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GUINEA AGRICULTURAL MARKET LINKAGES ACTIVITY

PAPAYA - A PROMISING EXPORT COMMODITY FOR GUINEA

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PAPAYA - A PROMISING EXPORT COMMODITY FOR GUINEA

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ACRONYMS

AIC	Agricultural Investment Company
CTO	Cognizant Technical Officer
CRAF	Centre de Recherche Agronomique de Fulaya
EU	European Union
FAO	Food and Agricultural Organization
GAMLA	Guinea Agricultural Market Linkages Activity
ITC	International Trade Center
MT	Metric ton
NPK	Nitrogen, phosphorous, potassium fertilizer
PCPEA	Project for the Promotion of Agricultural Exports (World Bank)
PMU	Project management unit
U.K.	United Kingdom
USAID	United States Agency for International Development

EXECUTIVE SUMMARY

The Guinea Agricultural Market Linkages Activity (GAMLA) work plan specifies that over the course of 2006 the project team will conduct analyses of potential agricultural products and product clusters in Guinea that present promising, long-term agribusiness opportunities. This exercise includes the screening of several possible commodities to identify those for which viable agribusinesses can likely be developed. This is the first in a series of reports on agribusiness opportunities in Guinea. This report analyzes papaya fruit as a potential export crop.

Much of the information in this report on the European Union (EU) market is taken from the Centre for the Promotion of Imports from Developing Countries—European Union publication entitled Market Brief 2005—Papayas published in June 2005.

Papaya is native to tropical America, from southern Mexico through the Andes region of South America. Papayas grow best in hot, rainy, tropical lowlands. The plants have a relatively high water requirement, and must be provided irrigation in dry seasons. The best production zone for papayas in Guinea is the region encompassing the cities of Coyah, Kindia, Forécariah, and Dubreka.

Papayas are recognized as a fruit that is healthy and nutritious, and their consumption is increasing in the European Union.

Good fruit quality is of paramount importance for exports to EU markets. Important quality standards for importers are firmness, good shelf life, strong colors, uniformity in size and color, and the ability to withstand handling by shoppers.

Solo papaya is by far the most common variety for fresh fruit markets, followed by the Sunrise variety, which is also popular. Other commercial varieties, particularly the varieties that produce large fruit, are mainly intended for the processing industry.

Without good control over the timing and duration of sea shipments, only air transport should be used for shipping papayas over long distances.

As with many products, the export of organically grown papaya could constitute a good market for growers in developing countries.

There are no quotas or import duties on papayas imported into the EU.

In 2003, developing countries directly supplied about 75 percent of the total value of fresh papayas imported by EU member states. Leading developing country suppliers

are Brazil, India, Pakistan, and Ghana. Brazil is, by far, the leading supplier of papayas to almost every EU member state.

The three primary EU gateways for importing fresh papayas are the Netherlands, Germany and France. The Netherlands, in particular, serves as a major distributor to the other EU member countries, mainly to Germany and the Scandinavian countries. Germany, France, Spain, Italy, and Belgium also re-export considerable amounts of papayas to other EU member states.

Between 2001 and 2003, fresh papaya imported by EU member countries increased by almost 50 percent in terms of value, amounting to nearly €65 million in 2003. During the same period, papaya imports in terms of volume more than doubled, reaching almost 50,000 metric tons (MT) in 2003. However, these numbers are somewhat misleading, since some imports are double-counted due to internal trade by member countries within the EU. Based on trade statistics, the apparent consumption of papayas within EU countries (imports minus exports) was 38,661 MT in 2003.

The import value of papayas in the EU has increased at a lower pace than the import volumes. As a result, the average import price of papayas imported into the EU member states decreased by nearly 30 percent between 2001 and 2003.

Market prices for papaya vary widely, depending on a number of factors, such as: (a) variety, (b) country of origin, (c) country of destination, (d) mode of transport, (e) quality and size, and (e) the availability of papaya fruit in the marketplace.

According to the Food and Agricultural Organization (FAO), global production of papayas reached almost 6.5 million MT in 2004. Production has continuously increased over the past decade. Between 1999 and 2004, global papaya production increased by almost 25 percent.

A total of 51 countries produce papaya on approximately 150,000 hectares. The average production yield on commercial farms is around 16 metric tons per hectare.

In general, the conditions in Guinea for the production of papayas are highly favorable. Papayas grow well in the types of soil and climate that are suitable for bananas, so Guinea's banana-producing zone is also suitable for papayas. If planted on well-drained soil, papayas can thrive during Guinea's rainy season. During the dry season, irrigation is required.

During the 1990s, the Centre de Recherche Agronomique de Fulaya (CRAF) did considerable work to support commercial papaya production for export. CRAF established papaya demonstration plots, conducted papaya variety trials and conducted experiments on the papaya plant's response to organic fertilizer. Good results were seen from the "Solo 8" plant variety. CRAF also learned that a problem to be overcome for commercial papaya production in Guinea is the high cost and limited availability of suitable papaya seed.

It is concluded that fresh "*Solo*" papayas produced in Guinea for export to Europe by air freight could be an attractive business opportunity. It is recommended that USAID and/or other development organizations strongly consider the possibility of supporting a fresh papaya export agro-industry in Guinea.

PAPAYA—A PROMISING EXPORT COMMODITY FOR GUINEA

INTRODUCTION

The GAMLA work plan specifies that over the course of 2006 the project team will conduct analyses of potential agricultural products and product clusters in Guinea that present promising, longer term agribusiness opportunities. These potential agribusinesses could produce commodities either for export or for import substitution. A complete report will be submitted to USAID by December 31, 2006 describing the longer term opportunities that have been identified. The recommendations must be further adjusted, and an update of the report will be provided at the end of the GAMLA task order.

This exercise will include the screening of possible commodities to identify those for which viable agribusinesses can likely be developed with some level of assistance from international donors, and writing a summary report explaining why each commodity considered was either accepted or rejected.

This report provided an analysis of papaya as a potential export crop from Guinea. It is the first of the series of report on agribusiness opportunities. Much of the information in this report related to the EU market is extracted from the Centre for the Promotion of Imports from Developing Countries (CBI)—European Union (EU) publication entitled *Market Brief 2005—Papayas* published in June 2005.

PAPAYA CULTURE

Papaya (*Carica papaya L*) belongs to the *Caricaceae* family of plants. Papaya is native to tropical America, from southern Mexico through the Andes region of South America. This family is closely allied with, and formerly part of the *Passifloraceae* or passion fruit family.

The first major cultivar of international importance was the small, pear-shaped "Solo," which was introduced to Hawaii from Barbados in 1911. The name derives from the relatively small size of the fruit, ranging from 500 grams to one kilogram. This convenient size can be eaten by one person, as opposed to the much larger papayas grown in Central America and many other tropical locations.

Papayas grow on a wide range of well-drained soils with pH from 5.5 to 7.0. Poor drainage predisposes plants to soil-borne diseases. Papayas have a relatively high

water requirement, and must be provided irrigation in dry seasons. Papayas perform best in hot, rainy, tropical lowlands. They are rarely cultivated in subtropical climates due to the impact of cool temperature on fruit growth and maturation. Plants are completely intolerant of freezing weather; optimal temperatures are 70-90°F. High winds can cause damage by fruit loss, leaf damage or uprooting. Fruit production occurs year-round since flowering is continuous; individual fruits mature in 5-9 months, depending on cultivar and temperature. Plants begin bearing in 6-12 months. The productive life of a plant is 4-5 years.

Papayas are sometimes said to be "trioecious," which means that separate plants bear either male, female, or bisexual flowers. Since bisexual plants produce the most desirable fruit and are self-pollinating, they are preferred over female or male plants.

The shape of the fruit is not a function of variety but of the sex of the plant where the fruit grows. Round fruit comes from a female plant, and traditional pear-shaped fruit comes from a hermaphrodite plant. Because the market prefers pear-shaped fruit, female plants (and males) are normally removed from production as soon as their sex is known.Unlike most fruit crops, papayas are seed propagated. Since plant sex cannot be determined in seed or seedling stages, several plants or seeds are planted at a single site in the field. After the plants flower and can be easily identified, all but the hermaphrodite plants are eliminated.

EU MARKET

The following discussion focuses on the EU market, since this is the most accessible international market for fruit produced in Guinea.

GENERAL MARKET CONSIDERATIONS

Fresh papayas are classified under the Harmonized System code as 080720.

Papayas imported from developing countries are exempted from EU import tariffs. Furthermore, there are no quotas on imported papayas. The "entry price system," which establishes a minimum import price for many kinds of fruit and vegetables during certain periods, does not apply to papaya imports.

Papayas are becoming more widely consumed within the European Union. This is exhibited by the steady increase in European imports — from 18,000 MT valued at €32 million in 1999 to 50,000 MT valued at €65 million in 2003.

The three leading EU gateways for fresh papayas are the Netherlands, Germany and France. The Netherlands, in particular, serves as a major distributor to the other EU member countries.

Solo papaya is by far the most common variety for fresh fruit markets. It has green-yellow skin, orange-yellow flesh, and is very sweet, fragrant, and juicy. One fruit typically weighs from 500 grams to one kilogram. Because of its uniform shape and size, it conforms best to the requirements of the various markets.

The *Sunrise* variety is also popular in fresh fruit markets. Its quality is similar to Solo. It is characterized by smooth skin, firm flesh, red-orange color, and high sugar content. Its weight averages from 600 grams to 750 grams, depending on where it is cultivated.

Other commercial varieties, particularly the varieties that produce large fruit, are mainly intended for the processing industry.

Since consumers in the European Union are quality conscious, good fruit quality is of paramount importance for exports to EU markets. EU consumers are generally less price conscious and they are willing to pay more for good quality, exotic tropical fruit such as papaya.

Important quality standards for importers are firmness, good shelf life, strong colors, uniformity in size and color, and the ability to withstand handling by shoppers.

The following trends affect European consumer demand for papayas:

- Increasing consumption of exotic fruit (including papaya)
- Greater convenience, resulting in more demand for processed and (semi-) prepared papayas such as fruit juice, preserves, and peeled/sliced papaya fruit
- Growing appreciation for health food. In this regard, papayas are recognized as being healthy and nutritious.

Papayas are normally sold to consumers when they are at least one-quarter ripe. Optimal ripeness occurs at the three-quarter color stage, when the fruit bears a yellow-orange peel and an orange-red pulp. Peel color may vary from yellow to reddish-orange, depending on the variety of papaya. Papayas are extremely perishable: shelf life at room temperature ranges from 3 to 8 days, depending on storage atmosphere.

To encourage papaya consumption by the EU consumers, it is recommended that exporters offer papaya that is relatively small-sized (less than one kilogram). In some market segments, however, particularly in the ethnic or catering segments, medium-sized and large papayas are preferred.

Predominant papaya varieties imported into the EU are Solo, Sunrise, Amazon Red and, in smaller quantities, Taiwanese varieties produced in Trinidad for the U.K. ethnic market. An increasing amount of the papayas is used for processing into fruit juices and ready-to-use exotic preparations, which provide an alternative outlet for papaya.

Difficulties to be overcome for papaya exports include the fragility of the fruit, sea transport technology (which is still being developed) critical maturity, short storage life, and a lack of knowledge of the product among consumers and retailers.

Without good control over the timing and duration of sea shipments, only air transport should be used for shipping papayas over long distances. This ensures that the product will arrive in optimum condition, but, of course, the cost of air transport is high. Consequently, to continuously boost export volumes, there is a need for technical progress in sea transport, as well campaigns to promote consumer awareness of papaya fruit.

As with many products, the export of organically grown papaya could constitute a good market for growers in developing countries.

Papain is an enzyme found in papaya latex. In some countries, latex is extracted on a commercial scale. The green fruit are "tapped" by making incisions on the fruit surface in the morning, and catching the exuding latex over a period of days. The latex is then dried, and ground into powder. The most popular use of the powder is as a meat tenderizer.

Green or unripe papaya can be used as a vegetable or salad garnish, but must be boiled first to denature the papain in the latex. Green papaya can also be rubbed onto a piece of meat and cooked with it, or crushed papaya leaves can be wrapped around meat to achieve the same effect as using a commercial tenderizer.

IMPORTS

Between 2001 and 2003, fresh papaya imported by EU member countries increased by almost 50 percent in terms of value, amounting to nearly €65 million in 2003. During the same period, papaya import volume more than doubled, reaching almost 50,000 MT in 2003. However, these statistics are misleading, since some imports are double counted due to internal exports and imports by member countries within the EU. The following table provides a summary of imports for the entire EU. The value and volume of imports for each country is shown in Table A.1 of the Annex.

Table 1. Papaya imports by EU member countries, 2001 – 2003

Importing Country	Import values (€ millions)			Import volumes (MT 000)		
	2001	2002	2003	2001	2002	2003
Total EU 25	43.93	56.39	64.75	23.34	33.06	49.52

As shown in Table A.1, the Netherlands and the United Kingdom are, by far, the leading EU importers of papayas, together accounting for half of the total volume of EU papaya imports. The 10 new EU member states[1] import only small amounts of papayas; in 2003, together they imported only 158 MT, valued at €282,000, representing less than 0.5 percent of total fresh papayas imported by the 25 EU member states.

Although EU consumption of papaya is still modest (i.e. approximately 30 grams per capita per year), it is increasing steadily and is driving the increase in imported volumes. Based on trade statistics (since direct consumption figures are not readily available) total EU papaya consumption (imports minus exports) was 38,661 tons in 2003 (see Table 3).

Despite the substantial increase in imports from 2001-2003, papaya imports remain relatively small compared to other tropical fruit imports such as mango/guava (251,000 MT valued at €284 million in 2003), avocados (194,000 MT valued at €330 million) and pineapples (666,000 MT valued at €625 million). In relation to global papaya production (6.5 million MT in 2004), the EU remains a relatively small importer.

[1] The new member states are Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia.

The top seven importing countries in the EU, and their main suppliers, are shown in the following table. Together, these countries account for more than 90 percent of the total EU papaya imports.

Brazil is, by far, the leading supplier of papayas to almost every EU member state. The Netherlands functions as an important gateway for papayas, for the most part originating in Brazil, mainly to Germany and the Scandinavian countries. Germany, France, Spain, Italy, and Belgium also re-export considerable amounts of papayas to other EU member countries.

Table 2. Papaya imports by the top seven importing countries in the EU, 2003

Rank	Importing country	Imports (€ 000)	Main Suppliers
1	The Netherlands	16,643	Brazil (90%), Ecuador (3%)
2	United Kingdom	15,418	Brazil (40%), India (20%), Pakistan (15%), Thailand (7%)
3	Germany	13,603	The Netherlands (67%), Brazil (16%), Ecuador (6%), USA (5%)
4	Portugal	6,264	Brazil (89%), Spain (8%), The Netherlands (3%)
5	France	3,707	Brazil (46%), Ghana (13%), Côte d'Ivoire (12%), Italy (11%)
6	Spain	3,257	Brazil (78%), Germany (9%), Portugal (3%)
7	Italy	2,037	Brazil (48%), Germany (20%), The Netherlands (16%)
Total for seven countries		60,929	
Source: Eurostat (2004)			

As shown by the following Table 3, in 2003 developing countries directly supplied about 75 percent of the total value of fresh papayas imported by EU member states. Leading developing country suppliers are listed in Table A.2 of the Annex. In recent years, India and Pakistan have become important suppliers of papaya to the EU.

Note that the import value of papayas has increased at a lower pace than the import volumes. This indicates that the average import price of papayas imported into the EU member states decreased by nearly 30 percent between 2001 and 2003.

Table 3. EU imports from developing countries, 2001-2003

	Import values (€ 000)			Import volumes (MT)		
	2001	2002	2003	2001	2002	2003
All developing countries	32,572	42,766	48,027	18,473	26,439	38,661

MARKET PRICES

Market prices for papaya vary widely, depending on a number of factors, such as variety, country of origin, country of destination, mode of transport, quality and size, and the availability of papaya fruit in the marketplace.

The following table shows the average low and high wholesale prices for papayas reported for various EU markets during the period May 10-23, 2005. Since papaya prices tend to fluctuate considerably, these prices should be regarded as merely indicative. Note that the price premium for air freight over sea freight ranges from 32 to 229 percent, undoubtedly reflecting the higher cost of transport as well as the better quality fruit by air freight.

Table 4. Papaya prices in EU markets, May 2005, in €/kg

EU Market	Origin	Transport	Low price	High price
Belgium	Brazil	Air	2.42	2.42
	Brazil	Air	2.28	2.28
	Brazil	Air	2.30	2.30
	Brazil	Sea	1.25	1.25
Denmark	Brazil	Sea	2.14	2.28
	Côte d'Ivoire	Sea	2.54	2.68
Finland	Brazil	Sea	2.10	2.15
France	Brazil	Air	2.60	2.80
	Côte d'Ivoire	Air	2.75	2.80
Germany	Brazil	Air	2.28	2.28
	Brazil	Sea	1.29	1.29
	Brazil	Air	2.00	2.00
The Netherlands	Brazil	Air	2.43	2.67
	Brazil	Sea	1.29	1.57
	Brazil	Air	2.05	2.05
	Brazil	Sea	1.55	1.55
	Jamaica	Air	2.70	2.70
	Thailand	Air	4.25	4.25
Italy	Brazil	Sea	2.28	2.28
Spain	Brazil	Sea	1.30	1.30
	Brazil	Air	2.25	2.25
	Cuba	Air	2.75	2.75
Sweden	Brazil	Sea	1.96	2.01
	Brazil	Air	2.47	2.47
	Brazil	Sea	1.69	1.69
U.K.	Brazil	Air	2.48	2.48
	Brazil	Sea	1.65	1.65
	Malaysia	Sea	1.74	1.74
Source: ITC Market News Service 'Fresh Tropical and Off-Season Fruit and Vegetables', Issue 5, May 2005				

PAPAYA PRODUCTION

According to the FAO, global production of papayas reached almost 6.5 million MT in 2004. Production has continuously increased over the past decade. Between 1999 and 2004, global papaya production increased by almost 25 percent.

The following table provides an overview of the world's leading papaya producers for the period 2002-2004. Production by each country can be seen in Table A.3. of the Annex.

Table 5. Global papaya production, 2002-2004 (MT 0000)

Production	Year 2002	Year 2003	Year 2004
World	6,312	6,467	6,504

A total of 51 countries produce papaya on approximately 150,000 hectares. The average production yield on commercial farms is around 16 metric tons per hectare.

FAO reports that in 2002, the top 10 producing countries were those shown in the following table. These top 10 producing countries accounted for 87 percent of world production.

Table 6. Top 10 Papaya Producing Countries (Percent of World Production)

1. Brazil (25%)	6. Ethiopia (4%)
2. Nigeria (13%)	7. Congo (4%)
3. India (12%)	8. Peru (3%)
4. Mexico (12%)	9. China (3%)
5. Indonesia (9%)	10. Colombia (2%)
Total top ten producers (87%)	
Source: FAO	

COMMERCIAL PAPAYA PRODUCTION IN GUINEA

In general, the conditions in Guinea for the production of papayas are highly favorable. Papayas grow well in soils and climate that are suitable for bananas, so Guinea's banana producing zone is also suitable for papayas. The best production zone is bounded by the perimeter encompassing the cities of Coyah, Kindia, Forécariah, and Dubreka.

If planted on well-drained soil, papayas can thrive during Guinea's rainy season. During the dry season, irrigation is required. Consequently, in view of the requirement for irrigation water, most papaya production by small farmers is located in "bas-fonds" where water is available from shallow wells.

Presently, under Guinea's growing conditions, small farmers consider papayas easier to grow than bananas. Small farmers also believe that papayas (for local markets) are more profitable than bananas.

The following is a summary of activities in recent years related to the commercial production of fresh papayas in Guinea.

- In the late 1990s, the *Centre de Recherche Agronomique de Fulaya* (CRAF) established papaya demonstration plots, conducted papaya variety trials and conducted experiments on the papaya plant's response to organic fertilizer. Good results were seen from the plant variety "Solo 8." CRAF determined that the optimum fertilizer application was composed of manure, NPK, and the micro-element, boron. CRAF also learned that boron is a critical component of the fertilizer regime for papayas—without sufficient boron, the papaya fruit becomes misshapen and therefore unmarketable.
- Problems encountered by CRAF in its demonstration plots included leaf damage by mites, soil nematodes and fusarium wilt. However, no problems were recorded for papaya ring spot virus, a serious limitation to papaya culture in many producing locations.
- A problem that must be overcome for commercial papaya production in Guinea is the high cost and limited availability of suitable papaya seed. Should commercial papaya exports involve small farmers as producers, a satellite business of papaya seed production would be required. Over the long term, however, farmers can be trained to produce their own seed. CRAF produced papaya seed for commercial operators from 1993-998.
- In the mid-1990s an export agribusiness was established by a Guinean, Malik Conde, who exported fresh papayas produced by small farmers to markets in France. The exporter provided small farmers with seed and other inputs, and purchased mature papaya fruit from the same farmers for packaging and export. This venture was supported by the World Bank project, PCPEA. His business eventually failed, apparently due to fruit quality problems caused by improper post-harvest handling and cooling.

CONCLUSIONS AND RECOMMENDATIONS

Based on the previous analysis, it is concluded that fresh "Solo" papayas produced in Guinea for export to Europe by air freight could be an attractive business opportunity. It is recommended that USAID and/or other development organizations strongly consider the possibility of supporting a fresh papaya export agro-industry in Guinea. The reasons are as follows:

a) From all indications, commercial varieties of papaya fruit can grow well in Guinea. While post-harvest handling and cooling may have been a problem in the past, the infrastructure presently exists in Guinea to overcome these obstacles. For example, the fresh fruit and vegetable export facility at the Conakry airport could well serve the needs of papaya exporters.

b) As shown by Table 4 above, a large percentage of European papaya imports arrive by air freight from locations as far distant as Brazil. With relatively low labor costs, a devalued currency and relatively inexpensive air freight rates, Guinea should be cost competitive with production from other countries.

c) There is an increasing demand for papayas in EU countries that Guinea could readily fill.

d) One Guinean exporter of fresh pineapples, in particular, has developed a profitable business of exporting fully-ripened pineapples by air to upscale markets in France. A similar business could undoubtedly be developed for fresh papayas, using a similar business model: an exporter with EU marketing contacts could export fresh papayas grown under production contracts by small farmers. Ideally, for better control the exporter would produce a substantial percentage (say, 30 percent) of the total export volume from farms controlled directly by the exporter. A necessary condition would be that the exporter should provide farm inputs and technical assistance to the small farmers, with the value of the inputs provided deducted from the payment for fruit purchased.

ANNEX A — TABLES

Table A1. Papaya Imports by EU Member Countries, 2001 – 2003

Importing Country	Import values (€ millions)			Import volumes (MT 000)		
	2001	2002	2003	2001	2002	2003
Total EU 25	**43.93**	**56.39**	**64.75**	**23.34**	**33.06**	**49.52**
The Netherlands	8.69	13.07	16.64	4.90	8.29	15.07
United Kingdom	7.23	13.49	15.42	4.13	8.03	11.41
Germany	11.02	11.39	13.60	5.12	6.13	9.14
Portugal	5.66	5.74	6.26	3.19	3.95	5.35
France	2.66	3.48	3.71	1.23	1.69	1.96
Spain	1.83	2.21	3.26	0.94	1.32	2.57
Italy	1.73	1.85	2.04	0.83	0.91	1.24
Belgium	1.93	1.49	0.86	1.22	0.96	0.72
Luxembourg	0.80	0.52	0.78	0.93	0.58	0.90
Sweden	0.63	0.48	0.67	0.21	0.17	0.34
Austria	0.55	1.17	0.62	0.19	0.44	0.36
Denmark	0.29	0.42	0.24	0.13	0.19	0.15
Finland	0.17	0.19	0.17	0.06	0.07	0.07
Czech Republic	0.07	0.10	0.11	0.03	0.03	0.05
Ireland	0.46	0.57	0.10	0.15	0.21	0.04
Greece	0.06	0.08	0.10	0.02	0.03	0.04
Slovenia	0.05	0.05	0.05	0.01	0.02	0.02
Poland	0.05	0.04	0.04	0.03	0.02	0.04
Hungary	0.02	0.02	0.02	0.01	0.01	0.02
All other	0.03	0.03	0.06	0.01	0.01	0.03

Table A.2. EU Imports from Developing Countries, 2001-2003

Exporting Country	Import values (€ 000)			Import volumes (MT)		
	2001	2002	2003	2001	2002	2003
All developing countries	**32,572**	**42,766**	**48,027**	**18,473**	**26,439**	**38,661**
Brazil	27,169	32,004	34,471	15,302	20,329	29,109
India	33	2,283	3,084	23	1,288	2,004
Pakistan	3	1,741	2,272	1	1,303	2,007
Ghana	2,273	1,837	2,191	1,937	1,414	1,711
Thailand	1,134	2,014	1,919	362	646	789
Ecuador	47	10	1,290	25	14	1,272
Côte d'Ivoire	483	727	494	236	340	232
Jamaica	410	415	278	226	235	181
China	0	0	260	0	0	195
Sri Lanka	15	84	250	5	43	117
Malaysia	375	365	207	127	122	97
Egypt	0	199	174	0	172	191
Colombia	98	101	140	21	24	75
Other	532	986	997	208	509	681
Source: Eurostat (2004)						

Table A.3. Global papaya production, 2002-2004 (MT 0000)

Production	Year 2002	Year 2003	Year 2004
World	6,312	6,467	6,504
Brazil	1,598	1,600	1,600
Mexico	876	956	956
Nigeria	755	755	755
India	700	700	700
Indonesia	605	627	650
Ethiopia	226	231	230
Congo, DR	210	211	211
Peru	173	170	170
Venezuela	153	175	170
China	163	165	165
Cuba	107	120	125
Thailand	120	125	125
Colombia	86	88	102
Other	540	544	545
Source: FAO 2004			

ANNEX B: PAPAYA PRODUCTION COSTS

Resume du coût de production - Papaye (FG)

Investissement

Nature	Coût	Nombre d'années	Amortissement/an
Pépinière	3,623,000	3	1,207,667
Petit matériel et outillage agricole	704,999	3	235,000
Cajots de récolte (plastique) 100	250,000	10	25,000
Achat moto pompe avec système goute à goute	25,000,000	10	2,500,000
Preparation du sol	1,340,000	3	446,667
Transplantation	5,165,000	3	1,721,667
Total	**36,082,999**		**6,136,000**

Charges d'exploitations	**Année 1**			**Année 2**			**Année 3**		
	Ch. fixes	**Ch. variables**	**Total**	**Ch. fixes**	**Ch. variables**	**Total**	**Ch. fixes**	**Ch. variables**	**Total**
Entretien durant la croissance		5,829,000	5,829,000		5,829,000	5,829,000		5,829,000	5,829,000
Fonctionnement irrigation		5,258,000	5,258,000		5,258,000	5,258,000		5,258,000	5,258,000
Gardiennage	1,440,000		1,440,000	1,440,000		1,440,000	1,440,000		1,440,000
Location terre	50,000		50,000		50,000	50,000	50,000		50,000
Supervision	480,000		480,000		480,000	480,000	480,000		480,000
Assistence technique	300,000		300,000		300,000	300,000	300,000		300,000
Intérêt	100,000		100,000		100,000	100,000	100,000		100,000
Dotations aux amort.	6,136,000		6,136,000	6,136,000		6,136,000	6,136,000		6,136,000
Main d'œuvre recolte et conditionne		960,000	960,000		960,000	960,000		960,000	960,000
Total charges			**20,553,000**			**20,553,000**			**20,553,000**
Qtés de produits (Kg)			32,000			25,000			20,000
Coût unitaire de Prod.(Ha.)			20,553,000			20,553,000			20,553,000
Coût unitaire de Prod.(Kg.)			642			822			1,028
Coût unitaire de Prod.(Kg.) - $US			$0.13			$0.16			0.21
Porcentage marché d'export			80%			80%			80%
Porcentage marché local			20%			20%			20%

Coût de production d'un hectare de Papayer solo (FG)

Activité	Opération	Nature	Quantité	Prix unit FG	Coût total FG
Pépinière pour la	Achat intrant	Sachets plastique 0,5L	8000 sachets	100	800000
production de 7500 plants	Mecanisation au tracteur	Transport de 3000 kg de terreau	3000 kg	10 F/kg	30000
de papayers pour 1 hectare	Achat intrant	de1000 kg de M. organique	1000 kg	350/ kg	350000
	Main d'œuvre	Desinfection du terreau à la chaleur	5 h/j	4000	20000
	Main d'œuvre	remplissage sachet plastique	20 h/j	4000	80000
	Achat intrant	Achat Graines	400 grammes	500000/100 g	2000000
	Main d'œuvre	Semis graines	10 h/j	4000	40000
	Main d'œuvre	Irrigation pepinière	30 h/j	4000	120000
	Main d'œuvre	Désherbage pépinière	5 h/j	4000	20000
	Achat intrant	chlorotalonil	0,5 l	50000	25000
	Achat intrant	endosulfan	1 l	50000	50000
	main d'œuvre	Traitement	2 h/j	4000	8000
	Mecanisation au tracteur	Transport des plants	8000 sachets	10	80,000
	Sous-total				**3623000**
Preparation du sol	Mecanisation au tracteur	Retrobroyage ou Gyrobroyage	2 heures	100,000	200,000
	Mecanisation au tracteur	Labour/ ha	4 heures	100,000	400,000
	Achat intrant	Dolomie	500 kg	1,000	500,000
	Mecanisation au tracteur	Pulverisage/ha	2 heures	100,000	200,000
	Main d'œuvre	Epandage	10 h/j	4,000	40,000
	Sous-total				**1,340,000**
Transplantation	Main d'œuvre	Piquetage	25 h/j	4,000	100,000
	Main d'œuvre	Trouaison (050 m x 050m)	50 h/j	4,000	200,000
	Achat intrant	Matière organique(fumier de ferme ou fiente de	10T	350,000	3,500,000
	Achat intrant	Engrais de fond (15-15-15)	500 kg	2250/ kg	1,125,000
	Main d'œuvre	Epangage et engrais de fond	25 h/j	4,000	100,000
	Main d'œuvre	Rebouchage des trous	10 h/j	4,000	40,000
	main d'œuvre	Transplantation	25 h/j	4,000	100,000
	Sous-total				**5,165,000**

ANNEX B

Coût de production d'un hectare de Papayer solo (FG)					
Entretien durant la croissance	Achat intrant	Urée	300 kg	2,500	750,000
	Achat intrant	Sulfate de potasse	500 kg	2,500	1,250,000
	Achat intrant	Borax	5 kg	100,000	500,000
	Main d'œuvre	Application engrais	30 h/j	4,000	120,000
	Achat intrant	Chlorotalonil - fongicide-	5 L	50,000	250,000
	Achat intrant	Mancozeb - fongicide-	5 kg	100,000	500,000
	Main d'œuvre	Traitement	20 h/j	4,000	80,000
	Achat intrant	Endosulfan 50% - insecticide-	5 L	50,000	250,000
	Achat intrant	Carbofuran 5% - insecticide- nematicide-	20 kg	50,000	1,000,000
	Main d'œuvre	Application	12 h/j	4,000	48,000
	Achat intrant	Glyphosate - herbicide-	5 L	30,000	150,000
	Main d'œuvre	Application	2 h/j	4,000	8,000
	Main d'œuvre	Desherbage	100 h/j	4,000	400,000
	Main d'œuvre	Selection des plants hermaphodites	20 h / j	4,000	80,000
	Main d'œuvre	Paillage	100 h/j	4,000	400,000
	consommable	Essence pour les traitements	10 L	4,300	43,000
	Sous-total				**5,829,000**
irrigation à la raie	Mécanisation	Achat moto pompe avec système goute à goute	1	25,000,000	
Materiel d''irrigation		Durée de vie 10 ans	-		
		Amortissement annuel	-	2,500,000	2500000
Fonctionnement irrigation		Gas oil 80 l x 6 mois	480 L	4200	2016000
		huile SAE 50	20 L	8,000	160000
		Graisse	1 kg	2000	2000
		Entretien moto-pompe	2	50,000	100000
		irrigueur permanent	1 x 10 jours x 6 mois = 60 h/j	4,000	240000
		ouvrier irrigueur	1 x 10 jours x 6 mois = 60 h/j	4,000	240000
					5,258,000

Coût de production d'un hectare de Papayer solo (FG)					
Petit matériel et outillage agricole		Houe	4	10000	40000
		Daba	4	10000	40000
		Coupe - coupe	4	15000	60000
		fut vide	2	50000	100000
		Coteau	4	10000	40000
		cordeau	1	25000	25000
		App,trait,Solo amortissement sur 3 ans	1	1000000	333333
		App,trait,vermorel amortissement sur 3 ans	1	200000	66666
	Sous Totale				**704999**
Gardiennage	main d'œuvre gardiennage		360 jours	4000	**1440000**

equipements recolte	Cajots de récolte (plastique) 100	2,500,000		25000	250000
	Amortissement Cajots sur 10 ans	250000			
Main d'œuvre recolte et conditionne	1 recolte/semaines x 6 mois =240 h/j	960000			960000
					24569000