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Small Island Developing States”**

**“Realidad y Potencial de la Seguridad Alimentaria y la Diversificación
Agrícola en Pequeños Estados Insulares en Desarrollo”**

**“Sécurité alimentaire et diversification agricole dans les petits états
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COMPETITIVE ASSESSMENT OF THE MARKET OPPORTUNITIES FOR SELECTED AGRICULTURAL COMMODITIES IN THE CARICOM REGION – THE CASE OF FRESH CARROTS PRODUCED IN JAMAICA

Govind Seepersad, Ardon Iton, Ranjit Singh and Faraad Hosein, CARDI, Jamaica. Email: marketing@cardi.org

ABSTRACT: The aim of this study is to determine the competitiveness of the major producers of carrots in the region and whether production should be expanded to displace the current extra-regional imports. Problem: Trinidad, traditionally imported carrots from the USA; however, since 2005 this trade has been diverted to Costa Rica primarily through the signing of the bilateral arrangement with Costa Rica. In this case, the 40% CET has been waived, thus making it more attractive to import from Costa Rica. At the same time, CARICOM producers are seeking markets for their produce and any opportunities that lie therein. This study examined the market opportunities for carrots in the Caribbean Region and any opportunity that exist for the major carrot producer(s) in CARICOM. The study was done in an attempt to locate opportunities for small carrot producers who characterize the Region and to highlight the challenges they would face, both within their country and also those challenges which would arise through globalization. Jamaica was found to be the major CARICOM producer, and Trinidad and Tobago the major importer of carrots; however, no trade took place between these CARICOM partners. The study found that Jamaica was not price competitive against the two major suppliers to the Trinidad and Tobago market: Costa Rica and the USA. The results also show that a greater sum of domestic resources will be used to produce a unit of carrot compared to the foreign exchange earned against low market prices in Trinidad and Tobago. Thus Jamaica will not have a comparative advantage as it relates to the use of foreign exchange. In times when prices are high in the Trinidad and Tobago market, Jamaica will have a comparative advantage as it relates to the use of foreign exchange. There are, however, opportunities for Jamaica in this market if they can supply at more competitive prices as they were found to be uncompetitive when the competitor prices are low but marginally competitive when the competitors' prices increase on the market. Jamaica's high costs are associated with inefficiencies in the production process. Thus, should Jamaican carrot producers improve their agronomic practices, they would be able to effectively compete in this regional carrot market.

Keywords: Competitiveness, Policy Analysis Matrix, Nominal Protection Coefficient

1.0 Global & Regional Carrot Situation

1.1 World Outlook: Production, Trade and Consumption

World production of 'carrots and turnips' was estimated at 26.6 mn T (2005/07); the top ten producers were China, Russia, USA, Poland, the UK, Japan, France, Ukraine, Spain and Italy. In the western hemisphere, Canada is ranked # 20 and Costa Rica is unlisted as a producer. Jamaica is ranked # 70, Barbados # 102 and Antigua # 117. The production figures for the top 10 producers are presented in Table 1. From global production, only 7% of 'Carrots and Turnips' enter world trade. The top three exporting countries are the United States of America, China and the Netherlands, accounting for 16%, 17% and 14% of world exports, respectively. The top ten consumers of carrots are China, Russia, United States of America, Poland, United Kingdom, Japan, France, Germany, Ukraine and Spain.

Table 1: Top 10 Producers of Carrots and Turnips (2005/07)

Production Ranking	Country	Tonnes (T)			
		2005	2006	2007	Average
	World	26,094,700	26,797,508	26,908,944	26,600,384
1	China	8,397,934	8,700,000	9,105,000	8,734,311
2	Russian	1,793,310	1,918,370	1,900,000	1,870,560
3	USA	1,637,380	1,583,480	1,600,000	1,606,953
4	Poland	929,014	833,218	902,100	888,111
5	UK	832,600	807,000	859,300	832,967
6	Japan	762,100	747,500	750,000	753,200
7	France	726,950	692,795	710,000	709,915
8	Ukraine	645,300	719,500	625,000	663,267
9	Spain	573,067	600,000	605,000	592,689
10	Italy	594,815	614,530	548,537	585,961

1.2 Regional Consumption, Trade and Production

CARICOM consumes all its carrots, *Daucus carota*, produced and satisfies its shortfall through imports (Table 2 and Annex Table A1). In 2005/07, imports were estimated at 7,487 T valued at USD 6.2 mn. Production as a percentage of global was recorded at 0.1%; import value 0.6% and volume 0.4% of global trade and its consumption at 0.1% of global consumption.

The Region's self sufficiency was estimated at 77%. While there is a high level of self sufficiency at the regional level, this self sufficiency is due to Jamaica's production, accounting for 88% of total. The most import dependent countries in terms of volumes were Trinidad and Tobago and the Bahamas, whereas Jamaica recorded 99% self sufficiency.

Table 2: CARICOM Carrot Situation (2005/07 average)

Importers	Production	Imports		Consumption	Self Sufficiency	Import Dependency
	Volume (T)	USD (000)	Volume (T)	Volume (T)		
World	26,600,384	1,105,229	1,854,723	28,455,107	93%	7%
CARICOM	25,534	6,250	7,487	33,021	77%	23%
Trinidad and Tobago	0	3,022	4,304	4,304	0%	100%
Bahamas	0	1,054	543	543	0%	100%
Guyana	0	458	422	422	0%	100%
Barbados	1,000	431	431	1,431	70%	30%
St Kitts/ Nevis	62	150	304	366	17%	83%
Belize	256	142	532	788	32%	68%
St Lucia	0	410	427	427	0%	100%
Jamaica	22,640	215	123	22,763	99%	1%
Grenada	79	126	104	183	43%	57%

Antigua	247	117	126	373	66%	34%
Dominica	530	25	31	561	94%	6%
St. Vincent	607	66	86	693	88%	12%
Montserrat	113	18	26	139	81%	19%
Suriname	0	12	14	14	0%	100%
Haiti	0	5	14	14	0%	100%

Data Source: FAOStat and ITC Database

Regional Carrot Production

CARICOM countries produce an estimated 25,534 T. The top producer, Jamaica produced 24,500 T of carrots in 2007, decreasing by 1,613 T when compared the amount in to 2006 (22,887 T). The other top CARICOM producers were Barbados 1,050 T; St. Vincent, 640 T; Dominica, 550 T; Belize, 280 T; Antigua 260 T (FAO Stat Database).

2.0 Opportunities in the CARICOM Market

Within CARICOM, Trinidad and Tobago represent about 48% of CARICOM carrot imports in value terms; 57% by volume. Imports by the other CARICOM member states are much smaller. Jamaican imports represent 3% in value and 2% in volume, that market being satisfied by domestic production. Trinidad and Tobago imported 3,908 T of carrots in 2005, then increasing to 4,511 in 2006 and to 4,492 in 2007 (see Table 3). Previous to 2006, the country imported all its carrots from the USA (66%) and Canada (33%). However, since 2006, most imports have been originating from Costa Rica, while the USA and Canada have both lost more than 75% of their market share. Reported fob price during that year was USD 0.43/kg, compared to USD 0.46/kg for Canada and USD 0.63 for carrots originating in the USA. Costa Rica was able to enter this market through a bilateral trade arrangement with CARICOM and to enjoy a waiver of the 40% CET.

Table 3: Trends and Sources of Imports of Carrots into Trinidad and Tobago from 2004 to 2007.

Source of Imports	Year							
	2004		2005		2006		2007	
	Tonne	USD 1,000	Tonne	USD 1,000	Tonne	USD 1,000	Tonne	USD 1,000
Costa Rica	0	0	0	0	2,407	1,612	3,660	2,625
USA	2,314	1,388	2,313	1,288	1,066	880	397	410
Canada	1,622	706	1,522	800	1,032	650	435	270
Total	3,964	2,105	3,908	2,110	4,511	3,150	4,492	3,305

Data Source: Trade Map

3.0 Varieties

There are four basic types of carrots in the USA market: Imperator (the most common fresh-market type), Nantes, Danvers, and Chantenay (largely used for processing). Fresh-cut "baby" carrots are not true baby carrots, but are usually Imperator types that have been planted closer together to force them to grow long and thin. After harvest, these carrots are mechanically cut, trimmed, grated, polished, and shaped into the small uniform sizes and then retail packed.

Carrot is adapted to cool climates with a long growing period free from extremes of temperature and moisture. The optimum mean temperature is between 16 and 21° C.

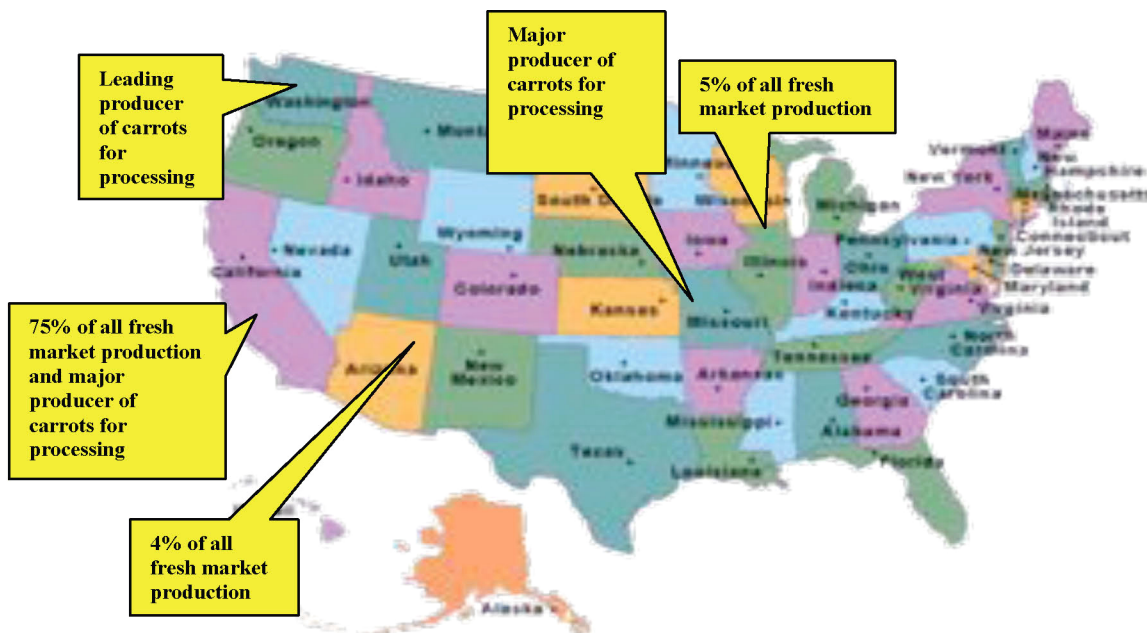
Temperatures below 16° C can retard growth¹. After harvest, the roots should be cooled as quickly as possible to 0° C and maintained at this temperature together with 98% relative humidity. Carrots can be kept six to nine months with the latest application of storage technology (ibid). In Jamaica the Caranid variety is grown.

4.0 Profile of Major Carrot Exporters to the Trinidad and Tobago Market

4.1 The USA

The United States is a major world producer, importer, and is also a net exporter of fresh-market carrots. The shipping side of the fresh carrot market is highly concentrated, with the two largest California firms accounting for the majority of the products sold². The farm value of U.S. carrots (fresh and for processing) averaged USD 573 MN per year during 2003-05, with fresh-market carrots accounting for 94%. The major producing areas are presented in Map 2.1.

Map 2.1: Carrot Production in the USA – Volume Share by Major Producing States



4.2 Canada

Canada is ranked # 20 in global production at 302 thousand T over the 2005/07 period. It is also one of the most valuable crops in Canadian vegetable production. Ontario and Quebec are the main production centres, but carrots are grown in all provinces. Carrot is the second most important vegetable after the potato in Quebec (ibid)³.

¹ (Source: Les légumes du Canada Vegetables of Canada Daucus, pp. 192-198 < <http://pubs.nrc-cnrc.gc.ca/eng/books/bookpages/9780660973005-chap.html> >

² ibid

³ (Source: Les légumes du Canada Vegetables of Canada Daucus, pp. 192-198 < <http://pubs.nrc-cnrc.gc.ca/eng/books/bookpages/9780660973005-chap.html>).

4.3 Costa Rica

Carrot export from Costa Rica accounts for 0.4% of world carrot exports, which will likely increase as production continues to increase. In 2006, Costa Rica produced 14 thousand T of carrots valued at USD 3.1 mn. During the period 2004 to 2006, both the volume of carrots exported and the revenue generated by exports increased three-fold. The USA has been the prime importer of Costa Rican carrots in past years. In 2006, Trinidad and Tobago began sourcing carrots from Costa Rica, making the country the third largest export destination after Nicaragua and the USA. The USA fob ex.-Miami fob ranged from a low of USD 0.30/kg to a high of USD 0.59/kg in 2008/09 and Costa Rica from USD 0.50 - 0.83/kg in May 2009.

5.0 A review of the production capability of the Jamaican Carrot Industry

Although the major players in the Jamaican market expressed strong support for local carrots, periodically they have to resort to import mainly because of inconsistency of supply and poor quality produce. In 2007, Jamaica imported 316 T of carrots valued at USD 101,721. Imports have been showing a variable but a generally decreasing trend in value terms and in volume terms from 914 T in 2005 (Annex Table A3). The country imported 316 T of carrots in 2007 to satisfy production shortfall, mainly from the USA and smaller amounts from Canada. Manchester is the top-producing parish in quantity and also has recorded the highest productivity levels. St. Elizabeth, St. Ann and St. James are amongst the least efficient producers of carrot in Jamaica, with productivity levels of 12, 13 and 10 T per ha, respectively. Meanwhile, St. Elizabeth is the second largest producing parish, producing 27% of domestic production, behind Manchester, which produces 33%.

Carrot is cultivated on the flat and sloping Terra Rosa soil in Jamaica, because of its friable, loose and free-draining characteristics. The soil is bauxitic in nature, high in calcium and phosphorous but low in nitrogen. In some areas visited, the microclimate is suitable for year-round cultivation. Although the rainfall is low, the heavy dew reduces the need for irrigation water. In other areas, the drier conditions necessitate the need for irrigation, especially during the dry seasons.

Typical plot size ranges from 1 to 5 square chains (405 to 2,025 m²) in some areas visited and one acre (0.4 ha) in others. A significant amount of the land is prepared manually, because of small plot sizes on the one hand, and alternatively, because of the karst terrain. In other areas, the soil is ameliorated mechanically by using large wheel tractors to plough and harrow where the soil is free from rocks. Cultivation involves tilling, refining, leveling the soil, broadcasting seeds and harrowing with rakes.

The Caranaid hybrid variety is commonly grown in major producing areas and reportedly yields higher volumes per unit area and is more adapted to the drier conditions. In order to reduce the expenditure on labour and to increase efficiency, Fusilade is applied for weed control. Mulching is not common because of the scattered distribution of the crop.

6.0 Model Used for the Competitiveness Analysis

The Policy Analysis Matrix was used to assess the competitiveness of Jamaica's carrot production and to determine whether the country has a comparative advantage in producing the

crop. The private prices used were the observed prices of the underlying economic costs and valuations plus the effects of all policies and market failures. World prices are used as the social prices or reference prices for the study. Thus, the social prices will be the fob port of Miami, and Costa Rica will be used as the reference prices. The world prices were adjusted for transportation and marketing costs to the comparable location in the market.

6.1 The Nominal Protection Coefficient (NPC)

The NPC was used to assess the competitiveness of Jamaica's carrot production relative to that of Costa Rica and the USA on the Trinidad and Tobago wholesale market. The reference prices used were ex. fob port of Miami and Costa Rica. These prices were adjusted for transportation and marketing costs.

The Nominal Protection Coefficient (NPC) is a ratio of the domestic price of a commodity to its border price, using the official exchange rate. The analysis was done by using the Nominal Protection Coefficient (NPC) model, computed using the following formula:

$$\text{NPC} = \frac{\text{Domestic Price}}{\text{Border Price}}$$

The domestic price is the wholesale market price in Trinidad and Tobago (for carrots currently imported from Costa Rica and USA), and the border price is the selling price of the simulated commodity imported from Jamaica and transported to the wholesale market in Trinidad and Tobago with all adjustments made for costs. A NPC <1 will indicate that Costa Rican and USA carrots on the Trinidad and Tobago market are competitive against Jamaican carrots; NPC >1 will indicate that Costa Rican and USA carrots are uncompetitive against Jamaica; and NPC =1, that Jamaica is marginally competitive. The relative NPCs will indicate which country is more competitive on the Trinidad and Tobago market.

6.2 Domestic Resource Cost Coefficient

The domestic resource cost coefficient measures the efficiency, or comparative advantage, of crop production. If the social returns to land cannot be identified clearly because full information about alternatives is lacking, the DRC may be calculated with respect to labour and capital only. The DRC serves as a proxy measure for social profits. It is calculated by dividing the cost of labour and capital by value-added at social prices.

$$\text{DRC} = \frac{\{(\text{Labour cost} + \text{Capital cost}) \text{ in Social Prices}\}}{\{(\text{Revenues} - \text{Cost of tradable inputs}) \text{ in Social Prices}\}}$$

Where the opportunity cost of land can be clearly identified, the DRC is calculated by including the cost of land (i.e., the social profitability) of the next best alternative crop. The resulting DRC reflects the country's comparative advantage, not only with respect to capital and labour, but within agriculture as well.

6.3 Strengths and Criticisms with the Models

(a) STRENGTHS OF THE PAM

- One of the main strengths of this approach is that it allows varying degrees of disaggregation.
- It also provides a straightforward analysis of policy-induced effects.

(b) CRITICISM OF THE PAM

- Despite its strengths, the PAM approach has been criticized because of its static nature.
- Some do not consider the results realistic in a dynamic setting.
- One of the ways to overcome this limitation is to conduct sensitivity analysis under various assumptions⁴.

7.0 COMPETITIVENESS ANALYSIS

The analysis of the competitiveness of carrot imports from various sources was based on a comparison of the simulated landed price of carrots imported from Jamaica *versus* the domestic wholesale price of other imported carrots from Costa Rica and the USA. A competitive advantage in importing carrots is defined as the extent to which the price of the landed product is below the competitors' prices in the same marketplace. The analysis was conducted by using the low and high prices for carrots from Miami and Costa Rica and was benchmarked against the Cost Plus Profit ex. Kingston, Jamaica.

7.1 Prices used in the Analysis

The low and high prices in the international market for 2008/09 were used to estimate the feasibility of importing carrots into Trinidad and Tobago from Jamaica (Table 4). The Costa Rica and USA carrots landed at the port and cleared, delivered and placed on the Macoya Wholesale Market, Trinidad, were used as the benchmarks.

Table 4: Carrots Prices from Various Sources of Supply

Market	Size / Packaging	Low – High, Free on Board Prices (USD/kg)
USA- Miami Terminal	Sacks 48 1-lb film bags - (size not specified)	0.30 – 0.59
Costa Rica	Sacks 48 1-lb film bags - (size not specified)	0.50 – 0.83
Jamaica	Cost of Production + Processing and Profit	0.81

7.2 Freight

An important cost component in the importation of commodities is the respective freight rates from origin. The refrigerated cargo freight rates from the ports of origin are presented in Table 5: container from Miami cost USD 4,900/shipment or USD 0.20/kg, and Costa Rica USD 4,500/shipment or USD 0.19/kg. Other parameters used in the calculation of landed prices are presented below in Box 1.

⁴ Pearson, Scott R. and Monke, Eric A. The policy analysis matrix for agricultural development Cornell University Press (Ithaca) <http://www.getcited.org/?PUB=102722762&showStat=Rating>

Table 5: Refrigerated Cargo Freight Rates from Various Sources of Origin

Origin	Freight Rates, Container Size: 40 ft. 25 Ts or 55,000 lbs		
	Cost (USD/shipment)	Cost (USD/kg)	Estimated Cargo Transport Time
Costa Rica	\$4,710	\$0.19	1.5 to 2 wks
Miami	\$4,900	0.20	1 wk
Jamaica	\$3,000	0.12	1 wk

Parameters in the Calculation of Landed Prices

Box 1 Rates and Charges Applied to Imports	
i. Freight	Freight rate per kg as given by shipping firms using a volume of 25 Ts / 40 ft reefer unless otherwise stated.
ii. Insurance	Insurance at a rate of USD 0.01/kg.
iii. OER	An official exchange rate of \$TT 6.30 = USD 1.00.
iv. Duty	The CET of 40% applies to carrot imports from all extra-regional countries except Costa Rica.
v. Broker's Fee	Broker fee is applied at a rate of 2% on the cif.
vii. Port Charges	Port Charges applied at a rate of USD 129 plus USD 23.00 per import bill of landing per shipment.
viii. Handling & Transport	Internal transport estimated at \$US 250.
ix. Interest	Interest for financing is charged at a rate of 12% per annum.
x. Cold storage cost	Cold storage cost charged at a rate of \$US 0.04/kg. Estimated time in cold storage is three months maximum.
xi. Marketing margin of importer	Marketing margin of importer estimated at 15%.

Mark-Up and CET: This import competitiveness analysis for carrots assumed an importer's markup of 15% on imports and the 40% CET was applied on all imports except those originating in Costa Rica.

8.0 RESULTS:

8.1 CARROT COST OF PRODUCTION IN JAMAICA

Currently, an estimated 80 to 90% of the carrots are sold to higglers at the farm gate, at which time, the produce is sorted and marketed in three informal grades (1, 2 and 3), with grade one being of best quality, which comprises approximately 33% of the crop. The cost of production was computed based on field data obtained from typical carrot farmers in St. Elizabeth (Table 6). The 0.4 hectare plot recorded a yield of about 5,455 kilograms.

8.2 Price Competitiveness

The two major suppliers on the Trinidad and Tobago market (Costa Rica and the USA) were more competitive against the simulated imports from Jamaica in the case of the low import prices from these countries. However, against high import prices these countries were marginally competitive against simulated imports from Jamaica. The 40% CET waiver afforded to Costa Rica has placed Jamaica in an uncompetitive position. (It is apparent that the Costa Rica price was increased to match the ex-USA price, which does not enjoy CET waiver).

Jamaica will be marginally competitive against the current major suppliers on the Trinidad and Tobago market when the competitors' prices are high indicated by the NPC = 1.01 from Costa Rica and NPC = 1.06 from the USA.

Table 7: Competitiveness of Simulated Imports of Carrots from Jamaica Competing with Costa Rica and the USA on the Trinidad and Tobago Market (2008/09 Market Prices)

Source of Imports	NPC	Jamaica Price Differential against Costa Rica and the USA
Costa Rica Low price	NPC = 0.68	+USD 0.38
High price	NPC = 1.01	-USD 0.01
Miami - USA Low price	NPC = 0.68	+USD 0.39
High price	NPC = 1.06	-USD 0.06

At the high market prices from Costa Rica and the USA, Jamaica's carrots were competing with costs of USD 0.01/kg and USD 0.06/kg lower than the respective competitors on the Trinidad and Tobago market. When the competitors are supplying the market at their low prices, Jamaica's simulated prices were USD 0.38/kg and USD 0.39/kg higher, respectively. Costa Rica occupies a marginally better competitive position in the Trinidad and Tobago wholesale market based on the NPC and market price differential (and the waiver of the CET gives them much more flexibility).

8.3 Analysis of Jamaica's Comparative Advantage

DRCs greater than one indicate that the value of domestic resources used to produce the commodity exceeds its value added in social prices. The DRC of 1.74 (using the low price in Trinidad and Tobago) indicates that Jamaica does not have a comparative advantage in producing carrot as it relates to the use of foreign exchange. Using the high price in Trinidad and Tobago the DRC was 0.66, which indicates that at that price the domestic resources used to produce the commodity are less than its value added in social prices, thus giving Jamaica a comparative advantage as it relates to the use of foreign exchange.

9.0 Conclusion

From the analysis, the data suggest that the simulated imports of carrots will be price uncompetitive against the low market prices and will be marginally competitive against high market prices from Costa Rica and the USA in the Trinidad and Tobago carrot market. From field visits to Jamaican carrot producers, one finds that the high cost of production may be due to inefficiencies in field production. Given the proximity of Jamaica to Trinidad and Tobago and the intrinsic trading relationships that lie therein, this represents a good market for Jamaica, should the country be able to increase its production and to compete on the basis of quality and price. It is recommended that Jamaica pursue the initiative, and after successful entry in the lucrative Trinidad and Tobago market, the other CARICOM markets may then be targeted for entry.

Annex

Table Annex Table A1: World and CARICOM Imports of Carrots (2005 – 2007)

Importers	2005		2006		2007		2005/07 average	
	USD (000)	Volume (Ts)	USD (000)	Volume (Ts)	USD (000)	Volume (Ts)	USD (000)	Volume (Ts)
World	968,938	1,746,032	1,155,866	1,934,885	1,190,882	1,883,252	1,105,229	1,854,723
CARICOM	4,768	7,140	7,079	7,820	6,902	7,502	6,250	7,487
Trinidad and Tobago	2,275	3,908	3,296	4,511	3,496	4,492	3,022	4,304
Bahamas			1,527	834	1,634	795	1,054	543
Guyana	410	324	490	389	475	553	458	422
Barbados	431	445	418	435	444	413	431	431
Saint Kitts/ Nevis	127	271	145	304	179	336	150	304
Belize	128	914	141	359	156	323	142	532
Saint Lucia	511	609	563	501	156	172	410	427
Jamaica	380	109	148	121	116	138	215	123
Grenada	126	114	150	107	101	92	126	104
Antigua	241	236	42	51	67	91	117	126
Dominica	23	28	22	27	29	37	25	31
Saint Vincent	74	100	99	126	24	33	66	86
Montserrat	19	30	18	31	18	18	18	26
Suriname	21	9	11	24	4	9	12	14
Haiti	2	43	9		3		5	14

Data Source: ITC Database based on Comtrade Statistics