TROPICAL FRUIT NET

Your Global Partner in Tropical Fruits Development

Issue No. 5
JAN 2005

NEWSLETTER

INTERNATIONAL TROPICAL FRUITS NETWORK (TFNet)
Box 334, UPM Post Office, 43400 Serdang, Selangor Darul Ehsan, Malaysia
Tel: (603) 8941 6589 / 8941 6590 Fax : (603) 8941 6591 E-mail: info@itfnet.org Website: *www.itfnet.org*

New Partnership:
Moving the Tropical Fruit Agenda

One of the Millennium Development Goals is to "develop a global partnership for development" in efforts of various parties to combat poverty, malnutrition and hunger. Indeed, since its inception in 2000, TFNet's initiatives in tropical fruit projects, especially for and with its members, have been guided by this principle of win-win partnership and synergistic networking. Logically, partnership enables the mobilization and sharing of resources and expertise as well as avoiding duplication of efforts, in particular, when involving the same target beneficiaries.

However, from our own experience, as more partners are involved in a particular project, the more complicated will be the relationships or rules of engagement and if not handled judiciously, the project may not get off the ground or aborted soon after its implementation. The reasons are obvious, each party has its own bureaucratic idiosyncracies and workculture that must be adapted to accomodate the partners. What more if the project is supposed to yield economic returns and each party has its own notion or norm of how much financial benefit should accrue to each its partners.

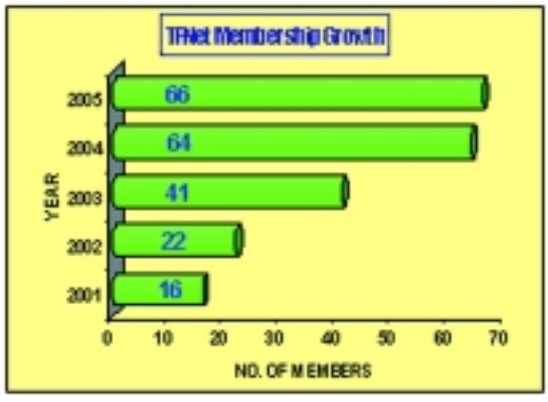
Somehow, TFNet has been able to seal some partnership projects in the past on the premise of developing long term relationships and mutual benefits and less on short term gains. As covered later in the newsletter, TFNet has established beneficial interphases with an international development bank, a multinational corporation and a small-medium scale entrepreneur to move forward the agenda of the tropical fruit industry in a sustainable manner, in particular sharpening the knowledge and skills of the stakeholders in the industry so as to better prepare them to make informed decisions in a competitive environment.

"A man may esteem himself happy when that which is his food is also his medicine."
- Henry David Thoreau

"Fresh fruits, vegetables, nuts, and seeds can provide plentiful plant enzymes."
- Howard F. Loomis Jr., D.C.

"People think that if they simply take vitamins and minerals they will be healthy, but every vitamin and mineral requires an enzyme. You can eat pounds and pounds of vitamins and minerals, but if you don't have the proper enzymes, they don't work."
- Dr. Lita Lee, Ph.D.

"The primary cause of our disease is in us, always in us."
- Antoine Beachamp, 1883



In this issue...

IDB - TFNet : International Study Visit cum Workshop on Postharvest Handling and Processing of Tropical & Subtropical Fruits

Honourable Deputy Minister of Agriculture & Agro-based Industry, Malaysia (centre) at the opening ceremony

...during the seminar session

...and at the orchard

PARTICIPATING COUNTRIES:

EGYPT:	*Horticulture Research Institute*
INDONESIA:	*Directorate of Fruit Crops*
IRAN:	*Hormozgan Agri Jahad Organisation*
MALAYSIA:	*Department of Agriculture*
OMAN:	*Ministry of Agriculture & Fisheries*
PAKISTAN:	*National Agriculture Research Centre*
SENEGAL:	*Institut De Technologie Alimentaire*
SUDAN:	*Ministry of Agriculture & Forestry*
SURINAME:	*Ministry of Agriculture*
UGANDA:	*National Agriculture & Research Organisation (NARO)*
YEMEN:	*General Authority for Agricultural Research*

In collaboration with Islamic Development Bank (IDB), TFNet successfully organised a five-day International Study Visit cum Workshop on Postharvest Handling and Processing of Tropical and Subtropical Fruits from September 6-10, 2004 in Kuala Lumpur, Malaysia.

This international event was officiated by the Honourable Deputy Minister of Agriculture & Agro-based Industry of Malaysia, Dato' Seri Kerk Choo Ting. Also present were the Regional Director of the Islamic Development Bank, Mr. Ahmed Saleh Hariri and honourable guests including Ambassadors, High Commisioners, Trade Commissioners, and Heads of departments and agencies.

With 11 participating countries comprising 28 participants from government agencies and the private sector, this programme focused on the importance of postharvest activities in the fruit industry and its potential contribution to output, export and employment.

The objectives of this programme were:

- To inform participants on current and latest trend and development in postharvest handling and processing of tropical and subtropical fruits.
- To conduct a Needs Assessment on the tropical and subtropical fruit sector of participating countries, particularly in the areas of postharvest handling and processing.
- To provide opportunities to participants for networking and making business contacts.

Some of the key papers presented were:

- *Global Outlook on Tropical & Subtropical Fruit Development*
- *Good Manufacturing Practice (GMP) & Hazard Analysis and Critical Control Point (HACCP)*
- *Information Technology in Supply Chain Management*

A Panel Discussion on *Market Access: International Standards & Regulations Compliance* was also held.

The findings of the Needs Assessment Workshop are as below:

1) The need to enhance extension and delivery systems.
2) The need to develop better logistics and infrastructure.
3) The importance of government's role in formulating policies that will benefit producers, and prioritization of research and development, logistics and market aspects.
4) Market access related to networking and partnerships among member countries.
5) Access to affordable inputs which includes processing machinery.

Included in the programme were visits to agricultural small and medium entrepreneurs, research institutions and private food processing companies.

Visits to marketing agency (left) and fruit processing company (right)

Syngenta & TFNet Assist Fruit Growers Access EU Markets

Syngenta Crop Protection Sdn Bhd and TFNet signed a Memorandum of Understanding (MOU) at the Malaysian Agriculture, Horticulture & Agrotourism Show 2004 (MAHA 2004) on 5 October 2004. Syngenta was represented by its General Manager, Mr. John McGillivray, and TFNet by its Chief Executive Officer, Mr. Khairuddin Md. Tahir. The signing ceremony was witnessed by the Honourable Prime Minister of Malaysia, Datuk Seri Abdullah Ahmad Badawi.

The signing ceremony witnessed by the Honourable Prime Minister of Malaysia

Responding to the demands of consumers, retailers and their global suppliers have created and implemented a series of sector specific farm certification standards with the aim of ensuring integrity, transparency and harmonisation of global agricultural standards.This includes the requirements for safe food that is produced respecting worker health, safety and welfare, and environmental issues.

Fruit exporters to Europe increasingly need to comply with the production standards determined by the **EUREPGAP** certification scheme. Achievement of EUREPGAP certification is through auditing by visiting EUREPGAP inspectors, and with this, the "licence to sell" to the lucrative EU markets.

Prior to the farm audit by EUREPGAP inspectors, an internal audit is usually conducted in order for to ensure that growers' production systems are compliant with EUREPGAP. During this internal audit, producers/growers will be advised of any deficiencies, and the required corrective action to be taken before the farm audit by EUREPGAP inspectors. In this respect, Syngenta has the capacity to provide the requisite knowledge pertaining to the use of agrochemicals compliant with EUREPGAP, and the relevant accreditation to conduct the EUREPGAP internal audit.

Through the signing of the MOU, Syngenta will collaborate with TFNet in the following areas:-

- Provision of **EUREPGAP PRE-COMPLIANCE AUDIT (Farm Group Internal Audit)** services to members of TFNet who export fruits to EU, and who are certified under the Malaysian Farm Accreditation Scheme (SALM);
- **Establishment of an education and training fund** which will be utilised to provide education and training on (i) pest & disease management, and (ii) safe use of agrochemicals and application technology to TFNet members.

Farmers will benefit through this strategic partnership as they will be able to compete with producers/growers from other countries in accessing the lucrative EU markets. In addition, new markets for specialist / indigenous produce that are EUREPGAP compliant can be developed in the EU. More importantly, the government's vision of developing agriculture as a key economic contributor will be supported as fruit exports increase.

EUREPGAP started in 1997 as an initiative of retailers belonging to the Euro-Retailer Produce Working Group (EUREP). It has subsequently evolved into an equal partnership of agricultural producers and their retail customers. Their mission is to develop widely accepted standards and procedures for the global certification of Good Agricultural Practices (GAP).

MALAYSIAN AGRICULTURE, HORTICULTURE & AGROTOURISM (MAHA) SHOW 2004

Exhibitions & Demonstrations during MAHA Show 2004

As part of a contribution to the agriculture sector focusing on the tropical fruit industry, TFNet has set up a booth during the show to promote tropical fruits to all the visitors and to share information on the tropical fruit industry.

The main focus is to promote the nutritional value of fruits and to create an awareness on fruits as an enjoyable food in take for a healthier lifestyle.

ENHANCING SKILLS IN FOOD PROCESSING

TFNet and the Integrated Farming Development Centre (SPAT) in Malang, East Java jointly organised the "Hands-on Skill Enhancement Workshop and Study Visit" in Malang, East Java on 23-27 January 2005.

The objectives of this programme were:

- To familiarise participants with the knowledge of various products and steps in chips and nugget processing;
- To provide technical skills through hands-on experience in various aspects of chips and nugget processing; and
- To expose participants to postharvest handling and processing activities of the main fruits in East Java, Indonesia.

This programme, specifically designed for community extension leaders, trainers, and would-be entrepreneurs, focused on the practical aspects of fruit chip and sweet potato nugget processing. A hands-on practical session was conducted at SPAT, and participants prepared fruit chips using the vacuum frying machine, as well as fruit nuggets.

Fruit processing equipment at Briwijaya University

... in deep concentration

The study visit segment of the programme acquainted participants with the trend and development of postharvest handling and processing activities. During the visit to the Brawijaya University, there was a briefing on fruit-chip making industry, and various types of fruit chip making equipment were shown. At the Merdeka University, participants prepared traditional food from tropical fruits. Visits to agrotourism attractions included the Buluhkerto apple farm, Kusuma Agrotourim Park (strawberry farming and fruit juice processing) and Lawang tea plantation.

Following the success of this workshop, it is envisaged that the collaboration between TFNet and SPAT will be further enhanced, with reciprocal visits by participants from both countries.

Gallant men in aprons!

'Mana Lagi' apple in Buluhkerto

"We live by our imagination, our admirations, and our sentiments."

-anonymous-

TFNet UPCOMING EVENTS

TFNet / SPAT 2nd HANDS-ON SKILL ENHANCEMENT WORKSHOP & STUDY VISIT

Event Date : July / August, 2005

Venue : SPAT, Malang, East Java, Indonesia

Registration Fees:

RM3,000.00 (USD800.00) inclusive of:

- airfare (Malaysia Airlines)
  - discounted economy fair
  - ex-Kuala Lumpur International Airport to Juanda Airport, Surabaya, Indonesia
- accommodation & meals
- taining kit & raw materials
- transportation in Surabaya

For more details and further enquiries about the event's programme and registration process, please visit our website:

http://www.itfnet.org

or contact us at:

Tel. : (603) 8941 6589 / (603) 8941 6590
Fax : (603) 8941 6591
E-mail: info@itfnet.org

2nd ANNOUNCEMENT OF THE 1st INTERNATIONAL SYMPOSIUM ON PAPAYA

22-24 November, 2005

Genting Highlands Resort, Malaysia

Organised by: MARDI, ISHS, ISAAA, TFNet

Objective of the Symposium:
Elevating the status of the papaya from cultivation in traditional smallholdings to commercial orchards globally grown and the fruit internationally traded.

Keynote Speakers:

- *International Trade & Marketing* by Mr. Loren Mochida, USA
- *Breeeding & Genetics* by Dr. Chan Ying Kwok, Malaysia
- *Biotechnology* by Dr. Dennis Gonsalves, USA
- *Cultural Practices & Cropping Systems* by Dr. Osvaldo K. Yamanishi, Brazil
- *Pest & Disease Management* by Dr. Shi-Dong Yeh, Taiwan
- *Postharvest Handling & Storage* by Dr. Robert E. Paull, USA
- *Product Development & Processing* (to be identified)

Registration Fees:

ISHS Member : USD400.00
Non-ISHS Member : USD 450

For more details, please visit this website:

http://www.itfnet.org

or e-mail: miramlah@mardi.my

STRATEGY AND ACTION PLAN FOR THE DEVELOPMENT OF THE TROPICAL FRUIT INDUSTRY IN FIJI

INTRODUCTION

Fruit production in Fiji in the past was a combination of success and failure. Fiji is small in size and remote in location compared to the rest of the world and this puts her at a disadvantage when it comes to competition. Being located in the cyclone belt, the weather has played an important role in the selection of fruits for Fiji. Pests and diseases also have been key factors in the withdrawal of some of Fiji's export commodities from the market.

Banana was exported to New Zealand in large quantities up to the late sixties when the Black Sigatoka Disease took its toll and knocked Fiji banana off the New Zealand market. Passionfruit was a thriving industry and a good source of income for farmers in the Sigatoka Valley in the sixties and seventies when the potty virus virtually destroyed the industry up to now. Pineapple and oranges were planted in large acreages in the early eighties mostly for juice extraction for exports. These could not survive the competition in the international market and as a result, the company went bankrupt.

PRODUCTION

Fruit production is carried out at three levels namely commercial, semi-commercial and subsistence. Commercial farmers sell all their produce either locally or abroad. Their activities are systematic and well-coordinated and production is usually on a large scale.

Semi-commercial producers adopt a commercial outlook only when the crop is bearing and would revert to subsistence farming when production ceases. Production is usually not sustainable due to the lack of forward planning. The subsistence grower is one who depends on the one or two trees planted around the property plus those growing naturally in the wild for subsistence. The produce is sold by the roadside or to buyers who come to the farm.

Tropical fruit production in Fiji is seasonal and the weather is usually a setback: heavy rains and strong winds during the critical stages of development of the trees usually result in reduced or no production. This is especially true for the introduced varieties of mangoes.

The acreage planted to the 3 main fruit types is given in Table 1 below:

Table A.1 Fruit Production (Mt) and Area harvested (ha) 1997 – 2001

	1997		1998		1999		2000		2001	
FRUITS	Mt	Ha	Mt	Ha	Mt	Ha	Mt	Ha	Mt	Ha
Pineapple	2974	258	2534.3	46.6	2130	40	2422.5	200.1	2614.7	207.3
Pawpaw	1745	73	2072	72.9	751.9	15.6	1601.74	59.14	1758	68.4
Mango	45	72.2	246	72.2	32	72.2	48	26.6	33.6	34
Total	**4764**	**403.2**	**4852.3**	**191.7**	**9681**	**127.8**	**4072.24**	**285.8**	**4406.3**	**309.7**

Source: MASLR Annual Report

There is market potential for the indigenous or naturalized fruits of Fiji as they are adapted to the harsh weather conditions. These fruits are gaining recognition for their nutritive value.

A summary of the current situation and prospects for the three (3) main fruit types is given below:

Pineapple (*Ananas comosus*)

In Fiji, pineapple is an ideal crop for sloping land management. It is grown as a monocrop or as an inter-crop with pulses to prevent soil erosion.

The varieties grown are *Rough Ripley Queen, Smooth Cayenne,* and *Veimama.* The average farm size is one (1) ha and the planting density is 48,000 plants /ha from double row planting (100cm x 40cm x 30cm). Pineapple can be grown all year round but best results are from March/April plantings.

Peak production is in November and December under natural conditions. For year round production, planting is done monthly with hormone application. Yields for main season production vary from 60–65 tonnes/ha for *Smooth Cayenne*, 45–50 tonnes/ha for Veimama, and 35–40 tonnes/ha for *Ripley Queen.* However, similar yields could be achieved with 85% fruitset with hormone application.

Pawpaw (*Carica papaya*)

Pawpaw is currently grown as a monocrop. Some Indian farmers practise share-farming with landowners who do not have the resources to develop their land, while other growers pay an agreed rental for the use of land. Farm sizes vary from 0.2 – 7 ha, and planting density is 1,667 plants/ha (3m x 2 m spacing). The main varieties grown are *Sunrise Solo* and *Waimanalo.*

Pawpaw is best planted between October and November when there is sufficient soil moisture for proper establishment of the plant. The pawpaw flowers at six months with fruits appearing after nine months. Production peaks in three years. Replanting should be done after the second year to ensure continuity of supply. The average yield is 195 tonnes/ha and the unit cost of production is $0.17/kg.

Fruits for export are required to meet quality standards viz. smooth skin that is free from latex stains and bruises, average weight of 350 grams and oval in shape. The prospects for increased production are good as the quarantine pathway to enter the Australian market has been established.

Mango (*Mangifera indica*)

Mango was mainly grown in the backyard until recently when marginal land and sugar-cane headlands particularly in mango producing areas were utilised, with selected farmers planting 10 to 100 trees each. Commercial farms however, are still limited to 2 main sites i.e. Jack's Farm in Nadi and Yaqara Farms in Tavua. Backyard type farming using the out-grower concept continues to be the main mode of increasing tree population and achieving desired production levels. Due to its short seasonal production with an early or late fruiting behaviour, mango is grown as a supplementary crop, and total dependence on this crop is uncommon. Generally, individual tree (spot) planting is prevalent, and orchards incorporate grazing and inter-row crop cultivation.

The exotic varieties viz. *Mapulehu, Kensington, Tommy Atkins, Mexican Kent, Edward, Tahitian* and *Carabao,* have wider consumer acceptance and complement major export

The Fijian fruit market...

market preferences. There are however, several promising varieties available at Legalega Research Station for future market assessments (a total of 47 cultivars in germplasm collection plots).

The local (homestead) varieties viz. *Peach, Parrot, Juicy* and *Jara (Kerosene),* perform very well in the warm western side of the main Islands with a few exceptions of the *Parrot (Baramasia)* fruiting heavily and consistently in the areas with higher rainfall and wet conditions. The local mangoes are generally fibrous, with a high percentage of blemishes, and uneven in ripeness and size, but this is acceptable to the local market. Exotic varieties have been the top preferences in the fresh fruit market for the New Zealand and Japanese consumers. However, only 30 percent of the production meets the quality standards and quarantine requirements; poor harvesting and postharvest practices are major factors contributing to the high rejection rate (70%).

Mango can be planted throughout the year but its establishment is best during the rainy season i.e. November– April. Grafted seedlings come into production in the 3rd– 4th year but economical fruiting is expected from the 7th year. In Fiji, the yield of exotic mango is erratic; however, a well structured bearing tree can produce fruits in a good season as follows:

- Local varieties – Maximum 500 kgs/tree (approximately 50 tonnes/ha)
- Exotic varieties – 10–150 kgs/tree (approx 1–1.5 tonnes/ha)

Mango is considered to be highly profitable with potential as an export commodity, benefiting from the seasonal advantages over the Northern Hemisphere producers. Nearby markets of New Zealand and soon Australia recognize Fiji as a source of supply of fresh fruit with regular airline connections and reliable quarantine protocols. Government, exporters, farmers and other stakeholders place high priority on organized planting and production of this crop whilst maximising the utilization of the large production of the local varieties through the window of export opportunities and downstream processing.

CONSUMPTION, MARKETING & TRADE

The bulk of local fruits is consumed locally and very little is exported. Five hotels in the Coral Coast and twelve from the Nadi area use 548 tonnes of local fruits annually. The major fruits are papaw, mango, pineapple, watermelon, lemon, lime, passion fruit, banana, avocado and guava. Consumption in the hotels depends on occupancy rates and this is envisaged to increase in the future.

Fruit is not normally a part of the family meal in the rural areas; most of the fruits consumed in the rural areas are consumed outside mealtimes, mostly in the gardens or when people loiter around the village. The urban dwellers however usually have fruits with their meals if they can afford them.

The marketing of fruits in Fiji is not well coordinated. Middlemen dominate the scene and this is the reason why small growers do not show much interest in increasing production. Small subsistence growers usually sell their fruits from market stalls or take them to the consumers directly. The export sector is more organized, guided by rules and guidelines that are strictly adhered to by all stakeholders.

Approximately 625 tonnes of fruit and fruit products were exported in 2002.The two major fruits exported were papaw (244 tonnes) and mango (35 tonnes). In as far as new markets and opportunities are concerned, Australia has opened up for re-exporting of papaw. The main ethnic markets targeted are in New Zealand and Australia with increasing potential in Canada. Market development activities should be pursued to take advantage of available markets and to create an environment that will allow for the future expansion of fruit exports. New products that can be further promoted include breadfruit, star apple, jackfruit, ivi *(Inocarpus fagiferus)*, wi *(Spondias dulcis)*, Fijian mandarin, watermelon, seedless lime, kaffir lime leaves, lemon grass and gumfruit for pickling.

PROCESSING

There are two (2) major fruit processing companies viz. (i) Fiji Foods (Vatuwaqa Suva), and (ii) Atys (formerly South Pacific Foods), Sigatoka. Both are large processors with one processing plant each in Fiji, although Atys is a global company with processing plants in 15 countries. Both companies export to Australia, New Zealand, Canada, U.S.A and Tahiti. However, Fiji Foods also sells its products locally.

The types of food that are processed and exported are canned breadfruit and ivi (both indigenous fruits), diced and canned banana (approximately 2,000 tonnes), mango pulp/puree (600 tonnes) and guava pulp/puree (600 tonnes).

The new products being developed by Fiji Foods include pineapple, "tropical jams" using assorted fruits, and vacuum packed breadfruit. Atys, on the other hand, is involved in pineapple processing. However, the problem is supply and being part of a global company, the pineapple is sourced from Brisbane. Pineapple is also expensive to buy locally; growers are not willing to sell pineapple at 30 cents/kg. Atys is looking into processing of the *Waimanalo* pawpaw because it is easier to handle (peel) and has 40% pulp yield compared to 20% pulp yield in *Sunrise.*

CONTRAINTS ANALYSIS

Physical & Institutional Infrastructure

Poor road conditions are a major constraint in fruit production and marketing in the rural areas, and contribute significantly to the high postharvest losses experienced by growers and exporters. In addition, the lack of proper irrigation facilities add to the poor quality of fruits.

There are no collection centres for cleaning, grading and sorting of fruits for the market. Fruits are just transported at the back of open trucks in bags or cases, or left loosely on the floor of the carriage. There is no formal marketing network in place, and buyers compete among themselves, and growers suffer at the end of the day.

The long distances from major markets are a problem e.g. the transport cost of fruits from Vanua Levu that are sent to Viti Levu for export to New Zealand is very high as there is no port in Vanua Levu.

Support Services

Support services from the Government are provided by the Extension and Research division of Ministry of Agriculture, Sugar and Land Resettlement (MASLR). Funding is limited, and its late release affects the ability of Extension to support farmers in the "1/3 farmer : 2/3 Government" payment system for farm inputs. In addition, current support services do not seem to help farmers who do not have machinery.

Unreliable water and electricity supply has also led to the breakdown of specialised processing equipment. Unskilled workers add to the problems faced by processors.

Access to Land, Labour, Capital & Technology

Land is plentiful but access is difficult to non-Fijians who are the bigger fruit growers. Even Fijians working on communal land face difficulty in planting on a commercial scale because all the members of the *Mataqali* would be vying for the same land. Non-Fijians feel insecure about the non-renewal of leases, and therefore refrain from investing for the long term. Investors in share-farming agreements with landowners are also suspicious of foul play, rendering such agreements short-lived.

Labour is plentiful and accessible under the right conditions. Capital is inaccessible to farmers on communal land whereas those on leased land can obtain loans from the Fiji Development Bank.

Production technology, while freely available, is not fully utilised by farmers; they adopt only parts of the technology package that are affordable to them.

Markets

The market for fruits is not a problem; the main constraints are supply and marketing. Long distances from markets make farm produce more expensive e.g. mango from Vanua Levu landed in Nadi is more costly than Nadi mango transported to New Zealand. The absence of a port at Vanua Levu is a constraint.

Facilities in the local markets are sub-standard and contribute to the short shelf life of fruits. In addition, competition from cheap imports from Asian countries is also a threat to local fruits.

STRATEGY AND ACTION PLAN

i. Policies & Programmes

- Government assistance on Machinery & Farm Services. The government should create a machinery pool to assist resource-poor farmers to carry out large operations like land preparation at a reasonable cost.
- Seed production should be moved from Research to the private sector.
- The government should provide funding for capital costs of seed production – coolers, seed cleaners, etc. This will provide incentives to the private sector to take up seed production.
- Large-scale pineapple production should be highlighted in the Ministry's programme for Viti Levu.
- There should be clear policy guidelines on the development of indigenous/naturalized fruits that are highly nutritious but are currently neglected. Most of these fruits have a lot of potential for export and or processing.
- The Fruit Industry Council should be strengthened, with initial funding from the government to engage a full salaried Chief Executive and secretariat. The consultation process should be used to establish membership among farmers, marketers and processors.
- An enabling environment should be created for potential investors. Fijians should be encouraged to make best use of their land, and *Mataqali* run orchards can be a way to utilize their huge land resources.
- Organic fruit production should be incorporated into the Ministry's programme to capitalise on demand for organic products internationally.

ii. Mobilising Market Players

- An up-to-date market information system should be established so that stakeholders are informed of market trends locally and abroad. Farmers should also be made aware of market requirements and marketing. The government marketing body to purchase fruits from farmers should be re-established.

iii. Building physical & institutional infrastructure

- Central packhouses and information centres should be set up in major production areas e.g. Nadi, Lautoka/Ba, Tavua/Rakiraki, Ra, Tailevu North Coastal area, Tailevu North inland, Upper and lower Naitasiri, South Tailevu/Rewa, Serua/Namosi, Seaqaqa and Nasarowaqa. In addition, roads to inland producing areas should be upgraded. International airports and ports should be developed at Nausori and Waiqele, and Savusavu respectively.
- The Quarantine Division should be strengthened, and effective plant protection services provided to farmers.
- The Development aspect that is carried out by Extension needs to be strengthened through the provision of good vehicles, and back-up support of funds and inputs.

iv. Reinforcing Support Services

- Resources should be made available for mass production of pineapple and other fruit planting material.
- Fruit collection centres should also act as information centres and market centres where agro inputs are made available at reasonable prices.

v. Strengthening Research & Development

- There should be ample funding for research, with a corresponding training programme for research personnel.
- Collaboration with other national, regional and international research organisations for the sharing of information is vital.

vi. Developing Markets (Domestic and Foreign)

The mid-term report of the Alternative Livelihood Project identified three marketing opportunities for produce from the sugar cane belt and this could be applied to tropical fruits viz.

- Type 1 Market Opportunities: Existing markets that can be immediately expanded

Type 1 market opportunities relate to fruits that are currently under-supplied to identified export and/or domestic markets. Little or no additional capital investment is required, only a more focussed Research and Extension effort, and some adjustments to Quarantine arrangements are required. Type 1 opportunities for fruits are:

Export Markets

- o Expanding list of Quarantine treated products – pawpaw, mango, breadfruit, etc.
- o Expanding non-fruitfly host products that are allowed to be exported to New Zealand e.g. pineapple.
- o Expanding markets of processed fruits eg. banana, guava, breadfruit and ivi.

Local Markets

- o Off–season pineapple and all the other locally produced fruits.

- Type 2 : Market Opportunities : Market opportunities that can be developed in a short period

Type 2 products are locally produced and are adapted to local conditions. These include the indigenous and naturalized fruits identified for export and /or local markets, and could be exploited in a relatively short time if certain constraints and impediments are removed. It will require investment, and a concerted market access effort on the part of Quarantine and Ag Trade, and focused extension and applied research. Type 2 opportunities are:

Export Market

- o New Quarantine treated products – jackfruit, wi, carambola, etc.
- o Breadfruit, banana, certified organic products, medicinal products.

Local Market

- o Increased sales of local produce to the tourism market.
- o Local indigenous nuts like ivi and vutu (*Barringtonia racemosa* Linn.).

It is envisaged that over the next five years Type 1 & 2 opportunities will be put in place and will enable farmers to increase their earnings.

- ⊙ Type 3 Market Opportunities: Opportunities that could possibly be exploited in the longer term.

For Type 3 opportunities, there is no market structure in place and substantial agribusiness investment is required. Some examples include larger scale pineapple, nuts and exotic fruits.

vii. Promoting Multilateral and Bilateral Cooperation

The Quarantine and Plant Protection sections should actively pursue the development of Quarantine protocols for fruits that Ag Trade has identified for markets overseas. In addition, farmers, exporters and all stakeholders should be aware of the importance of strict compliance to all protocols and agreements.

Summary of Paper Presented by:
Mr. Apisai Ucuboi
Principal Senior Research Officer
Ministry of Agriculture, Sugar & Land Resettlement (MASLR), Fiji
at TFNet Second General Assembly, July 2003

"Change is the law of life and those who only look to the past or the present are certain to miss the future." **JOHN F. KENNEDY, 1963**

GLOBAL TRADE OF PROCESSED TROPICAL AND SUBTROPICAL FRUIT PRODUCTS

Processing of tropical and subtropical fruits into a number of products is an important value added activity in a number of producing countries, particularly Asia. The export of these processed products such as canned pineapples, juices from pineapple, mangoes, grapefruits, citrus and lemons contributes significantly to the fruit sector of these countries. In 2003, the export value of processed tropical and subtropical fruit products amounted to about USD1,630 million, an increase of 40 percent from USD1,160 million in 1994.

EXPORT MARKET

The global export volume of processed tropical and subtropical fruit products had increased by 35 percent during the last decade from 1.9 million mt in 1994 to 2.5 million mt in 2003 as shown in Table 1. Processed pineapple products are the major products traded in the tropical and subtropical processed products market. In 2003, canned pineapple, concentrates, and single strength pineapple juices accounted for 71 percent of the total global export volume of processed tropical and subtropical fruit products. There has been a significant growth of 21 percent in the export volume of pineapple juice concentrates during the last decade, increasing from 56,200 mt in 1994 to 386,700 mt in 2003.

In value terms, the export of processed tropical and subtropical fruit products has increased significantly by 40 percent from USD1,160 million in 1994 to USD1,630 million in 2003. Canned pineapple is the major contributor with an export value of USD650 million, representing about 40 percent of the total export value of processed products in 2003 as shown in Table 2. Pineapple juices accounted for another 30 percent or USD470 million in 2003. The other major products are juices from grapefruits, citrus, lemons, and mangoes.

Countries in Asia are the major global exporters of processed tropical and subtropical fruit products. In 2003, almost 60% of the global export volumes of these products were shipped by countries in Asia, with Thailand and the Philippines accounting for 25% and 19% respectively as shown in Table 1. In value terms, the export of processed products from Asia amounted to about USD809 million in 2003, with Thailand and the Philippines' exports accounting for USD413 million and USD180 million respectively. Europe is the next major exporting region, with the Netherlands exporting about USD207 million or 13% of the total global export value in 2003 as shown in Table 2.

Table 1: EXPORT QUANTITY OF PROCESSED TROPICAL & SUBTROPICAL FRUIT PRODUCTS 1994 - 2003 (mt)

A: By Product Types

EXPORT - QTY (mt)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
Pineapples, Canned	1,109,687	993,573	1,012,190	799,879	771,795	1,060,977	1,074,106	1,078,321	1,012,110	1,151,092	45.32	0.37
Pineapple Juice Concentrates	56,288	67,772	75,853	59,982	56,632	68,757	27,567	27,173	157,633	386,705	15.23	21.25
Pineapple Juice Single-Strength	276,406	284,489	270,265	224,820	267,658	290,234	376,710	403,333	253,127	255,821	10.07	-0.77
Grapefruit Juice Concentrates	79,269	102,363	97,828	92,150	70,156	143,091	196,393	185,743	168,132	234,545	9.23	11.46
Grapefruit Juice Single-Strength	103,902	118,001	113,821	120,988	150,237	158,212	163,885	179,529	193,423	156,808	6.17	4.2
Fruit Tropical Dried	26,237	16,883	51,386	103,301	28,831	39,474	110,165	39,888	30,623	131,753	5.19	17.51
Citrus Juice Concentrates	27,082	37,659	48,281	47,478	57,291	61,659	48,316	46,293	65,634	77,670	3.06	11.11
Citrus Juice Single-Strength	124,852	123,782	102,709	110,587	124,762	208,022	167,257	157,754	58,523	51,920	2.04	-8.4
Lemon Juice Concentrates	18,850	19,007	17,280	12,733	12,889	14,379	16,877	12,263	51,226	47,010	1.85	9.57
Lemon Juice Single-Strength	12,963	15,123	15,169	21,517	24,016	22,440	29,717	31,369	30,046	25,147	0.99	6.85
Mango Juice	5,263	8,821	14,908	19,212	14,816	4,241	3,906	8,928	9,833	11,848	0.47	8.45
Mango Pulp	43,319	43,748	6,992	6,162	5,600	6,391	6,893	7,670	7,609	9,510	0.37	-14.07
TOTAL	**1,884,118**	**1,831,221**	**1,826,682**	**1,618,809**	**1,584,683**	**2,077,877**	**2,221,792**	**2,178,264**	**2,037,919**	**2,539,829**	**100.00**	**3.03**

B: By Regions

EXPORT - QTY (mt)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
World	1,884,118	1,831,221	1,826,682	1,618,809	1,584,683	2,077,877	2,221,792	2,178,264	2,037,919	2,539,829	100.00	3.03
Asia	1,230,768	1,123,714	1,107,225	860,333	847,410	1,197,070	1,236,843	1,233,382	1,122,681	1,447,000	56.97	1.63
Europe	267,149	298,088	297,847	282,943	297,700	308,805	301,860	369,347	411,338	474,266	18.67	5.91
Latin America & Caribbean	68,754	81,517	104,241	170,142	115,477	140,485	242,341	153,800	137,442	236,368	9.31	13.14
USA	155,845	163,855	163,869	169,004	173,344	296,406	265,339	247,973	194,477	203,715	8.02	2.71
Africa	154,082	155,442	146,152	129,080	142,658	127,038	166,383	164,786	162,185	167,530	6.60	0.84
Oceania	6,252	6,089	5,002	5,314	5,600	6,531	4,718	5,390	6,463	6,738	0.27	0.75
Other Regions	1,268	2,516	2,346	1,993	2,494	1,542	4,317	3,586	3,333	4,212	0.17	12.76

C: By Major Countries

EXPORT - QTY (mt)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
Thailand	623,573	497,783	444,433	357,285	309,037	598,164	571,924	534,456	495,456	622,437	24.51	-0.02
Philippines	300,436	287,950	363,550	272,573	311,635	270,309	377,201	393,527	280,279	479,277	18.87	7.56
United States of America	155,845	163,855	163,869	169,004	173,344	296,406	265,339	247,973	194,477	203,715	8.02	2.71
Netherlands	74,280	92,015	91,188	105,716	110,470	128,095	107,493	153,755	151,505	178,994	7.05	9.19
Indonesia	106,512	106,741	151,328	83,907	43,412	162,879	152,094	156,976	177,662	146,130	5.75	3.21
Guatemala	201	13,459	42,054	13,997	28,268	32,948	103,469	35,426	23,906	120,493	4.74	89.57
Kenya	82,235	95,961	92,214	87,311	98,476	72,602	76,898	92,002	80,325	91,056	3.59	1.02
China	12,883	10,118	11,287	20,746	55,827	37,063	25,089	29,472	45,840	62,112	2.45	17.04
Spain	15,939	16,249	17,215	15,518	25,542	30,026	33,382	39,672	49,957	61,310	2.41	14.42
Germany	31,330	29,789	32,204	29,335	39,396	35,132	33,330	32,845	46,202	59,216	2.33	6.57
Others	80,884	517,301	417,340	463,417	389,276	414,253	475,573	462,160	492,310	515,089	20.28	0.69
WORLD TOTAL	**1,884,118**	**1,831,221**	**1,826,682**	**1,618,809**	**1,584,683**	**2,077,877**	**2,221,792**	**2,178,264**	**2,037,919**	**2,539,829**	**100.00**	**3.03**

(Data Source: FAOSTAT)

Table 2: EXPORT VALUE OF PROCESSED TROPICAL & SUBTROPICAL FRUIT PRODUCTS 1994 - 2003 (USD '000)

A: By Product Types

EXPORT - VAL	YEAR										Percent of	Avergae Annual
(1000$)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Year 2003 (%)	Growth Rate (%)
Pineapples, Canned	573,458	570,894	683,909	538,191	503,658	676,050	516,645	525,309	575,630	649,667	39.86	1.26
Pineapple Juice Concentrates	32,966	45,946	61,197	49,440	44,139	49,586	17,106	17,755	131,130	259,901	15.95	22.93
Pineapple Juice Single-Strength	176,267	214,867	265,202	206,002	209,114	251,230	207,719	225,755	160,014	208,707	12.81	1.7
Grapefruit Juice Concentrates	77,595	97,948	76,739	59,817	51,537	85,156	126,200	104,750	96,196	151,670	9.31	6.93
Grapefruit Juice Single-Strength	84,920	95,782	89,339	88,091	98,989	116,410	132,015	137,949	152,139	113,939	6.99	2.98
Citrus Juice Concentrates	21,579	36,503	45,424	39,892	37,843	43,079	39,438	32,597	62,110	84,537	5.19	14.63
Citrus Juice Single-Strength	100,786	116,447	118,813	115,888	104,888	123,286	121,319	127,257	54,939	46,430	2.85	-7.46
Lemon Juice Concentrates	9,717	10,018	14,570	14,310	11,995	10,920	13,612	10,168	48,178	43,018	2.64	16.04
Lemon Juice Single-Strength	13,348	16,538	20,144	25,992	26,109	25,996	33,625	36,527	31,287	32,943	2.02	9.45
Fruit Tropical Dried	32,171	8,114	15,389	30,025	4,271	14,528	9,392	8,796	7,857	24,237	1.49	-2.79
Mango Pulp	33,089	33,340	7,095	6,409	5,144	5,691	5,826	6,202	5,892	7,510	0.46	-13.78
Mango Juice	4,586	7,047	9,994	9,564	6,947	3,935	3,090	5,957	6,208	7,114	0.44	4.49
TOTAL	**1,160,482**	**1,253,444**	**1,407,815**	**1,183,621**	**1,104,634**	**1,405,867**	**1,225,987**	**1,239,022**	**1,331,580**	**1,629,673**	**100.00**	**3.45**

B: By Regions

EXPORT - VAL	YEAR										Percent of	Avergae Annual
(1000$)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Year 2003 (%)	Growth Rate (%)
World	1,160,482	1,253,444	1,407,815	1,183,621	1,104,634	1,405,867	1,225,987	1,239,022	1,331,580	1,629,673	100.00	3.45
Asia	659,427	679,701	765,920	580,559	515,570	763,873	582,851	584,599	640,280	808,478	49.61	2.06
Europe	252,155	289,961	341,469	305,084	302,166	318,173	266,067	314,922	380,855	501,048	30.75	7.11
Latin America & Caribbean	65,931	74,947	83,012	100,406	81,236	100,338	136,494	122,599	105,723	109,415	6.71	5.20
Africa	85,963	105,050	115,573	94,043	107,906	89,799	100,772	96,644	97,480	108,155	6.64	2.32
USA	90,523	96,550	95,013	96,937	91,420	127,143	132,916	112,989	99,311	93,045	5.71	0.28
Oceania	5,546	5,729	5,287	5,258	4,549	5,165	4,462	4,767	5,459	6,439	0.40	1.50
Other Regions	937	1,506	1,541	1,334	1,787	1,376	2,475	2,502	2,472	3,093	0.19	12.68

C: By Major Countries

EXPORT - VAL	YEAR										Percent of	Avergae Annual
(1000$)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Year 2003 (%)	Growth Rate (%)
Thailand	265,688	234,125	263,803	202,409	174,131	313,655	212,403	207,060	306,558	413,008	25.34	4.51
Netherlands	68,439	88,161	107,146	108,302	110,933	126,973	82,970	119,237	155,671	206,758	12.69	11.69
Philippines	126,770	122,535	138,185	130,219	119,517	120,997	131,154	134,295	119,054	179,558	11.02	3.54
United States of America	90,523	96,550	95,013	96,937	91,420	127,143	132,916	112,989	99,311	93,045	5.71	0.28
Indonesia	50,409	60,483	118,962	61,657	30,288	102,619	71,694	75,944	98,969	85,513	5.25	5.43
Germany	27,669	29,748	37,045	26,564	32,930	28,559	26,995	27,676	38,972	60,162	3.69	8.08
Kenya	40,007	58,148	67,718	59,383	72,076	51,392	43,244	52,932	48,254	57,671	3.54	3.72
Spain	15,236	16,721	21,106	17,545	24,834	29,750	22,898	25,144	35,252	46,266	2.84	11.75
Argentina	2,941	4,177	1,844	774	649	2,031	1,668	2,696	42,472	35,523	2.18	28.29
China	6,335	5,443	7,865	13,599	35,763	21,909	12,084	13,747	25,030	33,169	2.04	18.00
Others	466,465	537,353	549,128	466,232	412,093	480,839	487,961	467,302	362,037	419,000	25.71	-1.07
WORLD TOTAL	**1,160,482**	**1,253,444**	**1,407,815**	**1,183,621**	**1,104,634**	**1,405,867**	**1,225,987**	**1,239,022**	**1,331,580**	**1,629,673**	**100.00**	**3.45**

(Data Source: FAOSTAT)

IMPORT MARKETS

The demand for processed tropical and subtropical fruit products has expanded by 20 % during the last decade, increasing from 2.08 million mt in 1994 to 2.5 million mt in 2003, with pineapple products being the major imported product. In 2003, the import volumes were dominated by canned pineapples (1.1 million mt, or 43%), pineapple juice concentrates (499,000 mt, or 20%) and pineapple single strength juice (253,000 mt, or 10%) as shown in Table 3.

During the ten-year period (1994 – 2003), the import value of processed pineapple products had increased by 65%, increasing from USD814 million to USD1,340 million. Pineapple juice concentrates registered a significant average annual growth rate of 18%, with import values increasing by 400% from USD70 million in 1994 to USD354 million in 2003 as shown in Table 4.

The import markets for processed tropical and subtropical fruit products are mainly in Europe and the United States of America. In 2003, Europe imported about 1.2 million mt valued at USD1.1 billion, accounting for about 50% of total imports as shown in Tables 3 and 4. Of this volume, the imports by Netherlands accounted for 267,000 mt valued at USD247 million (10%). The United States of America imported a total of 831,230 mt valued at USD414 million.

Table 3: IMPORT QUANTITY OF PROCESSED TROPICAL & SUBTROPICAL FRUIT PRODUCTS 1994 - 2003 (mt)

A: By Regions

EXPORT - VAL	YEAR										Percent of	Avergae Annual
(1000$)	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	Year 2003 (%)	Growth Rate (%)
World	2,083,256	1,975,049	2,048,115	1,991,156	1,812,909	2,087,322	2,192,911	2,188,990	2,247,230	2,482,072	100.00	1.77
Asia	993,504	896,832	985,789	943,628	907,380	945,840	1,028,293	1,091,440	1,119,622	1,228,528	49.50	2.15
Europe	699,552	694,986	698,437	704,900	599,271	790,147	796,802	702,759	726,597	831,912	33.52	1.75
Latin America & Caribbean	259,587	247,770	240,115	201,516	180,184	199,900	210,039	232,324	255,506	246,140	9.92	-0.53
Africa	50,719	47,839	37,117	49,397	41,253	53,737	63,451	59,759	45,521	64,431	2.60	2.42
USA	18,660	23,556	22,333	26,110	23,941	31,070	26,796	25,721	27,026	33,432	1.35	6.00
Oceania	7,473	10,260	7,279	8,428	9,010	10,058	10,069	17,462	16,953	18,958	0.76	9.76
Other Regions	53,761	53,806	57,045	57,117	51,870	56,570	57,461	59,525	59,005	58,671	2.36	0.88

B: By Product Types

EXPORT - QTY (mt)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
Pineapples, Canned	1,070,673	905,593	936,987	898,322	808,865	964,170	991,955	964,456	973,595	1,064,030	42.87	-0.06
Pineapple Juice Concentrates	286,210	316,096	339,674	302,055	238,721	303,156	266,470	284,006	438,184	498,507	20.08	5.71
Pineapple Juice Single-Strength	246,320	274,365	251,412	246,838	247,519	273,963	285,003	366,432	247,282	252,994	10.19	0.27
Grapefruit Juice Concentrates	20,841	21,545	25,674	16,809	20,434	37,028	53,373	40,931	161,489	162,210	6.54	22.78
Grapefruit Juice Single-Strength	159,292	181,231	218,447	213,425	219,075	246,851	243,444	241,151	134,656	152,597	6.15	-0.43
Citrus Juice Concentrates	35,211	24,651	18,376	19,571	24,167	18,346	33,609	23,133	80,938	97,775	3.94	10.75
Lemon Juice Single-Strength	22,470	25,015	26,353	25,085	28,543	35,457	37,985	45,191	35,011	92,303	3.72	15.18
Lemon Juice Concentrates	61,862	58,527	48,758	68,806	75,647	87,754	148,501	88,360	82,355	65,465	2.64	0.57
Citrus Juice Single-Strength	82,976	80,871	87,521	80,671	87,976	88,429	90,967	92,111	50,588	53,727	2.16	-4.25
Other Fruit Tropical Dried	91,596	77,835	82,021	105,738	43,665	30,829	39,902	32,794	27,529	29,171	1.88	-10.81
Mango Juice	4,701	8,658	12,058	13,162	17,705	892	1,160	7,155	11,555	11,009	0.44	8.88
Mango Pulp	1,104	662	834	674	592	447	542	3,270	4,048	2,284	0.09	7.54
TOTAL	**2,083,256**	**1,975,049**	**2,048,115**	**1,991,156**	**1,812,909**	**2,087,322**	**2,192,911**	**2,188,990**	**2,247,230**	**2,482,072**	**100.00**	**1.77**

C: By Major Countries

EXPORT - QTY (mt)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
United States of America	693,860	691,099	691,482	704,064	598,576	782,159	779,914	700,146	726,479	831,226	33.49	1.82
Netherlands	160,846	157,519	177,741	153,198	163,049	196,452	198,606	252,336	238,164	266,956	10.76	5.20
Germany	190,951	147,117	169,082	165,088	178,011	171,948	208,359	208,242	203,100	207,583	8.36	0.80
France	111,367	118,200	111 ,181	116,231	122,859	128,459	128,487	121,163	115,945	138,479	5.58	2.20
Japan	112,093	105,149	101,105	88,688	79,225	98,721	101,670	110,668	111,405	109,128	4.40	-0.30
United Kingdom	140,214	139,229	146,909	154,732	106,561	95,463	102,331	98,989	91,454	108,231	4.36	-2.56
Italy	61,766	61,265	56,695	56,967	62,404	69,444	79,611	66,064	76,893	81,140	3.27	2.77
Spain	59,249	51,197	55,688	47,535	51,804	59,181	59,335	62,849	71,491	72,979	2.94	2.11
Russian Federation	30,381	23,900	42,028	37,774	18,625	7,768	19,814	39,078	58,402	67,130	2.70	8.25
Canada	31,337	29,646	30,864	31,670	29,061	31,722	29,486	30,458	29,397	29,234	1.18	-0.69
Others	491,192	450,728	465,340	435,209	402,734	446,005	485,298	498,997	524,500	569,986	22.96	1.50
WORLD TOTAL	**2,083,256**	**1,975,049**	**2,048,115**	**1,991,156**	**1,812,909**	**2,087,322**	**2,192,911**	**2,188,990**	**2,247,230**	**2,482,072**	**100.00**	**1.77**

Table 4: IMPORT VALUE OF PROCESSED TROPICAL & SUBTROPICAL FRUIT PRODUCTS 1994 - 2003 (USD '000)

A: By Product Types

EXPORT - VAL (1000$)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
Pineapples, Canned	720,215	648,573	785,008	750,418	692,339	827,881	673,105	616,759	630,838	784,392	41.57	0.86
Pineapple Juice Concentrates	70,321	78,425	112,071	97,791	81,385	96,239	70,067	84,012	265,872	354,349	18.78	17.55
Grapefruit Juice Concentrates	23,218	26,763	25,111	18,474	20,086	28,727	41,892	38,136	203,212	200,572	10.63	24.06
Pineapple Juice Single-Strength	180,508	225,626	279,513	259,236	264,510	289,254	205,515	253,007	126,744	156,821	8.31	-1.40
Citrus Juice Concentrates	23,162	17,769	17,010	16,621	16,145	15,663	21,828	16,416	96,294	117,477	6.23	17.63
Grapefruit Juice Single-Strength	192,204	208,593	210,832	170 ,843	169,867	202,862	252,024	252,784	91,008	108,208	5.73	-5.58
Lemon Juice Single-Strength	33,606	41,795	41,827	41,403	44,667	50,624	48,220	57,559	39,414	54,129	2.87	4.88
Citrus Juice Single-Strength	94,633	100,143	119,662	119,587	113,561	103,994	103,070	105,524	50,264	53,220	2.82	-5.59
Fruit Tropical Dried	75,293	62,493	71,537	91,184	46,758	24,212	30,813	29,308	28,322	35,289	1.87	-7.30
Lemon Juice Concentrates	14,527	16,251	15,008	18,125	18,618	16,179	32,950	24,312	18,469	14,184	0.75	-0.24
Mango Juice	3,928	7,386	9,607	9,668	11,910	555	761	5,067	6,844	6,640	0.35	5.39
Mango Pulp	721	685	668	371	325	274	362	2,033	2,994	1,820	0.10	9.70
TOTAL	**1,432,336**	**1,434,502**	**1,687,854**	**1,593,721**	**1,480,171**	**1,656,464**	**1,480,607**	**1,484,917**	**1,560,275**	**1,887,101**	**100.00**	**2.80**

B: By Regions

EXPORT - VAL (1000$)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
World	1,432,336	1,434,502	1,687,854	1,593,721	1,480,171	1,656,464	1,480,607	1,484,917	1,560,275	1,887,101	100.00	2.80
Europe	799,631	794,188	977,074	902,286	879,675	900,895	792,265	824,298	907,505	1,097,196	58.14	3.21
USA	293,658	287,284	349,865	364,827	313,716	415,419	352,974	326,774	305,018	414,572	21.97	3.51
Asia	233,147	233,728	242,284	200,387	172,341	204,954	210,739	209,392	231,848	236,743	12.55	0.15
Latin America & Caribbean	41,015	45,388	38,151	43,401	37,598	50,908	49,206	43,657	31,465	43,017	2.28	0.48
Oceania	13,870	19,152	22,304	24,487	21,107	26,952	20,126	20,847	23,749	30,724	1.63	8.28
Africa	7,293	11,042	7,142	8,475	7,528	7,126	7,010	11,863	11,510	13,110	0.69	6.04
Other Regions	43,722	43,720	51,034	49,858	48,206	50,210	48,287	48,086	49,180	51,739	2.74	1.70

C: By Major Countries

EXPORT - VAL (1000$)	YEAR										Percent of Year 2003 (%)	Avergae Annual Growth Rate (%)
	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
United States of America	291,981	285,888	348,284	364,501	313,339	414,098	348,764	325,853	304,893	414,211	21.95	3.56
Netherlands	125,029	139,596	185,739	147,220	154,372	180,842	150,220	195,718	201,705	246,700	13.07	7.03
Germany	151,134	133,326	172,546	157,353	164,812	154,042	151,174	150,612	151,277	173,686	9.20	1.40
Japan	124,840	121,614	125,028	105,430	92,663	119,483	125,542	121,673	128,597	130,410	6.91	0.44
France	93,306	105,852	115,788	109,895	110,583	113,208	99,815	90,718	94,294	125,650	6.66	3.02
United Kingdom	118,132	121,582	143,812	160,216	119,115	100,192	84,105	79,126	76,801	97,972	5.19	-1.85
Italy	52,938	55,793	64,941	61,605	67,854	72,579	66,151	58,307	69,229	81,071	4.30	4.35
Russian Federation	21,076	16,050	17,720	14,035	10,812	5,803	6,881	15,950	33,249	39,062	2.07	6.36
Spain	19,707	19,974	27,436	20,082	24,568	31,554	21,912	22,213	43,498	59,452	3.15	11.67
Poland	4,767	8,164	10,899	14,911	16,223	18,597	19,781	21,453	20,036	21,444	1.14	16.23
Others	429,426	426,663	475,661	438,473	405,830	446,066	406,262	403,294	436,696	497,443	26.36	1.48
WORLD TOTAL	**1,432,336**	**1,434,502**	**1,687,854**	**1,593,721**	**1,480,171**	**1,656,464**	**1,480,607**	**1,484,917**	**1,560,275**	**1,887,101**	**100.00**	**2.80**

(Data Source: FAOSTAT)

SUPPLY CHAIN MANAGEMENT OF AGRICULTURAL FRESH PRODUCE: A New Approach

(*by* Mr. Azizi Meor Ngah - *Paper Presented at AGRICONGRESS 2004, Malaysia*)

Food safety standards and traceability have become important concerns in the marketing and export of agricultural produce of many trading nations. In this regard, supply chain management as practised in the manufacturing sector, is becoming more visible in the agriculture and food sector. Here, there is apparent development in the competition between supply chains rather than products or companies themselves, driven by stiffer food safety regulations, increased productivity, improved efficiency, transparency and branding. Marketing of perishables no longer adhere to traditional distribution systems which do not encourage use of cold chain systems and product packaging. Instead, producers are engaged in contract farming while retailers opt for backward integration to control supply through distribution centres. This farm-to-table concept has resulted in a shorter supply chain with fewer intermediaries in the marketing chain.

Definition of supply chain management (SCM)

Supply chain management is "a network of connected and interdependent organisations mutually and cooperatively working together to control, manage and improve the flow of materials and information from suppliers to end users" (J. Aitken, Cranfield University). Dedicated supply chains are those where facilities are not shared with other non-related commodities e.g. as in the handling of milk and *halal* products.

Proposed new farming concept

A farming model proposed here involves the government, a private company or farmers' cooperative and farmers. This public-private sector partnership, also known as ***3P***, would require an understanding of the cultural and economic implications on this farming system. Land (about 500 acres) is leased or purchased form government, and subdivided and leased/sold to *bonafide* farmers. The manager of the project will guide farmers as to the choice of crops to be grown, application of technology, farming practices in accordance with Good Agricultural Practice or GAP, and packaging, Distribution and logistics will be handled by the manager or outsourced to a third party. The role of government is in the building of collection and packaging centres, and assistance in marketing. The number of farmers would be around 150-200, assuming that each farmer cultivates a 2-3 acre lot. As the project progresses, the farming community and production area will expand beyond the boundary of the model farm; hence, the collection and packaging facilities would also be increased proportionately.

The system is modeled after the ***nucleus/plasma*** model promulgated by the World Bank (used in the transmigration project on industrial crops in Indonesia). Following this model, the period for the learning curve is shortened, risks minimized with faster return on investment.

The role of government is the establishment of a collection and packaging centre or CPC that acts as a half-way house in the project area. The Government would also assist in marketing, as access to many international markets is usually only possible through a Government-to-Government (G-to-G) approach. Government's involvement would also lend credibility to the quality of the produce.

The objective of this new farming model is to standardize farming practices i.e. to establish the ***Standard Operating Procedure*** that is consistent with market requirements e.g. food safety and quality. The farms together with CPC, will undertake all the activities along the supply chain i.e. grow, sort, grade, label, transport and promote the produce to the market or end-buyer (retailer/converter/exporter/consumer). This farm model will also promote import-substitution commodities to save on foreign exchange. The application of new technology would ensure that the produce are competitive in the longer term.

Issues on the supply side

Problems on the supply side viz. lack of market information, cold chain services and inventory management, need to be resolved and coordinated. High postharvest losses are not only attributed to limited use of cold chain services, but are also exacerbated by the multiple layers of marketing intermediaries that escalate distribution costs. Another challenge in the trade of perishable commodities is logistic management.

Issues on the demand side

It is acknowledged here that the consumer will be the driver for change in the whole food value system. New demands that include food safety, quality, security and traceability are concerns that only add to the cost of producing food, although the cost of implementing these standards (HACCP, GMP, etc.) is more than offset by the premiums obtained by adhering to them.

Marketing infrastructure and communication system in SCM

An effective SCM system will require that all the facilities/services along the value chain should be consolidated and rationalized in order to enhance efficiency and productivity. A good IT system with a well-connected information delivery system is a prerequisite to successful SCM and increased competitiveness

Impacts and spin-offs

Existing broadband infrastructure will enable the CPCs to be linked to a central distribution centre which will have the required bargaining power to leverage against large hypermarket operators, exporters, and the wholesale market.

In addition, these model farms will operate as a business entity, with good business processes embedded in their management system. This will instill confidence in the trading partners and investors as well as the farmers themselves. As a consequence, product branding becomes more effective.

There are numerous benefits of promoting the concept of SCM for perishable agriculture produce through the CPCs. Consistent and regular information on demand supply will assist in regulating product movement as well as making SCM more competitive. Equipped with cold rooms, and coupled with proper logistic management and inventory control, price fluctuations can be minimized. In the longer term, the CPCs would be as first step towards zoning and clustering towards "industrialisation of agriculture" and achieving competitiveness in the perishable produce market.

WHY FOOD SCIENCE & TECHNOLOGY IS IMPORTANT?

What is 'food science' and 'food technology'?

Food science integrates the application to food of several contributory sciences. It involves knowledge of the chemical composition of food materials (for all food consists entirely of chemical substances); their physical, biological and biochemical behaviour; human nutritional requirements and the nutritional factors in food materials; the nature and behaviour of enzymes; the microbiology of foods; the interaction of food components with each other, with atmospheric oxygen, with additives and contaminants, and with packaging materials; pharmacology and toxicology of food materials, additives and contaminants; the effects of various manufacturing operations, processes and storage conditions; and the use of statistics for designing experimental work and evaluating the results.

As for ***food technology***, it integrates the application of food science to the practical treatment of food materials so as to convert them into food products of the kind, quality and stability, packaging and distribution, to meet the needs of consumers for safe, wholesome, nutritious and attractive foods. The technologies applied could be such as those of steel, tinplate, glass, aluminium, plastics, engineering, instrumentation, electronics, agriculture and biotechnology.

Definition of Food

FOOD SCIENCE

Food Science is the discipline in which biology, physical sciences, and engineering are used to study the nature of foods, the causes of their deterioration, and the principles underlying food processing.

FOOD TECHNOLOGY

Food Technology is the application of food science to the selection, preservation, processing, packaging, distribution, and use of safe, nutritious, and wholesome food.

FOOD SCIENTIST

A Food Scientist studies the physical, microbiological, and chemical makeup of food. Depending on their area of specialization, Food Scientists may develop ways to process, preserve, package, or store food, according to industry and government specifications and regulations. Consumers seldom think of the vast array of foods and the research and development that has resulted in the means to deliver tasty, nutritious, safe, and convenient foods.

FOOD RESEARCH

Food Research is the careful, systematic study, investigation, and compilation of information about foods and their components.

FOOD MANUFACTURING

Food Manufacturing is the mass production of food products from raw animal and plant materials utilizing principles of food technology.

FOOD INDUSTRY

In terms of value of shipments, food processing is the largest manufacturing industry in the United States.

What are the elements of public interest?

SUPPLY - There should be a sufficient ***amount*** of food, nationally and internationally, with healthy, efficient and responsible production and distributive industries capable of supplying it, nationally and internationally.

WHOLESOMENESS - Food should be safe, wholesome and of consistent quality; that its manufacture and handling should be carried out in compliance with all the aspects discussed in the IFST Professional Conduct Guideline on Wholesomeness of Food; and that the control systems for safety and quality should be designed and monitored by competent and ethical professionals.

NOURISHMENT - Although most people tend to choose diets of foods that they like and can afford, balanced diets based substantially on manufactured foods should provide enough of the right kinds of nutrients for energy and good health.

ECONOMY - Foods should be prepared and distributed as efficiently and economically as possible.

ENVIRONMENT - Food production/distribution should be carried out with due regard to the total ingredients/ processing/packaging impact on the environment.

ANIMAL WELFARE — Animals are used in food production, responsible attention should be paid to their welfare.

INFORMATION — The public should be adequately provided with information to enable it to make informed choice, to know what it is buying and to understand what measures and precautions to take in storing and using it safely.

REDRESS — Adequate recourse should exist for a purchaser to seek and obtain appropriate redress in the event of a justifiable complaint.

LEGISLATION AND ENFORCEMENT — The public interest should be embodied in appropriate legislation, arrived at through public consultation, with compliance independently monitored by regulatory agencies or enforcement authorities.

Who are the professional bodies?

Institute of Food Science & Technology (IFST) of United Kingdom, is the independent incorporated professional qualifying body for food scientists and technologists. Its purposes are to serve the public interest by furthering the application of science and technology to all aspects of the supply of safe, wholesome, nutritious and attractive food, nationally and internationally; to advance the standing of food science and technology, both as a subject and as a profession; to assist members in their career and personal development within the profession; to uphold professional standards of competence and integrity.

The Institute of Food Technologists (IFT) is the premier scientific and educational society serving the food science and technology field. The mission is to advance the science and technology of food through the exchange of knowledge. IFT members represent a broad cross-section of food professions in industry, academia, and government throughout the world.

Source: *Institute of Food Science & Technology (IFST)*
Institue of Food Technologists (IFT)

Rambutan

(*Nephelium lappaceum* L.)

The rambutan (*Nephelium lappaceum*) derives its name from the Malay word "*rambut*" meaning "hair". The rambutan skin, which may be yellow or red when ripe, is covered with many curved or fleshy spines, giving the fruit a hairy appearance. The fruit is usually oval to round and are borne on bunches. The skin separates easily from the flesh.

The rambutan is a bushy, wide-crowned tree that may grow up to a height of 2 m. The tree thrives in the tropics on sandy loam soils rich in organic matter. Rambutan is pollinated by insects, especially honey bees. It is a seasonal fruit, with two main fruit seasons – July to October and November to March.

Other than being eaten fresh, rambutan can also be canned in fruit cocktails or made into jams.

Botanical Description

Rambutan is a medium sized tree, 15–25 m high, has a straight trunk up to 60 cm wide, with a dense, usually spreading crown.

The evergreen leaves are alternate, slightly leathery, yellowish-green to dark-green and somewhat dull on the upper surface.

The flowers are very small (0.5 cm wide) and borne on inflorescences near the terminal end of the crown. There are many flowers to a panicle. There are no petals, only 4–6 sepals, which are faintly woolly. In Malaysia, rambutan flowers from March to July and again between July and November, usually in response to rain following a dry period. Most, but not all, flowers open early in the day. Up to 100 flowers in each female panicle may be open each day during peak bloom. Initial fruit set may approach 25 percent but a high level of abortion contributes to a much lower level of production at harvest (1–3%).

The fruits hang in bunches, on woody stalks on the terminal end of the branches. The fruit is about 5 cm in length and round to oval in shape with hairs or tubercles on its skin. Unripe fruits are green in colour and change to yellow or red when ripe. The skin is quite pliable and is easily detached from the flesh. The flesh is firm, white and translucent. It is sweet and juicy. Most rambutan trees propagated from seed are not true-to-type and are usually sour. Male rambutan trees are also not uncommon. Selected clones produce thick, firm flesh which is sweet.

Growth and Development

Rambutan is propagated vegetatively by air-layering, and budgrafting - the latter is most common as trees grown from seed often produce sour fruit. Budgrafted trees normally fruit after 2–3 years with optimum production occurring after 8–10 years. Trees grown from seed bear after 5–6 years.

The fruit usually matures 15 to 18 weeks after flowering.

Ecology

The most favourable climate for rambutan cultivation is within 12° of the Equator, at altitudes up to 600 to 700 m above sea level where the temperature range is 22–30°C

Red Rambutan

Yellow Rambutan

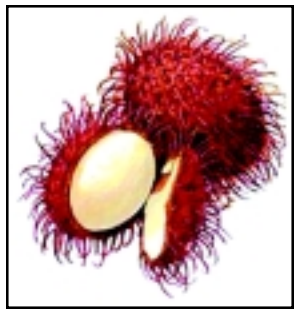
and having well-distributed rainfall with 2,000 to 5,000 mm per annum.

Rambutan can be grown successfully in a wide range of soils but optimum growth and fruiting occurs on well-drained sandy loam or clay loam that is rich in organic matter. Rambutan grows well on hillsides with a moderate slope. The water table should be less than 3 meters from the surface. A pH range of 4.5 to 6.5 is considered appropriate for rambutan cultivation. At higher pH, iron and zinc deficiencies (chlorosis, leaf yellowing) are common.

Irrigation is not widely used in most of the production areas since rainfall is adequate for the plant's needs. Irrigation is only necessary in areas where the rainfall is lower than optimum or where the rainfall pattern is uncertain such as in northern Malaysia where the length of dry period can last for more than 3 months.

Origin and History

The rambutan is native to Malaysia and commonly cultivated throughout the archipelago and southeast Asia. Many years ago, Arab traders introduced it into Zanzibar and Pemba. There are limited plantings in India, a few trees in Surinam, and in the coastal lowlands of Colombia, Ecuador, Honduras, Costa Rica, Trinidad and Cuba . Some fruits are being marketed in Costa Rica. The rambutan was taken to the Philippines from Indonesia in 1912.



Also known as a 'Hairy Fruit'

Uses

Food use

Rambutans are commonly eaten fresh after removing the rind, or cutting it around the middle and pulling it off; it does not cling to the flesh. The peeled fruits are occasionally stewed as dessert. They are canned in syrup on a limited scale. In Malaysia a preserve is made by first boiling the peeled fruit to separate the flesh from the seeds. After cooling, the testa is discarded and the seeds are boiled alone until soft. They are combined with the flesh and plenty of sugar for about 20 minutes, and 3 cloves may be added before sealing in jars. The seeds

are sometimes roasted and eaten in the Philippines, although they are reputedly poisonous when raw.

Non-food uses

Medicinal uses: the fruit is said to be astringent, stomachic and anthelmintic; the roots are used in decoctions for treating fever; the bark as an astringent for disease of the tongue; and the leaves are used in poultices for headache. The fruit wall contains a toxic saponin; and cases of poisoning are known; however, in Java it is dried and used as a medicine.

Dye uses: young shoots are used as a green dye for silk which has already been dyed yellow with turmeric. The fruit walls are used, together with tannin-rich parts of other plants, to dye silk black after a preliminary red staining. Leaves are used, together with mud, as an impermanent black dye.

Seed fat: the seed kernel can be used for the production of rambutan tallow, a solid fat similar to cacao butter, which is edible and also used for soaps and candles. When heated, it becomes a yellow oil having an agreeable scent. Its fatty acids are: palmitic, 2.0%; stearic, 13.8%; arachidic, 34.7%; oleic, 45.3%; and ericosenoic, 4.2%. Fully saturated glycerides amount to 1.4%. The oil could be used in making soap and candles if it were available in greater quantity.

The seed itself is edible (after roasting) but is bitter and narcotic. The wood is suitable for general construction. The tree is very ornamental when it fruits.

Wood: The tree is seldom felled. However, the wood – red, reddish-white, or brownish – is suitable for construction though apt to split unless carefully dried.

Toxicity

There are traces of an alkaloid in the seed, and the testa contains saponin and tannin. The seeds are said to be bitter and narcotic. The fruit rind also is said to contain a toxic saponin and tannin.

Rambutan Processed Products

Rambutan in Syrup

Rambutan can be canned in syrup, singly, or together with other fruits like pineapple, jackfruit and starfruit. The concentration of the syrup is adjusted according to market requirement.

Rambutan Jam

Rambutan jam is processed from the pulp of rambutan. It is prepared by cooking the pulp singly, or in combination with pulps of other fruits, fresh or semi-processed, with sugar or sorbitol, with or without additional pectin. Jam contains not less than 35% fruit and 65% total soluble solids. It can contain permitted preservatives, colouring, flavouring and food conditioners. For added value, rambutan jam is packed in small attractive bottles.

Dehydrated Rambutan

Rambutan flesh can be dehydrated. For a sweetened dehydrated product, the flesh is soaked in syrup where its concentration is increased in stages till the desired sweetness is reached. The flesh is then drained followed by dehydration.

Rambutan Nutritional Information

Food Value Per 100g Serving

Moisture	84.7 g
Protein	0.7 g
Fat	0.1 g
Carbohydrates	13.9 g
Fibre	0.3 g
Ash	0.3 g
Calcium	22.0 mg
Phosphorus	30.0 mg
Iron	2.5 mg
Thiamine (Vitamin B1)	0.01mg
Riboflavin (Vitamin B2)	0.04 mg
Niacin (Vitamin B3)	0.1 mg
Ascorbic Acid (Vitamin C)	38.6 mg
Food Energy	59.0 calories

(Source: myfruits.org)

Names of Rambutan

Scientific Name

Nepthelium lappaceum

Common Names

English	: *Rambutan*
Bahasa Melayu	: *Rambutan*
Mandarin	: *Hongmaodan*
Tamil	: *Rambutan*
Indonesian	: *Rambutan*
Tagalog (Philippines)	: *Rambutan*
Thai	: *Ngoh*
Vietnamese	: *Choâm choâm*
Cambodia	: *Ser mon, Chle sao mao*

Frozen Rambutan

Rambutan can be frozen whole. The frozen fruits are thawed before serving. Frozen rambutan can be stored for 6 months.

Other potential products that could be processed from rambutan include pickles, fruit rolls, jelly confectionery, mix fruit cordial and fruit juices and desserts.

References:

Morton, J. 1987. Rambutan. p. 262-265. **In: Fruits of Warm Climates.** Julia F. Morton, Miami, FL.

Website:

http://www.hort.purdue.edu/newcrop/morton/rambutan.html

http://myfruits.org/

EKSOTIKA PAPAYA FOR THE WORLD

Papaya industry before Eksotika

Papayas before the advent of Eksotika were very inconsistent in yield and generally have very poor eating qualities. Popular varieties then were Sitiawan, Batu Arang and Subang and their fruit size were large and inconvenient to handle and serve. Papayas were grown mainly for domestic consumption and export was insignificant.

The making of Eksotika

In 1972, the Malaysian Agriculture Research and Development Institute (MARDI) started a backcross breeding programme for improving papayas. The Sunrise Solo which has excellent eating qualities but with poor yield and small fruit, was introduced from Hawaii. It was crossed with the locally adapted, large-fruited Subang 6. Subsequent progenies underwent a series of 'self-pollination' and backcrossing to Sunrise Solo to reconstitute its excellent eating qualities while selecting for larger fruit size of the Subang 6. After 15 years of breeding and selection, a line called 'Backcross Solo' with the features of Sunrise Solo but with increased fruit size and local adaptability of Subang 6 was selected. In1987, it was released as the 'Eksotika'.

The Eksotika had shortcomings in fruit freckles, soft texture and sensitivity to environment stress. Eksotika was crossed with its sister line (Line 19) which was resistant to freckles and had better keeping qualities. The resultant F_1 hybrid was more robust, higher yielding and had much improved fruit cosmetics and keeping quality. This hybrid named 'Eksotika II' was released in 1991.

Eksotika: Prolific, petite, attractiv and sweet

Giving what Eksotika wants

One of the major reasons for successful adoption of Eksotika was the development of component technologies like agronomic requirements, R & D management and postharvest needs to give a complete technology package to the industry. A team of researchers comprising the breeder, agronomist and postharvest expert worked on the needs of Eksotika to deliver the complete technology package. The nutritional requirement for optimal growth and fruit production was determined by foliar leaf sampling and deficiency symptoms, in particular boron, was resolved. There were initial problems with pest, disease and weed management and all these were adequately controlled with appropriate use of agro-chemicals and integrated pest management programme. Knowing and giving what the crop wants had helped tremendously in building up confidence in investing in cultivation of Eksotika papaya.

"Peace cannot be kept by force; it can only be achieved through understanding."
- A. Einstein -

Getting Eksotika to the market

Getting Eksotika to the market requires efficient postharvest management and this includes knowledge of the optimum time to harvest (maturity indices) and ripening behavior of the fruit during storage. Packaging using corrugated fibreboard boxes holding a net weight of 6 kg was developed. This is the best packaging in terms of economy, efficiency and cosmetic appeal for the export of Eksotika. Early export of Eksotika was entirely by air which was very expensive and also has limitation in cargo space. Research on the use of refrigerated reefers for cheaper export by sea was successful and today more than 50% of the export of Eksotika to Hong Kong is done this way.

The road to commercialization of Eksotika was not entirely smooth in the beginning. There were initial objections to this variety by traditional farmers not used to the small fruit. However, up scaling projects with more receptive, innovative and enterprising companies scored significant success. The Eksotika fruits started to make inroads into previously untapped markets like Hong Kong, China, Middle East countries and Europe. Many growers started to emulate the success of these companies and the acreage and export of Eksotika climbed at a very rapid rate to become the most important export fruit in the country today.

Getting Eksotika successfully to the market was in some ways helped by the quality standards set by SIRIM and monitoring compliance of standards of exported fruits by FAMA. In supply of planting materials, MARDI produces high quality, affordably-priced Eksotika seeds under an ISO 9001 certification.

Eksotika papaya for the world

The advent of Eksotika had given the fruit industry a dramatic boost, particularly in generation of export earnings. In 1986 the year before Eksotika was released, the export revenue of papaya was a mere RM 3 million. The export revenue climbed steadily every year since then and today it has passed the RM 100 million mark. The Eksotika is the flagship variety exported both by refrigerated sea reefers and air freight to its major markets in Hong Kong and China. The export trade to Singapore, the Middle East countries and Europe is also increasing. Malaysia currently is the second most important exporter of papaya in the world, thanks to the research in developing a complete technology package for Eksotika.

Significant annual increases in export earning of Eksotika papaya

Prepared by:

Chan, Y.K., Raveendranathan, P. and Pauziah, M.
Horticulture Research Centre,
Malaysian Agricultural Research and Development Institute (MARDI)

The marketing channel of two underutilized fruit species of Malaysia:
Pulasan [*Nephelium ramboutan-ake* (Labill.) Leech] & Kuini (*Mangifera odorata* Griff.)

by N. Kozai[1], M.Keizer[2], F. dela Cruz [2], P.E. Sajise [2] and S. Idris[3]

This research was carried out in collaboration with IPGRI-APO as part of the Japan-CGIAR Fellowship Programme supported by Japan International Research Centre for Agricultural Sciences (JIRCAS). Data collection and the field work were conducted from November to December 2004 in cooperation with Malaysian Agricultural Research Development Institute (MARDI), International Tropical Fruits Network (TFNet), and International Plant Genetic Resources Institute (IPGRI).

Introduction

Pulasan [*Nephelium ramboutan-ake* (Labill.) Leech] and kuini (*Mangifera odorata* Griff.) are considered underutilized fruit species in Malaysia. Pulasan is a close relative of rambutan (*N. lappaceum*), with fruits having short and stubby spines. This species occurs in India (Assam), Burma, Indonesia, Malaysia and the Philippines. Fruits found in Peninsular Malaysia have mostly dark red skin, although there is a rich diversity in skin colour such as yellowish green, yellow, and purplish red. Kuini is a close relative of mango (*M. indica*) but with a stronger flavour. Its species name *odorata* means 'flavourful'. Kuini has never been found in the wild and its exact origin remains unknown. It is commonly cultivated in Peninsular Malaysia, Borneo, Sumatra and Java in Indonesia.

Pulasan

Kuini

In 2001, the total area planted to pulasan was 846 ha in Peninsular Malaysia, of which 70% was in the southern state of Johor. The total area cultivated for kuini in 1999 was 706 ha, with growing areas mainly found in the states of Pahang, Terengganu, Johor, and Kedah. Pulasan is grown both in small-scale and commercial farms whereas kuini is mostly cultivated in home gardens. An understanding of the marketing channel is necessary in order to explore market opportunities and to promote cultivation of the two fruit species to farmers.

Marketing Channel - Pulasan

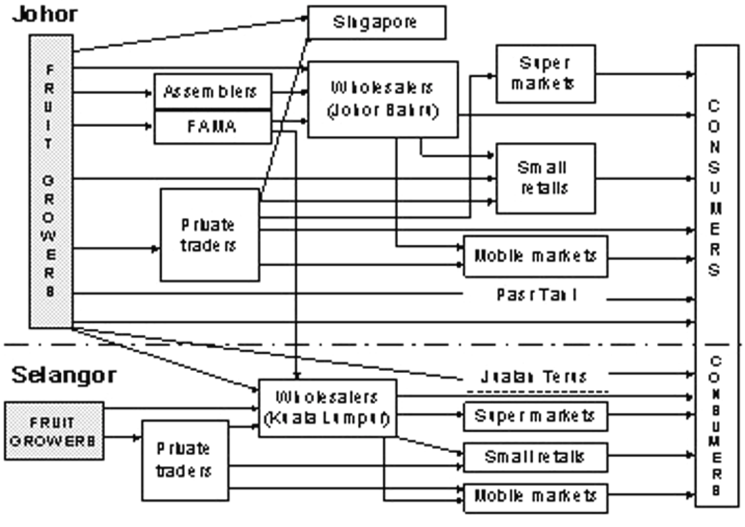


Figure 1: Marketing Channel of Pulasan in Johor & Selangor

Trading of pulasan fruits is done by middlemen and farmers. In Johor, the private traders and Federal Agricultural Marketing Authority (FAMA), a government agency under the Ministry of Agriculture and Agro-based Industry, act as *middlemen* in the marketing chain of pulasan. FAMA buys the fruits directly from the farmers and supplies fruits to wholesale markets in Johor Bahru and Kuala Lumpur. Private traders supply fruits to supermarkets, small retailers and mobile markets. Some farmers sell their fruits directly to consumers at farmers' markets called *Pasar Tani* and *Jualan Terus*, which are also supported by FAMA and the Department of Agriculture (DOA) in Johor. The marketing channel for pulasan is shown in Figure 1.

Pulasan from Johor exported to Singapore enjoy higher market prices even though an additional 5% import tax is levied. Another advantage is that no quarantine restrictions are imposed on pulasan exports to Singapore since the latter is regarded as a local market. Pulasan production is quite low in Selangor, and fruits are brought in from Johor to meet the local demand.

Prices of pulasan range from RM 2.00 – RM 3.50 per kg (1 US$ = RM 3.77) at the farm gate, and RM 3.20 – RM 4.00 per kg at the small retail level in Johor. In Selangor, prices range from RM 1.50 at the farm gate to RM 2.00 – RM 5.50 at the small retail level.

a) Producer

Pulasan cultivation started only in the last eight years, hence commercial production is relatively new. Commercial producers sell the fruits either to FAMA or to private traders, or sell directly to the market. When selling directly to the market, large-scale farmers bring the fruits to wholesale markets or to Singapore using their own trucks. Small farmers however, form groups to jointly market their produce in open mobile markets such as *Jualan Terus*. Cultivation of pulasan in the home garden is mainly for home consumption.

b) Middlemen

FAMA as a middleman can offer good prices for pulasan in large quantities, as they can sell the products at their own booth in the wholesale market. The private traders sell the fruit directly to retailers after buying the fruits from farmers. Depending on the agreement with farmers, traders usually harvest the fruits while farmers are responsible for managing the orchards.

[1] The United Graduate School of Agricultural Sciences, Ehime University
[2] International Plant Genetic Resources Institute –Regional Office for Asia, Pacific and Oceania (IPGRI-APO)
[3] Malaysian Agricultural Research & Development Institute (MARDI)

Traders also provide market information to farmers. The profit is shared between traders and farmers. Some private traders have their own shops, and sell their fruits to consumers or other traders. Pulasan is graded and priced according to fruit size. Big or 'Grade A' fruits (10 – 12 fruits per kg) can be traded at RM 0.50 higher than smaller 'Grade B' fruits (more than 13 fruits per kg).

c) Retailers

Larger quantities of pulasan are sold in small retail outlets and mobile markets compared to supermarkets. The selling price is RM 0.50/kg higher than for rambutan, and trade of pulasan is limited by the seasonal production.

d) Consumer

Pulasan is a popular fruit among consumers because of its sweet taste and easy seed-removal. Demand of fresh pulasan is quite high, and currently, the supply of pulasan does not satisfy the demand in the fresh market; there is no demand for processed products.

Marketing Channel - Kuini

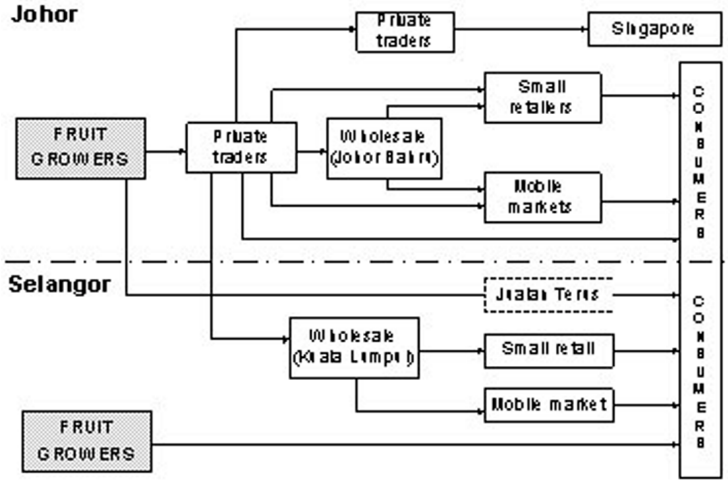


Figure 2: Marketing Channel of Kuini in Johor & Selangor

Kuini is mostly grown in backyards for home consumption, although there are a few commercial farmers in the state of Johor. Here, fruits are collected by private traders and sold to various markets in other states (Figure 2). Some fruits are also exported to Singapore. FAMA is not involved in the marketing of kuini as there are only a few producers. There are no commercial kuini farms in Selangor – kuini produced is mainly for home consumption.

The price of kuini ranges from RM 1.50 – 3.00/kg at the farm gate, and are retailed at RM 4.00/kg by small retailers in Johor. In Selangor, the retail price ranges from RM 3.00 to RM 5.00 per kg. The price at the *Jualan Terus* market is RM 1.00/kg. Kuini fruits are not graded.

a) Producers

Most of the kuini trees are more than 20 years old. As the trees were propagated by seed, the quality of fruits varies from tree to tree. In addition, growers find it difficult to manage the big trees, resulting in poor fruit set and infestation by insects (fruit fly) and diseases. In addition, since the kuini is used mostly for home consumption, there is no or little expenditure on farm inputs.

b) Middlemen

The buying and selling of kuini is done by private traders. Traders buy the fruits left on the higher branches of the trees, and harvest them using ladders or long poles with bags attached to them. FAMA is not involved in kuini trading at all.

c) Retailers

Kuini is not sold in supermarkets, but only at small retail outlets and local markets. Some small retailers consider the kuini as having low commercial value because the fruits are infested by the fruit fly, whereas others prefer kuini as it is a rare fruit, which can be sold a higher price compared to other major fruits including mango.

d) Consumers

Many consumers are still not familiar with the kuini. While some consumers prefer its sweet taste, others do not like its strong flavour.

Market Potential of Pulasan and Kuini

There is a good demand for pulasan in the local market. Due to its rather short shelf life of only three days, export opportunities are limited. However, since the local market is still undersupplied, the opportunity exists for farmers to expand pulasan cultivation. A more in-depth economic analysis of pulasan production including marketing strategies is necessary before concrete recommendations can be made.

On the other hand, kuini has limited production and is not a popular fruit. Although the fruit is sweet, some consumers do not like its strong flavour. Efforts should be made to promote the good taste of kuini to increase its demand. In addition, the potential of processing kuini into various products such as jams and pickles should be investigated further. Currently kuini is being propagated by seed hence there is a great variation among trees and their production, and fruit quality. This has a significantly negative effect on the propagation and marketing of kuini. Research is needed to evaluate existing trees, and identify, select and multiply outstanding kuini varieties. It is anticipated that this will lead to an increased interest by producers to grow kuini; with better varieties available in the market, consumers' interest in this fruit may also increase.

Pulasan and Kuini are sold with other fruits in local market

References

Bompard, J. M. 1992. *Mangifera odorata* Griffith. In. Edible Fruits and Nuts, (E. W. M. Verheij and R. E. Coronel, eds.). Plant Resources of Southeast Asia No. 2. PROSEA. Bogor, Indonesia.

Salma, I. and Raziah, M. L. 2002a. Status report on genetic resources of kuini (*Mangifera odorata* Griff.) in Southeast Asia.

Salma, I. and Raziah, M. L. 2002b. Status report on genetic resources of pulasan [*Nephelium ramboutan-ake* (Labill.) Leech] in Southeast Asia.

Seibert, B.1992. *Nephelium* L. In. Edible Fruits and Nuts, (E. W. M. Verheij and R. E. Coronel, eds.). Plant Resources of Southeast Asia No. 2. PROSEA. Bogor, Indonesia.

Japanese Fruit Parks as Models for Rural Development in Hawaii

Much of Japan's agricultural heritage has given way to multinational corporations, and with changes in lifestyle, traditional family farms are in need of an outlet for both their crops and their frustrations. This, compounded with the aging population of farmers and their offspring who have little or no interest in farming, has created a need to promote development and sustainable agriculture in rural areas.

Due to the growing awareness of this situation, a number of fruit parks have been developed throughout Japan. What could be called tourist attractions in reality serve a broad number of purposes. The parks are developed through a collaboration of agricultural cooperatives, prefecture governments, local universities, agricultural product companies, commodity wholesalers/marketers, tourism companies and others in private enterprise.

The following examples can serve as role models for development of attractions in rural Hawaii that can contribute to the sustainability of the rural Hawaiian life style and the unique Hawaiian agricultural heritage.

These models combine a number of services that result in contributions to the local economy as well as directly to farmers and the participating cooperatives. In addition to being popular visitor attractions, these fruit parks offer educational services that include onsite extension agents and educators, reference libraries, and meeting rooms. Activities for children, shops featuring products made from crops grown in the vicinity, and farmers' markets are also integrated into the attractions. Assistance is provided in both horticulture and product development. Often, growers are paired with marketing companies or production facilities: match making is a frequent mode of participation in these operations. Local participants and visitors are brought together for both special events and daily educational activities.

Nagoya City Togokuzan Fruit Park

The Togokuzan Fruit Park opened in 1980 and is located within the city limits of Nagoya, Japan's third largest city. In addition to being a popular spot for tourists and elementary school excursions, it serves a number of functions for the agricultural community that surrounds the city. Nagoya is the centre of Aichi prefecture, which is the largest fig producing area in Japan as well as a major producer of persimmon, peaches and other fruit crops. Visitors can purchase fruits grown in the park grounds as well as those grown in the two large tropical green houses, as well as locally produced fruit products.There are picnic areas with fish ponds adjacent to the park where there are poles and small boats for rental. Farmers can also sell their produce in designated areas within the park and at the park store.

The two large green houses that require an entrance fee offer visitors an educational experience with fruit we often take for granted in Hawaii. The park has special events timed with the harvesting of jackfruit, mango, strawberry guava and many other tropical fruit. Parks like Togokuzan are the reason why fruit shops and department stores throughout Japan routinely carry the more unusual fruit like durian, dragon fruit, passion fruit and jackfruit.

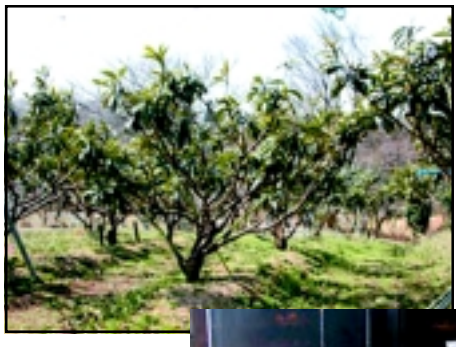
The park features 150 varieties of fruit with more than 1,000 trees. An onsite reference library, meeting room, wax museum of fruit varieties, toys and activities for children and a multimedia presentation area are also within the park area. Farm tools, various types of fertilizers, spray units and other farm implements are also on display.

Special events revolve around flowering and harvesting seasons, and demonstrations of farming techniques by staff and guest experts are frequent as are lectures on diverse but related topics. There are signages that describe its history, cultural practice and usage of each of the fruits.

Park staff consists of horticulturalists as well as tour guides and research associates. Experts are on hand to assist visitors with questions related to fruit growing and general horticulture. Special events, lectures, tours and viewings are common in both the tropical green house and growing areas.

In the surrounding area are examples of commercial fruit farms in Japan and elsewhere in Asia, with farming operations routinely carried out. Walkways that wind through the park feature "fruit" landscaping - plums, peaches, persimmons, apricot, kiwi, apple, pears and grapes and many citrus varieties.

The Togokuzan Fruit Park is a full-fledged farm with daily operations in addition to being a visitor attraction. Perhaps one of the more interesting aspects of Togokuzan is the tree shaping and pruning techniques that visitors can see. In many parts of Asia, trees are kept low to facilitate harvesting and save on labour time. At the park it is apparent that sustainable practices such as mulching, composting and recycling of organic material are carried out.



Nagoya City Togokuzan Fruit Park

Hamamatsu Fruit Park

The Hamamatsu Fruit Park, about a two-hour drive from Togokuzan, covers 43 hectares and contains 5,000 trees of which there are 160 cultivars. The park's extensive collection of citrus cultivars especially kumquat is well known. The domed greenhouses are filled with tropical fruits familiar to Hawaii. There are interactive displays with quizzes and museum displays. Mango, banana and papayas are grown and harvested for park festivals and for sale at the park stores. What makes the Hamamatsu Park so unique is the design and architecture – although it is a large working farm, it is very visitor oriented in its design.

One can wander endlessly through the orchards and green houses or ride on a small tractor built into a steam engine train design.

There is a very large modern and very innovative playground for children under 12.

In keeping with the theme, the playground includes a giant slide coming out a 3-storey tall pineapple. All the gym equipment has some connection to fruit - Banana swings, Orange jungle gyms and a host of others. Summer day camps are also organised.

The three restaurants on the grounds offer a wide choice of culinary fare but would always include fruit products from the park. There are two shopping areas: in one, there is a store featuring fruit products and fresh fruit, including tropical specialties such as cherimoya and dragon fruit. When the park's trees are not in production, fresh fruit is brought in so that visitors can still enjoy the taste of the fruit they would have just learned about on the park tour. The other area is a farmers' market for fresh produce from the park and surrounding areas.

Built on a hillside, the park has one of the longest covered escalators in Japan going up and down the side of the mountain. A modern suspension bridge connects different parts of the park. Signage is everywhere: directional signs, signs with botanical information, seasonal guides and maps and historic information on the fruits and their origins.

There are numerous weekly events posted on websites and advertised in the area. They revolve around floral viewing and displays, fruit harvesting and tasting, guest lectures and farming technique demonstrations.

Often, very large potted trees are moved to the entrance area when they are flush with fruit or flowers offering the visitor their first taste of what's to come during a day at the park.

In addition to the visitor attractions, the park also has on-site horticultural specialists to answer any question from farmers or the visitors. Technical publications are made available as well. As a whole, the production area of the park typifies the best cultural practices of Japanese farming - the trees are perfectly pruned and trained; the fruits are bagged and harvested, and fertilizing, mulching and watering are monitored constantly. Educational seminars on fruit growing are also conducted regularly.

Tomiura Biwa Club

The Biwa Club in Tomiura Chiba Japan, about a 3-hour drive from Tokyo, is unique in the sense that it focuses primarily on Biwa or loquat, as we know it in Hawaii. Founded by the Chiba Prefecture Government, Biwa Cooperative, private investors and farmers, the remote location of the club is a rest stop for weary travelers heading farther south to the tip of the Chiba Peninsula. While there, they are immersed in the world of the Biwa fruit. Among the facilities is a shop which features almost 2,000 items manufactured locally from the fruit, as well as a number of other items that are made from Chiba's wide range of agricultural products.

There is something for everyone at the shop – a wide range of products including foods, wines, toys, cosmetics and books, all from loquat. There are many logo items featuring cartoon type characters based on the Biwa. The restaurant inside the Club also serves food made from this fruit: Biwa curry and Biwa ice cream are among the more popular items. There is also a library and reference room for farmers as well as a meeting room.

During the height of loquat season (May and June) the club also provides space for farmers to sell directly to the public. The large area around the club is both for parking and staging area for bus tours from Tokyo and elsewhere in Japan. More than 30 large buses can be accommodated as well as a large numbers of cars. Tours are either pre-arranged or can be booked on arrival. Independent travelers can also leave their cars at the club and join bus tours. The tours are not at the club but at member farmers' locations. The tours start and end at the club, which during the height of the season, is packed with people.

Once at the farms, visitors can either join a farm tour and learn about the growing cycle of the Biwa trees or they can simply enter a designated area to pick and eat the fresh fruit. Packaged fruit and other items are also sold. Some visitors tour a number of different farms growing different cultivars of loquat. Some farmers report that since the club started these tours, their incomes have almost doubled; previously, the fruit was sold solely to the cooperative. The cooperative plays the role of disseminating information about of the fruit and the farming community. Both the cooperative and the farmers

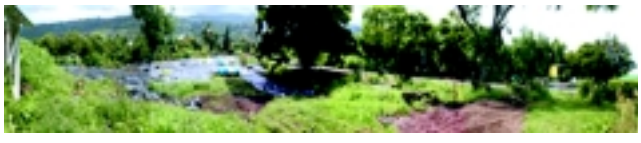
benefit economically from the tours and sale of items by the Club. The Club's website also links to individual farm sites as well as companies offering products that support the sale of the fruit.

Potential for Hawaii

All of the examples show ways to promote sustainable livelihoods in rural areas in Hawaii. Private enterprise, university and government agricultural professionals, cooperatives and individual farmers can work to build attractions that showcase the best that Hawaii can offer in tropical agriculture. Tropical fruit, tropical flowers, aquaculture, and Kona coffee can be provide an entertaining and educational experience for visitors while providing technical assistance to growers. In addition to displaying modern horticultural and production technologies, Hawaii fruit parks can educate visitors and growers on how to make jams, jellies and a host of processed products and how to package both fresh and processed items to capture the eye of the consumer. Guest or resident chefs can demonstrate how locally produced agricultural products can be turned into culinary delights.

The **12 Trees Project** *(http://www.hawaiifruit.net/12trees.html)*, just started in Kona, is a collaborative effort between the University of Hawaii College of Tropical Agriculture and Human Resources, the Kona Pacific Farmers Cooperative, and the West Hawaii Culinary Arts programme. This project can serve as a small prototype of a fruit park that could be developed in Hawaii modeled on the Japanese fruit parks. Its objectives are to help farmers to develop greater diversity, provide a more consistent income and promote sustainable practices that work in concert with the natural environment.

The 12 Trees Project is working to commercialize under-utilised fruit and fruit products. This park will highlight Hawaii's coffee and macadamia nut industries as well as the growing diversity of other agricultural produce and products that come from this region. The 12 Trees Project fruit park will be a centre for revitalizing agriculture and rural development in order to maintain Kona's rich agricultural heritage.



The progress of the 12 Trees Project in Hawaii

Contibuted by TFNet Member:

Mr. Ken Love
mycoffee.net
Hawaii, USA

TOWARDS A METABOLOMICS PROGRAMME ON UNDER-UTILIZED TROPICAL FRUIT SPECIES

The emerging discipline of metabolomics merges high-throughput analytical capabilities with sophisticated data management to enable the simultaneous detection of hundreds of metabolites in plant material. At the same time, there is a growing knowledge of the health benefits of a wide range of constituents of fruits and vegetables. This international collaborative research programme aims to describe the health-related phytochemical composition of identifiable varieties of under-utilized tropical fruit species from developing countries in order to promote opportunities for commercialisation of the best of those varieties. It brings the rich genetic resources of tropical countries and the wealth of their local horticultural knowledge into collaboration with the sophisticated science power of major international laboratories. The data about individual varieties of each studied species will be given to the local research partners to give guidance to local horticultural industry professionals for their breeding and post-harvest research programmes.

Tropical fruit come from a very wide selection of plant families (Table 1). From an international science perspective, access to documented collections of varieties of fruit from such widely dissimilar genera and growing regions will generate meta-information on the evolution of biosynthetic pathways for functional or nutritional compounds in plants. Documenting changes in these compounds during standard postharvest storage regimes will give meta-information on the control of these pathways. These datasets will be a rich resource for all the research partners in this programme.

In addition, it could be useful to run whole extracts from the fruit varieties against a small number of bioassays to assess their functional properties in terms of e.g. phase II enzyme induction as an indicator of effectiveness against cancer. Meta-analysis of the data will indicate the relative effectiveness of different mixtures of compounds for the promotion of human health.

This programme is not aimed at pharmaceutical discovery. The premise of health promotion through the increased consumption of whole fruit is what drives the research programme. As Hippocrates once said, 'Leave your drugs in the chemist's pot if you can heal your patient with food'.

Analytical technologies are slowly advancing to allow the simultaneous detection of large numbers of compounds in a single extract. However it is still fair to say that most groups using liquid or gas chromatography followed by mass spectroscopy prefer to analyse a smaller group of similar compounds in more detail from one extract, and use a different extraction system to measure another group of compounds. A coordinated network of laboratories may be required to optimise sample extraction for the range of compounds involved.

Many different phytochemicals have been identified as components of food with useful properties for aiding in disease prevention (notably cancer, diabetes and cardiovascular disease); other compounds are known to be 'anti-nutritional'. Those we would like to measure include alkaloids, amino acids, dietary fibre and oligosaccharides, essential oils, flavonoid antioxidants, glucosinolates and other sulphur-containing compounds, organic acids, phytosterols, polyamines, saponins, sugars and sugar derivatives, vitamins and their precursors.

A key success factor for this work will be to identify resource people with access to collections of under-utilized fruit varieties in developing countries. A number of international groups have resources which would make this possible. The first is of course the International Tropical Fruit Network. Another crucial body would be the International Board for Plant Genetic Resources, with a wide network of experts. The Global Facilitation Unit for Underutilized Species (established under the auspices of GFAR in Italy) has expressed interest in this work, as has the 'Under-utilized Tropical Fruits in Asia Network' which recently established a research centre in Sri Lanka.

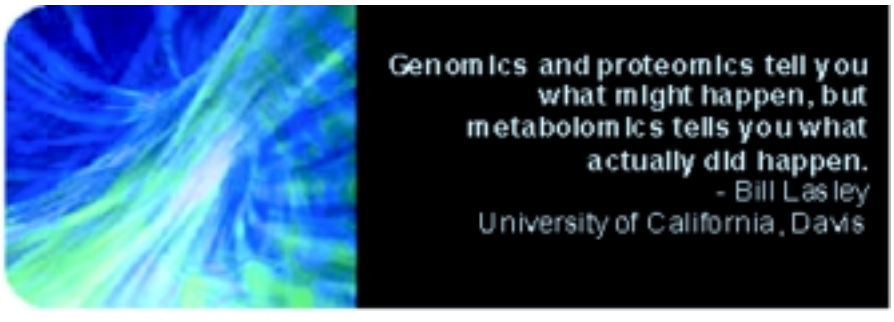
A second key factor is to engage the willing participation of research groups with sophisticated analytical capabilities. Gaining their interest to work in this potentially large multinational collaboration with largely uncharacterised samples may not be easy. As a starting point, active discussion between scientists in New Zealand working in the field of metabolomics (at Crop & Food Research, AgResearch and HortResearch) and scientists at MARDI will help to identify our shared technical capabilities and practical barriers to success.

Table 1: Classification of Some Tropical Fruits

Order	Family	Common name	Scientific name
Arecales	Arecaceae	Coconut	*Cocos* spp.
Arecales	Arecaceae	Date	*Phoenix dactylifera*
Arecales	Arecaceae	Salak or snakefruit	*Salacca edulis*
Brassicales	Caricaceae	Papaya	*Carica papaya*
Caryophyllales	Cactaceae	Pittaya	*Hylocereus undatus*
Commelinoids	Bromeliaceae	Pineapple	*Ananas comosus*
Cucurbitales	Cucurbitaceae	Watermelon	*Citrullus*
Ericales	Ebenaceae	Persimmon	*Diospyros kaki*
Ericales	Sapotaceae	Sapodilla or ciku	*Manilkara achras*
Fabales	Fabaceae	Tamarind	*Tamarindus indica*
Fagales	Myricaceae	Red bayberry	*Myrica rubra*
Gentianales	Apocynaceae	Karonda	*Carissa congesta*
Gentianales	Loganiaceae	Monkey orange	*Strychnos spinosa*
Lamiales	Oleaceae	Olive	*Olea europea*
Laurales	Lauraceae	Avocado	*Persea americana*
Magnoliales	Annonaceae	Cherimoya, soursop	*Annona* spp
Malphigiales	Clusiaceae	Mangosteen	*Garcinia mangostana*
Malphigiales	Euphorbiaceae	Aonla	*Emblica officinalis*
Malphigiales	Flacourtiaceae	Flacourtia	*Flacourtia jangomas*
Malphigiales	Passifloraceae	Passionfruit	*Passiflora edulis*
Malvales	Bombacaceae	Durian	*Durio zibethinus*
Malvales	Tiliaceae	Phalsa	*Grewia asiatica*
Myrtales	Myrtaceae	Guava	*Psidium guajava*
Myrtales	Myrtaceae	Rose apple	*Syzygium aquem*
Oxalidales	Oxalidaceae	Starfruit	*Averrhoa carambola*
Rosales	Moraceae	Breadfruit, cempedak, jackfruit	*Artocarpus* spp
Rosales	Rhamnaceae	Jujube	*Zizyphus mauritania*
Rosales	Urticaceae	Fig	*Ficus carica*
Santalales	Olacaceae	Ximenia	*Ximenia caffra*
Sapindales	Anacardiaceae	Mango	*Mangifera indica*
Sapindales	Rutaceae	Bael	*Aegle marmelos*
Sapindales	Rutaceae	Lemon, mandarin, orange, pomelo	*Citrus* spp
Sapindales	Sapindaceae	Duku Langsat	*Lansium domesticum*
Sapindales	Sapindaceae	Guarana	*Paullinia cupana*
Sapindales	Sapindaceae	Litchi	*Litchi chinensis*
Sapindales	Sapindaceae	Rambutan	*Nephelium lappaceum*
Solanales	Solanaceae	Pepino	*Solanum muricatum*
Zingiberales	Musaceae	Banana / plantain	*Musa* spp

Prepared by PMC & TFNet Member:

Dr. Julian Heyes
NZ Institute for Crop & Food Research,
New Zealand



SPECIAL TROPICAL FRUIT TREATS

SOURSOP PUDDING

Ingredients:

For Pudding:

Soursop	:	200 gm
Gelatin	:	1 1/2 packs
Sugar	:	200 gm
Milk	:	1,000 ml

For Sauce:

Water	:	200 ml
Lemon Juice	:	1 dessert spoon
Corn Flour	:	1 dessert spoon
Sugar	:	50 gm

Directions:

1) ***Pudding:***

a) Blend the soursop and milk. Add sugar and gelatin.

b) Heat mixture and slowly stir until it comes to a boil.

c) Pour the mixture into pudding dishes, then refrigerate.

2) ***Sauce:***

Boil water, lemon juice, sugar and corn flour. Mix it well until viscous.

Contibuted by TFNet Member:

Sentra Pengembangan Agribisnis Terpadu (SPAT)
www.spat-indonesia.or.id
Surabaya, Indonesia

FRUIT BRUSCHETTA

Ingredients:

Bruschetta Sliced	:	1 - 1˚ cm thick
Malang Apples (peeled and diced 0.5 cm and soaked)	:	100 gm
Pineapples (peeled and diced 0.5 cm and soaked)	:	100 gm
Tomato Sauce	:	3 dessert spoons
Mayonnaise	:	100 gm
Mozarella Cheese	:	75 gm

Batter:

Butter	:	2 dessert spoons
Wheat Flour	:	2 dessert spoons
Milk	:	100 ml
Sugar	:	1 3/4 tea spoon
Salt	:	3/4 tea spoon

Directions:

1) Melt butter in saucepan. Add the wheat flour and mix it well until the batter forms a lump.
2) Add milk, salt and sugar. Mix.
3) Add apple, pineapple, sauce, mayonnaise and cheese.
4) Spread it on the bruschetta and bake for 15 minutes at 16°C.

TFNet MEMBERSHIP

WELCOME NEW MEMBERS

Welcoming TFNet new members with the addition of 10 members in total with the following:

Ordinary Member:

1) ***Ministry of Agriculture, People's Republic of China***

Honorary Members:

1) ***Peninsula Plantations Sdn. Bhd., Malaysia***
2) ***Nidhal Yousuf Mahyoob Sultan, Yemen***
3) ***Goldenpine Enterprise, Malaysia***
4) ***Aziz Torahi, Iran***
5) ***Fuyit Sdn. Bhd., Malaysia***
6) ***MYB Food Industries Sdn. Bhd., Malaysia***
7) ***Institute of Post Harvest Technology, Sri Lanka***
8) ***Southern Sub-Institute of Agricultural Engineering & Post Harvest Technology, Vietnam***
9) ***Sentra Pengembangan Agribisnis Terpadu (SPAT), Indonesia***

Note:
For those interested to contribute and participate in TFNet's activities, the membership application form is on the last page of this newsletter.

TFNet Membership by Country

REGION	COUNTRY	NO.
Asia Pacific	Malaysia	31
	Vietnam	5
	New Zealand	2
	Sri Lanka	2
	Iran	2
	China	2
	Bangladesh	1
	Fiji	1
	Taiwan	1
	Thailand	1
	Yemen	1
	Indonesia	1
Africa	Kenya	4
	South Africa	1
	Cote d'Ivoire	1
	Ghana	1
	Sudan	1
Latin America	Ecuador	3
	Costa Rica	2
North America	Hawaii, USA	1
Europe	Switzerland	1
Caribbean	Trinidad & Tobago	1
TOTAL	22 COUNTRIES	66

RELATED EVENTS

COURSE ON PLANT VARIETY PROTECTION

Event Date : June 20-July 1, 2005
Venue : Wageningen, the Netherlands

For more details about the event's programme and registration process, please visit the website at:

http://www.upov.int/en/news/2004/PVPFolder2005.pdf

IMPROVING THE PERFORMANCE OF SUPPLY CHAINS IN THE TRANSITIONAL ECONOMIES

Event Date : July 19-23, 2005
Venue : Chiang Mai, Thailand

For more details about the event's programme and registration process, please visit the website at:

http://muresk.curtin.edu.au/conference/ishscm/

EFITA / WCCA 2005 JOINT CONFERENCE:

The 5th Conference of the European Federation for Information Technology in Agriculture, Food and Environment & The 3rd World Congress on Computers in Agricultural and Natural Resources

Event Date : July 25-28, 2005
Venue : Universidade de Trás-os-Montes e Alto Douro, Vila Real, Portugal

For more details about the event's programme and registration process, please visit the website at:

http://www.agriculturadigital.org/efitaandwcca2005

QUOTATIONS OF THE DAY!

"Man spends his life
in reasoning on the past,
in complaining of the present,
in fearing future".
- Anonymous -

"Growth means change, and change involves risk - stepping from the known to the unknown."
- Anonymous -

"The beginning of anxiety
is the end of faith,
and the beginning of true faith
is the end of anxiety."
- Anonymous -

Any queries, suggestions or articles for this newsletter?

Contact us at:

INTERNATIONAL TROPICAL FRUITS NETWORK (TFNet)
Box 334, UPM Post Office, 43400 Serda
Selangor Darul Ehsan, Malaysia
Tel: (603) 8941 6589 / 8941 6590
Fax : (603) 8941 6591
E-mail: info@itfnet.org

Editorial Members

Tropical Fruits Net is published half yearly by the *International Tropical Fruits Network (TFNet).*

Editors:
Mr. Khairuddin Md. Tahir
Ms. Khoo Gaik Hong
Mr. Yacob Ahmad

Contributors :
Mr. Apisai Ucuboi ***(Fiji)***
Dr. Julian Heyes ***(New Zealand)***
Mr. Ken Love ***(USA)***
Ms. Naoko Kozai ***(Japan)***
Sentra Pengembangan Agribisnis Terpadu (SPAT) ***(Indonesia)***
Dr. Chan Ying Kwok ***(Malaysia)***
Mr. Azizi Meor Ngah ***(Malaysia)***

Mr. Chua Piak Chwee (TFNet)
Ms. Anis Shahrizahin Bt Ghazi (TFNet)

comingup for the next issue

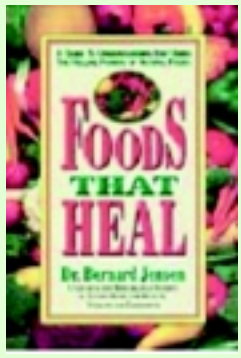
Mangosteen
ICT in Agriculture
China Fruit Trade

Tongue Twister

How much wood would a woodchuck chuck if a woodchuck could chuck wood?

He would chuck, he would, as much as he could, and chuck as much wood as a woodchuck would if a woodchuck could chuck wood.

BOOK REVIEW



Foods That Heal : A Guide to Understanding and Using the Healing Powers of Natural Foods

by **Bernerd Jensen Ph.D.**

Published : February 1993

The American Cancer Society recently recommended that Americans eat more fresh fruit and vegetables. Based upon the works of pioneering nutritionists, this well-researched, comprehensive guide reveals the restorative and healing properties of fruits and vegetables. A food analysis chart includes the length of time needed for digestion. Line drawings. 50 charts.

Growing Tree Fruit

by **Richard Bird**

Published : March 2003

Growing tree fruit can be one of the most satisfying experiences in the garden. Fruit trees can be highly decorative, whether grown individually or trained as fans and aspaliers. All the main types of fruit tree are described in this delightful book.

Delicious Tropical Fruits

by **Liliana Villegas**

This book by Liliana Villegas includes sound historical and cultural information on 32 exquisite species of tropical fruit from the prodigal Colombian coffee-growing zone. It has beautiful photographs that illustrate the fruit in its natural and prepared states. It gathers the best knowledge about tropical fruit, its varieties, its culinary uses, medicinal properties and beauty treatment uses. It takes us by the hand and leads us to experience healthy, new, pleasant gastronomic experiences.

New Generation New Drinks

Containing Calcium, Fibre, Vitamin C & Edible Natural Fruit Seeds

natural taste from original fruit

pitaberry™

taste it, u'll love it!

Best Serve Chilled • No Artificial Colouring •

INTERNATIONAL TROPICAL FRUITS NETWORK (TFNet)

Box 334, UPM Post Office, 43400 Serdang, Selangor, Malaysia
Tel: (603) 8941 6589 / 8941 6590
Fax: (603) 8941 6591
E-mail: info@itfnet.org
Website: *http://www.itfnet.org*

MEMBERSHIP APPLICATION FORM

I / We wish to apply for membership of TFNet as:

Choose Membership Category:

- **Ordinary** [ ]
- **Associate** [ ]
- **Honorary** [ ]

Name of Government / Organisation / Individual _____

_____

Correspondence Address _____

_____

City _____ Postcode _____

State/Province _____

Country _____

Telephone _____

Fax _____

E-Mail _____

Payment enclosed: USD _____.

Authorised Signature _____

Name :

Designation :

Membership & RegistrationFees:

- Ordinary Membership: USD 5,000 for one calendar year (for government only);
- Associate Membership: USD 3,000 for one calendar year; and
- Honorary Membership: No membership fee but contribution in cash or kind is encouraged.
- Registration fee: USD 50.00

Payment by International Bank Draft payable to **'International Tropical Fruits Network'** or telegraphic transfer to:

A/C No. 5121-4701-0969
Malayan Banking Berhad
No. 231-233, Jalan 18/23,
Taman Sri Serdang,
43300 Seri Kembangan,
Selangor, Malaysia.