

**THE CARICOM REGIONAL TRANSFORMATION
PROGRAMME FOR AGRICULTURE
EXECUTIVE SUMMARY**

The Papaya Industry in CARICOM

*Competitiveness and Industry
Development Strategies*



Core Team of Consultants

Singh, R.H. (Ph.D)

Seepersad, G (Ph.D)

Rankine, L.B (Ph.D)

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Dedication

We dedicate this work to the Memory of our Colleague and member of the study team, Dr Lloyd B. Rankine. Dr Rankine passed away on October 25, 2006. He was a colleague with whom we shared many long hours in dialogue, in the field and in the class room. His life long endeavours and dedication reflect his passion for agriculture in the Caribbean.

Dr. Rankine was an integral part of the University of the West Indies having served the University (both Mona and St. Augustine campuses) from 2nd December 1968 to June 3, 2006 when he suffered a debilitating stroke. He served as Head of the Department of Agricultural Economics and Extension from 1977 to 1990 and taught in the capacity of Senior Lecturer up until 2003, when he retired. From 2003 to June 3, 2006, he lectured part-time in the Department

Dr. Rankine also served as Director and Chairman on many Boards in Trinidad and Tobago. .

Ranjit H. Singh & Govind Seepersad



EXECUTIVE SUMMARY

1. INTRODUCTION

The Competitiveness Report for Papaya is the second commodity-focused study presented under the CARICOM Regional Transformation Programme for Agriculture. Herein, is the Report on the International Competitiveness of Papaya and the proposals for the development of the Industry.

The countries reviewed in the Competitiveness Study of Papaya are namely: Belize, Guyana, Jamaica and Trinidad and Tobago. The competitiveness of these countries was analyzed with respect to the following extra-regional markets: the USA (focusing on the Miami and New York Terminal Markets), the Canadian Market, and the United Kingdom Market. It is informed by the findings of two sets of studies conducted as part of the overall RTP project – the Market Intelligence Studies and the Industry Productivity and Cost of Production Studies.

The major components of the Papaya study are:

- (i) an analysis of Cost of Production of Papaya in the major producing countries (Section 4)
- (ii) an analysis of the International Competitiveness of Papaya exports to the major export markets (Section 5),
- (iii) a diagnostic evaluation of the sources of competitiveness / uncompetitiveness for Papaya (Section 6)
- (iv) the identification of industry development strategies and drivers for transformation of the Regional Papaya industry (Section 7).

2. METHODOLOGY: MEASURING COMPETITIVENESS

The methodology for quantitative evaluation of competitiveness is based on cost / price competitiveness of Papaya exports into a given market. Essentially the analysis attempts to determine whether our farmers and exporters could deliver a quality product of the preferred variety on a timely basis and in commercially economical volumes to the market at prices that are competitive with our main competitors in those markets. The analytical model therefore builds up

cost (simulation) along the value chain from the farm gate to the Terminal Wholesale market of the importing country. Final landed cost at the export market destination includes the following:

1. *Production cost, and other on-farm post harvest cost*
2. *Entrepreneurial margin to the producer for production, packing and exporting*
3. *Administration cost: satisfying export protocols and documentation*
4. *Cost of air or sea transport to the destination country/market*

Competitiveness is measured by comparing the **Final Landed Cost (FLC)** at the market destination with the average wholesale price of Papaya of the same variety and grade/quality at that market. Our measure of competitiveness is the **EXPORT COMPETITIVENESS COEFFICIENT (ECC)** defined as the ratio the Final Landed Cost of Papaya to the average **wholesale price at the Terminal Market (TWP)**:

Where: ECC = export competitiveness coefficient

FLC = the final landed price at the export market destination

TWP = average wholesale price of Papaya at the export terminal market

ECCD > 1 indicates a competitive export

Competitiveness is measured by comparing the **Final Landed Cost (FLC)** at the market destination with the average wholesale price of Pepper of the same variety and grade/quality. Our measure of competitiveness is the **EXPORT COMPETITIVENESS COEFFICIENT (ECC)** defined as the ratio the Final Landed Cost of Pepper to the average **wholesale price at the Terminal Market (TWP)**:

$$\text{ECC} = \text{FLC} / \text{TWP} \quad \dots\dots\dots \text{Eq'n (1)}$$

Where: ECC = export competitiveness coefficient

FLC = the final landed price at the export market destination

TWP = average wholesale price of Hot Pepper at the export terminal market

Exports are considered price competitive when the $\text{ECC} < 1$. The degree of competitiveness or uncompetitiveness (ECCD) is measured by the difference between the value 1 and the ECC. A positive ECCD value indicates a competitive export whereas a negative value for ECCD indicates

that the export is not competitive. For example, when $ECC = 0.85$; then $ECCD = 0.15$. The ECCD therefore measures the extent to which landed price is below the terminal wholesale market price. In this example, the exported product arrives in the terminal market at a cost that is 15 % below the prevailing terminal wholesale price, clearly a competitive position.

$$ECCD = 1 - ECC \dots\dots\dots \text{Eq'n (2)}$$

Where ECCD = degree of competitiveness

ECCD > 1 indicates a competitive export

ECCD < 1 indicates an uncompetitive export

3. MARKET INTELLIGENCE: SOURCES OF COMPETITION

Generally, the small scale Papaya producers sell their fruits on the local market whereas the larger producers are involved in both the growing and exporting operations. Just about five varieties of papayas are traded commercially; the most preferred are the Solos’.

The extra regional Papaya market is highly competitive. Mexico and Brazil are two of the World’s most competitive producers of Papaya with a capacity to leverage the market with respect to their large volume of production and low cost. In fact, Brazil is the World’s largest producer and exporter of Papaya.

The USA Market: The imports of papaya into the USA in 2002 were valued at USD 58.3 million. Hawaii, Mexico, Belize and Brazil are the major suppliers to the USA market. Imported papaya represents about 80% of the US consumption. Significant differences exist between the observed markets with respect to market penetration and competitiveness. Mexico, the major supplier to this market, has a competitive edge based upon its large volumes and low cost (both with respect to production and transport).

The Canadian Market: The size of this market is relatively small, with a total import value of about USD 10 mn annually. Today the market for Papaya in Eastern Canada is dominated by two exporters: Belize and Brazil. During the early 1990s, Jamaica controlled this market but with the onset of diseases, exports disappeared.

The EU Market: The size of the EU market is estimated at USD 84 mn. Generally, consumption of Papaya in the EU is relatively low with the UK and the Netherlands being the largest consumers. The UK market for Papaya is highly competitive with Brazil controlling almost 60 % of this market. Generally, UK prices for Papaya are lower than that offered in the USA and Canadian markets.

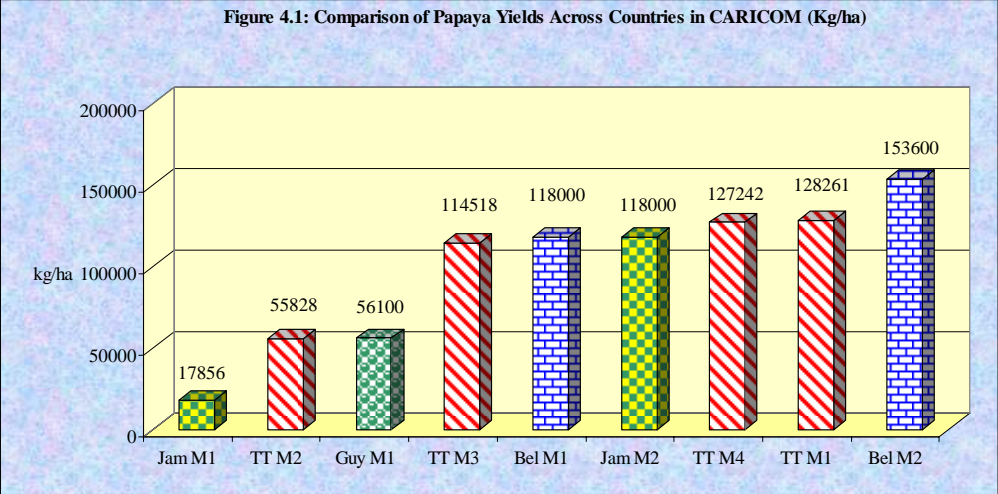
4. COST OF PRODUCTION FOR PAPAYA

Cost of production of Papaya depends on a number of parameters including:

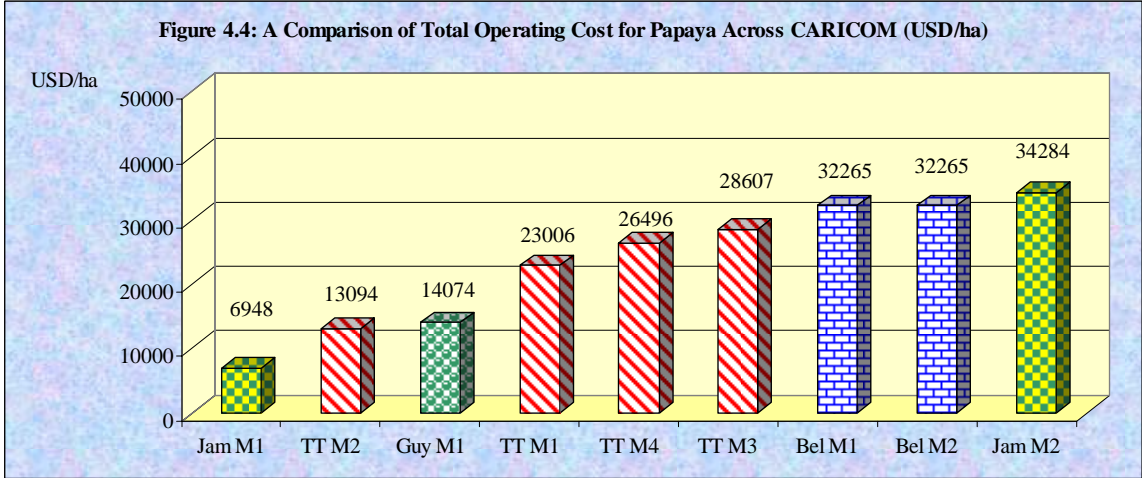
- (i) variety
- (ii) duration of harvest
- (iii) crop husbandry and management including spacing, nutrition and pest /disease control, field sanitation
- (iv) irrigation

Differences in Productivity by Country: For the representative farms in the study, exportable yields are shown in Figure 4.1. Based on irrigated production systems, generally the commercial growers in Jamaica, Belize and Trinidad & Tobago achieved yields that were close to the benchmark levels of productivity noted in the literature. When one considers that the duration of harvest in Trinidad & Tobago is generally about 10 months and in the case of Belize and Jamaica, approximately 16 months, this performance may be considered very good. Guyana's productivity however is quite low, explained partly by climatic conditions. It should be noted that local growing conditions, including the probability of early onset of diseases, is one of the major reasons for a shorter harvest period in Trinidad & Tobago and Guyana than elsewhere.

Irrigated vs. Rainfed Yields: As expected, irrigated yields were significantly above the yields from non-irrigated production. For example, expected exportable yields for Solo Sunrise in Jamaica were 17,856 kg/ha and 118,000 kg/ha, respectively for rainfed and irrigated production (Figure 4.1). Similarly, in Trinidad & Tobago exportable yields for the Tainung #2 variety were 55,828 kg and 127,242 kg/ha, respectively for rainfed and irrigated production.



Total Operational Cost of Production on a hectare basis ranged from a low of USD 9,948 for rainfed small farmer production in Jamaica, to a high of USD 34,284 for large scale irrigated production in Jamaica (Figure 4.4). With respect to the subset of irrigated farms, Operational Cost ranged from USD 14,074 with respect to production in Guyana to USD 34,284 for Jamaica. Productivity at the farm level as well as the cost of production generally contributes most to overall cost at the market. Production technology is very similar amongst the large scale producers of Papaya in the Region, particularly those that are primarily export-oriented.



The estimated unit Cost of Production of Papaya for the various representative farms is presented in Table 4.2. Estimates are provided for each of the cultural operations. Cost of production efficiency in Papaya production is best represented by unit grow-out cost. Costs ranged from a low of USD 0.22/kg for one of the irrigated farms in Trinidad to a high of USD 0.49/kg of fruit

for rainfed production in Jamaica. While rainfed production in Jamaica resulted in the highest unit cost, the rainfed farm in Trinidad was able to realize substantially higher efficiency with a cost of USD 0.29/kg of fruit.

Generally, the Trinidad farms were found to be the most cost efficient with unit costs of USD 0.22 / kg, USD 0.25/kg and USD 0.30/kg. The Belize farm producing the larger fruits also had unit cost that was within this range (USD 0.25/kg). Unit cost for farms producing the Solo Sunrise variety in Belize and Jamaica realized the highest cost among irrigated farms, USD 0.33 and 0.36/kg, respectively for Belize and Jamaica. The slightly higher unit cost for Solo Sunrise reflects the lower yields in comparison to the other larger varieties grown.

Table 4.2: Estimates of Cost of Production for Papaya in Selected Countries

ITEM	Trinidad and Tobago				JAMAICA REGION		Guyana	Belize Solo Cost in BZE \$/ha	Belize Maradol Red Lady Tainung Cost in BZE \$/ha
	TT M1	TT M2	TT M3	TT M4	Jam M1	Jam M2	Guy M1	Bel M1	Bel M2
Land Preparation	0.41	1.83	0.43	0.42	2.78	0.42	0.67	0.42	0.33
Planting	1.01	1.48	0.36	0.75	6.56	0.86	2.18	0.84	0.64
Chemical Control (total)	5.83	3.20	8.01	6.84	18.62	9.61	13.31	9.39	7.21
Irrigation	2.50	0.00	3.88	3.24	0.00	1.98	1.83	1.96	1.51
Fertilizing	5.14	8.09	6.50	4.36	6.58	6.66	3.65	6.55	5.03
Pruning	0.00	0.00	0.00	0.00	0.50	0.18	0.00	0.18	0.14
Harvesting	3.04	8.85	5.79	5.21	2.02	9.35	3.45	8.01	6.15
Other Costs	0.00	0.00	0.00	0.00	1.85	0.00	0.00	0.00	0.00
Total Operational Cost	17.94	23.45	24.98	20.82	38.92	29.05	25.09	27.34	21.01
Total Fixed Costs	3.91	5.43	5.36	4.49	10.10	6.86	5.86	5.55	4.27
Total All Costs (Exportable Yield)	22	29	30	25	49	36	31	33	25
Exportable Yield (kg/ha)	128261	55828	114518	127242	17856	118000	56100	118000	153600

While Papaya is marketed both locally in the domestic market and in the export market, based on our observations (in the absence of a comprehensive statistical database) we are of the view that the domestic market for Papaya remains largely underdeveloped and unfilled. In the absence of a well developed domestic market for the fruit, the few large scale producers of Papaya naturally

turn to export markets, claiming that the domestic market is unable to absorb their production. As indicated earlier, the export markets of relevance to CARICOM Papaya producers are the USA, Canada and the UK.

5. PAPAYA COMPETITIVENESS

5.1 KEY DETERMINANTS OF COMPETITIVENESS

Cost of papaya delivered to the Terminal Market was simulated by including all costs from the farm to the export destination. Based on the findings of the Study, the following are identified as the major critical factors influencing the Export competitiveness of Papaya:

- ❖ ex-farm cost of production
- ❖ freight cost to the various markets
- ❖ the level of market price
- ❖ the variety of Papaya exported

Ex-Farm Production Cost: Production cost for Papaya was presented in Table 4.2. As a percentage of market price, ex-farm cost accounts for 9-13 % of the Terminal Wholesale Market prices in the case of Solo Sunrise and 10 – 24 % in the case of Red Flesh/ Tainung. In general, these percentages reflect cost that may be considered low relative to the level of market prices.

Freight Cost: Given the bulky nature of Papaya, inclusive of packaging, the level of freight cost associated with Papaya exports is likely to play a decisive role in the competitiveness of exports. Table 5.2 presented the freight costs via air and ocean to the various market destinations. The cost of exporting Red Flesh / Tainung Papaya from Trinidad using air freight could account for as much as 67 % of the market price in the Miami market and 56 % in the New York market (Table 5.4). With respect to export of Solo Sunrise (which attracts a higher price), the cost of air freight as a percentage of market price ranges from 31 % for the Miami market, to 35 % for exports to New York.

Table 5.2: Freight Rates to the Various Markets (USD/kg)

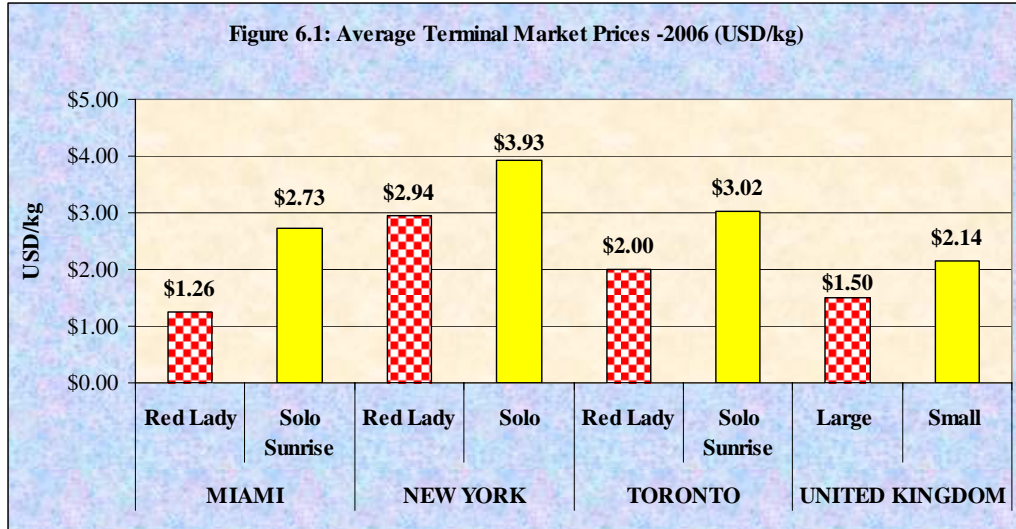
Country	Destinations			
	Miami	New York	Toronto	United Kingdom
Trinidad Air	\$ 0.85 (Am)	\$ 1.37 (BW)	\$ 1.37 (BW)	\$ 1.50 (BW)
Ocean	\$0.23	\$0.27	\$0.29	\$0.31
Jamaica Air	\$ 0.50 (AJ)	\$ 0.66 (AJ)	\$ 0.75 (BW)	\$ 0.98 (AJ)
Ocean	\$0.19	\$0.19	\$0.24	\$0.28
Belize Air	\$ 0.98 (AA)	\$ 1.46 (AA)	\$ 1.75 (AA)	\$ 7.18 (AA)
Ocean	\$0.23	\$0.27	\$0.29	\$0.31
Guyana Air	\$ 1.20 (Am)	\$ 1.27 (BW)	\$ 1.54 (BW)	\$ 1.50 (BW)
Ocean	\$0.20	\$0.25	\$0.27	\$32.00
Assumption: 40 ft refer container; 13,236 kg or 832 boxes papaya Code: Am: Amerijet; BW: BWIA (Caribbean Airlines); AA: American Airline				

**Table 5.4: Importance of Freight Cost in Competitiveness: Cost as % of Market Price:
(Example of Exports from Trinidad to Miami & New York Markets)**

Variety	Miami Market		New York Market	
	Air Freight (%)	Ocean freight (%)	Air Freight (%)	Ocean freight (%)
Red Flesh /Tainung	67	18	56	9
Solo Sunrise	31	8.4	35	9

Market Prices and Choice of Variety of Fruit: Among the four markets considered, the most attractive with respect to prices is the New York market, followed by the market in Eastern Canada (Figure 4.1). The UK market is the least attractive of all markets.

Prices in the Miami market are depressed relative to the New York market. The level of competition in the UK market, together with the dominance of Brazilian exports to that market, is in part the reason for the relatively low prices for Papaya in that market.



5.2 PAPAYA EXPORT PRICE COMPETITIVENESS

In particular, we determine which of the following factors are of strategic importance to the final position -- the level of farm production cost, freight cost and/or Terminal Market Price. CARICOM exporters of Papaya, with the exception of Belize, use air freight.

5.2.1 Papaya Export Competitiveness: Air Transport

Exports of Papaya from Jamaica, both from rainfed and irrigated production, are competitive in all North American Markets using air transport, but are not competitive in the UK market on account of the higher transportation cost (Table 5.6).

- ❖ None of the CARICOM producers of Papaya are export competitive in the UK market. Only Jamaica is competitive in the Toronto market.
- ❖ Exports of Papaya from Belize using air freight are only competitive in the New York market. Exports of Papaya from Belize to the Miami market are only marginally competitive with respect to Solo Sunrise exports, but not competitive in the case of exports of the larger fruit varieties, again on account of the lower price.
- ❖ The only market in which exports from Trinidad and Guyana are competitive using air freight is the New York market and only marginally so.

5.2.2 Papaya Export Competitiveness: Ocean Transport

The results of the competitiveness analysis clearly show the advantage of ocean freight in terms of market competitiveness (Table 5.6).

- ❖ Exports from all countries, and with respect to all Papaya varieties grown are highly competitive in both the New York and Toronto markets.
- ❖ Additionally, exports of Solo Sunrise (produced in Belize and Jamaica) to all markets are highly competitive.

Table 5.6: CARICOM Papaya Export Competitiveness in Various Markets

Country	Farm Model	Variety	Prodn Cost (US cents / kg)	Landed Cost Air Freight ECCD (1- FLC/TWP)				Landed Cost Ocean Freight ECCD (1- FLC/TWP)			
				Miami Market	New York Market	Toronto Market	UK Market	Miami Market	New York Market	Toronto Market	UK Market
Trinidad and Tobago	1	Red Lady	0.22	NC	0.07	NC	NC	-0.02	0.55	0.32	0.07
	2	Tainung #2	0.29	NC	0.02	NC	NC	NC	0.5	0.25	-0.02
	3	Tainung #2	0.3	NC	0.01	NC	NC	NC	0.49	0.24	-0.03
	4	Tainung #2	0.25	NC	0.05	NC	NC	-0.06	0.53	0.29	0.04
Jamaica	1	Solo Sunrise	0.49	0.21	0.40	0.18	NC	0.36	0.55	0.4	0.12
	2	Solo Sunrise	0.36	0.3	0.46	0.26	NC	0.45	0.62	0.48	0.24
Guyana	1	Tainung #2	0.31	NC	0.05	NC	NC	NC	0.49	0.23	-0.01
Belize	1	Solo Sunrise	0.33	0.1	0.22	NC	NC	0.47	0.61	0.49	0.25
	2	Red Flesh	0.25	NC	0.01	NC	NC	-0.03	0.54	0.3	0.03

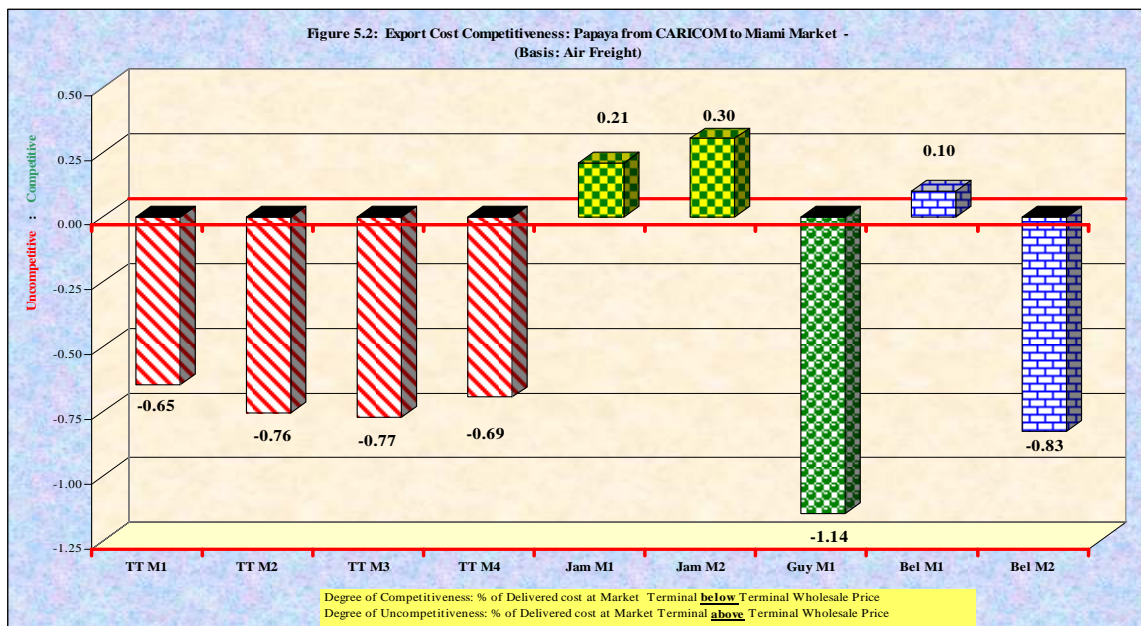
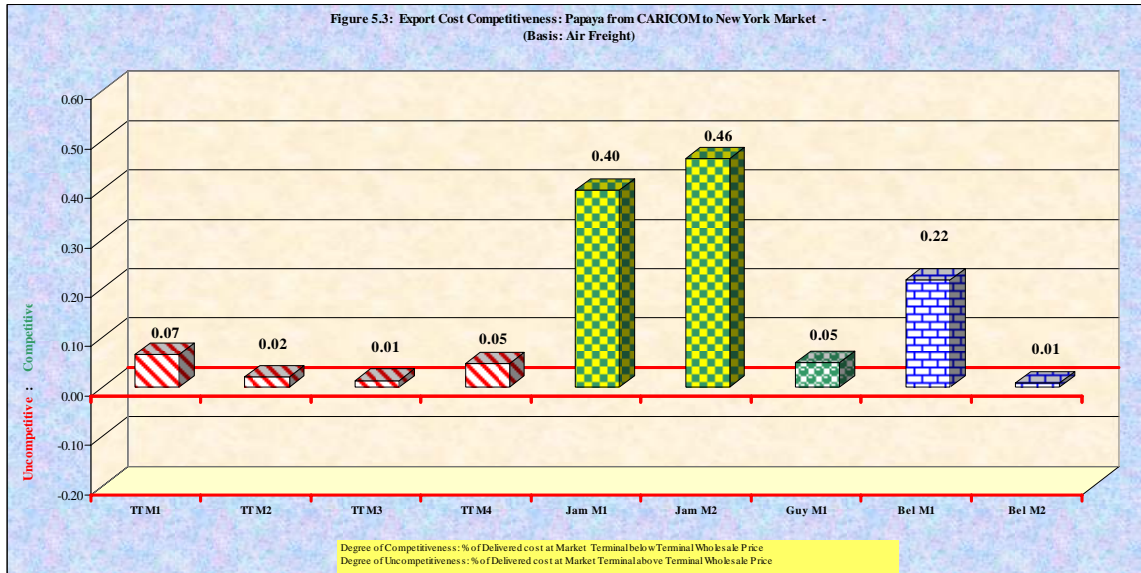
Note: Green indicates highly competitive exports (ECCD > 0); Red denotes marginally (un)competitive (ECCD approx 0).

5.2.3 SUMMARY FINDINGS

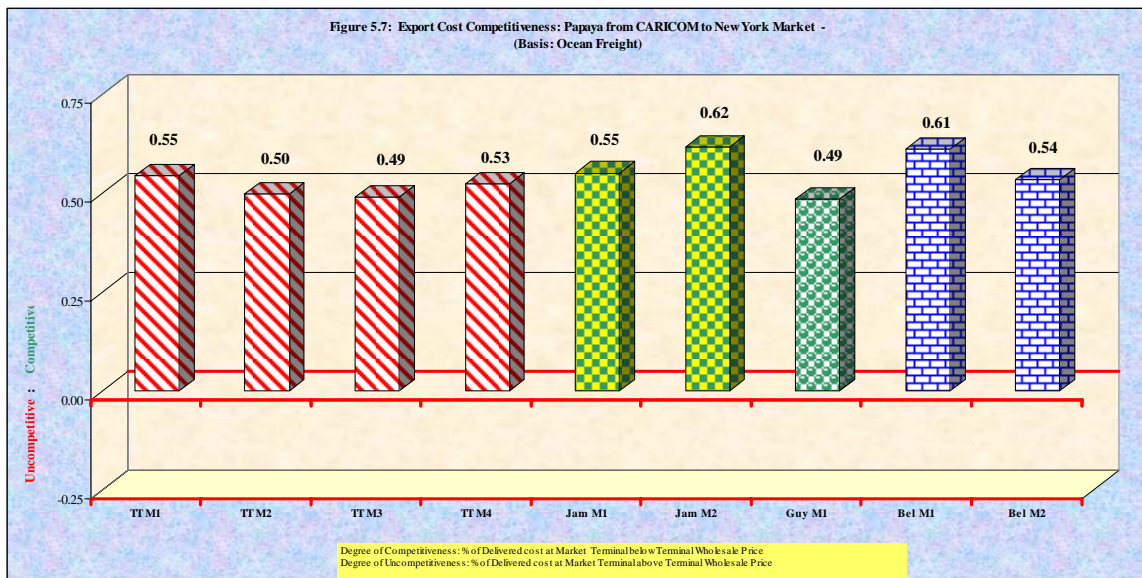
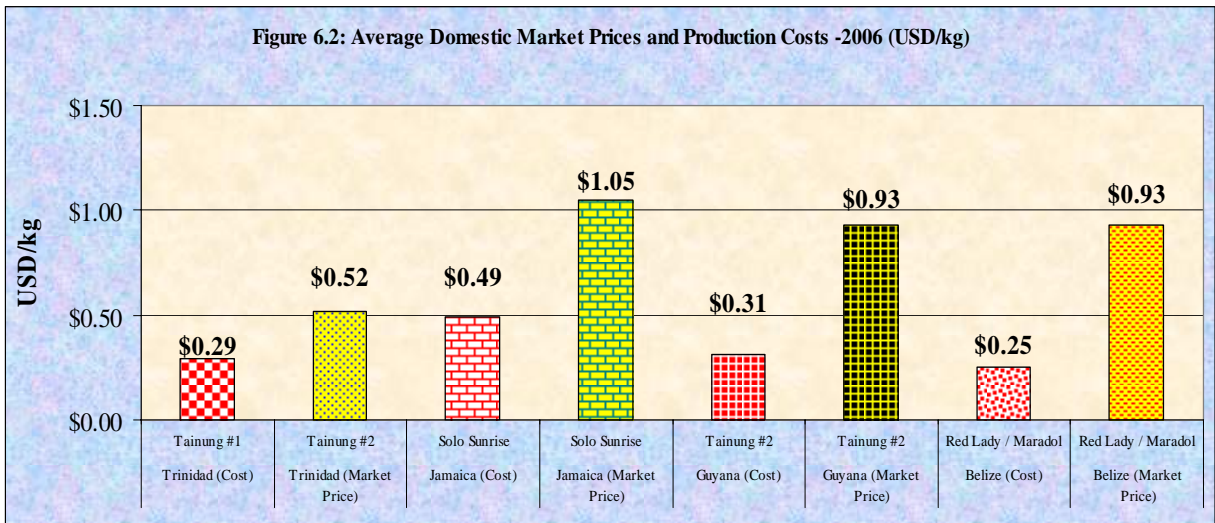
The main findings of the analysis of Papaya competitiveness in the extra-regional markets are as follows:

- ❖ Generally, the cost of commercial Papaya production in relation to terminal market prices is relatively small and is therefore not an important factor where exports are not competitive.
- ❖ The UK market is dominated by Brazil.

- ❖ There is high preference in all markets for single serve fruits and in particular for Solo and Solo Sunrise varieties. Given the above, only exports of Papaya from Jamaica and Belize are competitive using air transport and only when exporting the higher valued fruit -- Solo Sunrise.
- ❖ Exports are highly competitive in both the New York and Toronto markets.
- ❖ Additionally, exports of Solo Sunrise (produced in Belize and Jamaica) to all markets are highly competitive.
- ❖ Even with lower Ocean transport cost, exports of varieties other than Solo Sunrise to the Miami and UK markets are either not competitive, or only marginally so.
- ❖ Relatively large volumes must be shipped regularly and at market-required standards for the development of a Regional Papaya Industry
- ❖ Strong and diversified market linkages with other sectors (e.g. Tourism and Hospitality), both domestically and regionally, are needed.



Codes for Representative Farms								
Trinidad and Tobago				Jamaica		Guyana	Belize	
TT M1	TT M2	TT M3	TT M4	Jam M1	Jam M2	Guy M1	Bel M1	Bel M2
Red Lady	Tainung #2 Rainfed	Tainung #2	Tainung #2	Solo Sunrise Rainfed	Solo Sunrise	Tainung #2	Solo Sunrise	Red Flesh



5.3 DEVELOPMENT OF THE DOMESTIC MARKET FOR PAPAYA

The CARICOM domestic market for Papaya remains unfulfilled and under-exploited. When one considers that Papaya is considered an exotic fruit in the extra-regional markets, the potential of the tourist market for this fruit (as well as other tropical fruits) remains largely untapped. In Trinidad, the wholesale price for Papaya gives a margin of 23 US cents/kg over the cost of production for Tainung. The levels of profitability for Papaya in the Trinidad market, together with the less stringent demands of this market are two factors explaining the diversion of exports to the local market in recent years. Figure 6.2 presents the average domestic market prices for papaya at the wholesale level.

6. INDUSTRY DEVELOPMENT STRATEGY

6.1 The CARICOM Papaya Industry: Summary Of Key Characteristics

The Papaya industry in CARICOM is relatively underdeveloped. The volume of production is commercially significant in only a few countries, with the most important being Belize, Jamaica, Trinidad & Tobago, Barbados and Guyana. Papaya, as a significant export industry, is limited mainly to Belize and Jamaica, with exports in both cases dominated by few large producers /exporters. The Belizean Papaya industry is the largest in CARICOM, ranking second to Mexico in terms of the volume of exports to the US market. However, production is concentrated amongst three large producers.

The export markets for CARICOM Papaya are characterized by high levels of competition, particularly the Miami and UK markets. Key competitors are Mexico, Brazil, Hawaii and the Dominican Republic. The two major CARICOM exporters are both competitive in the US markets (East Coast), but key determinants in this regard are the use of cheaper ocean freight in the case of Belize, the production and exports of the higher valued variety (Solo Sunrise) by both and in the case of Jamaica, its close proximity which allows the use of air freight.

Other CARICOM countries wishing to enter the export market must address factors that are critical for achieving competitiveness. These include the production of higher valued varieties, the use of ocean freight for shipping to realize economies and volumes with reliability in supply to make the supply chain relationship attractive.

An obvious deficiency in the regional Papaya industry is the state of development of the domestic market. This market remains underexploited, particularly the tourism component. So too is the development of value added aspect of the industry. Given the image of Papaya as an exotic fruit, we are of the view that the opportunities for growth and expansion of the local market are enormous.

At the production / entrepreneurial level Papaya production faces a number of challenges including:

- (i) the high level of capital investment required for the establishment and maintenance of the crop
- (ii) the riskiness of Papaya production on account of its susceptibility to diseases
- (iii) the need for adequate land to facilitate rotation in an effort to break the disease cycle
- (iv) availability of a reliable supply of water for irrigation

There is no doubt that the above factors to a large extent explain the relatively low investment levels in commercial Papaya production in CARICOM today. Additionally, it explains why the industry is dominated by a few large investors, mostly foreign.

At the production level, commercial growers of Papaya in CARICOM have adopted technologies that appear are fairly standard. Most have achieved high levels of productivity. The industry, however, continues to face the high probability of losses on account of disease. In response to this risk, across the board producers have adopted a strict spraying regime for the crop. As a result, the Cost of Production estimates reveal the application of chemicals for pest and disease control as the major cost item in growing Papaya. Accordingly, one of the strategic areas for cost control in Papaya production is the adoption of strategies to reduce the incidence and cost associated with pest and disease.

The key success factors for achieving competitiveness in Papaya may be summarized as follows:

- ❖ achieving high levels of production efficiency by maintaining high yields and keeping a tight control on chemical application cost so as to result in low unit cost of production per kg of fruit
- ❖ growing varieties that are preferred by the market
- ❖ targeting the more attractive markets eg New York vs Miami (also the domestic)
- ❖ using ocean freight for exports given that Papaya is a bulky commodity
- ❖ having the volume of high quality fruit supplied on a regular basis to make it economically attractive for brokers /importers to enter a supply chain arrangement

The Regional Drivers for the development of the CARICOM Papaya industry are now presented:

- ❖ R&D:
 - Evaluation of the new transgenic disease resistant Solo Rainbow variety out of Hawaii
 - Development of IPM to reduce the demand for chemical application in Papaya production and enhance sustainability
 - Development of Papaya-based value added products, both food and non food
- ❖ Development of the Regional Domestic market for Papaya - both the fresh fruit and value added products
- ❖ Develop a Regional industry strategy and business model for expansion of the industry, including the allocation of adequate land resources to allow for expansion and crop rotation.
- ❖ Establishment of CARICOM industry Stakeholder Group, including Producers, Exporters, and Marketeers

To complement the above interventions at the regional level, we propose the following Strategies at the individual country level:

- ❖ The development of a Papaya Business Model, inclusive of marketing, to specifically address the current constraints /barriers to entry in the industry faced by smaller entrepreneurs (1 – 20 acres)
- ❖ Development of the domestic market through a well designed promotional programme and the creation of the necessary linkages with the tourism sector
- ❖ R&D to development precision farming models so as to optimize chemical, fertilizer and water application with a view to reducing cost while increasing productivity
- ❖ Provision of technical support to proactively monitor pest and disease on Papaya farms