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CAES Caribbean
Agro-Economic
Society

Farm & Business

The Journal of the
Caribbean Agro-Economic Society

Theme:

**“Mitigating Climate Change Effects to
Ensure Food Security”**

Vol. 8, No. 1, July 2016

ISSN 1019—035 X



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Cover Design: **Kavita Butkoon**

ISSN 1019 – 035 X

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Developing Food Value Chains to meet Tourism Demand in the Caribbean: Case Studies of St. Kitts Nevis and St. Lucia

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Abstract

Tourism plays a vital role in the Caribbean region and it is one of the fastest growing industries globally. According to the World Travel and Tourism Council Report (2014), tourism's contribution to regional GDP of Caribbean is estimated at 14.2% in 2014 and it accounts for 11.4% of regional employment. As the two most common pillars of the region's economy, sugar and bananas industries, have declined, tourism has increasingly become a major source of income for many of the Caribbean countries. For some countries tourism accounts for more than half of their GDP for example in the Bahamas and Antigua and Barbuda. With an increasing number of tourist arrivals and cruise ship visits per year, tourism continues to be an important opportunity for further promoting economic development in the Caribbean.

Caribbean small island developing states (SIDS) are very vulnerable open economies. This paper investigates how the tourism industry can contribute in a much greater manner to regional development through the development of competitive food value chains for all aspects of tourism food demand. The tourism industry mainly relies on food imports as opposed to accessing the local market. Despite numerous efforts over many years there has been little success in sustainably supplying tourism demand from domestic production and value-chains. This paper evaluates tourism, food and agricultural linkages and presents an approach to increase these linkages for greater economic and social impact.

The main challenges for Caribbean farmers in meeting supply requirements have been related to their inability to compete (Beckford and Campbell, 2013; FAO, 2011, 2012; IICA, 2014). This inability results not only from low productivity but has also been related to quality and reliability of supply. The weak public policy and governmental support framework as well as private sector structural weaknesses have also contributed to the lack of inclusion of Caribbean farmers in tourism food markets.

Based on a survey of tourism sector agricultural product buyers, the analysis of main food trade actors and requirements of the tourism industry carried out for two case studies countries – St. Kitts and Nevis and St. Lucia. With this information and the experience of domestic producers, production and marketing processes, local commodities with the greatest potential for the tourism food market are identified. The lessons from case studies analysis lead to the design of new approaches to the development of food value chains for the tourism sector. Results of this analysis can be applied to other Caribbean countries that have similar agricultural characteristics and depend on the tourism industry. Main findings demonstrate that if Caribbean producers are able to develop competitive food value chains, a cost saving alternative food supply will be available to the tourism sector and this specific segment of the Caribbean agricultural sector can be sustainable.

Keywords – Food Value Chains, Food Trade, Tourism Food Demand

Introduction

The tourism industry has become the principle economic sector in the Caribbean and the leading source of foreign exchange for many of its countries. However, a significant proportion of food for the tourism industry continues to be imported from extra-regional sources due to the inability of the local agricultural sector to meet the increasing demand for high quality produce (Renard, 2001; Timms, 2006). Despite numerous efforts over many years, there has been little success in providing a sustainable supply from domestic agricultural production (including of value added products) to meet tourism demand. However, increasing linkages between the agricultural and the tourism sectors can contribute to overcoming fiscal difficulties due to high public debt and high levels of food imports, as well as address certain social problems in the region.

Opportunities arising from improved linkages between the tourism and agricultural sectors provide important macroeconomic and social benefits. By developing competitive value-chains, countries could reduce the food import bill, improve national food security, increase rural employment and reduce rural poverty (FAO, 2013a; Hepburn, 2013). This paper investigates ways in which the tourism industry can provide a greater contribution to regional economic development and presents an approach which can be used to increase linkages between tourism and agriculture through the development of competitive food value chains in case studies of St. Kitts and Nevis and St. Lucia.

The main challenges for Caribbean farmers in meeting food supply required by the tourism industry relate to their inability to compete with imported crops in terms of quality, price and adequate volume. These challenges of domestic agriculture in meeting food supply requirements are traditionally related to low productivity, high production costs and poor marketing systems (Beckford and Campbell, 2013; FAO, 2011, 2012; IICA, 2014). However, opportunities exist for local produce to successfully compete with imported products as interviews carried out with hotels and restaurants in two selected countries revealed that supply managers prefer to purchase local vegetables and fruits due to the better taste, freshness and longer shelf life. Countries with high imports related to tourist preferences can promote fresh food consumption as part of the tourism thrust. At the same time food production value chains in the countries will need to be strengthened to meet the demand (FAO, 2013b). Caribbean countries have the conditions and resources to produce an adequate supply of fresh fruit and vegetables if farmers can introduce new production systems that address the current problems. Attention would need to be paid to increased use of fertilizers, irrigation and post-harvest storage. The results of this paper show that higher production yields will decrease the current cost of production, making local produce more competitive.

To transition successfully, farmers need increased access to technical and financial assistance to achieve further commercialisation and meet the demand from the tourism industry. The weak public policy and governmental support framework as well as private sector structural weaknesses have contributed to the lack of inclusion of Caribbean farmers in tourism food markets. This paper presents policy measures utilized in other countries, which can provide support for small farmers including in St. Kitts and Nevis and St. Lucia.

This paper is divided into three parts. The first part explains the linkages between tourism and agriculture in the Caribbean economy and the main social benefits from meeting the demand of the tourism sector, including supply of fresh food products. The second part analyses the value chain development of onions and cole crops in St. Kitts and Nevis with the special reference to the demand from tourism. The third part is a case study on value chain

development of fruits and vegetables in St. Lucia. Both case studies summarize the main problems facing domestic agricultural supply in meeting the tourism sector demand and provide policy recommendations to help expand the share of domestic products in meeting the tourism sector market.

1. TOURISM AND AGRICULTURAL LINKAGES IN THE CARIBBEAN ECONOMY

1.1 Potential Demand from Tourism Sector

Tourism plays a vital role in the Caribbean region and it is one of the fastest growing industries globally. According to the World Travel and Tourism Council Report (2014), tourism's contribution to regional GDP of Caribbean is estimated at 14.2% in 2014 and it accounts for 11.4% of regional employment. As the two most common pillars of the region's economy, sugar and bananas industries, have declined, tourism has increasingly become a major source of income for many of the Caribbean countries. For some countries, such as the Bahamas and Antigua and Barbuda, tourism accounts for more than half of their GDP. With an increasing number of tourist arrivals and cruise ship visits per year, tourism continues to be an important opportunity for further promoting economic development in the Caribbean.

The tourism industry has direct benefits for the economy and additionally, significant indirect social benefits. It stimulates local economies through foreign investment and also creates employment opportunities for the local population. This includes employment by hotels, restaurants and leisure industries as well as travel agents, airlines and other passenger transportation services. World Travel and Tourism Council Report (2014) estimates that the tourism sector in 2013 supported 1,909,000 jobs in the Caribbean¹, including jobs indirectly supported by the industry. This is estimated to rise by 2.8% in 2014 to 1,963,000 jobs and to 2,377,000 jobs in 2024 (12.2% of total employment). Moreover, the Cruise Lines International Association (CLIA)² reports that the Caribbean is the leading cruise destination and it accounts for 45.3%³ of global ship deployments. Cruise passengers to the region are estimated at 21.84 million⁴. Table 1 summarizes the main characteristics of FAO Caribbean countries in terms of population, tourist arrivals and contribution of tourism industry to national economies. The number of tourist arrivals is more than double the national population for most of the countries, highlighting the importance of the tourism industry as a substantial market in national economies. Furthermore, for some countries, such as Antigua and Barbuda and the Bahamas tourism accounts around half of their GDP, providing also more than 50% of employment. Therefore, growing demand from tourism sector opens a potential market for local food production.

¹ Caribbean includes CARICOM and non-CARICOM islands.

² CLIA is the world's largest cruise industry trade association with representation in North and South America, Europe, Asia and Australasia. <http://www.cruising.org/>

³ CLIA's figure adjusted to include the Bahamas and Bermuda.

⁴ Total cruise passenger arrivals as given in table represent the sum of arrivals at all destinations. However, because most cruise ships stop at more than one destination, this figure is considerably larger than the actual number of cruise passengers visiting the region.

Table 1: Main Characteristics of Tourism Sector

CARICOM	Population	Tourist (Stop-over) Arrivals (2014)	Tourism Total Contribution to GDP (%) (2014)	Tourism Contribution to Employment
Antigua and Barbuda	89,985	249,316	64	57.7
Bahamas	377,374	924,898	48	54.5
Barbados	284,644	458,510	36.5	35.7
Belize	331,900	321,217	37.2	32.9
Dominica	72,003	81,15	31.9	29
Grenada	105,897	133,521	20.8	18.7
Guyana	799,613	n/a	7.5	8
Jamaica	10,317,461	2,080,181	26.1	23.4
Haiti	2,715,000	465,174	4.2	3.6
St. Kitts and Nevis	54,191	74,317	23.4	21.3
St. Lucia	182,273	338,158	39.6	42.1
St. Vin. & the Gren.	109,373	61,684	21.3	19.3
Suriname	539,276	140,878	2.1	2
Trinidad & Tobago	1,341,151	412,537	8.2	4.4

Source: Caribbean Tourism Organization (2014), World Travel and Tourism Council (2013), World Bank (2013)

Many Caribbean nations import goods and services, especially food, to sustain the tourist industry. Those countries that are able to develop competitive food value chains and meet tourism sector requirements for food products would benefit greatly in terms of jobs, foreign exchange savings and debt reduction.

1.2 Agricultural Supply for Tourism Sector

This section reviews agriculture's contribution to economic development in the Caribbean. In many tourism-oriented economies, there is a low contribution of agriculture to GDP as well as low annual growth in agriculture. Agriculture remains the primary economic activity only in five countries: Belize, Dominica, Guyana, Haiti, and Suriname (Table 2). Most Caribbean economies are service oriented, with the exception of Trinidad and Tobago which is primarily energy-based. According to World Bank Statistics (2013), the contribution of agriculture to GDP ranges from a low of 0.6% in Trinidad and Tobago to highs of 21.5 % and 14.9% in Guyana and Dominica, respectively. Moreover, Caribbean countries with lower levels of agricultural contribution to GDP

tend to be net food-importers with a high ratio of food dependence⁵ - greater than 0.5. This is especially true in the case of Antigua and Barbuda, the Bahamas and Barbados, where the annual growth rate for agricultural value is negative.

Table 2: Agricultural Performance and Food dependence Ratio

CARICOM	Agriculture, value added (% of GDP)	Agriculture, value added (annual % growth)	Food Dependence Ratio
Antigua and Barbuda	2.1	-12.7	0.92
Bahamas	2.1	-9	0.92
Barbados	1.5	-3.4	0.87
Belize	13.1	20.3	0.40
Dominica	14.9	0.7	0.55
Grenada	5.4	3.2	0.81
Guyana	21.5	3.7	0.41
Jamaica	6.7	2.5	0.44
Haiti	n/a	4.5	0.63
St. Kitts and Nevis	1.5	0.8	0.95
St. Lucia	3.6	19.1	0.83
St. Vin. & the Gren.	7.5	17.6	0.68
Suriname	9.3	9.1	0.64
Trinidad & Tobago	0.6	-19.1	0.85

Source: World Bank (2013), FAOSTAT (2012)

Partly due to the low contribution of agriculture to national economies, the Caribbean tourism sector mainly relies on food imports as suppliers continue to import food products as opposed to accessing the local market. Despite numerous efforts over many years to establish direct linkages between farmers and hotels, there has been little success in sustainably supplying tourism demand from domestic production and value-chains. However, those countries that are able to develop competitive food value chains and meet tourism sector requirements for food products can significantly increase the level of foreign exchange. For some countries, this strategy is especially critical to increase the level of the high levels of leakage of foreign exchange expenditures from the tourism left in the country (as much as 90% in the Bahamas and 50% in Barbados⁶).

⁵ Food Dependence Ratio=Total Food Imports/Total Consumption, where Total Consumption = (Domestic Production + Imports).

⁶ CTA, IICA, CARICOM (2013), Investing in Agrotourism Development in the Caribbean Region (2013), Agrotourism Seminar, Caribbean Week of Agriculture (CWA).

Caribbean farmers have difficulties competing internationally due to higher production costs, caused by low land productivity and scarce water resources for irrigation, high costs for other inputs, limited food-processing sector and low economies of scale. The main problem is not only low production, but is also a question of quality and reliability. Private sector structural weaknesses have also contributed to the lack of inclusion of Caribbean farmers in tourism food markets. Thus, as jobs in agriculture can be created, development of local food value chains is crucial for regional food security. Adoption of new practices and training of farmers can improve the provision of goods and services to the selected value chains in a sustainable manner (FAO, 2014a; FAO, 2014b).

Analysis done by CTA, IICA and CARICOM in 2013 to investigate agrotourism development in the Caribbean region indicates a strong preference by tourists for products that are authentic, linked to local agriculture, culture and heritage in a destination. A focus on freshness and 'localness' of food products is presented as a key component of this strategy. Therefore, if local farmers can improve quality and reliability to meet commercial needs and consumer tastes, the tourism industry can contribute in a much greater manner to regional economic development. Caribbean agriculture has potential to compete in domestic markets and meet tourism demand but development of improved food supply chains and linking them with tourism food market is necessary.

1.3 Social benefits from meeting tourism sector demand and agricultural food supply.

This section presents the main social benefits from linking local agriculture with the tourism industry. Overall, the Caribbean region continued to be adversely affected by relatively weak economic conditions in terms of low economic growth, high public debt and high level of unemployment, especially, among youth. All countries have low average economic growth except for Trinidad which has an energy-oriented economy (Table 3). High levels of public debt, especially in case of Jamaica and Barbados, reduce the ability of countries to implement social programs and contribute to rural development and economic growth. Moreover, the high level of unemployment in all countries, especially among youth, further contributes to high poverty level.

Table 3: Overview of Main Economic and Social Indicators in the CARICOM

CARICOM	GDP growth (Average 2011-2013, %)	Public Debt (%) of GDP)	Unemployment Total (% of total labor force)	Unemployment Youth total (% of total labor force)	Population poverty line (%)
Antigua & Barbuda	2.1	89	8.4	19.9	18.4
Bahamas	2.1	57.6	13.6	28.9	9.3
Barbados	0.4	101.2	12.2	27	19.3
Belize	3.4	79.6	14.6	29.7	41
Dominica	1.2	70	11	26	29
Grenada	2.4	110	10.2	31.5	38
Guyana	1.8	58	11.1	23.9	35
Haiti	2.5	20.4	7	17.4	58.5

CARICOM	GDP growth (Average 2011-2013, %)	Public Debt (%) of GDP)	Unemployment Total (% of total labor force)	Unemployment Youth total (% of total labor force)	Population poverty line (%)
Jamaica	1.4	132	15	35.5	17.6
St. Kitts and Nevis	-0.2	83	5.1	n/a	21.8
St. Lucia	1.8	77	20.6	27.5	28.8
St. Vin. & the Gren.	1.9	67	18.8	33.8	30.2
Suriname	2.2	20	7.8	22.5	31
Trinidad & Tobago	4.8	50.6	5.8	13.2	17

Source: World Bank (2013), IMF (2014)

Development of food value chains can help address serious challenges related to rural development through job creation and reduction of food import bill. Supporting domestic producers and promoting production of local commodities for the tourism food market can diversify the Caribbean economy and can create sustainable tourism industry and revitalize agricultural sector (CARICOM, 2012).

Sustainable local food value-chains will also enhance food and nutrition security and reduce poverty in rural areas and promote local awareness and good practices with respect to climate change and environmental issues. Finally, engagement of local small farmers to increase agricultural food supply will create income-earning opportunities, especially for the youth, and will contribute positively to the development of tourism sector in a meaningful and sustainable manner (Lengefeld and Stewart, 2004).

The remainder of paper presents two case studies of how tourism and agriculture might be efficiently linked.

2. VALUE CHAIN DEVELOPMENT OF ONIONS AND COLE CROPS IN ST. KITTS AND NEVIS

2.1 Situation Assessment

This section shows how selected value chains, supported by an FAO project TCP/STK/3501 (FAO, 2014c) on value chain development of onions and cole crops in St. Kitts and Nevis can decrease food import bill and meet the food demand of the tourism industry. Import analysis indicates that a large proportion of the foreign exchange earnings serves to pay for the increased imports, valued at about nine times that of the exports. The twin-island Federation of St. Kitts and Nevis like most of the other Caribbean Islands has seen rapid changes in its economy over the past decades. Following the decline and closure of the sugar industry in July 2005, tourism, small export-oriented manufacturing, and offshore banking have become important economic activities and foreign exchange earners. However, the food import bill (FIB) is a substantial portion of the overall imports, causing the twin island republic to have a food

dependence ratio equal to 0.95. Total agricultural and food imports are estimated at ECD 111.6 mn⁷, where the proportion of fruits and vegetables imports is estimated at ECD 17.8 mn or 16 % of total food imports.

Agriculture, together with forestry and fisheries, contributes 1.7% of St Kitts and Nevis' GDP (World Bank, 2013). An analysis of the period 1995 through 2011 indicates that total food imports increased from USD 24.4 mn in 1995 to USD 40.4 mn in 2011. Over the said period, the growth of the tourism sector continued to expand. Current tourism contribution to GDP is estimated at 23.4 %. However, foreign exchange earnings from the tourism industry are mainly used to pay for increasing imports, valued at about nine times that of the exports.

The tourism sector offers a great opportunity for local agricultural development through the utilization of fresh local products. Environmental conditions including soil and climate are favourable for the year-round production of local crops. Examining the most commonly imported fruits and vegetables shows that most of these commodities can be grown locally thus reducing foreign exchange leakage. Substitution of imported for locally grown products can be as high as 32% of total fruits and vegetables (Table 4).

Therefore opportunities exist for local produce to successfully compete with imported products on the supermarket shelves. Further export opportunities also exist in the nearby sub-regional markets that currently depend on the importation of local vegetables and fruits from extra-regional sources.

Table 4: Top 20 imported commodities from fruits & vegetables group

Commodity	Value (EC\$)	% of Fruits & Vegetables Imports	Commodities that can be grown locally
Juice, fruit nes	1,555,124	8.7%	
Potatoes, frozen	1,505,723	8.4%	x
Juice single fruit n.e.s.	1,024,554	5.7%	
Potatoes	704,193	3.9%	x
Grapes, fresh.	651,729	3.6%	
Onions, fresh or chilled.	565,492	3.2%	x
Apples, fresh.	560,672	3.1%	
Cabbage lettuce	513,190	2.9%	x
Headed broccoli	467,875	2.6%	x
Nuts and other seeds,	465,264	2.6%	x
Other orange juice	445,420	2.5%	

⁷ Ministry of International Trade, Industry and Commerce, St. Kitts & Nevis (2014).

Commodity	Value (EC\$)	% of Fruits & Vegetables Imports	Commodities that can be grown locally
Sweet peppers	415,932	2.3%	x
Frozen orange juice	366,256	2.0%	
Other apple juice	365,505	2.0%	
Grapes	328,255	1.8%	
Mixtures of vegetables, frozen.	324,908	1.8%	
Cabbages, fresh	287,442	1.6%	x
Carrots, fresh	286,341	1.6%	x
Garlic, fresh	274,734	1.5%	x
Other beans dried	240,741	1.3%	x
TOTAL	11,349,350	63%	32%

Source: National Statistics

FAO project foresees value-chain development of onions and cole crops (cabbage, cauliflower, broccoli, brussels sprouts) in St. Kitts and Nevis as one of the main strategies to reduce the food import bill and create employment. According to National Statistics, total imports of onions in 2014 are estimated at ECD 0.5 EC mn, which is 4% of fruits & vegetables; imports of cole crops (cauliflower, broccoli, cabbages, cabbage lettuce and brussels sprouts) are estimated at ECD 1.9 mn, which is 11% of total fruits & vegetables imports.

Total domestic supply of onions is estimated at 325 MT - only 120 MT were locally produced in St. Kitts & Nevis, while 205 MT were imported. In all 63% of domestic supply of onions is imported. Overall domestic supply of cole crops in St. Kitts and Nevis is estimated at 311 MT, and 91% of this is imported. Local production of cabbages is 25.9 MT and broccoli 0.8 MT; while imports of these crops were 284 MT.

2.1.1 Challenges of domestic agricultural supply to meet tourism demand

Based on field work carried out by the researcher in St. Kitts and Nevis in May 2015 and interviews with extension officers and small farmers main challenges of domestic agricultural supply to meet tourism demand were identified. Six main problems of the agricultural sector limit producers in St. Kitts and Nevis from meeting the food demand of the tourism industry: access to land, marketing, irrigation, lack of post-harvest outlets, inconsistency of supply and low quality of local commodities. While local produce has an advantage of freshness and taste, the proportion of local purchases by the tourism sector is still very low due to sporadic distribution, seasonality of production and inconsistent quality.

Agricultural production of cole crops and onions in St. Kitts and Nevis is primarily through small farming, where producers operate on less than 2 ha of land. Current production models are characterized by traditional land management, where about 85% of farmers are landless farmers and have to lease the land from the Government. Furthermore, most of the farmers rely on rain fed water therefore, production yields are severely affected, due to lack of irrigation.

Higher production is also possible, by increasing the number of harvests per year but the production cycle is very limited with only one per year. With irrigation, up to four possible cycles per year are possible, which is not currently realized. Other limitations to regular supply are the lack of storage and processing facilities which increase post-harvest losses. As result, domestic crops cannot be supplied during the whole year. Furthermore, farmers have very limited access to restaurants and hotels to sell their commodities, as a result street markets continue to be main market outlets. Farmers are also not motivated to introduce any quality control and grading system as they do not receive a better price for a better quality of crops. All these issues prevent expansion of local agriculture to supply the increasing food demand from tourism sector.

2.2 EXPANSION OF DOMESTIC MARKET SHARE

2.2.1 Prices

In order for the domestic agricultural sector in St. Kitts and Nevis to be competitive, the price of local production needs to be competitive with that of imported products. Analysis of current average retail prices indicates that local commodities are only slightly higher priced than imported commodities (Table 5). Local farmers could reduce their prices to equal or below that of imported commodities with higher production yields, which could be obtained with adequate training to farmers on improved production and management techniques. This will enable the tourism sector purchasing managers to increase the volume of purchased domestic products if farmers can meet quality requirements of the tourism industry and guarantee the consistency of supply.

Table 5: Current Average Retail Prices from Selected Supermarkets May 2015⁸

Commodity	Local EC\$/lbs.	Imported EC\$/ lbs.
Onion	2.6	2.5
Broccoli	6.61	8.96
Cabbages	3.2	3

There is currently a 100% mark-up by farmers, and even so the difference in retail price between local and imported commodities is minimum. After introduction of improved management the cost of production is expected to drop by 50%, suggesting that farmers can apply the same a mark-up of 100% and their prices will be very competitive with imported commodities.

2.2.2 Land

The agricultural land area of St. Kitts and Nevis is 23.1 % of total land (6000 ha). The closure of the sugar industry in 2005 provided access to fertile agricultural land that was previously occupied by sugarcane. The amount of ex sugar cane land in St. Kitts and Nevis that is potentially available for agriculture is estimated at 3156 Ha (Table 6). Efficient land policy for landless farmers can expand domestic production of cole crops and onions and replace imported commodities, saving annually about 2.4 ECD mn of national budget.

⁸ Ram's, CNC, Valu Mart, Best Buy, Chinese Supermarket (chain).

Table 6: Land Distribution in St. Kitts and Nevis

Land Area (ha)	
Land Area	26,000
Agricultural area	6,000
where total ex sugar cane land ⁹	3,937
- ex sugar cane land approved for agriculture uses	781
- ex sugar cane land potentially available for agriculture	3,156
Forest area	11,000
Other land utilization	9,000

Source: Ministry of Sustainable Development of St. Kitts and Nevis

Land Requirements for the Expansion of Onions Production

Currently domestic production of onions occupies only 6 Ha¹⁰ of harvested area, while harvested area of cabbages occupies 7 Ha. In order to expand production of onions to enable substitution of imported onions, based on current volume of imports of onion in 2014 of 205 MT/ 471,789 lbs, on average around 30 acres are needed annually or less than 2.5 acres per month with an increase in yield to 14 000 lbs/acre. At current yields of 10 000 lbs/acre, 45.1 acres is required (Table 7). Yields will also need to increase from the current level of 10,000 lbs/acre to 14,000-16,000 lbs/acre. Small farmers, operating on less than 2 Ha¹¹ can be also engaged to increase the domestic share of total market.

Table 7: Land requirements for import substitution of onions

Onions Imports (lbs.)	Acres Required Annually					
	10 000 lbs/acre ¹²	12 000 lbs/acre	14 000 lbs/acre	16 000 lbs/acre	18 000 lbs/acre	20 000 lbs/acre
451,947	45.1	35.1	32.2	28.2	25.1	22.5
	Monthly Acres Requirement for 2 crops cycle					
	3.7	2.9	2.6	2.3	2.1	1.8

Land Requirements for the Expansion of Cole Crops Production

To expand cole crops production to meet current volume of imports in 2014 of 626,112 lbs. approximately only 60 acres are required annually or 5 acres per month - if there is an increase in yield from the current level of 3,000 lbs/acre to 9,000-12,000 lbs/acre.

⁹ Data is only for St. Kitts. In Nevis sugar cane was not grown.

¹⁰ Production data only refers mainly to St. Kitts, data for Nevis is not captured.

¹¹ 1 Ha=2,47 acres.

¹² Here and after in grey colour current yield of onions production in St. Kitts and Nevis is indicated.

Table 8: Land requirements for import substitution of cole crops

Cole Crops Imports (lbs.)	Acres Required Annually					
	3 000 lbs/acre ¹³	6 000 lbs/acre	9 000 lbs/acre	12 000 lbs/acre	13 000 lbs/acre	16 000 lbs/acre
626,112	209	104	70	52	48	39
	Monthly Acres Requirement for 2 crops cycle					
	17	9	6	4.3	4	3.2

2.3 LINKS WITH TOURISM SECTOR

This section estimates the total demand of the tourism industry for onions and cole crops, both local and imported. It also identifies the key requirements for farmers to increase the supply of local products to the tourism sector. The factors informing this are based on a survey conducted in May 2015 with food importers in the tourist industry. The methodology is as follows: estimates of tourism demand of cole crops and onions are based on Resort A's¹⁴ monthly purchases and average number of guests. The demand per guest is extrapolated to the total demand of tourism sector by multiplying by the total number of visitors. These findings indicate the quantity of this potential demand which can be supplied by local production of onions and cabbages. Furthermore, proportion of current supply consumed by the tourist sector is estimated in order to show the percentage of domestic supplies that goes to the tourism sector.

There were twenty-five scheduled interviews with purchase managers of the biggest hotels in St. Kitts and Nevis, extension and marketing officers from the Ministry of Agriculture and Fisheries and domestic producers. These interviews took place in May, 2015. Participants were asked for to quantify food purchases from local farmers, indicate main mechanisms of domestic supply and identify main constraints. The survey found that consumption of total food imports by tourism sector (hotels, restaurants) account around 40% of total food imports and total food imports is equal to ECD 44.6 mn. Hotels and restaurants can order local commodities either through the Marketing Department of Ministry of Agriculture or directly placing order for farmers. The current local purchase of onions by hotels and restaurants is less than 6% annually of total domestic production, while purchases of cabbages account for only 2%. Supply consistency, grading, packaging and diversification are key indicated requirements of tourism operators in order to increase local purchases.

St. Kitts Resort A - Case Study¹⁵

St. Kitts Resort A has on average 988 guests per month. Demand per guest is estimated based on monthly purchases of local and imported onions and cabbages (Table 9).

¹³ Here and after in grey colour current yield of cabbage production in St. Kitts and Nevis is indicated.

¹⁴ To respect company privacy policy business name is not indicated.

¹⁵ The respondent asked to be anonymous

Table 9: Estimated Demand per Guest

Commodity	Monthly Demand (Imports) A	Monthly Demand (Local) B	Total Demand per guest: (A+B)/ 988 C
	<i>Volume (lbs.)</i>	<i>Volume (lbs.)</i>	<i>Volume (lbs.)</i>
Onion	8,200	300	8.6
Cabbage	1,200	30	1.24

Extrapolating per guest demand and multiplying it by total number of visitors¹⁶ in St. Kitts and Nevis in 2014 (74,317 tourists), it is possible to estimate total demand of the tourism sector for selected commodities as well as the proportion of domestic supply consumed by the tourist sector. This shows that approximately 639,126 lbs. of onions and 92,153 lbs. of cabbages are needed annually to satisfy the demand of tourism industry (Table 10). It shows that 89% of total domestic supply of onions is consumed by local hotels and restaurants and only 30% of total domestic supply of cabbages goes to the tourism sector. The high proportion of onions consumed by the tourist sector indicates a potential market for local production to meet this growing demand.

Table 10: Estimated Demand by Tourism Industry

Commodity	Total Tourism Demand (C*74,317) (lbs.) D	Domestic Production (lbs.) E	Imports (lbs.) F	Total Supply (E+F) (lbs.) G	Proportion of Supply consumed by the Tourism Sector (D/G) (%) H
Onion	639,126	264,554	451,947	716,501	89
Cabbage	92,153	57,099	243,094	300,193	30

2.3 PRODUCTION COST ANALYSIS (cabbage, onions)

This section estimates profit margins for farmers based on production costs and improved yields. In particular, a baseline survey questionnaire was used to provide the parameters for calculating the cost of production under current and improved management systems. Main parameters refer to cost of land preparation, planting material, fertilizing, weed and pest control, irrigation, harvesting, transportation and storage. The researcher developed cost of traditional and improved production models in May 2015 in close collaboration with extension officers from Ministry of Agriculture and Fisheries of St. Kitts and Nevis. National data from the baseline

¹⁶ Only stop-over arrivals

survey (44 farmers who grow cole crops and onions in St. Kitts as part of Farmer Field School approach) was used to estimate the cost and the associated yields of existing traditional and improved practices. Estimated production costs are presented in Appendix. The main difference between two production models (current and improved) is based on increased use of fertilizers, additional labour, irrigation and post-harvest storage.

2.3.1 Cole Crops Production Costs (Cabbage)

The cost of production for cabbage under a traditional management system is estimated at ECD 4,884/acre. Introduction of improved practices such as weed control, fertilizers, irrigation and post-harvest storage increase this cost to ECD 13,934 (Appendix A-B). However, the lower production cost of traditional systems also has a low yield of 3,000 lbs/acre due to post-harvest losses and use of rain fed agriculture, while yield under the improved management system is expected to reach 16,000 lbs/acre. The estimated cost per lbs. at increased yields thus decreases by almost half from ECD 1.62 to ECD 0.87 (Table 11).

Table 11: Cabbage: estimated Cost (EC\$) of Production at increasing Yields

YIELD (LBS/ACRE)	COST PER ACRE EC\$	COST PER LBS.
3000 lbs/acre	4,884	1.62
6000 lbs/acre	9,000	1.5
9000 lbs/acre	11,000	1.22
12.000 lbs/acre	11,500	0.95
13.000 lbs/acre	12,000	0.92
16.000 lbs/acre	13,934	0.87

Table 12 presents the estimations of profit margins at different yields of production using the current wholesale price of local cabbage (ECD 2 /lbs). The production cost in Table 11 is used to demonstrate that current profit margin under yield 3,000 lbs/acre is only 0.38 ECD while under improved yield it can be up to 1.13 ECD. At current yields the profit margins for one production cycle (16 weeks) is low and contributes less than 10% to household income. However, profit margins increase from ECD 1,116 to ECD 18,066 per production cycle at higher yields. Furthermore, under improved production techniques farmers can realize up to 3 production cycles per year, thus tripling estimated profit margins. It implies that small farming can be not only profitable, but can also satisfy the growing demand of the tourism industry.

Table 12: Cabbage Estimated Profit Margin

YIELD (LBS/ACRE) A	SALES (A * ECD 2) B	COST OF PRODUCTION (\$EC) C	PROFIT MARGIN PER CYCLE (B-C) \$EC D
3 000 lbs/acre	6,000	4,884	1,116
6 000 lbs/acre	12,000	9,000	3,000
9 000 lbs/acre	18,000	11,000	7,000
12 000 lbs/acre	24,000	11,500	12,500
13 000 lbs/acre	26,000	12,000	14,000
16 000 lbs/acre	32,000	13,934	18,066

2.3.2 Onions Production Costs

The cost of production for onions under a traditional management system is estimated at ECD 9,963/acre. Introduction of improved practices such as weed control, fertilizers, irrigation and post-harvest storage increase this cost up to ECD 11,430 (Appendix C-D). The estimated yield of current traditional production systems is 10,000 lbs/acre. However, under improved production with inputs of than 1,500 ECD (cost difference between traditional and improved systems), yield can increase to up to 20,000 lbs/acre. Table 13 shows that little improvement is needed in order to decrease current cost of production per lbs. from ECD 1 to ECD 0.57.

Table 13: Onions: estimated Cost (EC\$) of Production at increasing Yields

YIELD (LBS/ACRE)	COST PER ACRE EC\$	COST PER LBS.
10,000 lbs/acre	9,963	1
12,000 lbs/acre	10,300	0.86
14,000 lbs/acre	10,600	0.82
16,000 lbs/acre	10,900	0.68
18,000 lbs/acre	11,200	0.62
20,000 lbs/acre	11,430	0.57

Table 14 presents the estimations of the farmer's profit margins at different yields based on the current wholesale price of local onions in St. Kitts and Nevis (ECD 1.5 lbs). At current yields under traditional management profit margins per production cycle (18 weeks) are almost five times less than under improved management system. Profit margins gradually increase from ECD 5,037 to ECD 18,570 with very little additional investment (column C). Furthermore, improved production systems would allow harvesting twice per year, thus doubling the profit margins.

Table 14: Onions Estimated Profit Margin

YIELD (LBS/ACRE) A	SALES (A* ECD 1.5) B	COST OF PRODUCTION (\$EC) C	PROFIT MARGIN PER CYCLE (B-C) \$EC D
10,000 lbs/acre	15,000	9,963	5,037
12,000 lbs/acre	18,000	10,300	7,700
14,000 lbs/acre	21,000	10,600	10,400
16,000 lbs/acre	24,000	10,900	13,100
18,000 lbs/acre	27,000	11,200	15,800
20,000 lbs/acre	30,000	11,430	18,570

2.4 POLICY SUPPORT FOR VALUE CHAINS DEVELOPMENT

The models above show that there is a market opportunity for farmers to compete with imports, producing and selling local onions and cole crops and increasing their incomes. However, farmers must have access technical and financial assistance from the Government in order to meet the strong demand of the tourism industry. Improving the inadequate quality of local products and ensuring reliability to supply required volumes are the main components of a strategy based on the linking the local agriculture and tourism sector. This section presents policy measures used to support small farmers in other countries. These cases show the efficacy of five principal areas of support: marketing assistance, land distribution, irrigation, post-harvest losses and quality control.

First, further marketing support should be developed in order to link local farmers with tourism sector operators. Technical assistance to the respective farmers is needed to build an effective distribution system and ensure consistent supply. Second, attention must be given to issues such as distribution of available and unused ex sugar cane land for landless farmers. Third, improvement of current policy for irrigation is needed to facilitate permission for farmers to get lower water rates for farming and implement drip irrigation. Fourth, greater emphasis must be placed on the importance of post-harvest losses, and practical steps should be taken to create central storage outlets for farmers. Currently only one storage outlet in St. Kitts is under development and it is not being utilized. Finally, farmers should be assisted with the improvement of packaging and grading systems to meet the quality required by the tourism sector. Overall, if policy support is provided for farmers, the tourism industry in St Kitts and Nevis is expected to continue to offer good market opportunities for local producers. As result, by meeting the demand of tourism industry, farmers have an excellent opportunity to expand current agricultural production of selected commodities and thereby increase their incomes.

3. VALUE CHAIN DEVELOPMENT OF SELECTED CROPS ST. LUCIA

3.1 Situation Assessment

This section shows how development of selected value chains in St. Lucia, supported by an FAO project on value chain development of staples (sweet potatoes, yams), fruits (cantaloupe, water melon) and vegetables (tomato, sweet pepper, spinach and salad beans) can contribute to reduce the food import bill, diversify the agricultural sector and meet the demand for food of the tourism industry. St. Lucia is an island nation with a population of 182,300 (World Bank, 2013) and an area of 620 sq. km. Like many other Caribbean states, St. Lucia is facing a number of challenges related to the transition from an agricultural economy to a more service-based economy, namely one based on tourism. This change from an agro-based to a tourism-based economy was influenced significantly by the loss of market access due to changes to international trade rules for the banana industry, which lead to St Lucia losing some its preferential access to markets in Europe. Traditionally, St. Lucia's production of bananas for exports was the primary source of foreign exchange within the agricultural sector and economy. However, since the changes, the contribution of the agricultural sector has continued to decline and tourism has replaced agriculture as the main economic driver, now accounting for 40% of GDP.

Agriculture's contribution to GDP in St Lucia has declined over the past decade from 11% in 1993 to 3% in 2013. The agricultural sector has been declining due to several economic,

technical and institutional factors, which have also affected food and nutrition security in the country. Furthermore, St. Lucia is classified by the WTO as a net food-importing country and the current food import bill amounts to approximately 350 ECD mn. Total imports of fruits and vegetables imports account for 16 % of the food import bill and equal 56 ECD mn per year. A large proportion of foreign exchange earnings is used to pay for the increasing food imports. So far the agricultural sector has not responded to this expansion of the tourism market.

Creating linkages between the agriculture and the tourism sector could provide important economic benefits as well as social inclusion of small farmers into tourism industry. Increasing these opportunities would enable local produce to successfully compete for a large proportion of the imported fruits and vegetables market. Agricultural diversification and increased production of fresh fruits and vegetables can also contribute to national food security and augment farmers' incomes. Table 15 presents the analysis of top the 16 imported fruits and vegetables. It shows that as much as 33% of total fruits & vegetables, in selected agricultural crops, can be grown domestically to replace similar imported vegetables. St Lucia has the conditions and resources to produce fresh fruits and vegetables which would enable this.

Table 15: Top 16 Imported Fruits & Vegetables in St. Lucia

Commodity	Value (ECD'000)	% of Fruits & Vegetables Imports	Commodities that can be grown locally
Potatoes, fresh	4,326	7.7%	x
Potatoes, frozen	2,931	5.2%	x
Lentils	2,532	4.5%	
Onions	2,446	4.4%	x
Potatoes, prepared or preserved	2,264	4.0%	
Carrots	1,918	3.4%	x
Grapes	1,704	3.0%	x
Apples	1,686	3.0%	
Garlic	1,631	2.9%	x
Ground-nuts, prepared	1,486	2.7%	
Nuts and other seeds	1,437	2.6%	
Cabbage	1,097	2.0%	x
Mixtures of vegetables, frozen	1,057	1.9%	
Sweet peppers	846	1.5%	x
Lettuce	833	1.5%	x
Pineapples	692	1.2%	x
TOTAL	28,886	52%	33%

Source: National Statistics

According to FAO project TCP/STL/3501 in St. Lucia for 2014-2016 (FAO, 2014d) the increased production is foreseen through the value-chain development of the fruits, vegetables, and root crops by linking family/small farming to markets. The main crops envisaged to compete

with imports are tomatoes, carrots, cantaloupe, melons, sweet potatoes and spinach. Estimation show that even focusing on these crops alone would improve domestic and tourism industry supply and enhance the resilience of the agriculture sector, where savings could account for 3.5 ECD mn (Table 16).

Table 16: Imports of selected commodities in St. Lucia in 2014

Commodity	Value (\$EC)	NET MASS (MT)
Tomatoes	631,177	120,5
Carrots	1,918,199	666
Cantaloupes	515,425	154
Melons	433,610	97,4
Sweet Potatoes	14,481	0.27
Spinach	6,610	0.053
TOTAL	3,519,502	1,034

Source: National Statistics

The total domestic supply of selected commodities is estimated at 2,712 MT - only 1,675MT were locally produced, while 1,034 MT were imported (Table 17). In all 60% of domestic supply is produced locally and 40% is imported. Of the produce supplied domestically, the proportion of imported carrots and cantaloupes is especially high, accounting for 98% and 84% of total domestic supply, respectively. Domestic production of tomatoes, sweet potatoes, spinach, yams and beans is higher than the proportion of imports. Farmers in St. Lucia are already competitive with certain products, and therefore have a high capacity to increase their share of the domestic market.

Table 17: Domestic supply selected commodities in St. Lucia in 2014

Commodity	A Domestic Production (MT)	B Imports (MT)	C=A+B Domestic Supply (MT)	D=B/C, Imports in Domestic Supply
Tomatoes	263	120	383	31%
Carrots	15	666	681	98%
Cantaloupes	29	154	183	84%
Sweet Potatoes	576	0.27	576.27	0.05%
Spinach	5	0.053	5.053	1%
Yams	476	n/a	476	n/a
Salad Beans	74	n/a	74	n/a
TOTAL	1,438	940	2,378	

Source: National Statistics

3.1.1 Challenges of domestic agricultural supply to meet tourism demand

Based on field work carried out by the researcher in St. Lucia in June 2015 and several interviews with extension officers and small farmers, main challenges of domestic agricultural supply to meet tourism demand were identified. This section analyses five constraints of the agricultural sector in St. Lucia related to meeting the tourism industry demand: access to inputs, irrigation, lack of proper production schedules, quality issues, marketing infrastructure and processes. These constraints prevent farmers from increasing local production to meet the growing demand from the tourism industry.

First, agricultural production in St. Lucia is practised primarily as small scale farming. Farmers in St. Lucia traditionally produced mainly bananas for export and, to a lesser degree, non-traditional crops for export and domestic consumption. With the diversification of the agricultural sector into non-traditional crops, many small farmers face the problem of lack of access to inputs: credit, land, seeds, and fertilizers. Farmers cannot access credit because of lack of record keeping and collateral availability. Furthermore, complicated family land tenure issues and inadequate land distribution policies prevent farmers from expanding their farming activity. Finally, critical inputs such as imported seeds and fertilizers are often out of stock when most needed given inadequate amounts of the local supplies.

Second, agricultural production in St. Lucia is characterised by high seasonality as most of the farmers do not use irrigation, instead relying on rain fed agriculture. In particular, high costs of irrigation equipment cannot be afforded by majority of small farmers. As result, while local crops are preferred by most hotels and restaurants in St. Lucia, the inconsistency of supply due to seasonality of production prevents farmers from supplying the tourism industry in a continuous and consistent manner all-year-round.

Third, according to St. Lucia Extension Division many small farmers have limited knowledge of crop production scheduling and the best time for planting different vegetables. Therefore, periodically, production without proper land preparation and planning leads to gluts, high production losses and loss of competitiveness.

Fourth, quality control of domestic produce is needed. For several years the Ministry of Agriculture, Lands, Fisheries & Forestry initiated a Farmer Certification Programme to ensure that farmers meet international market standards. Farmers were trained in Good Agricultural Practices (GAP) that promote environmental and economic sustainability, and result in safe and healthy agricultural products. These GAP standards assure purchasers that fruits and vegetables grown domestically meet the highest health and safety standards. After completion of training, farmers were issued with the farmer's identification card that guaranteed better prices for domestic produce from local supermarkets and hotels. However, this programme has limited duration and capacity. Meanwhile, the tourism industry requests farmers groups to produce local crops according to their quality standards (size, shape, colour, level of maturity). This quality control is rewarded by the tourism industry with higher prices. Therefore, communication from the tourist industry on the specifications that produce must meet need to be improved and disseminated more widely. Only one resort, Sandals, has produced such specifications for each crop in order to help increase the quality of local fruits and vegetables.

Finally, at the national level a better product marketing system is needed to coordinate national demand and supply. There is not enough information to guide producers on what to grow and to inform food buyers on what is available. Poor marketing infrastructure and low level of communication prevents hotels from purchasing greater quantities from local farmers and from the St. Lucia Marketing Board.

3.2 EXPANSION OF DOMESTIC MARKET SHARE IN ST. LUCIA

3.2.1 Prices

Competitively priced local produce with high quality standards is essential to increasing domestic agriculture market share. The average retail prices of locally produced and imported commodities purchased by hotels and supermarkets in St. Lucia in 2014 are shown in table 18. Prices of local commodities vary during the year due to seasonal production. However, price analysis shows that for local commodities hotels pay higher prices to the farmers than supermarkets because of higher quality standards. Moreover, farmers are price competitive in production of carrots, spinach, sweet potatoes and salad bean production. If farmers can implement irrigation and new production techniques, higher yields will reduce production costs and be competitive against imported products.

Table 18: Average Prices of Selected Agricultural Produce (2014)

Commodity	Price -Hotel to farmers (Local Produce) EC\$/lbs.	Price - Supermarket to farmers (Local Produce) EC\$/lbs.	Price – Imported Produce EC\$/lbs.
Tomatoes	9.87	7.1	6.81
Carrots	5.77	5.1	2.72
Spinach	7.67	6.5	-
Sweet Potatoes	5.47	4.3	-
Cantaloupe	6.27	4.5	4.52
Honeydew	6.4	4.2	-
Salad beans	7.2	7.3	-

Source: National Statistics

3.2.2 Land

St. Lucia is 620 sq. km or 62,000 Ha, of which agricultural land area accounts for 17% of total land (10,600 Ha). The decline of the banana industry has provided additional land which is potentially available for agricultural development and diversification. Table 19 shows current distribution of land in St. Lucia. However, small and fragmented farms, which generally operate on less than 1 ha and a complex land tenure system is an important constraint to farm investment, therefore improvement of the land tenure system and access to land is one of the main priorities in St. Lucia.

Table 19: Land Distribution in St. Lucia

Country Area	
Land Area	62,000 Ha
Agricultural area	10,600 Ha
- Arable land	3,000 Ha
- Permanent Crops	7,000 Ha
- Permanent meadows and pastures	600 Ha
Forest area	47,000 Ha
Other land utilization	3,400 Ha

Source: FAOSTAT

Land Requirements for the expansion of two most imported commodities: Carrots and Cantaloupes

Local production of carrots and cantaloupes needs to increase to satisfy local demand due to the increasing demand by households and the hotels. Tables 20 and 21 show land requirements for imports substitution of two the most imported commodities in St. Lucia - carrots and cantaloupes. Based on the current volume of imports of carrots in 2014 of 666 MT/ 1,467,864 lbs., on average around 110 acres are needed annually or less than 9 acres per month with an increase in yield up to 13-14,000 lbs./acre from the current 10,000 lbs./acre. Farmers in St. Lucia operate on average under 1 ha (2.47 acres). However, small farmers can be also engaged in this import substitution strategy through participation in farmers' cooperatives.

Table 20: Land requirements for import substitution of carrots

Carrots Imports (lbs.)	Acres Required Annually				
	10,000 lbs/acre ¹⁷	11,000 lbs/acre	12,000 lbs/acre	13,000 lbs/acre	14,000 lbs/acre
1,467,864	146,7	133	122	113	105
	Monthly Acres Requirement for 2 crops cycle				
	12,2	11	10	9.4	8.7

Based on current volume of imports of cantaloupes in 2014 of 154 MT/ 339,512 lbs., land requirement for imports substitution of cantaloupes is on average around only 15 acres

¹⁷ Here and after in grey colour current yield of production in St. Lucia is indicated.

required annually or 2 acres per month - if there is an increase in yield up to 22-24,000 from the current 14,000 lbs./acre (Table 21). Overall, import substitution of cantaloupes seems to be more feasible as fewer acres are required annually and small farmers can be easily engaged.

Table 21: Land requirements for import substitution of cantaloupes

Cantaloupes Imports (lbs.)	Acres Required Annually				
	14,000 lbs/acre ¹⁸	18,000 lbs/acre	20,000 lbs/acre	22,000 lbs/acre	24,000 lbs/acre
339,512	24.2	19	17	15	14
	Monthly Acres Requirement for 2 crops cycle				
	2.2	1.57	1.4	1.2	1.1

3.3 LINKS WITH TOURISM SECTOR

This section analyses the demand of the tourism industry for local and imported fresh produce and summarizes the key requirements for local small farmers to access tourism markets. Tourism industry has a vital importance for the economy of St. Lucia. Total stop-over visitor arrivals was estimated at 338,158 guests in 2014, almost doubling the total population of St. Lucia. Clearly, to meet this substantially increased demand, development and further diversification of local agriculture is needed. A survey carried out in June 2015 by the researcher among food buyers¹⁹ in St. Lucia (tourism industry and wholesalers) suggests a willingness on the part of hotels and restaurants to purchase local vegetables and fruits due to better taste and longer shelf life of local commodities. The current purchasing scheme implemented by most of the hotels in St. Lucia uses 30% of local fruits and vegetables and 70% imported. Even if local produce has an advantage of freshness and taste, the proportion of local produce purchased by the tourism sector is still very low due to sporadic distribution, seasonality of production and inconsistent quality.

Many hotels have their own groups of farmers and vendors who supply them with local crops, using private relationships based on gentlemen's agreements. All food buyers interviewed indicated that they prefer to buy locally even if the price is higher than imported fruits and vegetables. Therefore, the tourism industry offers particularly good opportunities for farmers who demonstrate the ability to supply the required volume and quality on a regular basis. Demand for vegetables is expanding in volume and variety and the tourist industry is an important source of income for local farmers. Table 22 shows the quantity of local commodities, purchased by major hotels in 2014 and the value generated for local farmers. In particular, local tomatoes are especially in demand. Even if the price of local produce is higher than imported tomatoes, all hotels confirm a willingness to pay more in order to have better taste and freshness.

¹⁸ Here and after in grey colour current yield of production in St. Lucia is indicated.

¹⁹ 8 hotels, 2 restaurants, 1 supermarket, 4 Food Imports Agencies were interviewed.

Table 22: Hotel Purchases of Domestic Commodities in 2014

Commodity	Quantity (kg)	Value (EC\$)
Tomatoes	79,323	777,763
Carrots	715	4,128
Spinach	6,686	51,273
Sweet Potatoes	62,590	342,924
Cantaloupe	29,658	184,429
Honeydew	22,823	145,557
String beans	3,475	21,158

Source: National Statistics

However, quality control continues to be one of the main constraints amongst food purchasers within the tourism industry. Furthermore, many farmers cannot guarantee the constant supply. As a result the majority of hotels have to source the fruits and vegetables required directly from abroad instead of buying locally. Analysis of the top food importers in St. Lucia indicates that 90% of their imports are used to directly supply the demand from tourism (60% hotels and 30% restaurants). The top imported commodities for the tourism industry include potatoes, carrots, tomatoes, lettuce, cabbage, onions, cantaloupe, apples and grapes. In particular, carrots, tomatoes and cantaloupes are in high demand but local farmers are not able to guarantee the supply needed and the required quality throughout the year. Therefore, only an improved and coordinated production and marketing system can decrease the current level of food imports. With adequate domestic production systems, supply and quality, estimated incomes for farmers could amount for more than 53,000 ECD per week and more than 638,000 annually for these three products. Based on estimations presented in Tables 20 and 21, it is possible to conclude that under improved management system with higher yields, on average only 3 acres would be required to meet the demand of Sandals for carrots and cantaloupes. Individual farmers through farmers' cooperatives could coordinate production to improve consistency of supply.

Table 23: Sandals Demand of Fresh Selected Commodities

Commodity	Demand/lbs.		Value (ECD)	
	Weekly	Annually	Weekly	Annually
Carrots	3,000	36,000	17,310	207,720
Tomatoes	3,000	36,000	29,610	355,520
Cantaloupe	1,000	12,000	6,270	75,240
TOTAL	7,000	84,000	53,190	638,480

Greater coordination through farmers' cooperatives is one of the ways to deal with supply consistency, grading, and packaging. Successful examples already exist in St Lucia, which can serve as models for further development of coordination mechanisms. BelleVue Farmers' Cooperative in St. Lucia is one of the examples of collaboration between the agricultural sector and the tourism industry. Currently, this cooperative sells to more than 35 hotels and restaurants in St. Lucia at a premium price. It supports this price based on ability to supply higher value produce which are fresher (picked same day), fully organic, and ensuring timely and reliable delivery. Inconsistency of supply in terms of quantity and quality was the major challenge to local farmers. FAO has previously supported St. Lucia in increasing the links between the agricultural sector and the tourism industry for the fruit salad value chain development (papaya, melon and pineapple). The Bellevue Farmers' Cooperative project a participant in this analysis was able to increase production of papaya by 50%, melon by 30% and pineapple by 20% and to negotiate favourable prices with the main food buyers and local luxury hotel chains, for example Sandals Resorts. This case study provides an example how local farmers can develop competitive food value chains and therefore increase quality and food safety to a standard which meets the food requirement of the tourism sector. By coordinating the supply through cooperatives and developing appropriate contracts, linkages with buyers and access to markets was strengthened.

3.4 PRODUCTION COST ANALYSIS OF SELECTED COMMODITIES

This section estimates profit margins for farmers based on production costs under current and improved yields. The cost of production under two management systems was calculated by researcher in June 2013 in close collaboration with the extension officers of the Ministry of Agriculture, Food Production, Fisheries, Co-operative and Rural Development in St. Lucia. National data was used to estimate the cost and the associated yields of existing traditional and improved practices. The main parameters are cost of land preparation, labour cost, planting material, fertilizing, irrigation, harvesting and transportation. The main difference between the two production models is based on assumptions of mechanized land preparation, increased use of fertilizers, additional labour, irrigation and transportation.

Table 24 presents the comparison between costs and yields under traditional and improved production practices for commodities most in demand by the tourism industry: tomatoes, carrots, and cantaloupes. Improved practices reflect additional investment to soil preparation, irrigation and post-harvesting and increase the cost production. Traditional cost of production estimated per acre is lower than the improved cost but as expected this traditional management provides lower yields. According to Table 24 increased yields under improved management system with minimal investment will decrease the cost of production per pound of each selected crop.

Table 24: Estimated Cost of Production at Increasing Yields

Commodity	Traditional System Cost per acre, (EC\$) A	Current yield (lbs/acre) B	Improved System Cost per acre, (EC\$) C	Increased yield (lbs/acre) D	Traditional System Cost per lbs., (EC\$) E	Improved System Cost per lbs., EC\$ (F)
Tomatoes	\$11,430	11,200	\$16,590	18,750	1.02	0.88
Carrots	\$7,090	10,000	\$8,211	14,000	0.71	0.59
Cantaloupe	\$9,643	14,000	\$12,562	24,000	0.69	\$0.52

If farmers implement an improved production system for various crops it can guarantee higher yields. They will have higher returns in sales under improved production management and therefore their estimated profit margins increase accordingly (Table 26). Growing tomatoes under an improved production model is an especially profitable activity for small farmers which can enable farmers to increase their incomes by an additional 28,060 ECD per year.

Table 26: Estimated Profit Margin under Different Management Systems

Commodity	Price - Hotel Purchases (EC\$/lbs.) G	SALES Traditional System, (EC\$) H=B*G	SALES Improved System, (EC\$) I=D*G	PROFIT MARGIN Traditional System, (EC\$) J=H-A	PROFIT MARGIN Improved System, (EC\$) K=I-C	DIFEREN CE IN PROFIT MARGIN, (EC\$) L=K-J
Tomatoes	4.4	49,280	82,500	37,850	65,910	28,060
Carrots	2.6	26,00	36,400	18,910	28,189	9,279
Cantaloupe	2.8	39,200	67,200	29,557	54,638	25,081

3.5 POLICY SUPPORT FOR VALUE CHAINS DEVELOPMENT IN ST. LUCIA

The cost estimation models above show that there is an important market opportunity for farmers to replace a larger percentage of imports and increase their incomes, by using improved production systems. However, public policy intervention is needed to provide technical and financial assistance for small farmers, in order to enable them to improve productivity, which is necessary to decrease imports of certain key vegetables and fruits. This section provides examples of public policy measures which could be implemented in St. Lucia to support small farming in meeting the demand from the tourism industry. These measures addressed mainly the problems of domestic agricultural supply indicated previously: improved input distribution systems, training of farmers to better schedule production, subsidized irrigation equipment, quality certification programs and creation of marketing infrastructure.

First, creation of an input distribution system is needed to ensure a constant and reliable supply of inputs to farmers. Provision of planting material with better characteristics will increase yields and make farmers' prices more competitive. To facilitate credit the National Food Production Plan (2015) seeks to provide greater access to credit through special arrangements for farmers with banks and other financial institutions for agricultural financing. In addition, the development of a Land Bank in close collaboration with assistance from FAO will lead to support for farmers with land administration issues and will facilitate access to available land in order to expand domestic production.

Second, farmers should be assisted with education training on better scheduling, improved production practices, post-harvest technologies and use of crop rotation. In close collaboration with extension officers from the Ministry of Agriculture, farmers under these education programs could increase knowledge about improved management systems and develop new technical skills.

Third, further expansion of local produce can be addressed through improved irrigation. However, the high cost of the initial investment for irrigation equipment (about 4,000 ECD in the case of tomato production) prevents many small farmers from using irrigation. Therefore, subsidized irrigation equipment for small farmers, who grow key commodities under the agricultural diversification program, could help farmers to get higher yields and ensure consistent supply.

Fourth, farmers' certification programs should be revitalized by the Ministry of Agriculture in order to improve production/marketing linkages, better defining market requirements and developing production plans to manage the supply of fresh produce. Moreover, farmers have to be educated on the requirements for packaging, maturity, size and shelf life of each crop in order to meet specifications from the tourism industry.

Finally, the creation of an electronic dissemination platform, which provides real time information on local supply (varieties, quantity, prices), which food buyers can use to obtain information on local sources of supply is essential to meet the demand from the tourism sector. Better communication between farmers and hotels is needed in order to create sustainable market linkages. There is a need for a facility that can coordinate local production, estimate tourism demand and can be used as reference point to measure the exact quantity of authorized imports for issuing import licenses. By implementing this system, farmers will have tremendous opportunity to establish pre-ordering arrangement and grow local crops, based on the demand from tourism buyers.

4. RECOMMENDED APPROACH TO THE DEVELOPMENT OF FOOD VALUE CHAINS FOR THE TOURISM SECTOR

The lessons from case studies analysis lead to the design of new approach to the development of food value chains for the tourism sector. Results of this analysis can be applied to other Caribbean countries that have similar agricultural characteristics and depend on the tourism industry.

- I. Value Chains – any actors involved in the supply of product should continue their operations in a value chain context.
- II. Promote varied support points: government, private sector, cooperatives and small farmers organizations

- III. Quality is linked to certification to ensure easy and clear communication of products standards, especially, in terms of size, appearance and maturity.
- IV. Targeting of specific market volumes linked to specific buyers in specific time period is one of the highest priority needs.
- V. There is no alternative to utilization of irrigation if constant volumes and quality of produce is to lead to increased domestic market share by small and medium size farmers.
- VI. Land banks and land utilization schemes, explicitly, linked to ex-banana and sugar lands should also be an integral part of the new approach.
- VII. Approach to greater market share for domestic agriculture produce should pay more attention to quality and regularity of supply than to price as price is not cited by hotels and restaurants as major constraint of local purchase.

CONCLUSIONS

The tourism sector is of critical importance for the Caribbean as a primary source of economic activity. However, the tourism industry is one of the major consumers of imported agricultural products due to the incapacity of local agriculture to meet the increasing demand for high quality local produce. Many Caribbean nations continue to import food products to sustain the tourist industry because local farmers cannot provide consistent supply, quality and diversification of local produce as the key issues indicated by the tourism operators in order to increase local purchases. As result, only those countries that are able to develop competitive food value chains and meet the demand of the tourism sector, will have a huge potential market for local production due to the increasing number of visitor arrivals and increasing food demand.

Improvement of the link between agriculture and the tourism industry can provide rural employment, improve food security in the country and reduce foreign exchange leakage. It provides important economic benefits for net food importing countries as well as social inclusion of small farmers into the tourism industry, the major growth sector. The promotion of agriculture tourism linkages in the Caribbean is especially important for the development of a sustainable tourism industry, while at the same time diversifying domestic agriculture.

The case study analysis of two countries: St. Kitts and Nevis and St. Lucia, indicates that there are several constraints that prevent farmers from increasing local production to meet the growing demand from the tourism industry. The main agricultural problems are related to: access to inputs, irrigation, low quality of local commodities and weak marketing infrastructure. As a result even if local produce has an advantage of freshness and taste, the proportion of local purchases by the tourism sector is still very low due to sporadic distribution, seasonal production and inconsistent quality. To overcome these issues better governance is needed. Moreover, one of the main strategies should focus on improving production and coordination among farmers through a centralized marketing system. Together this will help to increase use of local production and decrease current food imports by the tourism industry. Finally, case studies analysis of linkages between agricultural sector and tourism industry highlighted the importance of technical and financial assistance to the respective farmers in order to build an effective distribution system and ensure consistent supply of high quality local crops.

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**Appendix A: COST OF PRODUCTION – Cole Crops
(cabbage) in St. Kitts & Nevis Traditional Management System
- yield 3,000 lbs/acre (ECD per acre)**

ITEM DESCRIPTION	UNIT COST	COST/ ACRE	CUMMULATIVE COST PER ACRE
Land preparation			
❖ Ploughing, Furrowing	150 hour*4 hours	600	
			600
Planting Material/Planting			
❖ Planting Material (seeds)	55/package *3	165	
❖ Labour	75/day	75	240
Fertilizing			
❖ Bonus	30/bag *2 bags	60	
❖ 15:15:15	184/bag * 9 bags	1656	
			1,716
Weed Control			
❖ Weedicide -Herbicide	310/acre	310	
❖ Gramoxine	75/spraying *2	150	
❖ Manual Weeding	350/week	350	
			810
Pest/Disease Control			
❖ Pesticide applications	Phoenix 204,Karate 30	234	
❖ Fungicides applications	64/application	64	
❖ Labour	350/week	350	
			648
Irrigation			
❖ Labour	75/day	150	
❖ Water	80	80	
			230
Harvesting/Transportation/Storage			
❖ Packing/bagging	640	640	
			640
TOTAL			ECD 4,884

Source: Ministry of Agriculture and Fisheries of St. Kitts and Nevis, Agricultural Extension Division

**Appendix B: COST OF PRODUCTION – Cole Crops
(cabbage) in St. Kitts & Nevis Improved Management System –
yield 16,000 lbs/acre (ECD per acre)**

ITEM DESCRIPTION	UNIT COST	COST/ ACRE	CUMMULATIVE COST PER ACRE
Land preparation			
❖ Ploughing, Furrowing	150 hour*4 hours	600	
			600
Planting Material/Planting			
❖ Seedling	2000	2000	
❖ Labour	75/day	75	
			2,075
Fertilizing			
❖ Bonus	30/bag *2 bags	60	
❖ 15:15:15	184/bag * 9 bags	1656	
			1,716
Weed Control			
❖ Weedicide -Herbicide	310/acre	310	
❖ Gramoxine	75/spraying *2	150	
❖ Manual Weeding	350/week	350	
			810
Pest/Disease Control			
❖ Pesticide applications	Phoenix 204,Karate 30	234	
❖ Fungicides applications	64/application	64	
❖ Labour	350/week	350	
			648
Irrigation			
❖ Labour	75/day	150	
❖ Water	80	80	
❖ Water Transportation (irrigation for 3 weeks)	2373	2373	2,603
Harvesting/Transportation/Storage			
❖ Reaping	1200	1200	
❖ Packing/bagging	640	640	
❖ Transportation	3632	3632	
❖ Subsidized storage	10/1000 lbs.	10	
			5,482
TOTAL			ECD 13,934

Source: Ministry of Agriculture and Fisheries of St. Kitts and Nevis, Agricultural Extension Division

**Appendix C: COST OF PRODUCTION – ONION in ST. KITTS
& NEVIS (Traditional Management System) – yield 10,000
lbs./acre (ECD per acre)**

ITEM DESCRIPTION	UNIT COST	COST/ ACRE	CUMMULATIVE COST PER ACRE
Land preparation			
❖ Ploughing, Furrowing	150 hour*4 hours	600	
			600
Panting Material/Planting			
❖ Planting material	4 tins/170	680	
❖ Labour	75/day	75	
			755
Fertilizing			
❖ MPK	186/bag *4 bags	744	
❖ Sulphate Am	120/bag *2 bags	240	
❖ Bonus	30/bag * 1 bag	30	
❖ Labour	350/week	350	
			1,364
Weed Control			
❖ Weedicide -Herbicide	368/acre	368	
❖ Labour	350/week *2	750	
			1,118
Pest/Disease Control			
❖ Pesticide applications	Diazinon	80	
❖ Fungicides applications	Acrobat/application	64	
❖ Labour	350/week	350	
			494
Harvesting/Transportation/Storage			
❖ Reaping	1200	1200	
❖ Transportation	3632	3632	
❖ Packing/bagging	400 bags/2	800	
			5,632
TOTAL			ECD 9,963

Source: Ministry of Agriculture and Fisheries of St. Kitts and Nevis, Agricultural Extension Division

**Appendix D: COST OF PRODUCTION – ONION in ST. KITTS
& NEVIS (Improved management system) – yield 20,000 lbs./acre
(ECD per acre)**

ITEM DESCRIPTION	UNIT COST	COST/ ACRE	CUMMULATIVE COST PER ACRE
Land preparation			
❖ Ploughing, Furrowing	150 hour*4 hours	600	
			600
Panting Material/Planting			
❖ Planting material	4 tins/170	680	
❖ Labour	75/day	75	
			755
Fertilizing			
❖ MPK	186/bag *4 bags	744	
❖ Sulphate Am	120/bag *2 bags	240	
❖ Bonus	30/bag * 1 bag	30	
❖ Labour	350/week	350	
			1,364
Weed Control			
❖ Weedicide -Herbicide	368/acre	368	
❖ Labour	350/week *2	750	
			1,118
Pest/Disease Control			
❖ Pesticide applications	Diazinon	80	
❖ Fungicides applications	Acrobat/application	64	
❖ Labour	350/week	350	
			494
Irrigation			
❖ Water	80	80	
❖ Water Transportation	1187	1187	
			1,267
Harvesting/Transportation/Storage			
❖ Reaping	1200	1200	
❖ Packing/bagging	400 bags/2	800	
❖ Transportation	3632	3632	
❖ Subsidized storage	10/1000 lbs.	200	
			5,832
TOTAL			ECD 11,430

Source: Ministry of Agriculture and Fisheries of St. Kitts and Nevis, Agricultural Extension Division

**Appendix E: COST OF PRODUCTION – TOMATOES in ST.
LUCIA (Improved Management System) – yield 18,750 lbs./acre
(ECD per acre)**

ITEM/OPERATION	UNIT	QUANTITY	UNIT PRICE (\$EC)	TOTAL COST (\$EC)
Labour Costs:				
Land Preparation	Tractor Hours	8	\$135.00	\$1,080.00
Digging holes and transp.	Person Days	8	\$50.00	\$400.00
Supplying	Person Days	1	\$50.00	\$50.00
Staking, tying & moulding	Person Days	10	\$50.00	\$500.00
Fertilizing	Person Days	4	\$50.00	\$200.00
Pest & Disease Control	Person Days	4	\$50.00	\$200.00
Weeding (Chemical)	Person Days	4.8	\$50.00	\$240.00
Weeding (manual) and moulding	Person Days	12	\$50.00	\$600.00
Irrigation	Person Days	1.2	\$50.00	\$60.00
Harvesting	Person Days	20	\$50.00	\$1,000.00
Subtotal				\$4,330.00
Material Inputs:				
Seedlings	seedling	11,000	\$0.45	4950
Foliar Fertilizer	kg	4	\$28.75	\$115.00
Fertilizer (11:22:22)	50kg	10	\$125.00	\$1,250.00
Sulphate of Ammonia or urea	50kg	10	\$90.00	\$900.00
Lime	25 kg	20	\$48.20	\$964.00
Manure	10	100	\$3.00	\$300.00
Insecticide	liters	4	\$180.00	\$720.00
Fungicide	kg	5	\$100.00	\$500.00
Weedicide	litre	3	\$85.00	\$255.00
Stakes	100 bundles	100	\$25.00	\$2,500.00
Twine	roll	4	\$67.00	\$268.00
Water	gallons	19500	0.00147	\$28.67
Subtotal				\$7,800.67

ITEM/OPERATION	UNIT	QUANTITY	UNIT PRICE (\$EC)	TOTAL COST (\$EC)
Other Costs				
Contingencies	10% of Labour & Material			\$1,213.07
Tools	5% of Material			\$390.03
Supervision	15% of Labour & Material			\$1,819.60
Transport of inputs	lbs	1	100	\$100.00
Transport to market	lbs	18750	0.05	\$937.50
Subtotal				\$4,460.20
Grand Total				ECD 16,590.86

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

**Appendix F: COST OF PRODUCTION – TOMATOES in ST.
LUCIA (Traditional Management System) – yield 11,200 lbs./acre
(ECD per acre)**

ITEM/OPERATION	UNIT	QUANTITY	UNIT PRICE (\$EC)	TOTAL COST (\$EC)
Labour Costs:				
Land Preparation	Person Days	15	\$50.00	\$750.00
Digging holes and transp.	Person Days	8	\$50.00	\$400.00
Supplying	Person Days	1	\$50.00	\$50.00
Staking, tying & moulding	Person Days	10	\$50.00	\$500.00
Fertilizing	Person Days	4	\$50.00	\$200.00
Pest & Disease Control	Person Days	4	\$50.00	\$200.00
Weeding (Chemical)	Person Days	4.8	\$50.00	\$240.00
Weeding (manual) and moulding	Person Days	12	\$50.00	\$600.00
Harvesting	Person Days	20	\$50.00	\$1,000.00
Subtotal				\$3,940.00
Material Inputs:				
Seedlings	seedling	11,000	\$0.45	4950
Foliar Fertilizer	kg	4	\$28.75	\$115.00
Fertilizer (11:22:22)	50kg	10	\$125.00	\$1,250.00
Sulphate of Ammonia or urea	50kg	10	\$90.00	\$900.00
Lime	25 kg	20	\$48.20	\$964.00
Manure	10	100	\$3.00	\$300.00
Insecticide	liters	4	\$180.00	\$720.00
Fungicide	kg	5	\$100.00	\$500.00
Weedicide	litre	3	\$85.00	\$255.00
Subtotal				\$5,004.00
Other Costs				
Contingencies	10% of Labour & Material			\$894.40
Tools	5% of Material			\$250.20
Supervision	15% of Labour & Material			\$1,341.60
Subtotal				\$2,486.20
Grand Total				ECD 11,430.20

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

Appendix G: COST OF PRODUCTION – CARROTS in ST. LUCIA
(Improved management system) – yield 14,000 lbs./acre (ECD per acre)

ITEMS	Unit	No. of Units	Cost/unit (\$)	Total Cost (\$)
Labour Costs:				
Soil Preparation	Tractor hours	8	\$135.00	\$1,080.00
Sowing	Manday	2	\$50.00	\$100.00
Fertilizing	Person Days	3	\$50.00	\$150.00
Pesticide application	Person Days	6	\$50.00	\$300.00
Harvesting	Person Days	13	\$50.00	\$650.00
Sub-total				\$1,630.00
Material Inputs:				
Seed	kg	15.0	\$140.00	\$2,100.00
Foliar Fertilizers	bag	1.0	\$120.00	\$120.00
Biostimulants	liters	4.0	\$100.00	\$400.00
NPK - 12:12:17	50 kg	3	\$150.00	\$450.00
Fungicide	liters	1.5	\$220.00	\$330.00
Insecticide	250ml	3	\$45.00	\$405.00
Water/irrigation	Pump hours	45	\$5.00	\$675.00
Sub-total				\$4,480.00
Other Costs:				
Contingencies	10% of Labour & Material			\$611.00
Tools	5% of Material			\$224.00
Supervision	15% of Labour & Material			\$916.50
Transport of inputs	Trip	1	100	\$100.00
Transport to farmgate	Lbs	12500	\$0.02	\$250.00
Sub-total				\$2,101.50
Total				ECD 8,211.50

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

Appendix H: COST OF PRODUCTION – CARROTS in ST. LUCIA
(Traditional management system) – yield 10,000 lbs./acre (ECD per acre)

ITEMS	Unit	No. of Units	Cost/unit (\$)	Total Cost (\$)
Labour Costs:				
Soil Preparation	Person Days	25	\$50.00	\$1,250.00
Sowing	Manday	2	\$50.00	\$100.00
Fertilizing	Person Days	3	\$50.00	\$150.00
Pesticide application	Person Days	6	\$50.00	\$300.00
Harvesting	Person Days	13	\$50.00	\$650.00
<i>Sub-total</i>				\$2,450.00
Material Inputs:				
Seed	kg	15.0	\$140.00	\$2,100.00
Foliar Fertilizers	bag	1.0	\$120.00	\$120.00
Biostimulants	liters	4.0	\$100.00	\$400.00
NPK - 12:12:17	50 kg	3	\$150.00	\$450.00
Fungicide	liters	1.5	\$220.00	\$330.00
Insecticide	250ml	3	\$45.00	\$405.00
<i>Sub-total</i>				\$3,805.00
Other Costs:				
Contingencies	10% of Labour & Material			\$611.00
Tools	5% of Material			\$224.00
<i>Sub-total</i>				\$835.00
Total				ECD 7,090.00

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

**Appendix I: COST OF PRODUCTION – CANTALOUPE in ST.
LUCIA (Improved Management System) – yield 24,000 lbs./acre (ECD
per acre)**

ITEMS	Unit	No. of Units	Cost/unit (\$)	Total Cost (\$)
Labour Costs:				
Soil Preparation	Tractor hours	8	\$135.00	\$1,080.00
Planting	Manday	3	\$50.00	\$150.00
Fertilizing	Person Days	3	\$50.00	\$150.00
Pesticide application	Person Days	12	\$50.00	\$600.00
Harvesting	Person Days	10	\$50.00	\$500.00
Sub-total				\$1,980.00
Material Inputs:				
Seedlings	seedling	4800.0	\$0.35	\$1,680.00
Foliar Fertilizers	bag	1.0	\$120.00	\$120.00
Biostimulants	liters	4.0	\$100.00	\$400.00
NPK - 12:12:17	50 kg	3	\$115.00	\$345.00
Bio Neem	litre	1	\$200.00	\$200.00
Plastic Mulch	Roll	5	\$500.00	\$2,500.00
Trigard	50g	1	\$87.25	\$87.25
New Mectin	250 ml	2	\$160.00	\$320.00
Banrot	kilogram	0.5	\$325.00	\$162.50
Phyton 27	250ml	6	\$45.00	\$810.00
Water/irrigation	Pump hours	50	\$5.00	\$750.00
Sub-total				\$7,374.75
Other Costs:				
Contingencies	10% of Labour & Material			\$935.48
Tools	5% of Material			\$368.74
Supervision	15% of Labour & Material			\$1,403.21
Transport of inputs	Trip	1	100	\$100.00
Transport to farmgate	Lbs	20000	\$0.02	\$400.00
Sub-total				\$3,207.43
Total				ECD 12,562.18

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

Appendix J: COST OF PRODUCTION – CANTALOUPE in ST. LUCIA (Traditional Management System) – yield 14,000 lbs./acre (ECD per acre)

ITEMS	Unit	No. of Units	Cost/unit (\$)	Total Cost (\$)
Labour Costs:				
Soil Preparation	Person Days	25	\$50.00	\$1,250.00
Planting	Manday	3	\$50.00	\$150.00
Fertilizing	Person Days	3	\$50.00	\$150.00
Pesticide application	Person Days	12	\$50.00	\$600.00
Harvesting	Person Days	10	\$50.00	\$500.00
Sub-total				\$2,650.00
Material Inputs:				
Seedlings	seedling	4800.0	\$0.35	\$1,680.00
Foliar Fertilizers	bag	1.0	\$120.00	\$120.00
Biostimulants	liters	4.0	\$100.00	\$400.00
NPK - 12:12:17	50 kg	3	\$115.00	\$345.00
Bio Neem	litre	1	\$200.00	\$200.00
Plastic Mulch	Roll	5	\$500.00	\$2,500.00
Trigard	50g	1	\$87.25	\$87.25
New Mectin	250 ml	2	\$160.00	\$320.00
Banrot	kilogram	0.5	\$325.00	\$162.50
Phyton 27	250ml	6	\$45.00	\$810.00
Sub-total				\$6,624.75
Other Costs:				
Tools	5% of Material			\$368.74
Sub-total				\$368.74
Total				ECD 9,643.49

Source: Ministry of Agriculture, Food Production, Fisheries, Cooperatives & Rural Development of St. Lucia, Extension Division

