Research Report No. 2

A Value-Chain Analysis for the Sri Lankan Rambutan Subsector

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Championing underutilised plant species for food, nutrition and sustainable development

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List of Acronyms

ATDP	-	Agro-based industries and Technological Development Project
CARP	-	Council for Agricultural Research Policy
CIAT	-	Centro Internacional de Agricultura Tropical
CIC	-	Chemical Industries Colombo
CTA	-	Centre Technique de Cooperation Agricole et Rurale ACP et UE
DA	-	Department of Agriculture
DS	-	Divisional Secretariat
EDB	-	Export Development Board
FAO	-	Food and Agricultural Organization of the United Nations
GA	-	Gramadoya Niladari
GTZ	-	Deutsche Gesellschaft für Technische Zusammenarbeit
HORDI	-	Horticulture Research and Development Institute
ICUC	-	International Centre for Underutilised Crops
IPGRI	-	International Plant Genetic Resources Institute (now Bioversity International)
ITI	-	Industrial Technology Institute
KIT	-	Koninklijk Instituut voor de Tropen (Royal Tropical Institute)
LKR	-	Sri Lankan Rupee
MARDI	-	Malaysian Agricultural Research and Development Institute
MIS	-	Management Information Systems
PODI	-	People's Organization for the Development of Exports and Imports
R&D	-	Research and Development
SEEDS	-	Sarvodaya Economic Enterprises Development Services
UC	-	Underutilized Crops
UNEP	-	United Nations Environment Program
UNU	-	United Nations University
USAID	-	United States Agency for International Development
USD	-	United Stated Dollar
WCMC	-	World Conservation Monitoring Centre

Exchange Rate: 1 USD = 102.48 LKR

Management Summary

Ever since recognizing the potential that underutilized species may hold as drivers of agricultural diversification and rural growth, efforts have been undertaken to improve the capacity of farmers to market such crops. The assumption was that markets can play a key role in fulfilling that potential.

A series of value-chain analyses for the following species: rambutan (*Nephelium lappaceum*, this report), beli and wood-apple (*Aegle marmelos* and *Feronia limonia,* report forthcoming) were thus undertaken by the International Centre for Underutilised Crops (ICUC) in Sri Lanka. A research method for agro-enterprise development designed by the World Bank was used.

The study raised the following key issues for the Sri Lankan rambutan subsector:

Production capacity

- **Total production and land extent have been continuously increasing since the mid 1990s.** This trend is expected to continue due to the identification of off-seasonal production sites and the crop's high profit rate per hectare.
- **Product seasonality and short shelf life are seen as the biggest problems faced by the sector.** Increased R&D efforts focusing on the processing and freezing of rambutan as well as on developing off-seasonal production through management are therefore strongly encouraged.
- **The sector has a relatively balanced mix of professional estate growers and homegarden producers.**
- **Quality and coverage of the extension system is weak and inequitable.** This resulted in poor transfers of information and technology between the Agrarian Department and rural farmers; and low technology adoption rates by the small-scale sector. Training extension officers, encouraging farmer-led workshops, demonstrations as well as local initiatives could serve as a possible remedy.
- **Vertical integration of producers varies from weak to average.** No sub-contracting arrangements exist between input suppliers, farmers and/or buyers. Production is highly scattered and fragmented and decisions by chain actors are taken on an *ad hoc*, autonomous basis, resulting in a failure of coordination and poor production planning. Linking farmers to retailers and exporters via various sub-contracting arrangements could serve to alleviate this problem.
- **Access to capital for small-scale producers is difficult.** Technological upgrading and sector growth are thus impeded. Group lending and guided micro credit loan schemes could possibly be developed here.

Product

- **Even though great varietal diversity exists, the presence of a wide range of varieties and local sub-varieties is seen as a major concern.** Crop marketing is rendered difficult as consumers are not always aware of what they buy.
- **There is no processing of rambutan taking place on a commercial scale.**
- **Product dehydration is seen as a major problem**. This results in fruit shrinkage and browning, which are considered to be a major threat to fruit quality.
- **Poor cultivation techniques and post-harvest handling contribute to large losses and low product quality**. Inadequate tree/land management, plucking techniques, packaging, storage and transportation are seen as the main problems. The study showed that losses can be cut significantly and product quality raised by encouraging small-scale farmers to adopt better, yet simple, cultivation practices.

Markets and Product Distribution

- **Local and international demand for Sri Lankan rambutan is strong.**
- **Sri Lankan rambutan is internationally competitive in terms of price and quality.**
- **Colombo and Kandy represent the two major domestic end markets**. Informally set-up vendors next to roadsides, campuses and bus stations represent major sales outlets for the domestic market. Legalizing sales outlets

and creating direct marketing opportunities for farmers could thus strengthen the distribution process and help improve the bargaining position of producers.

- **The domestic market predominates.** Most rambutan is sold in the domestic market, only a fraction is exported (i.e. mainly to the Gulf countries).
- **Distribution happens mainly via intermediaries.** The dominance of the intermediaries is seen as a major issue.
- **Strategies for market/product development and supply chain management are lacking.** This is due to a high degree of fragmentation within the chain. Linking farmers to exporters via sub-contracting arrangements, identifying direct sales outlets for farmers to set up farm shops in big cities and granting temporary selling permits to some vendors are therefore recommended.

Pricing

- **Price fluctuations are mainly seasonal**. Peaks are reached at the onset of the season in July and steadily decrease until the end of the season in August/beginning September.
- **Quality, variety, size and color play a key role in determining fruit prices**.
- **High seasonality & short shelf life lead to precipitated selling by producers**. This results in a glut, thus lowering farm gate prices. Developing producer clusters and cooperatives could help strengthen the bargaining power of producers, encourage more price setting behavior on their behalf and help coordinate and smoothen supplies.
- **Direct price competition is low and price setting behavior by intermediaries can be observed.**

1. Introduction

A rural strategy paper developed by the World Bank points out that roughly 75% of the world's poor live in rural areas, with the incidence of poverty highest in South Asia, sub-Saharan Africa and South America (World Bank, 2003). Furthermore, it has been estimated that roughly half of the world's 852 million poor live in small holder farming households (United Nations Millennium Project, 2005). It is thus apparent that in order to meet the ambitious targets of the United Nations Millennium Project, a significant effort must be made to enhance the performance of the rural, small-scale agricultural sector.

However, the paradox is that global food production has grown at high enough rates to meet global demand, yet malnutrition remains pervasive. The problem therefore seems not to be a shortage in food supply, but inadequate food availability and household income (World Bank, 2003). That calls for multi-faceted, broadly-based interventions, something more than yet more agronomic improvements to production.

One theme that has been gathering an increasing amount of interest within the scientific community ever since the 1992 Convention on Biological Diversity and the FAO IV International Conference on Plant Genetic Resources for Food and Agriculture (1996) (Padulosi et al., 2002) has been that of agricultural biodiversity and its potential as a driver of economic growth, food security and natural resource conservation (WCMC, 1992; UNEP, 1995).

Currently, only a handful of crops are responsible for meeting most daily global food requirements. Only 30 crops account for 95% of the world's food energy (Williams and Haq, 2002), and only 150 crops are currently being commercialized on a significant global scale (Padulosi et al., 2002). Yet various ethnobotanical studies indicate that more than 7,000 plant species are still being cultivated or harvested from the wild (Williams and Haq, 2002) and thus still serve as an important source of food, shelter, medicine and many other purposes, as well as representing an immense stock in genetic diversity (WCMC, 1992; UNEP 1995).

Crops which are currently still being cultivated and managed by local communities, but which haven't been commercialized in an extensive manner are also known as *underutilized crops* (UC). They are still an important component of the livelihood strategies of small-scale rural households, but they have the potential to play a much greater role.

While a consensus has yet to be reached by the scientific community on this, the following definition for UC, taken from ICUC's Strategic Framework (Jaenicke and Höschle-Zeledon, 2006), shall be employed for the study at hand: "*those species with under-exploited potential for contributing to food security, health (nutritional/medicinal), income generation, and environmental services*".

The systematic identification of the constraints and obstacles - as well as the opportunities - faced by the rural poor in fully exploiting UC, is increasingly seen by the agricultural R&D community as an important component of any strategy for reaching the Millennium Goals (Guiliani and Padulosi, 2005).

Nonetheless, the lack of market access that many rural farmers face is considered to be a major constraint to combating poverty (Best et al., 2005). This, despite their being agreement about the importance of facilitating market access to small-scale producers (Padulosi et al., 2004) as well as developing chain competitiveness and efficiency in order to improve rural livelihoods (Lundy et al., 2004, Ostertag and Felipe, 1989).

It is for this reason that ICUC, under its new strategic framework, has made a concerted effort to prioritize research projects assessing the market performance of UC (Jaenicke and Höschle-Zeledon, 2006).

With the goal of increasing understanding on the topic of subsector operations and market developments for UC, separate case studies were performed for three underutilized fruit species in Sri Lanka. The aim of the study was to analyze the various chain functions within the commodity's subsectors and to identify points for leveraged intervention within the sector's value-chain.

A methodological approach borrowed from the World Bank's *Guide to Developing Agricultural markets and Agro-enterprises* (Giovannucci, 2002) was used in combination with consumer surveys.

This report on rambutan (*Nephelium lappaceum* L.) represents the first in a 2-part series of chain analyses in Sri Lanka for underutilized fruits. The other two fruits, wood-apple (*Feronia limonia* L.) and beli (*Aegle marmelos* Correa) will be treated in a subsequent document.

The rest of this report begins with a brief discussion about the concept of the value-chain, followed by a section about the methodology. The remaining sections present results, recommendations and a conclusion.

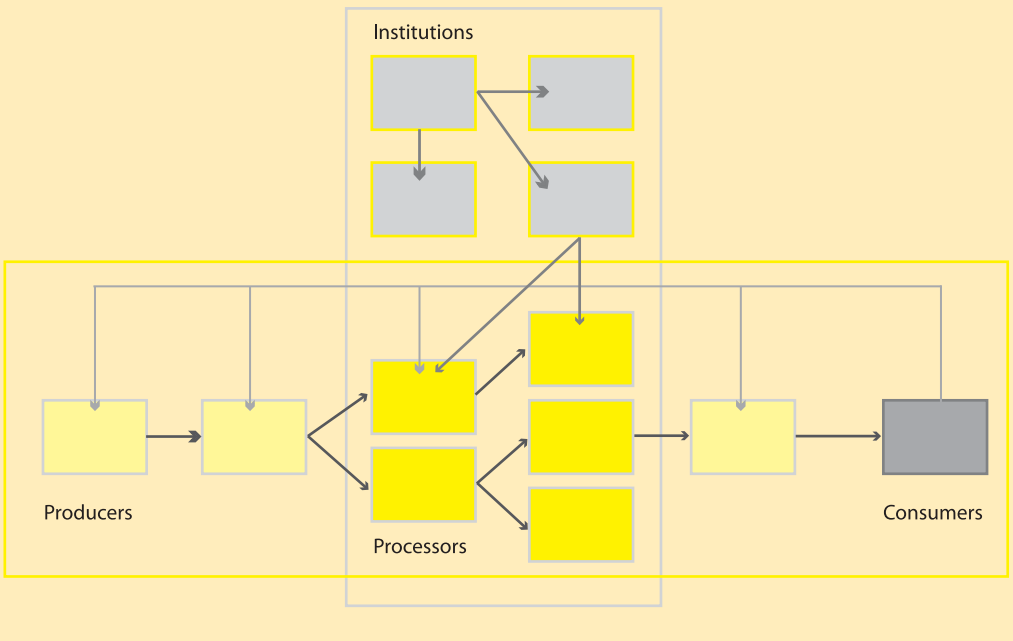
2. Why the value-chain? ... A conceptual framework for the value-chain and its relevance to rural agro-development

This section describes the chosen method of analysis: the value-chain. Since the study was performed with the alternate aim of enhancing understanding of rural (crop) marketing, a clear understanding of the value chain concept, prior to its application, is therefore necessary.

At the start of this report it was mentioned that a more multi-faceted approach would be required in order to ensure the sustainability and effectiveness of interventionist programs. An analysis of the extended chain provides us with a more holistic understanding of the socio-economic environment most participants operate in, and allows for the formulation of more integrated solutions.

According to Kaplinsky and Morris (2001), the value-chain: "*describes the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use*".

Figure 1: The extended value-chain framework (Stamm, 2004)



These authors make a distinction between what they call *the simple value-chain* and *the extended value-chain*. The latter is said to be superior to the former in terms of degree of complexity. They tend to be often considered as more accurate in reflecting real life subsector processes while the opposite is true for simple chain representations, where the number of links are usually limited and one-way. Structures tend to be often of a vertical nature.

Therefore, this study adopted the extended model in order to allow for a more critical understanding of the subsectors and for more integrated solutions. Figure 1, taken from Stamm (2004), illustrates an example of an extended chain.

As can be seen in Figure 1, the flow from product to end consumers is a complex process requiring more than just a simple, direct link between the "main chain actors" (e.g. producers, processors, transporters etc.). It includes a host of external parties and institutions which themselves contribute value to the end product.

By identifying the chain functions which create the least value, and either replacing or supporting the participants which are relatively uncompetitive, recommendations aimed at improving the competitiveness of the chain (measured in terms of cost effectiveness and/or product differentiation) can be designed. Such policy recommendations usually call for the adoption of the two following types of solutions: an outsourcing of chain activities, or increased investment (these may be of monetary or physical nature or may take the form of training, product branding, information sharing etc.).

Once a choice has been made as to the preferred chain model, a point of entry into the chain needs to be selected prior to the start of the analysis, in order to ensure an effective and targeted study. According to Kaplinsky and Morris (2001), due to the high degree of complexity of most chains and their overlap with other chains, the selection of the point of entry is critical to the study as it often determines the actual chain (or chains) that will be investigated. If, for example, the primary area of research interest is the position of rural, small-scale, agricultural producers, launching the inquiry by approaching urban producers in the first stage may yield map linkages which omit rural producers, if the assumption is made that little interaction occurs between the two producers.

To stay in line with the previously stated goals of the Millennium Project, the focus of this study and point of entry was the small-scale rural producer. Further links and functions were then investigated by departing from the grower's respective position, moving up and down the chain as necessary.

3. Working Methodology

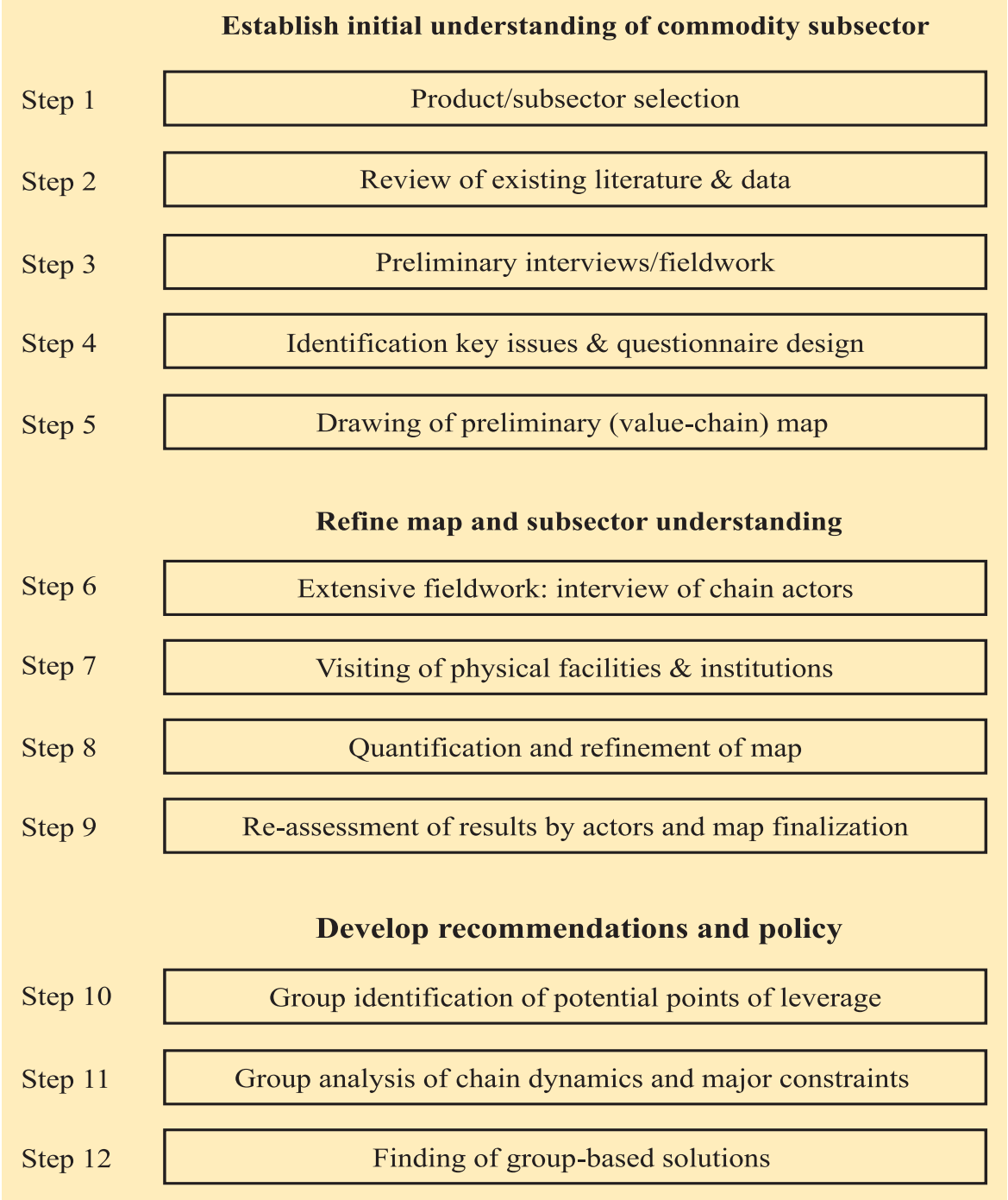
Initially, this study was to include a separate investigation of the scientific, technological and innovation processes within the sectors for UC testing a methodology designed by CTA and KIT (CTA/UNU-Intech/KIT, 2005) but this project was quickly abandoned because it was not compatible with the situation of the subsector in Sri Lanka.

Research efforts were focused on: analyzing the value-chain and identifying weaknesses within it, developing recommendations and observing the functioning of the local innovation systems for when these are present.

The approach employed in this study follows a simple yet practical methodology borrowed from both Miles (2002) and Holtzman (2002) found in the World Bank's online "*Guide to Developing Agricultural Markets and Agro-enterprises*" (Giovannucci, 2002).

The combination of the two authors' approaches led to the development of a 10-step work plan describing the sequence of efforts needed to construct a viable and representative chain map for the selected commodities.

Figure 2: Employed work methodology: chain construction and sector analysis



This approach also ensured that an effort would be made to identify the potential points of leverage using a participative approach[1].

A flow chart illustrating the overall procedure is depicted in Figure 2.

3.1 Crop Selection

Due to time and resource constraints, only three species: rambutan (*Nephelium lappaceum* L.), beli (*Aegle marmelos* Correa) and wood-apple (*Feronia limonia* L.) were selected out of the broad range of

[1]A choice was made into holding workshops and group discussions where chain participants could voice their opinions regarding the chain's/subsector's performance, constraints, key issues and opportunities. Results for the workshop held for the current study can be found in Annex D.

UC that have been identified so far in Sri Lanka (Gunasena et al., 2004).

The three species featured on the list of priority crops for Sri Lanka and the region of South Asia as a whole developed by both ICUC and the International Plant Genetic Resources Institute (IPGRI; now Bioversity International) (Williams and Haq, 2002; IPGRI, 2003; see also Annex A).

Focusing on these fruit species provides a link to previous ICUC activities in Sri Lanka, which promoted the processing and marketing of underutilized tropical fruits and included beli and wood-apple, amongst others (Abeyrathne and Jaenicke, 2006; Gunasena et al., 2004).

Adding rambutan for this present study allowed for the coverage of a broader socio-economic spectrum of UC in Sri Lanka: rambutan is already being commercialized and cultivated to a significant extent; beli is perceived by most growers as being an 'uneconomic crop', a 'wild crop' and thus features at the opposite end of the spectrum from rambutan and wood-apple is traded on a significant scale in Sri Lanka yet not as much as rambutan and can thus be placed somewhere between the positions of the two other crops.

3.2 Product description

Rambutan is a medium-sized, tropical, evergreen tree belonging to the *Sapindaceae* family. It is native to South-East Asia and originates from Malaysia. This fruit tree is related to other edible tropical fruit trees such as: Lychee (*Litchi chinensis* Sonn.), Longan (*Dimocarpus longan* Lour.) and Mamoncillo (*Melicoccus bijugatus* Jacq.), all of which belong to the Sapindaceae family (Simons et al., 2005). While the tree serves multi-purpose uses, it is mainly cultivated for the sweet and juicy flesh of the fruit.

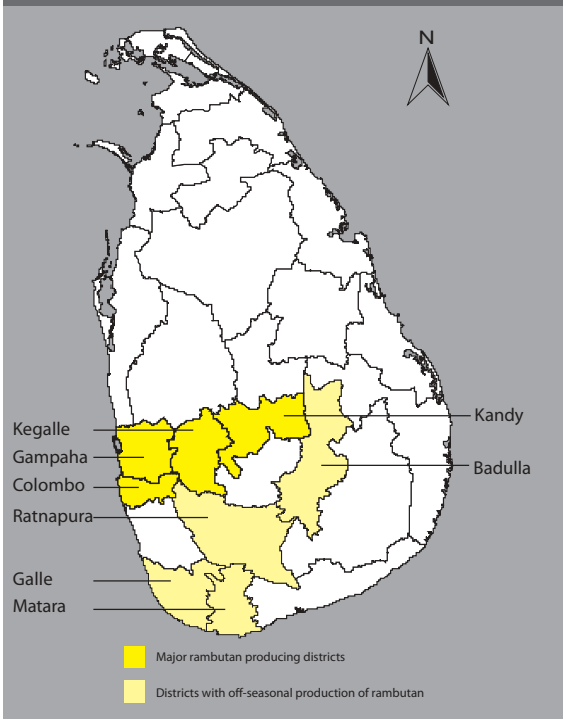
Although its precise natural distribution is unknown, most of the global production for rambutan is concentrated in the region of South-East Asia. Countries such as Australia, China, Cameroon, the United States, Nicaragua and Costa Rica, have also started cultivating rambutan (Simons et al., 2005).

The cultivation of this crop in Sri Lanka is more suited to the mid- and low-country wet zones of the island[2]. Flowering tends to occur around February/ March and fruit maturation around July/August. Depending on weather conditions, and more specifically, rainfall, a second harvest can be obtained between December and February (www.agridept. gov.lk). On the following map are shown the island's rambutan producing districts.

As can be seen in Figure 3, rambutan is mainly grown in the districts of Colombo, Gampaha, Kandy and Kegalle though some sites with off-seasonal bearing have been identified in adjacent districts such as Galle, Rathnapura, Badulla and Matara (www.agridept.gov.lk).

The most popular variety both amongst consumers and cultivators is "Malwana Special". This local variety derives its name from the area where rambutan was first cultivated after its introduction to the island by Dutch VOC traders in the 17th century.

Figure 3: Distribution of rambutan production in Sri Lanka



[2] Altitude levels for the low-country zone ranges from 0 to 300 m, for the mid-country zone from 300 to 900 m and for the high country above 900m. The country's wet territories receive on average 2500 mm of precipitation (www.agridept.gov.lk).

It is also the variety which has been recommended to most rambutan cultivators by the Department of Agriculture (DA) (www.agridept.gov.lk).

Other popular varieties include Malaysian Yellow, Malaysian Red, Java Special, Thai, Philippino and various other local cultivars (Satharasinghe and Champik, 1993).

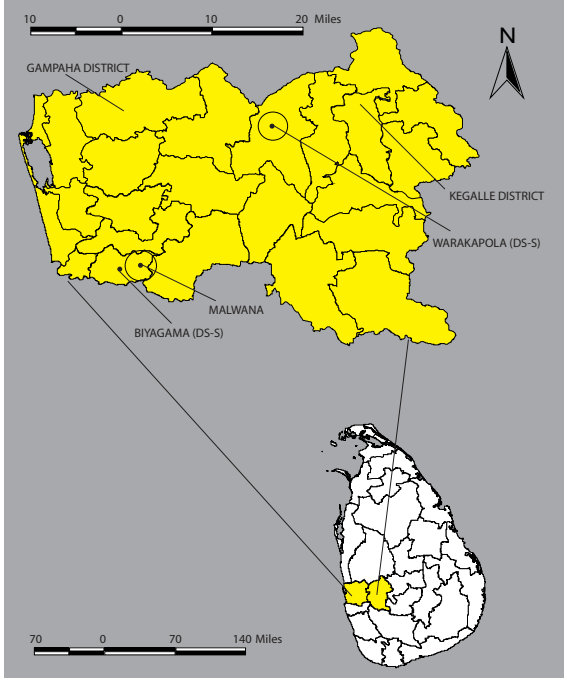
Rambutan is highly perishable and usually starts to lose its distinctive red color within three days as it turns brown and shrinks in size. It also has a high content of vitamin C such that one fruit can suffice one person for a day *(http://www.nnc.da.gov.ph/nutfacts/nutqty/vit_c.html)*.

3.3 Selection of territory/sample and questionnaire design

3.3.1 Selection and description of territory (steps 2 through 5 in Figure 2)

As this was the first study of its kind in Sri Lanka, the availability of secondary data sources on rambutan marketing and economics was extremely limited. Recourse had to be made mainly to the collection of primary data. Certain key stakeholders, participants and leading researchers were interviewed in a set of preliminary, semi-structured interviews in order to gain some first hand insight into the sector and to identify the major production and selling sites[3]. Based on these preliminary findings, the two locations of Malwana and Warakapola were selected (Figure 4) for the surveying of producers and as the entry point into the study of the chain.

Figure 4: Areas where farmer/producer surveys were carried out



The two GN[4] divisions: Malwana and Warakapola are situated in the Byagama and Warakapola DS divisions, themselves located in the Western provincial districts of Gampaha and Kegalle respectively. The latter two districts are known for being major rambutan producing districts and have a long history with regards to the cultivation of this crop.

The two districts differ significantly in their economic makeup, with agriculture playing a relatively more prominent role in the economy of Kegalle while retailing and trade represent a relatively larger share in Gampaha's economy (Government of Sri Lanka: Department of Census and Statistics, 2001 a, b).

Gampaha is one of the island's most industrialized districts. It is for this reason that the district has been excluded from a recent government regional development program, known as the "300" industry program. This program, launched in 2006, represented an effort by the Ministry of Industries to bolster regional investment and development in the island's less industrialized districts. Kegalle though remained eligible for the program.

One factor which might help account for this difference in the level of industrialization between the two districts may be the proximity of Gampaha to the island's capital and the presence of the island's only international airport within the district's boundaries. It is also dissected by one the island's major arteries: the Colombo-Kandy Road, running through the district's capital Gampaha town as well as Kegalle town.

[3]These mentioned findings also allowed for the construction of a preliminary subsector map (without the quantified overlays).

[4]GN stands for 'Gramadoya Niladari and represents the most basic local unit of government institution in Sri Lanka. Usually a GN will be a collection of a few villages and/or townships. A DS (Divisional Secretariat) lies, in terms of hierarchy, between the GN and the district's council.

Malwana and Warakapola have a population of 4,616 and 4,398, respectively (Government of Sri Lanka: Department of Census and Statistics, 2001 a, b) and are located in the island's wet-zone.

3.3.2 Questionnaire design and use

Two sets of questionnaires were then constructed[5]: one evaluating the livelihood assets of growers, the second dealing with issues specific to the rambutan chain. An effort was made to incorporate into the questionnaires questions pertaining to key issues identified during the preliminary interviews.

The purpose behind using the livelihoods questionnaire was to provide a more holistic and complete understanding of the sector. By extracting both qualitative as well as quantitative data about the socio-economic assets that chain participants held, a more accurate picture of the constraints as well as the strategy decision making process of chain participants could be drawn.

Qualitative analysis was also employed in order to try and assess the degree of strength (or weakness) in the relationships amongst chain members. To achieve this, questionnaires were employed containing a numerical scale (please see Annex B). In most cases though, interviewees were asked to rate the perceived quality in a particular relationship by providing a verbal assessment.

During the testing of the questionnaire many of the respondents had difficulties in quantifying certain abstract notions such as 'trust' and 'reliability'. Other domains covered by the qualitative research included: the listing of constraints, obstacles as well as a ranking of future crop opportunities.

3.3.3 Sampling of chain actors

While rambutan farmers formed the focus of this research, an effort was made not to concentrate solely on the production of rambutan. In order to estimate consumer preferences and product positioning vis-à-vis other fresh fruits in the island's major markets, consumer surveys (Satharasinghe and Champik, 1993) were carried out simultaneously in Kandy and Colombo.

In total, 143 actors were interviewed; Table 1 provides an overview of the respective position of actors in the chain and the various locations at which they operate.

Since too little was known of the population beforehand in order to allow random sampling of participants, use had to be made of non-probabilistic methods. In this case, the snowball and maximum variation methods were used. Under the latter, representativeness is sought not by equal probabilities but by including a wide range of extremes. A concerted effort was thus made to include participants belonging to widely differing socio-economic backgrounds. In order to locate them for the purpose of interviewing, village spokesmen, local field officers and rambutan growers were all asked to identify potential interviewees belonging to the extreme ends of the socio-economic spectrum.

Table 1: Respondent Categories

	Chain position respondent: # of cases						
Location	**Farmer**	**Consumer**	**Collector**	**Exporter**	**Agricultural extension officer**	**Fertilizer seller**	**Fruit researcher**
Kandy	-	50	-	-	-	-	4
Colombo	-	50	-	3	-	-	2
Malwana	14	-	1	-	1	2	-
Warakapola	11	-	2	-	1	2	-

[5]The livelihoods-assets questionnaire was designed solely for the growers, not other chain participants. Furthermore, the set of questionnaires evaluating the market contained four questionnaires: one for plant nursery operators; growers; intermediaries and exporters. The livelihood-assets questionnaire as well as the farmer questionnaire and the consumer survey can be retrieved from Annex B.

The snow-ball sampling method links up with this technique in the sense that, after having identified a grower who fitted the criteria for inclusion (i.e. small-scale rural rambutan grower), the grower was asked for information concerning other growers which may or may not be, located in his or her vicinity and may or may not belong to an extreme group.

4. Overview of the rambutan subsector for Sri Lanka and chain functions

Following this process of secondary data collection and the interviewing of key participants, the following findings for the sector and its corresponding chain were produced:

4.1 Value-chain operations

4.1.1 Plant production

Both private and public nurseries are involved in the production of planting material, although some of the private ones (called 'registered nurseries') also supply some public ones. Registered nurseries charge wholesale prices, and sell on to public nurseries at the prevailing retail price. Wholesale prices will always be slightly lower than the retail ones.

All cultivars are sold for the same retail price of circa LKR 125[6] per grafted seedling.

Public nurseries also sell at prevailing market prices and usually play a 'price-setting role' as their production represents the bulk of the sector's total production.

Public distribution systems of plants can be categorized into two further sub-categories: government farms, which are directly involved in the production and distribution of plants; and local agrarian centers, which purchase their planting material either from registered private nurseries or government farms in order to resell them (at market price) to growers.

Most planting material production involves Malwana Special, although some private nurseries have started propagating some foreign cultivars, such as Malaysian Yellow and Red.

The most common techniques of vegetative propagation used by rambutan nurseries are budding and grafting. Shade nets and trees are used for shading and all nurseries employ at least one experienced professional budder.

Private nurseries tend to operate on a small-scale and are often located on the premises of the nursery owner's home. The product range for most rambutan-producing nurseries will also include several other crops, mainly fruits such as mango, pineapple, papaya, jackfruit, durian and mangosteen.

There are no specific government programs targeting rambutan nurseries at the moment. In 2006, however, the government launched the 'Crop Zoning' project, in which 1,800 plants were distributed for free, and 2,000 sold at a discount price of LKR 100 per plant, to a selected number of professional growers. The district of Gampaha was excluded since here a significant amount of land had already been dedicated to the cultivation of this crop.

Badulla and Matare districts, where sites of off-seasonal production have been identified, were major beneficiaries of the project (Dr I. Medagoda, pers. comm. 2006). These were identified by the Horana Regional Agricultural Research Centre through field experiments in which crops were planted across various locations within the districts and their performance, over time, was monitored.

4.1.2 Other input supply

Manual household labor represents the major source of input into rambutan production for the

[6]USD 1 = LKR 102.48.

small-scale sector, while the large scale estate sector mainly relies on hired labor. According to the survey, labor charges represent 55% of the total cost of production (note: this figure is taken as an average for both sectors). Much of it includes the work of laborers in maintaining land and in protecting fruits from pests (e.g. bats, monkeys, squirrels etc).

Laborers are hired on a seasonal basis, after which family members will maintain the land for the remaining part of year, until the following season. Most hired laborers also have occupations in other commodity subsectors, mainly paddy rice.

Labor availability was not identified, by the small-scale growers, as a major constraint to production. Virtually all of the interviewed small-scale growers stated that their own labor, in addition to their family's and hired input, was sufficient. The growers in Malwana did identify the lack of labor as being a constraint as far as the marketing of rambutan is concerned: they don't have the resources to pick *and* sell fruits at the same time during the harvesting season since they are in their fields collecting fruits (see Annex D).

Fertilizers represent the second major source of input. An extension manual published by the Government of Sri Lanka: Department of Agriculture (1997), contains recommendations with regards to fertilizer application practices[7].

Nonetheless, while most commercial farmers have adopted the recommended practices, most small-scale producers have not. Instead, due to resource constraints, use is made of alternative, cheaper forms of fertilizers, often organic (such as plant debris and kitchen waste).

The third major source of input is extension help. Both private agro-chemical companies as well as public institutions have been the main providers of such services. Local agrarian centers based in each DS division are responsible for disseminating information on cultivation practices to growers. The agrarian centers tend to have, on average, 28 field officers but this figure varies widely per DS Division.

Field officers are appointed to a specific GN division and then meet farmers on a weekly, sometimes daily, basis. Upon meeting the growers, officers can be consulted on a specific matter. For problems of a highly technical nature, officers are encouraged to contact agrarian consultants based in the local agrarian centers.

Recently, special technology-extension and resource centers, known as Vidhata Centers, have been set up across the island. The establishment of these centers is the result of a project launched by the Ministry of Science and Technology which aimed at fostering the transfer of technologies from public institutes to the rural sector. The program is currently being coordinated by ITI (Industrial Technology Institute). This institute is very active in the fields of post-harvest, pests and disease management. In 2001, ITI, in a project financed by CARP, carried out a study on rambutan post-harvest management, disease control and fruit perishability (ITI, 2001). It also carries out quality tests for certain growers and will provide recommendations concerning the post-harvest management of rambutan.

Local agrarian centers and extension officers who assist rambutan cultivators mainly use the previously mentioned manual on rambutan cultivation as a guideline. The book has been published in English, Tamil and Singhalese.

The extension division works closely with other partner institutes. One of the leading public institutions in Sri Lanka which has been carrying out research on rambutan is HORDI (Horticulture Research and Development Institute). This institute has been delegated by the Department of Agriculture to lead research programs concerning the evaluation of germaplasm, crop production and plant breeding. HORDI has been leading research on rambutan since 1947, when it imported rambutan germplasm from several neighboring countries, such as Malaysia, Thailand and Indonesia. Using fruit samples from these plants, it conducted a comparative analysis of 16 cultivars (both local and foreign) looking at a wide range of factors (fruit size, appearance, pest resistance etc).

[7]The respective ratio per ha is 17.5 kg of urea, 34.5 kg of triple super phosphate and 16 kg of mono ammonium phosphate (Government of Sri Lanka: Department of Agriculture, 1997).

It came to the conclusion that the DA should recommend Malwana Special (personal communication, Dr. I. Medagoda, 2006).

Several regional research centers which fall under the supervision of HORDI are responsible for carrying out horticultural research on crops specific to a particular agro-ecological zone. The Horana Regional Agricultural Research Centre (located in the wet zone) is thus responsible for most of the field research being carried out in the surveyed territories of Gampaha, Colombo, Kandy and Kegalle. It also functions as a government nursery and provides basic training and extension services to farmers in surrounding areas. With regards to rambutan, it is currently involved in identifying sites where off-seasonal bearing (under 'non-irrigated' conditions) occurs, in performing high density planting and doing research on orchard management.

The private sector also contributes to the performance of the rambutan sector through the provision of extension help. Some of the island's leading agrochemical companies (e.g.: Baur, Mackwood, Hailey's, CIC, Lanka Ceylon Ltd and Harrison Chemicals) are involved in such activities. These companies tend to have multiple sales branches located across the island which are responsible for the distribution of their products to farmers. As a result of this direct interaction, leading companies have recently started to use their existing extension divisions to assist growers. Officers are appointed to a specific territory and also work closely with local distributors in order to estimate buying patterns and chemical application practices. Companies also perform soil research and occasionally carry out free soil tests for growers.

Figure 5 summarizes the information dissemination process for the subsector, listing all the major identified disseminators, their services and inter-relationships.

4.1.3 Production, harvesting and post-harvest treatment

Figures released by the DA indicate that the production of rambutan and land extent under its cultivation has been increasing during the mid 1990s (see Figure 6a and b). The most recent figures available on rambutan cultivation in Sri Lanka put production for the year 1999 at 7,168 metric tons and total land extent used for the cultivation of rambutan at 896 ha[8] (www.agridept.gov.lk).

While there are no exact figures about the share in total land extent that homegarden producers hold (at least not recent ones), a census carried out by the Department of Census in 1993 put the figure at 36%[9].

However, the current survey pointed out that most homegarden producers had a land holding between 1 to 1.5 acres. Taking into account the discrepancy between the obtained results and the definition for homegarden producers employed by the Department (see footnote 11), the importance of homegarden producers may be much higher than the figures from the Department of Census suggest[10]. Secondly, results from the study pointed out that while the majority of growers are clearly small-scale producers, estate production accounts for a larger share in total production (75%). This survey result is consistent with the findings of the Department of Census.

Most small-scale growers hold other occupations besides the cultivation of rambutan, usually paddy rice cultivation and the growing of vegetables, bananas and pineapple. Large to semi large scale mono-crop commercial estates exist, scattered throughout the major rambutan producing zones.

Much of the small-scale production isn't destined for commercial purposes though as many producers use their harvest for their own consumption and as gifts for family members and friends. Since the

[8]The districts of Gampaha and Kegalle, for the year 2002, both held a land extent for rambutan cultivation of 527 and 147 ha, respectively (pers. comm. Government of Sri Lanka: Department of Census, 2006).

[9]The Census defined a homegarden as a parcel of land of which the extent is less than or equal to 20 perches (0.125 acres) having some form of cultivation or livestock tending with a dwelling house (Satharasinghe and Champik, 1993).

[10]The classification of a grower under the homegarden or estate category is thus highly subjective since much depends on how the term 'homegarden' is defined. The choice of definition will thus have implications in determining the relative importance that the homegarden sector has in total land extent and production. Using the Department's definition, not a single surveyed grower would have been classified as a homegarden producer since their land holding would have been too large.

Figure 5: System of technology and science dissemination within the Sri Lankan rambutan subsector

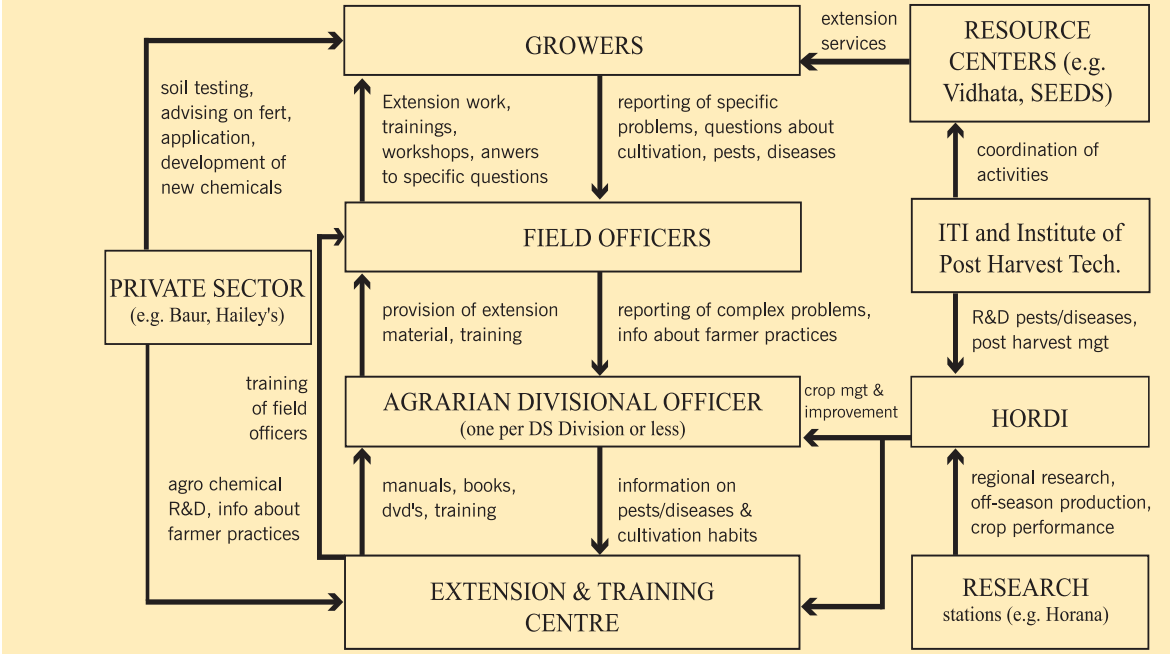


Figure 6a: Sri Lanka rambutan production (metric tons) 1995 - 1999

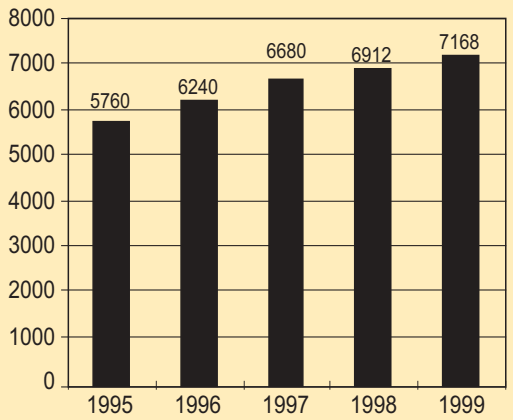
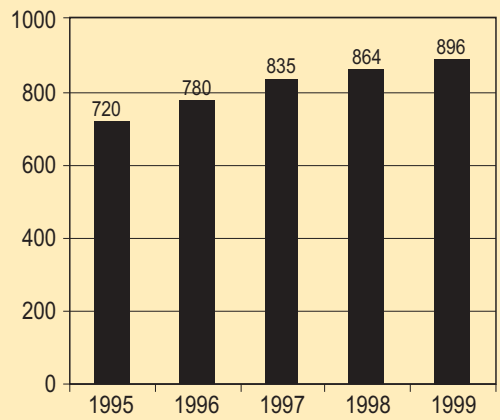


Figure 6b: Sri Lanka land area under rambutan (hectares) 1995 – 1999



semi-large and large producers are scattered throughout the producing districts, much of the supply to the major markets in Colombo and Kandy, as well as to exporters, is extremely fragmented and irregular.

Most production is rain-fed and only a few large scale farmers have been able to adopt (micro) irrigation in order to improve fruit bearing during the season. In some cases, some off-season production was reported. The developing of off-seasonal production capacity is an attractive option for those farmers who have the means to do so, since the price for rambutan can increase to LKR 10 per fruit.

A further difference between large and small-scale producers is in post-harvest losses. While large scale producers, on average, have been able to keep losses under 15%[11], it was as high as 35% for the

[11]To construct these rations, farmers, were asked during the survey how many fruits, out of the preceding year's total production, had lost their edibility properties and therefore did not find their way either to the collector or to the final consumer (see Annex B).

smaller producers. This difference can be explained by the better access to extension help that large scale farmers had, and, in general, the availability of better farming technology (pruning knives, irrigation, electricity etc). Various farming practices, such as the application of fertilizers, tree spacing and pesticide usage, were not adequate in the small-scale sector.

4.1.4 Fruit collection and distribution

Intermediaries played a key role in this as the bulk of rambutan production flows from producers to end consumers via them. Small-scale growers indicated in the survey that collection and distribution of fruits was done by collectors in 85% of cases. The remaining times the growers would sell directly, either by setting up little stands along roadsides or by selling to local retailers.

Roughly 50% of the collected produce was sold in 'distant markets', meaning major cities such as Colombo and Kandy. The other half was resold at locations in the vicinity of the producer's residence.

None of the small-scale producers sold to collectors sub-contracted by exporters. In the case of semi to large producers, 10% of their produce did reach exporters. The rest of their produce was resold across the island at large.

Intermediaries, when reselling their goods in the domestic markets, often acted on an informal basis by setting up street vendors alongside major routes and streets, such as Havelock and Thurston Roads in Colombo. Other important sales outlets can be found next to campuses, at markets and bus/train stations where sellers tend to hold selling permits and aren't intermediaries.

In summary, three major marketing channels were identified for rambutan: 1) medium to large sized growers selling rambutan directly to consumers across the island; 2) small-scale producers reselling directly to local markets; 3) growers selling via intermediaries, who are reselling rambutan either to local markets or distant markets (which includes exporters, most of which are based in Colombo).

4.1.5 Transport

The most common modes of transport used for rambutan were three-wheelers and lorries. Most intermediaries believe the cost of transport to be negligible relative to the total value of their cargo. However, rambutan fruits will often be loaded into the back of three-wheelers to maximum capacity, without proper packaging, if any. This results in the squashing of much of the crop, high fruit losses and damage to the fruit's appearance.

4.1.6 End markets

Local: Most small-scale production seems to be for domestic purposes and the economic potential which this crop holds for these markets has already been acknowledged by the DA (www.agridept.gov.lk).

During the season, the fruit is widely available for a period of two months in most of the island's major markets (e.g. Colombo, Kandy, Kegalle Town etc.[12]) and is highly popular amongst youths and students; with the fruit's appearance playing a key role in influencing consumer preferences. Paradoxically, rambutan is traded only on a small-scale in most of the producing territories. Most households tend to possess a tree already and will use the fruit for domestic consumption only.

Although prices may differ per location, the differences tend to be minor. Peak prices are reached at the on-set of the season (early July) and then drop, reaching a low towards the end of August/start of September. Due to the extremely short shelf life of this crop, both farmers and collectors are under heavy pressure to sell their produce as quickly as possible and competition can be fierce, this often depressing prices. When sellers are unable to dispose of their fruits at the prevailing market price, they will either sell them at a discount or keep them for their own consumption.

Malwana Special sells on average at LKR 5 per fruit. The next most popular varieties are Malaysian Yellow and Red, which both sell at LKR 3.5 per fruit. Both are readily available during the season in the major markets.

[12] During the survey, several growers as well as intermediaries claimed that some of their sales have been lost due to the 'cutting off' of Jaffna, located in the North due to the political conflict. The majority of growers though claimed that this wasn't too much of a problem since there were always enough buyers in Colombo and Kandy.

While the most sought after variety amongst consumers remains Malwana Special, frequent cross-breeding has led to a very wide range of variation within varieties, despite sellers supposedly selecting for particular varieties. This means that consumers are often unaware of which variety they are purchasing. As a result of this diversity, there is a general lack of product uniformity. Quality, size, color and taste will tend to vary strongly.

Results from the consumer surveys held in Colombo and Kandy indicated that interviewees not only valued rambutan highly relative to other fruit crops, but a significant amount of latent demand could be detected. Some 93% of the consumers interviewed said they would be willing to purchase rambutan on a regular basis during the off-season and 72% claimed to be willing to pay a price equal or greater to what they paid now, for their preferred variety, both during the season as well as during the off-season.

Exports: According to leading exporters, only a small fraction of total production is used to supply export markets despite the DA acknowledging the economic potential which this crop holds for such markets (www.agridept.gov.lk).

The bulk of Sri Lankan rambutan is exported to the Gulf region, with Dubai as a primal destination (due to its relatively lower import duties) from whence it is redistributed to Dubai's neighboring countries.

Exporters place their orders with several independent collectors, who will select and purchase a given quantity of fruits on their behalf from farmers. Most points of collection are warehouses located in Colombo. Fruits are then sorted by the exporter according to their size, quality and taste, packaged (usually 8 fruits per pack), labeled and stored. According to the results obtained in the study, the entire logistical process, from the picking of fruits, to sorting/ handling and distribution to the Middle East takes about 26 hours.

The international market for rambutan is only for premium quality fruits and fruits are therefore selected by exporters themselves prior to shipment. Despite such efforts, the rate of rejection faced by Sri Lankan exporters of fresh rambutan is high. Exporters indicated that 25% of their total shipments failed to meet the quality standards set by buyers.

Nonetheless, there seems to be good demand for Sri Lankan rambutan in international markets which is said to be competitive both in terms of price and quality. According to one exporter, Sri Lankan exporters of rambutan benefit from relatively lower air freight charges than some competitors. Exporters from the Far East have to face stiffer competition in terms of cargo space destined for the Middle East and Europe. There is demand for the fruit throughout the year. Even during peak production periods, some demand remains unfulfilled. Demand has been consistently increasing for rambutan during the last 10 years, but so has supply, and as such the international price for Sri Lankan rambutan has remained stable, roughly around the current price of USD 2.44 per kg (note: this is the average 'Gulf area' price or LKR 250 per kg). This price includes the freight charges (cost in freight), purchase price, handling charges and according to the study, a 15% markup for the exporters.

Major competing countries include: Thailand, Malaysia, the Philippines, Indonesia and Australia. Other importing countries include the Maldives, Malaysia, France and The Netherlands.

Most customers in the Gulf countries are South Asian expatriates. The Sri Lankan community is well represented, although exporters claim that an increasing number of locals as well as other immigrant groups have started to consume the fruit.

International markets remain 'unsaturated' and the degree of competition faced by Sri Lankan exporters so far is still relatively limited.

4.2 Inter-firm cooperation

The sector has weakly integrated vertical structures and three major producing groups: the large scale commercial farmers, homegarden producers and a mixed group which produces both rambutan on estates as well as within private homegardens.

Producers in all three categories work on an independent basis as no sub-contracting takes place

and no cooperatives have been identified on the island. Only some of the large and semi-large scale farmers have been able to reach verbal agreements with exporters under which producers set aside a part of their production for a special reservation fee. In such cases, producers 'reserve' an entire tree for the exporter for a given value. Negotiations between the intermediary who acts on the exporter's behalf and the producer then take place in order to fix the value of the tree. Physiological features such tree health, age, quality of its fruits etc are all taken into consideration. The average reservation price of a tree lies between LKR 18,000 to 24,000. A fraction of this fee is paid in a lump sum prior to the harvest and the rest after the harvest.

Intermediaries also work primarily on an independent basis, although exporters tend to rely on the same ones when purchasing their rambutan for reasons of trust and reliability.

4.3 Subsector map

From the findings discussed above, a subsector map can be drawn which highlights both the main operations being performed within the chain and the flow of produce from the plant producing stage to end markets. The information shown in Figure 5 is not included here to maintain clarity[13].

The following map (Figure 7) employs a structure and format originally designed by Miles (2005) in her assessment of the Moroccan frozen strawberry subsector using results from the USAID-ATDP Morocco Agribusiness Promotion Project (Giovannucci, 2002)[14].

5. Key identified issues/problems

Following the construction of the subsector map, the main problems were identified. These included problems pertaining to the production, transportation and marketing of the fruit and will be discussed below.

The problems have been addressed based on the basic value added characteristics of rambutan and on the market situation.

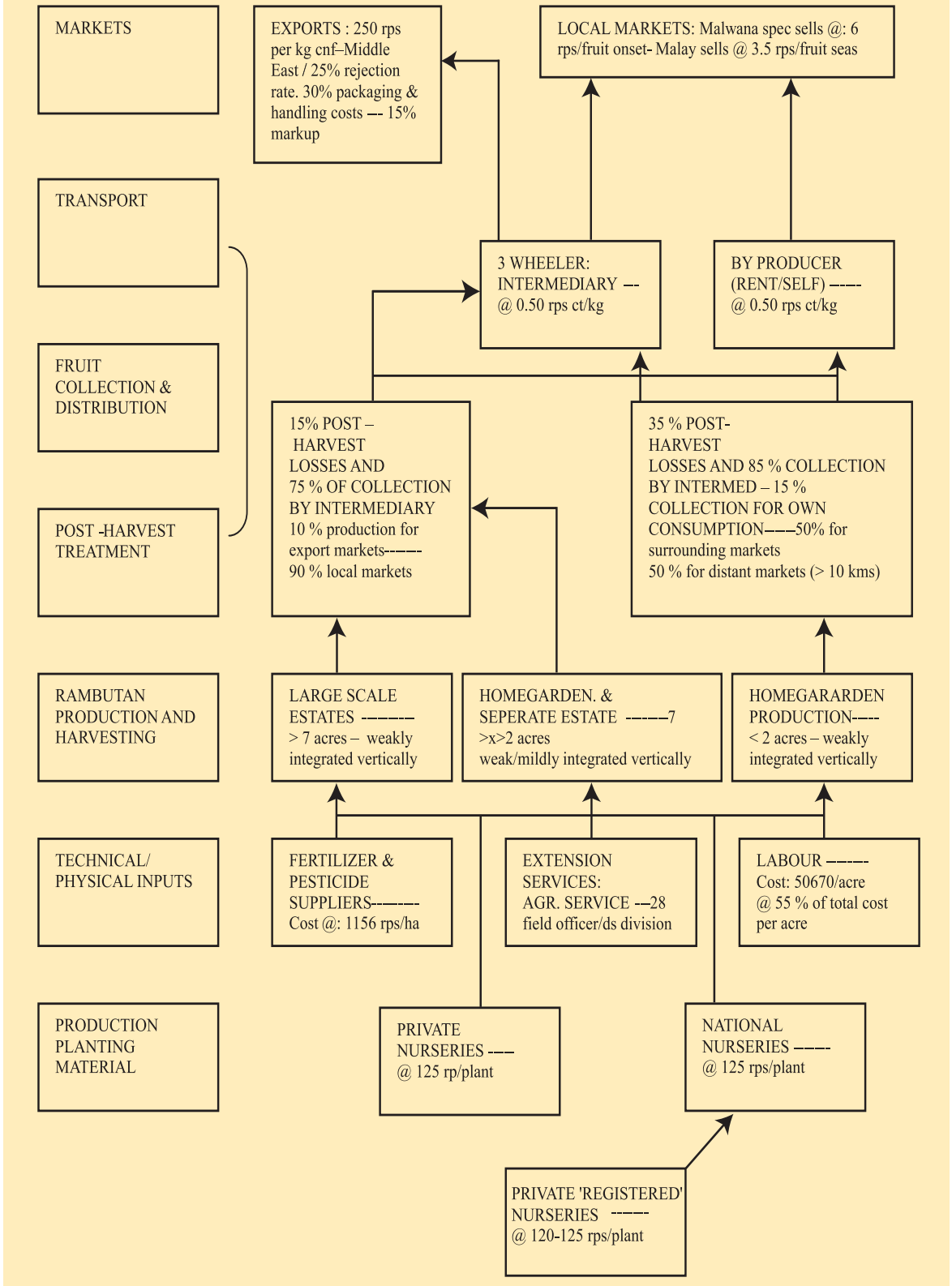
5.1 Key issues and major problems related to the production and transportation of rambutan

- **Technological upgrading is limited and this is seen as a major bottleneck** impeding the growth of this sector and restricting most producers into selling their produce only into the national market.
- **Value addition is low** and is mainly generated through transport.
- **Poor and inappropriate land/tree management practices** result in the production of unprofitable, low quality crops and wastage of land.
- **The international rejection rate for Sri Lankan rambutan is extremely high due to poor quality**.
- **Inadequate packaging, transportation and overall post-harvest treatment of rambutan lead to huge post-harvest losses.**
- **The highly seasonal nature of this crop prevents most farmers from expanding production and exploiting economies of scale** thus generating higher per unit long term costs of production and a lower level of output.
- **According to leading exporters and experts, unreliable supplies of rambutan discourage exporters from developing a long term strategy around this product.**

[13]They would likely fall in the boxes: 'Production of planting Material' and 'Technical/Physical Inputs'.

[14]The Morocco Agribusiness Promotion Project (MAPP, contract # 608-0210-C-00-2044) was funded by USAID. Subsector studies were performed on the following horticultural commodities: olives, fresh fruit, fresh-cut flowers, herb/spices, early vegetables, fresh vegetables, strawberry and wine. Information on these studies can be obtained through the USAID Center for Development Information and Evaluation.

Figure 7: An overview of the Sri Lankan rambutan subsector: subsector map



- **The crop is strongly exposed to environmental hazards**. Slight variations in environmental conditions and rainfall patterns can strongly affect production, thus raising the level of risk faced by investors and government research agencies. This problem is exacerbated by the fact that small-scale growers do not practice inter-cropping on an extensive basis.
- **Extensive cross-breeding with (local) sub-cultivars** has led to a deterioration of crop quality and a discord in consumer expectations regarding variety type and quality.
- **The lack of access to financial capital and the absence of credit and subsidy schemes** for producers and exporters constrain the growth of this sector.
- **The quality and quantity of planting material and extension services are both limited** and often are only available for a restricted number of the large scale farmers.
- **High fertilizer costs** forces farmers to make recourse to cheaper but possibly less effective (and sometimes toxic) organic substitutes such as plant compost, manure and household waste.
- **Most R&D efforts are geared towards main crop (mainly paddy) improvement** and protection but little on fruit processing and off-seasonal production of rambutan.
- **The developing of proper processing and freezing technology (such as low oxygen transportation) for rambutan is seen as a major issue.**

5.2 Key issues and major problems related to the marketing of rambutan

- **Short product shelf life combined with low market access** is seen as an important issue exerting downwards pressure on prices and increasing the bargaining position of the intermediary.
- **Lack of market information** concerning selling practices and locations as well as the time constraints faced during harvesting period, means that farmers often are unable to sell their produce directly to end consumers.
- **Little research efforts geared towards marketing and economics.**
- **Extension agents are technically oriented** and lack the professional and managerial skills needed to improve marketing.
- **The strong focus by local agrarian centers and extension agents on other crops** (mainly paddy) often happens to the detriment of rambutan.
- **No specific market-development strategy available**.
- **Weakly vertically integrated structures** limit the overall effectiveness of supply chain management related policies.

  Weak, fragmented information flows within the chain prevent the development of long term export market strategies, although international demand for Sri Lankan rambutan outstrips supply.
- **Conflict in North-East of the island** has cut off several key markets, including Jaffna. The increased number of checkpoints has increased the cost of transport.
- **A shortage of managerial innovation and entrepreneurial dynamism** also impedes growth within the sector and prevents key organizational improvements such as the creation of cooperatives and specific buyer-seller agreements.
- **The highly autonomous and independent operating nature of chain participants** contributes to an overall weak logistical harmonization of the supply chain process and incapacity to respond adequately to market signals.

6. Opportunities for leveraged intervention

The previous dichotomization of the key issues and problems into the two sub-categories 'production' and 'marketing' is repeated here but it must be mentioned beforehand that an allowance has been made for a certain degree of overlap of the recommendations. In certain cases, the classification of a recommendation may thus seem arbitrary. For example, a recommendation regarding the development of producer cooperatives may be categorized as being more 'marketing related' (i.e. producer bargaining power gets strengthened) or as 'production related' (e.g. producers can now potentially increase their access to financial capital as well as other inputs and training).

In addition, emphasis is put upon the development of an effective MIS (Management Information System), which is needed to allow for an efficient flow of market signals from the consumer to the producer and vice versa, dictating production levels, investments, as well as identifying new potential areas of future research.

All in all, based on these findings, the study highlights that the scope for intervention within this sector is considerable and, more importantly, is highly required in order to uplift its performance.

It is believed that intervention programs mainly targeting the farmers will hold the most leverage as this group plays a critical role within the chain and is also its most vulnerable participant.

The various recommendations in terms of leveraged intervention are listed below:

6.1 Program A: Develop production and technological capacity of small-scale growers

Increasing the availability and accessibility of farming technologies to small-scale rambutan cultivators will help them not only raise their productivity, but will also allow them to cut down significantly on post-harvest losses and improve the quality of their produce. Most large scale farmers already possess good access to technology and extension aid and thus operate already close to optimum capacity levels.

While research is currently being carried out in Sri Lanka on the issue of post-harvest and disease treatment of rambutan, small-scale growers can make significant gains simply by adopting similar cultivation/land management practices and technologies as the larger scale farmers have and improving issues such as tree pruning, fruit picking, fertilizing, irrigating.

An emphasis should be made here though on increased productivity and not just increased production in general since most farmers face land constraints and are operating at sub-optimal production levels.

An increase in productivity, through the generation of economies of scale, could then lead to further reductions in average cost levels.

Developing and improving the productive capacity of rambutan farmers could thus be achieved in the following ways:

- **Increasing the availability of cultivating technologies for rambutan farmers**. Many farmers claim that they have both the will and capacity to purchase new equipments and technologies but little was known about the selling points for such items. Use could be made here of local Vidhata centers which serve as distribution centers for new technology. Currently, most Vidhata centers do not display technologies specifically applicable to the cultivation of rambutan and other fruit trees. For example, distribution centers located in the major rambutan producing areas could start selling pruning knives. These were in great demand amongst farmers who often had to resort to less desirable alternatives resulting in major tree damage. The centers could also sell sprinklers and other irrigation material since this is usually only available in Colombo and other distant markets.
- **The quality of the existing extension services should be improved**. Many extension officers, even those who have been delegated to supporting rambutan cultivators, lack the expertise to provide adequate advice on certain technical matters. An effort could be made here

to raise the overall level of technical knowledge amongst extension officials in the rambutan producing zones by allowing those with more expertise and experience (i.e. those that are currently advising some of the more professional farmers) into training their colleagues. Lastly, greater collaboration between the officials and the Vidatha centers on technological developments within the sector should be enhanced.

- **Coverage of the extension services should be rendered more targeted and equitable**. While the resources of most agrarian centers are already severely stretched, this serves as an additional impetus into allocating them in a more effective and equitable manner. So far, mainly the larger, more established producers tended to receive adequate extension help. Also, a grower with personal links to the agrarian department or the agrarian centre was more prone to receiving assistance. So far, one officer is appointed to one community/village even though this officer may have a set of expertise for crops other than rambutan. Furthermore, field officers cover a large area and usually meet cultivators on a random basis. Appointing, on a permanent basis, a set of officials with expertise to collaborate with a given set of producers would be one way into improving the services. Local farmer organizations can be encouraged into organizing monthly meetings and workshops where officials hold both demonstrations and open question sessions specific to the cultivation of rambutan. Similar efforts so far have been done for paddy, mango and papaya but not for rambutan. Such gatherings could also serve to foster 'Farmer-to-Farmer-exchange' in an attempt to bridge the technical and knowledge gap between growers. It would also alleviate the pressure on the extension officials.
- **Increase quality of available planting material**. While most nurseries tend to work with experienced budders and plant loss was low, improvements can still be made. Most farmers tend to be focused on matters pertaining to the cultivation of rambutan but seem to be unable to judge the quality of a budded plant when it is in the younger stage of its life, often leading to poor future growth. Training farmers on the techniques of vegetative propagation can allow for more selective purchasing behavior. The planting nurseries themselves can receive training on plant propagation. The Seed and Planting Material Development Centre (SPMDC) as well as certain registered private nurseries could play a leading role here[15]. In addition, given the high rate of rambutan cross-breeding in Sri Lanka, improvements can be made by breeding and selection of superior germplasm.
- **R&D activities on the off-seasonal production of rambutan should be increased**. So far only a limited amount of research is being done on investigating the possibilities to expand the production of rambutan into the off-season through management. A few locations (such as Badulla and Rathnapura) have already been identified as potential sites where off-seasonal bearing can take place yet, in these locations, the exploitation of rambutan is still heavily under-commercialized and lies in a primary stage. Therefore research efforts on off-seasonal production should target those zones where the cultivation of rambutan already plays a significant role in determining livelihood strategies for the small-scale sector. Emphasis can then be placed on issues such as pruning, irrigation and other techniques. These are techniques which have been successfully adopted by some of the major rambutan producing countries (i.e. Thailand and Malaysia) and while a consideration must be made for climatic differences within the region of South Asia, it is believed that significant gains can be made by increasing the dialogue with regional partner institutions such as MARDI (Malaysian Agricultural Research and

[15]With regards to the quantity of the planting material, the provincial office of extension services for the district of Kegalle has distributed roughly 1,800 rambutan plants for free in the year 2006 under the HORDI led Crop Zoning Project. A selected group of growers who met criteria set by the provincial office and who followed recomended practices were the main recipients. Other rambutan producing districts (with the exception of Gampaha and Colombo) also have a similar scheme in place.

Development Institute), Bioversity International, the Chanthaburi Research Center (Thailand) and regional researchers.

- **Increase R&D activities on crop diversification.** Efforts could be made to explore the possibilities of intercropping rambutan with other crops. Certain farmers have been able to successfully intercrop rambutan with banana and/or coconut. Nonetheless, as mentioned previously, many farmers face land constraints and by intercropping rambutan too close with other trees, growers may face a reduction in yields and crop quality. Research should therefore be geared towards identifying those crops which can be intercropped with rambutan in high density fashion. This may include 'non-fruit' crops such as vegetables, roots and tubers of which the harvesting seasons may or may not alternate with that of rambutan.
- **Farmer access to alternative forms of credit should be enhanced**. Small-scale farmers either face extremely high rates of interest imposed by the main registered financial institutions or have to go to the often unregistered local pawn shops, businesses and money lenders (also known locally as 'Ukas') where they obtain loans against collateral and at inflated borrowing rates[16]. Not only does the weak bargaining power of small-scale rambutan farmers ensure an unfavorable evaluation of their collateral in terms of the loan they get in return, but the collateral is often not returned upon the fulfillment of the repayment. Microcredit institutions such SEEDS (Sarvudaya Economic Enterprises Development Services) and the Janashakthi Bank of Sri Lanka can play a key role here in providing the capital needed to finance the purchase of farming material such as fertilizers which, for many growers, remain very costly.
- **Encourage the wider adoption of already existing local initiatives.** For example, the Department of Agriculture advises on the use of polyethylene bags for the storage of rambutan however, this (supposedly) accelerates the rate of dehydration[17] and some farmers have started using the stems from banana plants claiming that this is much more effective.

Also, special home-made fruit fly traps containing chemicals are being using used by some farmers and is said to be highly effective.

The Department of Agriculture could test such ideas and if proven, promote them widely.

Cross-inoculation studies and research on the identification of various (local) biocontrol agents will also need to be carried out in order to assess both the degree of risk and scope for fruit protection for when the rambutan producing sectors decide to adopt organic modes of rambutan packaging, storage and transportation (Kunz et al., 2006).

6.2 Program B: Build organizational capacity and strategic alliances amongst stakeholders to improve the functioning of distribution systems

Improving the marketing position of small-scale rambutan farmers is critical since it aims mainly at improving the bargaining position of the farmers and will allow for a greater recuperation of returns on their produce. Rambutan producer cooperatives would allow both the joint selling of rambutan and joint buying (at possible discount rates) of certain key inputs. Other benefits would be sharing the costs of marketing, transportation, administration and technological transfers among farmers.

Nonetheless, improvements in the organizational capacity of producers must be coupled with improvements in the distribution system for rambutan. As pointed out above, despite playing a key role within the functioning of the chain, the dominance of the collectors/intermediaries over this section of the chain has allowed them to gain a

[16]National microcredit lending rates fluctuate between 21 to 27%. The average weighted prime lending rate (AWPL) for commercial banks is 14.97% (www.cbsl.lk). The difference charged by microcredit institutions over and above the market rate is said to reflect the premium on risk faced by the lending institutions since their customers often belong to low income groups and thus, have little (or no) collateral.

[17] Moisture loss is seen as one of the major factors limiting the storage life of rambutan (Pantastico et al.,1975)

dominant position and to appropriate excessively high rents, often to the detriment of the producers. This issue must be addressed simultaneously as the cooperatives and strategic alliances are formed. Similarly, other efforts generated towards improving the marketing position of the sector as a whole (i.e. the enforcing of quality checks at farmgate and consumer levels) can be undertaken.

While much can be done on the domestic front, a key role can be played here by exporters. As mentioned in the study results (section 5.1), exporters faced unreliable supplies and were therefore unwilling to develop any kind of long term strategy around this product. A collective approach linking exporters with farmers as well as including other organizations involved in this sector is therefore strongly encouraged.

In a summary, the following recommendations can thus be made:

- **Support the development of farmer cooperatives or clusters to smoothen supply and reduce costs via bulk production**. The clusters can be formed not just on a product basis (i.e. in this case, for fresh rambutan) but can also take into account annual production cycles. For example, the pruning of rambutan trees during the season leads to bearing in the off-season which can smoothen the supply levels. In order to encourage the adoption of such a practice amongst producers, specific arrangements between exporters and farmers would have to be made.
- **Provide continuous monitoring to cooperatives** and ensure that there is a general level of understanding amongst cooperative members concerning the cooperative's *raison d'être*. Cooperatives are to devise strategies with great care taking a long term perspective, preferably requiring an initial investment outlay on behalf of the members. Extension officers working both for privately as well as publicly run organizations can play a key role here. The study indicated that most officials were very technically-oriented. By providing them with management and professional training, extension officials would be able to assist both growers and cooperatives on a wider range of issues now spanning into the field of administration, cooperative building, human resources, marketing etc. Vidhata centers can be used here for the training of extension officers as well as the training of the cooperatives. The Extension and Training centre in Peradeniya, ICUC as well as the small-business development programs of organizations such as GTZ, SEEDS and others, could all contribute here.
- **Legalize sales outlets in the island's major cities and encourage direct selling by farmers**. Due to high set up costs, most vendors, in order to maximize profits, will operate on an underground basis often leading to a congestion of the public pavement and the disposal of much litter on public grounds. Further, as a result of not having any selling permits, vendors are constantly being evicted from where they sell. This is usually of little effect as most return to their original point of selling. Legalizing and registering certain sales points would benefit collectors in the form of increased security and would lead to a better use of the public space. Collaborative cost-benefit studies by urban researchers and micro enterprise specialists on this matter can be done in order to determine optimal locations and the overall viability of such an intervention. Additionally, local municipalities could grant- on a temporary basis - selling permits to farmers during the season; farmers can be linked forwardly with retailers and assistance can be provided in the creation of sales outlets in the major markets (such as by creating farm shops), in order to help farmers appropriate greater returns for their production and increase competitive pressures on the collectors. An additional benefit of such an arrangement would be a saving in transportation costs and reduced congestion as farmers could now sell in bulk to a more limited yet targeted customer base[18].

[18] Some vendors travel up to 40 kms a day during the season.

- **Link farmers groups, clusters to exporters**. Under various subcontracting and forward contract arrangements, vertical integration can be stimulated in the chain reducing supply uncertainty and developing guaranteed markets for investing parties (i.e. these may be the producer groups, lending organizations or any other designated third party). Use could be made here of the Integrated Model Project Program of the Export Development Board (EDB) which is a government-led initiative seeking to improve the relationships amongst exporters and small-scale producer groups.

- **Arrange buyer-seller meetings and identify new potential markets for Sri Lankan rambutan exports should be undertaken**. Sri Lankan rambutan exporters have virtually only been serving the same customers and retail markets in the Middle East for most of their history even though significant demand exists for it in other countries such as: Malaysia, France, Australia, Japan and others. Independent researchers can be attached to exporters for the carrying out of profitability studies on the export of both fresh and processed rambutan. Such research projects could follow examples set by other exporting countries (such as Australia) who have even carried out missions to importing countries in order to evaluate the performance of their produce vis-à-vis those of rivals[19].

- Specific policies targeting the rambutan sector should **first select a limited amount of producer groups to serve as a reference group** before the implementation of the intervention on a wider scale. This would allow for greater in depth knowledge about the integrated approach being used and also on the functioning of the sector. A specific outline of requirements for the cooperative concerning quality standards, production levels, prices, as well as an assessment of all the partners involved in the project would have to be made. **Technical as well as financial assistance could be provided to farmers in terms of packaging, sorting, transportation and product distribution** in order to enhance their marketing efforts and help set quality standards at the farmgate level. This would also help exporters (who currently face high rejection rates) and local consumers.

- **R&D efforts on fruit processing should be carried out**. As pointed out earlier in the study, there is no processing of rambutan in Sri Lanka taking place on a commercial scale, although the benefits of it have been widely acknowledged[20]. Certain agricultural researchers have already been able to develop processed rambutan and are currently holding public demonstrations where the preparation procedure is explained[21]. Such efforts need to be encouraged and market trials need be carried out on both a local scale as well as on an international scale. Local agrarian centers and Vidhata centers could be approached on this matter as well as PODI. A separate evaluation on the canning and labeling costs of processing rambutan would have to be carried out. Studying the possibility of using air blast systems to freeze rambutan (as several Thai exporters already do), is also recommended as this technique is capable of extending the storage life of the fruit significantly while still maintaining product freshness and nutritional levels (*http://itfnet.org/articles.content.fm?ID=290&Channel=Business*).

- **Relaxing legislative restrictions on the importing of germplasm is strongly recommended**. This can be achieved by reducing the amount of administrative steps faced by importers as well as strengthening and supporting the Sri Lankan national quarantine programs. A long term benefit accruing from such an intervention would be the potential adoption of better, high yield foreign varieties. In Sri Lanka, in general,

[19]For more information please consult Noller (2001).

[20]According to Salakpetch (2005): "*the economic benefit from the export of processed rambutan is 8.5 times greater than that of fresh fruits*".

[21]In this processed form of rambutan, as developed by the agricultural researchers, the fruits (the seed included), are boiled and cooked together with some spices in caramelized sugar. The product has a shelf life of 18 months and the seed becomes edible.

restrictions laid upon the importing of foreign-bred germplasm are significant.

- **In order to strengthen links between exporters and producers, as well as serving domestic markets, a data bank should be constructed for the sector**. This would contain detailed information concerning issues such as land extent, type of variety cultivated, number of trees, geographic location, production etc. Studies such as the 1993 census on rambutan land extent and the cost of rambutan cultivation[22] are either outdated or not truly reflective of the current day situation of the sector. Studies can be undertaken on a more frequent basis by reducing the scale of the undertaking and by operating more on a by-sample basis. Sample studies can be carried out in the major rambutan producing areas in order to develop more accurate indicators for the databank to use. Simultaneously, consumer surveys can be carried out across the island in order to evaluate market size and potential for a given time period. Such information can then be made available online to exporters or be sold to producers in the form of hardcopies, via extension officials.

- **Online access to marketplaces on the World Wide Web should be promoted in order to encourage direct selling by producers.** Current day exporters mainly rely on established networks. Small-scale producers who do not have such market relations could thus benefit largely from such an intervention. Providing computer literacy training skills to heads of producer cooperatives would be one possible solution. Furthermore, special internet applications can be developed and used in combination with mobile telephony (to send SMS text messages) allowing users to exchange information regarding prices and selling locations. Such a virtual 'meeting place' could also serve as a platform for farmer exchange concerning new innovations within the subsector and issues pertaining to the cultivation of rambutan as well as a warning system when new diseases emerge, for example.

- **Exporters can be encouraged into disseminating information** regarding international quality requirements, freight companies and freight charges to producers. The Sri Lanka Standards Institute (SLSI) as well as other certification institutions can play a major role here.

[22]In this document (Satarasinghe and Champik, 1993) the cost of rambutan cultivation has been calculated, on a per acre basis, according to the recommended practices of the DA. The present study demonstrated that current day rambutan farmers in Sri Lanka clearly haven't adopted such practices and as such, this cost, under a profitability study of the sector today, would contain a wide error margin.

7. Conclusion

In Sri Lanka, the rambutan subsector holds much potential and could, in the future, serve as driver for improved livelihoods and rural development in some important parts of the island. Many constraints in place today though are preventing the subsector from reaching its true potential. The highly seasonal nature of the crop as well as its short shelf life were identified as being two of the most important obstacles and contributed to the large irregularities in supply. As a result of this, most exporters were unable or unwilling to adopt any form of marketing strategy around this product and producers faced uncertain markets with low returns. The problem therefore seems to be that of a failure in the coordination of the entire chain and various forms of intervention are needed in order to allow this sector to develop. For this, both the government as well as certain NGOs can play a key role in assisting the farmers and the private sector. Implementing intervention programs targeting the productive capacity of small-scale growers would thus be an effective way at improving the overall performance of the sector when considering the vulnerable yet important position these growers hold. Improving the flows of technical information between and to small-scale growers as well as increasing their access to capital would thus be required.

Simultaneously, an effort would have to be made in improving the marketing position of growers: growers need more direct access to local markets and to exporters in order to increase competitive pressures on the intermediary who often is able to appropriate excessively high rents within the sector. By creating producer cooperatives/clusters and by linking farmers to exporters, significant advances could be made in this regard.

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ANNEX SECTION

Annex A: ICUC criteria list for selecting priority crops for a region

1. Policy framework

Importance to NARS
Importance to regional and sub-regional collaborative research

2. Germplasm

Availability of germplasm
Genetic erosion perceived
Current genetic conservation status
Potential demands for germplasm

3. Acceptability

Local preferences/consumption
Market potential
Rural income generation
Acceptability in broader markets

4. Uses

Nutritional value
Cultural/religious affinities
Potential diversification of products

5. Production

Wide adaptability
Cropping systems suitability (including agroforestry)
Satisfies need for crop diversification
Pest/disease situation
Production technology

6. Post-harvest

Harvest/storability/handling
Processing technology
Products in relation to markets

Source: p.22, Williams and Haq, 2002

Annex B: Questionnaires

B 1: Rambutan grower survey instrument

Serial # : RQ1

The International Centre for Underutilised Crops (ICUC)

Date/Time: _____ / _____

1. Interviewer: Ismael Nicolas Barry
2. Translator: Savantha Samarasinghe
3. Interviewee/ position(s) in chain: _____ / _____
4. Contact details farmer: _____
5. Location: district: _____ ds-secretary: _____ name village/town: _____
6. GPS: _____ long: _____ alt: _____ lat: _____
7. Tile project: A value- chain analysis on rambutan: Rambutan Farmer survey.
8. Sample group: Rambutan growers district: _____

Serial #: RQ1

1) *To who do you primarly sell your rambutan to?*

Local consumers (inner-district)	
Distant markets (outer-district, specify*)	
Exporters	
Intermediaries	

* *(markets:.....)*

In case producer doesn't sell via intermediaries, continue with question 3

2) *Have you ever considered selling rambutan directly to local markets? Exporters? Why or why not?*

Answer farmer:	Reason farmer:
No, because...	
Yes, because	

3) *Do you know for what purpose your rambutan is being bought?*

Only for direct, fresh consumption	
For processing	
Some processing and some fresh consumption (specify)	

4) *Can you tell something about the rambutan trees?*

Variety	No trees	Ha	Spacing	Tech*	Bearing seas.	Age
						Less than 5 years old
						Beteween 5 and 10 years
						Between 10 and 15 years
						More than 15 years of age

* *(T = traditional system; M = mechanised and or semi-mechanised)*

Serial # : RQ1

5) *How many fruits did you produce last year and how much of it was sold?*

Produced:		Sold:	

6) *How much of it is used for commercial purposes, and how much of it goes to...?*

% commercial use:	% non commerc. consumption:	% waste:
X < 40 %:		
40% <X< 60%:		
60% < X< 80%:		
X > 80%:		

7) *Could you give me an estimation of what it costs you to produce rambutan?*
.....Rps/kg

8) *Could you briefly describe me on how you set prices with buyers?*

_____

Serial #: RQ1

9) *For how much do you sell (on avegrage) your rambutan?*
start price: .....Rps/kg end price:.....Rps/kg
(Note: see end of document for additional info: peak & on/off-set part of season)

10) *Do you think it is a good price , if not, why?*

Degree of 'fairness'	Answer & reason farmer
Unfair	
Relatevly fair	
Fair	
Good	

11) *What factors determine the price you get the most, do you think? Specify* please.*

Seasonality/availability of rambutan	
Bargaining/negotiating strength of buyer	
Lack of market information	
Lack of transport means	
Other	

** (to scale from one to five, explain scale here)*

12) *How do you follow price changes (including export prices, all crops) and how (quickly) do you respond?*

Crop:	Price volatility*	Speed adj month	Speed readj	Ha subs. ramb
Rambutan				
Other:				
Other:				
Other:				

** (to scale from high to medium to low)*

I follow price changes in the market by...

Serial #: RQ1

13) *What are the major inputs that you use?*

Input:	Type	Price	Qty	Supplier(s)
Fertlizers				
Pesticides (specify)				
Planting material (specify*)				
Labor (specify**)				
Financial (specify)				
Other (specify)				

* *(Be specific here, source of seedlings, plants and price, see end of document)*
** *(Be specific here in case family labour is used, gender and work allocation, see end of document)*

14) *Are these inputs readily available to you? How would you rate their availability? Could you also give me a reason?*

Input:	Grade:	Reason farmer:
Fertlizers		
Pesticides		
Planting material		
Labor		
Financial [1]		
Other		

* *(to scale from one to five)*
1) specify eligibility criteria: _____
_____

Serial # : RQ1

15) *Do you and other farmers have access to alternative forms of credit? How does one become eligible for such loans?* _____

_____

16) *Where would you say that you incur the most expenses?*

Category expenditure	Sub-category to expenditure	Estimated absolute amount rps	Estimated % of total expenditure
Purchase inputs			
Maintenance			
Rent of land			
Loan repayments			
Other			

17) *In case you produce other crops, where would you rank rambutan in terms of profitability compared to your other crops?* *

Rank crop:

* *If not in top five, mention rank in following space:* _____

18) *Do you set production targets? How do you plan production and reach targets?*

a) No I do not set any production targets, I...: _____
b) Yes, I do, I ....: _____

Serial # : RQ1

19) *Do you also practice intercropping?*

No: ☐

Yes (*please specify*):

Crop:	Ha/quantity:	Period:	Profitability*	Reason prod.	Speed adj.*
1)					
2)					
3)					
4)					

* *(to scale from high to medium to low)*

20) *What variety do you mainly use ?*

Variety:	Rank:	Why did you decide to use the selected variety?:
1)		
2)		
3)		
4)		
5)		

21) *Are you looking for other varieties? Please elaborate.*

_____

_____

Serial #: RQ1

22) *How is the quality of your rambutan checked for:*

Location where testing occurs:	Testing done by:	Time when testing is done:
At point of distribution		
On site of production		

23) *On a scale of 1 to 5, please indicate which of the following production factors you believe are the most critical to a successful (both quality and quantity wise) harvest of rambutan.*

Determining factor:	Specification	Grade:
Availabilty & quality planting material		
Training & monitoring external parties		
Information about prices and market demand		
Land space		
Good relationship with buyer/trust		
Other		

Serial # : RQ1

24) *In relation to the previous question, please tell me what are the biggest obstacles you face as a rambutan grower (using scale again):*

Determining factor:	Value:	Specification:
Availabilty & quality planting material		
Training & monitoring external parties		
Information about prices and market demand		
Land space		
Good relationship with buyer/trust		
Other		

25) *How do you think these obstacles may be resolved?*

Obstacle:	Solution farmer:
Availabilty & quality planting material	
Training & monitoring external parties	
Information about prices and market demand	
Land space	
Good relationship with buyer/trust	
Other	

26) *If the possibility would be there, would you be willing to produce rambutan in larger quantities and for a longer time period (i.e. in the offseason)?*

No (under no conditions...)	
Yes, but only during the season	
Yes and even during the off-season	
Undecided	

Serial #: RQ1

27) *In general, would you say that producing rambutan is…?*

Answer farmer:	Reason farmer:
Risky but profitable	
Risky and unprofitable	
Unrisky and profitable	
Unrisky but not profitable	

28) *Do you or did you receive some assistance from the government, producer/exporter an ngo or some other organisation/association? Was it effective?*

No: ☐

Assisting body:	Type of help received	Effectiveness intervention*
Government		
Ngo		
Other chain member		
Other		

* *(to scale from one to five)*

29) *How would you rate the strength of your relation to other chain actors* ?*

Chain actor:	Strength:	Problems & solutions:
Input suppliers		
Intermediaries		
Land owner		
Government		
Ngo		
Exporters		
Localk customers		

* *(to scale from one to five)*

30) *Do you also collaborate with the following individuals in your community?*

Community member:	Nature of relationship:	Strength Relationship*:	Why is it strong/weak?:
Other rambutan growers			
Other crop producers			
Local organisation			
Other CBO			

* *(to scale from one to five)*

B2: Grower's socio-economic profile

Serial #: RSE _____

The International Centre for Underutilised Crops (ICUC)

A SOCIO-ECONOMIC PROFILE ON RAMBUTAN FARMERS

Date/Time: _____ / _____

1. Interviewer: Ismael Nicolas Barry
2. Translator: _____
3. Name interviewee/position in the chain: _____
4. Contact details farmer: _____
5. Age & Gender interviewee: male: female: age: _____
6. Location: district: dn-secretary: name village: _____
7. GPS: _____ long: _____ alt: _____ lat: _____
8. Tile project: A value-chain analysis on rambutan: A livelihood assessment .

Serial #: RSE

LIVELIHOOD AND HOUSEHOLD ASSETS ASSESSMENT OF RAMBUTAN FARMERS

1) *Could you tell me what your highest level of educational attainment is?*

Education followed:	Passed:
Primary education	
Secondary (GCE)	
Degree and above	
Not stated	

2) *Could you tell me what your marital status is?*

Status:	Since (years):
Single	
Married	
Seperated	
Divorced	
Widowed	

3) *Tell me something about your family lifestyle*

Bachelor	
Young married	
Long time married	

4) *And the size of your household?*

5 or less	
5 to 8	
8 to 11	
More than 11	

5) *Are you linked to any particular organisation/club/institution?*

No. Never.	
No, but used to be **(specify)**	
Yes **(specify)**	

Serial #: RSE

6) *Could you tell me how long you have been a farmer?*

Less than one year	
One to 5 years	
5 to 10 years	
More than 10 years	

7) *Do you receive any income from the following sources:*

Yes	
No	

Source of income	**For how many years/months ?**	Estimated amount (rps)
Allowance Retirement benefit/pension Husband/wife employment Business Crop sales Livestock sales Remittance and gift Family entreprise Sale of (non-livestock) assets Loan **(add detail)** Others.....		

8) *Could you give me a rough estimate of what your daily income was last year/now (excluding any amount mentionned in 7)?*

Less than 250 rps/day	
250 -300 rps/day	
300 – 350 rps/day	
More than 350 rps/day	

Serial #: RSE

9) *Do you own a house?*

Yes	
No (**specify arrangement**)	

10) *Could you describe your house for me?*

1) House non-bricks no utilities	
2) House bricks no utilities	
1) + water	
1) + water + electricity	
1) + water + electricity + telephone	
2) + water	
2) + water + electricity	
2) + water + electricity + telephone	

11) *Do you own your farmland or does it belong to someone else?*

Farmer owns land	
Farmer doesn't own land	

Homegarden production: Y/N

12) *How many acres of land do you possess/lease for farming purposes?*

Less than 1 acre	
1 – 3 acres	
4 – 7 acres	
More than 7 acres	

Serial #: RSE

13) *Do you possess any livestock? If yes, what kind of livestock and how much?*

No I do not possess any livestock	
Yes I do possess some livestock...(specify type, amount)	

14) *Does your household possess any other major forms of capital? Appliances?*

No	
Yes...tv, fridge, radio (household elec.)	
Yes...car, truck, bike (automotive)	
Other...	

15a) *Tell me a bit about how income is being shared in your household and as to how decisions are taken with regards to how you spend your income*

Spend majority of what I earn and/or dictate purchase done by other members with my income plus their income	
Spend what I earn and/or dictate purchase done by others with my income but not their own income	
Spend a minority of what I earn and/or dictate purchases made by other member with my plus their income	
Spend a minority of what I earn and let other members decide purchase decisions	

Other arrangement.....

15b) *The arrangement is such that I give my money to my....*

Wife and she buys **(specify purchases and amount)**	**rps**
Husband and he buys **(specify purchases and amount)**	**rps**
Children and they buy **(specify purchases and amount)**	**rps**
Other....	**rps**

B 3: Consumer survey: Colombo & Kandy

interview serial # :.....

QUESTIONNAIRE – CONSUMER SURVEY

Sample description: consumers who just purchased or who are on the verge of purchasing rambutan from various locations in Kandy, Colombo and Wariyapola.

General Information

Date of interview: .....

Name interviewer:.....

Location interviewed (district-town/village-street/neighbourhood):

.....

Demographic category respondent:

Youth: ☐ Middle Aged: ☐
Teenager/young adult: ☐ Old: ☐

Gender:

Male: ☐ Female: ☐

Marital status:

Married: ☐ Unmarried: ☐

Highest level of attained degree:

(a) Grade 08 ☐ (c) GCE A/L ☐
(b) GCE O/L ☐ (d) Graduate ☐

Occupation:.....

Monthly income (Rs)

(a) Less than 5,000 ..... (b) 5,000-10,000 .....
(c) 10,000-15,000 ..... (d) 15,000-20,000 .....
(e) 20,000-25,000 ..... (f) More than 25,000 .....

Discretionary monthly income (Rs) (It is the income that can be saved or spent on goods and Services *wanted* not *needed)*

(a) 0 .... (b) Less than 3,000 .....
(c) 3,000-6,000 .... (d) 6,000-9,000 .....
(e) 9,000-12,000 .... (f) 12,000 – 15,000 .....
(g) More than 15,000 ....

interview serial # :.....

Specific information

1. Site of selling point:
   University Campus: ☐ Market: ☐
   Bus/train station: ☐ Side of road: ☐

2. How many kilometres did you travel to come here?

Actually, I was going somewhere else and just happened....	
I came specifically to buy rambutan and travelled....0 – 1 kms	
I came specifically to buy rambutan and travelled....1 – 3 kms	
I came specifically to buy rambutan and travelled....3 – 5 kms	
I came specifically to buy rambutan and travelled....more than 5 kms (specify).....kms	

3. There are usually several rambutan sellers nearby, why chose this particular vendor?

No particular reason, this vendor just happened to be there....	
I trust this vendor fo the quality of his produce....	
This vendor has the tastiest rambutan....	
This vendor has the cheapest rambutan....	
This vendor was the closest.....	
Other.....	

4. Did/does this rambutan seller have the variety that you were looking for? Which variety were you looking for?

Yes:		No:	

Variety sought by consumer at present time:.....

(if no, go to 4.1)

4.1 What was/will be your purchasing decision then ?

Bought/buy the available variety	
Bought/buy other substitute (another fruit)	
Will visit another seller/wait	
Will not buy at present time	

If not, what else did you expect? .....

interview serial # :.....

5. Which variety do you usually purchase and what is that you like about it?*

Variety:	Taste	Appearance	Price	Flesh easily removeable	Size	Other: (specify)
Malw spec						
Malay yel						
Malay red						
Other.....						

** please assign a value from 1 to 5 to signal importance (1 being the most important, 5 the least)*

6. How frequently do you purchase rambutan during the season?

Variety:	Specify unit measure*	Location where most is bought	Period (month):
Malw spec			
Malay yel			
Malay red			
Other			

** if customer gives x amount on a weekly basis, ask for how many weeks per year, same applies to similar given measurements*

7. Have you ever considered purchasing other varieties?

No: ☐ Yes: ☐

Variety:	Reason why 1:	Reason why 2:	Reason why 3:
1)			
2)			
3)			

8. Do you manage to purchase rambutan in the offseason?

No: ☐

Yes: ☐

Variety	Quanity (*specify unit)	Period (month):

interview serial # :.....

9. If rambutan were to be available in the offseason, how much (Q) would you purchase then per....(use specified unit of measurement) and at what price (per variety)*?

Variety:	PR 1: 2.50-3.50/Q	PR 2: 3.50-4.50/Q	PR 3. 4.50-5.50/Q	PR. 4 5.50-6.50/Q	PR. 5 6.50-7.50/Q
Malw spec					
Malay yel					
Malay red					
Other **					

* *if more than 7.50, please make additional note at end of document.*

** specify:.....

10. What types of fruit do you eat/purchase freaquently?

Type of fruit (rank in order of importance):	Unit cons per day or week	Rupees spent per week (or kgs purchased)
1)		
2)		
3)		
4)		

11. Where would you rank rambutan compared to these fruits?

Rank by overall importance in diet:	Rank by taste:	Rank by price*:
1)		
2)		
3)		
4)		

**from the most expensive to the cheapest*

Annex C: Respondent Background Data

interview serial number #:	date:	district:	dn-secretary:	village/ town:	name interviewee:	age:	gender:	chain position:
#test1#	7/3/2006	Gampaha	Biyagama	Malwana	Thanuj Darshana	34	male	grower/farmer
#test2#	7/3/2006	Gampaha	Biyagama	Malwana	Gamin Samaranayake	50	male	caretaker
#test3#	7/3/2006	Gampaha	Biyagama	Malwana	Sarath Kumara	52	male	grower/farmer
rseg1/rq1g1	7/4/2006	Gampaha	Biyagama	Malwana	S.S. Athanayake	58	male	grower/farmer
rseg2/rq1g2	7/4/2006	Gampaha	Biyagama	Malwana	K.I. Kuruwita	54	male	grower/farmer
rseg3/rq1g3	7/4/2006	Gampaha	Biyagama	Malwana	M.D. Chandrasena	60	male	grower/farmer
rseg4/rq1g4	7/4/2006	Gampaha	Biyagama	Malwana	Samwikramarathna	60	male	grower/farmer
rseg5/rq1g5	7/4/2006	Gampaha	Biyagama	Malwana	Darmasiri Kapuaradri	48	male	grower/farmer
rseg6/rq1g6	7/5/2006	Gampaha	Biyagama	Malwana	S.A. Piyasena	62	male	grower/farmer
rseg7/rq1g7	7/5/2006	Gampaha	Biyagama	Malwana	N.P.S Gunarathne ***	77	male	grower/farmer
rseg8/rq1g8	7/5/2006	Gampaha	Biyagama	Malwana	E.A. Suraweera Perera	72	male	grower/farmer
rseg9/rq1g9	7/5/2006	Gampaha	Biyagama	Malwana	Ariyarathne	50	male	grower/farmer
rseg10/rq1g10	7/5/2006	Gampaha	Biyagama	Malwana	Thissa Kalubowila	49	male	grower/farmer
rseg11/rq2g11	7/6/2006	Gampaha	Biyagama	Malwana	R.N. Piyasena	64	male	nursery
rseg12/rq2g12	7/6/2006	Gampaha	Biyagama	Malwana	W.K.C. Weerakkodi	33	male	nursery
rseg13/rq2g13	7/6/2006	Gampaha	Biyagama	Malwana	Lalithe Kularathne	32	male	agri. service center
rseg14/rq3g14	7/6/2006	Gampaha	Biyagama	Malwana	W.K. Perera	36	male	fertilizer distribitor
rseg15	7/6/2006	Gampaha	Biyagama	Malwana	Wejerathne	52	male	intermediarie
rseg16/rq1g15	7/6/2006	Gampaha	Biyagama	Malwana	N. Piyadasa	72	male	grower/farmer
rsek1	7/7/2006	Kegalla	Warakapola	Warakapola	Nandawath	45	female	picker

continued on page 51

Continued Annex C: Respondent Background Data

interview serial number #:	date:	district:	dn-secretary:	village/ town:	name interviewee:	age:	gender:	chain position:
rsek2	7/7/2006	Kegalla	Warakapola	Warakapola	Etana Estate	--	--	grower/farmer
rsek3/rq3k1	7/7/2006	Kegalla	Warakapola	Warakapola	K.D. Sunnil Dulasena	67	male	grower/farmer
rsek4	7/7/2006	Kegalla	Warakapola	Warakapola	N.P. Nimal Karunathilake	44	male	intermediarie
rsek5	7/7/2006	Kegalla	Warakapola	Warakapola	G.M. Gunerathne	55	male	intermediarie
rsek6/rqk3k2	7/7/2006	Kegalla	Warakapola	Warakapola	M.T.A Aswar	51	male	fertilizer distribitor
rsek7/rq1k3	7/8/2006	Kegalla	Warakapola	Warakapola	W.A. Sayasinghe	40	male	grower/farmer
rsek8	7/8/2006	Kegalla	Warakapola	Warakapola	Winitha Sumarasiri	45	female	field officer
rsek9	7/8/2006	Kegalla	Warakapola	Warakapola	Azengue	--	male	grower/farmer
rsek10/rq3k4	7/8/2006	Kegalla	Warakapola	Warakapola	Karuna Thilake	48	male	fertilizer distribitor
rsek11/rq2k5	7/8/2006	Kegalla	Warakapola	Warakapola	K.M. Somawardana	62	male	nursery
rsek12/rq1k6	7/8/2006	Kegalla	Warakapola	Warakapola	Seetha Sepalika Rathnayake	43	female	grower/farmer
rsek13/rq1k7	7/8/2006	Kegalla	Warakapola	Warakapola	L.M. Jayawardana	56	female	grower/farmer
rsek14/rq2k8	7/8/2006	Kegalla	Warakapola	Warakapola	W.A. Rupasinghe	47	male	nursery
rq2k9	7/11/2006	Kegalla	Warakapola	Warakapola	Horticulture Research Farm	--	--	nursery
rsek15/rq1k10	7/11/2006	Kegalla	Warakapola	Warakapola	Indika	20	male	grower/farmer
rsek16/rq1k11	7/11/2006	Kegalla	Warakapola	Warakapola	Titus Perera	51	male	grower/farmer
rsek17/rq1k12	7/11/2006	Kegalla	Warakapola	Warakapola	M. Hema Madurasinghe	41	female	grower/farmer
rsek18/rq1k13	7/11/2006	Kegalla	Warakapola	Warakapola	S.B. Edirisinghe	57	female	grower/farmer
rsek19/	7/11/2006	Kegalla	Warakapola	Warakapola	Prfr. Jayarathne	69	male	grower/farmer

Annex D: Malwana workshop: presentation of results and chain reassessment

Place: Lemegempola Temple, Malwana

Date: 19th of August, 2006

Title workshop: *The Rambutan Growers of Malwana*

Aim of the workshop was to present the initial results for the chain/subsector to chain participants and allow for a critical reassessment of these preliminary findings through participatory manner. Of those that took part during the workshop, many had been surveyed previously during the data collection phase. An effort was made into selecting participants with varied backgrounds (exporter, farmer, extension officer etc…) in order to ensure a minimum level of both stakeholders as well as results representativeness.

The workshop was thus divided into three parts: the first one presenting the initial findings of the study; the second one involving the formation of two focus groups (each one headed by one leader) evaluating the major production, marketing constraints and potential solutions; the third involved the setting of an eventual future agenda according to which efforts would have to be undertaken in order to tackle some of the identified issues.

Background information of guests, presented results and key issues raised during the workshop can be found in the following tables here below:

Table D1. Participants Malwana workshop and background information

Chain position participant:	# of participants:
farmer:	40
intermediarie:	0
exporter:	1
agrarian officer:	2
fertilizer (sales) agent:	2
NGO observer	1

Survey Results presented at workshop (1)

Sample descriptive & background data Malwana:
14 growers surveyed in Malwana
93% landownership (one tenancy arrangement)
60% homegarden growers
Average extent: 1.5 acres
Extent low: 0.25 acres/40 perches - Extent high: 2.25 acres/360 acres
Experience cultivating rambutan: 20 years
Total estimated land extent Malwana: 150 acres
Total estimated number of growers Malwana: 150
Total estimated yearly production: 36 million fruits/1200 tons
For most growers the selling of rambutan is a side-business, not a core income generating activity

Key identified issues during survey:

Average tree spacing (35 feet) according to Agri recommended measures

Low and poor usage of fertilizers

No usage of pesticides

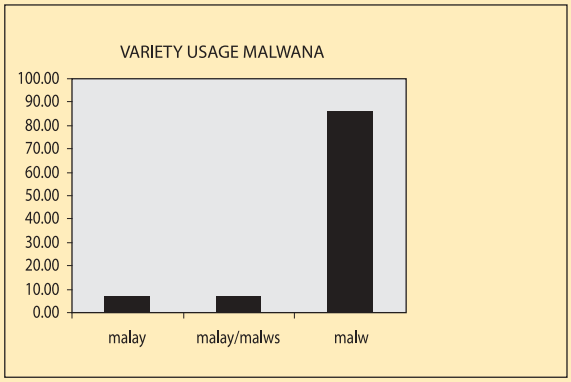
No access to formal credit

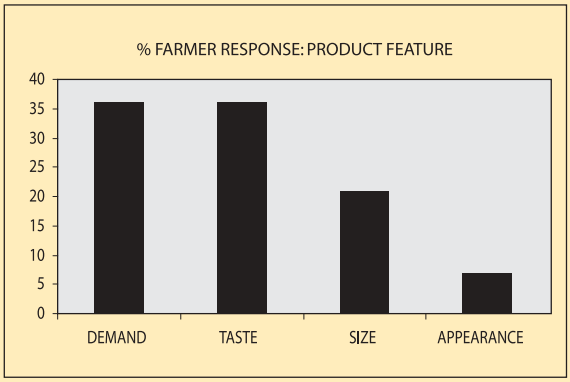
High post-harvest losses: 35%

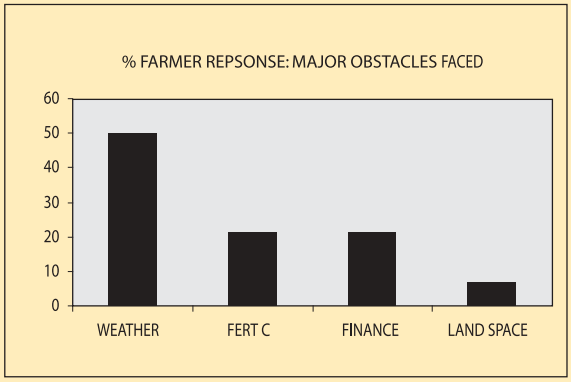
Lack of extension help, many did not ask for it or want it

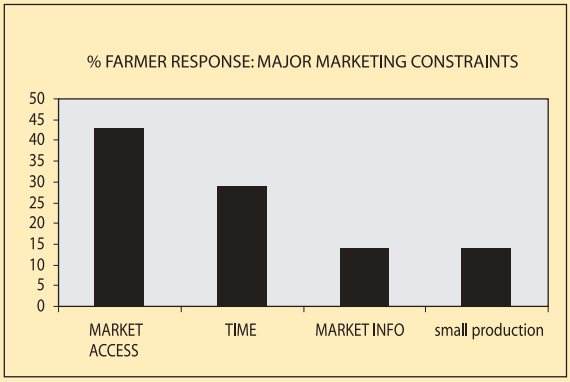
No direct selling, always via intermediary

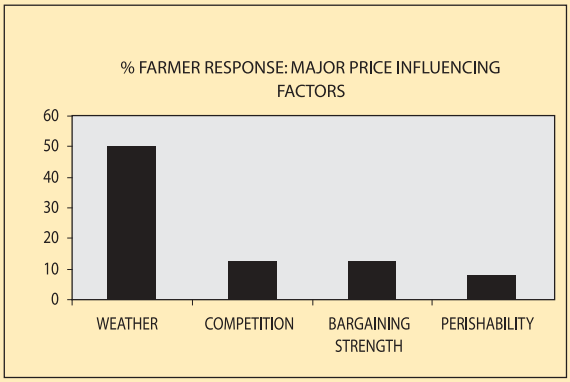
Selling price at start of season: LKR 4/fruit - Selling price at end of season: LKR 3/fruit











During the second part of the workshop, an interactive discussion was held whereby the growers as well as the other producers were to form two sub groups, each named after its group leader. This leader was appointed on the basis of his/her respective experience as a cultivator as well as taking into account several other factors such as: position in the community, degree of involvement in extra curricular activities, wealth etc…

Each group, in a first step, was to make a list of what both the major issues/constraints were pertaining to the production of rambutan. Due to time constraints, a similar procedure identifying the major marketing constraints faced by producers could not be repeated, instead, the group at large was asked to provide a ranking of the major issues on marketing.

Lastly, each sub-group was to evaluate the findings of the other respective group and then produce one, final overall list.

Issues and problems raised by the tow teams: Team S & Team T[23] can be found summarised here below:

	TEAM T		TEAM S	
KEY ISSUES/ PROBLEMS RAISED:	PRODUCTION RELATED:	MARKETING/ RELATED:	PRODUCTION RELATED:	MARKETING RELATED:
1	Quality and coverage of extension services is poor.	Lack of time for both direct sales and harvesting during the season.	Quality of planting material offered by nurseries is often poor.	Lack of time for both direct sales and harvesting during the season.
2	To many unprofitable, low quality (sub) varieties are cultivated.	Presence of intermediaries, cartels and other inhibitors in the big cities.	Fertilizer availability and information on where you can buy it is poor.	Presence of intermediaries, cartels and other inhibitors in the big cities.
3	The cost of a bag of fertilizers is very high.	High set-up costs in the major cities.	The cost of a bag of fertilizers is very high.	High set-up costs in the major cities.
4	N.A.	Lack of access to export markets. Practices are often wrong.	Growers' tree pruning and fruit plucking	Lack of access to export markets.
5	N.A.	N.A.	Post-harvest losses are extremely high.	N.A.
6	N.A.	N.A.	Little inter cropping of rambutan by growers.	N.A.

As can be seen from the table above, the list for production constraints provided for by Tissa's team, compared to Sarath's team was much less exhaustive. Also, by looking at the quality of the answers given by team Sarath, indication seems to be that overall level of technical knowledge concerning rambutan cultivation was much higher in the latter team than in the former. This turned out to be true, Mr Sarath himself was head of the farmer's association for the village of Henegama, was fluent in English and also worked as a part time reporter for a local newspaper. Tissa, while mastering a good overall level of English and being active within the Malwana community, had as his prime occupation primarily the cultivation of rambutan and seemed to be less experience on issues pertaining to agriculture than Sarath.

[23]Each letter serves as an initial for that particular group's team leader. Team S was headed by Sarath Bandara and team T by Tissa Kalybogila.

As mentioned before, the sub-group approach was not used to discuss the major marketing issues and as such, the two columns in the previous table are identical.

At the end, of the workshop, after each group had evaluated the other group's results, the workshop yielded the following major issues faced by the Malwana growers (in descending order) without making any distinction anymore on whether the problem is marketing or production related: lack of access to financial capital; poor quality of planting material; low availability and high cost of fertilizers; low extension coverage and high post-harvest losses.

While the mentioned problems were numerous, the range of offered solutions was limited except for when the growers suggested forming a cooperative in order to improve their bargaining position vis-à-vis intermediaries.

Further, Team S was in favor of adopting special banana-stem made rods instead of the recommended polyethylene bags. The latter causes increased fruit dehydration thus increasing the post-harvest losses. Subsidizing fertilizers was also a popular request.

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