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Assessment of Horticulture in Eastern, Uva, and North Central Provinces of Sri Lanka

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Assessment of Horticulture in Eastern, Uva, and North Central Provinces of Sri Lanka

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Acronyms

AESD	-	Agriculture and Environment Statistics Division
BIA	-	Bandaranaike International Airport
BOI	-	Board of Investment
BOO	-	Build Own and Operate
CORE	-	Connecting Regional Economies
DOA	-	Department of Agriculture
FCRDC	-	Fruit Crop Research and Development Centre
FFC	-	Fresh Fruit Company
FS	-	Farmer Societies
GDP	-	Gross Domestic Product
Ha	-	Hectares
HORDI	-	Horticulture Crop Research and Development Institute
IFCO	-	International FoodStuff Company (Pvt.) Ltd.
LKR	-	Sri Lankan Rupees
MT	-	Metric Tons
NCECP	-	North Central, Eastern and Uva Provinces
SLEDB	-	Sri Lanka Export Development Board
SLFVPPEA	-	Sri Lanka Fruits and Vegetable Producers, Processors and Exporters Association
USAID	-	United States Agency for International Development
USD	-	U.S. Dollars
VAT	-	Value Added Tax

Executive Summary

Sri Lanka has promising -- but virtually untapped -- potential as an exporter of high-value horticulture products to nearby markets in the Maldives and the Persian Gulf. Because of its tropical location and two monsoons, it can grow many types of tropical fruits and vegetables year round. In addition Sri Lanka benefits from its proximity and regular shipping connections to these markets. Faster and more frequent delivery times means that fruits and vegetables exported from Sri Lanka will arrive fresher than produce shipped from more distant countries. Freshness plus the lower cost of maritime transport are strong reasons for "best practice" horticulture enterprises to locate in Sri Lanka rather than in more distant countries.

A few forward-looking entrepreneurs have already begun to invest in and develop these opportunities, but constraints, including (a) policies that make it difficult to practice horticulture on a large scale, and (b) supply chain inefficiencies in the island have kept Sri Lanka from benefiting even more from its advantages and opportunities.

This report looks at the horticulture sector from the viewpoint of development opportunities and concludes that more effort to build its exports would be advantageous to the country overall. Horticulture has a strong tradition throughout Sri Lanka. Many farmers practice integrated farming that includes small scale, home garden cultivation of fruits and vegetables. This small scale of cultivation scattered over large distances makes quality control, collection and consolidation for export more difficult and more expensive. One way to overcome these problems is to integrate a large, commercial scale orchard in an area that can also partner with smaller farmers in the neighboring area who are willing and able to meet standards required. This is a strategy already been implemented successfully on a small scale in some districts of the North Central, Eastern and Uva Provinces. Early results indicate that it is a practical approach to overcoming constraints and raising rural incomes in a way that can be sustained from export earnings. The Department of Agriculture's Five-Year Plan 2006-2010 for developing the horticulture sector, emphasized the importance of developing tropical fruits for exports, plus the need for larger, commercial scale horticulture enterprises to do so.

Development of popular traditional horticulture products such as onions and chilies will also benefit many rural farmers in post-conflict zones, especially if farmers plant higher yielding varieties, adopt best agricultural practices and have access to village collection centers and simple storage facilities that will enable farmers to store some produce for sale outside the peak harvest season. In recent years, Sri Lanka has imported and consumed three times more onions than it has produced. Given the advent of peace there is every reason to expect that additional production from Northern areas will soon reach Sri Lanka's markets, increasing the total domestic supply and reducing the amounts imported, and also helping to lower retail prices. This will be good news for the country and all consumers, but it could mean less income for farmers who have not improved their average yields. Cultivating higher yielding varieties of traditional crops and storing them past the peak harvest season will help improve farm incomes, but linking farmers to the export markets for fruits and vegetables will help even more.

In 2008, Sri Lanka exported USD 69 million worth of fruits and vegetables both fresh and processed. That was less than 0.7% of all Sri Lanka's exports for the year, but it was also 167% more than the value of fruits and vegetables exported only two years earlier in 2006. Most of the exports are going to the Maldives and Persian Gulf countries. Long term demand in these countries is large, despite the recent downturn due to the global recession and property collapse in Dubai. Exporters are increasingly excited at Sri Lanka's potential to capture a larger share of this market, but they are also frustrated by their inability to access greater quantities of export-quality fruits and vegetables. If

rural farmers knew about the horticulture income opportunities they are missing, they would also be frustrated. The value chain linking high-valued horticulture products to exports is not reaching enough capable producers and not attracting the larger volumes of quality products that it could.

Horticulture Sector Development – Directions Forward

The report's central strategic recommendation for developing the horticulture sector is to sell more into the export markets where Sri Lanka enjoys a location advantage. The fruits in demand in the Persian Gulf and the Maldives are traditional tropical fruits: bananas, pineapples, papaya, and melons of the highest most attractive quality. Importers/distributors in Dubai advertise that they handle only the highest quality, branded products. Because demand for these well-liked fruits is large and steady, they can be grown and exported in volume, and these "mainstay" crops can "pay the freight" for developing a competitive value that, once established, will also facilitate growth and diversification into more exotic fruits and vegetables.

Successfully growing and exporting more tropical fruits will require extensive private and public investment in expanding production and improving the supply chain links into rural areas. To attract the needed private investment, new government policies are needed that will make it easier and more attractive for entrepreneurial producers to lease and develop large tracts of land (1000 Ha) into commercial scale orchards and farms. The government can use a version of the already proven public-private partnership model to lease or auction/lease suitable parcels of land to suitable enterprises. In addition to standard lease payments to the government, the lease/partnership agreements should include an obligation on the part of the lessor-enterprise to work with smaller farmers in the surrounding areas, to bring into outgrower purchase and collection arrangements. Structured in this way, government policy will be encouraging new investments that create direct employment opportunities on the large commercial-scale parcel and also help raise the incomes of smaller farmers in the surrounding area. These leases will be a natural outgrowth of other successful government and private sector partnerships, similar to ongoing efforts to produce and distribute high quality onion seed.

Increased planting of higher yielding varieties of onions and chilies should be accompanied by plans to collect, sort and provide storage facilities that can keep part of the harvest through the off season. To make effective use of the storage facilities, small farmers will need to be part of a village-level collection program that should be tied into a zonal collection arrangement to reach larger buyers and processing facilities. Village farmers will also need: (a) better access to market information, radio programs or cell phones that provide price and market information, and (b) credit or financial arrangements that enable them to "forward sell" or store a portion of the crop until the price is more favorable.

The Department of Agriculture (DOA) should use its valuable network of surveyors/researchers and statistical database to educate more farmers about opportunities and the comparative advantages and disadvantages of certain crops. Average yields reported in DOA statistics for traditional crops vary greatly among the various districts of Sri Lanka. By telling farmers in the Eastern Province that their onion yields are less than half those of farmers in Puttalam and explaining why there is such a difference, the government (or private sector suppliers of agricultural inputs) can help farmers improve their crop selection decisions and cultivation practices.

More ways have to be found to educate farmers about best practices, market opportunities, and urgent issues such as spread of pests. In many other countries, extension services have used a variety of electronic media, especially radio to disseminate useful extension advice. While more

modern methods are also useful, broadcast media, especially radio programs that feature real farmers from the listening area, have proven to be popular, cost effective and highly successful.

Intervention Opportunities

Potential exists for a number of promising opportunities in horticulture, including continuing work with private sector enterprises that are pioneering "direct buy" and contract production agreements with rural farmers. These efforts have already had some beneficial impacts on rural productivity and incomes and will have more as they spread and create healthy competition among other buyers. Opportunities exist to sponsor events that help willing villages to link up with buyers and exporters.

Another helpful activity would be to encourage using the public-private partnership model to improve dissemination of useful DOA extension materials. The DOA has a library of useful guides and tracts on fertilization and pest control and crop budgets including some material on DVD and available on-line. Some materials are available in Tamil as well as in Sinhala, but more needs to be translated and produced in farmer-friendly media and formats. Also more copies and a distribution program are needed. More farmers need to easier access the information in these booklets.

Experimenting with some exotic fruit crops frequently requires a multi-year investment and outlook. Pomegranate, for example yields fruit only after two years of cultivation. This is too long for most small farmers. Even medium-scale farmers may be unwilling to plant unfamiliar crops unless they can be persuaded that (a) they have a guarantee purchase contract from a solid buyer, (b) they have access to good technical inputs and advice, and (c) at least part of their risk can be offset by some kind of incentive or insurance arrangement. Depending mainly on the underlying capacity and willingness to experiment with more exotic, higher-value horticulture crops, government and donors can encourage such experimentation by supporting partnerships between farmers and private sector enterprises committed to buying and marketing the produce.

Another potential area is to encourage financial institutions to develop and offer "forward-selling" arrangements to farmers or farmers and buyers with reliable storage arrangements. Reportedly the price of onions over a year in Sri Lanka varies from LKR 25 per kg to LKR 125 per kg just prior to the new harvest. Being able to store part of the harvest safely for six months would be a way to add value to the harvest itself.

1. Horticulture Sector and the National Economy

A variety of cropping systems in use by small growers

1.1 Introduction

Sri Lanka is an ideal location for many types of agriculture, including tropical horticulture. Favorable natural conditions including its tropical location, two monsoons annually, varied topography, and generally good soil allow for year round cultivation in different parts of the island. These have been augmented with man-made investments in irrigation and water management to enhance the island's potential for growing a wide variety of crops. Sri Lanka has three distinct climatic zones: (1) Wet Zone (1.5 million hectares in the Southwest quadrant of the island), (2) Dry Zone (4.17 million hectares encompassing the rest of the island north and east), and (3) an Intermediate Zone of 0.9 million acres lying between the wet and dry zones. The island can be further sub-divided into 22 well-defined agro-ecological regions with distinct rainfall patterns, elevation, landform, and temperature and soil type.[1] Also, see maps in Appendix A.

According to the last agricultural census of the country in 2002[2] about 1.8 million agricultural holdings totaling 1.5 million hectares were under cultivation. In rough terms, Sri Lanka is using about 25% of its cultivated land to grow paddy (rice) for domestic consumption and 40% to grow its four plantation crops for exports: tea (11%), rubber (6%), coconut (20%) and spices (2-3%). In 2008 about one-third

[1] Kudagamage, C. Ph.D., *Present Status of Horticulture Research in Sri Lanka*, paper delivered at World Conference on Horticulture Research, June, 1998, Rome Italy.

[2] *Census of Agriculture, 2002*, Department of Census and Statistics. Agriculture censuses are carried out every ten years.

of Sri Lanka's labor force was engaged in agriculture (including fishing) and they produced 12% of the national GDP. The productivity of workers in agriculture is less than that of workers in the industry and service sectors, but agriculture contributes important raw materials to the island's leading agro-industrial exports: tea, rubber and coconut. Historically the fertility of the island and the success of agriculture helped sustain high rates of population growth. Unfortunately, technological improvements in agriculture have not been sufficient to offset declining productivity in labor and land. In 2008 about 28% of Sri Lanka's labor force was engaged in land-based agriculture, but produced only 10% of the national GDP. Labor productivity in agriculture was 37% of the national average productivity.[3] The major challenge facing agriculture, to raise productivity, has five interrelated component challenges that must be dealt with: (1) increasing scarcity and declining quality of land (low fertility) and water resources, (2) low profitability due to the small scale of most holdings, (3) years of underinvestment in technology and preserving fertility, (4) the challenge of creating more employment opportunities in the industry and service sectors to absorb surplus labor from agriculture, and (5) educating the workforce in agriculture to qualify for jobs in other sectors.

1.2 Horticulture and GDP

In terms of GDP, which uses factor costs rather than market or export prices, agriculture (including fishing) accounted for approximately 12% of national GDP in 2007, crop agriculture for 10%. See Table 1. The three major export crops represented only 3% of GDP and paddy cultivation only one percent. The category "Other Food Crops" which includes "Fruits and Vegetables" and many other crops as well accounted for 3% of GDP, roughly equal to the total for all three of Sri Lanka's major export crops and more than double the value of paddy.

Table 1: GDP at Current Factor Cost Prices, 2007 (a)

Subsector and Sector	Subsector GDP *LKR Bn*	Sector GDP *LKR Bn*	Subsector Share of GDP *%*	Sector share of GDP *%*
Agriculture Total		363		10.2
Tea	49		1.4	
Rubber	22		0.6	
Coconut	41		1.1	
Minor Export Crops	11		0.3	
Paddy	45		1.2	
Livestock	41		1.1	
Other Food Crops	108		3.0	
Other Agriculture	48		1.3	
Fishing		55		1.5
Industry		1,071		30
Services		2,090		58
Total GDP		3,579		100

(a)Provisional

Source: Economic and Social Statistics of Sri Lanka, 2009, Central Bank of Sri Lanka, p. 36, Table 4.13, March 2009.

[3] *Annual Report 2008*, Central Bank of Sri Lanka, provisional data from Department of Census and Statistics. Excludes data from Northern Province. Percentages for employment (28%) and GDP contribution (10%) for land-based agriculture exclude data for Fishers (2.5%) and Fishing (1.5% of GDP). Average productivity per employed person in land-based agriculture in Sri Lanka was lower than average productivity per person in the Fishing sector in 2008.

Despite its significant contribution to the country's GDP, and plantation model used for tea, rubber, and cinnamon, cultivation of fruits and vegetables on a commercial orchard scale is rare in Sri Lanka except in the coconut triangle where fruits such as Banana, Pineapple, Rambutan and Papaya are grown extensively as intercrops. Rubber plantations in Sri Lanka are also experimenting with banana as an intercrop during the early years of rubber tree growth. Most fruit cultivation in Sri Lanka takes place on a small scale in home gardens for home consumption and sale within the domestic market. Most Sri Lankan paddy farmers practice a version of integrated farming. It is customary to plant orange, lime, mango and a few clumps of bananas around their homes. Although frequently talked about for its export potential, fruit and vegetable cultivation on a commercial scale is rare. Recently, however, a few agriculture entrepreneurs and exporters have found ways to venture into exports.

1.3 Production, Consumption and Exports

According to information in the Food Balance Sheets prepared by the Agriculture and Environment Statistics Division (AESD), Sri Lanka produced 86% of the vegetables sold in the country in 2007 and imported the other 14%. Most of the vegetable imports were onions. The country was even more self-sufficient in fruit, producing 93% of the fruit sold in the country and importing only 7%.

Agricultural exports as a whole generated 23% of Sri Lanka's export earnings (USD 8.1 billion) in 2008.[4] Exports of fresh fruits and vegetables represented USD 39.5 million (<0.5 %) of total exports. Adding in processed fruits and vegetables exported in cans or as juice raised that total to USD 68.7 million -- still less than one percent of the country's total exports for 2008. However, while Sri Lanka's total exports grew by only 6.5% from 2007 to 2008; its exports of fresh fruits grew by 25%, and exports of fresh vegetables more than doubled. In dollar terms Sri Lanka's exports of vegetables and fruits (fresh and processed) increased 167% from 2006 to 2008. See Table 2.

Table 2: Value of Fresh and Processed Vegetable and Fruit Exports, 2004–2008 (millions of LKR)

Year		Vegetables fresh	Fruit fresh or Dried	Fruits in tins or bottles	Fruit & vegetable juices	Total Fruit & vegetables	Yearly Increase %
		(millions of LKR)					
2004		964	651	442	173	2,230	
2005		1,153	609	358	213	2,333	5%
2006		1,005	982	507	178	2,672	15%
2007		1,252	1,317	1,765	329	4,663	75%
2008	(a)	2,717	1,508	3,013	209	7,447	60%
		(millions of USD) (b)					
2004		9.5	6.4	4.4	1.7	22.0	
2005		11.5	6.1	3.6	2.1	23.2	5%
2006		9.7	9.4	4.9	1.7	25.7	11%
2007		11.3	11.9	16.0	3.0	42.2	64%
2008	(a)	25.1	13.9	27.8	1.9	68.7	63%

(a) Provisional
(b) Exchange rates from Central Bank of Sri Lanka Table 2.12
Source: *Annual Report 2008*, Tables 72 and 73. Central Bank of Sri Lanka.

About half of the USD 27 million of growth in exports from 2007 to 2008 came from increased exports of fresh vegetables that also were exported mainly to the Maldives and the Persian Gulf.

[4] *Annual Report 2008*, Central Bank of Sri Lanka, Table 1.3, p.8.

Fresh vegetable exports did not grow very much from 2004 to 2007 while the volume of fruit exports was nearly doubling. The surge in vegetable exports from 2007 to 2008 is arguably due to increasing interest in Sri Lanka as a source – generated by the earlier fruit exports. Also encouraging is the 74% increase in exports of fruit in cans and bottles. Fruit processing creates higher paying jobs in the industry sector and helps farmers sell the less valuable segment of their crop at bulk rates. The increase in processed fruits and vegetables[5] more than offset the slight decrease in exports of processed juices.

1.4 Imports

In 2008, Sri Lanka imported about LKR 122 billion (USD 1.1 billion) of food and beverages[6]. Most of that amount was used to import milk and milk products (26%), sugar (18%) and fish (10%). Approximately 8% was spent to import rice (4%) and onions (4%). Table 3 gives more information on onion imports. Because this is an important crop for farmers and food for consumers, the government is frequently involved in policies regarding the import of onions. Import is not permitted during Sri Lanka's own harvest season, and since February 2009, onion imports have had to pay a specific tariff (LKR 25 per kg). In general government policy tries to put a floor under prices to protect its onion farmers during their peak production months, and then allows imports the rest of the year to keep prices from rising too high for consumers.

Table 3: Imports of Onions, 2005-2008

Crop	2005	2006	2007	2008	% change 2007-2008
	(in 1000 MT)				
Big Onion	111	119	141	146	4%
Red Onion	10	11	24	27	13%
Total	121	130	164	173	5%
	(in million LKR)				
Big Onion	1,826	1,940	4,392	3,473	-21%
Red Onion	304	377	949	1,583	67%
Total	2,130	2,317	5,342	5,057	-5%
	(in million USD)*				
Big Onion	18	19	40	32	-19%
Red Onion	3	4	9	15	70%
Total	21	22	48	47	-3%
*LKR/USD	100.5	103.96	110.62	108.33	

Source: Sri Lanka Customs.

Note that in 2008 the total value of onion imports decreased, but not the quantity. Most of the onions imported into Sri Lanka come from India, especially the "Big" or "Bombay" onion. India's yields are reportedly higher than those in Sri Lanka for onions and average prices lower, and India, with its large size overall also has a longer harvest season.

[5] A large part, but not all, of the increase in this category could be due to increased exports of gherkins by one company, Hayley's.

[6] Provisional estimate reported in *Annual Report 2008*, Central Bank of Sri Lanka, citing Sri Lank Customs as source.

1.5 Productivity – National Trends

Except for the growth in exports in recent years, there have been few other signs of remarkable progress in the horticulture sector. Table 4 looks at seven fruit crops tracked by the Agriculture and Environment Statistics Division (AESD) of the Department of Census and Statistics. The area planted in these seven crops has increased by about 10% in the dozen years from 1996 to 2008, but yields have declined for all the fruit crops except pineapple.[7] The reported yield for papaw (papaya) and passion fruit has fallen to about half what it was twelve years ago. Partly due to lower yields, there has been a 47% decrease in the production of passion fruit and a 19% decrease in production of mangoes since 1996. There has been a 16% increase in papaw and a 10% increase in limes, but with lower average yields. In terms of land use, almost half (48%) of all land allotted to these seven fruits is planted in bananas, with mangoes accounting for another 26%. Table 5 presents the equivalent data on extent, production and average productivity for onions, an important cash crop for paddy farmers and also Sri Lanka's principal vegetable import.

Table 4: Major Fruit Crops - Extent Cultivated and Production, (1996, 2005, 2008)

Category and Year	Total All 7 Fruit Crops	Plantain Banana	Papaw	Pine -apple	Mango	Orange	Lime	Passion Fruit
Extent Cultivated	(1000 Ha)							
1996	91	46.7	3.0	4.8	25.8	3.7	6.7	0.4
2005	103	51.1	4.9	5.3	27.2	4.4	9.7	0.3
2008	100	47.7	6.3	5.0	25.7	5.1	9.7	0.4
% of Total 2008	100%	48%	6%	5%	26%	5%	10%	0%
Production	(millions of fruits or bunches)							
1996	786	34.4	33.0	41.1	489.6	27.1	151.5	9.0
2005	785	34.1	30.4	48.7	464.1	29.5	173.7	4.5
2008	710	33.1	38.4	43.5	394.6	28.8	166.8	4.8
% of Total 2008	100%	5%	5%	6%	56%	4%	23%	1%
Yield	(millions of fruit or bunches per Ha)							
1996		0.74	11.17	8.62	18.96	7.33	22.64	20.39
2005		0.67	6.15	9.27	17.06	6.66	17.95	14.24
2008		0.69	6.11	8.76	15.33	5.60	17.24	11.08
% change in Yield		94%	55%	102%	81%	76%	76%	54%
Change in Production								
From 1996 to 2008		-4%	16%	6%	-19%	6%	10%	-47%
From 1996 to 2005		-1%	-8%	19%	-5%	9%	15%	-50%
From 2005 to 2008		-3%	26%	-11%	-15%	-2%	-4%	8%
a./ Million bunches								

Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka, .statistics.gov.lk/agriculture/hcrops. Data from 1996 taken from "Present Status of Horticulture Research in Sri Lanka, C. Kudagamage, Ph.D. Deputy Director Research, HORDI, 1998.

[7] Production Estimates in the AESD tables are given in 1000's of fruits or bunches rather than in a measure of weight. If the average weight of a fruit or a bunch of bananas has increased or decreased since 1996, this is not reflected in the reported data on production used for this table. It is possible, if average weights have improved from planting better varieties, that yields in terms of MT have not declined as much as they appear to have using just the measures based on numbers of fruits.

Table 5: Onion Cultivation in Sri Lanka, 2005 - 2008

Crop	2005	2006	2007	2008	% change 2005-2008	% change 2007-2008
Extent Cultivated	(1000 Ha)					
Big Onion	4.6	6.8	7.0	4.1	-10%	-41%
Red Onion	5.8	6.2	5.6	4.9	-16%	-13%
Total	10.3	13.0	12.6	9.0	-13%	-29%
Production	(1000 MT)					
Big Onion	55.6	73.6	92.2	57.3	3%	-38%
Red Onion	53.7	60.8	57.0	49.3	-8%	-14%
Total	109.3	134.4	149.2	106.6	-2%	-29%
Avg. Yield	(MT per Ha)					
Big Onion	12.2	10.8	13.2	14.0	15%	6%
Red Onion	9.3	9.8	10.2	10.1	9%	-1%

Source: Agriculture and Environment Statistics Division of Department of Census and Statistics.

The average yields for both types of onion improved respectably from 2005 to 2008, probably reflecting spreading willingness by farmers to buy and plant the higher yielding varieties. Note, however, the 29% drop in extent and production from 2007 to 2008, but still a 6% increase in average yield nationwide. This suggests that the 3,600 hectares not planted in between 2007 and 2008 were below average in their productivity for onion. One interpretation of the drop in production is that farmers decided the economics of planting onions was not as attractive for them as it might be for some other crop, especially with the drop in world prices in 2008. If so, the decision was probably the correct one for the farmers that made it. The average 2008 price paid to producers in the Central, Eastern, North Central and Uva Provinces for big onion was LKR 5 to 21 per kg less than the price paid in 2007.[8]

1.6 Conclusions

The picture of the horticulture sector that emerges from the tables above is a mixed one. The absence of productivity gains in fruit contrasts sharply with gains reported in onion cultivation and with the dramatic increases in exports. However a mix of images is probably an accurate portrait of the reality of horticulture in Sri Lanka – a sector with a few impressive points of progress emerging from a larger background of very slow growth and even decline. One could see the uneven progress as the dominant trend and as a threat to the sustainability of recent progress in areas such as exports. A more hopeful view is that success in exports and onions (yield improvements) in particular can be repeated and spread more widely fueling progress throughout the sector overall.

The balance of this report looks more closely at the state of horticulture in USAID/CORE project geographic areas namely; the North Central, Eastern and Uva Provinces and into possibilities for accelerating horticulture development so that it yields benefits to rural farmers in those Provinces as well as to consumers and exporters.

[8] Economic and Social Statistics of Sri Lanka, 2009, Central Bank of Sri Lanka, Table 7.7, p.67.

2. Main Horticulture Products in Eastern, Uva, and North Central Provinces

2.1 Primary Producers - The Farmers

There are approximately 856,000 farmers of all types (not just horticulture) in the North Central, Eastern and Uva Provinces (NCEUP). They represent 21% of the total population (4 million) and 50% of all persons employed in the NCEUP.[9] See Table 6. In turn, the three Provinces account for 20% of the national population, and 21% of the nation's employed labor force living on about 44% of the country's land area. The average population density in the three Provinces is less than half that for Sri Lanka as a whole (Table 7); but the average size of farm holdings is small. The smaller the farm holdings are the more difficult and expensive it is to operate collection routes or supply distribution or extension services.

Table 6: Employment by Major Industry Group for Districts of NCEUP, 2008
('000 persons)

NCEUP Region a./	Total	Agriculture	Industry	Services
Districts				
Batticaloa	137	32	42	63
Ampara	239	79	57	103
Trincomalee	98	35	18	45
Anuradhapura	387	243	48	96
Polonnaruwa	162	83	27	52
Badulla	415	264	46	105
Moneragala	204	121	24	58
Provincial Totals				
Eastern	474	145	117	211
North Central	549	325	75	148
Uva	618	386	69	164
Three Province Total	1,640	856	261	523
Three Provinces as % of National Totals	21%	34%	13%	17%
National Employment Total	7,648	2,490	2,005	3,154

a/ NCEUP = North Central, Eastern and Uva Provinces.
Source: Sri Lanka Labour Force Survey Final Report-2008 Department of Census and Statistics, Ministry of Finance and Planning Table 13. p. 52

Table 7: Population Density 2008 by Districts and Provinces, 2008

Province District	Land Area (a)/ Sq. km.	Population in 1000's	Density Pop./Sq.km	% of National Pop.
Eastern	9,361	1,515	162	7.5%
Batticaloa	2,610	530	203	2.6%
Ampara	4,222	624	148	3.1%
Trincomalee	2,529	361	143	1.8%
North Central	9,741	1,209	124	6.0%

[9] Data for the Agriculture sector include persons employed in fishing.

Province District	Land Area (a)/ Sq. km.	Population in 1000's	Density Pop./Sq.km	% of National Pop.
Anuradhapura	6,664	809	121	4.0%
Polonnaruwa	3,077	400	130	2.0%
Uva Province	8,335	1,291	155	6.4%
Badulla	2,827	861	305	4.3%
Moneragala	5,508	430	78	2.1%
Three Province Total	27,437	4,015	146	19.9%
Three Province Total				
as % of All Island	44%	20%	45%	
All Island Total	62,705	20,217	322	100.0%

a./Total land area excluding inland waters.
Source: Economic and Social Statistics of Sri Lanka 2009, Table 3.6, p.15,
Central Bank of Sri Lanka, March 2009, citing Surveyor General's Office
Registrar General's Office and Department of Census and Statistics.

Land Use and Farming Activities

Almost 50% of Sri Lanka's paddy land is located in the North Central (25%) Eastern (18%) and Uva (7%) Provinces combined. See Table 8. As shown in Table 9, the paddy farmers of the North Central and Eastern Provinces have higher yields than the national average for paddy.

In 2008, farmers in all three Provinces combined produced 57% of all paddy production that year nationwide on 52% of the nation's paddy land. While yields in the Uva Province were slightly below average, yields in the North Central and Eastern Province led the nation. The North Central Province, which benefits from extensive irrigation, produced 28% of the nation's paddy in 2008 and at a yield 14% higher than the national average. The importance of the region to the nation's annual rice crop is a limiting factor on how much land and farming effort could be invested in horticulture, especially if it meant re-deploying land and water resources. Paddy farmers could still participate in horticulture as data in the upcoming section will show. They do this by following their traditional practices of mixed or integrated agriculture around the paddy seasons, engaging in horticulture and livestock but with paddy as the primary and mainstay activity. From a strategic standpoint, therefore, it does not make sense to build a commercial horticulture operation around the idea of using the nation's leading paddy farmers or the nation's best paddy land.

Table 8: Extent of Cultivation in Sri Lanka, 2008

Crop	Total National Extent by crop	NCEUP as % of National Extent	Uva		North Central		Eastern		
			Badulla	Mona-ragala	Anura-dhapura	Polonn-aruwa	Trinco-malee	Batti-caloa	Ampara
All Farmed Land	100%	29%	5%	5%	8%	4%	1%	2%	4%
Tea	11%	15%	14%						
Rubber	6%	2%		2%					
Coco	20%	11%	1%	3%	4%	2%	1%	1%	1%
Paddy	25%	49%	4%	3%	16%	9%	3%	5%	10%
Cinnamon	1%	2%	1%	1%					
Sugar Cane	1%	3%	1%						2%
Other	35%	34%	8%	10%	9%	3%	1%	1%	3%

Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka;
.statistics.gov.lk/agriculture/hcrops

Table 9: Paddy Production and Yields in Selected Provinces, 2008*

Province	Production MT '000s	Net Extent Harvested 1000 Ha	Yield MT/Ha
Eastern	830	179	4.63
North Central	1,103	231	4.78
Uva	294	71	4.17
Three Province Total	2,227	481	4.63
All Island	3,875	926	4.19
Three Province total as % of All Island	57%	52%	111%

*Provisional
Source: *Economic and Social Statistics of Sri Lanka 2009* Table 5.7, p. 43; Central Bank of Sri Lanka, March 2009, cites Department of Census and Statistics

Vegetables, Pulses and Oil Seeds

In addition to farming about half of Sri Lanka's paddy land, the farmers in the NECUP also tend to about 34% of the country's land devoted to "other crops" [See table 8]. This high percentage reflects the fact that many paddy farmers also maintain home gardens devoted to fruits and vegetables and the fact that not everyone in the region is a paddy farmer.

Table 10 presents 2005 data for 23 key vegetables, pulses and oil seeds tracked by AESD. The data show that farmers in the three Provinces produced 86% of the nation's maize, 68% of the country's kurakan and more than half (by weight) of the country's total output of cowpeas, gingelly (Sesame), chilies, ground nut, red and ash pumpkins and brinjal (eggplant). They also accounted for more than a third of the national production of black gram, manioc, ash plantain, cucumber, and lady's fingers.

Table 10: Selected Crop Production in Sri Lanka, 2005

Vegetables, Pulses and Oil Seeds										
				As percent of National Production						
		Total National Production	NCEUP as % of National Production	Uva		North Central		Eastern		
#	Crop			Badulla	Mona-ragala	Anura-dhapura	Polon-naruwa	Trinco-malee	Battica-loa	Ampara
		(1000 MTs)	(%)	(%)	(%)	(%)	(%)	(%)	(%)	(%)
1	Kurakkan	6	68%	5%	16%	42%	1%	1%	0%	3%
2	Maize	42	86%	20%	16%	32%	2%	1%	1%	15%
3	Green Gram	9	41%	3%	24%	8%	2%	1%	0%	3%
4	Cowpea	11	62%	4%	22%	12%	3%	0%	0%	21%
5	Soya Bean	5	13%	0%	1%	12%	0%	0%	0%	0%
6	Black Gram	7	48%	0%	0%	46%	0%	0%	1%	0%
7	Manioc	223	38%	9%	8%	7%	4%	2%	6%	3%
8	Sweet Potato	41	27%	9%	5%	4%	4%	1%	1%	3%
9	Red Onion	54	12%	2%	1%	2%	1%	4%	2%	0%
10	Bombay Onion	56	21%	0%	0%	21%	1%	0%	0%	0%
11	Gingelly	6	63%	7%	14%	40%	0%	1%	0%	0%
12	Ground Nut	9	56%	1%	32%	8%	5%	3%	4%	3%
13	Chillies	53	56%	3%	7%	41%	3%	1%	1%	2%
14	Cabbage	64	33%	33%	0%	0%	0%	0%	0%	0%
15	Red Pumpkin	80	58%	4%	11%	36%	1%	1%	0%	5%
16	Ash Plantain	70	47%	7%	18%	7%	3%	1%	1%	8%
17	Cucumber	27	42%	8%	10%	14%	1%	1%	0%	9%

Vegetables, Pulses and Oil Seeds										
				As percent of National Production						
		Total National Production	NCEUP as % of National Production	Uva		North Central		Eastern		
#	Crop			Badulla	Mona-ragala	Anurad ha-pura	Polon-naruwa	Trinco-malee	Battica-loa	Ampara
18	Lady Finger	41	44%	3%	10%	18%	3%	3%	4%	4%
19	Bitter Gourd	26	32%	4%	9%	10%	2%	2%	2%	2%
20	Ash Pumpkin	8	61%	3%	16%	34%	1%	1%	0%	5%
21	Brinjal	84	53%	16%	10%	19%	2%	2%	3%	2%
22	Snake Gourd	20	28%	1%	10%	6%	2%	3%	2%	3%
23	Capsicum	14	39%	27%	5%	5%	1%	0%	0%	1%
	Total	955	43%	9%	9%	15%	2%	1%	2%	4%

Note: A "0%" signifies less than 0.45% percent.
Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka .statistics.gov.lk/agriculture/hcrops

Fruits

The various districts of the three Provinces also play an important role in cultivation of some of Sri Lanka's leading fruit crops as shown in Table 11.

Table 11: Selected Fruit Crop Production in Sri Lanka , 2008

		2008 Total National Production (million fruits)	2008	Uva		North Central		Eastern		
#	Crop		Three Provinces	Badulla	Mona-ragala	Anurad hapura	Polon-naruwa	Trinco-malee	Battica-loa	Ampara
1	Plantain/banana	33,121a./	23%	3%	9%	4%	2%	1%	1%	3%
2	Papaw	38,361	24%	4%	4%	8%	5%	1%	1%	2%
3	Pineapple	43,490	8%	2%	4%	0%	na	na	na	1%
4	Mangoe	394,598	25%	2%	5%	7%	4%	1%	2%	4%
5	Oranges	28,847	44%	10%	7%	16%	5%	1%	2%	3%
6	Limes	166,821	60%	6%	24%	11%	3%	1%	0%	15%
7	Passion Fruit	4,807	9%	6%	2%	na	na	na	na	0%
	a./ Thousand bunches									

Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka, .statistics.gov.lk/agriculture/hcrops

About 60% of the nation's limes are grown in three Provinces, 24% in Moneragala alone. The three Provinces also produce 44% of the nation's oranges, mainly Uva Province and Anuradhapura district. Except for 15% of the nation's limes, the Eastern Province grows less than 5% of the seven major fruits tracked by the AESD.

The concentration of certain fruit crops in Badulla and Moneragala districts reflects the higher than average yields for those crops in those districts. Table 12 gives yields for these seven crops using AESD's yield measure of 1000 fruits (bunches in the case of bananas) per hectare.

Table 12: Yields for Selected Fruit Crops in Sri Lanka, 2008
('000 Fruits/Ha)

Crop	2008 National Average Yield	2008 Three Province Average Yield	Uva		North Central		Eastern		
			Badulla	Mona-ragala	Anura-dhapura	Polon-naruwa	Trinco-malee	Batti-caloa	Ampara
Plantain/banana a./	0.69	0.59	0.56	0.88	0.34	0.43	0.41	0.38	0.21
Papaw	6.11	5.59	9.17	11.88	2.68	2.60	4.32	4.92	2.20
Pineapple	8.76	6.87	6.42	9.73	0.83				3.42
Mango	15.33	15.28	20.03	16.55	16.42	18.08	7.32	11.45	9.13
Oranges	5.60	5.76	12.00	6.32	3.48	4.32	4.95	4.71	1.76
Limes	16.85	17.84	23.40	26.23	8.35	11.28	9.36	5.30	8.58
Passion Fruit	11.08	8.80	13.75	8.08					1.14

a./ thousand bunches
Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka, www.statistics.gov.lk/agriculture/hcrops

The higher than average yields are easier to spot in Table 13 which uses the data from Table 12 to calculate the difference between average yields in a particular district and the national average yield for that crop. The cells with positive numbers indicate that reported average yields in those districts are greater than the national average yields for that fruit crop. Negative numbers indicate that the average yield in that district is below the national average.

Table 13: Comparison of Selected Fruit Crops Yields in Sri Lanka, 2008
('000 Fruits/Ha)

Crop	National Average Yield	National Average Yield Minus Average Yield in District in 1000 fruit per hectare							
		Three Province Average Yield	Uva		North Central		Eastern		
			Badulla	Mona-ragala	Anura-dhapura	Polon-naruwa	Trinco-malee	Batti-caloa	Ampara
Plantain/banana a./	0.69	-0.11	-0.14	0.18	-0.36	-0.27	-0.28	-0.31	-0.48
Papaw	6.11	-0.52	3.06	5.77	-3.43	-3.51	-1.80	-1.20	-3.91
Pineapple	8.76	-1.90	-2.35	0.97	-7.93				-5.35
Mango	15.33	-0.05	4.71	1.23	1.09	2.76	-8.00	-3.88	-6.20
Oranges	5.60	0.16	6.40	0.72	-2.13	-1.28	-0.65	-0.89	-3.84
Limes	16.85	0.99	6.54	9.38	-8.51	-5.57	-7.50	-11.56	-8.28
Passion Fruit	11.08	-2.28	2.67	-2.99					-9.93

a./ Thousand bunches
Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka, .statistics.gov.lk/agriculture/hcrops

Except for mango cultivation in the North Central Province, only the districts in the Uva Province show crop yields higher than the national averages. Yields in the Eastern Province are well below national averages for six of the seven fruit crops and only slightly below average for bananas.

Onion Cultivation

Most of the big onion and red onion crops produced in Sri Lanka in 2008 were grown outside the three NCEUPs. Twenty four percent of the big onion crop was grown in Anuradhapura which combined with Matale to produce 80% of all the big onion grown in the nation. Anuradhapura's average yield for big onion, 12.2 MT per Ha was the best yield among NCEUP districts, but still 13% below the national average. The average yield for Matale, 17.6 MT per Ha was the highest in the nation and 24% above the national average.

Districts have specialized in growing either big or red onion but not both. Three districts accounted for 75% of all production of red onion in Sri Lanka in 2008, Puttalam (44%), Jaffna (24%) and Vavuniya (7%). The highest yield for red onion cultivation in 2008 was 13 MT per Ha reported for Vavuniya. The average yield for the combined three districts of Vavuniya, Jaffna and Puttalam was 11 MT per Ha, 10% higher than the national average and 33% higher than the average yield for the districts in the North Central and Eastern Province. The small amounts of red onion grown in the Uva Province experienced very poor results, yields only one-fifth the national average.

Table 14: Big and Red Onion Cultivation
Extent, production, and yield for selected districts, 2008

Area of Measure	Extent Ha	Big Onion Production MT	Yield MT/Ha	Extent Ha	Red Onion Production MT	Yield MT/Ha
National Total	4,090	57,371	14.0	4,879	49,290	10.1
Districts in NCEUP	1,199	14,523	12.1	1,659	5,897	3.6
Batticaloa	--	--	--	108	876	8.1
Ampara	8	45	5.6	25	177	7.1
Trincomalee	6	60	10.0	193	1,655	8.6
Anuradhapura	1,118	13,672	12.2	55	428	7.8
Polonnaruwa	65	729	11.2	37	323	8.7
Badulla	2	17	8.5	566	1,220	2.2
Moneragala	--	--	--	675	1,218	1.8
Ddistricts/ Areas with Highest Yields						
Matale	1,827	32,202	17.6	34	248	7.3
Vavuniya	97	1,016	10.5	248	3,228	13.0
Mahweli H	605	7,400	12.2	32	227	7.1
Puttalam	15	68	4.5	1,880	21,497	11.4
Jaffna	81	638	7.9	1,159	11,831	10.2

Source: Agriculture and Environment Statistics Division, Department of Census and Statistics, Colombo Sri Lanka, www.statistics.gov.lk/agriculture/hcrops

Farmer Societies (FS)

Following tradition, but also because of the small size of holdings, low-income levels, and government programs, many farmers in the area are organized into farmer societies. These FS have the ability to arrange for gatherings to interact with extension services from the government or private sector and some have gone on to better serve their constituent farmers as collective purchasing agents for supplies and collectors and consolidators for product sales. The Eastern Province has 95 farmer societies organized by the DOA for the production, quality improvement and value addition of highland crops. Of these societies 45 are in the Ampara district while Trincomalee and Batticaloa district have 30 and 20, respectively.

2.2 Input Suppliers

Most of the input supply services are carried out by private sector agribusiness enterprises such as CIC Agribusiness or Hayley's, with links to global multinationals. The government operates research centers and seed nurseries and limited supply distribution programs through its extension programs. Working together, formally and informally, the DOA and the private sector have managed to reach more farmer societies and farmers than either could reach on their own. CIC Agribusiness has helped DOA multiply and distribute more quality seed than the government's nurseries could manage with only their own resources. The private sector finds the leverage of working with farmer societies FS more economical than trying to reach individual farmers. Hayley's Annual report for 2008/09 says its agricultural input distribution network "covers 90% of the country's farm supply retail outlets [and] despite logistical issues created by the war, it reaches over 350,000 farmers and growers around Sri Lanka". Both Hayley's and CIC Agribusiness are also exporters of horticulture products, supplied through "direct-buy" arrangements they have with farmers.

2.3 Agricultural Credit

Unlike fishers, farmers typically own their produce and land and are better positioned financially to qualify for loans or production credits. Some credits come from the official banking systems but most comes from input suppliers or commission/purchasing agents, who sell input supplies on credit and then collect on loans at harvest time. Over-indebtedness and lack of suitable storage leaves many small-scale rural farmers with no option but to sell to the agent who has supplied him credit for whatever price the agent offers.

2.4 Marketing and Middlemen

Because horticulture cultivation takes place on small plots, scattered on large areas, special efforts are required to collect and consolidate the produce and move it to market. In Sri Lanka an elaborate system of middlemen is responsible for this task in the value chain. Typically, the farmer's primary contact is a village level collection agent. A simple chain runs: Farmer-Collector/Assembler-Wholesaler-Retailer-Consumer, but there can also be another "Consolidator" prior to reaching the wholesaler and possibly a "distributor" between the wholesaler and the retailer. The smaller and more scattered the producers, the more links or layers of middlemen seem to be involved. A few FS have attempted to eliminate some of the middlemen and capture more value added by undertaking some of the collection and consolidation function, but some of those FS have recognized they incur a sizable transport cost by doing so. Produce is packed in gunny sacks and or baskets and loaded onto trucks for transportation. Transport pricing encourages overloading, causing damage from crushing and heating. Poor packing and overloading of trucks result in losses estimated at 35-40% of total production.

Sri Lanka has a major wholesale market established at Dambulla, where wholesalers' trucks stop for price information and transactions before heading to major urban areas. There has been little or no investment in upgrading village-level storage facilities. The annual market cycle is characterized by price increases prior to harvest and price crashes from gluts following harvest periods.

The layering and multiple markups that characterize the collection system together plus high rates of wastage have frustrated both farmers and consumers. Newspaper articles carry complaint stories from farmers and politicians about the unfair prices and monopolistic practices from middlemen and

truck owners, but there has been little challenge from new competitors and not much regulatory interference from the government. Middlemen defend their markups, explaining that it is no easy task to collect and consolidate harvests that are so small and spread over so many villages and that, because they buy the produce at the village level, they have also assumed the risk of loss from spoilage and unsold produce. Recently competition at the middleman level has improved somewhat as a result of the entry of a few urban-based supermarket chains and FS into the field previously left to middlemen.

2.5 Direct Buyers, Processors and Exporters

A few major buyers of horticulture produce including the island's major supermarket chains (John Keells Holdings, PLC; Cargills Ceylon, PLC) and some major fruit and vegetable exporters (Hayleys's HJS Condiments and Sunfrost, CIC Agribusiness, Dole Asia and others) have initiated efforts to link up and contract directly with farmers and FS in a few selected rural areas. International Food Stuff Company (Pvt.) Ltd. (IFCO), a quality exporter of fruit and other perishables is another example. IFCO has its headquarters in Colombo, with farms and collection centers located in twelve districts and a high-tech (liquid nitrogen) packing facilities in Southern India. These firms have invested in rural production and outreach efforts to ensure they can access the quality, quantities and specific varieties their buyers in the export market are seeking. Their rural production enterprises center around a hub which is a commercial scale farming enterprise on land owned or leased by the major buying/exporting firm. In general that operation is also linked to other growers in the area, through collection centers or more formal contract farming arrangements as well. In addition to purchase agreements for produce meeting required standards, the buying firms typically offer quality inputs and extension advice. As this kind of competition spreads, it should help improve the situation of the small rural farmers and help improve and develop the entire horticulture value chain.

Until recently processing of fruit (drying, canning, fruit juices) in Sri Lanka was not a growing industry and not a major factor in the horticulture value chain. Recently, however, processing and exporting of processed fruit from Sri Lanka have been on the increase. Hayley's gherkin exports fall into the "processed" category. So do the processed fruit drinks that are packed in cartons or "tetrapaks" and sold within Sri Lanka as well as exported. At least one of Sri Lanka's dairy processing firms switched part of its production schedule over to fruit juice processing in recent years, motivated in part by a shortage of local raw milk but also by sales opportunities in the fruit juice market.[10]

Hayleys PLC's Annual Report for 2008/09 says that its subsidiary, HJS, is Sri Lanka's biggest fruit and vegetable exporter with about 25% of the market. Its main export is processed gherkins and pickles. It exports to 26 countries around the world and holds a 50% share of the Japanese bottled pickles market.

Private Sector Associations

The Fruits & Vegetable Producers, Processors & Exporters Association (SLFVPPEA) is a private sector, non-profit association established in 1981. It functions as the apex body for promoting and exporting the Island's fresh and processed horticulture produce to the World Market. As explained on its

[10] One unintended but potential consequence of the government's new pro-dairy sector development policies would be a lessening of interest on the part of dairy processors in buying and processing fruit-based drink products. This would be unfortunate, because Sri Lanka's competitive advantage is probably stronger in fruit drinks than it is in milk. As this report is being written, there is as yet no concrete evidence of this unwanted side effect from the pro-dairy policies.

website the Association, “supported by the Sri Lanka Export Development Board (SLEDB), comprises over 50 active members who proactively involve the Association on matters pertaining to the Industry.” A partial list of SLFVPPEA members is included in Appendix B. The list includes firms engaged in drying and dehydrating fruits and vegetables such as Prime Food Products (Pvt.) Ltd. of Kandy and S.A. Silva & Sons of Colombo, as well as Sun Frost (Ltd.), owned by Hayley’s. There are a number of canning and bottling firms, such as Lanka Canneries, Ltd., Kelani Valley Canneries, V&J Industries, Ltd. and South Asian Canneries and Consolidated Business Systems that produce jams, chutneys, sauces and juices. Consolidated Business Systems, Ltd. also exports fresh frozen vegetables. Also on the list is Rich Life Dairies Ltd. that processes and packs fruit juice in tetrapaks. The two lists combined, however, do not include all the major exporters and processors of fruit and vegetable products in Sri Lanka, because some major firms have not joined the association.

Recently the FVPPEASL joined with representative associations of other exporters of perishable products (fresh cut flowers, ornamental fish) in an advocacy effort to convince the government to provide better export facilities for perishable products at Colombo airport and to remain committed to its policy of ”open skies” that creates more direct air links to overseas markets.

2.6 Government

The government plays a large, central and important role in directing and supporting agriculture activity and development throughout the island. The government’s resources and attention have been necessarily focused on the island’s staple rice crop and its plantation-based export crops: tea, coconut, rubber and spices. The DOA is well aware that most rural farmers depend on horticulture crops for both nutrition and added cash income. Through a variety of programs the government is a key supporter of smaller farmers and the fruit and vegetable sectors. Government services are primarily involved with extension advice and supply side issues such as supporting the distribution of planting material, especially through its “One Village One Crop” Program, as well as harvest and post harvest improvements. A partial list of government agencies contributing to horticulture development includes:

- Department of Agriculture (DOA),
- Agrarian Services Department,
- Divisional Secretaries,
- Mahaweli Authority of Sri Lanka,
- Industrial and Technological Institute,
- National Packaging Centre,
- Universities,
- Agrarian Services Department,
- Divisional Secretaries, and
- Horticultural Crop Research and Development Institute.

The Horticultural Crop Research and Development Institute (HORDI) has the responsibility of technology development concerning vegetables, fruits, root and tuber crops and floriculture. The research program focuses on the development of improved crop varieties, new propagation methods, post harvest and food processing methods, the use of protected culture and ensuring better plant health with less dependence on chemicals.

The aim of HORDI is to generate and disseminate cost effective, eco-friendly, sustainable technologies that will increase productivity, improve quality, reduce post harvest losses and add value to the products of mandated horticultural crops such as fruits, vegetables, roots and tubers,

and ornamental crops while ensuring sustainable use of natural resources.

HORDI is one of three national institutes formed as part of a restructuring of the DOA in 1994 to conduct research on horticulture, rice, and field crops. It is located in Gannoruwa, Peradeniya outside Kandy.

In its Annual Report for 2008 of the Central Bank of Sri Lanka describes DOA's key research and development successes for 2008 as developing and releasing new hybrid, high yield varieties of tomato, chili and black gram.[11]

Other Government Agencies

In addition to the above agencies which are working with horticulture on the production side, two other government agencies are important to the future of the sector.

- Sri Lanka Export Development Board (SLEDB)
- Board of Investment

The SLEDB assists Sri Lanka exporters requesting technical advice and information about overseas export opportunities and contacts. It also joins with exporters on promotional tours to important markets. The SLEDB's registry of Fruit Exporters contained the names of 60 firms as of 2009 and can be found in Appendix B of this report.

The Board of Investment (BOI) is important to new ventures locating in Sri Lanka that have a significant component of foreign direct investment.

2.7 Development Agencies and Programs

The International Development Association (IDA) funds a program in Sri Lanka called "North-East Irrigated Agriculture Project" whose purpose is to restore irrigation and rural roads as a means of restoring food security for displaced communities. Until recently the program has been operating with USD 65 million approved as additional funding in 2004.

Past donor programs also afford a wealth of information about successful and unsuccessful practices. One project of particular interest for horticulture and development professionals was the UNDP-funded program called Area Based Growth and Equity Program, a broad initiative that focused on Uva, one of the poorest Provinces in Sri Lanka. This USD 4 million program that ran from 1998 to 2002 pioneered a number of new ideas including poly-tunnel-based horticulture and connecting rural farmers directly to large buyers of quality produce in major urban areas. Sri Lanka Airlines was one of the premier buyers serving quality fruits and vegetables from Uva farmers to passengers aboard its flights. The program selected and trained local farmers/entrepreneurs to undertake the job of collecting and consolidating vegetables and fruits from farmers in the villages – freeing the farmers from dependence upon purchasing agents working for wholesalers based out of major urban areas. More information about this project can be found at UNDP's project website. [12]

[11] *Annual Report, 2008*, Central Bank of Sri Lanka, page 39.
[12] website http://www.undprcc.lk/Publications/CGP/POVERTY/1.3-Sri%20Lanka.pdf.

3. Horticulture Sector - Constraints and Success

3.1 Introduction

Developing horticulture offers Sri Lanka opportunities to increase its export earnings, and also to (a) improve standards of living in many rural areas and (b) create jobs in the agro-industry processing sector. Turning those opportunities into reality, however, requires overcoming significant obstacles and constraints. This chapter begins with three expert views of the constraints facing development along with some suggestions for overcoming those constraints. This is followed by a section that looks at the success of Sri Lankan exports of horticulture products in recent years – despite the acknowledged constraints.

3.2 Constraints on Horticulture Sector Development

Analyses of the constraints hindering horticulture development go back more than a decade. Three are touched on here that show a great deal of consensus about what the constraints are.

HORDI - 1998

At the World Conference on Horticulture Research in 1998, Dr. C. Kudagamage, Ph.D., director of the Sri Lanka Horticulture Crop Research and Development Institute (HORDI) at Peradeniya presented a paper that listed the main constraints on more rapid development of the fruit and vegetable sector in Sri Lanka:[13]

1. Lack of suitable varieties to meet requirements of processing and export industry;
2. Inadequate availability of good quality seed and other input materials;
3. Improper, unbalanced fertilizer use;
4. High incidence of pests and diseases and improper pesticide use;
5. Overdependence on rain-fed systems and limited spread of modern irrigation techniques and best practices;
6. High post-harvest losses to improper handling, storage and transport;
7. Inadequate storage facilities; excessive seasonal price fluctuations;
8. Insufficient modern processing capacity;
9. Inefficient marketing and distribution network; and
10. Unavailability of land and support services for large scale commercial production.

All of these items remain binding constraints on horticulture today, eleven years later.

Department Of Agriculture Five-Year Work Plan 2006-2010.

The Department of Agriculture's Five Year Work Plan 2006-2010 set development as well as production goals and targets for all major crops from rice to floriculture, and looked at the constraints on reaching those goals. The following strategic goals were given for vegetables tuber crops and fruits:

[13] Kudagamage, C. Ph.D., *Present Status of Horticulture Research in Sri Lanka*, presented at the World Conference on Horticulture Research, 17-20 June, 1998, Rome ,Italy. Dr. Kudagamage's list contained 11 items that have been combined here into ten items.

Vegetables and Tuber Crops

- Achieve a sustainable production growth rate of 1% per year by 2010;
- Increased total production to reach nutritional goal of per capita availability (80kg/per year) and increase exports;
- Increase farmer income through value addition lower post-harvest losses;
- Achieve self-sufficiency in potato through increased productivity;

Fruits

- Increase current level of fruit production to 1 million MT by 2010 through growth rate of 1% per year; and
- Develop environment friendly and economically viable production and processing technologies for development of commercial farms.

Constraints and Challenges

The chapter on vegetable crops listed more than 20 items under four main headings:[14]

- Technology
  - Low yields due to rain-fed cultivation, lack of irrigation;
  - Improper, outdated irrigation techniques;
  - Large gaps between research and farmer yields;
  - Imbalanced fertilizer use;
  - High incidence of pests and disease;
  - Improper pesticide use;
  - Insufficient farm mechanization;
  - Limited availability and high cost of new high yield varieties and hybrid seed;
  - Improper post harvest handling techniques;
  - Improper storage and transport;
  - Lack of capital;
  - High cost of input supplies;
  - Inadequate extension staff and mobility;
- Natural Resource
  - Inefficient resource management;
  - Seasonality of production;
  - Environmental degradation;
  - Small holdings due to land fragmentation;
- Socio Economic and Policy
  - Lack of farmer group activities;
  - Producers ignorant of consumer preference;
  - Government policies favoring importation;
- Marketing and Processing
  - Lack of market information;
  - Lack of high quality products;
  - Lack of organized marketing systems and storage facilities;
  - Low farm-gate price and profitability; and
  - Inadequate processing facilities and agro-based industries.

The plan chapter on fruit crops repeated many of the above constraints in a concise fashion and also spotlighted one constraint particularly relevant to fruit production – lack of commercial scale orchards.

[14] *Five Year Plan, 2006-2010*, Department of Agriculture, Colombo Sri Lanka, 2006, page 41.

- Technology
    - Lack of improved varieties and inadequate availability of improved technological packages for cultivation and production;
    - Unawareness of improved technologies;
    - Inadequate improved technologies for processing and value addition;
- Natural Resource
    - Limitation of suitable lands for commercial scale cultivation;
- Marketing and Processing
    - Limited availability of organized commercial scale orchards (except pineapple & banana);
    - Seasonality in production and high wastage during glut;
    - Poor handling during collection, transportation and storage; and
    - Lack of storage facilities and poor marketing system.

Land for Commercial Scale Orchards Needed

The Five Year Plan 2006-2010 recognized that some constraints on fruit crop development could be addressed within the DOA's structure of programs, but that others such as the lack of suitable lands for commercial scale cultivation would require higher level policy decisions and direction. The authors went on to present a set of policy options for consideration by decision makers, some of which are summarized below.

(*Excerpt from Department of Agriculture Five Year Plan 2006-1010*)

- Finding Suitable Lands for Commercial Scale Orchards (small/medium/large);

    - Identify and develop lands in dry and intermediate zones with irrigation facilities for crops such as mango, papaya and banana;
    - Re-engineer marginal rubber and tea lands in the wet zone for rambutan, mangosteen, durian, and pineapple;
    - Use intercropping on coconut lands (and rubber plantations) to grow pineapple, passion fruit, and banana; and
    - Consider options for using steep-slope lands under agro-forestry for durian and avocado.

- Establishing horticulture productivity villages or cooperative farms with collection centers and small processing units to organize home garden cultivation (e.g. lime, mandarin, avocado);
- Developing a suitable incentive scheme for cultivation of the above mentioned crops;
- Developing storage and small scale processing units in producing areas.
- Organizing more efficient marketing networks and forward contract systems for passion fruit, etc.;
- Signing bilateral agreements for introduction new fruit varieties from other tropical countries; and
- Assigning an Assistant Director of Agriculture for development of the fruit crop sector with staff and resources to serve each Province/District.

The recommendations above understandably focus on problems along the entire value chain, not just at the production stage. While there is no outright discussion of ways to enlist the help of the private sector to overcome constraints, there is a clear statement of the need for larger, commercial cultivation and for better organized, more modern technology at various stages of the value chain.

These statements suggest or imply that the situation and policy climate in Sri Lanka are ready for new policies that would be more supportive of private sector investment in larger, commercial scale horticulture ventures – provided these not only spur exports but also benefit neighboring groups of smaller producers as well.

2009 Study by Norman Borlaug Institute

In September-October of 2009 a team from the Norman Borlaug Institute for International Agriculture visited Sri Lanka under the auspices of the CORE project funded by USAID and prepared a draft report titled "A Preliminary Assessment of the Agricultural and Veterinary Service Provision Systems" covering selected Provinces in Sri Lanka. The report noted that yields in Sri Lanka for a number of vegetables and pulses were less than yields found in India, Indonesia, Malaysia and Thailand. Sri Lanka's best district yield for Bombay onions in 2008 was 17.6 kg per HA in Matale, 42% below "potential productivity" according to the Institute's specialists. They noted some of the same constraints on productivity covered in the DOA's Five Year plan, and proposed the following solutions:

- Distribute and plant higher quality genetic material;
- Improve and conserve soil and water;
- Improve cultivation practices;
- Provide better farmer education and extension; and
- Integrate business and extension activities.[15]

3.3 Recent Successes with Export Market

Despite all the constraints mentioned in the previous section exports of horticulture products from Sri Lanka grew 167% from 2006 to 2007. There are two fundamental explanations for that success. The first is the emergence of new markets and new demand. Demand for fresh fruits and vegetables have risen in step with the dramatic growth of hotels, construction and tourism in the Persian Gulf and the Maldives. These countries cannot grow fresh fruits and vegetables as easily as countries with more rainfall and better soil. Second Sri Lanka, which can grow fruits and vegetables, is located close to both markets and has very good shipping connections.

Those fundamental conditions explain only the emergence of the opportunity for exports but not the actual exports themselves. For that part of the success one has to study the leadership role played by major private sector companies, such as Dole Asia, CIC Agribusiness, Hayley's PLC, John Keells Holdings, Aitken Spence, IFCO and other companies. These companies were prepared technically, financially, and commercially to undertake the risks inherent in commercial scale horticulture for export ventures. They had the resources and experience needed to deal with and overcome constraints that would have discouraged and overwhelmed smaller farmers. However they also had the insight and capacity to work with farmers, organizing them to band together to raise the quality and quantity of their produce to a level that made it possible to export. In many ways these companies managed to follow the recommendations made in DOA's Five Year Plan, that recognized the importance practicing horticulture on a commercial scale.

[15] *A Preliminary Assessment of Agricultural and Veterinary Service Provision Systems in Sri Lanka*. Draft Report, Table 7, Norman Borlaug Institute for International Agriculture, The Texas A&M University System, College Station, Texas, October 2009.

Overcoming obstacles was not easy or quick. It took CIC and Dole Asia several years to locate and obtain leases on a parcel of land large enough to meet their minimum size demands. All of the firms above can cite lost opportunities despite their success. If they had been able to grow or access more quality fruits and vegetables in Sri Lanka, the growth in horticulture exports would have been even larger.

Another aspect of their success story is that the benefits from their export ventures are reaching more farmers and workers than those directly employed by the firms themselves. In each case these firms have also pioneered "contract-farming" and collection arrangements with other farmers capable of meeting their quality standards. The firms have also helped strengthen the supply chain of agricultural input supplies reaching rural areas and creating more opportunities for transport from rural areas to Colombo port. In short they have made it easier for other farmer/exporters to follow in their footsteps.

Lessons for Development

There are several lessons for development professionals that emerge from an examination of the case of successful exporting firms. But the most interesting one is the opportunity for the government to play a catalytic role and leverage one resource it has good command over to accomplish multiple development goals.

The government is faced with small farmers who need:

- Better quality planting materials;
- Other quality inputs for cultivation – irrigation, fertilizer, pesticides;
- The right equipment and tools;
- Training to use inputs properly, best farming practices for new crops;
- Training in post-harvest handling;
- Buyers for their harvest produce;
- Credit for inputs during the cultivation period;
- Better collection and consolidation services;
- Efficient transport and storage; and
- Processing facilities.

Other parts of the government dealing with exports and exporters hear that they need the government's help to:

- Access quality produce in greater quantities;
- Fruits and vegetables that are attractive and not tainted with pesticides or chemicals or other contaminants;
- Produce that has been properly handled, sorted, graded and packed;
- Efficient collection and consolidation services ;
- Fast efficient refrigerated transport services that are not prohibitively expensive;
- Ample cool storage facilities;
- Fast efficient processing for exports; and
- Frequent, regular competitive transport services to overseas markets.

The government faces its own limitations and constraints in trying to solve the problems facing both the farmers and the exporters, even though some problems are common to both. Fundamentally, it is difficult and expensive to grow a product that meets export brand standards in small quantities

scattered over a large area. It is also difficult to then collect, consolidate, sort and grade that produce. It is difficult to deal with many different farmers and locations than to manage a large enterprise at a single location.

The resources the government can deploy to address farmers' needs and the constraints are limited and probably not sufficient to the task, but government, in this case, has an opportunity to attract and enlist substantial resources from the private sector. To do that the government has to adopt land policies that will attract private sector investment on terms set by the government that encourage and require them to use their own resources to develop select parcels into commercial horticulture enterprises that also serve as "development hubs" for the farmers in the surrounding areas. One way the government can help smaller farmers take a major step toward entering the export market is to encourage private enterprises to set up operations in Sri Lanka that have good access to the export market and resources to overcome the constraints blocking sector development.

4. Horticulture Sector Development – Way Forward

4.1 Overview

This section looks at ways for the sector to move forward, first in terms of improving fundamentals at the farm and village level, then focusing on promising markets, crops, and finally discussing the need for new policies and improved implementation. To develop the horticulture market from this point forward, the government, development professionals and the private sector can start with strategic recommendations and policy suggestions made in the Department of Agriculture's Five Year Plan 2006-2010.

There are a number of possible opportunities for horticulture development; some aimed at connecting rural producers to the domestic market, but more aimed at the export market. Interestingly, in many cases there are experienced private sector firms also interested in sourcing more quality horticulture produce from rural areas as well as improving the reach and efficiency of their own supply chains. Before elaborating on the possible interventions, the following comments are useful as a prologue.

Farming decisions are more complex and risky than generally appreciated. The crop and technological recommendations in this report, therefore, should be considered as general indicators and first steps in the process of acquiring more detailed information about the particulars and specifics of any one crop and location, especially before making a sizable investment in a new crop decision.

Horticulture development professionals should keep in mind that 49% of Sri Lanka's paddy land is located in the North Central (25%) Eastern (18%) and Uva (7%) Provinces and that in general the land is above average in productivity. Development plans that would seek to alter the amount of land or the labor a farmer could devote to paddy would be highly controversial and, at the very least, need to be studied in terms of the opportunity cost (of lost paddy production) to Sri Lanka, something that was outside the scope of this report.

Many earlier assessments and development plans for this sector did not take into account the impact that a fully revitalized agriculture sector in northern Sri Lanka would have on Sri Lankan markets some day. That day, it is hoped, is not far off, but its advent has implications for activities in target areas. The main implication is more competition in two senses: (1) market competition in the case of crops like onions and chilies and (2) competition for government resources and attention.

With that introduction the sections below provide an overview of fundamentals for boosting farm productivity, continuing with a brief discussion of promising crops and technologies and other opportunities for assistance and ending with a discussion on policy areas.

4.2 Fundamentals

Given the number of persons working in agriculture, it is important to focus on fundamental steps that can boost farm productivity both pre- and post-harvest. Farmers in rural areas face a number of technical constraints on productivity. Listed below are inputs or training aimed at overcoming the main technical constraints. Each recommended activity or input could succeed in producing some benefits even in isolation from other assistance, but they are much more likely to generate sustainable benefits if they are part of a package of assistance with a contract buyer or partner. The priority strategies for every marketable cash crop should be to:

1. Improve yields and productivity
    - Sufficient supplies of high quality planting material.
    - On-farm demonstrations of the latest advanced crop technology to improve productivity, especially solar micro irrigation.
2. Reduce Post-Harvest Losses
    - On-farm demonstrations of small farm harvest and post-harvest equipment.
    - Basic on-farm storage bins for crops.
    - Village collection centers with additional storage.
3. Elementary Processing
    - On-farm demonstrations of village level facilities for basic grading, sorting, and packaging.
    - Value added processing at the village level, especially drying equipment for limes and chilies.

Improving Yields

Sri Lanka's yields for most horticulture crops are below average for South Asia, and the Department of Agriculture's Five Year Work Plan 2006-2010 targets a doubling of yields for 18 of the major vegetables grown in Sri Lanka by 2010. Targeted increases in yields for the major fruit crops were small (banana 8%, papaya 5%, and pineapple 6%). The plan sets targets for only minor increases in the area cultivated for big onion, red onion and chilies, but aimed for increasing the average annual national supply by improving the yield for red onion by 17%, for big onion by 8%, and for green chili by 21% by 2010. The higher yields will be achieved by planting better, higher yielding varieties and by following better horticulture practices (irrigation and fertilization) taught to farmers by the government or other extension support.

Because higher yielding varieties for onions and other crops are not yet used everywhere in Sri Lanka, there is considerable scope for improving yields where they can be made available and farmers convinced and trained how to raise them. Vendors claim hybrid seeds can yield triple the yield of non-hybrids. Private sector companies like CIC Agribusiness are engaged in this effort alongside the government. Yields have improved in recent years and the national average yield for Big or Bombay onion in 2008 was 15.2 kg per Ha. This is already ahead of the DOA's Five-Year-Plan target of 12.5 kg per Ha for 2010, but average yields in Matale in 2009 were 17.6 kg per Ha for which the rest of the country should aim. Similarly, the average national yield for red onion in 2008 was 9.7 MT per Ha, already better than the DOA's 2010 target of 9.5 MT per Ha. In the case of chilies, however the actual yield is running 10% below the target for 2010, but that still represents a 10% improvement from yields in 2005.

Reducing Post Harvest Losses

Analysts have estimated post-harvest losses for fruits and vegetables in Sri Lanka at between 30% and 40%. Recommendations from the Institute of Post Harvest Technology are being implemented to try to reduce transport losses. The Institute is providing plastic packaging at concessionary rates to farmers in the Western Province. The packaging should help maintain freshness and market value.[16]

[16] Daily News, July 28, 2009, remarks made by Trade, Marketing Development, Cooperatives and Consumer Services Minister, Bandula Gunawardene at a media briefing on the planned opening of the Dedicated Economic Center (DEC) for vegetables and fruits at Narahenpita.

Cost-effective solutions to reducing waste nearly always benefit some part of the value chain, but the evidence of losses at this scale, more than 30%, also suggests that the supply chain may be overloaded with produce at certain periods compared to effective market demand. In other words, losses this size are evidence that Sri Lanka's domestic markets may be near saturation during certain periods of the year and that the real solution to reducing losses will be to access new markets outside Sri Lanka. Accessing such markets may require processing the fresh produce into juice or some other form easier to transport and preserve than fresh produce.

Better storage at the farm and village level will help reduce losses and will help farmers realize some benefit from not having to sell their entire crop at the peak harvest time when prices are at their lowest. However, Sri Lanka has year round problems with pests and molds that are typical of a tropical country and that can ruin crops not stored and protected properly. Farmers know this and will consider it risky to store much of the crop for long.

Financing Instrument to Go with Storage

The technical solution of providing better storage facilities will be more effective if combined with financial instruments that allow farmers to borrow against or "forward sell" reliably stored crops. Reportedly the price of onions over a year in Sri Lanka varies from LKR 25 per kg to LKR 125 per kg just prior to the new harvest. Having the needed storage hardware plus the financing to "wait" until prices improve will enable a farmer to capture this form of post-harvest value addition.

Elementary Processing

A variety of simple value-added processing steps can be carried out at the village level. At the most basic this involves training in the basics of sorting and grading to capture the added value of best quality fruit. The next step can be drying of limes and chilies using simple equipment. All these should help improve farm level incomes, and will certainly do that if farmers practicing this technique can be linked up with high-end buyers and exporters.

4.3 Promising Crops and Opportunities

4.3.1 Crops Featured in the Five Year Plan

Vegetables

The vegetable crops featured in the Department of Agriculture's Five Year Plan for 2006-2010 included:

Up-country vegetables:
Bean, beetroot, tomato, carrot, capsicum, leeks, radish, knoll-khol, cauliflower and cabbage

Low Country vegetables:
Brinjal, okra, bitter gourd, snake gourd, luffa, red pumpkin, leafy vegetables, mushroom, sweet potato and cucumber

Onions and Chilies:
Big or Bombay onion, red onion, green chilies

Fruits
The fruit crops covered in the DOA Plan were arranged according to four priority groups:

Group 1:
Pineapple, papaya, banana, mango

Group 2:
Passion fruit, lime, orange, guava, avocado, rambutan, pomegranate

Group 3:
Durian, mangosteen, grapes, mandarin

Group 4:
Strawberry, pears, wood apple, beli, anona, jak, pomelo and other

The government's ranking of fruit crops took into account local consumer preferences and demand, export and agro-processing potential as well as short-term production potential, income generation potential and agro-ecological suitability. The targets for fruits included 1,000 more hectares for cultivation of papaw and 6,000 more hectares each for cultivation of mango and banana. The plan also called for improving yields for avocado, guava, passion fruit and rambutan between 22% and 25% by 2010.

4.3.2 Export Demand

One simple and quick indication of which crops are enjoying strong export demand is possibly by consulting the websites of leading importers in markets such as the Persian Gulf. Fresh Fruits Company (FFC) based in Dubai is one such importer. FFC is a wholesale supplier to a number of buyers in the Persian Gulf area. FFC's website, .freshfruitscompany.com features the following fruits:

Bananas, apples, citrus, pears, kiwi, grapes and mangoes
along with vegetables, ginger, garlic and stone fruit.

The site tells buyers that FFC can source the highest quality of these fruits from internationally recognized brand names and labeled suppliers 12 months out of the year and features the brand logos of six of the leading international suppliers. Exhibit 1 below is an excerpt from the company's webpage on bananas.

Exhibit 1: Excerpt from Webpage for Fresh Fruit Company in Dubai

Bananas are one of the most widely consumed fruits in the world.

Commonly known as the 'poor man's fruit', Islamic conquerors brought the banana to Palestine. Arab merchants eventually spread this fruit over much of the Middle East and Africa.

The Cavendish variety accounts for 90% of the sales in this category worldwide, and most banana imports into the U.A.E originate from the Philippines.

Market

Bananas are serious business, forming the backbone of any fruit distribution operation in the world. On a daily basis our dedicated banana ripening rooms are ready to meet the demand of our consumers, ensuring bananas are ripe, ready and in pristine condition for local consumption. The main brands imported into Dubai through FFC are: Chiquita™, Estrella™ , Frutia™ and Island Sun™.

(www.freshfruitscompany.com)

4.3.3 Priority Crops – for NCEUP

In interviews the consultants conducted for this assessment between April and July 2009 the consultants asked key buyers, processors, wholesalers and exporters for their professional opinions about which horticulture crops had the highest potential for sourcing and development in the North Central, Eastern and Uva Provinces. The seven crops most frequently mentioned were:

Red Onion
Bombay Onion
Chili (dried)
Pineapple
Papaya
Banana
Lime

Also mentioned were two new crops not currently cultivated by many farmers but with strong market potential and generally suitable to conditions in the three Provinces.

Pomegranate
Early season watermelon

Each crop has its own unique agro-climatic needs, value chain issues and opportunities. All are at varying stages of development in one or other of the Provinces. In some, vertical linkages are strong, while in others they need strengthening. In general, horticulture farming in the North Central and Uva Provinces show higher yields and enjoys better developed supply chains than in the Eastern Province. Farm holdings in the Uva Province tend to be larger, so farmers have more land available for horticulture than paddy farmers in the Eastern and North Central Provinces, who practice home

garden horticulture on their smaller plots and grow onions outside the paddy seasons. The reader can find additional information on the potential for crops listed above in Appendix C.

Onions and Chilies

Considerable effort has been invested since the start of the last Five Year Plan to raise the yield of Sri Lankan grown onions and chilies to replace imports. These efforts have had only limited success. Big onion imports into Sri Lanka grew by 4% in volume from 2007 to 2008 and declined 21% in value with the drop in world prices in 2008. This fixation on replacing imported onions needs to be re-examined as a strategy for Sri Lanka, especially now that the Northern Province will be reviving its agriculture sector. Introducing the higher yield varieties into Sri Lanka is certainly a worthwhile strategy that is likely to help most farmers who adopt the new varieties. Initiatives to promote onion and chili cultivation in the Eastern Province probably have a higher probability of success and better impact than similar initiatives in the North Central Province. This is because the Eastern districts are net importers of most fruits and vegetables, particularly onions and chilies, most months in the year. Local demand exceeds the local supplies, and onions, chilies and other produce have to be transported from Colombo (imports) or other Provinces to the east coast at some cost. In the world of fresh produce, location closer to the consumer is a major advantage, especially when transport costs are high. This means local farmers in the eastern districts can compete in their local markets as long as they are approximately as productive as farmers elsewhere in the country. Unfortunately for eastern farmers, they are far less productive in many crops, including onion. Yields can be improved however, by using better inputs, including quality seed and better farming practices, even if other constraints prevent yields from climbing to above average. Even minor improvements in onion yields will result in more income for eastern farmers adopting better practices. And because Sri Lanka's annual imports of onions are three times greater than its annual production, the gradual revival of agriculture in the north is unlikely to have an immediate adverse impact on farmers in the three Provinces. Eventually, however, increased production from the north will add to the national supply and to the competition that farmers anywhere in Sri Lanka face when they ship product for sale to markets in the more urbanized areas.

New Crops - Melons and Pomegranate

Early season melons can be harvested in the first year and are not considered a risky investment in areas with adequate water. Pomegranate, on the other hand yields fruit only after two years. This is probably too long for most small farmers. Even medium-scale farmers may be unwilling to plant unfamiliar crops unless they can be persuaded that (a) they have a guaranteed purchase contract from a solid buyer, (b) they have access to good technical inputs and advice, and (c) at least part of their risk can be offset by some kind of incentive or insurance arrangement. Depending mainly on the underlying capacity and willingness to experiment with more exotic, higher-value horticulture crops, encourage such experimentation by supporting partnerships between farmers and private sector enterprises committed to buying and marketing the produce. The need for a "deep-pocket" partner increases with the time to yield of the horticulture product.

Organic Farming

For the immediate future, the economics of striving for "organic" labeled horticulture do not appear to be a promising a strategy for most of Sri Lanka's farmers, who should concentrate instead simply on producing more higher-quality attractive fresh produce using a minimum level of pesticides and chemicals. The export markets in Maldives and the Persian Gulf are paying a premium for quality and branded fruits, but "organic" is still a niche market, larger in the U.S. and EU than it is in Asia. Qualifying for a certified, internationally recognized "organic" is an expensive, demanding process

that takes several years and is beyond the financial and technical reach of most farmers.[17] However there are steps that Sri Lanka should take in terms or reducing pesticides and chemicals that will help both its exports and the island's overall "brand reputation" appealing to a healthy lifestyle. Also there will be a niche demand for crops that can lay a claim to being grown in an "environmentally-friendly" manner even if not entirely free of pesticides and chemical fertilizers, and not fully certified as "organic". Some of this demand will come from tourists visiting Sri Lanka for its Ayurvedic, Health Spa and Eco-lodge offerings.

4.3.3 Improving Extension, Training, and Outreach

Another area with potential is in promoting private sector involvement in extension work and training for farmers. The private sector is already active in this area and is already partnering with the government.

Increase Production and Distribution of Extension Materials

Many firms such as Hayley's and CIC Agribusiness already provide basic extension training as part of their service to agriculture supply clients. This assistance can be expanded to offer even more services to interested farmers in rural areas, particularly in partnership with the DOA's extension research and materials. For example, the DOA has produced a library of useful guides and tracts on agriculture topics from fertilization and pest control to crop budgets. Most materials are in print. Some materials are audio-visual on DVD and some are available on-line. See Appendix E. Some materials are available in Tamil and Sinhala, but more need to be translated and produced in farmer-friendly media and formats. More copies are needed along with a distribution program. The result will be easier access to valuable information for more farmers.

Village Level Sorting and Grading

Both private firms and the DOA can offer training for members of FSs, especially women, in value-addition methods of sorting, grading, handling and packing of highest quality fruits or vegetables. This type of training, combined with higher prices per kilogram for the produce will have an immediate impact on the incomes and self-esteem and will be sustainable if done with leading supermarket chains or other high-end buyers because they have a market for the value-added product. Without a link to such a buyer, there is a chance that the better produce might not sell in the local market at a price that justifies the extra work. Partnering with strong buyers and good trainers is the key.

Training in Basics of Farm Budget Management

Training is needed for village farmers, especially women, in the basics of family farm budgeting, managing budgets, savings and repayment plans, and in contracts and financial instruments such as insurance. This type of training helps farmers become better partners with firms looking to contract with astute, organized, reliable producers.

[17] Besides being good for food crops, Sri Lanka's tropical climate is also hospitable to weeds, pests, blights and other crop diseases. Growing a fruit or vegetable crop in commercial quantities without the help of pesticide or chemicals might not be technically possible.

Extension Using Broadcast Media and Internet

One of the most successful USAID development activities in Egypt was a short television program that used a popular soap opera format to teach elementary extension lessons, for example the importance of using rubber gloves when handling pesticides. Because of the variety of Sri Lanka agro-climatic conditions, crops and languages, extension is complicated and expensive. More efficient ways have to be found to reach more farmers with the information on a timely basis. Computers and the Internet have revolutionized the information and communication process, but they have not yet reached everyone and not yet replaced radio. Broadcast programs, especially radio programs that feature real farmers from the listening area, have proven to be a popular, cost effective, highly successful way to reach farmers with useful extension information.[18]

Cellular and Internet-Based Price Information

The majority of farming decisions do not depend on having real-time market and price information, but such technology is increasingly available and affordable and farmers in the vanguard will want to check price information before making decisions about harvesting, storing, and selling portions of a crop this week or next. Being able to access yesterday's or even this morning's prices for onions in Trincomalee as well as in Colombo could help FSs in Anuradhapura decide which direction to send their produce or whether or not the price being offered by a middleman is reasonable. Developing such a cellular and internet based price information service that farmers in the North Central, Uva and Eastern Provinces can use to check wholesale or retail prices in various markets (Dambulla and Colombo) will be a powerful tool. This channel of information will also be helpful as way to reach farmers with critical information about possible pests for crop diseases. Agriculture input suppliers will be interested in this new way to reach farmers and promote their products.

4.3.4 Markets

For most Sri Lankan farmers the domestic market is the only market, and even though yields are low, transport is difficult and retail prices appear high to consumers, there are reasons to believe that production in Sri Lanka comes close to saturating the local market especially at peak seasons. Wastage and loss rates above 30% are possible indications of oversupply. The point to bear in mind is that the local market has limits that depend on the population's purchasing power, which can be quite different from the demand as calculated by the recommended nutrition levels used to set production targets in the Five Year Plan. With steady improvements in yields, storage and the supply chain, it will still be important for Sri Lanka to act decisively to develop its export markets. Appendix D contains recent imports and exports of selected fruit crops grown in Sri Lanka.

Despite the recent downturn in demand in the Maldives and the Persian Gulf as a result of the global financial crisis and property price collapse in Dubai, these markets have more growth potential. Domestic market demand for more fresh fruits and vegetables will also increase within Sri Lanka as the urban population grows and as tourism volumes increase.

[18] Sposato, S. and Smith, William A., Radio: *A Post Nine-Eleven Strategy for Reaching the World's Poor*, University Press of America, 2005.

4.4 Policies

As noted in the DOA's Five Year Plan 2006-2010, there are a number of policy issues that have to be addressed by senior decision makers for the Horticulture sector to develop in the desired directions, including a few policies that constitute constraints on development in their current form.

4.4.1 Land Availability

The availability of land in large enough parcels to facilitate commercial scale horticulture is the most important issue for sector development and is the policy that constitutes a significant development opportunity for the government. Current policies and practices restrict land availability especially land in large parcels issued to private firms and especially firms not owned and controlled by Sri Lankans. Land is a very special resource, non-renewable, difficult to create, and in Sri Lanka's case very scarce. Land is enmeshed in a host of historical, cultural, and political issues that can easily complicate otherwise simple transactions. There are sound reasons for any country to pass laws against the sale or alienation of land by any government. Most countries have some laws that restrict ownership of certain land by foreigners and sometimes by their own nationals. But most governments also see the benefit of allowing private sector use of land that serves development purposes without alienating or reducing the value of the land. Lease agreements are one method of allowing temporary "use" but not "ownership" of land. Long period leases allow more time for a lessee to invest in developing the land and to realize a return on the investment before the lease and access to the land ends. The Sri Lankan government owns and commands a considerable inventory of "crown" lands, some of which are not contributing what they could to national development goals. The government also has models and experience with the form of lease agreements described. What remains is to use the leases and appropriate land to attract and encourage firms to invest in horticulture development that will serve the national purpose. Discussions with potential investors indicate that experienced commercial firms would seek parcels in the 500 to 1500 Ha range for initial horticulture development aimed at the Persian Gulf market.

Will leasing large parcels to large companies help smaller farmers? Or will it only help the large firms themselves? The answer to those very important questions depends mainly on the terms of the lease that the government as lessor requires of the firm as lessee. The government is in a position to require more than a simple payment for the land it leases. It can require that operators make certain investments, respect the environment, preserve soil fertility and work with smaller farmers in the surrounding area. The lease can be as sophisticated and structured as the government wishes, provided the land in question is attractive enough to a potential investor that the terms are seen as reasonable. One thing in favor of both the government and the small farmer is that it is in the enterprise's interest to reach out to close-by farms and try to increase production of their best selling produce.

The government can also combine a lease with a tender competition, instructing interested firms that they would be obliged if selected to comply with minimum lease terms and then asking firms to compete against each other to be selected as the lessor of the parcel. The government can select the firm offering the highest lease payment or choose a firm that offers the best combination of lease payments and development benefits such as guarantees to work with and buy from a larger network of surrounding farmers. Again, Sri Lankan government officials are skilled at drawing up leases that serve development purposes.

What the government and the lease program should avoid is too much development at once, because there are limits even on the size of the markets that are the initial targets for Sri Lanka's

horticulture exports. Too many projects trying to serve the same market will not be in the interest of investors, the government, or the nation.

What the government wants to achieve is the establishment of a viable commercial horticulture enterprise with solid export markets in an area where it will be able to impact the lives of a number of surrounding farmers both directly by providing them with better inputs and training and buying produce, and indirectly by improving the supply chains that reach their villages. These "hub" horticulture enterprises will, in effect, leverage the government's research, extension and other resources to elevate farmer skills and yields, by using private sector resources and all the time paying a lease income to the government.

4.4.2 Other Polices

In addition to new policies needed with respect to land, there are a number of other policies discussed below that relate to horticulture development, especially in the case that it does continue to grow significantly in the future.

Public-Private Partnerships:
There are numerous examples of successful cooperation between government and private sector firms in agriculture, including cultivation and distribution of high quality seeds and other input supplies The government should be looking for more opportunities to enlist the resources and interest of the private sector in horticulture development.

Importing Restrictions:
Firms involved in the business of importing higher quality hybrid seeds and other organic materials report major problems with delays, inspections, quarantines and permits. This is an area where government leaders need to clarify and simplify the process, eliminating unnecessary delays while ensuring that basic health and safety requirements are met.

Tax Refund Issues:
Although the laws and official policies provide for reimbursement to exporters of all duties paid inputs that subsequently are built into export products, many exporters complain that the process is too involved and too long for them to operate on a normal commercial basis. Some exporters mention that they have waited more than 12 months for "duty drawback" reimbursements. A similar complaint arises in the case of claims for reimbursement of Value Added Tax (VAT) paid on packing and shipping materials. Delayed payments act as a cash flow constraint on the development of any enterprise and can be especially lethal to enterprises working in the horticulture sector. The government has to work vigilantly to see that delays are minimized by streamlining requirements and improving performance of officials and systems responsible for tax and refund administration.

More Cold Storage at BIA:
Bulk horticulture exports travel in refrigerated containers aboard ships to the Maldives and the Persian Gulf, but some buyers are willing to pay the cost of air freight for fresh produce. Sri Lankan exporters of fruits and vegetables have joined with exporters of other high value perishables (tuna, ornamental fish, and fresh flowers) to petition the government for larger and better cold storage facilities at Bandaranaike International Airport (BIA). The private sector should encourage the government to issue a tender for this new facility inviting private sector firms to submit "Build, Own and Operate" (BOO) proposals.

Competition Policy:
The government is aware that many farmers complain about unfair practices by lorry owners and middlemen in the domestic fruit and vegetable transport business. Not all such complaints have a basis in fact, but the government has an obligation to investigate these claims and decide if there is a basis in fact and take action if there is evidence of anti-competitive behavior or illegal practices. The government also collects detailed information about wholesale and retail prices in various markets on a weekly basis. This information can be used by trained analysts and investigators to make a preliminary examination into the facts of alleged overcharging to decide if more investigation is warranted.

Tariff Policy:
The government has a range of objectives (revenue, equity, and protection) that its tariff policies are meant to promote. However tariffs meant to help one industry, like dairy, can end up working against the prospects for development of another industry. This may happen in the case of horticulture if the tariff on imported milk powder, meant to encourage dairy processors to collect local fresh milk, causes some dairies to shut down lines that had switched over to processing fresh fruit into packaged juices. The government's high, but seasonal tariff, on imported onions and chilies protects local farmers who invest in and grow those crops. That confers a short-term benefit but may be encouraging farmers to continue with onion cultivation when it would be better for them to grow a fresh vegetable that could be easily exported at even more profit than the onions bring – especially in the absence of the tariff.

Import Substitution:
Much of Sri Lanka's policies with respect to tariffs and agriculture are all aimed at import substitution, but Sri Lanka is also a capable exporter. So government officials encouraging crops such as onions should make the best use of the country's land and labor. Simply replacing imports is not always the best strategy, especially given Sri Lanka's competitive advantages in exporting to the nearby markets like the Maldives and the Persian Gulf. Sri Lanka even has the potential of selling early season fruits and vegetables into the Indian and Pakistani markets. Also tourists to Sri Lanka will become a growing source of demand for higher quality fruits and vegetables. If government programs are fixated solely on trying to replace cheap onions coming from India, they could miss even more rewarding opportunities. Sri Lanka's current tariff policy (as well as other agriculture policies) does not give any signals to farmers that they should be looking at export opportunities.

4.5 Implementation Issues

This section touches on a few implementation issues that can also contribute to boosting horticulture sector development.

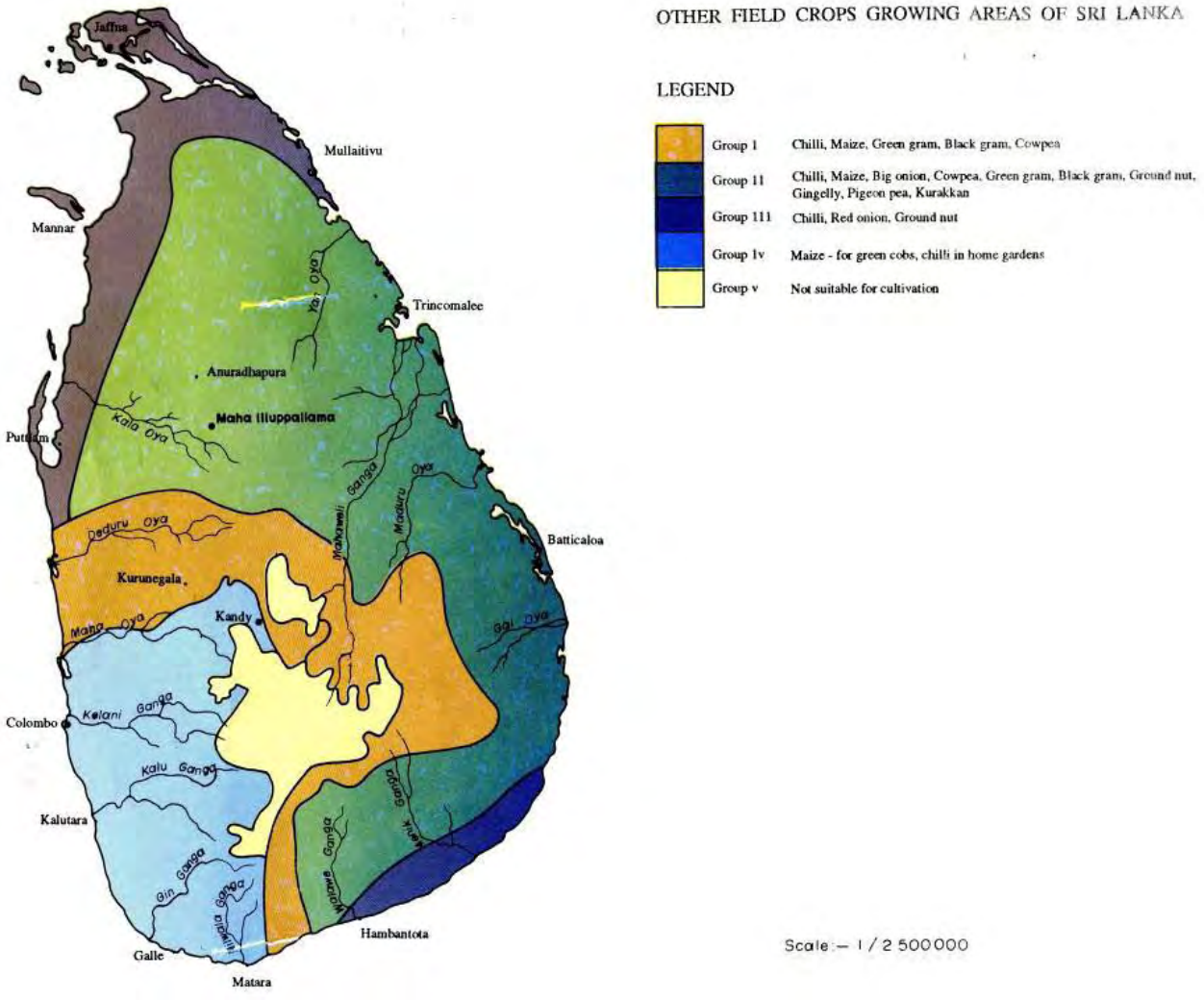
Making better use of government data

The DOA and the Department of Census collect and produce a remarkable amount of data about agriculture in the country. Much of this data is easily accessible to a person with a computer and access to the internet. Much is published in printed form. But a review of the data causes one to wonder how well it is being put to practical use. For example, do onion farmers in Ampara know that their average yield in 2008 was only 5.6 kg per Ha, while the average for farmers in Matale was 17.6 kg per Ha? Do local district development officers know those figures? If so, what are they doing about trying to improve the performance of farmers in Ampara? Government agencies responsible for development should first check the quality of data collection and reporting. Once

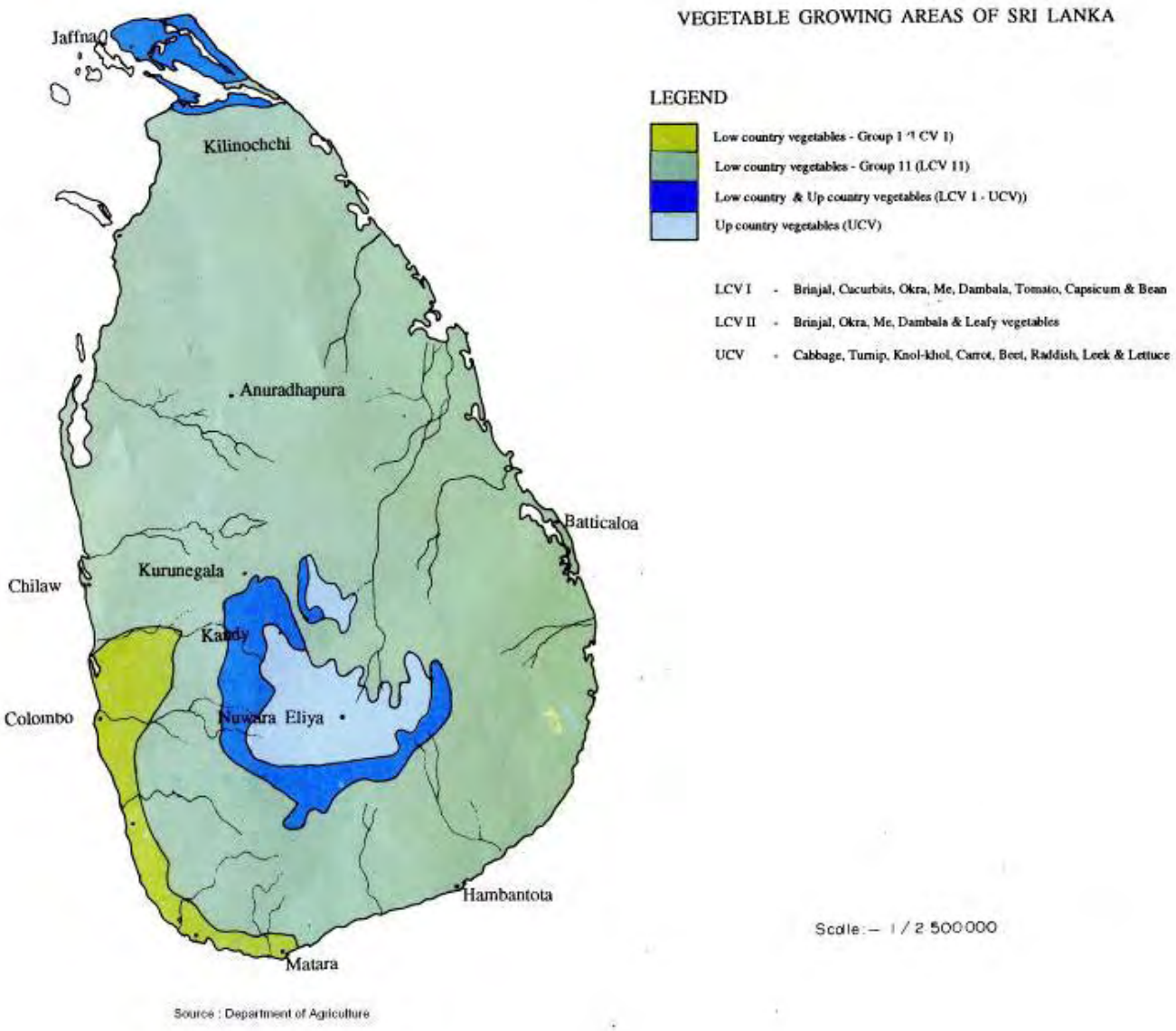
the variations in yields are confirmed, extension advisors should work on ways to transfer technology and best practices from those areas and farmers with higher yields to those with lower yields. Where that is not possible (e.g., a high yielding area has special advantages such as irrigation), extension agents should make farmers aware of the differences and possible disadvantages the low yield farmers will face in competing with higher yielding areas. There may be other crops where the disadvantage is less.

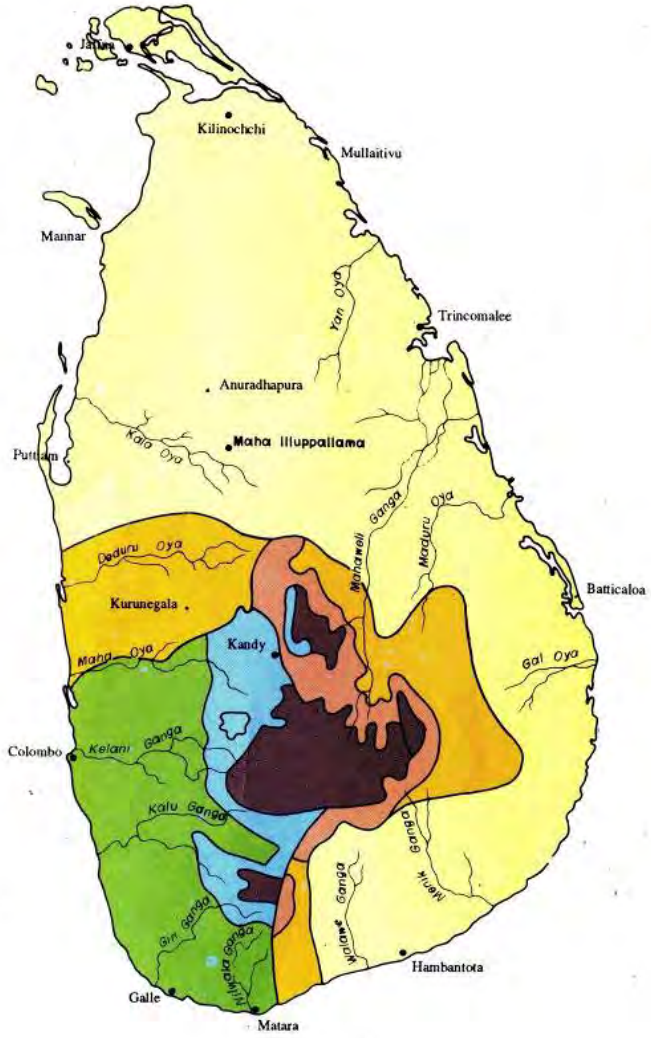
Appendices

Appendix A: Maps of Agriculture Growing Areas in Sri Lanka



Source : Department of Agriculture


VEGETABLE GROWING AREAS OF SRI LANKA
LEGEND
Low country vegetables - Group I (LCV I)
Low country vegetables - Group II (LCV II)
Low country & Up country vegetables (LCV I - UCV))
Up country vegetables (UCV)
LCV I - Brinjal, Cucurbits, Okra, Me, Dambala, Tomato, Capsicum & Bean
LCV II - Brinjal, Okra, Me, Dambala & Leafy vegetables
UCV - Cabbage, Turnip, Knol-khol, Carrot, Beet, Raddish, Leek & Lettuce
Jaffna
Kilinochchi
Anuradhapura
Batticaloa
Chilaw
Kurunegala
Kandy
Colombo
Nuwara Eliya
Hambantota
Matara
Scale :- 1 / 2 500 000
Source : Department of Agriculture



Source : Department of Agriculture

FRUIT GROWING AREAS OF SRI LANKA

LEGEND

Group 1	Banana, Passion fruit, Citrus, Pineapple, Mangosteen, Papaya, Mango, Rambutan
Group 11	Banana, Passion fruit, Citrus, Papaya, Mango, Rambutan, Durian, Avocado
Group 111	Straw berry, Pears, Apple
Group 1v	Banana, Passion fruit, Citrus, Pineapple, Papaya, Mango, Woodapple
Group v	Banana, Passion fruit, Citrus, Pineapple, Papaya
Group vi	Banana, Passion fruit, Citrus, Papaya, Mango, Woodapple, Pomegranate, Melon, Guava

Scale – 1 / 2 500 000

Appendix C: High Potential Horticulture Crops for Development in NCEUP

This appendix presents useful information on eight horticultural crops that the consultants consider promising candidate crops for horticulture development in the North Central, Eastern and Uva Provinces (NCEUP). Because crop selection is a complex, technical and risky investment decision that should be location and farm-system specific, the considerations provided here should be preliminary information into the actual research and selection process.

The eight crops covered in this section include six crops that are already grown successfully in Sri Lanka, even if they are not widely grown in the NCEUP. Two new fruit crops are also included, early season watermelon and pomegranate, which the DOA has recently added to its list of priority horticulture development crops.

Not discussed here are two horticulture crops that already are being successfully grown and exported from the Uva Province, namely banana and cucumber (gherkins). Expanded cultivation of these crops should also be considered as part of any horticulture development strategy, especially if more local farmers can be linked to the already established and successful export value chains.

Traditional crops:
Bombay and red onion
Dried chilies
Lime
Pineapple
Papaya

Suggested New Crops:
Watermelon (early season)
Pomegranate

Bombay (Big) and Red Onion

Strengths

- Bombay onion imports into Sri Lanka for 2007 and 2008 averaged 143,000 MT/yr and cost between LKR 3.5 and 4.4 billion. Red onion imports averaged 25,000 MT/yr. and cost LKR 0.9 billion in 2007 and LKR 1.6 billion in 2008.
- Sri Lanka's total commercial production of Bombay (Big) Onion in 2008 was 53,000 tons. Prices fluctuated from a low of 35 Rps/kg to 120 Rps/kg in the off season.
- Anuradhapura is a major producer of the big (Bombay) onion type; red onion is grown mainly in Puttalam and Jaffna.

Weaknesses

- On-farm storage units are scarce; growers tend to sell most of their produce just after seasonal harvest when prices are lowest.
- Yields in the Eastern Province are currently low, possibly from lack of available high yielding variety seed.

Opportunities

- In the Eastern Province commercial cultivation is minimal, but many areas, especially those with sandy soils, are technically suited to production of red onion. Small land plots are ideal for intensive onion production.
- In 2008, the total area planted to red onion in the Eastern Province was 550 hectares and Bombay onion only 16 hectares. These farmers may not be planting the newer high yield varieties yet. Improving access to high yield varieties could lead to early successes that would spread quickly in future seasons.
- CIC plans to expand its Bombay onion "buy back" operations to the Eastern Province with its recent acquisition of two government farms. CIC provides farmers with high yielding varieties of big onion and currently works with 1,500 farmers in the North

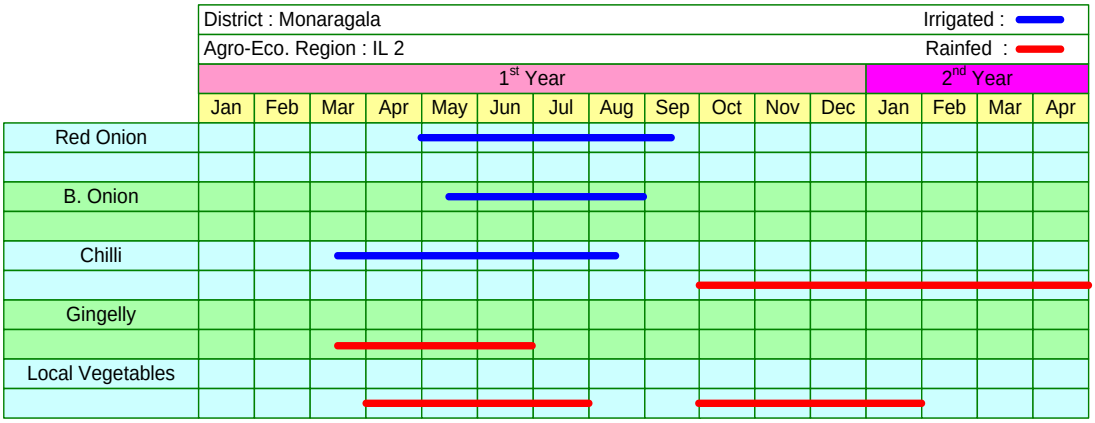
Central Region but plans to expand to 15,000 farmers within the next 5 years. Simple storage units constructed from local materials will add value to the farmer's produce.

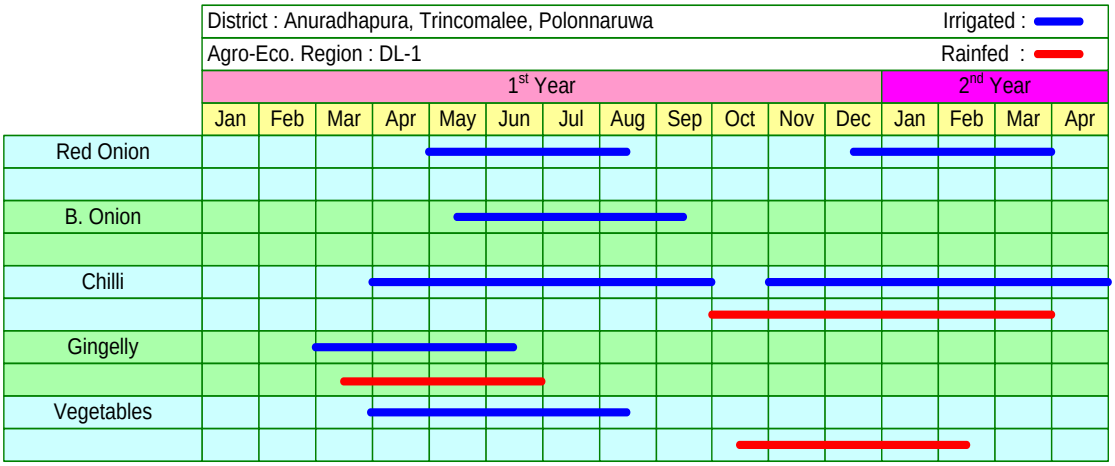
- Next planting season in SL is April-May

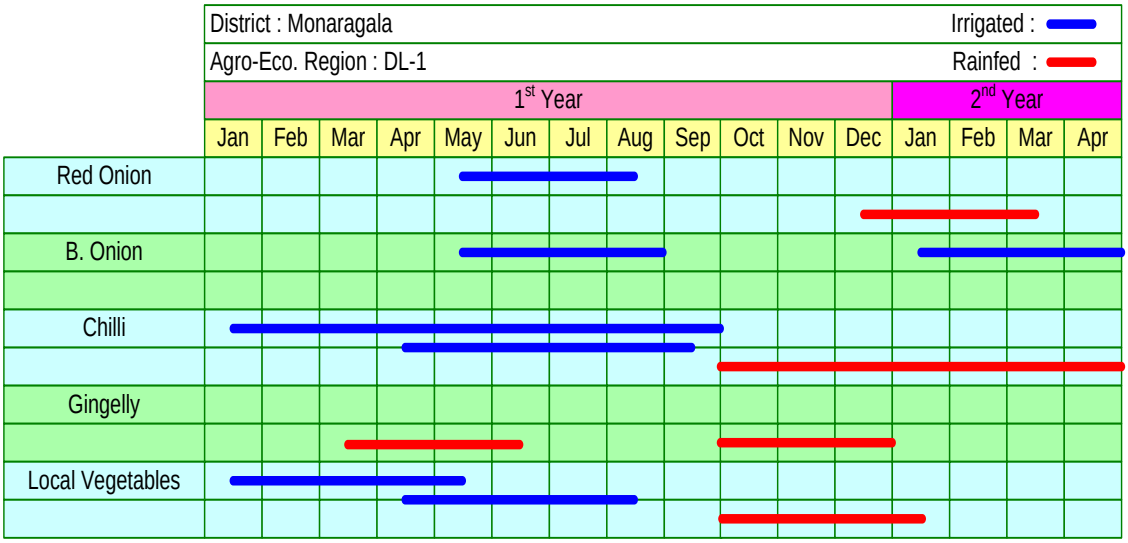
Threats

- Farmers in the Northern Provinces will soon be cultivating and adding their production to the national supply of red and Bombay onions. This will tend to lower market prices to levels below those that were typical during the years of the conflict with the LTTE.

Growing Season Calendars for Selected Districts for Red and Big Onion







Source: Crop Specialization for Sri Lanka – (Agro-Technical Information, DOA 1997-2000)

Big Onion – Targets for Extent in Hectares and Production in MT				
District	Maha 2008/09		Yala 2009(target)	
	Extent(he)	Product(t)	Extent(he)	Product(t)
Batticaloa	20	353	30	68
Ampara	no	no	no	no
Trincomalee	6	92	15	254
Anuradhapura	50	500	1200	12000
Monaragala	1	10	3	30

Red Onion – Targets for Extent in Hectares and Production in MT				
District	Maha 2008/09		Yala 2009(target)	
	Extent(he)	Product(t)	Extent(he)	Product(t)
Batticaloa	116	1688	74	1069
Ampara	40	400	20	200
Trincomalee		7725	198	2245
Anuradhapura	60	600	50	500
Monaragala	77	770	100	1000

Source: Onion Crop Production Program, Ministry of Agriculture and Agrarian Development 2008-2009

Dried Chilies

Issues:

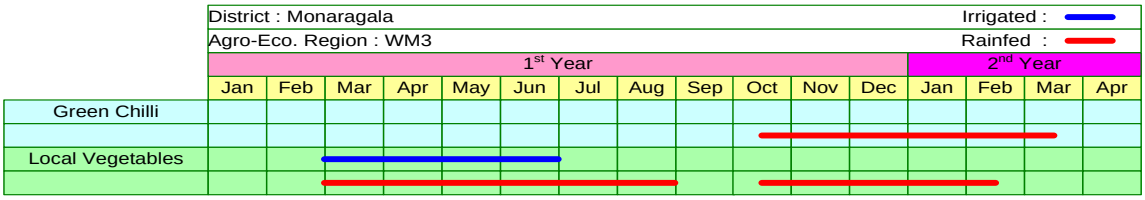
- Imports of dried chillies over a three year period averaged 30,000 MT per year.
- Production of green chillies in Sri Lanka was 51,000 MT in 2008.
- Dried chili with (MI 2) variety is not a major commercial activity compared to fresh green chili which is perceived as having a better return on investment.

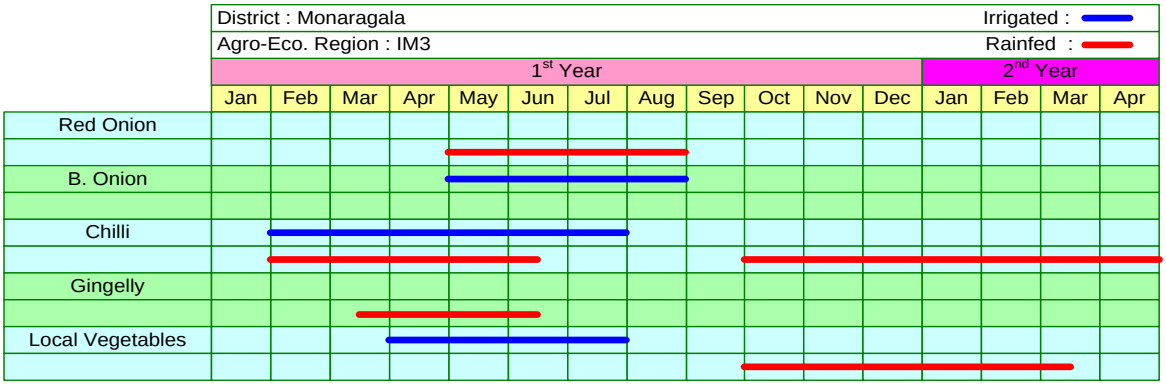
Opportunities:

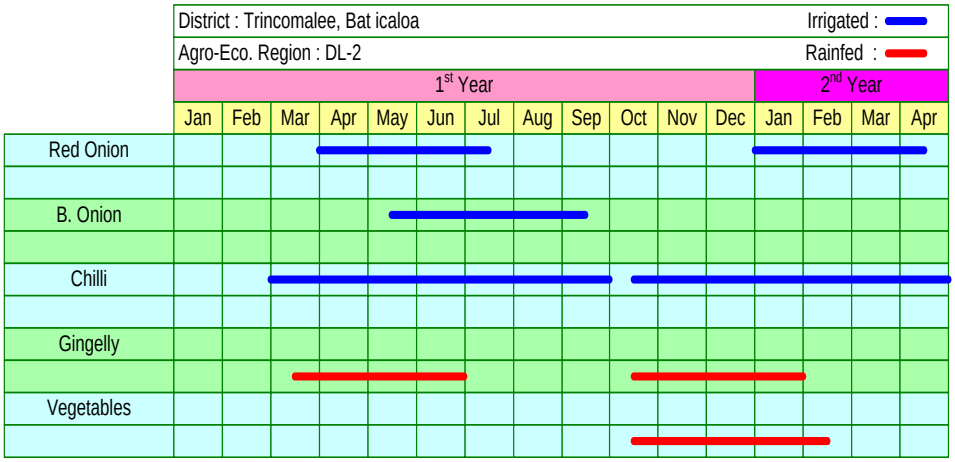
- The semi arid climate in the Eastern Province is conducive to small scale growing and solar drying at farm level.
- It fits within the traditional home garden structure. It can also be expanded beyond the garden into larger plots.
- Two tons per hectare is an average yield with the use of good agricultural practices (GAP)
- Four kilograms of green chilies are needed to produce one kilogram of dried product. The farm gate price over a three year period averaged 120 Rs. /kilogram.

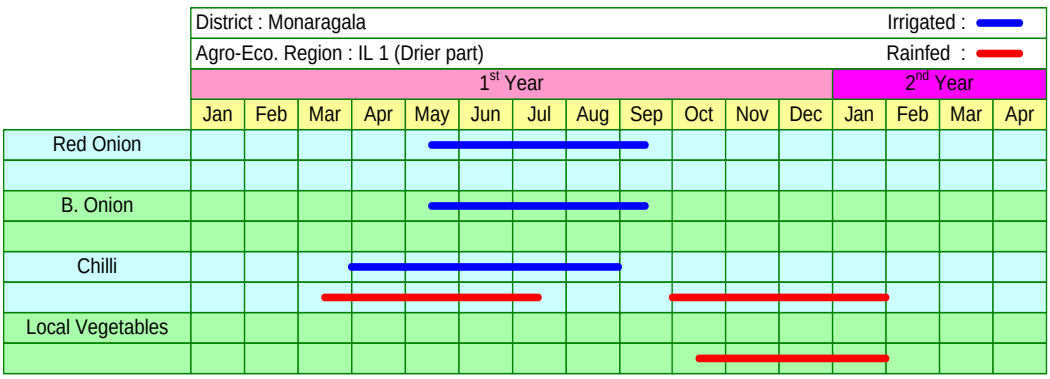
Chilli Crop Production Program, Ministry Of Agriculture, & Agrarian Development - 2008-2009

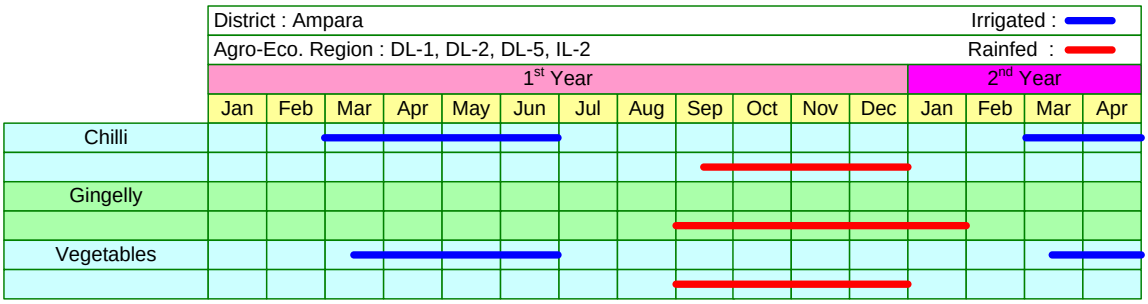
	Maha 2008/2009			Yala 2009(target)			Season	
District	Extent(he)	Production(t)		Extent(he)	Production(t)		Total(t)	
		Green	Dry		Green	Dry	Green	Dry
Batticaloa	262	725	294	168	562	106	1287	400
Ampara	750	1691	2059	200	685	315	2376	2374
Trincomalee	176	141	57	91	73	73	214	130
Anuradhapura	3200	2400	3140	650	495	470	2895	3610
Monaragala	921	41	51	291	17	12	58	63


District : Monaragala
Irrigated :
Agro-Eco. Region : WM3
Rainfed :
1st Year
2nd Year
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Green Chilli
Local Vegetables


District : Monaragala
Irrigated :
Agro-Eco. Region : IM3
Rainfed :
1st Year
2nd Year
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Red Onion
B. Onion
Chilli
Gingelly
Local Vegetables


District : Trincomalee, Bat icaloa
Irrigated :
Agro-Eco. Region : DL-2
Rainfed :
1st Year
2nd Year
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Red Onion
B. Onion
Chilli
Gingelly
Vegetables


District : Monaragala
Irrigated :
Agro-Eco. Region : IL 1 (Drier part)
Rainfed :
1st Year
2nd Year
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Red Onion
B. Onion
Chilli
Local Vegetables



Source: Crop Specialization for Sri Lanka – (Agro-Technical Information, DOA 1997-2000)

Lime

Issues:

- Fresh fruit is the main business model for most small growers.
- Many growers are not familiar with the value added opportunities for dried lime as their surplus fruits are not processed commercially.

Opportunities:

- The export supply chain for dried and processed lime is growing. Approximately 40 metric tons were exported in 2008 down from 855 exported MT exported in 2007. The export price FOB Colombo was 140 Rs. /kg.
- Lime trees are low input and easy to manage at home garden level or small lot/orchard.
- Growers can convert current unsold limes (waste product) into an economic resource. No additional cost to grower.
- Drying lime is a tradition with some growers who use locally woven mats and solar energy to process the fruit. Copra driers are also used. Approximately 230 fruits are needed to produce 1 kilogram of dried lime.
- Early season fruit typically enjoy a price premium. Growers can use advanced production technology to harvest earlier to earn this premium.

Pineapple

Issue

- Most commercial cultivations are located in the western Provinces close to the Colombo market.
- In the Eastern Province, supply from local sources does not meet the local area demand. Retail wet market price in Ampara (May 2009) was 100 Rs. per fruit compared to 50 Rs. per fruit in Colombo
- Locally grown pineapple has room to improve in terms of yield and quality.
- Post-harvest practices contribute to quality and quantity loss
- Access to planting materials is insufficient for rapid expansion.

Opportunities

- It is climatically adapted to the southern part of Eastern Province with irrigation.
- It yields in the second year after planting over a four year period.
- "Suckers" are removed from the mother plant and planted for additional "ratoon" crops.
- It is a low input crop with minimal labor requirements at home garden level.
- It can be incorporated into the traditional home garden structure or expanded outside of the garden.
- It can be inter-cropped with Papaya, to raise the return/unit of land
- Sales are often completed at farm gate, reducing transaction costs to growers.
- There are increasing opportunities for value addition such as producing sun dried fruit from second quality or surplus pineapples

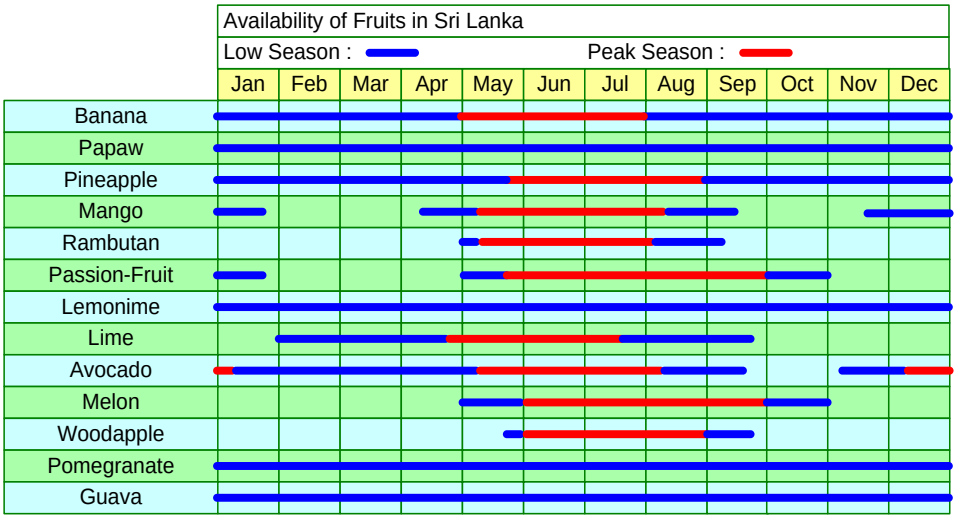
Papaya

Issues:

- Papaya is grown commercially throughout the North Central and Western Provinces. It is well adapted to home gardens for home consumption.
- In the Eastern Province supply from local sources does not meet the demand.
- Production and post harvest techniques are not optimal
- Access to planting materials, especially “Red Lady” variety is insufficient.

Opportunities:

- It is climatically adapted to some parts of the Eastern Province.
- Can be harvested in the first year after planting and yields over a four year period
- It fits into the traditional mixed home garden structure
- It is a low input crop with minimal labor requirements at the home garden small plot level (other than seed cost)
- It can be inter-cropped with pineapple raising return/unit of land
- Value added opportunities for sun dried fruit from second quality or surplus papaya
- Export marketing companies are entering the Eastern Province to set up buy-back deals with growers of the “Red Lady” variety.



Source: Tropical Fruits of Sri Lanka – (DOA – 1997)

New Crops

Watermelon

Issues

- Genetic potential of locally bred varieties are not realized due to suboptimal production methods.
- Limited commercial experience in the Eastern Province. The region imports from other areas of the country.
- No buy back schemes are in place in the CORE target areas

Opportunities

- In the Eastern Province commercial cultivation is minimal but is suited to production, especially in sandy/sandy loam soils.
- Early season produce fetches a premium price in Colombo market
- Pre-plant buy contracts may be possible if early season production can be assured.
- Links to the regional tourist industry could be highly profitable due to its popularity amongst Europeans.

CORE Interventions

- Assist consolidation of production. Linking commercial farmers with integrated consolidators
- Technical package for productivity improvement and post harvest management.
- On-farm production and post harvest demonstrations using GAP Guidelines.
- Access to market information to secure optimal price.

Cost share grants

- Contributions should be worked out jointly with key actors in the value chain.
- Input dealers and equipment companies should be encouraged to jointly fund on farm demonstrations (Priority to registered farmer's organizations and associations)
- Planting material
- Solar micro irrigation

Pomegranate

Issues:

- Pomegranate is a traditional crop and is well adapted to home gardens for home consumption.
- In the Eastern Province supply from local producers does not meet local area demand. Shortfall is imported from other districts.
- Production techniques are not optimal
- Access to improved varieties of planting materials is not widely available

Opportunities:

- The Government has added pomegranate to the list of priority crops
- It is climatically adapted to most parts of the Eastern Province.
- It fits into the traditional mixed home garden structure
- It is a low input crop with minimal labor requirements at the home garden small plot level
- It is harvested in the third year after planting and yields over several years
- Links to the regional tourist industry could be highly profitable due to the juice's ayurvedic and health properties and popularity with Europeans.

CORE Interventions

- Technical package for productivity improvement
- On-farm production and post harvest demonstrations
- Links to tourism industry

Cost share grants

- (Contributions should be worked out jointly with key actors in the value chain)
- Planting material
- Solar micro irrigation

Appendix D: Sri Lanka's Import and Export Data of Selected Fruit Crops

Year	Item	Export Data		Import Data	
		MT	Rs.000	MT	Rs.000
2006	Banana	57.6	11,227.2	.005	2.4
	Lime	753.8	62,193.6	5.2	1,589.5
	Mango	40.2	16,775.6	3.6	1,500.5
	Papaw	113.4	23,711.4	4.6	394.5
	Orange	10.1	985.1	4,952.4	188,426.4
2007	Banana	854.9	51,568	22.3	1,646.1
	Lime	833.5	81,703	5.9	2,297.1
	Mango	90.2	60,980	7.1	852.9
	Papaw	196.6	35,369	-	-
	Orange	8.9	1301.7	3,346.9	158,736.5
2008	Banana	1,751.1	87,558	25.6	2,791.6
	Lime	1,628.6	140,054	6.2	2,461.4
	Mango	43.3	27,238	0.2	75.1
	Papaw	799.7	97,580	-	-
	Orange	13.1	2,535.2	3,579.2	169,627.1

Source: Sri Lanka Customs

Appendix E: Extension Advice Available CD-ROMs from Department of Agriculture

The Department of Agriculture has produced more than forty instructional CD-ROMs on 34 farming topics for use by Extension Agents and Farmers. Six of the CD-ROMs are available in Tamil and Sinhala. The page below is from the DOA website listing the CD-ROMs, which can be purchased for LKR 300 each.

Department of Agriculture
Government of Sri Lanka

Home Contact Site Map Suggestion

IMM CD ROMs

- About DOASL
- Profile
- Directorate
- Staff Search
- Institutes / Centers
- Vacancies
- Agriculture Technologies
- Agri Technology Search
- Printed Publications
- IMM CD ROMs
- TV Programmes / Video Films
- FAQ
- Agriculture Business
- Application Forms
- Market Information
- Annual Symposium of DOA (ASDA)
- Agriculture Technology Parks
- Projects
- Cyber extension /CWR /GAP
- Farmer Database
- **Provincial Agriculture**
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IMM CD ROMs

A stand alone computer application distributed with CD-ROMs, with a range of media elements such as graphics, photos, text, illustrations, animations, sounds and video, presented in a user interface where users have some control to select, what information is presented and when.

Each CDROM was developed with the assistance of a senior Research Officer of the subject, a Research Assistant and team of multimedia designers of the Audio Visual Centre of the DOA.

In addition to technical information on each crop, organized under several chapters a separate chapter was devoted for compiling database on research papers and articles published by local authors in local and foreign journals. Each CD has a separate link for video films pertaining to each crop, which were produced and telecast through *Mihikatha Dinuwo* (weekly television program of the Department of Agriculture) by the Audio Visual centre.

Interface and Navigational Design of CDROMs

CDROMs were produced for extension workers as well as farmers, where few of the potential users were expected to have had much previous exposure to such technologies. Considering the low computer literacy of extension workers as well as farmers, a familiar concept for the interface was used; an electronic book. Similar to reading an analogue book. Page turn is facilitated by two icons; 'Next' (to go next page) and 'Previous' (to go previous page). The contents were organized into chapters, topics and sub-topics. Most of the pages contain variety of multimedia presentations (video, sound, animations, graphics and text). All media are interactive and users may review and/or skip section, as they desire. Each page is printable and farmers will be able to get a print.

	Title	Medium	Price (Rs)
1.	Paddy Cultivation	Sinhala	300.00
2.	Paddy Cultivation	Tamil	300.00
3.	Brinjal Cultivation	Sinhala	300.00
4.	Brinjal Cultivation	Tamil	300.00
5.	Tomato Cultivation	Sinhala	300.00

http://www.agridept.gov.lk/other_pages.php?heading=IMM CD ROMs 10/28/2009

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