that may have an impact on these women.

[1]We have assumed one liter of juice weighs one kilogram.

SECTION IV

MARKETING OF RAW CASHEW NUTS FOR EXPORTS

Market Structure, Channels and Conduct

Structure and Participants. The collection and exportation of cashew nuts is primarily in the hands of the following six large trading organizations:

Armazens do Povo	Geta/Bissau
Fara Heneni and Brothers	Mamadou Djabi and Brothers
Jaite and Brothers	L'Aiglon S.A. Geneve

These merchants operate through "delegations" or satellite shops which they own and operate through employees. The delegations act as retailers of merchandise provided by the home office. Additionally, the delegations purchase or "assemble" quantities of commodities, such as cashew nuts, rice, or palm oil nuts, produced in the surrounding farm communities. In addition, to their delegations, the major merchants have similar relations with independent, small-scale merchants.

There is a tendency for the major merchants to depend less and less on their delegations and intermediary merchant/clients in favor of dealing directly with the producer. This tendency may be more pronounced in areas that are readily accessible by road from Bissau. The result of this process is for the producer and the major merchant to share the marketing margin formerly gained by the intermediary merchant. The farmers receive higher prices for their product and the major merchant, through better organization, receives a higher profit on its merchandizing transactions. Such an evolution is expected in a market-directed economy when roadways and other transportation systems are improved.

Merchants normally sell their cashew nuts to foreign buyers on a free on board basis. However, there appears to be no regulation which would prevent foreign buyers from purchasing cashew nuts anywhere inside the country. In past years, the Nabisco company has been a major buyer of Guinea-Bissauan cashew nuts. However, the firm has not been a major buyer during the past two years. Another buyer mentioned by one exporter as having shown some interest in purchasing GB cashew nuts is Woodhouse Drake and Correy of Geneva. Other buyers, some from India, visit Bissau from time to time during the year. The position of dominant buyer appears to have been taken by Sterling Merit, Ltd. of London.

Once the cashew nuts leave Guinea-Bissau they are shipped to India where they are purchased by private sector buyers. India is the only country presently purchasing this form of the product for processing. In 1982, there were 547 cashew processing factories in India with a combined processing capacity of 500,000 tons (Sridharan, 1982, p. 321). At that time, domestic production in India only amounted to around 150,000 tons, revealing the need for a substantial amount of imported cashew nuts (op. cit., p. 321). Once the raw cashew nuts are processed into cashew kernels, they are sold for local consumption or re-exported. From India, the kernels are exported predominately to the U.S.A. and

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Europe. The United States is the world's largest market for cashew nuts (see SECTION VII).

Conduct. Business conduct among the major merchants is a rather odd combination of collusion and fierce competition. Early in the cashew kernel buying season, the major merchants met with representatives of the Ministry of Commerce and the MRDA and agreed on a schedule of prices to be used during the remaining portion of the season. The price for cashew nuts at the farm level was set at 450 GP per kilo and at 550 GP per kg at the intermediary merchant level. Since 70 to 80 percent of the cashew nuts in GB are purchased through a barter transaction involving rice, the price of rice was also agreed upon.

It was agreed that rice would be sold to the intermediary merchants at 800 GP per kg and they in turn would sell or barter with farmers at a price of 900 GP. This implied a barter exchange rate of one kilogram of rice for two kilos of cashew--an exchange rate of "one for two." Since the rice was valued at 900 GP/kg, the price from the producers point of view was 450 GP/kg. However, from the intermediaries' point of view, the cashew nuts cost 400 GP/kg. The intermediaries then sold the cashew nuts to the major merchants for 550 GP/kg. This implies that the intermediaries' margin on their sale would be 27 percent (150/550=.27).

It is quite understandable that such a margin would invite a competitive reaction by anyone capable of doing the work of the intermediary for less expense. This is obviously what happened when the major merchants began avoiding their more expendable intermediary merchants/clients to deal directly with the producers. To do this, the merchants sent trucks loaded with rice and other trade items into the villages and using a portable weighing scale traded directly with the producers at a barter exchange rate of "one for one" (one kilogram of cashew for one kilogram of rice). In isolated locations away from the main production area of Biombo and the major roads, the merchants maintained their collusive agreement and the price remained as set at 450 GP/kg. On the island of Bolama, competition between the merchants had raised the producers' price so that it varied between 500 GP/kg to 600 GP/kg.

Needless-to-say, most of the producers having access to the "one for one" barter rate quickly responded to this doubling of price by waiting for the arrival of the truck to sell their produce. There were some producers who decided to sell their cashew at the local intermediary shop for one-half the price in order to obtain the money rather than rice.

Competition among exporting merchants is somewhat restricted by governmental regulations (see Section V) which require that export shipments be greater than 300 tons and require a deposit of 10,000,000 GP to obtain an export license. This limits the access of smaller merchants or producer organizations to international markets and forces them to sell to larger domestic merchants.

Competition among international buyers was difficult to observe. In fact, at least two of the major merchants indicated that one buyer, Sterling Merit, Ltd. purchased over 90% of the 1989 crop. Sterling Merit, Ltd. has stationed an agent in Bissau and has apparently established excellent business relations with the major merchants.

Physical Handling, Storage, and Storage Losses. The physical process of assembling, transporting, and storing cashew nuts prior to export occurs as follows. Cashew nuts are brought to village-level assembly points in small (10 to 20 kg) units by the women who have done the harvesting. In some cases, the assembly point is located on the cashew plantation. In other cases, the assembly point is located at the intermediary merchant's place of business. In the case of truck-based merchants, the assembly point is where ever the truck stops.

Unless the cashew nuts are being purchased by a truck-based purchasing enterprise, they are stored in bulk at the assembly point until sufficient quantities are gathered for economical shipment to Bissau. For shipment to Bissau, the nuts are packaged into used burlap bags (usually, rice sacks) and hand loaded onto ten-ton trucks. Merchants purchasing cashew nuts from plantations often provide sacks, sacking and truck loading services as part of the purchasing agreement. The nuts are purchased without reference to quality or moisture content, there being no price premiums or discounts for quality or moisture content as normally occurs in the commodity markets of developed economies.

At the warehouse in Bissau, the cashew nuts are often emptied from their sacks and stored in bulk behind retaining walls built of sacked cashew nuts. Losses in weight during storage result from the cashew nuts losing moisture. Physical damage is insignificant or unnoticed. Merchants reported loses ranging between 3 and 15 percent. Clearly, the amount of loss during transport and storage is related to the moisture level of the nuts at the time of purchase and the length of storage. No attempt is made to ascertain the moisture level of the nuts at the time of purchase and no attempt is made to control the humidity of the warehouses. Thus, merchants appear to be making no attempt to control losses during storage. This may be related to the level of competition: the nuts must be purchased as soon after harvest as possible to prevent them from being purchased by competitors.

Moisture levels and storage losses may become areas of concern if producers or intermediary merchants begin storing the crop for longer periods of time before selling to the exporting merchants. If this occurs, producers or intermediary merchants may be able to demand a premium for nuts with certain moisture levels. This will imply the need for a simple method of determining moisture content. Nut quality and size could become a concern if international buyers are willing to pay premiums for these characteristics. There are significant price differentials for cashew kernel size and condition at higher levels in the market channel. This implies the need to investigate the feasibility of grading the cashew nuts before sale to the international buyers.

To export the crop, the cashew nuts are repackaged into newly purchased bags holding 60 kg. The repackaged nuts are then reloaded onto ten-ton trucks for transport to the port. The fees and taxes paid by the exporting merchants during the exporting process are detailed in Section V.

Profitability of Marketing Operations

It is questionable whether the marketing operations of the major merchants can be profitable under the present circumstances. The analysis presented in Table

IV-1 can be used to demonstrate this assertion. The figures in Table IV-1 were collected from interviews with persons involved in the exportation of cashew nuts during the study period of June 1990. An attempt was made to develop in the Table a model of an efficient marketing firm which deals directly with producers through mobile buying operations based on a ten ton truck.

Structure of the Spreadsheet Model. The model of the hypothetical export marketing enterprise presented in Table IV-1 was set up on an electronic spreadsheet to facilitate the alteration of certain basic assumptions to discover the effect such changes have on profitability. The primary assumptions of concern are listed at the head of the Table along with the calculated gross profit. In the second section of the model, the cost of importing rice and transporting it to the village or assembly stage of the cashew marketing channel is calculated. The total cost of the imported rice at the assembly stage is used as the price paid for the cashew nuts. The third section of the model develops the cost of transferring the cashew nuts from the assembly stage, through a period of storage in Bissau, and onto the export ship. This cost is then subtracted from the f.o.b. price of cashew nuts to obtain an estimate of the gross profit from the cashew exporting enterprise. A more complete discussion of the model, including the assumptions embedded in the body of the model, is contained in Annex 2.

The model is somewhat unrealistic in several aspects which tend to make the model firm more efficient--and thus, more profitable--than an actual firm. For example, the model assumes that resources such as men, trucks, and warehouses can be employed at permanent-use rates for the short periods of time when the resources are actually needed. An actual firm would have to have other operations in which to employ the resources when not used for cashew operations or pay higher short-term-use rates. To a certain extent, this procedure approximates the operations of the major merchants, as they are typically general merchants dealing in consumer goods and more than one commodity.

Another unrealistic aspect of the model firm presented in Table IV-1 is that overhead expenses, such as office space rental and management personnel salaries are not included. Thus, any profit demonstrated by the model should be considered as profit plus a payment for the use of such overhead resources.

TABLE IV-1

MODEL CASHEW NUT EXPORTATION ENTERPRISE

SECTION I: Primary assumptions of the Analysis and Gross Profit

		Pesos/Ton	Percent of f.o.b. Cashew Price
Exchange rate in Pesos/Dollar	2100		
Interest rate on working capital	14%		
F.o.b. price of cashew nuts in dollars	$700	1,470,000	100%
C.i.f. price of imported rice in dollars	$280		
Barter exchange rate (rice/cashew nuts)	1/1.1		
Export tax on f.o.b. cashew nut value	35%		
Total cost per ton of f.o.b. of f.o.b. cashew nuts		1,435,909	97.7%
Gross profit per ton of f.o.b. cashew nuts		34,091	2.3%

SECTION II: Expenses for the importation and distribution of rice to village

			Pesos/Ton	Percent of f.o.b. Cashew Price
R1	C.i.f. price of imported rice	$280	588,000	40.0%
	Transfer from ship to warehouse			7.2%
R2	(.18 of c.i.f. price of imported rice)		105,840	
	Cost of storage in Bissau warehouse			
R3	(based on 3,000 tons)			
	two guards per month	180,000 GP		
	one manager per month	150,000 GP		
	warehouse rent	1,300,000 GP		
	total cost per month	1,630,000 GP		
	number of months stored	4		
	total for seasonal storage	6,520,000 GP		
	storage cost per ton		2,173	0.1%
R4	Transfer from warehouse to village site			
	ten-ton truck rental			
	(one-way trip)	175,000 GP		
	loading and unloading charge	48,000 GP		
	cost per ton		22,300	1.5%
Total cost of imported rice less financing expenses			718,313	48.9%
R5	Cost to finance the imported rice for the number of months indicated below			
	number of months	8		
	rate of interest for financing	14%		
	total cost of financing per ton		67,043	4.6%
Total cost of imported rice used in cashew trade			785,356	53.4%

SECTION III: Expenses for the Exportation of Cashew Nuts

			Pesos/Ton	Percent of f.o.b. Cashew Price
C1	Price of cashew nuts			
	(based on imported rice cost in village multiplied by the barter exchange rate)		713,960	48.6%
C2	Cost of assembling cashew nuts at village shops based on a margin of 50 Pesos/kg for 50% of total nuts purchased		25,000	1.7%
C3	Transportation from village to Bissau			
	ten-ton truck rental			
	(one-way trip cost)	175,000 GP		
	loading and unloading	48,000 GP		
	total for one ton		22,300	1.5%
C4	Cost of storage in Bissau			
	(based on 3,000 tons)			
	two guards per month	180,000 GP		
	one manager per month	150,000 GP		
	warehouse rent	1,300,000 GP		
	total cost per month	1,630,000 GP		
	number of months stored	4		
	total for seasonal storage	6,520,000 GP		
	storage cost per ton		2,173	0.1%
	total cost of storage loss		66,885	4.6%
C5	Transport from warehouse to port			
	cost of sacking (16.7 sacks @ 1,125 Pesos/sack)	18,788 GP		
	ten-ton truck rental			
	(daily rental rate 350,000 GP)			
	Transportation per ton			
	(based on 3 ten-ton trips per day)	11,667 GP		
	loading and unloading	16,000 GP		
	total cost per ton		32,055	2.2%
C6	Port costs			
	(based on 3,000 tons)			
	customs agent fee			
	(0.3% of f.o.b. value)	US$ 2.16	4,410	0.3%
	tax stamp (90,000 GP/3,000 ton)		30	
	international traffic charge	US$ 1.03	2,163	
	port use fee	US$ 0.75	1,575	
	stevedore service fee	US$ 1.50	3,150	
	total port costs		11,328	0.8%

SECTION III: Expenses for the Exportation of Cashew Nuts (continued)

			Pesos/Ton	Percent of f.o.b. Cashew Price
C7	Taxes			
	regional taxes		5,000	0.3%
	cashew exportation tax	28%		
	emoluments garais	5%		
	contribution pradiale brustico	2%		
	total national taxes	35%	514,50	35%
C8	Cost of Financing			
	based on the following costs:			
	costs of assembly	25,000 GP		
	transportation:			
	from village to Bissau	22,300 GP		
	from Bissau to port	32,055 GP		
	costs of storage	2,173 GP		
	port costs	11,328 GP		
	regional tax	5,000 GP		
	total	97,856 GP		
	cost of financing the above total for the number of months indicated below:			
	number of months	2		
	bank interest rate	14%		
	total financing cost per ton		2,283	0.2%
C9	Banking expense (letter of credit, etc.) (2.75% of f.o.b. value)		40,425	2.8%
Total cost per ton of exported cashew nuts			1,435,909	97.7%

Model Results. In the electronic spreadsheet form, one could change any of the primary assumptions listed in the first section of Table IV-1, for example, the barter ratio or the interest rate on borrowed capital and observe the change in gross profit. (Assumptions embedded in the body of the table could also be changed.) The spreadsheet form of the model was demonstrated to various Ministers of the GOGB and to representatives of the private sector to obtain their reactions to the assumptions used and the results obtained. A copy of the spreadsheet model was provided to those Ministers requesting it. Thus, the model could be modified as Guinean analysts and decision makers desired for use in policy discussions.

Under the assumptions of the model presented in Table IV-1, the collection and exportation of cashew nuts appears to be marginally profitable at barter exchange rates of 1/1.1. The level of profitability increases as the barter exchange rate decreases. For example, an exchange ratio of 1/2 or .5 would be more profitable than a rate of 1/1.1 or 0.90. An enterprise could obtain an average ratio of 0.90 by making all its purchases at the 0.90 ratio or by making 80% of its purchases at the 1/1 ratio and 20% at the 1/2 ratio. Given the tendency for the "one for one" barter ratio to be used in the major producing areas, it is questionable whether such an average barter exchange rate could be obtained. Table IV-2 presents the changes in percent gross profit and total revenue on sales of 3,000 tons calculated by the spreadsheet model when the barter exchange rate is varied and all other assumptions are held constant.

TABLE IV-2

RELATED CHANGES IN BARTER RATIO AND PROFIT FOR MODEL

Barter Ratio	Related Profit Ratio	Profit per Ton in Pesos	Profit per Ton in Dollars	Total Gross Profit on Sales of 3,000 tons (Dollars)
1/1	-2.5%	-37,305	-17.80	-53,400
1/1.1	2.3%	34,091	16.23	48,690
1/1.2	6.4%	93,587	44.57	133,710
1/1.3	9.8%	143,931	68.54	205,620

The rate of interest on working capital invested in the cashew exporting enterprise also has a significant effect on the profitability of the enterprise. To the extent that exporters rely on funds borrowed from the National Bank, this interest rate ties the government's gain from the exporting enterprise to the exporter's loss. In this case, the government gains what the exporter pays (or loses) through higher real interest rates. Table IV-3 presents the changes in percent gross profit and total revenue on sales of 3,000 tons calculated by the spreadsheet model when the real interest rate is varied and all other assumptions are held constant.

TABLE IV-3

RELATED CHANGES IN INTEREST RATE AND PROFIT FOR MODEL

Interest Rate	Related Profit Ratio	Profit per Ton in Pesos	Profit per Ton in Dollars	Total Gross Profit on Sales of 3,000 tons (Dollars)
13%	2.6%	38,607	18.38	55,140
14%	2.3%	34,091	16.23	48,690
15%	2.0%	29,574	14.10	42,300
16%	1.7%	25,058	11.93	35,790

It is important to understand the difference between nominal and real interest rates. The nominal interest rate is the interest rate stated on a loan agreement. Nominal interest contains a charge to account for the expected rate of inflation. If the expected rate of inflation were 36% and the bank were to charge only 36% on its loans, the money it would receive in repayment at the end of a year would be equal in value to the money it lent at the beginning of the year. No real interest would have been made on the loan. Thus, the bank must add what it wishes to receive as real interest to the expected rate of inflation to determine the nominal rate of interest it charges its customers. If the bank wanted 14% in real interest and expected the inflation rate to be 36%, it would have to charge its customers a nominal rate of interest of 50%.

The current expectation was that inflation would range between 25% and 36%. Thus, with a nominal interest of 50%, the real interest rate would be 14%. This is the figure used in the analysis shown in Table IV-1. The use of the real rate of interest is appropriate since the selling price of the cashew nuts is not adjusted for inflation. If the nominal rate of interest had been used, it would be appropriate to increase the numbers of Pesos received for the exported product by the expected rate of inflation.

In the situation of cashew exporters, the government not only sets the interest rate charged on working capital loans but also controls the rate of inflation. Thus, the government is in a somewhat difficult position of attempting to achieve three conflicting goals: 1) maintain a positive real rate of interest to control inflation; 2) insure that its banking operations are reasonably profitable; and 3) encourage and support the private sector cashew exporters by providing investment funds at reasonable rates. If the government does a good job of containing inflation below expected levels, the real interest portion of the nominal interest rate on fixed interest rate loans will increase one percentage point for each percentage drop in the expected inflation rate. In the situation in which inflation was expected to be 36% and the nominal interest rate was 50%, the real interest rate would be 14%. However, if inflation amounted to only 35% during the loan period, the real rate of interest would increase to 15%. The bank would earn more and the borrower would pay more than expected.

Naturally, the price to be received for the exported cashew nuts has a major impact on the profitability of the exporting enterprise. There was some uncertainty surrounding this price since the product had not been sold at the time of the study. The figure of $700.00 was selected in an attempt to be conservative in estimating the profitability of the exporting enterprise. The National Bank of Guinea-Bissau has expected a price in the range of $650.00 per ton. Thus, the use of $700.00 per ton would tend to estimate a higher level of profitability than expected.

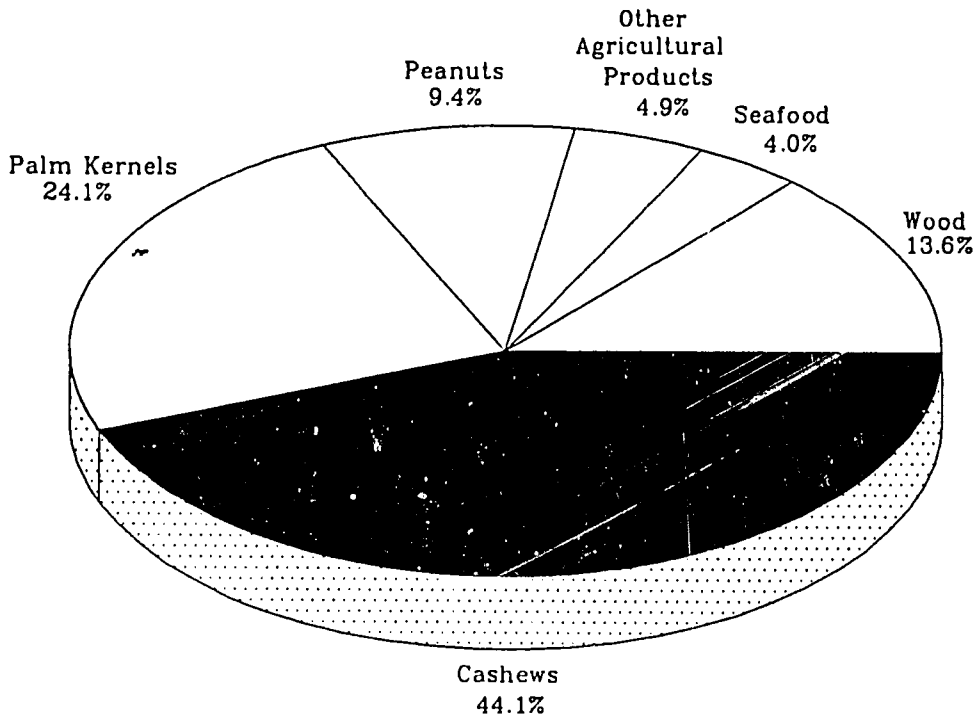
Indicated Performance. Given the conservative nature of this model, the implication is that the exportation of cashew nuts is a marginally profitable enterprise in 1990 for very efficient firms. For less-efficient firms, the exportation of cashew nuts may be an unprofitable enterprise. The profitability of the average enterprise in a marketing channel is a reflection of the performance of the marketing channel to perform the marketing task as efficiently as possible. Efficiency is achieved when the profits earned are just sufficient to encourage the most efficient operators to remain in the business. The profit level indicated in the above estimate coupled with the observation that the market channel is becoming more efficient through the reduced use of intermediary merchants provides some indication that the performance of the cashew nut exporting sector is moving toward a socially optimal level.

Exports of Raw Cashew Nuts

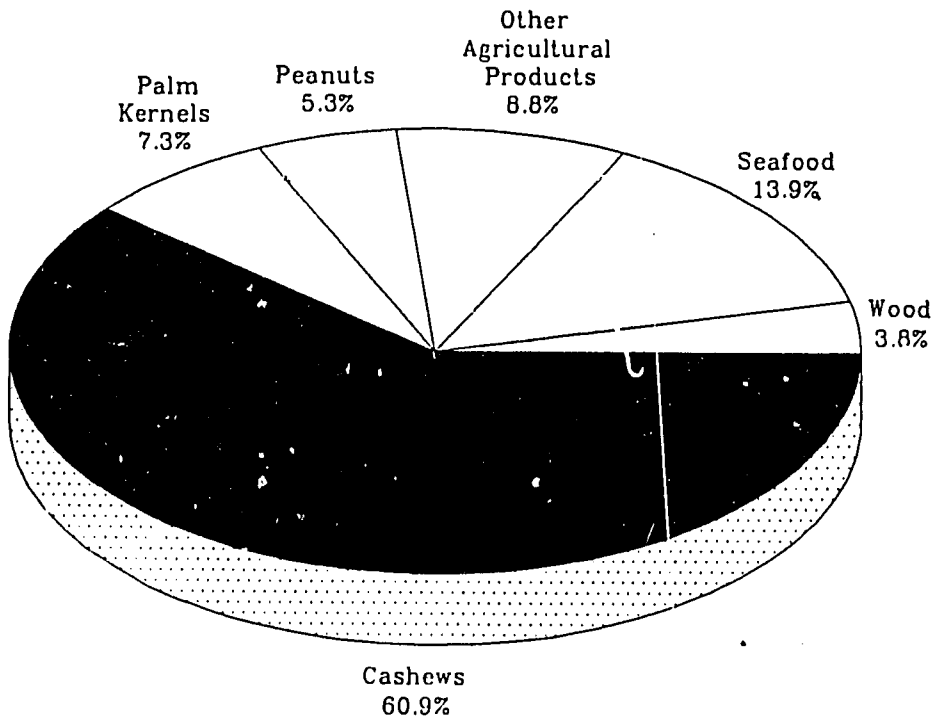
The importance of the raw cashew nut as a source of foreign exchange for the Republic of Guinea-Bissau is very significant. Its share of total commodity exports has increased considerably throughout the 1980's as exports of other agricultural products, fisheries and forestry have failed to follow the same trend or have even declined over the same time period (see Annex 3).

FIGURE IV-1
1989 VOLUME AND VALUE OF EXPORTS

VOLUME



VALUE



Source: Annex 3

Volumes and Values. The volume of raw cashew exports and associated value for 1989 is summarized in Figure IV-1. Raw cashew nuts represented 44% of the total volume exported, followed by palm kernels (24%), wood and wood products (14%), peanuts (9%), other agricultural products (5%), and seafood exports (4%). In terms of value, cashew represented 61% of all foreign exchange earnings obtained from exports, seafood was second with 14%, and all other commodities earned less than 10% each.

The significance of this contribution to annual exports levels and earnings is summarized in Table IV-4. While export volumes were less than 1,000 tons before 1980, sizable increases have led to export volumes in excess of 9,000 tons per year since 1987. The 1990 export volume is estimated at 15,000 tons; however the figure contains some raw nuts from the 1989 harvest.

The value of exports has more than doubled since 1984 from US$4.8 million to approximately US$10.0 million in 1989. More significant is the contribution of cashew exports to the total export value. Before 1980, cashew exports contributed less than 5% to the total export value. Since 1984, cashew exports have contributed more than 50% annually to the foreign exchange earnings produced by exports.

TABLE IV-4
EXPORT VOLUMES AND VALUES OF RAW CASHEW NUTS

Year	Volume (tons)	Value (million US$)	Percent of Total Export Value
1978	900	not available	2.5
1979	200	"	1.4
1980	400	"	3.5
1981	2,300	"	10.7
1982	1,500	"	9.3
1983	2,000	"	14.0
1984	8,000	4.80	28.2
1985	6,622	4.80	41.4
1986	5,995	5.20	53.1
1987	10,441	10.80	70.6
1988	9,918	8.40	57.5.
1989	9,409	10.68	61.1
1990	15,000[1]/	11.81[1]/	54.9

Notes: [1]/ Estimate
Source: 1978 through 1983; The Guinea-Bissau: A Study of the Food and Agricultural Sector, Swedish University of Agricultural Studies, International Rural Development Center, Uppsala, 1987.
1984 through 1990; Annex 2.

The Significance of Cashew Exports to Foreign Exchange Earnings and Tax Revenues. The foreign exchange earnings from cashew exports in 1990 is expected to amount to 55% of the amount earned from the export of commodities. Guinea-Bissau also earns considerable amounts of foreign exchange from the sale of fishing licenses

to foreign nationals. The portion of total foreign exchange earnings, including those earned from fishing license sales, expected to be provided by cashew exports in 1990 is 33%.[1]

The importance of the foreign exchange earnings from cashew exports can be fully appreciated when they are related to the government's need for foreign exchange to service its external debt. Current regulations allow the government to retain 50% of the foreign exchange earnings from exports. Combining this foreign exchange with that generated by the 35% tax on cashew nut exports yields a total of 7.97 million dollars. In 1990, the nation's debt servicing needs is expected to amount to approximately 13.6 million dollars. Thus, the foreign exchange expected to be made available to the government from cashew exports is equal to 59% of this need (7.97/13.6 = .586).

Finally, cashew exports contributes significantly to the government's tax revenue. At the regional level, a tax of 5 Pesos per kilogram of cashew nuts is collected for use by the regional governments. This is equal to approximately 1.0% of the value of the national crop at the regional level. Assuming a national crop of 15,000 tons, this implies a regional level contribution of 7.5 million Pesos. At the national level, a tax of 35% of the f.o.b. price of exported cashew nuts, is expected to contribute 4.13 million dollars to government tax revenues. This amount is equal to approximately 22% of total tax revenue. The tax contribution of cashew nut exports at the national level is expected to be equal to approximately 12% of total budgetary revenue, including revenue from the sale of fishing licenses.

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[1]These figures and the ones in the following paragraphs were calculated from information provided by the Bank of Guinea-Bissau and the World Bank. Specifically, the figures in million dollars are: expected cashew export value, 11.8; tax revenues, 18.4; non-tax revenue (including fishing license revenue of 14.2), 16.6; total export value 21.52; total budgetary revenue, 35.0. Foreign exchange equals 14.2 plus 21.52 or 35.72. Expected cashew export value as percent of total foreign exchange earnings is 11.8/35.72 = .33.

SECTION V

GOVERNMENTAL REGULATIONS AND PROGRAMS

Taxes and Port Fees

The Government of Guinea-Bissau (GOGB) obtains a significant percentage of its nationally generated revenue from a 35 percent tax on the free-on-board (f.o.b.) value of cashew nuts exported from the country. Regional governments, such as that of Biombo, place a 5 GP/kg tax on all cashew nuts exported from their regions. This tax amounts to about 1 percent of the regional-level value of the cashew nuts. Regional ports, such as that at Bolama, charge a 3 percent tax on the value of the cargo in addition to a per-ton unloading/loading charge for each ton moved through the port.

Taxes at the national port at Bissau amount to 35 percent of the f.o.b. value. Specifically, the taxes are 5 percent for "emoluments garais," 2 percent for "contribuição pradiale brústico," and 28 percent as the "sobretaxa de exportação" (export tax on cashew). Port fees paid to the Junta Autónoma dos Portos (the parastatal organization which operates the port and provides stevedore services) at Bissau are:

1. Tráfico internacional: 1.03 US$ per ton
2. Utilização do Porto: 0.75 US$ per ton
3. Estiva: 1.50 US$ per ton

The cost of the services of private sector forwarding agents range between 0.25% and 0.30%. Exporters usually bear the cost of opening a letter of credit for the international purchaser of the cashew nuts. The National Bank charges 2.75% of the value of the exported cashew nuts for this service.

To obtain an export license, an exporter must be capable of exporting more than 300 tons of cashew nuts and must deposit 10,000,000 GP toward the payment of the export tax on the exported nuts.

Parastatal Firms and Government Farms

Although the GOGB is moving toward the implementation of a market-directed economy that relies minimally on parastatal firms, some parastatal firms remain in competition with the private sector in the cashew market. The GOGB provides transportation services in competition with the private sector through its parastatal transportation company, Rodofluvial. Similarly, the parastatal commodity merchandizing company, Armazens do Povo, competes with private sector merchants for the purchase and sale of rice, cashew nuts and other commodities. Although the Armazens do Povo has been slated for privatization, this process had not been completed at the time of the study.

To the extent these two firms have cost advantages due to governmental subsidies, their existence in the market may distort the efficient use of national resources. Their existence may limit the entry of private sector firms into the cashew market. Alternatively, to the extent these two firms are inefficient and

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have controlling influence on prices dictating the marketing margin between farmer and external buyer, farmers will receive less than an efficient share of the final sales price of the goods they produce. This can be expected to distort the efficient use of resources at the farm level. The economic impact of the continued existence of these two parastatals requires further investigation.

The GOGB owns two cashew plantations: a ten hectare plantation on the state research farm at Prabis and a 200 hectare plantation on Bolama. The ten hectare farm at Prabis is operated as a commercial farm, selling juice and cashew nuts to private citizens. The second-in-charge of the farm explained that the yield from the 10 hectare plantation is lower than on comparable private plantations, at about 7 tons of nuts per year, because the management is not too strict in assuring that the women harvesters deliver all the nuts they harvest.

The farm on Bolama is less intensively managed, demanding only a token payment for the juice and a token share of the cashew nuts harvested by private citizens who have free access to the farm. The engineer-in-charge of the Bolama plantation explained that the farm there is operated for the benefit of the people. Thus, the farm management expects to collect less than 20 tons of cashew nuts per year from the 200 hectare farm.

Government Programs in Support of Cashew Production and Marketing

The study team could find no evidence of any currently operating Ministry of Rural Development and Agriculture (MRDA) programs of research or extension specifically devoted to the improvement of cashew product production or marketing. However, a research project to begin the selection of superior cashew plants is in the planning stages. An additional study, funded by the European Economic Community, to develop "in vitro" propagation techniques is in its initial year. The MRDA's Recenseamento Agricola de 1988, a statistically based survey to determine areas planted and yields of the nation's agricultural sector, contains only incomplete information on cashew. However, the MRDA plans to correct this deficiency during the next annual survey of Agriculture.

As a consequence of a study carried out in the Summer of 1989, a proposal was submitted to the MRDA for a reforestation project based on cashew. The response to this proposal had not been delivered at the time of this study in June 1990.

A meeting of MRDA officials in Catió (March 30 - April, 1 1989) adopted a resolution recommending that the MRDA Departmento de Experimenterçäo e Pesquisa Agricola (DEPA) conduct a research program to determine whether or not cashew trees have a detrimental effect on the fertility of the soil. MRDA officials indicated, in June 1990, that no reports have been issued regarding this recommendation.

Under the guidance of the Ministry of Economics and Finance, the GOGB has laid the legal and institutional foundation for a revolving fund to provide a supplemental source of income for cashew nut exporters during periods of low international prices. The fund is established as a mixed (private and state) enterprise, legally separate from the government, and managed by a board of directors representing both private and governmental sectors. The fund will operate as follows. The fund will borrow money from an international development

bank at preferential rates. If the price received for exported cashew nuts falls below a pre-established level (target price), exporters will be allowed to borrow from the fund a certain amount of money per ton of cashew nuts sold. Interest on the borrowed funds will be set by the board of directors, probably at a rate reflecting the preferential cost of the funds.

Obtaining the supporting loan will obligate the exporter/borrower to repay the loan from funds obtained from the sale of cashew nuts at prices that exceed the target price set by the support fund managers. In practice, the repayment will be collected by the intervening bank through which the international transaction takes place. The bank will deduct an agreed-upon percentage of the excess between the price paid and the target price established by the fund managers. Although the support fund had been established, it had not begun operating at the time of the study visit.

One international project, the Ajuda Desenvolvimentos Povo o Povo (ADPP), was found to be devoted to the culture of cashew. The project is located at Bissora and expects to plant nearly 1,000 hectares of cashew. In June 1990, the project had planted approximately 475 hectares of this total. The trees are planted so that each tree is separated from its neighboring trees by six meters. After three years, intervening trees will be cut so that the final spacing between trees will be twelve meters.

In 1981, USAID elaborated a project, "Guiné-Bissau Forestry Project for Zone I (AID Project No. 657,0005)," to encourage agroforestry based on the cashew. However, the project has not been implemented.

SECTION VI

RELATION OF CASHEW EXPORTATION WITH DOMESTICALLY PRODUCED RICE

Domestically produced rice, either in the undecorticated or paddy form or in the decorticated form, substitutes for imported rice in some of the barter transactions for cashew nuts. An important policy question is whether this use of domestically produced rice can be expected to encourage increased production of domestic rice. This effect can be expected if domestically produced rice can be purchased in the rice growing regions of the country and transported to the major cashew growing regions at a cost that is competitive with the cost of imported rice.

The Cost of Domestic Rice Used in the Cashew Trade

The cost of decorticated domestic rice transported to the major cashew growing region can be estimated using a modification of Section Two of the Model Cashew Nut Exportation Enterprise developed in Table IV-1. This modification is shown in Table VI-1. The major modification is the addition of a milling process to decorticate the rice. The modified model assumes that the rice is purchased in Catió in the paddy form and milled and stored in Bafatá. After storage and milling, the rice is transported where needed in the cashew growing region.

TABLE VI-1

ESTIMATED COST OF USING DOMESTIC RICE IN CASHEW TRADE

			Pesos/Ton
R1	Farm-level price GP/ton of Paddy	300,000 GP	
	Farm-level price expressed on decorticated basis		461,538
R2	Transfer from assembly point to Bafata		
	ten-ton truck rental (one-way trip)	500,000 GP	
	loading and unloading charge	48,000 GP	
	sacks (300 at 525 GP/sack)	15,750 GP	
	cost per ten-ton paddy	563,750 GP	
	cost per ton decorticated rice		86,731
R3	Cost of decortication/milling		
	decortication 50,000 GP/ton paddy, 65% yield, expressed on decorticated basis		77,000
	handling cost 10,000 GP/ton		10,000
R4	Cost of storage in Bafata warehouse (based on 3,000 tons)		
	two guards per month	180,000 GP	
	one manager per month	150,000 GP	
	warehouse rent	65,000 GP	
	total cost per month	395,000 GP	
	number of months stored	4	
	total for seasonal storage	1,580,000 GP	
	storage cost per ton		527
R5	Transfer from warehouse to village site		
	ten-ton truck rental (one-way trip)	175,000 GP	
	loading and unloading charge	48,000 GP	
	cost per ton		22,300
Total cost of domestic rice less financing expenses			658,096
R6	Cost to finance the domestic rice for the number of months indicated below		
	number of months	8	
	rate of interest for financing	14%	
	total cost of financing per ton		61,422
Total cost of domestic rice used in cashew trade			719,518

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Is Domestic Rice Competitive with Imported Rice?

The most interesting assumption of the modified model is the farm-level price for domestic paddy. Using the modified model in its electronic spreadsheet form, one can change the farm-level price and note the related cost of the decorticated product delivered to the cashew growing region. The delivered cost is then compared to the delivered cost of imported rice. If the delivered cost of domestic rice is less than the delivered cost of imported rice, it is expected that there may be a tendency for merchants to use the domestic rice in preference to the imported product. Table VI-2 shows the results of such an exercise. From the figures displayed in Table VI-2, it appears that domestically produced rice held a competitive edge over imported rice, during the 1989-90 season, when the domestic rice could be purchased at prices below 339 GP/kg.

TABLE VI-2

1989-90 FARM-LEVEL PRICES AND DELIVERED COST
OF DOMESTIC RICE COMPARED TO DELIVERED COST OF IMPORTED RICE
(Pesos per Ton)

Farm-level Price	Delivered Rice Price Domestic	Imported	Difference
300,000	719,518	785,356	65,838
310,000	736,339	785,356	49,017
320,000	753,159	785,356	32,197
330,000	769,980	785,356	15,376
339,000	785,118	785,356	238
340,000	786,800	785,356	-1,444

Other factors may enhance the competitive position of domestic rice. For example, the need for foreign exchange and the need to deal with the complexities of importing rice are eliminated when domestic rice is used. These and other factors may cause domestic rice to be preferred over imported rice even if the delivered cost of domestic rice, as estimated by the model, is equal to or greater than imported rice. Clearly, this relationship could be reversed if other unidentified factors weighted the analysis toward imported rice. One possible factor could be the existence of favorable credit terms allowed by the external seller of the imported rice.

In some locations, domestically produced rice in the undecorticated or paddy form was used in the barter trade for cashew. Certainly, in these situations, the exchange of cashew nuts for paddy on a one to one exchange rate could be expected to be a profitable enterprise.

Is Domestic Rice Production Encouraged by the Cashew Trade?

Whether or not domestic rice production is encouraged by its use in the cashew nut trade depends on the rice producers' view of the prices offered. If the rice

farmers feel the prices are attractive and they feel a need for the income produced from the sale of their rice, it is predictable that they will make an effort to increase the amount of rice they are willing to sell. Farmers in the major rice growing regions of GB, Tombali and Quinara Regions, responded to increased rice prices during the 1988-89 season by increasing the amount of rice they planted for the 1989-90 season (Lea, Hugo, and Ribeiro, p. 81).

Given the competitive nature of the market for cashew nuts and the demonstrated willingness for the merchants in the market to increase the price paid in rice for cashew nuts, it is predictable that changes in international cashew nut prices will have an influence on domestic, farm-level rice prices. An increase in international cashew nut prices should allow merchants to offer more rice for each kilogram of cashew nuts purchased. Assuming that domestic rice remains competitive with imported rice, the increased quantities of rice needed for the cashew trade should have a positive effect on the farm-level price of domestically produced rice. However, there should be a limit to this effect related to the fact that rice is a basic consumption commodity. After cashew growers have accepted enough rice to cover their familial requirements, additional quantities of rice will have less and less value for them. At some point, they will prefer to be paid in some other commodity or in money. At that point, the linkage between cashew nuts and rice will begin to break down.

SECTION VII

INTERNATIONAL ASPECTS OF THE PRODUCTION AND TRADE OF CASHEW

The cashew tree, Anarcadium occidentale, L., originated in northern Brazil, and was spread around the tropical areas of the world by Portuguese merchants during the 16th century. One possible reason for the propagation of the tree along the trade routes of the Portuguese might have been the high vitamin C content of the cashew apple. It was during the mercantilistic era that fresh fruits, specially acidic fruits were recognized as excellent means for preventing or reducing the incidence of scurvy during the long sea voyages of that time.

Today, cashew products have very different utilization and markets. Significant commercial quantities of cashew are being produced only in a limited number countries with the appropriate tropical climate. The products from the cashew apple, such as juice, wine, liquor, preserves, jams and candy are used only in the producing countries. On the other hand, products from the nut, such as cashew kernels and cashew nut shell liquid are in high demand as luxury consumption items and industrial material, respectively in high income and industrialized nations. Cashew kernels also represent an important seasonal consumption item in the producing nations.

Raw Cashew Nuts

Production Trends. World production of raw cashew nuts has fluctuated considerably over the years, ranging from a high of 500,000 long tons (one long ton = 1.016 metric tons or 2,240 pounds) in 1974/75 to a low of 250,000 long tons in 1982/83. Since then, production has recovered to nearly 400,000 long tons. Year to year fluctuations have also been pronounced. As highlighted in Table VII-1, the reasons for this instability in world production is found in the trends within those countries which represent the bulk of the production.

Since 1973, India has managed to nearly double its production from 80,000 to an estimated 150,000 long tons in 1989. Nevertheless, since the middle 70's the production trend has been much flatter, averaging 3% per year. Production increases have been affected mainly by national agricultural production policies and government market intervention.

Tanzania and Mozambique, the leading African cashew producers have seen their cashew production levels crash: Tanzania from 140,000 to 22,000 long tons between 1974/75 and 1989/90; Mozambique from 210,000 long tons in 1973/74 down to an estimated 50,000 long tons in 1989/90. The reasons for these declines are very different. In Tanzania, agricultural production policies (collective farming) are directly responsible for the decline in production. In Mozambique, decade-long civil strife and war contributed to the abandonment of cashew production in favor of production of basic staple foods such as grains and tapioca. Kenya has shown very erratic yet declining production levels as well. From a high of 30,000 long tons in 1974/75, production has declined to an estimated 12,000 long tons in 1989/90.

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TABLE VII-1

WORLD CASHEW PRODUCTION - MAJOR COUNTRIES

(Long Tons Raw Cashew Nuts)

Year	India	Tanzania	Kenya	Mozambique	Brazil	Africa	Total
1971/72	55,000	115,000	25,000	170,000	40,000	2,000	407,000
1972/73	60,000	105,000	12,500	167,500	25,000	5,000	375,000
1973/74	80,000	135,000	25,000	210,000	30,000	5,000	485,000
1974/75	90,000	140,000	30,000	185,000	60,000	5,000	510,000
1975/76	100,000	85,000	20,000	120,000	45,000	5,000	375,000
1976/77	120,000	85,000	13,000	102,000	45,000	5,000	370,000
1977/78	120,000	67,000	5,000	90,000	70,000	5,000	357,000
1978/79	115,000	56,000	10,000	62,000	65,000	5,000	313,000
1979/80	130,000	41,000	18,000	88,000	65,000	12,000	354,000
1980/81	125,000	56,000	16,500	90,000	75,000	12,000	374,500
1981/82	110,000	43,000	12,000	57,000	80,000	12,000	314,000
1982/83	90,000	32,000	7,700	18,000	90,000	12,000	249,700
1983/84	125,000	47,000	18,500	25,000	60,000	12,000	287,500
1984/85	135,000	32,000	8,500	30,000	115,000	12,000	332,500
1985/86	120,000	18,000	10,200	35,000	120,000	12,000	315,200
1986/87	125,000	16,000	8,500	40,000	75,000	12,000	276,500
1987/88	130,000	24,000	12,400	40,000	130,000	12,000	348,400
1988/89*	150,000	19,000	8,000	44,000	140,000	15,000	376,000
1989/90&	150,000	22,000	12,000	50,000	140,000	15,000	389,000

Source: Gill & Duffus; Edible Nut Statistics; Edible Nut Market Reports
October-September production season.

Notes: * Estimate; & Forecast

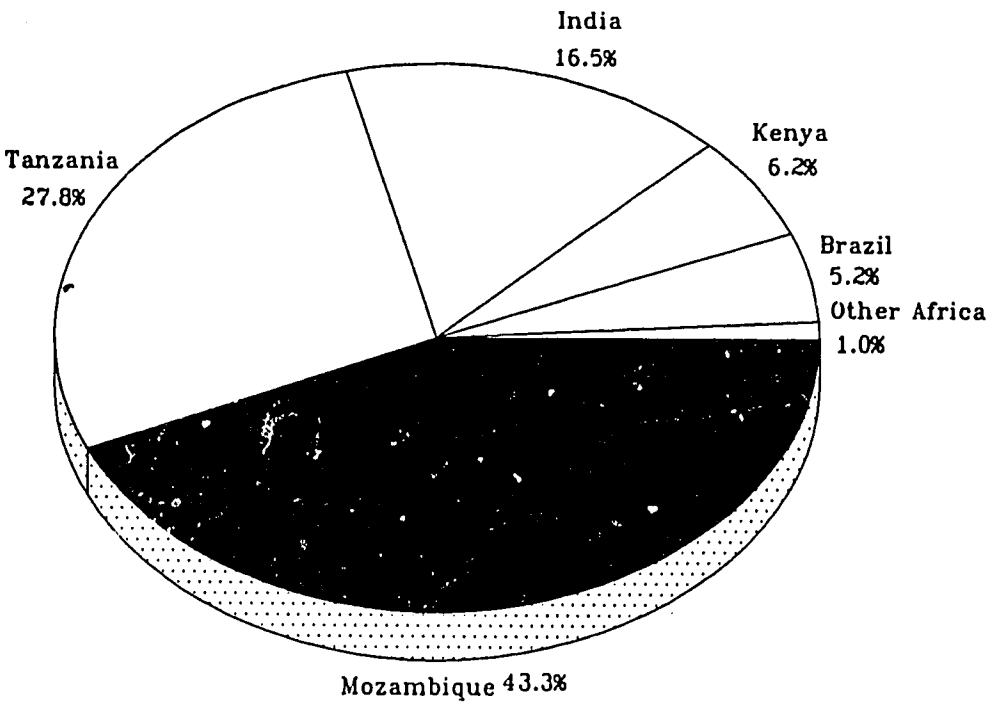
The country which has benefitted from these production declines in Africa is Brazil which has managed to increase production by over 400% since 1972/73, from 25,000 to an estimated 140,000 long tons in 1989/90. However, the production trend since the mid 1980's has been more gradual, averaging 3.6% per year.

Since the demand for raw cashew nuts in India has remained high, other African countries have benefitted from the decline in production and exports of this commodity, including Guinea-Bissau. Their contribution, however, remains limited due to the small production levels in these countries.

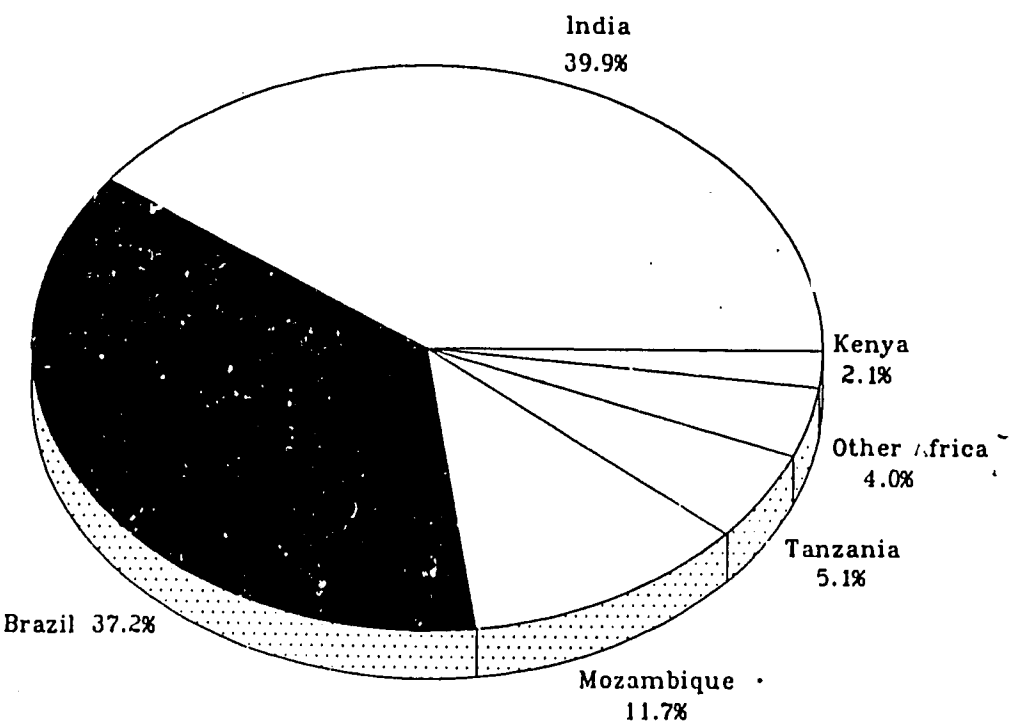
These dramatic shifts in world cashew nut production are shown in Figure VII-1 which highlights the changes in production shares between 1973/74 and 1988/89. Brazil's gain from 5% to 37% of world production has come at the expense of the African countries. India has also seen its production share more than double from 17% to nearly 40%. Should production levels recover in Tanzania and Mozambique, the price, and therefore production implications would be critical for Guinea-Bissau and should be taken into account in future policy decision making.

FIGURE VII-1
SHARE OF WORLD PRODUCTION OF RAW CASHEW NUTS

1973/74 - LONG TONS



1988/89 - LONG TONS



Source: Table VII-1

International Trade. The international trade of raw cashew nuts is pretty much limited to imports into India, where a large manual labor force depends on these imports for employment. Imported and national raw cashew nuts are processed for local consumption and exports. Historically, the bulk of the imports used to come from three African countries, namely Tanzania, Mozambique and Kenya, which managed to provide India with nearly 100% of its import needs in the 1970's and early 80's. Since then, however export levels from these countries have dropped dramatically, as the import columns in Table VII-3 indicate. The reason for this trend is twofold. First, there is the previously mentioned decreases in production of raw cashew nuts in these countries. Secondly, since the mid 70's these countries have been installing cashew nut processing facilities to capture the foreign exchange value added of processed cashew kernels.

TABLE VII-2

EXPORTS AND IMPORTS OF RAW CASHEW NUTS

(mt)

	Exports				Imports
Year	Kenya	Mozambique	Tanzania	Total	India
1971	10,604	53,383	95,973	159,960	167,459
1972	15,540	69,527	112,924	197,991	192,879
1973	9,368	33,195	109,915	152,478	172,110
1974	20,350	72,899	113,891	207,140	177,289
1975	14,297	65,592	97,328	177,217	135,815
1976	11,543	64,449	66,380	142,37[illegible]	76,181
1977	1,100		74,759	75,859	65,076
1978			44,200	44,200	23,009
1979	73		39,594	39,667	34,203
1980	10,700		20,737	31,437	20,682
1981			25,145	25,145	31,094
1982					3,212
1983					10,231
1984					33,283
1985					27,749
1986					32,080
1987	1/	1/	1/	1/	45,515
1988			7,000 2/		26,005

Source: 1971-1983 and 1987-1988 from Gill & Duffus Edible Nut Statistics.
1984-1986 Imports Review.

Notes: 1/ Empty cells imply no data is available.
2/ Estimate.

Since installed processing capacity in these African countries exceeds current production levels, exports of raw cashew nuts are not likely to increase should production levels increase in years to come. While lack of more current information prevents a more definitive statement, indications that this might be happening can be inferred from Table VII-3. While Tanzania had one-half of

TABLE VII-3

IMPORTS OF RAW CASHEWS INTO INDIA

(mt)

Countries	1970	1975	1976	1977	1978	1979	1980	1984	1985	1986
Australia										469
Dahomey Rep.	601		1,502							
Guinea-Bissau								1,604	5,625	2,157
Hong Kong								124		
Indonesia								403		1,517
Ivory Coast	127							816		1,309
Kenya	17,182	21,296	13,006	1,103			6,032		2,532	
Madagascar	815	346			893	370	590	304	326	1,153
Malawi										142
Malaysia								372		
Mozambique	81,840	47,819	18,062							
Nigeria								423	281	
Philippines									26	490
Singapore								5,585	2,598	4,913
Senegal								230	285	
Tanzania	70,220	66,354	43,115	63,973	22,116	33,833	14,060	20,581	15,447	15,944
Thailand								3,264	487	2,115
Other Africa			496							244
Vietnam										1,346
Total	170,785	135,815	76,181	65,076	23,009	34,203	20,682	33,283	27,749	32,080

Notes: 1984 and 1985 is January through December.
1986 is January through September.

Source: Imports Review - Imports of Raw Cashew Nut into India.

the Indian market in the early 70's, by the end of that decade it was supplying nearly 100% of that market. For the years 1984 through 1986, India did maintain import levels of raw cashew nuts of around 30,000 mt per year. Tanzania's share has since dropped again to one-half, but at a volume only one-fourth the size it had back in 1975. The other 50 per cent is now being supplied by other African countries (16.5%) and non-traditional exporters of raw cashew nuts in Asia (32%) and Australia (1.5%).[1] Kenya, an erratic exporter has seen its share decline to zero, while Mozambique has failed to export any amount (to India) since 1977.

Advantages and Perils of the Levels of Cashew Exports for Guinea-Bissau. While the contribution of cashew exports to Guinea-Bissau's foreign exchange earnings and fiscal revenue is significant, this situation has a potentially serious downside to it. The nation is dependent on this one commodity for approximately

[1]Hong Kong and Singapore are assumed to be transhipment points for raw cashew nuts grown in Asia.

one-third its foreign exchange earnings.[2] Also, as demonstrated above, the national government depends on this source of income for a significant amount of its budgetary revenue and its foreign debt servicing needs.

The danger is that cashew kernels may have a relatively inelastic demand in the importing nations (implying substantial changes in price for relatively small changes in supply), its international production and supply cannot be controlled (as can such products as petroleum), and it is a perishable commodity. Furthermore, neither the Government or the private sector in Guinea-Bissau has any control or influence over important international aspects related to the commodity and derived income, such as international trends in volumes and prices, market share, bargaining power, and prices received. A further decline in the international price, coupled with the inefficiencies of national production and marketing methods used can severely undermine the competitive position of this crop, and therefore its capacity to generate the needed foreign exchange and fiscal revenues.

Considered from a positive point of view, the country's cashew exports represent, in cashew kernel terms, a very small share of the international market. Such a small participation may allow the country to increase its level of production and export of cashew kernels (from its present level of zero) without materially affecting international cashew prices. Thus, GB may be in a position to take advantage of its small share since by increasing it somewhat, the nation could benefit without necessarily inducing an offsetting change in international market prices.

At present, however, all cashew nuts exported from Guinea-Bissau are in the raw nut form. This implies that the market for Guinea-Bissauan cashew nuts is somewhat more restricted than might be assumed by references to the international market for cashew kernels. In fact, most Guinea-Bissauan cashew nuts are sold on one market--the Indian market. This could place Guinea-Bissauans in a poor bargaining position should other sources of raw cashew nuts come into the market.

The situation can also be approached in a positive way. Figures in Tables IV-4, VII-2, and VII-3 imply that the share of India's imports of raw cashew nuts supplied by Guinea-Bissau has increased substantially during the 1980s. The increase was from a two-year average of 13% in 1984 and 1985 to a two-year average of 30% in 1987 and 1988. These calculations depend on the assumption that all Guinea-Bissauan exports go to India. If Guinea-Bissau is supplying such a substantial proportion of Indian imports, it may have achieved a substantial amount of negotiating strength with which to bargain directly and on more equal terms with the Indian buyers. This implies the need to develop a better understanding of the Indian cashew market and to begin developing alternative markets for cashew nuts from Guinea-Bissau.

Given the current size of the nation's investment in cashew production and marketing, as well as its fiscal importance to the nation, some programmatic attention to increasing the efficiency of cashew production and marketing appears

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[2]Fishing licenses fees were adjusted in 1990 and will generate US$14.2 Million vs. less than US$ 3.0 in 1987.

to be called for. Increased efficiency implies an enhanced ability to compete in the international market place. Also, close monitoring of the international market is warranted, so that perceived negative trends can be adjusted for, if feasible.

Cashew Kernels

Production and Exports. Until 1965, when other producers slowly began to supply cashew kernels, India was in a near monopolistic situation as a supplier of cashew kernels. Today, production of cashew kernels is also limited to the same five major producing countries mentioned earlier, and the shifts in export levels of kernels and market shares follow a similar pattern to those described for the raw nuts.

As shown in Table VII-4, after reaching a peak of 100,000 tons in 1973, world exports of cashew kernels have steadily declined and were barely above 50,000 in 1988. As a result of decreased raw cashew supplies from Africa, and increased internal consumption, India's exports levels have been reduced by roughly 50% from 60,000 to 30,000 tons between 1972 and 1988. Both Mozambique and Tanzania have seen their exports decline to about 25% of the 1972 levels. Of the African kernel producers, only Kenya has shown a positive trend in exports, increasing the 1972 levels from 168 to over 2,000 tons by 1986. While the annual percent rise of Kenya's trend is significant, the amounts are too small to make a major impact in the world wide supply of cashew kernels (4.5% in 1987).

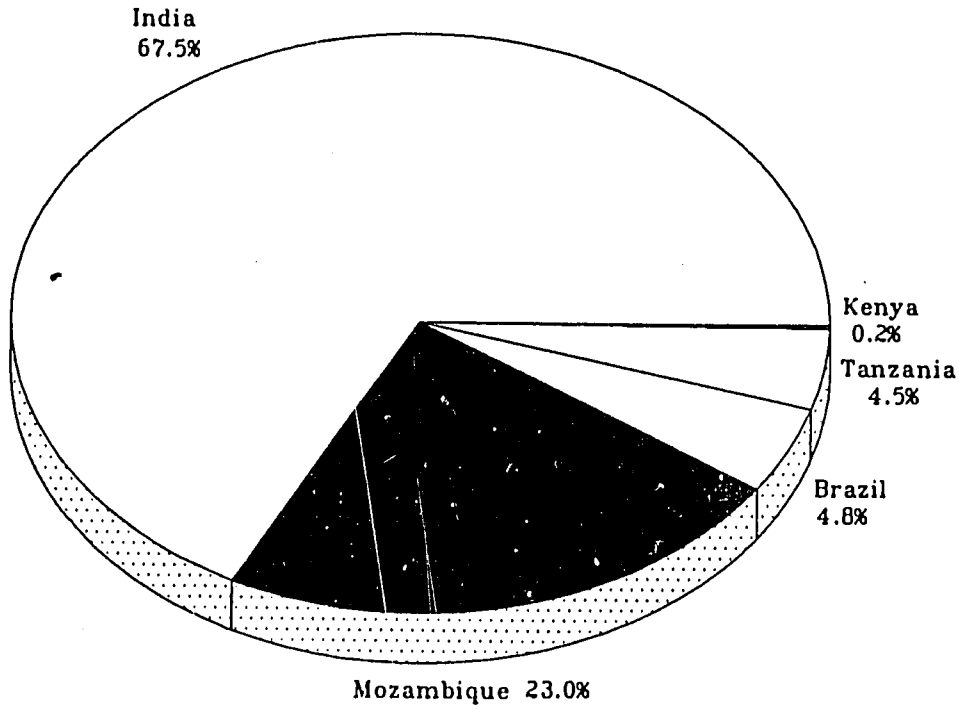
Brazil is the only major producer and exporter of cashew kernels which has been able to take advantage of the negative export trends being experienced by India, Mozambique, and Tanzania. Since 1972, its export level of 4,000 tons has increased by nearly 400% (22% per year) to 21,000 tons by 1988. This significant shift in market share is shown in Figure VII-2. While India still commands 60% of the market, Brazil has managed to increase its share from less than 5 to over 30% between 1972 and 1986, nearly all at the expense of Mozambique and Tanzania. If India's negative export trend continues, Brazil is likely to overcome India as the leading cashew kernel exporter within the next decade.

Imports. Cashew kernels are imported in sealed tins containing 25 pounds of cashew kernels. Two of these tins are shipped together in a single carton. Cashew kernels are graded according to size and quality condition. The most common grading method used is the "American Standard" which is followed by most exporting countries. The specifications are contained in Annex 9. Once cashew kernels arrive at the destination, say the U.S., they are stored in cold storage warehouses until sold to processors who roast or otherwise treat the kernels (salting, smoking, etc) and pack them for retail as a straight snack item, or in combination with other nuts. They also used as an ingredient in the preparation of confectionery, and baking products.

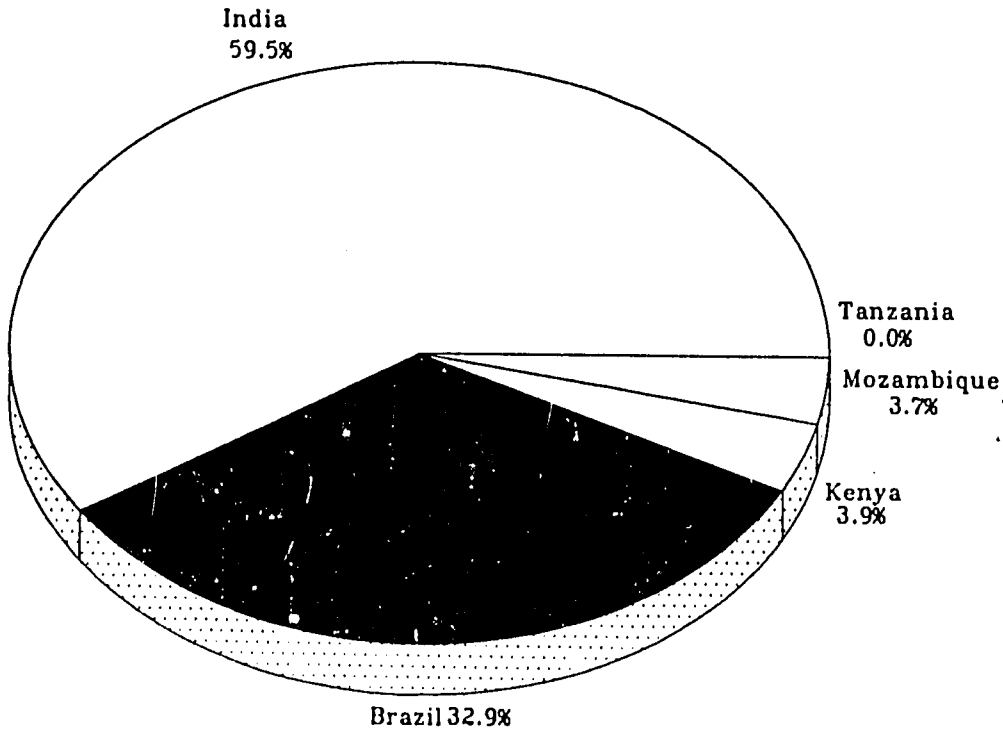
Table VII-5 contains the import levels and trends of major cashew kernel consumers. It is estimated that these countries account for no less than 90% of the world's cashew kernel trade. Imports reached nearly 100,000 mt in the early seventies. Since that period, the level of imports has dropped, with sporadic surges in demand, by 40% to just under 60,000 mt.

FIGURE VII-2
SHARE OF EXPORTS OF CASHEW KERNELS - MAJOR PRODUCERS

1972 - MT



1986 - MT



Source: Table VII-4

TABLE VII-4

EXPORTS OF CASHEW KERNELS - MAJOR PRODUCERS

(mt)

Year	India	Kenya	Mozambique	Tanzania	Brazil	Total
1947	16,906	0	244	0	0	17,150
1950	22,424	0	34	0	0	22,458
1955	31,452	0	1,014	0	0	32,466
1960	39,436	152	1,355	35	600	41,578
1965	53,793	196	4,069	48	724	58,830
1971	54,074	143	14,767	2,853	6,499	78,336
1972	59,985	168	20,438	3,977	4,286	88,854
1973	64,542	116	26,751	2,901	7,169	101,479
1974	57,062	227	29,560	3,710	5,980	96,539
1975	57,976	96	24,350	4,060	7,608	94,090
1976	59,174	170	21,195	4,000	11,421	95,960
1977	55,940	1,613	21,122	6,084	9,359	94,118
1978	40,051	3,046	17,025	3,890	7,430	71,442
1979	23,981	1,680	18,300	3,695	10,922	58,578
1980	37,412	2,693	17,100	3,887	11,898	72,990
1981	36,856	1,781	15,600	3,463	14,501	72,201
1982	29,449	1,856	12,233	5,621	15,528	64,687
1983	31,787	1,597	4,300	2,118	17,254	57,056
1984	31,142	2,640	2,938	1,753	14,770	53,243
1985	31,608	1,916	2,511	743	24,977	61,755
1986	37,395	2,474	2,307	0	20,709	62,885
1987	38,600	2,716	5,300	0	14,000	60,616
1988	31,892	1/	1/	932	21,000	53,824

Source: 1947-1965; Indian Journal of Agricultural Economics, Volume XXXVII, No.3, p.319.
1970-1988; Gill & Duffus Edible Nut Statistics, May 1989

Notes: 1/ Blank cells means no data is available

The composition of the import market for cashew kernels has also shifted. During the 70's the market was segmented into three major markets, namely the United States (about 50%), the Soviet Union (about 30%), and the rest (Europe, Canada, Australia, and Japan; about 20%). Since then, the market has shifted to just two markets, namely the United States (about 50%) and the rest.

The imports into the Soviet Union were curtailed drastically in 1983, and have since remained well below historical levels. Unlike the U.S. market, the demand for cashew kernels in the U.S.S.R. has neither been price responsive nor income

elastic.[3] Instead, the Soviet Union has imported cashews from India under bilateral agreements which allowed it to take advantage of the Indian Rupee/US$ switch whereby they purchase the cashews in discounted Rupees and sell then in US$ to obtain the foreign exchange.[4]

TABLE VII-5

IMPORTS OF CASHEW KERNELS - MAJOR CONSUMERS

(mt)

Year	Australia	Belgium	Canada	France	West Germany	Japan	Nether-lands	New Zealand	Sweden	United Kingdom	U.S.A.	Soviet Union	Total
1970	1,739	224	2,787	800	1,817	1,311	1,156	212	179	1,573	42,943	20,000	74,741
1971	2,339	280	5,778	959	2,105	1,735	1,679	171	163	2,305	44,229	16,500	78,243
1972	2,852	323	7,678	1,059	2,479	2,370	2,094	326	232	3,157	48,443	27,400	98,413
1973	2,364	391	6,703	1,164	3,004	3,289	2,616	254	197	3,420	49,003	25,600	98,005
1974	3,448	335	5,710	647	2,261	2,332	2,441	582	215	3,373	39,860	32,800	94,004
1975	3,576	393	4,865	835	2,703	4,323	3,198	438	165	2,303	42,998	30,029	95,826
1976	3,027	377	6,583	1,028	2,986	6,559	3,197	593	156	4,130	49,257	17,000	94,893
1977	2,901	325	4,475	760	2,595	4,634	2,809	293	125	2,745	34,128	18,895	74,685
1978	3,452	438	4,077	766	2,239	3,885	2,967	294	90	2,499	31,102	8,775	60,584
1979	2,511	601	3,896	1,016	3,177	4,548	2,681	304	154	2,591	33,878	13,146	68,503
1980	2,284	400	3,276	765	3,121	2,786	3,509	395	95	2,368	29,578	21,108	69,685
1981	2,754	259	2,485	612	2,404	2,198	2,733	390	58	2,289	27,601	23,281	67,064
1982	2,071	377	2,236	622	2,863	2,130	2,998	353	57	3,258	35,571	18,060	70,596
1983	2,634	432	3,231	620	3,363	2,954	2,550	333	45	3,040	43,162	867	63,231
1984	3,554	387	3,378	672	1,884	2,394	2,245	489	48	2,766	37,573	108	55,498
1985	2,685	401	3,244	778	3,022	2,348	2,382	364	34	2,756	47,982	4,600	70,596
1986	2,693	361	3,083	877	3,302	3,410	2,275	346	45	3,279	43,445	4,076	67,192
1987	2,073	271	2,753	851	2,825	2,736	2,474	372	57	3,650	40,661	4,893	63,616
1988	2,038	370	3,299	1,176	3,380	3,718	2,883	324	65	4,212	37,780	3,212 1/	62,457

Source: Gill & Duffus; Edible Nut Statistics, May 1989; Edible Nut Market Report, No. 130, December 1989
Edible Nut Market Report, No. 122, June 1986

Notes: 1/ 1988 import number for Soviet Union obtained from India Exports, Export Statistics, India Cashew Journal, p.24.

Cashew Price and Volume Relationships

Like any other traded commodity, cashew nut prices and volumes (ultimately volumes of raw cashew nuts) are interlinked through the nature of supply (production and carry-over) and demand, and specific product characteristics (quality). Other externalities affecting these basic variables include internal policies of producing and consuming countries, and trade relationships and conditions.

[3]Sandhu, p.303.

[4]Gill & Duffus, Edible Nut Market Report No.130, December 1989.

Cashew Price.[5] During the last decade, cashew prices have been extremely unstable with high intra- and inter-annual price fluctuations. As shown in Figure VII-3, monthly prices have shown rapid movements, leading to pronounced intra-annual price variations. For example, between January and August 1982, prices dropped by 54% from US$3.04/lb. to US$1.38/lb. Prices have risen by as much as 77% within less than one year, from 1.81 US$/lb. in March 1985 to 3.21 US$/lb. in December.

Inter-year price fluctuations have been equally pronounced. From a high of US$3.30/lb. in May of 1981, the price for W320 dropped to a low of US$1.38/lb. in August of 1982, a 58% drop, and rose by 93% to US$2.66/lb. by November 1983. By March of 1985 the price had dropped by 32% to US$1.94/lb. By December 1986, the cashew price had recovered and reached an all time high of US$3.41/lb. Since then, the price has continuously dropped, reaching US$2.50/lb. in May of 1989, and US$2.22/lb. in October. By December of 1989 prices had moved marginally higher with 320's trading at US$2.24/lb.[6]

Price-Volume Relationships. Figure VII-3 also summarizes the world production of raw cashew nuts for the crop years 1979/80 through 1989/90. As with prices, production has fluctuated considerably from one year to the next, as well as over the years. World production for 1989/90 (389,000 long tons) was only 3.9% higher than the 1980/81 crop (374,500 long tons) and well below the record production of 510,000 long tons achieved in 1974/75 (see Table VII-1).

As Figure VII-3 would suggest, a lagged multi-year relationship seems to exist between world prices for cashew kernels prices and world production of raw cashew nuts. Price declines have followed production increases, followed by price increases as supplies diminish over time. The fall in prices after May 1981 was preceded by increased production levels in the preceding years. As supplies tightened, prices started recovering in January of 1983, and continued to increase until the end of the year. Improved supply conditions in 1983 and 1984 put downward pressures on prices throughout 1984 an early 1985. Production levels did not recover to the 1980 levels and production declined in 1986 and 1987, putting additional upward pressure on cashew prices, which climbed to record levels in late 1986 and early 1987. At those price levels, demand began to stagnate, while producers, still reacting to the high prices of 1986 and 1987 continued to respond with increased production levels. Prices began a steady decline in early 1987 which has continued unabated through 1989. With record crops being forecast for the 1990/91 crop year it is unlikely that cashew prices will recover in the near future.

No doubt, the reasons for these volatile monthly and inter-year price fluctuations and their relationships to cashew nut demand and supply (therefore production of raw nuts) are much more complicated than the simple price-volume relationship previously described. Since no studies analyzing these

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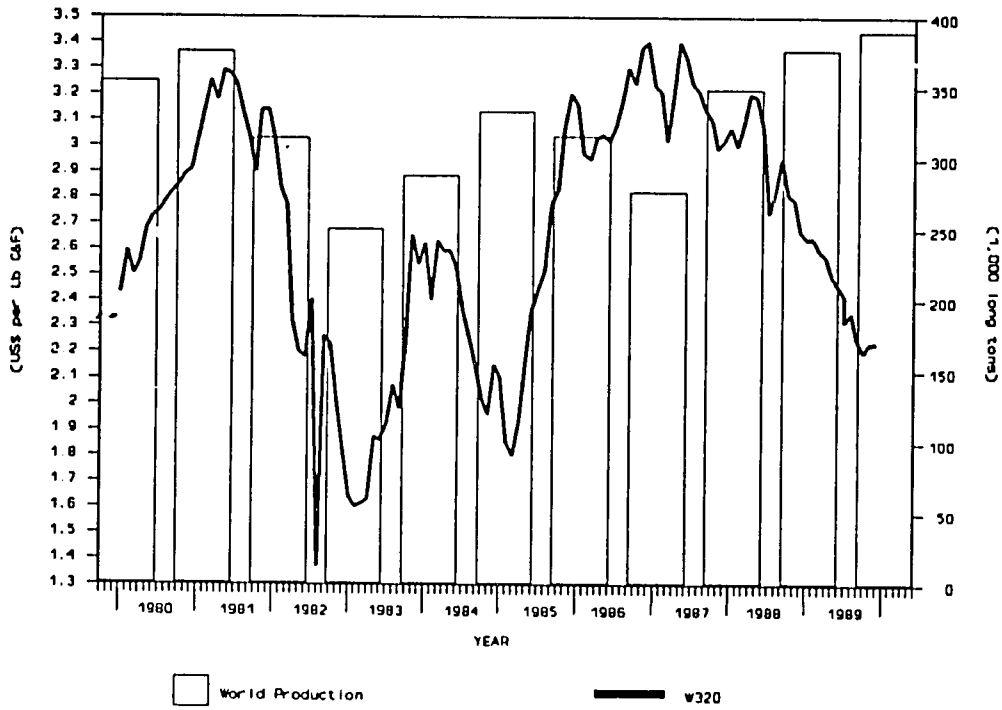
[5]Cashew price is based on US$ per lb., cost and freight in Europe for Count Whole 320, that is 320 whole kernels per pound.

[6]Gill & Duffus, Edible Nut Market Report No.130, December 1989.

FIGURE VII-3

WORLD PRODUCTION OF RAW CASHEW NUTS AND W320 PRICES



Source: Annex VII; Table VII-1

relationships were found, nor a study undertaken by the authors due to lack of time and data, all the inferences and reasons given below for these relationships are qualitative in nature. Nevertheless, the reasons given for these relationships and their potential implications should be taken into consideration as policy decisions are taken that impact on cashew production, marketing and trade in Guinea-Bissau.

General reason:

Commodity characteristics - cashew kernels is an expensive snack item and ingredient for confectionery and baking products in importing countries, making its demand, utilization, and consumption sensitive to price fluctuations.

Reasons for monthly intra-year price-volume fluctuations:

1. Other and sometimes less expensive substitutes (peanuts, walnuts, almonds, Brazil nuts, hazelnuts, macadamia, pistachios) compete head-on with cashew kernels. Producers of mixed nut snack products will readily use these substitutes depending on their relative prices.

2. Speculative positions taken by exporters, brokers, agents, importers, salters, and other processors will create temporary short or long stock positions in the world market.

3. At least 50% of the cashew kernels traded internationally are consumed in the U.S.A. A small percentage change in volume traded in that market will have a direct and immediate effect on world price levels.

4. Seasonal demand for cashews such as the Christmas and Easter season create temporary peak demand for the commodity.

5. Some of the nations that import cashew kernels from the major producers are acting as intermediate agents, exporting the same or a reconfigured product to other countries.

Reasons for inter-year price-volume fluctuations:

1. Farm level prices for raw cashew nuts is a derived price signal from cashew kernel prices in the international market. It takes time for these price signals to channel back to farm levels in the producing countries.

2. Production of raw cashew nuts cannot be adjusted "instantaneously", needing one or more seasons to rehabilitate existing plantations and bring new ones into production.

3. Cashew production is also undertaken for the apple and its sub-products. Since the internal value of the apple and its by-products can be greater to producers than the nut, national production could be more responsive to changes in local markets than to the changes in demand for raw cashew nuts.

4. Cashew production and exports of cashew kernels are concentrated in the hands of four major producers and exporters, making total world supply very sensitive to the internal policies and political conditions in these countries as well as to the weather and disease.

5. No visible production and trade coordination exists among the major producers and exporters which would permit them to act as a cartel and exert more control on supplies and prices.

6. One production cycle per calendar year and the perishability of the commodity makes storage and carry-over very expensive. Therefore, stocks are carried more in the kernel stage rather than the raw nut.

Cashew Nut Shell Liquid

The cashew nut contains a phenolic material known as the Cashew Nut Shell Liquid (CNSL) which contains about 90% anacardic acid (Muturi). CNSL represents between 20 and 25% of the weight of the nut. The extraction rate depends of which extraction method is utilized, namely "hot-oil bath", expeller, or liquid extraction, and may range from 200 kg of CNSL per ton of raw cashew nuts

(Ascenso). The hot-oil bath process has the advantage of being the roasting part of the nut processing cycle. However, if not properly controlled, the cashew kernels can be burned, thus losing quality. The expeller and liquid extraction processes are additional steps, requiring a high and steady volume of cashew nut shells to be economically feasible.

The CNSL is processed into resins for one major industrial application, namely as a friction modifying material for break linings (Wilson). Other applications include uses in paint varnish products, laminated products, moldings, foundry core oil or resins, and rubber compounding. The main factors affecting the utilization of CNSL are its dark color, variable quality, and high extraction cost (Murthy, Sivasamban). The main competitor of cashew resins are synthetic phenolic resins, which perform better at high temperatures (Wilson), and are readily available.

The main exporters of CNSL are the four major cashew producers, namely India, Brazil, Mozambique and Tanzania. The information contained in Table VII-6 is very incomplete, however if cashew production trends are indicative of CNSL production, it is reasonable to assume that today India and Brazil are the two most important suppliers of this industrial material. Apparent import statistics through 1972 indicate that the U.S.A. absorbs 50% of the exports, Britain and Japan roughly 20% each, and the rest of the industrialized nations the remainder. The major U.S. importer of CNSL is Palmer International of Worcester, Pennsylvania.

It has been very difficult to obtain information on volumes and prices for CNSL. The team will continue its efforts in this regard to attempt to fill in the picture prior to publishing the final report.

TABLE VII-6

EXPORT OF CASHEW NUT SHELL LIQUID

(mt)

Year	India	Mozambique	Tanzania	Brazil	Total
1962	7,400	1,400	0	800	9,600
1963	9,400	1,000	0	800	11,200
1964	14,400	1,300	0	1,500	17,100
1965	12,200	1,200	0	800	14,200
1966	13,300	2,100	0	1,600	17,000
1967	9,400	3,700	600	1,600	15,400
1968	10,400	6,900	300	3,700	21,300
1969	8,600	7,400	1,000	3,700	20,800
1970	6,900	5,000	700	4,800	17,400
1971	5,500	11,500	600	6,500	24,200
1972	5,000	12,200	400	7,300	24,800
1973					
1974					
1975	5,207				
1976	6,024				
1978	2,966				
1979	5,001				
1980	11,441				
1981	10,699				
1982					
1983					
1984					
1985					
1986					
1987	5,485				
1988	3,130				
1989					

Source: 1962-1972; The Market for Cashew-nut Kernels and Cashew-nut Shell Liquid, Tropical Products Institute, 56/62 Gray's Inn Road, London WC1X 8LU, April 1975, p. 59.
1975-1980; India data; Indian Journal of Agricultural Economics, Vol.XXXVII, No.3, p.320.

1987-1988; India data; India Exports, Export Statistics, India-Cashew Journal, Vol.?, No.?, p.24.

SECTION VIII

CONCLUSIONS AND RECOMMENDATIONS

This first survey of the cashew sub-sector in Guinea-Bissau has demonstrated that the cashew industry has a vital role to play in the generation of rural incomes, foreign exchange, and public revenue. The annual cashew harvest is probably the nation's largest source of farm-level cash revenue. The juice from the cashew apple provides approximately twice the amount of revenue at the farm level than does the cashew nuts. Revenues from the harvest and sale of cashew juice and the local sale of decorticated cashew kernels provide an important component of the annual incomes of certain women since this work is largely done by women. Cashew exports represent more than 50% of the foreign exchange generated by exports. These foreign exchange earnings are vital for servicing the nation's external debt, amounting to 59% of the amount needed in 1990.

The importance of this crop is, however not being supported by commensurate research and extension programs to establish optimally managed cashew plantations. No apparent emphasis or balance seems to exist between production for internal marketing verses international trade of cashew products. A reliable information base for policy analysis and formulation is not available. The high dependency of the country on this commodity for the generation of foreign exchange earnings and public revenue makes the nation vulnerable to seasonal and inter-seasonal international price variations.

The marketing of cashew nuts, from producer to Bissau merchant, appears to be evolving into an increasingly efficient system under the pressure of increased competition. Competition among merchants for the cashew nuts appears to be resulting in the merchants offering the maximum price possible to producers. One explanation of this observation is that the most efficient merchants can offer the highest prices and continue to make an attractive rate of return on their investment. This tends to insure that the internal marketing of the crop is handled by the most efficient firms. Under such conditions, it is expected that merchants will earn only a reasonable rate of return on their investments and efforts. Also, under such conditions, the export tax on cashew nuts takes on increased significance as to its effect on resource allocation--the uses to which producers and merchants invest their resources and efforts.

While the export tax on cashew nuts is an important source of government revenue and foreign exchange, it may reduce the competitiveness of Guinea-Bissauan cashew nuts and distort the allocation of national resources.

Certainly, the export tax on cashew nuts reduces the profitability of cashew exportation enterprises and thus encourages merchants to shift their efforts to other products or enterprises which are not taxed. This unequal application of taxation could result in a reduction of the nation's capability to produce cashew nuts for the wrong reason.

Compared to other nations, GB may be an efficient producer of cashew nuts; yet, the export tax could destroy this comparative advantage and place Guinea-Bissauan cashew nut producers and merchants at a comparative disadvantage to producers and merchants in other countries. This will force the private sector to shift to

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other products and investments. The problem is not so acute when international prices are relatively high when compared to costs. However, the pressure to shift to other enterprises is felt much sooner, in the presence of the unequal application of the tax, when prices are being driven closer to actual costs by increased production in competing countries.

Additionally, the unequal application of the tax places the nation in a less-than-desirable position of relying on one commodity for a significant proportion of its tax revenue. Efforts to reduce the impact of this tax include a reduction in the tax and a revolving loan fund to assist exporters during periods of relatively low international prices.

International cashew nuts prices are quite variable. There appears to be some cyclical pattern to these prices. At present, prices appear to be nearing the lower limit of this "cycle." A portion of the cyclical pattern may be explained by the reaction of producers to prices. Relatively high prices encourages increased plantings of cashew trees. Three years later the increased production from these new trees may tend to drive down international prices, causing some plantations or marketing efforts to be abandoned, reducing quantities on the international market and again putting upward pressure on prices.

The major events in the international market include:

1. the emergence of Brazil as a major producer of cashew nuts and major supplier of cashew kernels,

2. the reduction in the quantities of cashew nuts and kernels supplied by such East African countries as Mozambique and Tanzania, and

3. the increase in the proportion of cashew nut imports into India being imported from Guinea-Bissau.

If Guinea-Bissau is going to increase its international market share in raw cashews and penetrate the cashew kernel market successfully it will have to adopt measures that will lead to (1) improved production technologies and national marketing activities resulting in competitive (lower) f.o.b. prices for raw cashew nuts, (2) improved processing technologies and international trade activities to minimize the domestic price of processed cashews, and (3) minimize export disincentives in terms of taxes, export duties, and access to foreign exchange earnings. The following set of recommendations are aimed to assist the country in bringing about these beneficial changes.

Recommendations Related to Production

- Appraise current government efforts (staff, budget, programs, and plans) in research and extension, related to cashew production, and develop an appropriate plan to develop staff and a set of research and extension activities commensurate with the importance of the crop.

- Consider sending research and extension staff to India or Brazil for training and observation of cashew research and extension programs.

- Obtain and make available international publications reporting cashew production and utilization research in other countries. The abstracts listed in Annexes 4, 5, and 6 provide a basis for starting the search for such material.

- Develop plantation management recommendations based on soil types and water availability and make these recommendations available to growers.

- Institute a plant health monitoring system, coupled with recommended health management practices.

Recommendations related to National Marketing and International Trade

- Eliminate the practice of fixing purchase prices for raw cashew nuts by the GOGB.

- Investigate the possibility of grading (quality/size/moisture content) cashew nuts prior to sale at farm and/or international levels.

- Consider establishing a bonded warehouse system where farmers or other merchants could store nuts while retaining ownership until sale to international buyers.

- Consider allowing international buyers or others to purchase warehouse receipts (from bonded warehouse) in competition with local merchants.

- Continue the efforts to reduce the distorting effect of the cashew export tax. This could include the application of a reduced, but uniform export tax on all exports. Alternatively, the export tax could be applied in a variable fashion in which the tax would be reduced in concert with reductions in export profits caused by reductions in the international price of cashew nuts. Analysis of the impact of export tax levels on volume and revenue should be undertaken.

- The spreadsheet model for analysis of profitability of a cashew exporting enterprise should be fine-tuned and used for further policy and marketing analysis. Government officials, INEP staff, and private sector representatives should be trained in its use and application. Government officials and private sector representatives can use the model to estimate partially the impact costs over which the government has influence have on the profitability of cashew exporting enterprises. Costs over which the government has influence include transportation costs (through the provision of roads, ferries, and bridges), taxes, port fees, and bank charges.

- The internal value of the cashew apple and kernel should be fully assessed, and its significance to production incentives for local rather than export oriented production fully understood.

- Consideration should be given to the improvement or introduction of appropriate village-level processing technologies for apple juice extraction and cashew nut decortication. Annex 14 contains an example of a simple village-level nut sheller.

- Regular surveys and reports on internal marketing (volumes and prices) of apples, juice, wine, canna, and kernels should be generated as soon as feasible.

- The use of second-hand plastic containers for the storage of cashew juice and wine may pose a significant health hazard. This practice should be analyzed, monitored and appropriate action taken.

- Obtain and make available (through a library at the Central Bank, for example) international publications reporting prices, crop conditions in other countries, and market outlook reports. The publications of the World Bank, those of Gill & Duffus, and the Cashew News Teller are examples of the type of publications envisioned.

- Producers, merchants, and government officials should become more familiar with all markets for cashew products. This may include sending delegations to India, Brazil, and other African countries so that the individuals and practices of present and potential markets can be understood and evaluated.

ANNEX 1

SCOPE OF WORK

Scope of Work

The contractor shall provide a study including but not limited to the following:

1. Description of characteristics and analysis of recent trends in cashew nut production and export from Guinea-Bissau.

2. Description and analysis of the marketing system for unprocessed cashew nuts and related by-products in the country to include: identification and description of seasonality, marketing channels, participants, volumes, storage, handling, and processing infrastructure, transportation methods, and identifiable constraints. Specific attention will be directed to describing the relationship between the cashew nut, the fruit, and the people (especially women) involved in their harvest and processing.

3. Contingent upon data availability and quality, carry out a conduct and performance analysis of the cashew marketing system to include: price and margins at identifiable stages in the marketing channel, price discovery mechanisms, barriers to entry, etc.

4. Description and analysis of the cashew production system, including estimates of the average yield per hectare of nuts, and recommendations for yield improvement.

5. Contingent upon data availability, analyze recent and current GOGB policies, intervention strategies and programs and their impact on cashew nut and fruit production and marketing.

6. Work jointly with a representative of INEP to obtain the data, including field observation, interview responses, and published data, to accomplish the scope of work.

7. The following tasks will be accomplished at Kansas State University:

   a. Review of recent trends of prices and volumes of unprocessed cashew nuts on a world-wide market basis. Analysis of international origins and destinations for cashews.

   b. Preparation of the final report.

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ANNEX 2

MODEL OF CASHEW NUT EXPORTATION ENTERPRISE

DISCUSSION OF THE MODEL

CASHEW EXPORTATION ENTERPRISE

It is important to discuss selected assumptions used in the model presented in Table IV-1 to facilitate its understanding, critique, and use.

Barter Exchange Rate, Interest Rate, Rice, and the Cost of Cashew

Among the assumptions listed in the first section of the model, the variable most directly under the control of the private merchants is the barter exchange rate. Since 70 to 80 percent of the cashew nuts are purchased through barter transactions, the barter exchange rate sets the price of cashew nuts relative to rice. Further, since a major portion of the rice used in the barter transactions is imported rice, one can estimate the monetary price of cashew with reference to the price of rice (c.i.f. Bissau) and the cost of transferring this rice into the countryside where the barter transactions take place. This cost, the cost of imported rice at the village level, is developed in the second section of Table IV-1 following the assumptions section. The development of this cost will be discussed below after some additional discussion of the barter exchange rate.

Once the cost of the rice is known, it is multiplied by the barter exchange rate to obtain the cost (or price paid) of the cashew nuts at the village level. For example, if the barter exchange rate were one kilogram of rice for two kilograms of cashew nuts, the cost of the cashew nuts would be one-half the cost of the rice. Thus, the cost of the cashew nuts are determined by multiplying the cost of the rice by the barter exchange rate, 0.5, in this case. In the version of the model presented in Table IV-1, the barter exchange rate is "1 for 1.1" or 0.90. Given the assumptions shown in Table IV-1, if the barter exchange rate were changed to "one for one," the gross profit becomes negative.

The price of rice used was that reported by the National Bank as the price at which rice was purchased by the merchants during the months just prior to the beginning of the cashew purchasing season. The price of cashew nuts used was that reported by various merchants during the study period. The rate of exchange between Peso and the Dollar was the official exchange rate during the study period. The export tax of 28 percent was often quoted as 35 percent. In actuality, the 35 percent rate is a combination of three taxes, including the export tax of 28 percent, which sum to 35 percent. This summation process can be seen at item C8 in the Table.

Another important assumption of the analysis is the rate of interest. The inflation-adjusted or real rate of interest used in the model is 14 percent, which reflects the rate charged by the local bank to the cashew merchants requiring funds to conduct this business. The rate reported by interviewees ranged from 45 to 53 percent. Inflation was expected to range between 25 and 36 percent for the year 1990. Subtracting a rate of inflation of 36% from a nominal bank rate of 50% yields the 14% rate used.

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Assumptions in Section Two of the Model

Consider, now the assumptions underlying the development of the cost of imported rice at the village-level. Item R2, for example, adds 18 percent to the c.i.f. price of imported rice as the cost of transferring the rice from the ship to a warehouse in Bissau. The 18 percent derives from discussions with various merchants. Some report the cost at 100,000 GP to 111,000 GP per ton. Others report costs between 175,000 GP and 500,000 GP per ton. The public enterprise, Armazens do Povo, provided figures which are reported in Lea, Hugo, and Ribeiro, pp. 139-140, which show that this expense amounts to 30 percent of the c.i.f. value of rice. Since the intent here is to model an efficient, private sector enterprise, the 18 percent figure has been used. Clearly, this biases the analysis toward a finding of profitability.

Item R3 is also based on figures given to the study team by merchants during interviews. However, it is important to point out that the model assumes that the warehouse can be rented only when needed--in this case, only during the four months the rice is stored in Bissau. This is somewhat unrealistic, since most merchants either own their warehouses or are required to rent them for longer periods of time. By not accounting for the longer-term expenses of either owning or renting warehouse space, the model is again biased toward profitability. Similar comments can generally be made of the other resources used in the model.

Truck Rental. The rental charge used in Item R4 is based on merchants figures of 350,000 GP for a two-way trip of 100 km. This figure compares favorably with those reported in Lea, Hugo, and Ribiero, p. 37. This figure is conservative in comparison to the 507,600 GP for a 100 km trip quoted by Rodofluvial, the public transportation company.

Truck Loading and Unloading Charges. The reported cost of manually loading a ten-ton truck varied widely from 25,000 GP to 80,000 GP, with the least expensive price being based on permanently hired labor as follows. Such laborers earn a salary of 70,000 GP per month plus a 50 kg sack of rice worth approximately 50,000 GP for a total of 120,000 GP per month or 6,000 GP per day. Eight of these men can load and unload 3, ten-ton trucks per day for a cost of 16,000 GP per truck if they work continuously as they would if working at a warehouse in Bissau. Accordingly, the 16,000 GP figure is used in Item C6 which deals with the transfer of cashew between warehouse and port. However, if the men were sent on a delivery out of Bissau (as applies in Items R4 and C3), they may only be able to load and unload one truck per day. Thus, the charge would be 48,000 GP per truck. If the loading and unloading operation is done through contract, the prices quoted for a ten-ton truck (in Bissau) ranged from 45,000 GP to 50,000 GP.

The cost associated with Item R5 is based on the interest rate and the assumption that the money used in the cashew "campagne" would be invested for eight months. The rice used must be imported by February to commence the campagne in late February and early March. The receipt of the payment for the exported cashew nuts probably does not occur before the end of the season in September.

Assumptions in Section Three of the Model

Consider now, the costs of purchasing the nuts at the farm level and exporting them through the Port of Bissau. Item C2 attempts to account for the practice of purchasing some of the nuts through established shops or "delegations" as opposed to the practice of purchasing directly from the producers. No data was collected on the actual percentage of total purchases purchased according to these two practices. It is assumed in Item C2 that the percentage for both methods is 50 percent. This may be conservative since the direct method was used predominately in the major producing areas where one would expect the major percentage of the nuts to be purchased. The margin allowed for the assembly process, 50 GP per kg, is based on the practice of Armazens do Povo to allow intermediary merchants 50 GP per kilogram on the cashew nuts the intermediaries sell to Armazens do Povo. For example, if the farm level price is 450 GP/kg, Armazens do Povo will normally purchase nuts at 500 GP/kg from intermediary merchants. To calculate the figure used in the model, 25 GP/kg, one multiplies the 50 GP/kg margin by the percentage of total purchases purchased through intermediaries, i.e., 50 percent.

Shrinkage or the loss of cashew nut weight during storage due to the loss of moisture through drying is an important expense. This expense is addressed in Item C5. Quotations of the percent lost during storage varied from 3 percent to 15 percent. The selection of 7 percent is based on the advice of a semi-retired merchant with many years experience in the business. His experience had been that one could expect a 7 percent lost over a three-month storage period. To calculate the figure used, one multiplies the percentage lost by the f.o.b. price in Pesos times one minus the tax rate (700 X 2100 X .07 X (1-.35)).

The remaining figures used in the model are either official figures (for taxes and port costs) or are adequately explained in Table IV-1.

Annex Table I displays selected entries in the electronic spreadsheet cells which define the model shown in Table IV-1. Only those cells containing formulae are displayed in Annex Table I.

ANNEX TABLE I

SELECTED CELL ENTRIES FROM ELECTRONIC SPREADSHEET MODEL
OF A HYPOTHETICAL CASHEW EXPORTATION ENTERPRISE

H7: +$F$5*F7
I7: (P0) [W6] +H7/$H$7
H11: +$H$126
I11: (P1) [W6] +H11/$H$7
H12: +$H$7-H11
I12: (P1) [W6] +H12/$H$7

F18: +$F$8
H18: +F18*F5
I18: (P1) [W6] +H18/$H$7
H20: 0.18*H18
I20: (P1) [W6] +H20/$H$7

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E27: @SUM(E24..E26)

E29: +E28*E27
H30: +E29/C23
I30: (P1) [W6] +H30/$H$7
H36: @SUM(F34..F35)/10
I36: (P1) [W6] +H36/$H$7
H38: @SUM(H18..H37)

I38: (P1) [W6] +H38/$H$7
F43: (P0) +$F$6
H44: +H38*(F43/12)*F42
I44: (P1) [W6] +H44/$H$7
H47: @SUM(H38..H46)
I47: (P1) [W6] +H47/$H$7

H51: +H47*$F$9
I51: (P1) [W6] +H51/$H$7
I55: (P1) [W6] +H55/$H$7
H61: @SUM(F59..F60)/10
I61: (P1) [W6] +H61/$H$7
H63: @SUM(H51..H62)

I63: (P1) [W6] +H63/$H$7
F67: +$F$7
H68: +F67*$F$5*F66*(1-$F$103)
I68: (P1) [W6] +H68/$H$7
E75: @SUM(E72..E74)
E77: +E76*E75

H78: +E77/C71
I78: (P1) [W6] +H78/$H$7
F86: +E84/3
H88: +F82+@SUM(F86..F87)/10
I88: (P1) [W6] +H88/$H$7
F92: +$F$7*0.003

H92: +F92*$F$5
I92: (P1) [W6] +H92/$H$7
H94: +F94*$F$5

H95: +F95*$F$5
H96: +F96*$F$5
D97: @SUM(H92..H96)

I97: (P1) [W6] +D97/$H$7
I99: (P1) [W6] +H99/$H$7
F100: (P0) +$F$10
F103: (P0) @SUM(F100..F102)
H103: +F103*$H$7
I103: (P1) [W6] +H103/$H$7
```

```
F108: +$H$55
F110: +$H$61
F111: +$H$88
F112: +$H$78
F113: +$D$97
F114: +$H$99

F115: @SUM(F108..F114)
F120: (P0) +$F$6
H121: +F115*(F120/12)*F119
I121: (P1) [W6] +H121/$H$7
H124: 0.0275*$H$7
I124: (P1) [W6] +H124/$H$7

H126: @SUM(H63..H125)
I126: (P1) [W6] +H126/$H$7
H128: +$H$7-H126
I128: (P1) [W6] +H128/$H$7
END
```

ANNEX 3

VOLUME AND VALUE OF EXPORTS FROM GUINEA-BISSAU

VOLUME OF EXPORTS

(Tons)

Product	1985	1986	1987	1988	1989
Agricultural Products					
Shelled peanuts	4,265	2,385	3,270	3,511	2,000
Oil palm kernels	2,527	7,550	6,850	4,236	5,145
Raw cashew nuts	6,622	5,995	10,441	9,918	9,409
Unprocessed cotton	130	407	535	50	875
Palm oil	111	85	50	69	5
Other products	18	500	1,093	97	156
Total Ag. products	13,673	16,922	22,239	17,880	17,589
Fisheries					
Frozen shrimps	620	176	83	173	177
Frozen fish	1,085	254	19	186	450
Other products			9	11	217
Total Fisheries	1,705	430	111	370	844
Forestry					
Sawed wood	871	1,787	787	911	471
Wood logs	740	2,015	4,020	3,079	2,248
Other products	70	141	170	57	186
Total Fisheries	1,681	3,943	4,977	4,047	2,906
Industrial					
Acetylene					18
Grand Total	17,059	21,295	27,327	22,297	21,357

Source: Anuario Estatistico 1987
Customs Office in Bissau
Central Bank

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ANNEX 4

CASHEW CITATIONS
FROM COMMONWEALTH AGRICULTURAL ABSTRACTS INTERNATIONAL

CAB International
Wallingford
Oxon DX10 8DE
United Kingdom

Telephone number: 44-491-0491-32111
FAX number: 44-491-0491-33508
TELEX number: 851847964 (COMAGG G)

CASHEWS

Citations from CAB Abstracts (Worldwide agricultural database)
Commonwealth Agriculture Bureau
Britain

3
AN ACCESSION NUMBER: 891873088. 9002.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR032-01286.
TI TITLE: Cashew nut research in the Tanzania Agricultural Research Organization.
AU AUTHORS: Lattre-M-de.
VARIANT AUTHORS: De.Lattre.M.
SO SOURCE: Management perspective for agricultural research (edited by Felton, E.L., Jr.; Hobbs, S.H., IV). ISNAR Training Series, International Service for National Agricultural Research, Netherlands, 1989, (No. 1), 194.206.
LG LANGUAGE: English (EN).
AB ABSTRACT: Cashew production in Tanzania fell from 145,000 t in 1974 to 30.000 t in 1982. This decline is attributed to two factors: (1) poor linkage between the Tanzanian Agricultural Research Organization (TARO) and the Cashew Nut Authority of Tanzania (CATA); and (2) shortage of staple food. forcing farmers to divert resources from cashew (a cash crop) to food crop production. The problem of institutional linkages is looked at in detail. While CATA's main preoccupation was the expansion of cashew production in the short.term. TARO researchers focused on long-term issues. The result was that the TARO research team produced interesting results and new knowledge, but these findings were not considered immediately relevant by CATA. This illustrates a case where the research function is isolated from the total system. thus having a minimum impact.
DE DESCRIPTORS: Cashews. research.institutes. planning. Tanzania. Handbooks. research. management.
YR YEAR: 1989.

4
AN ACCESSION NUMBER: 890358246. 9002.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. OC060-01486.
TI TITLE: Cashew nut shell liquid: a review of production and research in Kenya.
AU AUTHORS: Muturi.P. Arunga.R.O.
IN AUTHORS AFFILIATION: Kenya Industrial Research & Development Institute, PO Box 30650, Nairobi, Kenya.
SO SOURCE: Tropical Science, 1988, 28, (3), 201-218.
LG LANGUAGE: English (EN).
AB ABSTRACT: This paper presents a historical review of the cashew nut shell liquid (CNSL) in Kenya, and reports briefly on several experimental studies aimed at developing secondary commercial products from CNSL. Various methods of extracting the liquid (which contains about 90% anacardic acid) from the shell are reported, and formulations for coating materials (lacquers andpaint) based on CNSL are described. Physical and

performance characteristics similar to those of existing commercial products can be achieved.
DE DESCRIPTORS: Cashews. products. oils. production. Kenya. Phenolic-compounds. composition.
YR YEAR: 1988.

7
AN ACCESSION NUMBER: 890635682. 8912.
HC HARDCOPY:
Forestry Abstracts 1978 - RECORD NO. 0F050-07245.
Forest Products Abstracts 1978 - RECORD NO. 1F012-02315.
TI TITLE: Non-wood forest products in Thailand.
AU AUTHORS: Chuntanaparb-L. Ari-Aran_P. Hoamuangkaew-W.
SO SOURCE: 1985, ix + 180 pp.
PB PUBLISHER: Bangkok. Thailand; Food and Agriculture Organization of the United Nations
LG LANGUAGE: English (EN).
AB ABSTRACT: A report from the FAO Asia-Pacific Region trust fund project 'Special Study on forest Management, Afforestation and Utilization of Forest Resources in the Developing Regions' (GCP/RAS/106/JPN). which includes financial contributions from Japan. Available information on non-wood forest products in Thailand is classified and summarized. The 9 main classes of products described are: bamboos and grasses; rattan; cashews; orchids; tannins and dyes; medicinal plants; edible products; products from bees; and gums and resins. The information covers cultivation or production, management, the processing of products, and their uses, economics, marketing and potential.
DE DESCRIPTORS: Minor-forest-products. reviews. canes-and-rattans. transtuffs. dyes. beekeeping. gums. Thailand. bamboos. medicinal-plants. resins. Anacardium-occidentale. Edible-species.
YR YEAR: 1985.

8
AN ACCESSION NUMBER: 890631986. 8912.
HC HARDCOPY:
Forestry Abstracts 1978 - RECORD NO. 0F080 04119.
Herbage Abstracts RECORD NO. 0G059-03311.
TI TITLE: Role of woody perennials in animal agroforestry.
AU AUTHORS: Torres-F.
IN AUTHOR AFFILIATION: ICRAF. PO Box 30677. Nairobi, Kenya.
SO SOURCE: Professional education in agroforestry. proceedings of an international workshop, 5-10 December 1982. Nairobi, Kenya (edited by Zulberti, E.). 1987. 266-316.
PB PUBLISHER: Nairobi, Kenya; International Council for Research in Agroforestry (ICRAF).
LG LANGUAGE: English (EN).
AB ABSTRACT: A detailed literature review and bibliography of trees and shrubs (collectively termed 'trubs') in productive and 'service' roles in silvopastoral and agrosilvopastoral systems. Discussion of the productive role covers browsing systems (crude protein content and protein digestibility of many trees and shrubs are tabulated), forest grazing, and plantation grazing (in coconut, rubber and cashew plantations). Service

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roles considered are overstorey/understorey relationships. shelter, and living fences. The relatively low productivity and palatability of the foliage of most woody plants suggests a supplementary role as fodder. especially during dry seasons in arid and semiarid zones: here pod.bearing trees seem to have a greater potential for improving fodder production. The negative effect of trees onpasture production in forest andplantation grazing systems is more than compensated for by other products. Several species appear to have a particular potential for fostering pasture growth underneath. mainly through soil enrichment. The importance of considering both productive and service roles when choosing species is stressed.

DE DESCRIPTORS: bibliographies. Forest-influences. crops. Conferences. Professional.education.in.agroforestrv. silvopastoral.systems. trees. roles. shrubs. agrosilvopastoral.systems. Agroforestry. reviews.

YR YEAR: 1987.

9

AN ACCESSION NUMBER: 890357869. 8912.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C060-00689.

TI TITLE: Effect of method of potting and hardening on field establishment of rooted cuttings of cashew (Anacardium occidentale L.).

AU AUTHORS:Rao.M.B.N. Satyanarayana.G. Kumari.N.G. Padmanabham.V.

IN AUTHOR AFFILIATION: Department of Horticulture, College of Agriculture. Rajendranagar, Hyderabad. India.

SO SOURCE: Indian Cashew Journal, 1989, 19, (2), 15-17.

LG LANGUAGE: English (EN).

AB ABSTRACT: The treatments studied were potting of rooted cuttings with or without the polybags of vermiculite in which they had been rooted, and hardening under continuous or intermittent mist. The best results with regard to the percentage of survival in pots, root DW and establishment in the field were obtained from potting with polybags and hardening under intermittent mist.

DE DESCRIPTORS: Cuttings. Mists. Propagation. Cashews.planting-stock. production. containers. establishment.

YR YEAR: 1989.

11

AN ACCESSION NUMBER: 892440964. 8907.

HC HARDCOPY:

Agricultural Engineering Abstracts RECORD NO. 8A014-02221.

TI TITLE: The potential for alcohol as a fuel in spark ignition engines in Tanzania.

AU AUTHORS: Dunn-P-D. Clancy-J. Rice-G.

IN AUTHOR AFFILIATION: Dep. Engineering, Univ. Reading. Berks RG6 2AY, UK.

SO SOURCE: Renewable energy development in Africa. Proceedings of the international conference on research and development of renewable energy technologies in Africa. held in Mauritius. 25-29 March 1985. Volume 2 (edited by Wereko.Brobby, C.Y. and Breeze. E.M.). 1986, 357-362.

PU PUBLISHER: London. UK; Commonwealth Science Council. Commonwealth Secretariat.

LG LANGUAGE: English (EN).

AB ABSTRACT: The potential for irrigation using pumps Powered by small spark ignition engines. with ethanol as the fuel. is assessed.The ethanol can be

produced on a small scale from fruit market wastes and the annual potential production from cashew fruit waste alone is estimated at 30-50 million litres. sufficient to irrigate 15 000-25 000 ha.

DE DESCRIPTORS: Conferences. Renewable-energy-development-in-Africa. Engines. spark-ignition engines. fuels. ethanol. performance. Energy-sources. Pumps. irrigation. appropriate-technology. Tanzania. Africa. Developing-countries.

YR YEAR: 1986.

12

AN ACCESSION NUMBER: 891127362. 8907.

HC HARDCOPY:

Review of Plant Pathology RECORD NO. OM068-02846.

TI TITLE: The powdery mildew disease of cashew in Tanzania.

AU AUTHORS: Sijaona-M-E-R. Shomari-S-H.

IN AUTHOR AFFILIATION: Tanzania Agric. Res. Org., Naliendele, Tanzania.

SO SOURCE: TARO Newsletter, 1987. 2, (3). 4-5.

LG LANGUAGE: English (EN).

AB ABSTRACT: Production of this crop is limitedby this disease, causedby Oidium anacardii, and losses of 50-70% were reported in preliminary trials. Increasing losses are attributed to poor agronomic conditions, climatic changes and possibly the appearance of a more virulent form of the pathogen. Efforts are in progress to identify and utilize resistant material and meanwhile applications of sulfur dust (17.5-35 kg/ha) at fortnightly intervals give good control, with yield increases of 125-898%.

DE DESCRIPTORS: Anacardium-occidentale. Oidium-anacardii. Tanzania. yield-losses. Crop-losses.

YR YEAR: 1987.

14

AN ACCESSION NUMBER: 891862159. 8903.

HC HARDCOPY:

World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR031-01294.

TI TITLE: An economic assessment of cashew production in the Northern Territory Top End.

AU AUTHORS: Cann-B. Baker-I. Kuppelweiser-W.

SO SOURCE: Technical Bulletin, Department of Industries and Development, Australia, 1987. (No. 110), 30pp. + app.

LG LANGUAGE: English (EN).

AB ABSTRACT: An economic analysis was undertaken of the profitability of growing cashews in the Australian Northern Territory, Top End. The aim was to determine: the likely profitability of growing cashews; the yield and price required to give a reasonable level of profitability; the major capital and operating cost items; and the flow of income and costs for a cashew plantation. The Top End of the Northern Territory contains a number of large tracts of land suitable for growing cashews. Factors favouring the Top End over other areas in northern Australia include better infrastructure and higher yields in research trials. Cashews currently offer returns of around 10% (before inflation) at yields of 5t/ha and a price of A$1.10/kg nut in shell, ex Darwin wharf. At lower

yields the investment is not attractive unless prices are considerably higher. Possible cost savings which would have a significant impact on profitability are outside the scope of technical research. The major cost items of freight, capital, overhead, harvesting and marketing are dependent on the efficiency of individual operators. Ultimately, the risk and the rewards rest with the investor.

DE DESCRIPTORS: Cashews. production-possibilities. profitability. Australia. Australian-Northern-Territory.

YR YEAR: 1987.

16

AN ACCESSION NUMBER: 891417889. 8902.

HC HARDCOPY:

Nutrition Abstracts and Reviews, Series 8 - Livestock Feeds and Feeding' 1977. RECORD NO. ON059-00545.

TI TITLE: Protein enrichment of cashew wastes for animal feeds.

AU AUTHORS: Stamford-T-L-M. Vieira-R. Guerra-N.B. Medeiros-R-B-de. Cavalcante-M-L.

IN AUTHOR AFFILIATION: Federal Univ. Pernambuco. Recife, Brazil.

SO SOURCE: Food and Nutrition Bulletin. 1988. 10, (1), 61-64.

LG LANGUAGE: English (EN).

AB ABSTRACT: Waste from the processing of cashews (Anacardium-occidentale) was fermented for 72 or 96 h with Aspergillus niger 2228, Myrothecium verrucaria 2100 or Trichoderma viride 2596 with all or part of a salt mixture was dried in an oven at 45deg or 60degC for 48 h or was dried in the sun. Protein was greatest, 21.48%, after fermentation with A. niger and part of the salt mixture (potassium iodide and ferrous sulphate) for 72 h. Protein for the other fermented products was 12.80 to 20.18%, for the oven-dried products 9.70 and 11.62 and for the sun-dried product 12.66%. Submerged liquid fermentation was more efficient for producing single cell protein than was moist solid-state fermentation. Sun drying was considered to be the most satisfactory method because of its simplicity. Methionine, tyrosine andvaline were the limiting amino acids of the meal produced.

DE DESCRIPTORS: Cashews. wastes. single-cell-protein. production.

YR YEAR: 1988.

17

AN ACCESSION NUMBER: 881850524. 8902.

HC HARDCOPY:

World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR030-01474.

Horticultural Abstracts RECORD NO. OC058-04570.

Forestry Abstracts 1978. RECORD NO. OF049-04374.

TI TITLE: Cashew plantation management, production, and commercialization in the Dinderesso National Forest.

AU AUTHORS: Panther-D.

SO SOURCE: 1984. 12pp.

PB PUBLISHER: Bobo-Dioulass. Burkina Faso; US Agency for International Development.

LG LANGUAGE: English (EN).

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AB ABSTRACT: The management, production and commercialization of the Dinderesso cashew plantation in Burkina Faso was evaluated by USAID in cooperation with the Ministry of Environment and Tourism of the Government of Burkina Faso. The plantation is described and cultivation practices, marketing and organization assessed. It is concluded that the eventual usefulness of Dinderesso cashew plantation depends upon several factors. Its ability to produce high quality fruits, nuts and fuel wood economically, the organization of its labour force, and the willingness of businesses to transform raw materials into marketable finished products are all identified as elements relevant to successful plantation management. Further, these factors are seen to dictate how much more investment is required, how large the plantation shouldeventuallybe or whether the land could be more productively plantedwith a different crop or left to revert to its natural state.

DE DESCRIPTORS: plantations. Cashews. cultural-methods. Fuel-plantations. Multipurpose-trees. Anacardium-occidentale. management. Burkina-Faso. economics. fuelwood.

YR YEAR: 1984.

19

AN ACCESSION NUMBER: 881859350. 8812.

HC HARDCOPY:

World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR030-07897.

Rural Development Abstracts RECORD NO. 2R011-02346.

TI TITLE: Women's issues and men's roles: Sri Lankan village experience.

AU AUTHORS: Casinader-R-A. Fernando-S. Gamage-K.

SO SOURCE: Geography of gender in the Third world (edited by Momsen, J.H.; Townsend, J.). 1987, 309.322.

PB PUBLISHER: London, UK; Hutchinson Education; Albany, New York, USA; State University of New York Press.

LG LANGUAGE: English (EN).

AB ABSTRACT: Village-based credit schemes organized by a non.governmental organization in two villages have been successful for the cashew nut processors of Sri Lanka. Credit allowed these women to free themselves of the middlemen and to set up as independent, petty commodity producers. This sudden expansion of women's economic power. at a time of declining opportunities for male employment, provoked adjustments in the gender division of labour in the household. The polarization of male reactions is described, with some husbands taking refuge in alcohol, violence and the denigration of women, while others choose to work with their wives in cashew nut processing or take over traditional female chores such as childcare and housework in order to free their wives for income-earning activities.

DE DESCRIPTORS: Cashews. processing. female-labour. sexual-roles. change. Sri-Lanka. Seminars. Women-in-Geography Study-Group-Institute-of-British-Geographers.

YR YEAR: 1987.

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22

AN ACCESSION NUMBER: 881113151. 8812.

HC HARDCOPY:

Review of Plant Pathology RECORD NO. OM067-05102.

Plant Breeding Abstracts RECORD NO. OP058-10773.

TI TITLE: Phytopathological aspects of cashew (Anacardium occidentale L.) in Tanzania.

IN AUTHOR AFFILIATION: CNR, P. le delle Cascine, 28 Florence, Italy.

SO SOURCE: International Journal of Tropical Plant Diseases, 1987, 5, (2). 115-130.

LG LANGUAGE: English (EN).

AB ABSTRACT: The most important among the diseases contributing to the serious decline in production of this crop in Tanzania are powdery mildew (Oidium anacardii). anthracnose (Glomerella cingulata), die-back of shoots and inflorescences caused by Phomopsis anacardii, 2 leaf diseases (Pestalotia heterocornis and Pseudocercospora anacardii) and internal rot of the fruit caused by Nematospora coryli. Biological aspects of these diseases were investigated and correlated with weather conditions. Genetic resistance exists to O. Anacardii and G. cingulata and control measures have been developed for some of the other diseases.

DE DESCRIPTORS: Tanzania. Oidium-anacardii. Glomerella-cingulata. Phomopsis-anacardii. Pestalotia-heterocornis. Pseudocercospora-anacardii. Nematospora-coryli. Anacardium-occidentale. diseases. Oidium. Glomerella.

YR YEAR: 1987.

23

AN ACCESSION NUMBER: 880352310. 8811.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. OC058-07134.

Tropical Oil Seeds Abstracts RECORD NO. 7Z013-00933.

TI TITLE: Research at CPCRI.

CA CORPORATE AUTHORS: India. Central Plantation Crops Research Institute.

IN AUTHOR AFFILIATION: CPCRI. Kasaragod 670 124. Kerala, India.

SO SOURCE: 1986. 82 pp.

PB PUBLISHER: Kasaragod. India.

LG LANGUAGE: English (EN).

AB ABSTRACT: Research on the following crops is reported: coconuts, arecanuts. oil palms, cashews, pepper (Piper spp.), cardamoms Elettaria cardamomum, ginger (Zingiber officinale), turmeric (Curcuma spp.), and tree spices (Myristica spp.). Brief reports are also included on planting material production, cropping systems, harvest and post-harvest technology, biotechnology (tissue culture), statistics, economic analysis, co. ordinated projects and collaborative programmes, transfer of technology. and impact of research efforts.

DE DESCRIPTORS: India-Central-plantation-Crops-Research-Institute. Coconuts. reports. India. Areca. Oil-palms. Cashews. Piper. Elettaria-cardamomum. Zingiber-officinale. Curcuma. Myristica. Central-Plantation-Crops-Research-Institute.

YR YEAR: 1986.

64

25

AN ACCESSION NUMBER: 870346526. 8711.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C057-09021.
TI TITLE: Prospects for a cashew industry in Queensland.
AU AUTHORS: Wait-A-J. Jamieson-G-I.
IN AUTHOR AFFILIATION: Queensland Department of Primary Industries, GPO Box 46, Brisbane, Qld. 4001, Australia.
SO SOURCE: Queensland Agricultural Journal, 1985. 111. (6). 315- 316.
LG LANGUAGE: English (EN).
AB ABSTRACT: Suitable environments in Queensland for cashew production are described and climatic data for these areas are compared with data for the major cashew producing countries (India, Tanzania, Mozambique and Brazil). Factors constraining and favouring the establishment of a cashew industry in Queensland are listed.
DE DESCRIPTORS: Australia. Cashews. production. climate. requirements.
YR YEAR: 1985.

26

AN ACCESSION NUMBER: 870346094. 8711.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C057-09023.
TI TITLE: Prospects of clonal propagation in cashew nut by softwood grafting.
AU AUTHORS: Sawke-D-P. Salvi-M-J. Patil-M-M.
IN AUTHOR AFFILIATION: Konkan Krishi Vidyapeeth, Dapoli, Maharashtra. India.
SO SOURCE: Indian Cashew Journal. 1985, 17, (4). 15-17.
LG LANGUAGE: English (EN).
AB ABSTRACT: In 3-year trials grafting on seedlings of the cv. Vengurla-1 was carried out at monthly intervals to study the seasonal effect. The highest mean success was obtained in August (83.66%) and April (83%), and the lowest (22.33%) in December.
DE DESCRIPTORS: Cashews. grafting. seasons. Planting-stock. production. techniques.
YR YEAR: 1985.

27

AN ACCESSION NUMBER: 870346093. 8711.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C057-09022.
TI TITLE: Modified method of 'epicotyl grafting' in cashew for commercial propagation.
AU AUTHORS: Seshadri-K-W. Rao-R-R.
IN AUTHOR AFFILIATION: Cashew Research Station, Bapatla 522 101, AP, India.
SO SOURCE: Indian Cashew Journal. 1985. 17. (4). 11-13.
LG LANGUAGE: English (EN).
AB ABSTRACT: The raising of rootstocks and preparation of the scions are outlined. The normal grafting method (beheading the rootstock some 4-5 cm above the cotyledon) was compared with the modified method (tip of the rootstock seedling was removed with a sharp knife leaving the 2 bottom leaves intact, then the stem was cut longitudinally so that each half had a leaf). With both methods the scion was inserted into the cleft. Grafting success was 6 and 45% with the normal and modified method,

70

respectively, and the greater success of the latter was attributed to the presence of the 2 leaves.
DE DESCRIPTORS: Cashews. grafting. techniques. seedlings. Planting-stock. Production.
YR YEAR: 1985.

28
AN ACCESSION NUMBER: 870344477. 8708.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C057-06722.
TI TITLE: Potential of the cashew crop. 1.
AU AUTHORS: Ascenso-J-C.
IN AUTHOR AFFILIATION: EMBRAPA, Brasilia, DF, Brazil.
SO SOURCE: Agriculture International, 1986, 38, (11), 324-326.
LG LANGUAGE: English (EN).
AB ABSTRACT: Although cashews are ranked amongst the most important and valuable nuts in world trade, scientific research has not kept pace with the expansion of the industry, and yields are low compared with those of other nut crops. This review mentions world production and productivity.
DE DESCRIPTORS: Cashews. reviews.
YR YEAR: 1986.

29
AN ACCESSION NUMBER: 870341346. 8708.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C057-02269.
Review of Applied Entomology, Series A - Agricultural RECORD NO. 0E075-04024.
TI TITLE: The cashew: its botany and cultivation.
AU AUTHORS: Wait-A-J. Jamieson-G-I.
IN AUTHOR AFFILIATION: Queensland Department of Primary Industries, Australia.
SO SOURCE: Queensland Agricultural Journal, 1986. 112, (5), 253. 257.
LG LANGUAGE: English (EN).
AB ABSTRACT: A review and discussion, with mention of climatic requirements, soils, cultivars, flowering and fruiting, seed andvegetative propagation, spacing, fertilizing, irrigation, pruning, weed control, harvesting, Yields, pests and diseases, processing, botany and uses.
DE DESCRIPTORS: reviews. Cashews. insect-pests. Queensland. Australia.
YR YEAR: 1986.

30
AN ACCESSION NUMBER: 871661130. 8707.
HC HARDCOPY:
Plant Breeding Abstracts RECORD NO. 0P057-06473.
TI TITLE: Flowering and sex ratio in some cashew (Anacardium occidentale L.) selections.
AU AUTHORS: Hanamashetti-S-I. Khan-M-M. Mahabaleshwar-Hegde. Mallik-B. Sulladmath-U-V.
IN AUTHOR AFFILIATION: Dep. Hort.. Univ. Agrio. Sci., Coll. Agric., Dharwad. 580 005. Karnataka, India.
SO SOURCE: Journal of Plantation Crops, 1986. 14. (1). 68-70.
LG LANGUAGE: English (EN).

AB ABSTRACT: Duration of flowering, male and bisexual flower production, number of flowers Per panicle, number of bisexual flowers per panicle and flower sex ratio were studied in 16 accessions at Ullal, Karnataka. Variation was observed in all characters and it is considered what there is scope forbreedingvarieties with a short, synchronized flowering period and high yield.
DE DESCRIPTORS: Anachardium-occidentale. flowering. sex.
YR YEAR: 1986.

31
AN ACCESSION NUMBER: 871844224. 8706.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR029-03152.
Rural Development Abstracts RECORD NO. ^R010-00859.
TI TITLE: The need for a closer integration between agricultural producer and agro-industries in Tanzania.
AU AUTHORS: Monji-R-G. Kuzilwa-J-A.
SO SOURCE: Readings of economic policy of Tanzania. (edited by Msambichaka. L.A.; Chandrasekhar, S.). 1984, 85-95.
PB PUBLISHER: Dar es Salaam, Tanzania; University of Dar es Salaam.
LG LANGUAGE: English (EN).
AB ABSTRACT: This paper, based on experience and observation, discusses contract smallholder farming and/or large scale, private operators in Tanzania as a basis for: (1) improving the performance of some selected agro. industries, notably cashew nut processing, oilseed processing and tobacco processing, and (2) bringing about improved incomes of smallholders. An appendix (pp.92-95) presents 'A suggested research on agro-industrial linkage".
DE DESCRIPTORS: Cashews. Tobacco. Oilseeds. Vertical-integration. small. farms. processing. Tanzania.
YR YEAR: 1984.

32
AN ACCESSION NUMBER: 870342109. 8706.
HC HARDCOPY:
Plant Breeding Abstracts RECORD NO. OP057-03264.
Horticultural Abstracts RECORD NO. OC057-03836.
TI TITLE: Studies on some qualitative aspects of cashew apple.
AU AUTHORS: Kumar-G-K. Aravindakshan-M.
IN AUTHOR AFFILIATION; College of Horticulture, Vellanikkara, Trichur. India.
SO SOURCE: Indian Cashew Journal, 1985, 17. (1), 19-21.
LG LANGUAGE: English (EN).
AB ABSTRACT: Ten cultivars were assessed for fruit colour, shape, weight, length. diameter, percentage juice recovery, TSS, acidity, reducing sugars and ascorbic acid content. The data are tabulated. Cultivars noted for high TSS (14.13%) were Sawantwadi and BLA-256-1. For high reducing sugar (14.16%) K.27.1, and for ascorbic acid BLA-1 (328.19 mg/100 g) and M-6-1 (321.81 mg/100 g). Acidity in the range 0.39.0.42% is considered highly desirable for processing; cultivars within this range were K-27-1. BLA-139-1, BLA-1 and Sawantwadi.

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DE DESCRIPTORS: Cashews. cultivars. assessment. India. Anacardium-occidentale. food-processing-quality.
YR YEAR: 1985.

33
AN ACCESSION NUMBER: 861839069. 8701.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR029-00242.
TI TITLE: Cashew nuts - a new export crop.
AU AUTHORS: Tosakull-K.
IN AUTHOR AFFILIATION: Res. Office, Bangkok Bank Ltd., 333 Silom Road, Bangkok, Thailand.
SO SOURCE: Bangkok Bank Monthly Review, 1986, 27, (9), 397-400.
LG LANGUAGE: English (EN).
AB ABSTRACT: Cashew nuts have not previously been a major crop in Thailand but the situation may change because they are being investigated as a possible alternative to cassava. given cassava's falling export price. In 1985 Thailand exported 906 t of cashew nuts although supply irregularities, poor quality and high relative prices have restricted exports. Greatest potential exists for exports to China but those problems must first be solved. The Bank for Agriculture and Agriculture Cooperatives (BAAC) and the Bangkok Bank have been extending credits in support of an integrated project, implemented by Mahboonkrong Cashew Nuts Company, which aims to help farmers produce high quality cashew nuts.
DE DESCRIPTORS: Cashews. production-possibilities. export-diversification. Thailand.
YR YEAR: 1986.

36
AN ACCESSION NUMBER: 861834062. 8607.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR028-03702.
TI TITLE: Problems of Indian cashew industry.
AU AUTHORS: Ananth-K-C.
INAUTHORAFFILIATION: State Trading Corporation of India Ltd., NewDelhi, India.
SO SOURCE: Foreign Trade Review, 1984, 19, (3). 426-436.
LG LANGUAGE: English (EN).
AB ABSTRACT: The paper evaluates the problems faced by India in promoting the domestic production of cashew nuts. Five development plans. the first begun in 1951. are reviewed and the efforts made by the various cashew development boards and agencies since then are discussed. Cashew is cultivated mainly by small growers in the private sector and by Agriculture and Forest Departments of the various state governments. To maximize the country's production, it is concluded that extension services, adaptive research, reoriented cultivacion schedules and the formation of one centralized agency are required.
DE DESCRIPTORS: Cashews. production-possibilities. India.
YR YEAR: 1984.

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38

AN ACCESSION NUMBER: 860335328. 8606.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C056-04700.

Plant Growth Regulator Abstracts RECORD NO. 7W012-00916.

TI TITLE: A comparative study of different methods of vegetative propagation of cashew.

AU AUTHORS: Valsalakumari-P-K. Vidyadharan-K-K. Damodaran-V-K.

IN AUTHOR AFFILIATION: Kerala Agricultural University, Vellanikkara 680 651, Kerala. India.

SO SOURCE: Acta Horticulturae, 1985. (No. 108), 289.

LG LANGUAGE: English (EN).

AB ABSTRACT: Air-layering, side grafting, veneer grafting, wedge grafting and patch budding were compared between 1974 and 1978. Air layering between February and April and treatment with IBA at 250 p.p.m. or NAA at 500 p.p.m. gave the maximum number of rooted layers. With side and veneer grafting and patch budding the highest success rate was obtained between May/June and September/October. With wedge grafting the best results (75% success) were obtained under mist on 8-month-old seedlings grafted in March.

DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. assessment. Growth-regulators. responses. Anacardium-occidentale. IBA. air-layering. grafting. budding. NAA.

YR YEAR: 1985.

39

AN ACCESSION NUMBER: 860335326. 8606.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C056-04703.

TI TITLE: Studies on cashew nut air-layers. I. Use of different decomposable containers and potting mixtures as aids in maximising field survival and establishment.

AU AUTHORS: Rajeevan-M-S. Srinivasan-K.

IN AUTHOR AFFILIATION; College of Agriculture, Vellayani 680 651, Kerala. India.

SO SOURCE: Acta Horticulturae. 1985, (No. 108), 287-288.

LG LANGUAGE: English (EN).

AB ABSTRACT: Raising the plants in straw or coconut-husk pots and planting them out in the pots gave 62.3 and 86% field survival, respectively, and good establishment compared with the conventional method of raising plants in clay pots and removing them from the pots when transplanting. which gave 32.6% field survival. The 4 potting media tried (unspecified) had no effect on field survival.

DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. containers. Pots. types.

YR YEAR: 1985.

40

AN ACCESSION NUMBER: 860335325. 8606.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C056-04702.

Plant Growth Regulator Abstracts RECORD NO. 7W012-00908.

74

TI TITLE: Preliminary studies on propagation of cashew by stooling and layering.
AU AUTHORS: Nagabhushanam-S.
IN AUTHOR AFFILIATION: Central Plantation Crops Research Institute, Vittal 574 243, Karnataka. India.
SO SOURCE: Acta Horticulturae, 1985. (No. 108), 286-287.
LG LANGUAGE: English (EN).
AB ABSTRACT: Fifteen adult trees, ranging from 16 to 40 cm in girth. were stooled in mid-February. The shoots produced were covered with sand in early May for about 40 days. The shoots were then cinctured at the base and treated with IBA and again covered with sand for rooting. In early August rooted shoots were detached and planted in polybags. In another trial the shoots were cinctured in late September and assessed for rooting in late October. Stools with a large girth (36-40 cm) produced more shoots, the number of which declined with decreasing girth size, but the percentage of shoots suitable for cincturing decreased with increases in stool girth due to a large number of slender shoots. Shoots cinctured in June gave 64.3% rooting and those cinctured in late September 44%. In a 3rd trial shoots cinctured in late November gave 55% rooting. Stooling and layering are considered viable methods for economic propagation on a large scale.
DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Growth-regulators. responses. Anacardium-occidentale. IBA. stooling. layering.
YR YEAR: 1985.

41
AN ACCESSION NUMBER: 860335324. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04699.
TI TITLE: Increase cashew production adopting vegetative propagation.
AU AUTHORS: Dhandar-D-G.
IN UTHOR AFFILIATION: I.C.A.R. Research Complex. Margao 403 602. Goa, India.
SO SOURCE: Acta Horticulturae, 1985, (No. 108), 285-286.
LG LANGUAGE: English (EN).
AB ABSTRACT: In trials between November and March. patch budding on seedlings gave better success (61%) than veneer grafting (36%). With veneer grafting, defoliation of the scion shoots about a week before grafting is recommended since grafting with non.defoliated shoots was unsuccessful. However. during the rainy seasonveneer grafting gave 92% success and Patch budding 62%. Overall, patch budding was preferred because more buds could be obtained per unit area of clonal material than with veneer grafting.
DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Grafting. assessment. Budding.
YR YEAR: 1985.

42
AN ACCESSION NUMBER: 860335323. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04698.
TI TITLE: Vegetative propagation in cashew.
AU AUTHORS: Das-R-C. Mishra-S-N.
IN AUTHOR AFFILIATION: Orissa University of Agriculture and Technology, Bhubaneshwar 751 003. Orissa, India.

SO SOURCE: Acta Horticulturae, 1985. (No. 108), 285.
LG LANGUAGE: English (EN).
AB ABSTRACT: In studies with the cultivars Hyb.2/12. Ansur No.1, M6/1. H4-7 and Tree No.1. grafting and budding on a local rootstock between December 1977 and September 1978 was compared. Side.grafting was more successful than T-budding, and the bestmonths for grafting, in decreasing order of success (80-60%). were January, February, September, July and June. All cultivars gave a good take when side.grafted during the optimal r
DEDESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting. stock. production. techniques. Grafting. assessment. Budding.
YR YEAR: 1985.

43
AN ACCESSION NUMBER: 860335321. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04721.
TI TITLE: Recent trends in CNSL utilization.
AU AUTHORS: Murthy-B-G-K. Sivasamban-M-A.
IN AUTHOR AFFILIATION: Regional Research Laboratory, Hyderabad 500 009, Andhra Pradesh, India.
SO SOURCE: Acta Horticulturae, 1985, (No. 108). 201-207.
LG LANGUAGE: English (EN).
AB ABSTRACT: The uses of CNSL (cashew nut shell liquid) and its derivatives in the brake lining industry, paint and varnish industry, for laminated products, foundry core oil and rubber compounding, and its scope for utilization in the development of drugs, antioxidants, fungicides, and other products are outlined and discussed. The main factors chat affect the utilization of CNSL are its dark colour, variable quality and high price.
DE DESCRIPTORS: oils. Conferences. International-cashew-symposium. Cashews. processing. residues. products. composition. fruits.
YR YEAR: 1985.

44
AN ACCESSION NUMBER: 860335313. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04707.
TI TITLE: Effect of nitrogen, phosphorus and potash fertilization on growth and production of cashew nut.
AU AUTHORS: Sawke-D-P. Gunjate-R-T. Limaye-V-P.
IN AUTHOR AFFILIATION: Konkan Krishi Vidyapeeth, Dapoli 412 715, Maharashtra, India.
SO SOURCE: Acta Horticulturae. 1985, (No. 108). 95-99.
LG LANGUAGE: English (EN).
AB ABSTRACT: The results of trials started in 1969 indicated that while N and P significantly increased tree canopy volume and yield, no response to K was observed. Trees responded to N at 125 kg/ha in the presence of P205 at 50 kg/ha and K20 at 100 kg/ha. However, the response to N was restricted to 75 kg/ha in the absence of P and K. Similarly the response to P was restricted to 25 kg/ha when low M levels (25 kg or 75 kg/ha) were applied. Response to P increased when N level was also increased to its maximum (125 kg/ha) and the N X P interaction was significant. The main

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effects of M and P and their interaction on canopy volume and yield were significant. However, their effect at higher levels was controlled by K application.

DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. nutrition. nitrogen. phosphorus. Potassium.

YR YEAR: 1985.

45

AN ACCESSION NUMBER: 860335310. 8606.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C056-04693.

TI TITLE: Comparative Performance of seedlings, air layers and inarched grafts in cashew.

AU AUTHORS: Sawke-D-P. Gunjate-R-T. Limaye-V-P.

IN AUTHOR AFFILIATION: Konkan Krishi Vidyapeeth, Dapoli 412 715, Maharashtra, India.

SO SOURCE: Acta Horticulturae, 1985, (No. 108). 75-77.

LG LANGUAGE: English (EN).

AB ABSTRACT: In 19-year trials on seedlings, air-layers and inarched grafts raised from a single mother tree (Vengurla-1), the yield of vegetatively propagated trees was better than that of seedling trees. However, the size of trees, judged by canopy volume, was greater in seedling trees than in trees from air-layers or inarched grafts.

DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Seedlings. development. assessment. Air-layering. Grafting.

YR YEAR: 1985.

46

AN ACCESSION NUMBER: 860335309. 8606.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. 0C056-04697.

TI TITLE: Vegetative propagation of cashew - through side grafting in situ.

AU AUTHORS: Sahani-J-N. Patro-C.

IN AUTHOR AFFILIATION: Orissa State Cashew Development Corporation Ltd., Bhubaneshwar 751 014, Orissa, India.

SO SOURCE: Acta Horticulturae, 1985. (No. 108), 71-74.

LG LANGUAGE: English (EN).

AB ABSTRACT: In 2.year trials side grafting was carried out at weekly intervals during the spring and monsoon seasons. During the spring season the success was greatest (53-58%) in March. and during the monsoon season in July and August (54-56%). The effect of temperature. rainfall andhumidity on side grafting was inconsistent and correlations between success and meteorological factors could not be established.

DEDESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Grafting. assessment.

YR YEAR: 1985.

47

AN ACCESSION NUMBER: 860335308. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04692.
Plant Growth Regulator Abstracts RECORD NO. 7W012-00909.
TI TITLE: vegetative propagation in cashew - work done at Vridhachalam.
AU AUTHORS: Palaniswami-V. Hameed-A-S. Vijayakumar-M.
IN AUTHOR AFFILIATION: Cashew Research Station, Vridhachalam 606 001, Tamil Nadu, India.
SO SOURCE: Acta Horticulturae, 1985, (No. 108). 67-70.
LG LANGUAGE: English (EN).
AB ABSTRACT: In 10-year trials 40-50% success was achieved by air-laying 1. year-old shoots during July to September. IBA at 500 p.p.m. improved rooting. With patch budding the highest success (71%) was recorded in July.
DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Growth-regulators. responses. Anacardium-occidentale. IBA. air-layering. budding.
YR YEAR: 1985.

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AN ACCESSION NUMBER: 860335307. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04691.
TI TITLE: Vegetative propagation of cashew - review of work done at Baptla.
AU AUTHORS: Rao-S-N.
IN AUTHOR AFFILIATION: Fruit Research Station, Sangareddy 502 001, Andhra Pradesh, India.
SO SOURCE: Acta Horticulturae, 1985, (NO. 108). 64-66.
LG LANGUAGE: English (EN)
AB ABSTRACT: Air-layering with sawdust as the rooting medium gave 100% rooting during the monsoon months. At this time callusing (10 days) and root initiation (25 days) were faster compared with other seasons. Layering was also successful. Although inarching gave 52 to 96% success from July to December on 7-month-old seedlings, the graft union was found to be defective. Of the various methods of budding tested, patch budding gave the best results with 41% success. There was no success with side grafting. Veneer grafting on seedlings gave 96% success in July and nil in May. Propagation by stem and root cuttings was not successful.
DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Air-layering. Layering. Budding. Sawdust. utilization. propagation. Grafting. assessment.
YR YEAR: 1985.

49

AN ACCESSION NUMBER: 860335306. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C056-04696.
TI TITLE: vegetative propagation in cashew - review of work done at Vittal.
AU AUTHORS: Nagabhushanam-S.
IN AUTHOR AFFILIATION: Central Plantation Crops Research Institute, Vittal 574 243, Karnataka, India.

SO SOURCE: Acta Horticulturae. 1985, (No. 108), 57-63.
LG LANGUAGE: English (EN).
AB ABSTRACT: The different methods of vegetative propagation tried during 1977. 78 were: (i) veneer grafting on 6-month-old seedlings raised in polybags, (ii) side-grafting on 3- to 5-year-old trees, (iii) patch budding on 6-month-old seedlings raised in polybags. (iv) patch budding in situ on 1-year-old shoots of adult trees, (v) air-layering, (vi) mound layering, (vii) cleft-grafting on 8- to 10-month-old seedlings raised in polybags, (viii) whip-grafting on 8- to 10-month-old seedlings raised in polybags, (ix) stone-grafting on 40-to 45-day-old seedlings and (x) stem cuttings. Air-layering was significantly superior to the other methods from March to May. Side grafting (June, July and October) and patch budding in situ (April, May and June) gave the best (and similar) results. Veneer grafting and patch budding in polybags gave poor results. In mound layering (stooling) trials 64% of shoots struck roots and 72% of them established in polybags. The success in cleft grafting was high in September (58%) followed by 54% in August while the success in whip grafting was 44 and 40% in August and September, respectively. Air-layers separated from the mother tree and nursed in polybags for about 3 weeks gave 94% survival after transplanting in the field. Despite low success veneer grafts and patch budded plants in polybags gave 92 and 80% field establishment, respectively.
DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Grafting. assessment. Budding. Air-layering. Stooling.
YR YEAR: 1985.

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AN ACCESSION NUMBER: 860335305. 8606.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. OC056-04690.
TI TITLE: Vegetative propagation of cashew - review of work done in Kerala.
AU AUTHORS: Damodaran-V-K.
IN AUTHOR AFFILIATION: Kerala Agricultural University, Vellanikkara 680 654. Kerala, India.
SO SOURCE: Acta Horticulturae. 1985, (No. 108), 51-56.
LG LANGUAGE: English (EN).
AB ABSTRACT: Studies on effective methods of vegetative propagation since 1952 are summarized. In the early trials, budding, side grafting and propagation by cuttings were unsuccessful. Air-layering and inarch grafting, however, were highly successful and among these 2 methods. The former was simpler and cheaper. Although 80-100% success was obtained during November-April, the post-separation mortality of layers was very high. Application of IAA (250 p.p.m.) improved root growth in layers and gradual hardening under mist gave 72% survival compared with 55% without mist. Using non-flowering shoots gave higher percentage of rooted layers than using flowering shoots. When a comparison was made between plants raised from air-layers and seeds. 3 years after the start of the experiment the layers had a better root system than seedlings. Rooting of air-layers was correlated with shoot growth cycles and the establishment was better when the layers were planted in polyethylene bags in soil supplied with Hewitt's nutrient solution.

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DE DESCRIPTORS: Conferences. International-cashew-symposium. Cashews. planting-stock. production. techniques. Grafting. assessment. Budding. Air-layering. Growth-regulators. IAA. responses.
YR YEAR: 1985.

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AN ACCESSION NUMBER: 861831698. 8605.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R028-02573.
TI TITLE: Cost of production and cost-benefit analysis of smallholder plantation crops under ideal management.
AU AUTHORS: Das-P-K.
SO SOURCE: Technical Bulletin. Central Plantation Crops Research Institute. Kerala, 1985. (No. 12), 13pp.
LG LANGUAGE: English (EN).
AB ABSTRACT: The study aims to estimate the cost of production and to work out the benefit.cost ratio (BCR). net present worth (NPW) and internal rate of return (IRR) of five smallholder plantation crops (coconut, arecanut, cashew nut, black pepper and cardamom). It was found that the BCR in all cases was greater than unity, and that the IRRwas in all cases higher than the interest rate of 14% charged by the commercial Banks. It is concluded that such components as irrigation andhighyielding cultivars provide much higher benefits than other comparable factors.
DE DESCRIPTORS: Coconuts. Cashews. Pepper. Cardomom. Plantation-crops. cost. benefit-analysis. small-farms. India. Kerala.
YR YEAR: 1985.

52
AN ACCESSION NUMBER: 851828370. 8604.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R028-01097.
Rural Development Abstracts RECORD NO. 2R009-00215.
TI TITLE: Women's issues and men's roles: Sri Lankan village experience.
AU AUTHORS: Casinader-R-A. Fernando-S. Gamage-K.
SO SOURCE: Sri Lanka Journal of Social Sciences. 1982, 5, (2). 73-91.
LG LANGUAGE: English (EN).
AB ABSTRACT: Two Sri Lankan villages participated in the Gampubuduwa Movement village development programme. The nature of the economy of the villages gave rise to women's issues becoming central to the programme. The involvement of women in the petty.production and processing of cashew nuts was significant in both economies. Case studied of five women in the two villages suggested that work connected with cashew nut processing had emerged as a poverty survival strategy, but ithad the potential to improve women's status. However, it had also combined within it the seeds of conflict between women's and men's objectives and roles, because they were trapped in social values and systems which conflicted with the emerging new patterns. It would not be possible to avoid such conflict unless men's consciousness regarding the oppression of women and equality between the sexes was awakened.

.90

DE DESCRIPTORS: Division-of-labour. sexual-roles. villages. woman's-status. Sri-Lanka.
YR YEAR: 1982.

53
AN ACCESSION NUMBER: 851823801. 8500.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R027-04895.
TI TITLE: Status of production and trade of cashew in India.
AU AUTHORS: Das-P-K.
IN AUTHOR AFFILIATION: Division of Agricultural Economics. Central Plantation Crops Research Institute, Kasaragod-670124. Kerala, India.
SO SOURCE: Agricultural Situation in India, 1985, 39, (10). 765-770.
LG LANGUAGE: English (EN).
AB ABSTRACT: Area under cashews in India has increased from 110 000 ha in 1955/56 to 481 000 in 1981/82, with the major growth in Orissa, Karnataka. Andhra Pradesh andMaharashtra. Kerala alone still accounts for one third of the total area under the crop, and 60% of total raw cashew nut production. The processing sector has 550 factories, employing 280 000, with a capacity of 500 000 t. Demand from domestic and export markets totals some 285 000 t. on which there is a shortfall of 95 000 t. The industry is relying heavily on imports from East Africa, which are becoming less easily available.
DE DESCRIPTORS: Cashews. Production. processing. exports. India.
YR YEAR: 1985.

54
AN ACCESSION NUMBER: 851819244. 8500.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R027-02101.
Rural Development Abstracts RECORD NO. 2R008-00828.
TI TITLE: Casual workers in the cashew industry: a profile.
AU AUTHORS: James-R.
SO SOURCE: Interim Reports, Labour and Poverty in India and the Philippines, Indo-Duch Kerala Research Project, Universiteit Amsterdam, 1981. (No. 10). 93pp.
LG LANGUAGE: English (EN).
AB ABSTRACT: The study on the casual workers in the factory of the cashew industry of South Kerala is the first report of a sociological investigation. The main foci are the changing patterns of household organization and income generation in Central Kerala. The study examines how these workers manage to live, discussing some aspects of labour and poverty and also the conditions of lower level female workers. The enquiry is based on one cashew factory in Chunakkara village near Kayamkulam town and 200 households whichhave at least one cashewworker employed as casual labour in the factory. Cashew production, procurement, processing, and export is covered. Characteristics of the household, its earnings and earners and the struggle to live as well as problems and grievances of casual workers are discussed.

91

DE DESCRIPTORS: Cashews. processing. labour. working-conditions. living-standards. India. Kerala.
YR YEAR: 1981.

55
AN ACCESSION NUMBER: 851641377. 8500.
HC HARDCOPY:
Plant Breeding Abstracts RECORD NO. 0P055-06424.
Horticultural Abstracts RECORD NO. 0C055-07304.
TI TITLE: A polyethylene glycol based medium for in vitro germination of cashew pollen.
AU AUTHORS: Subbaiah-C C.
IN AUTHOR AFFILIATION: Cent. Plantation Crops Res. Inst. Reg. Sta., Vittal 574 243, Karnataka, India.
SO SOURCE: Canadian Journal of Botany, 1984, 62, (12). 2473-2475.
LG LANGUAGE: English (EN).
LS LANGUAGE SUMMARY: French (FR).
AB ABSTRACT: Several concentrations of the constituents of the medium were tested. The best, which gave 90-95% germination as well as pollen tube production comparable with that found in vivo, contained 30% (w/v) polyethylene glycol, 20% sucrose and 20 p.p.m. each of B and Ca.
DE DESCRIPTORS: Anacardium-occidentale. pollen-germination. Techniques. Cashews. pollen. germination. culture-media.
YR YEAR: 1984.

57
AN ACCESSION NUMBER: 850331900. 8500.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C055-09916.
TI TITLE: Standardisation of layeringmedium, planting medium and containers for cashew air layers.
AU AUTHORS: Veeraraghavan-P-G. George-T-E. Nair-M-N-C.
IN AUTHOR AFFILIATION: Cashew Research Station, Madakkathara,Trichur, Kerala. India.
SO SOURCE: Agricultural Research Journal of Kerala, 1983, 21, (2). 55-57.
LG LANGUAGE: English (EN).
AB ABSTRACT: Of 5 different media tested. the percentage of rooted layers (40.0) was highest in wood shavings and lowest (18.7) in wood shavings enriched with rock phosphate. Of 9 planting substrates and containers tested, a high survival of planted layers (82.5%) at the lowest cost was obtained with standard potting mixture in polyethylene bags.
DE DESCRIPTORS: Cashews. planting-stock. production. containers. Air-layering. techniques. Growing-media. composition. wood-shavings. utilization. Phosphorus. nutrition.
YR YEAR: 1983.

58
AN ACCESSION NUMBER: 850326570. 8500.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C055-02175.
TI TITLE: Exotic tropical and sub-tropical fruits and nuts and the Australian plant propagator.

61

AU AUTHORS: Scholefield-P-B.
IN AUTHOR AFFILIATION: CSIRO Division of Horticultural Research, Darwin, Northern Territory, Australia 5791.
SO SOURCE: Combined Proceedings. International Plant Propagators' Society, 1983, publ. 1984, 33, 140-144.
LG LANGUAGE: English (EN).
AB ABSTRACT: Fruits with potential for production expansion in Australia include avocado, macadamia, mango, litchi, Annona spp. and cashew. Propagation of these and some others is discussed briefly, with reference to the literature.
DE DESCRIPTORS: Australia. Conferences. International-Plant-Propagators. Society. Avocados. production. Macadamia. Mangoes. Litchi. Annona. Cashews. fruits. nuts. Tropical-fruits. propagation. techniques. Subtropical-fruits.
YR YEAR: 1983, publ. 1984.

59
AN ACCESSION NUMBER: 841816846. 8500.
HC HARDCOPY:
WorldAgricultural Economics & Rural Sociology Abstracts RECORD NO. OR027-00509.
TI TITLE: Maharashtra cashew development project for financial assistance of the World Bank.
CA CORPORATE AUTHORS: India, Government of Maharashtra, Horticulture and Social Forestry Department.
IN AUTHOR AFFILIATION: Horticulture and Social Forestry Department, Government of Maharashtra, Bombay, India.
SO SOURCE: 1983, 76pp.
PB PUBLISHER: Bombay, India.
LG LANGUAGE: English (EN).
AB ABSTRACT: This proposal for World Bank assistance describes the project area, details the objectives and characteristics of the proposed project, presents its organizational features, and assesses processing and marketing difficulties. Cashew cultivation is ideally suited to the rainfed, hilly slopes and light soils of Maharashtra, but existing plantations use low yielding varieties. Strong foreign demand and consequent high prices have made the crop remunerative for farmers, but financial constraints limit the extent of plantations since capital costs and gestation periods are both quite high. The project involves large-scale plantations and the establishment of progeny orchards and nurseries and staff training. Production loans to cultivators wouldbe provided at 33.3% subsidy for new plantations and 25% for rejuvenation, at a 10.25% interest rate to cover maintenance up to the 7th year of operation. Loans would be recovered in eight annual installments starting from the 8th year. The internal rate of return is established at 24%.
DE DESCRIPTORS: Development.projects. cashews. production-possibilities. World-Bank. India. Maharashtra.
YR YEAR: 1983.

60

AN ACCESSION NUMBER: 841816798. 8400.

HC HARDCOPY:

World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR026-07090.

TI TITLE: Cashew production in East Africa.

AU AUTHORS: Brown-L-C. Minja-E. Hamad-A-S.

IN AUTHOR AFFILIATION: Mtwara/Lindi RIDEP Project. Mtwara. Tanzania.

SO SOURCE: Advancing agricultural production in Africa. Proceedings of CAB's First Scientific Conference, Arusha, Tanzania. 12-18 February 1984. (Edited by D.L. Hawksworth). 1984. 160-163.

PB PUBLISHER: Farnham Royal, Slough, UK; Commonwealth Agricultural Bureaux.

LG LANGUAGE: English (EN).

AB ABSTRACT: World production of raw cashew nuts reached a peak in 1973/74 at 480 000 t. of which three.quarters came from East Africa. Within East Africa, Mozambique contributes the largest share, followed by Tanzania, with Kenya a relatively small producer. In all three countries cashew is predominantly a smallholder crop. Until the early 1970s most of the raw nuts were exported to India for processing, but in recent years the East African countries have developed their own processing industries. From 1945 until 1973/74 production in Mozambique and Tanzania rose rapidly, but since then has declined steeply in both countries. By 1981 output from Mozambique and Tanzania was less than one third the peak level. The effect on world trade of the declining production in East Africa has been a rising trend in international prices. Also, because of the development of processing industries in all the major producing countries, the price of the raw nut has increased faster than that of the processed kernel. In both Tanzania and Mozambique the decline in production has led to substantial losses of potential foreign exchange earnings. In Tanzania, the other immediate and more serious consequence relates to the under utilization of processing capacity. An ambitious programme of expansion of the existing processing industry was initiated in 1974 which involved the construction of 10 new factories financed by international loans. The country now has a total rated processing capacity of 113 000 t against a production in 1982/83 of between 32.33 000 t. In spite of the favourable world market situation, however, improved management, marketing and research are required to realize this potential.

DE DESCRIPTORS: Cashews. Production-possibilities. constraints. East-Africa. Tanzania. Mozambique. Conferences. advancing-agricultural-production-in-Africa. CAB.

YR YEAR: 1984.

62

AN ACCESSION NUMBER: 841811107. 8400.

HC HARDCOPY:

World Agricultural Economics & Rural Sociology Abstracts RECORD NO. OR026-03809.

TI TITLE: Cashew development in India: potentialities and constraints.

AU AUTHORS: Kanan-K-P.

SO SOURCE: 1983. viii + 152pp.

PB PUBLISHER: New Delhi, India; Agricole Publishing Academy.

LG LANGUAGE: English (EN).

AB ABSTRACT: The study examines the development prospects of the cashew industry in Kerala. Data obtained both from primary and secondary sources were used in the analysis. A major finding of the study is that the Government policy for the import of nuts is not in consonance with the emerging trends in world markets for kernels and availability of raw nuts and their use in various producing countries. The potential for increasing the output of cashews in India remains largely untapped. Despite high levels of profitability in cashew processing, workers. wage levels have been quite low and working conditions very poor.
DE DESCRIPTORS: Cashews. production-possibilities. India. Kerala.
YR YEAR: 1983.

66
AN ACCESSION NUMBER: 840322003. 8400.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C054-05860.
Soils and Fertilizers RECORD NO. 0S047-09240.
TI TITLE: Root proliferation in cashew seedlings as influenced by soil texture.
AU AUTHORS: Kumar-P-H. Khader-K-B-A.
IN AUTHOR AFFILIATION: Central Plantation Crops Research Institute. Vittal, India.
SO SOURCE: Indian Cashew Journal, 1983, 15, (2), 7..14.
LG LANGUAGE: English (EN).
AB ABSTRACT: Seedlings were raised in 7 different soils and data are tabulated on the depth of root penetration, percentage of roots produced and lateral root spread on the 12th and 24th day after planting. Root development is also illustrated diagrammatically. The best root development occurred in loamy sand and the next best in laterite brick powder.
DE DESCRIPTORS: seedlings. production. growing-media. Cashews. soil-texture. roots. responses. development.
YR YEAR: 1983.

68
AN ACCESSION NUMBER: 83R950966. 8300.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R025-01049.
TI TITLE: An econometric analysis of Indian export-share of cashew kernels in the world trade.
AU AUTHORS: Sandhu-H-K.
IN AUTHOR AFFILIATION: Agricultural Finance Corporation Ltd., New Delhi. India.
SO SOURCE: Indian Journal of Agricultural Economics. 1982. 37, (3). 300-306.
LG LANGUAGE: English (EN).
AB ABSTRACT: The paper estimates the export demand, income and export market share elasticities for cashew kernels in important markets for Indian exports, using time-series data -- a double logarithmic function. An exercise was carried out to snag exchange rate fluctuations, domestic inflationary trends. Currency devaluations and other transitory trend effects by converting the unit values into SDR values. Structural and directional transformations were also incorporated in the model. Derived demand estimates for Indian cashew were worked out with regard to (1) export demand and income elasticities in general for the period 1950/1951

to 1979/1980. (2) export demand and income for the period 1955/1951 to 1979/1980. Elasticities in the USSR market in US markets in comparison with (3) export market share elasticities in US markets in comparison with Mozambique and Brazil during 1954/1955 to 1979/1980 and (4) in world trade during 1955/1951 to 1979/1980. The average growth rate of exports of cashew kernels is estimated at 3.8% per annum. The Indian export price elasticity is estimated at -0.5115, indicating an anticipated trend in respect of price resistance from Brazilian exports. Demand for cashew in the USSR is found to be neither price responsive nor income elastic. The results showed a better bargaining position in favour of Brazilian and Mozambique exports to US markets. The world export market share elasticity is estimated at 0.7247, and significant at the 5% level, indicating the competitive behaviour of the Indian market share. A few suggestions are made for maintaining or improving its existing market share of cashew kernel exports.

DE DESCRIPTORS: cashews. exports. terms-of-trade. India.
YR YEAR: 1982.

69

AN ACCESSION NUMBER: 83R950907. 8300.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R025-01048.
TI TITLE: Cashew in India's export trade.
AU AUTHORS: Sridharan-B.
IN AUTHOR AFFILIATION: Agricultural Development Department, Union Bank of India, Bombay, India.
SO SOURCE: Indian Journal of Agricultural Economics. 1982, 37, (3). 317-322.
LG LANGUAGE: English (EN).
AB ABSTRACT: An analysis of India.s export trade in cashew nuts showed a steady increase in net foreign exchange earnings from the export of cashewkernels from Rs 226.5 mill to Rs 1280 mill during the Period 1970-1978. India.s share in the world export trade in cashew kernels declined from 95% in 1960 to about 37% in 1978 and around 48% in 1980. One of the causes for the declining share of India in world exports of cashew is the dwindling imports from East African countries. The need is emphasized to diversify the national export trade in cashew and improve the production of cashew nuts.

DE DESCRIPTORS: cashews. exports. India.
YR YEAR: 1982.

71

AN ACCESSION NUMBER: 83R025685. 8300.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R025-05914.
Rural Development Abstracts RECORD NO. 2R006-02830.
TI TITLE: Marketing costs and the processing of cashew nuts in Tanzania; an analysis of the marketing margin and the potential level of the producer price.
AU AUTHORS: Ellis-F.

SO SOURCE: Development Studies Discussion Paper, University of East Anglia. 1981, (No. 89). 50pp.
LG LANGUAGE: English (EN).
AB ABSTRACT: The paper is concerned with the marketing and processing cost side of contemporary problems confronting the cashew nut economy in Tanzania. Its perspective is closely related to the findings of an earlier paper which examines the reasons for the deterioration of cashew nut production between 1974 and 1979. The point of reference common to both papers is the need for a substantial increase in the level of the price paid to growers. The detailed analysis of cost structure reveals that, contrary to previous projections, there exists a sufficient surplus within the future marketing margin to raise the producer price to a level in the region of 2.50 sh per kg. This conclusion is partly dependent on an effective control of the future costs of processing cashewnuts, consistent with the reasonably efficient utilization of the technology employed. It is argued that the potential producer price of 2.50 sh should be implemented instead of the level already decided of 1.80 sh per kg for the 1980/81 crop season, and that without such a price increase the already serious crisis in the cashew economy could assume catastrophic proportions in the mid-1980s.
DE DESCRIPTORS: cashews. marketing-margins. processing. producer-prices. Tanzania.
YR YEAR: 1981.

72
AN ACCESSION NUMBER: 83R025669. 8300.
HC HARDCOPY:
World Agricultural Economics & Rural Sociology Abstracts RECORD NO. 0R025-06195.
Rural Development Abstracts RECORD NO. 2R006-02762.
TI TITLE: A preliminary analysis of the decline in Tanzanian cashew nut production, 1974-79: causes, possible remedies and lessons for rural development policy.
AU AUTHORS: Ellis-F.
SO SOURCE: Development Studies Discussion Paper, University of East Anglia, 1981, (No. 88), 30pp.
LG LANGUAGE: English (EN).
AB ABSTRACT: The paper outlines a new programme of agricultural research carried out by a multidisciplinary team of scientists at the International Centre for Agricultural Research in the Dry Areas (ICARDA) based at Aleppo in Northern Syria. This research formed part of the whole ICARDA programme which, in turn, is part of a coordinated effort to stimulate the evolution ofmore stable andproductive management of agricultural systems throughout the Mediterranean Region. The approach and methodologies discussed are intended to contribute to the understanding of the complexity of problems surrounding present resource use and misuse and perhaps lead to the identification of some of the real causes of degredation and the undermining of the resource base in some areas. It may also suggest alternative solutions to those presently advocated. The limited role that formal agricultural research efforts can play in improving the present situations is first emphasized. Without an understanding of the factors involved and their interactions, agricultural research is likely to

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continue to reinforce and support the present narrow objective of output maximization through methods of production that are exploitative and destabilizing rather than conservative, people oriented and stable.
DE DESCRIPTORS: interdisciplinary-research. agricultural-research. cashew. rural-development. Tanzania.
YR YEAR: 1981.

74
AN ACCESSION NUMBER: 83C157369. 8300.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C053-07467.
TI TITLE: Prospects of cashew 'apple' processing and utilization in Nigeria.
AU AUTHORS: Ogunmoyela-O-A.
SO SOURCE: Process Biochem., 1983, 18, (2), 6-7.
LG LANGUAGE: English (EN).
AB ABSTRACT: The nutritional significance, processing applications and utilization prospects for cashew apples in Nigeria are discussed. There appears to be considerable potential for cashew apple, which is particularly rich.in vitamin C.
DE DESCRIPTORS: fruit. composition. ascorbic-acid. Plant-composition. nutritional-value. cashews.
YR YEAR: 1983.

75
An ACCESSION NUMBER: 83C156885. 8300.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C053-07464.
TI TITLE: New cultivation techniques for cashew (Anacardium occidentale L.).
AU AUTHORS: Eijnatten-C-L-M-van. Abubaker-A-S.
AUTHOR AFFILIATION: Agricultural University, Wageningen, Netherlands.
SO SOURCE: Netherlands Journal of Agricultural Science, 1983, 31. (1)
LG LANGUAGE: English (EN).
AB ABSTRACT: The cashew tree produces its fruits at the Periphery of the canopy but experiments in Kenya showed that increasing planting distances from 6 to 15 m did not influence yields/ha although they led to increased yields/tree. Productivity can be much increased, however, by planting cashews in hedge rows 9 to 12 m apart with 2 to 3 m within rows and using a clonal cashew cv. It is estimated that for the first 5 years of a new plantation gross margins would be 459, 519, 2827 and 2244 sh/ha annually, respectively, for traditional growing without charcoal production, traditional growing with charcoal production (from prunings at rejuvenation or replacement), hedge rows at 9 m. and hedge rows at 12 m.
DE DESCRIPTORS: cultural-methods. Kenya. yields. correlation. spacing. responses. cashews. Kenya.
YR YEAR: 1983.

76
AN ACCESSION NUMBER: 83C146626. 8300.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C053-06226.
TI TITLE: The processing of a date-like caramel from cashew apple.
AU AUTHORS: Ortiz-N-A-J. Cooke-R-D. Quiros-M-R-A.

IN AUTHOR AFFILIATION: Universidad de Costa Rica, San Jose, Costa Rica.
SO SOURCE: Tropical Science, 1982, 24. (1), 29-.38.
LG LANGUAGE: English (EN).
LS LANGUAGE SUMMARY: French (FR). Spanish (SP).
AB ABSTRACT: Utilization of the cashew apple or false fruit (normally discarded as waste) for caramel production is discussed. World annual production of cashew apple is estimated to range between 2.5 to 5 million tons.
DE DESCRIPTORS: plant-residues. processing. cashews. products. confectionery. confectionery.
YR YEAR: 1982.

77
AN ACCESSION NUMBER: 83C131262. 8300.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C053-04612.
TI TITLE: Operative long.range plan for cashew rehabilitation and expansion in Tanzania.
AU AUTHORS: Faenza-V.
IN AUTHOR AFFILIATION: Istituto Agronomico per l'Oltremare, Florence, Italy.
SO SOURCE: Rivista di Agricoltura Subtropicale e Tropicale, 1982, 76, (3/4). 179-189.
LG LANGUAGE: English (EN).
LS LANGUAGE SUMMARY: Italian (IT).
AB ABSTRACT: The production of cashews, one ofTanzania's four main export crops, has recently declined. A 30-year plan for research and rehabilitation is outlined. Special attention will be paid to breeding, propagation, land suitability, crop protection and expansion.
DE DESCRIPTORS: cashews. cultural-methods. Tanzania. Tanzania.
YR YEAR: 1982.

78
AN ACCESSION NUMBER: 83C125734. 8300.
HC HARDCOPY:
Horticultural Abstracts RECORD NO. 0C053-03747.
TI TITLE: Fermentation ethanol: an industrial profile.
AU AUTHORS: Adams-M-R. Flynn-G.
IN AUTHOR AFFILIATION: Tropical Products Institute, 56/62 Gray's Inn Road. London. UK.
SO SOURCE: Report of the Tropical Products Institute, 1982, (No. G169), 26 PP.
LG LANGUAGE: English (EN).
LS LANGUAGE SUMMARY: French (FR). Spanish (SP).
AB ABSTRACT: Raw materials, world production of fermentation ethanol, non-fuel uses, processing and byproducts are among the aspects discussed in this report. Data include the alcohol yields from various crops including bananas, cashews, cocoa, mangoes, sugarcane, nipa palms and pineapples.
DE DESCRIPTORS: bananas. cashews. cocoa. mangoes. sugarcane. Nypa. pineapples. products. alcohols. production. surveys. tropical-crops. alcohols.
YR YEAR: 1982.

82

AN ACCESSION NUMBER: 82C082903. 8200.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. OC052-07594.

TI TITLE: Increasing production of perfect flowers in cashew by treatment with gibberellic acid and maleic hydrazide.

AU AUTHORS: Panda-J-M. Pal-H-K.

IN AUTHOR AFFILIATION: Orissa University of Agriculture and Technology, Bhubaneswar-751 003, India.

SO SOURCE: Science and Culture, 1982, 48, (2), 66-67.

LG LANGUAGE: English (EN).

AB ABSTRACT: In trials with 5-year-old trees of the cashew cv. M-16/3. GA3 at 10.30 p.p.m. or MH at 500.2000 p.p.m. was applied twice at 10-day intervals to the buds and leaves in early January. The highest GA3 concentration and MH at 1500 p.p.m. increased the number of perfect flowers from 7.8% in the control to 19 and 20%, respectively.

DE DESCRIPTORS: growth-substances. flowering. GA. MH. cashew.

YR YEAR: 1982.

84

AN ACCESSION NUMBER: 82C048323. 8200.

HC HARDCOPY:

Horticultural Abstracts RECORD NO. OC052.04389.

TI TITLE: Evaluation of cashew apples of high yielding types for alcoholic beverages.

AU AUTHORS: Vilasachandran-T. Damodaran-V-K.

IN AUTHOR AFFILIATION: Kerala Agricultural University, Vellanikkara, Kerala, India.

SO SOURCE: Indian Cashew Journal, 1981, 13, (4), 4-7.

LG LANGUAGE: English (EN).

AB ABSTRACT: The ratio of apple to kernel in cashews is about 7:1 and the annual production of cashew apples in India is about one million tonnes. The physical and chemical characteristics of the apples of 16 cashew types were determined and the data are tabulated. Type M6/1 had the highest expected alcohol content.

DE DESCRIPTORS: India. fruit. composition. varieties. cashew. processing.

YR YEAR: 1981.

ANNEX 5

CASHEW CITATIONS FROM POSTHARVEST INSTITUTE FOR PERISHABLES

P.I.P.
Postharvest Institute for Persishables
University of Idaho
College of Agricultural
Moscow, ID 83843 U.S.A.

Telephone number: (208) 885-7059
FAX number: (208) 885-6624

Order #	F00569
Author	Vandendriessche, Henri
Title	Tropical Fruit Products.
Source	From Tropical Fruit Processing Industry, Case Studies of the Industry in Developing Countries. Development Centre of the Organization for Economic Co-operation and Development. Paris, France. 1976. P 15-28.
Subject	Mangos, Guavas, Papayas, Passion Fruit, and Cashew Apples.

Order #	F01014
Author	Ortiz, N. Alberto J.; Cooke, Rodney D.; Quiros, M. Ricardo A.
Title	The Processing of a Date-Like Caramel from Cashew Apples. (11 P. 1982). Rates of the Osmotic & of the Forced Air & Sun-Drying Processes.
Source	Tropical Science - A Quarterly Journal on Renewable Resources.
Subject	Cashew Apple 1160 Q10.

Order #	F01103
Author	Swamy, Vaidehi; Gowda, Annapurna R.; Fijayamma R.
Title	Utilization of Unconventional Fruits for the Preparation of Ready-To-Drink Beverages. Part I. (9 P. 1977) Woodapple, Chakota, Cashew Apple, Kamardrashi, Habbalasu, Punarpuli, Famnerale, Yelachi and Passion Fruits.
Source	Indian Food Packer. V 31. N 3. 1977. P.38-46. Q10.

Order #	F01194
Title	Cashew Nut Processing In Senegal. (1 p. 1982.) Description of Decorticating Plant & Ancillary Equipment at Kaolack in Senegal.
Source	The Crown Agents Quarterly Review. Summer, 1982. P 26.
Subject	Cashew Nuts 1220. N10. Q10.

Order #	F01277
Title	Anacardium Occidentale L.; (6 P. 1982.) Family. Vernacular Names. Origin & Distribution. Ecology. Botanical Characteristics. Cultural Requirements. Wood. Uses. Bibliography.
Source	In Fruit-Bearing Forest Trees. Technical Notes with the Assistance of the Swedish International Development Authority. Fad Forestry Paper No. 34. Rome: Food & Agriculture Organization of the United Nations. 1982. P 5-9
Subject	Cashews 1160. S10.

Order # F01443
Title Questions and Answers. (1 P. 1984.) Cashew Apple. Anacardium Occidentale. Cashew Apple Wine. Cashew Apple Brandy. Address for more information.
Source Life. League for International Food Education. V 17. N 5. October-November 1984. P 3/4.
Subject Cashew Apple 1160

Order # F01567
Title The Processing of a Date-Like Carmel from Cashew Apple. (10 P. 1982.) Rates of Osmotic & Forced Air and Sun Drying. Taste Panel Analyses.
Source Topical Science. V 24. N 1. 1982. P 29-30.
Subject Cashew 1160 Q10

Order # F01725
Author Prabhakaran A.
Title Cashew Apple in New Perspective. (2 P. 1977. Research.) Uses. Research in Progress. Research Needs. Commercialization.
Source Indian Cashew Journal. V 11. N 2. June, 1977. P. 15-16.
Subject Cashew Apples 1160 F60

Order # F01726
Author Johnson, Dennis.
Title Cashew Apple Products in Brazil. (3 P. 1977. General.) Preserves. Juices. Wine. Stewed Apples. Doce. Caju Cristilado. Cajo Ameixa. Jelly. Cajuada. Cajuina. Meal (Flour). Shrimp Bait. Medicinal Uses.
Source Indian Cashew Journal. V 11. N 2. June, 1977. P. 5-7.
Subject Cashew Apples 1160 Q02

Order # F01769
Title Market Briefs for Selected Products: Fruits. (9 P. 1985. Introduction.) Part of G03430. Brazil Nuts 1215. Cashew Nuts 1220. Pineapples 1126. Avocados 1110. Mangoes 1120. Guavas 1116. Mangosteen 1190. Commercial Level.
Source Hungary: A Market for Products from Developing Countries. International Trade Centre UNCTAD/GATT. Geneva, Switzerland. 1985. P. 53-61.
Subject Export Marketing E17

Order # F01910
Author Bernhardt, Lutz, Walter
Title Industrialization of Cashew Apple Fruit. (15.) Portuguese with Portuguese and English Summaries.
Source Coletanea Do Instituto De Tecnologia De Alimentos. V. 4. 1971/72. P. 47-61.

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Subject	Cashew Apples 1160
Keywords	Syrup. Juice. Extraction Methods. Hydraulic Press. Screw Press. Hot Filling. Spin Cooking.
Tech	Commercial Level. Intermediate Technology. Research.
Catcode	Q02. E21.

Order#	F01961
Author	Ascenso, J.C.
Title	Potential of the Cashew Crop. (4 P.)
Source	Agricultural International. V. 38. N. 1. 1986. P. 324-327.
Subject	Cashews 1220
Keywords	East Africa. India. Brazil. World Production. Productivity. Yields.
Tech	Commercial Level. General.
Catcode	E16. E21. E70. E71.

Order #	F02020
Author	La Gra, Jerry; Marte, Rafael
Title	Commodity Analysis. (11 P.) Part of F02018.
Source	InterAmerican Institute for Cooperation on Agriculture. The Fruit Subsector in the Windward Islands. St Lucia. July, 1987. P. 99-109.
Subject	Tropical Fruits 110
Keywords	Mangoes, Avocadoes, Grapefruits, Lime, Orange, Breadfruit, Papaya, Passion Fruit, Soursop, Pineapple, Carambola, Cashew, Mangosteen, Rambutan, Pullasan, Langsat, Durian, Market, Crop Adaptability, Pests and Disease, Cultivars.
Tech	Commercial Level. General.
Catcode	E70. H10. H20. J11.

Order #	F90196
Title	(Studies on Tropical Fruit Trees.) French only. Storage and Processing. Avocado 1110. Mango 1120. Papaya 1122. Guava 1116. Cashew Nut 1220. Dates 1114. Mangosteen 1190. Litchi 1118.
Source	Fruits. V 33. N 9. 1978. P 547-665. (Entire Issue.)
Subject	Tropical Fruit 1100 File 51 190744 80-9-J1194

Order #	F90201
Author	Benk, E.
Title	Uber Weniger Bekannte Tropische, SubTropische Und Sonstige Ueberseeische Obstfruechte. German only. Lesser Known Tropical, subtropical and other Fruits from Overseas. Tamarillo 1190. Cape Gooseberry 1190. Carambola 1190. Cashew Apple 1160. Cornelian Cherry 1190. Mangosteen 1190. Rambutan 1190. Sapote 1190. Loquat 1119.
Source	Riechstoffe, Aromen, Kosmetica. V 29. N 1. 1979. P 11-12.
Subject	Tropical Fruit 1100 File 51 174533 79-10-J1750

95

Order #	F90207
Author	Menninger, E.A.
Title	The Cashew and Some of its Relatives
Source	Edible Nuts of the World. Stuart, Florida USA: Horticultural Books
Subject	Cashew Nuts 1220 File 51 165399 79-4-J559

Order #	F90212
Author	Phang, S.
Title	Polarographic Determination of the Vitamin C Content of Some Malaysian Fruits. Melaka (Euphorbiaceae) 1190. Cashew Nuts 1122. Guava 1116. Durian 1115. Papaya 1122. Lime 1040. Pomelo 1062. Pineapple 1126. Tomato 1850. Hog Plum 1190. Soursop 1105. Sapodil Sapodilla 1190. Water Apple 1190. Mandarin 1060. Star Fruit 1190. Langsat 1190. Belimbing Asam 1190. Malay Gooseberry 1190. Banana 1112. Jackfruit 1835.
Source	Malaysian Agricultural Journal. V 50. N 4. 1976. P 442-228.
Subject	Nutritional Analysis File 51 154337 78-9-J1247

Order #	F90213
Author	Morales De Leon, J.C.
Title	(Tropical Fruits: Characteristics and Physico-Chemical Properties.) Spanish only. Nutritive Value. Organoleptic Properties. Encouraging Utilization. Avocado 1110. Banana 1112. Custard Apple 1105. Cashew Apple 1160. Cherimoya 1105. Giant Granadilla 1123. Guava 1116. Mango 1120. Mammee Apple 1190. Papaya 1122. Passion Fruit 1123. Flantain 1112. Pineapple 1126. Pomerac 1190. Soursop 1105. Sapodilla 1190. Sapote 1190. Sugar Apple 1105. Tamarind 1150. Yellow Mombin 1190. West Indian Cherry 1190.
Source	Tecnologia De Alimentos. V 11. N 5. 1976. P 205-206, 208-212, 214-223.
Subject	Tropical Fruits 1100 File 51 142511 77-12-J1910 File 50 909749 U48-7274

Order #	F90272
Author	Samson, J.A.; Chandler, W.H.
Title	Tropical Fruits. Book. Avocadoes 1110. Mangoes 1120. Cashews 1220. Citrus 1000. Banana 1112. Pineapple 1126. PawPaw 1122.
Subject	Tropical Fruits 1100 File 50 1245238 C51-3

Order # F90277
Author Alexander, M.; Possingham, J.V.
Title The Potential for Horticulture in Tropical Australia. Mangosteen 11 Durian 1115. Lychee 1118. Rambutan 1190. Longan 1190. Custard Apple 1105. Soursop 1105. Breadfruit 1108. Sapodilla 1190. Sapota 1190. Persimmon 1124. Brazil Nut 1215. Cashews 1220. Macadamia 1235. Crop Introduction. Preliminary Screening Methods.
Source Journal of the Australian Institute of Agricultural Science. V 40. N 1. 1974. P 36-42.
Subject Tropical Fruits 1100 Edible Nuts 1200 File 50 404777 R17-2604

Order # F90311
Author Gaillard, J.P.
Title Etudes Sur Les Frutiers Tropicaux (Autres Que Bananiers, Ananas, Citrus). French. Studies on Tropical Fruits Other Than Bananas, Pineapple, and Citrus. Mango 1120. Papaya 1122. Guava 1116. Cashew 1160. Mangosteen 1190. Rambutan 1190. Passion Fruit 1123. Avocadoes 1110. Dates 1114. Litchis 1118. Solanum Quitoense 1090.
Source Fruits. V 33. N 9. 1978. P 543-665.
Subject Tropical Fruits 1100 File 50 983138 C49-3830

Order# G01825
Author Neese, Harvey C.; Leeper, Donald S.
Title Marketing Survey of Thai Processed Fruits and Vegetables. (119 P. 1983.) Available in Microfiche only. U.S., Japanese, Singapore, and Hong Kong Market Development Potentials. Specifications and Standards for U.S. Markets. Guava 1116. Mango 1120. Papaya 1122. Pineapple 1126. Litchee 1118. Longan 1190. Asparagus 1610. Straw Mushrooms 1885. Cashews 1160.
Source Agri-Food Systems International, Inc. for the Postharvest Institute for Perishables. University of Idaho. Gts Report No. PIP/Thailand/ Nov. 82/No. 14. Moscow, Idaho. May, 1983. 115 + V PGS.
Subject Marketing E70 Q10

Order # G02992
Title Survey of Agro-Industries Investment Opportunities and Constraints. 4530. Herbicides 3876. Pesticides 3885. Cashew Nuts 1220.
Source Development Services Limited and Industrial Market Research Services. Unpublished report prepared for USAID/Bangkok. Thailand: U.S. Agency for International Development. May, 1982. 92 P.
Subject Agribusiness E10

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Order #	M00449
Author	Cheema, L.S.; Ribeiro, C.M.C.
Title	Solar Dryers of Cashew, Banana and Pineapple.
Source	Proceedings of the International Solar Energy Society Congress. Volume Three. New Delhi, India. January, 1978. P 2075-2079.
Subject	Bananas. Pineapples. Cashews.

Order #	N00006
Title	Edible Oils, Oilseeds and Edible Nuts. (3 P. 1979) TPI Biannual Report. Oil Palm Products. Cottonseed. Cashew Nuts. Macadamia. Small-Scale Processing of Oilseeds. World-Wide Study of Vegetable Oils & Fats Industry. Oilseed Development in Kenya. Coconuts.
Source	In Halliday, D. (Editor). Report of the Tropical Products Institute 1976 - 78. London. 1979. P 18-21.
Subject	Nuts and Oilseeds

Order #	N00007
Title	Edible Oils, Oilseeds and Edible Nuts. (4 P. 1977) TPI Biannual Report. Oil Palm Products. Cottonseed. Groundnuts. Cashew. Processing Macadamia Nuts. Small-Scale Processing. Trainees.
Source	In Halliday, D. (Editor). Report of the Tropical Products Institute 1974 - 76. London. 1977. P 17-20.
Subject	Nuts and Oilseeds

Order #	N00088
Author	Russel, D.C.
Title	Cashew Nut Processing.
Source	Food and Agriculture Organization of the Untied Nations. FAO Agricultural Services Bulletin No 6. Rome. 1969. 86 P.
Subject	Cashews.

Order #	N00157
Author	Wilson, Roger J.
Title	The Market for Cashew - Nut Kernels and Cashew - Nut Shell Liquid. (120 P. 1975.)
Source	Tropical Products Institute. Publication G 91. April, 1975. 120 P.
Subject	Cashews

Order #	N00199
Author	Rubio, P.
Title	Research Focuses Anew on Cashew. (1 P. 1982.)
Source	Philippine Council for Agriculture and Resources Research. Monitor. W 10. N 1. January, 1982. 5 P.

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Subject	Cashews
Order #	N00274
Title	World Brazil Nut and Cashew Nut Situation. (5 P. 1982.) Supply. Distribution. Pricing. Export Markets. Imports. Statistics.
Source	Foreign Agriculture Circular: Horticultural Products. Fhort 1-82. August, 1982. P 18-22.
Subject	1220 Cashews 1215 Brazil Nuts E70

Order #	N003303
Author	Gough, M.C.; Lippiatt, Georgina A.
Title	Moisture Humidity Equibibria of Tropical Stored Produce. Part II - Oilseeds. (13 P. 1977.) Cashew Nuts. Copra. Cottonseed. Groundnuts. Macadamia Nuts. Palm Kernels. Pecan Nuts. Rapeseed. Sunflower Seed.
Source	Tropical Stored Products Information. V 34. 1977. P 49-61. H70

Order #	N00321
Title	Cashew Nut Sheller. (3 P. 1981.) Thai and English.
Source	In Village-Level Technology for Better Life and Higher Income. Thailand Programme Office. UNICEF-EAPRO. Bangkok. February, 1981. P 15-16.
Subject	Cashews 1220 Appropriate Technology N20

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ANNEX 6

CASHEW CITATIONS FROM A.I.D. USER SERVICES

A.I.D.
User Services
A.I.D. Document & Information Handling Facility
7222 47th Street
Chevy Chase, MD 20815 U.S.A.

Telephone number: (301) 951-7191
FAX number: 301-951-9624

PN-ABC-877 Progress/Interim Report ISN-61824

Progress report no. 5: cashew nut compact sized sheller, a research report, grant no. 936-5544-G-00-5086-00

Thivavarnvongs, Thavachai; Sarig, Yoav; Chinsuwan, Winit

Khon Kaen University. Faculty of Engineering. Dept. of Agricultural Engineering, Khon Kaen,

U.S. Agency for International Development. Office of the Science Advisor, Washington, D.C., (Sponsor)

1988, 13p. + 3 attachments: ill., En. AID/SCI no. C5-301

Attachments are progress reports 2 (Apr - Sep 1986), 3 (Oct 1986 - Mar 1987) and 4 (Apr - Sep 1987)

Evaluation period: Oct 1987 - Mar 1988

9365544

936-5544-G-00-5086-00

Microfiche cost: $1.08

Paper copy cost: $12.22

PN-ABC-413 AID Supported Study ISN-60979

Management perspectives for agricultural research

Felton, Edward L., Jr., ed.; Hobbs, S. Huntington IV, ed.

International Service for National Agricultural Research, The Hague,

U.S. Agency for International Development. Bureau for Science and Technology. Office of Agriculture, Washington, D.C., (Sponsor)

Training series, no. 1, Apr 1989, xiii, 400p.: charts, statistical tables, En

PB90-105370,

936411113

* International Service for National Agricultural Research, P.O. Box 93375, 2509 AJ, The Hague, Netherlands

Microfiche cost: $5.40

Paper copy cost: $53.30

A series of common management problems and concepts useful in solving them are featured in this collection of 14 case studies on agricultural research management in developing countries. The book has four principal sections, each presenting a different management perspective capable of serving as an analytical tool for decision making: (1) a marketing perspective, which targets the consumers of agricultural research; (2) a partnership perspective, which seeks to maximize public and private sector linkages; (3) a systems perspective, intended to meet the challenges of a changing environment; and (4) integrating new perspectives to meet the challenge of implementation. Each section begins with a chapter about the managerial perspective on which the section focuses, followed by three case studies in which the perspective has proven valuable. The book also includes an introduction on the use of management perspectives in agricultural research management and a final overview on the application of management perspectives and on emerging trends and challenges facing agricultural research managers; each contains a case study. All the case studies have been tested in two ways - by use in management training seminars for leaders of agricultural research in Africa, Latin American, and Asia, where they have been

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well-received; and through discussions with the people represented in the case and with other research managers. (Author abstract, modified)

Descriptors: Agricultural research, Research management, Management methods, Research utilization, Public sector, Private sector, Systems approach, Rice, Dominican Republic, Ecuador, Farming systems research, Agricultural prices, Maize, Mexico, Kenya, Seed production, Agribusiness, Biotechnology, Potatoes, South America, Wheat, Research organizations, Organizational structure, Tanzania, Cashews, Cassava, Colombia, Nigeria, Institutional aspects, Beans, Nile River, Horticulture, Research centers, Philippines.

PN-AAW-708 AID Supported Study ISN-49238

Informe sobre un programa de produccion, cosecha, procesamiento y administracion del cultivo del maranon, Anacardium occidental (Report on a program of production, harvesting, processing and culture management of the cashew tree, Anacardium occidentale)

Agricultural Services and Development, Ltd., San Jose,

U.S. Agency for International Development. Bureau for Latin America and the Caribbean, Honduras, Tegucigalpa, (Sponsor)

May 1986, 113p.: ill., charts, statistical tables, Es

Microfiche not available - faded type

Descriptors: Crop production, Cashews, Rural development, Honduras, Harvesting, Plantations, Agricultural development, Agricultural management, Cash crops, Cropping systems, Food processing, Agricultural product marketing, Economic analysis, Employment, Feasibility studies.

PN-AAW-467 Reference Work ISN-48480

Cashew descriptors

International Board for Plant Genetic Resources, Rome,

U.S. Agency for International Development. Bureau for Science and Technology. Office of Agriculture, Washington, D.C., (Sponsor)

Jul 1986, v, 33p.: ill., En

936411111

* IBPGR c/o FAO, Via delle Terme di Caracalla, 00100 Rome, Italy. Available free

Microfiche cost: $1.08

Paper copy cost: $4.68

Descriptors: Genetic resources, Plant genetics, Cashews, Reference materials, Biogeography, Genetic resource conservation, Data bases, Disease resistance, Biochemicals, Cytology, Pest resistance.

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PN-AAQ-594 Directory/Catalogue ISN-35844

Tropical and subtropical fruits and tree nuts

Gulick, P.; van Sloten, D.H.

International Board for Plant Genetic Resources, Rome,

U.S. Agency for International Development. Bureau for Science and Technology. Office of Agriculture, Washington, D.C., (Sponsor)

Directory of germplasm collections, v. 6(1), Jun 1984, vi, 191p., En. AGPG:IBPGR/84/85

NTIS: PRB6-228566,

9310056; 936411111

* IBPGR c/o FAO, Via delle Terme di Caracalla, 00100 Rome, Italy. Available free

Microfiche cost: $2.16

Paper copy cost: $24.57

This directory - one of a series on the major crops being issued by the International Board for Plant Genetic Resources (IBPGR) - lists international germplasm resource collections for tropical and subtropical fruits and tree nuts.

Fruits and nuts with the greatest global significance are catalogued individually, including avocado, banana and plantain, breadfruit and jackfruit, cashew, citrus, date, fig, mango, papaya, and pineapple. Those with lesser significance are grouped together in a final chapter. Each entry includes the institution's name and address, the curator or person in charge, and details of the samples; information on maintenance of the collection, duplication or other smaller collections, availability for exchange, quarantine restrictions, evaluation, and documentation is also provided. The directory - based on questionnaires, IBPGR data, published reports, seed indexes, and verbal communications - is incomplete; commercial and very small collections have been excluded, except when they contain unique material.

Descriptors: Tropical fruits, Nuts, Subtropical zone, Germplasm, Genetic resources, Avocados, Bananas, Plantains, Cashews, Citrus fruits, Dates, Mangoes, Papaya, Pineapples.

Identifiers: Breadfruit, Figs.

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ANNEX 7

TIME SERIES ON CASHEW PRICES FOR COUNT 320
AND LARGE WHITE PIECES

ANNEX TABLE VII-1

CASHEW PRICES

(US$ per Lb C&F)

Year	Months	Count 320	Large White Pieces
	O		
	N		
	D		
1980	J	2.44	1.71
	F	2.60	1.84
	M	2.51	1.89
	A	2.56	1.89
	M	2.69	1.97
	J	2.74	2.02
	J	2.76	2.07
	A	2.80	2.07
	S	2.83	2.01
	O	2.86	1.99
	N	2.90	2.05
	D	2.92	2.00
1981	J	3.03	1.96
	F	3.16	1.96
	M	3.26	1.85
	A	3.19	1.88
	M	3.30	1.71
	J	3.29	1.45
	J	3.25	1.34
	A	3.14	1.21
	S	3.05	1.16
	O	2.91	0.95
	N	3.15	0.76
	D	3.15	0.77
1982	J	3.04	0.89
	F	2.85	1.06
	M	2.78	1.21
	A	2.33	1.18
	M	2.21	1.15
	J	2.19	1.06
	J	2.41	1.20
	A	1.38	1.31
	S	2.27	1.30
	O	2.24	1.27
	N	2.02	1.15
	D	1.83	1.10

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ANNEX TABLE 1 (cont.)

1983	J	1.65	1.08
	F	1.61	1.07
	M	1.62	1.17
	A	1.64	1.14
	M	1.88	1.48
	J	1.87	1.59
	J	1.93	1.59
	A	2.08	1.60
	S	1.99	1.65
	O	2.27	1.73
	N	2.66	2.02
	D	2.55	1.89
1984	J	2.63	1.87
	F	2.41	1.81
	M	2.64	1.83
	A	2.60	1.80
	M	2.60	1.78
	J	2.53	1.77
	J	2.37	1.72
	A	2.26	1.66
	S	2.16	1.49
	O	2.03	1.41
	N	1.97	1.35
	D	2.16	1.28
1985	J	2.11	1.44
	F	1.86	1.31
	M	1.81	1.11
	A	1.94	1.18
	M	2.16	1.28
	J	2.37	1.47
	J	2.45	1.49
	A	2.52	1.64
	S	2.78	1.76
	O	2.84	1.84
	N	3.08	1.92
	D	3.21	1.94
1986	J	3.17	1.95
	F	2.98	1.91
	M	2.96	1.91
	A	3.04	1.91
	M	3.05	
	J	3.03	
	J	3.09	
	A	3.18	
	S	3.31	
	O	3.25	
	N	3.39	
	D	3.41	

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ANNEX TABLE 1 (cont.)

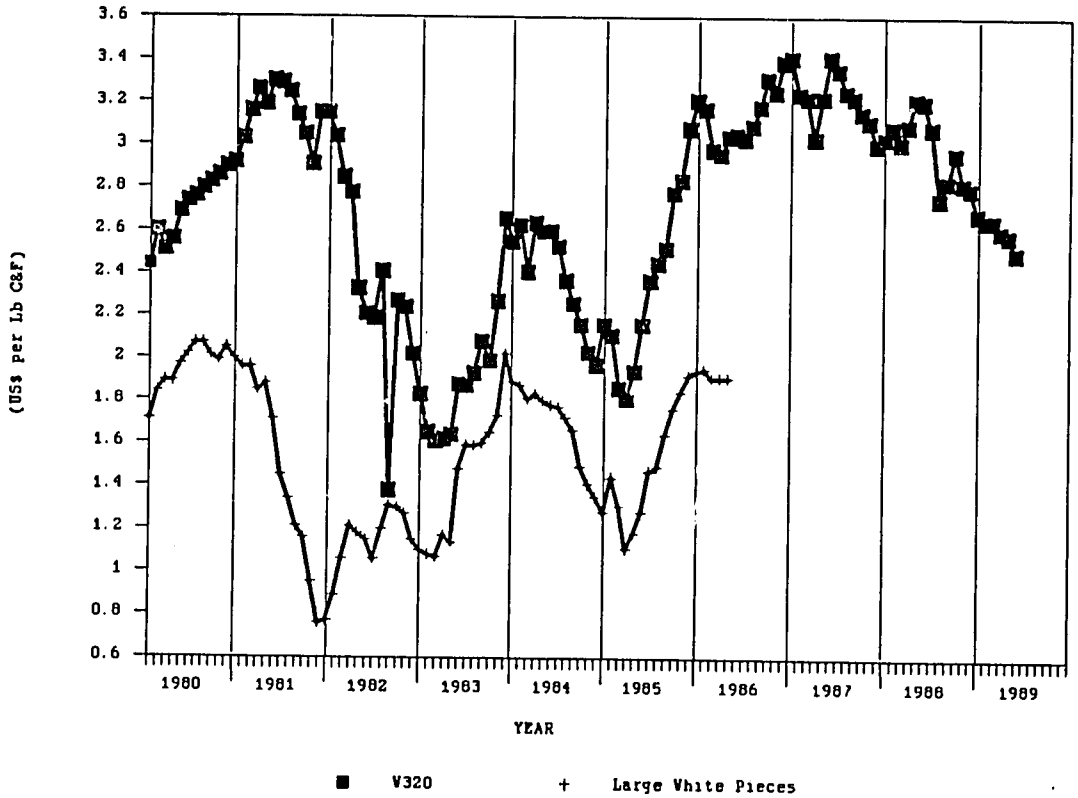
1987	J	3.24
	F	3.22
	M	3.03
	A	3.22
	M	3.41
	J	3.35
	J	3.25
	A	3.22
	S	3.15
	O	3.11
	N	3.00
	D	3.03
1988	J	3.08
	F	3.01
	M	3.09
	A	3.21
	M	3.20
	J	3.08
	J	2.75
	A	2.83
	S	2.96
	O	2.82
	N	2.80
	D	2.68
1989	J	2.65
	F	2.65
	M	2.60
	A	2.58
	M	2.50
	J	2.42
	J	2.31
	A	2.35
	S	2.25
	O	2.22
	N	2.24
	D	2.24
1990	J	
	F	
	M	
	A	
	M	
	J	

Source: Gill & Duffus Edible Nut Statistics; Edible Nut Market Reports.

ANNEX FIGURE VII-1

CASHEW PRICES

January 1880 through May 1989



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ANNEX 8

MID-MONTH WHOLESALE SPOT PRICES FOR
W320 IN NEW YORK AND LONDON

ANNEX TABLE VIII-1

MID-MONTH WHOLESALE SPOT PRICES

($ per Lb of W320)

Month	1986		1987		1988		1989	
	New York	London	New York	London	New York	London	New York	London
January	3.55	3.45	3.55	3.50	3.20	3.20	2.80	2.70
February	3.40	3.35	3.20	3.32	3.10	3.10	2.75	2.70
March	3.30	3.05	3.20	3.24	3.15	3.15	2.75	2.70
April	2.95	2.98	3.40	3.40	3.20	3.33	2.70	
May	3.20	3.10	3.60	3.58	3.10	3.20		
June	3.10	3.08	3.55	3.50	3.10	3.30		
July	3.30	3.15	3.50	3.35	3.10	2.85		
August	3.40	3.22	3.40	3.30	3.20	2.90		
September	3.65	3.38	3.25	3.20	3.20	2.95		
October	3.60	3.35	3.20	3.18	3.10	2.75		
November	3.60	3.45	3.10	3.10	3.05	2.80		
December	3.60	3.55	3.25	3.20	2.90	2.80		

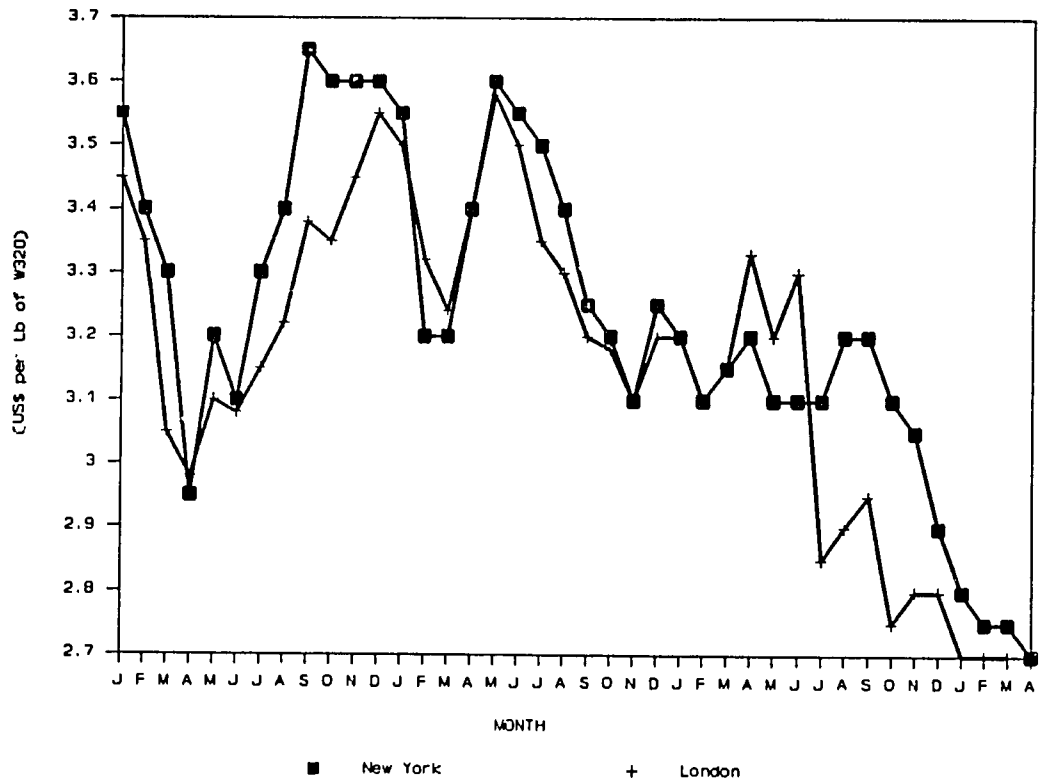
Source: Indian Cashew Journal

Notes: Prices are ex-warehouse less 1% discount to the buyer and 2% to brokers on re-sale.

ANNEX FIGURE VIII-1

W320 CASHEW PRICES

1986 through 1989



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ANNEX 9

SPECIFICATIONS FOR CASHEW KERNELS,
ASSOCIATION OF FOOD INDUSTRIES

Association of Food Industries, INC.
Established in 1906
177 MAIN ST. • P.O. BOX 776 MATAWAN, NJ 07747
201-583-8188 • TELEX 219262 • FAX 201-583-0798

SPECIFICATIONS FOR CASHEW KERNELS

GENERAL REQUIREMENTS

a. Each shipment inspected or released by FDA shall be of good quality, cleared by customs, and stored in accordance with good commercial practice.

b. The cashews shall be packed in new, clean, dry, leakproof containers with an airtight (hermetic) seal and without internal paper liners. Packaging shall be of sufficient strength to assure the integrity of the product during normal shipment and storage.

The outer container shall be constructed of a new cardboard, free of infestation and visual mold, and sealed without staples, unless otherwise specified by the end user.

c. Moisture levels of the cashews should be in the range of 3-5%.

d. All cartons shall be clearly marked on each end with the following:

1. Name of the product and trade name or brand name, if, any.
2. Name and address of producer or packer.
3. Grade
4. Net weight
5. Country or Origin
6. Buyer's name or marks
7. Destination
8. Crop year, and date of packing (if known)
9. Reference to AFI Specifications

e. Bill of Lading must list the number of cartons, source of origin, and the marks that are on the cartons.

f. All handling, processing, storage and transporting operations shall be conducted under those conditions of temperature and humidity necessary to preclude quality deterioration of the nuts. Fluctuations in temperature and relative humidity should be avoided to protect the integrity of the product. Fumigation is permitted in conformity with FDA regulations except that methyl bromide and EDB may not be used.

g. All shipments should be inspected prior to loading and shall be carried on conveyances suitable for transporting food products in good condition, i.e. free of odors, insect or mold damage, rodent activity, and all other foreign materials. Excessive breakage is avoided by control of moisture, proper storage, packing and handling. When it occurs it may reduce the grade contracted for to a lower grade.

DEFINITIONS

Wholes - Cashew nuts are whole provided that not more than 1/8 of the kernel is broken off. Although 7/8 kernels are permitted as "wholes", an excessive percentage would detract from the quality of the sampled lot and may be the basis for a claim.

WHOLE 7/8 7/8 BUTT BUTT

Splits - Cashew splits are whole splits provided not more than 1/8 of the split is broken off. Splits which are 3/4 or less are graded as pieces. Although 7/8 splits are permitted as "whole splits", an excessive percentage would detract from the quality of the sampled lot and may be the basis for a claim.

SPLIT 7/8 7/8 PIECE

Butts - Cashew butts are kernels which are broken crosswise in half and naturally attached. Butts which are <u>less than</u> 3/8 of a whole kernel lose the characteristic shape and appearance normally associated with butts and are generally scored as a piece.

BUTTS BUTT LESS THAN 3/8

Broken Kernel - one-quarter or more of the original kernel has been broken off.

Pieces - portions of kernels measuring less than one-quarter of a kernel.

Damage - any defect described in the specifications which materially detracts from the appearance of a kernel or of a lot, and lessens their marketing quality.

Shriveled - the kernel is materially shrunken, wrinkled, and tough.

Insect Injury - the presence of insects, frass or web, or evidence of boring.

Mold - a visible growth of mold either on the outside or the inside of the kernel.

Rancid - a visible breakdown of the oils in the kernels giving them an off taste.

Testa - skin adhering to any portion of the kernel.

Scorched - a darkening of the kernel from too much heat when kernel is shelled or blanched.

Spotting - on roasting spots or specks appear on the kernel.

FANCY OR FIRST QUALITY (WHOLE)

Indian/African Grade Designation	Brazilian Grade Designation	Count Per Lb. Size Description	General Characteristics
W180	SLW1	160-180	Cashew kernels shall have been obtained through shelling and peeling cashewnuts (Anacardium occidentale), shall have the characteristic shape; shall be white, pale ivory or light ash in color, reasonably dry, and free from insect damage, damaged kernels and black or brown spots. They shall be completely free from rancid kernels. The kernels shall be free from testa. They shall have a reasonably uniform appearance when roasted.
--	LW1	180-210	
W210	--	200-210	
W240	W1-240	220-240	
W320	W1-320	300-320	
W450	SW1 or W1-450	400-450	
--	W1	mixed sizes (210-400)	

Tolerance: Broken kernels and kernels of the next lower grade, if any, shall not together exceed 5 per cent at time of packing. Broken kernels shall not exceed 10% at port of entry/discharge.

SCORCHED OR SECOND QUALITY (WHOLE)

Indian/African Grade Designation	Brazilian Grade Designation	Count Per Lb. Size Description	General Characteristics
--	SLW2	160-180	Cashew kernels shall have been obtained through shelling and peeling cashewnuts (Anacardium occidentale), shall have the characteristic shape; shall be reasonably dry and free from insect damage, damaged kernels, black spots and testa. They shall be free from rancid kernels. The kernels may be light brown, light ivory, light ash or deep ivory in color due to scorching as a result of overheating. They may have an uneven appearance when roasted. Scraped and partially shrivelled kernels are also permitted provided such scraping/shrivelling does not affect the characteristic shape of the kernel.
--	LW2	180-210	
SW-210	--	200-210	
SW-240	W2-240	220-240	
SW-320	W2-320	300-320	
SW-450	SW2 or W2-450	400-450	
--	W2	mixed sizes (210-400)	

Tolerance: Broken kernels and kernels of the next lower grade, if any, shall not together exceed 5 per cent at time of packing. Broken kernels shall not exceed 10% at port of entry/dicharge.

DESSERT CASHEW KERNELS - THIRD/FOURTH QUALITY (WHOLE)

Indian/African Grade Designation	Brazilian Grade Designation	Trade Name	Blemish	General Characteristics
SSW	W3	Special Scorched Wholes or Third Quality Wholes	Slightly shrivelled kernels	Cashew kernels shall have been obtained by shelling and peeling cashewnuts (Anacardium occidentale), shall have the characteristic shape; be reasonably dry and free from insect damage and testa. Slightly scorched kernels and kernels with slight speckling and discoloration are permitted. They shall be completely free from rancid kernels. The kernels may also be immature. They may be light brown, deep blue, or deep ivory in color due to overscorching.
DW	–	Dessert Wholes		Cashew kernels shall have been obtained by shelling and peeling cashewnuts (Anacardium occidentale), shall have the characteristic shape; be reasonably dry and free from insect damage and testa. Deeply scorched, discolored, speckled and shrivelled kernels are permitted. The kernels may show deep black spots and may be deep brown or deep blue in color.
–	W4	Fourth Quality Wholes		Cashew kernels with black spots and/or dark patches.

Tolerance: Broken kernels or kernels of the next lower grade, if any, shall not exceed 5 per cent at the time of packing for third quality wholes. Broken kernels shall not exceed 10% at port of entry/discharge.

FANCY CASHEW KERNELS, BROKEN, FIRST QUALITY

Indian/African Grade Designation	Brazilian Grade Designation	Trade Name	Description
FB	B1	Butts	Kernels broken crosswise and naturally attached.
FS	S1	Splits	Kernels split naturally lengthwise.
LWP	P1	Large White Pieces	Kernels broken into more than two pieces and not passing through a 4 mesh 16 SWG sieve.
SWP	SP1	Small White Pieces	Broken kernels smaller than those described as LWP but not passing through a 6 mesh 20 SWG sieve.
	SSP1	Small Brazilian Pieces	Broken kernels smaller than those described as SWP or SP1 but not passing through an 8 mesh 20 SWG.
BB	G1	Baby Bits or Granules	Plemules and broken kernels smaller than those described as SWP or SP1 but not passing through a 10 mesh 24 SWG sieve.

General Characteristics

Cashew kernels shall have been obtained by shelling and peeling cashewnuts (Anacardium occidentale), shall be white, pale ivory or light ash in color, reasonably dry, and free from insect damage, damaged kernels, and black spots. They shall be free from rancid kernels. The pieces shall be free from testa, and reasonably uniform in size.

Tolerance: Up to 5 per cent of the next lower grade or pieces at the time of packing.

CASHEW KERNELS, BROKEN, SCORCHED, SECOND QUALITY

Indian/African Grade Designation	Brazilian Grade Designation	Trade Name	Description	General Characteristics
SB	B2	Scorched Butts	Kernels broken crosswise and naturally attached.	Cashew kernels shall have been obtained through shelling and peeling cashewnuts (Anacardium occidentale), shall be reasonably dry,and free from insect damage, damaged kernels, black spots and testa. They shall be free from rancid kernels. The pieces may be light brown or deep ivory in color due to scorching as a result of overheating. Pieces shall be reasonably uniform in size.
SS	S2	Scorched Splits	Kernels split naturally lengthwise.	
SP	P2	Scorched Pieces	Kernels broken into pieces and not passing through a 4 mesh 16 SWG sieve.	
SSP	SP2	Scorched Small Pieces	Broken kernels smaller than those described as SP or P2 but not passing through a 6 mesh 20 SWG sieve.	
	SSP2	Small Brazilian Scorched Pieces	Broken kernels smaller than those described as SSP or SP2 but not passing through an 8 mesh 20 SWG sieve.	
	G2	Scorched Brazilian Granules	Broken kernels smaller than those described as SSP2 but not passing through a 10 mesh 24 SWG sieve.	
African				
Regular Chips		Regular Chips	Broken kernels smaller than those described as SSP or SP2 but not passing through an 8 mesh 20 SWG sieve.	
Small Chips		Small Chips	Broken kernels smaller than those described as Regular Chips but not passing through a 10 mesh 24 SWG sieve.	

Tolerance: Up to 5 per cent of the next lower grade or pieces at the time of packing.

DESSERT CASHEWS KERNELS, BROKEN, THIRD QUALITY, AND FOURTH QUALITY

Indian/African Grade Designation	Brazilian Grade Designation	Trade Name	Description	Blemishes	General Characteristics
			Third Quality		
SPS	P3	Special Scorched Pieces/Seconds	Kernels broken into pieces but not passing through 4 mesh 16 SWG sieve.	Pieces of shrivelled kernels. May be deformed due to immature nuts and black spots.	Cashew kernels shall have been obtained through shelling and peeling cashewnuts (Anacardium occidentale), shall be reasonably dry, and free from insect damage and testa. Scorched pieces with surface speckling and discoloration are permitted. The kernels may be light brown, deep ivory or light to deep blue in color. They shall be free from rancid kernels. Pieces shall be reasonably uniform in size.
			Fourth Quality		
DP		Dessert Pieces	Kernels broken into pieces but not passing through 4 mesh 16 SWG sieve.	More shrivelled than those described as SPS and deeply scorched and may be black spotted.	Cashew kernels shall have been obtained by shelling and peeling cashewnuts (Anacardium occidentale), and shall be reasonably dry, and free from insect damage and testa. The kernels may be deep brown, or deep blue in color. They shall be free from rancid kernels. Pieces shall be reasonably uniform in size.
DSP		Small Dessert Pieces	Kernels of the same description as above but smaller than DP and not passing through 6 mesh 20 SWG sieve.	Same as DP	
DB		Dessert Butts	Kernels broken crosswise and naturally attached.	Same as DP	
DS		Dessert Spilts	Kernels split naturally lengthwise.	Same as DP	

Tolerance: Up to 5 per cent of the next lower grade at the time of packing for third quality dessert pieces.

January 1990

ANNEX 10

LIST OF RAW CASHEW NUT EXPORTERS, IMPORTERS, BROKERS AND AGENTS

Armazens do Povo

Geta/Bissau
Mr. Victor Mandinga
Rua Victor Ino Costa (Edifico Ancar)
CP 333
Bissau
Telephone 21-44-02
Telex 286

Fara Heneni and Brothers
Mr. Fara Heneni
Telephone 21-34-90

Mamadou Djabi and Brothers
Mr. Mamdou Djabi
Cupelao-Baixo
CP 97/192
Bissau
Telephone 21-56-67
FAX 21-10-66
Telex 299

Jaite and Brothers
Mr. Mamadou Baba Jaite
Av. 14 de Novembro No. 48
CP 283
Bissau
Telephone 21-35-29

L'Aiglon S.A. Geneve
Mr. Mamadou Tounkara
Telephone 21-50-38
FAX 21-30-63

ANNEX 11

LIST OF CASHEW KERNEL IMPORTERS AND ASSOCIATIONS
IN THE UNITED STATES

U.S. Cashew Kernel Importers

HTC Corp.
Ed Howard
855 Avenue of the Americas
New York, NY 10001-4173
TEL 212-613-1100
FAX 212-613-1121

J. F. Braun & Son, Inc.
Wally Huggins
265 Post Ave.
Westbury, NY 11590
TEL 516-997-2200
FAX 516-997-2478

For Trade, Inc.
8410 NW 53rd Terrace, Suite 214
Miami, FL 33166
TEL 305-592-8900

SLD Commodities, Inc.
Russ Lynch
222 Grace Church St.
Port Chester, NY 10573
TEL 914-934-0780

Nick Sachs
11333 N. Central Expressway, No. 209
Dallas, TX 75243
TEL 214-369-1145
FAX 214-361-2351

Zaloom Brothers of New Jersey, Inc.
505 Jefferson Ave.
Secaucus, NJ 07094
TEL 201-863-7400
FAX 201-863-8036

Mitchell Beck
Jerry Bennett
TEL 212-867-1919

Richard Franco Co.
David Rosenblatt
TEL 201-376-4111
FAX 201-376-8196

Flavor House Products
David Kerper
TEL 205-983-5643

Importer/Processors:

The first three of these are the major processors in the USA.

Planter's Nuts
TEL 919-741-2408

Fisher's Nuts
TEL 513-983-1100

Anheuser Bush/Eagle Snacks
Tom Crown
TEL 314-577-3104
(Buys only from importers)

Aster Nut Products
Rich Somese
1455 McCarter Highway
Newark, NJ 07104
TEL 201-483-8680
FAX 201-483-2756

Associations:

Peanut Butter and Nut Processors Association
James Mack
9005 Congressional Court
Potomac, MD 20854
TEL 301-365-4080
FAX 301-365-7705

Association of Food Industries
Richard Sullivan
POB 776
Matawan, NJ 07747
TEL 201-583-8188
FAX 201-583-0798

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ANNEX 12

LIST OF CASHEW PROCESSING EQUIPMENT MANUFACTURERS

Sturtevant
West Germany

Oltremare
Italy

Brazilian
Brazil

ANNEX 13

LIST OF INSTITUTIONS ENGAGED IN PRODUCTION, PROCESSING AND UTILIZATION RESEARCH

ANNEX 14

VILLAGE-LEVEL TECHNOLOGY FOR CASHEW PROCESSING

INFORMATION CENTER

ดูจีบัตรแสดงเครื่องมือเครื่องใช้
นิทรรศการที่จัดขึ้นภายใต้
งานแสดงผลิตภัณฑ์หัตถกรรมระหว่างประเทศ
ณ สถาบันเทคโนโลยีแห่งเอเชีย
กรุงเทพมหานคร
ระหว่างวันที่ ๖-๒๐ กุมภาพันธ์ ๒๔๒๔

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for better life and higher income

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International Crafts Conference and Exhibition - CONEX 81
at The Asian Institute of Technology
Bangkok, Thailand.
6-20 Februray 1981

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องค์การยูนิเซฟ
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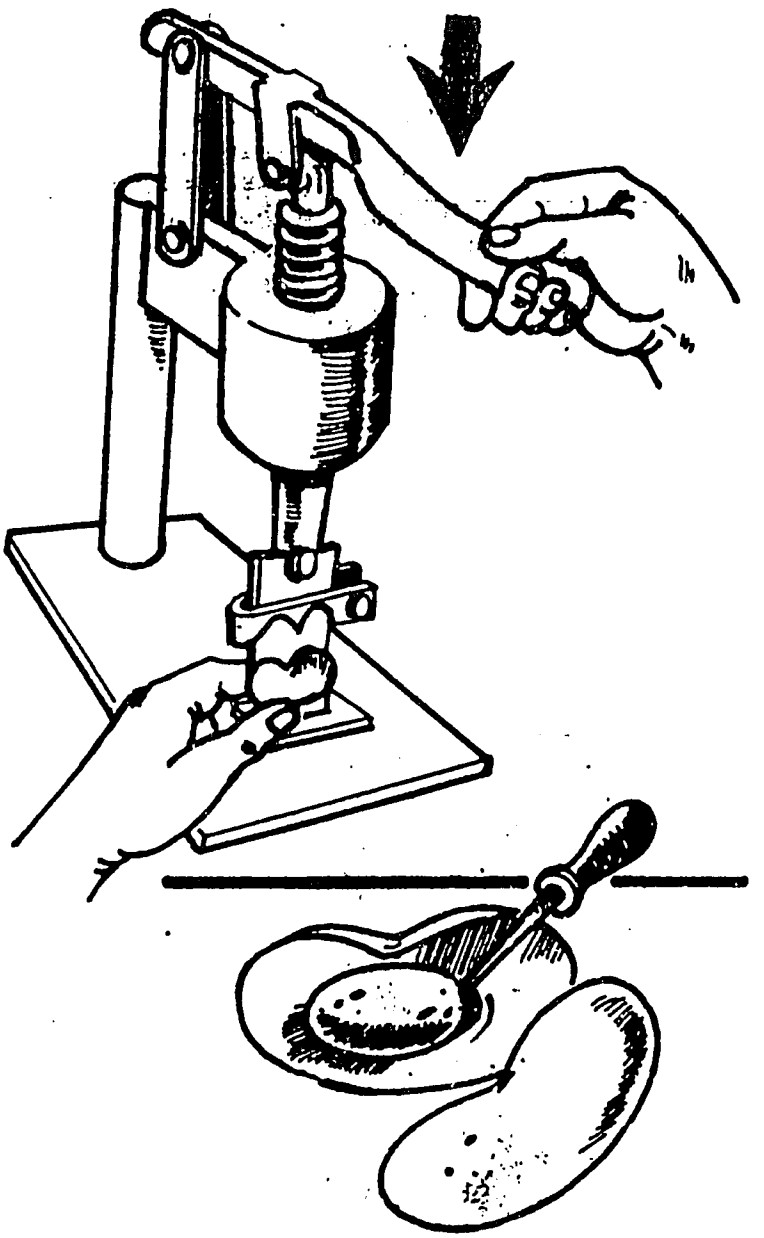
ที่ปรึกษา: อาลัน โรบินสัน
CONSULTANT: ALAN ROBINSON
ศิลปกรรม: พีระพงษ์ กุลพิศาล
ARTWORK: PIRAPONG GULPISAL

N00321

15.

เครื่องกะเทาะ(ผ่า) เมล็ดมะม่วงหิมพานต์

Cashew nut sheller



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เครื่องกะเทาะ(ผ่า)เมล็ดมะม่วงหิมพานต์

มะม่วงหิมพานต์เป็นพืชเศรษฐกิจอย่างหนึ่งที่เหมาะกับพื้นดินหลายประเภท และปัจจุบันนี้ก็ได้ปลูกกันอย่างแพร่หลาย ถึงอย่างไรก็ตามวิธีการกะเทาะ(ผ่า)เมล็ดก็ยังเป็นวิธีดั้งเดิม ไม่มีเครื่องทุ่นแรงช่วย

งานพัฒนาเทคโนโลยีจึงได้ประดิษฐ์เครื่องมือง่ายๆ นี้ขึ้น เครื่องนี้สามารถกะเทาะ(ผ่า)ได้เนื้อในของเมล็ดที่สมบูรณ์ไม่ต่ำกว่า ๙๐% คนหนึ่งสามารถกะเทาะได้เนื้อในตั้งแต่ ๖-๑๐ กก.ต่อวัน ทั้งนี้ขึ้นอยู่กับความชำนาญในการใช้เครื่อง

รายละเอียดในการสร้างเครื่อง วัสดุที่ใช้สร้าง ตลอดจนการใช้งานของเครื่องนี้สามารถติดต่อขอรับได้ที่

งานพัฒนาเทคโนโลยี
กองอุตสาหกรรมในครอบครัว
ถนนวิภาวดีรังสิต อ.พญาไท
ก.ท.ม. ๔

โทร. ๒๔๕ ๔๗๔๑

CASHEW NUT SHELLER

Cashew trees are suitable for a variety of soil conditions and are presently grown in many places. However, shelling techniques of cashew nuts are still primitive, laborious and time-consuming.

The Technology Development Unit has, therefore, designed this simple sheller which gives not less than 90% of unbroken nut An average of 6-10 kgs. of shelled nuts can be produced in a working day depending on the operator's experience.

Construction details as well as the operation manual of this sheller are obtainable from:

Technology Development Unit
Home Industry Division
Vipavadee-Rangsit Road
Payathai, Bangkok 4
Thailand

Tel: 245 4741

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ANNEX 15

PERSONS CONTACTED DURING THE STUDY VISIT IN GUINEA-BISSAU

PERSONS CONTACTED DURING THE STUDY VISIT IN GUINEA-BISSAU

Ambassador William Jacobson, Ambassador, U.S.A.

Minister Santos Manecas, Ministry of Economics and Finance

Minister Bernardino Cardoso, Ministry of International Cooperation

Minister Luis Oliveira Sanca, Ministry of Commerce

Minister Carlos Correia, Ministry of Rural Development and Agriculture

Mrs. Anne Williams, USAID/Bissau/OAR

Mr. Carlos Andrade, Ministry of Economics and Finance

Mr. Nelson Diaz, Ministry of Rural Development and Agriculture

Mr. Mamadou Mané, Ministry of Rural Development and Agriculture

Mr. Mamadu Djabi, Empresa Mamadu Djabi, Irmao e Filhos, Ltd.

Mr. Mamadou Baba Jaite, Firma Mamadou Baba Jaite e Filhos

Mr. Joaquim Correia Pimentel, Empreendimentos Pimentel

Mr. Fernando Ferrage, Secretary General, Chamber of Commerce

Mr. Victor Mandinga, Administrator, Geta/Bissau

Mr. Paulo Barros, Grower

Mr. E. Evora, Grower

Mr. Teodoro Romano, Sociadade Vinicola da Guinea-Bissau, Ltd.

Mr. Manuel do Santos, Merchant, Bissau

Mr. Mamadou Tounkara, Director General, L'Aiglon S.A., Agence de Bissau

Mr. Fara Heneni, Merchant, Bafata

Mr. Antonio da Silva (Tutu Silva) Monteiro, Administrator, Ecofruta, Lda.

Mr. Rogerio Goncalo E.S. Reis, Despachante Oficial

Mr. Bolo Sumaré, Office Manager, Empresa Mamadu Djabi, Irmao e Filhos, Ltd.

Mr. Fernando Esteves, Warehouse Owner, Bissau

Mr. Eduardo Memdes Pereira, Second-In-Charge, National Research Farm, Prabis

Mr. Filipe Silva, Grower, Cumura

Mr. Antonio Saba Alsado, Statistician, Armazens do Povo, Bissau

Mr. José Saraiva, President, Region of Bolama

Mr. Bacar Mané, Delegé do Desenvolvimentos Rural, National Cashew Farm, Bolama

Mr. Mota, Merchant, Bolama

Mr. Abdou Fati, Dry Goods Store Manager, Bolama

Mr. Luis Barbosa, Armazen do Povo Store Manager, Bolama

Mr. Nicolo Carlos Pires, Delegado da Junta, Junta Autonoma das Portas da Guinea-Bissau, Bolama

Mr. Pedro Pinto, Merchant, Tite

Mr. Armando Gomez, Merchant, Tite

Mr. Miguel Cassania, Adjuda ao Desenvolvimentos do Povo para o Povo, Bissora

Mr. Joao Cardoso, Merchant, Bissora

Mr. Carlos Capé, Grower, Bafata

Mr. Amadu Jau, Merchant, Mansaba

Mr. Mamadou Alfa Baldé, Merchant, Farim

Mr. Samba Tenem Djallo, Merchant, Sao Domingo

Mr. Chekis Zhaidan, Merchant, Ingoré

Mr. Mario Crames, Grower, Ingoré

Mr. Franciso Dias, International Bank of Guinea-Bissau, Bissau

Mr. Alfredo Torres, National Bank of Guinea-Bissau, Bissau

Mr. Baldé, National Bank of Guinea-Bissau, Bissau

Mrs. Maria Wallace, Cashew Buyer, Sterling-Merit, Bissau

Several other people were contacted, such as women harvesting cashew and other small-scale merchants; however, their names were not obtained.

ANNEX 16

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REFERENCES CITED

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