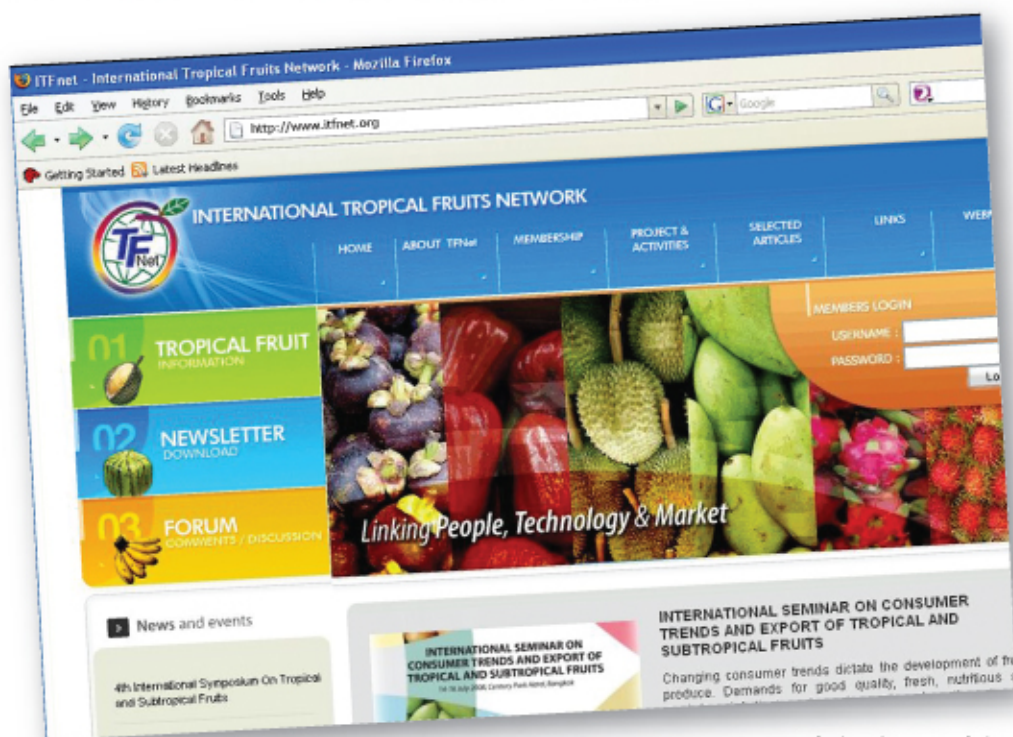


## TFNet launches new website

The TFNet website [www.itfnet.org](http://www.itfnet.org), which has been on since 2002, has been useful in providing news on the activities and events of TFNet, including technical information on selected tropical and subtropical fruits. However, of late, due to server malfunction, the website had to be 'simplified' due to the inability of the system to function normally.



The 'new' TFNet website

### In this issue...



**Guava Intercropping - Management for Citrus Greening Disease**

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**TFNet / Syngenta Training on GAP**

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**TFNet organizes GAP briefing for agriculturalists from Vietnam**

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Recently, after experiencing irritating crashes and accessibility problems, the project office decided to revamp the whole website and its IT infrastructure. This was done after numerous attempts to maintain and improve the former system did not rectify the problem.

The 'new' website, which utilizes open source technology, features a fruit information section which will provide detailed information on the various tropical fruit types. Full information, however, is restricted for non members while TFNet members have free access to all information in the database by logging on with a password that will be provided by the project office. The new website will focus on more 'complete and accurate' information in the fruit information section. This section will be updated from time to time.

The website features news and events, downloadable newsletter and articles, dynamic fruit news section, fruit information database, a forum section, a search engine, some space for promotion and trade. This is besides the static information on membership, links, projects / activities and information on TFNet.

We will also be requesting members to contribute articles and relevant pictures to be included to build up the fruit information section.

Besides this, as in the former website, a forum section which will be mediated by the project will be resumed.

We hope members will write and give us suggestions or comments on improving the website. Lets also hope the 'new' TFNet website will be useful to all, and will help create an online TFNet community.

## Editor's Note...

After organising the International Seminar on Economics and Marketing of Tropical and Subtropical Fruits and the Board of Trustees meeting in July 2007, the later half of the year was rather hectic with the project office trying to complete major projects on time. The projects include the CFC Fruit Information System in the French language, the Study on PVP Testing on Tropical Fruits in Asian countries and the Study on Competitiveness of six fruits and 3 vegetables types in Indonesia, Malaysia, Philippines, Thailand and Vietnam. Towards the end of last year, the CEO and Project Officer of TFNet attended the FAO/CFC meeting in Guangzhou, China to propose new potential projects that can be undertaken by TFNet in the next few years. One such project is the study on competitiveness of Tropical Fruits in India, Sri Lanka, Thailand and Malaysia.

This period also saw the re-appointment of Dr. Izham Ahmad as the CEO of TFNet until March 2009.

A major event for 2008 is the International Seminar on Consumer Trends and Exports of Tropical and Subtropical Fruits, which will be held at the Century Plaza Hotel Bangkok from 14 – 16 July 2008. This seminar is a cooperation with Agricultural and Food Association for Asia and the Pacific (AFMA), Department of Agriculture and Department of Agricultural Extension of Thailand. The TFNet Board of Trustees meeting will be held on 17 July 2008 at the same venue.

This first newsletter for 2008 comes at an appropriate time when TFNet has just 'overhauled' its IT infrastructure and system and updated its website, since plagued by technical glitches last year. We are glad to announce that the major problems have been resolved and that members of TFNet can now access the website without problems.

## TFNet Editorial Members

**TROPICAL FRUIT NET** is published half yearly by the International Tropical Fruits Network (TFNet)

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## Welcome New Members

TFNet welcomes the following members :

### Associate members

· Bioersity International  
*Serdang, Malaysia*

### Ordinary members

· Dr. M.L. Anothai Choomsai  
*Almatha Seeds Co. Ltd, Mae suay,  
Chiangrai, Thailand*

· Dr. Mai Van Quyen  
*President of Consulting Council Binh  
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· Dr. Nguyen Tho  
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· Prof. Dr. Ha Minh Tung, Chairman,  
*Vietnam Gardening Association,  
Hanoi, Vietnam*

**Note:**  
For those interested to contribute and participate in TFNet's activities, the membership application form is on page 19 of this newsletter.

## Benefits as TFNet Members

- Sharing information, expertise and technologies;
- Participation in conferences and seminars;
- Market development and trade promotion;
- Participation in collaborative projects or studies;
- Assistance in implementation and harmonisation of international regulations; and
- Participation in human resource development programmes



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## TFNet UPCOMING EVENTS

### TFNET / SPAT STUDY VISIT TO THE AGRICULTURAL MARKETING SYSTEMS IN THAILAND

**Event date :** 9 - 14 June 2008  
**Venue :** Bangkok, Thailand

This ongoing collaboration will involve a workshop and visit to the agriculture markets in Thailand including the biggest wholesale market, Talaad Thai. This program has been arranged for the office of the Mayor of Batu, Malang, East Java which comprises of 40 officers, farmers and the private sector. This program is in response to the proposal by the Mayor to develop an efficient agricultural marketing center in Batu, where citrus, apples and vegetables are the main products.

### INTERNATIONAL SEMINAR ON CONSUMER TRENDS AND EXPORT OF TROPICAL FRUITS

**Event date :** 14 - 16 July 2008  
**Venue :** Century Hotel, Bangkok, Thailand

Changing consumer trends have an influence on the development of fresh produce. Demands for good quality, fresh, nutritious and ready-to-eat fruit have been increasing since the advent of super and hypermarkets. This seminar also looks at the various facets of consumer trends, including the potential for organically grown fruits and the effect it has on the export of tropical fruits. The program includes 2 days of oral presentation and 1 day field visit to a fruit farm and vapor heat treatment facility. The seminar is a collaboration between TFNet, Agricultural and Food Marketing Association for Asia and the Pacific (AFMA), Department of Agriculture and Department of Agriculture Extension Thailand.

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### SEMINAR ON DRAGON FRUIT (Pitaya) CULTIVATION AND MARKET IN MALAYSIA

**Event date :** delayed to August 2008  
**Venue :** will be determined

Dragon fruit has gained popularity in Malaysia, even though it is a relatively 'new' fruit. The seminar will look at constraints and problems faced by the growers, especially the recent bacterial disease outbreak and potential markets. Growers, researchers and the public sector are invited to attend.

For further information please email : yacob@pc.jaring.my

## OTHER RELATED EVENTS

### 4th INTERNATIONAL SYMPOSIUM ON TROPICAL AND SUBTROPICAL FRUITS

**Event date :** 3 - 7 November 2008  
**Venue :** IBP International Convention Center, Bogor Agricultural University, Bogor, Indonesia

The Symposium will review current progress and explore potential application in the various research on tropical and subtropical fruits. The aims of the symposium are to facilitate discussion and exchange of technical and scientific information and to promote international cooperation amongst stakeholders who are involved in the development of the tropical and subtropical fruit industry. The symposium is organised by International Society for Horticultural Sciences, Ministry of Agriculture Republic of Indonesia, Bogor Agricultural University, Ministry of Research and Technology Republic of Indonesia and the Indonesian Horticulture Society.

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Fax: +62-21-7806760  
Email: srikuntarsih@yahoo.com  
Website: <http://www.ifs2008.info/>

### 2ND INTERNATIONAL SYMPOSIUM FOR PAPAYA WITH THE THEME 'PAPAYA FOR NUTRITIONAL SECURITY'

**Event date :** 9 - 12 December 2008  
**Venue :** Pandiyan Hotel, Madurai, Tamil Nadu, India.

The symposium is organised by the International Society for Horticultural Science in collaboration with the Tamil Nadu Agricultural University, Coimbatore, India.

Symposium topics include:

- International trade and marketing
- Breeding and genetics
- Biotechnology
- Cultural practices and cropping systems
- Pest and disease management
- Post harvest handling and storage
- Product development and processing

The organizers of this symposium cordially invite everyone involved in papaya research, extension, education, trade and commerce to be present at this meeting to share their experiences and build up the fraternity and network for advancement of this important fruit. The symposium will consist of three days of technical proceedings with a one-day mid symposium tour. A strong scientific programme will be presented with invited speakers / several high-quality oral presentations to address the latest progress made in research on papaya. In addition, a comprehensive poster session will allow delegates to present their own research results.

For further information, please contact:

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Professor (Horticulture)  
Tamil Nadu Agricultural University  
Coimbatore - 641 003 India  
E-mail : kumarhort@yahoo.com  
Phone : (0)-91- 422 - 6611310 / 6611377, (R): 91- 422 - 2436046  
Fax : 91- 422- 6611399 Mobile : 91- 936 312 1916

### ASIA-PACIFIC SYMPOSIUM ON ASSURING QUALITY AND SAFETY OF AGRI-FOODS

The Asia-Pacific Symposium on Assuring Quality and Safety of Agri-Foods will be held at the Radisson Hotel, Bangkok, Thailand on 4 - 6 August 2008. The symposium is organised by Division of Postharvest Technology, King Mongkut's University of Technology Thailand and the International Society for Horticultural Science.

The symposium aims to highlight the most recent and exciting developments and innovations in the areas of :

- Effects of fruits and vegetables on human health
- Quality modeling
- Quality management in supply chains
- Food traceability and safety
- Postharvest pest management
- Postharvest physiology
- Storage and transport technology
- Value-adding and innovation agro-processing technologies
- Market and distribution systems

For details please contact:

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Division of Postharvest Technology  
King Mongkut's University of Technology Thonburi  
Thungku, Bangkok 10140, Thailand  
Tel: (662) 470-7728, Fax: (662) 452-3760  
Email: aps2008@kmutt.ac.th  
Website: [www.kmutt.ac.th/APS2008](http://www.kmutt.ac.th/APS2008)

### POSTHARVEST TRAINING ON FOOD SAFETY AND QUALITY ASSURANCE OF FRESH HORTICULTURAL PRODUCE - JOINTLY ORGANISED BY

Universiti Putra Malaysia (UPM), International Tropical Fruits Network (TFNet), Malaysian Agricultural Research and Development Institute (MARDI) and the Federal Agricultural Marketing Authority (FAMA).

**Objectives:**

1. To create awareness of principles and programs of food safety and quality assurance and their uses and limitations in fresh horticulture produce.
2. To attract all stakeholders - investors, producers, marketers and other players - in the horticultural industry into forming a postharvest working group, under the Malaysian Society of Horticultural Science (MSHS), in order to address and resolve postharvest handling issues.

### Postharvest Colloquium 2008

**22 July 2008**

**Dewan Persidangan  
Pusat Pendidikan Luar  
Universiti Putra Malaysia**

This colloquium will highlight the advances in postharvest research and development worldwide which could benefit the local horticultural supply chain. The colloquium will also provide insight on the requirements and limitations of the local horticulture industry which in turn could lead to new areas for research and development. The keynote address will be given by Prof. Dr. A.U. Malik from University of Agriculture, Pakistan.

\* Registration fee is RM50, including refreshment and lunch.

&

### Postharvest Training Course

**23-25 July 2008**

**Faculty of Agriculture  
University Putra Malaysia**

Background: Food Safety and Quality Assurance for fresh horticultural produce should be an ongoing process, beginning from produce production to postharvest operations and consumption. Successful food safety and quality assurance program could be achieved through involvement of all stakeholders in training and system implementation. Produce quality should be continuously monitored to comply with compositional and microbial standards and government regulations. Objective: To enhance knowledge and provide techniques which will enable provision of consistent, high quality supply of fresh horticultural produce to consumers and to protect the reputation of a given marketing label.

This training course comprise of 3 modules and a field trip to Mango Farm, Batang Padang, Perak.

\* Registration fee is RM500, which covers breakfast, lunch, refreshment and transportation for field trip.

For further information, please contact:

Dr. Phebe Ding,  
Organizing Secretary, Postharvest Training Programme on Food Safety and Quality Assurance of Fresh Horticultural Produce,  
Jabatan Sains Tanaman, Fakulti Pertanian, Universiti Putra Malaysia,  
43400 UPM Serdang, Selangor.  
Tel: 603-8946 6942 / 7253  
Fax: 603-8943 5973  
E-mail: postharvest.upm@gmail.com

### MALAYSIAN AGRICULTURE, HORTICULTURE AND AGROTOURISM EXHIBITION 2008 (MAHA 2008)

**Date:** 10- 23 August 2008

**Time:** 10.00 am - 7.00 pm

**Place:** Malaysia Agro Exposition Park, Serdang, Selangor

Following the success of MAHA 2006, Malaysia is once again set to host the region's largest exhibition showcasing the latest Technologies and Innovations in the Agriculture, Agro-Based, Horticulture and Agrotourism Industry. Hosted by the Ministry of Agriculture and Agro-Based Industry and organised by Federal Agricultural Marketing Authority (FAMA), MAHA 2008 is expected to be the biggest event of the year serving the Agro-Based Industry. Being awarded by The Malaysian Book of Records as the Largest Exhibition in Malaysia, MAHA 2008 is undoubtedly the largest industry gathering in the South East Asia region. MAHA 2008 is regarded as a 'must attend' for the industry to be updated with the latest innovations and solutions and to do business. Over 950 local and international exhibitors are expected to showcase their latest solutions to the industry.

For further information, please contact :

The Event Manager  
Prima Bumi Avenue Sdn. Bhd.  
Tel : 603 7957 3999  
Webpage : <http://www.mahaexpo.com>

# Opportunities and Challenges for Smallholders: Issues and Constraints in Production, Processing and Trade and Their Effect on Rural Development and Income Generation in Asia<sup>1</sup>

By  
Dr. Izham Ahmad<sup>2</sup>  
Chua Piak-Chwee<sup>3</sup>

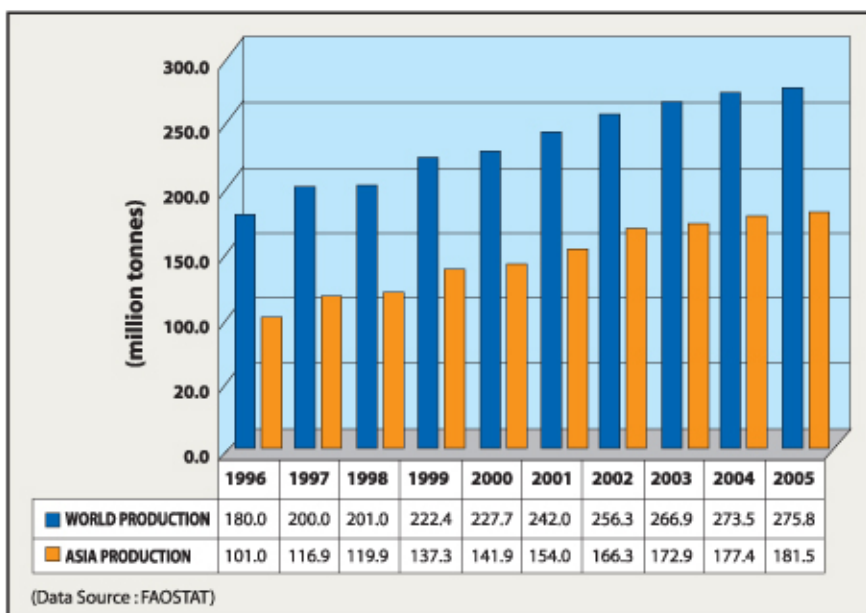
## ABSTRACT

Production and trade of fresh tropical fruits in the Asian region has expanded during the last decade. Total production has increased by 79.8 percent from 101 million tonnes in 1996 to 182 million tonnes in 2005. Asian countries accounted for about 65.8 percent of total world production. Watermelon is the dominant fruit produced, followed by bananas, mangoes, other melons and pineapples. In 2005, watermelon production of 81.6 million tonnes accounted for 45 percent of total Asian tropical fruit production and 84.2 percent of total world watermelon production.

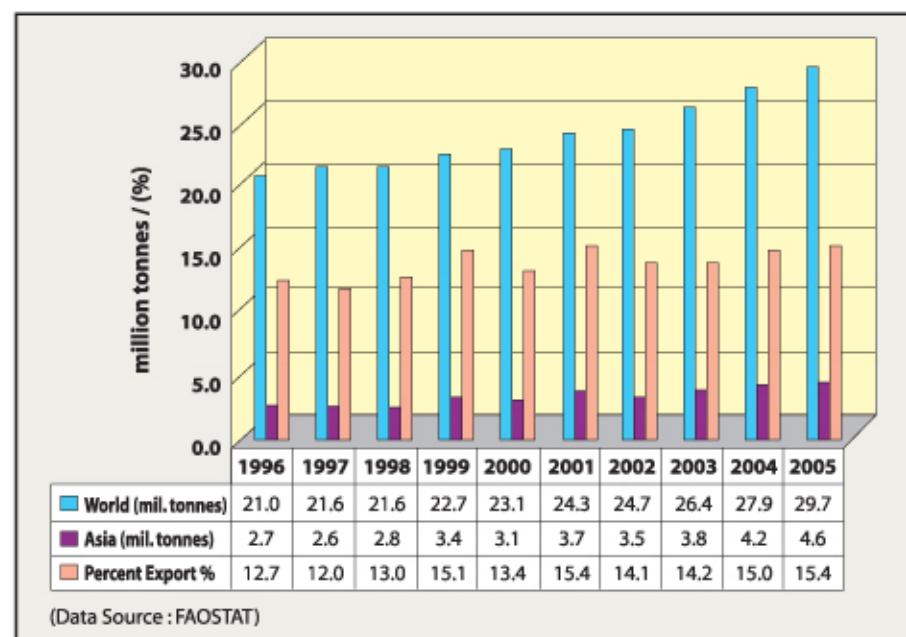
China continued to be the major producer of tropical fruits in the region, followed by India, Philippines, Indonesia and Thailand. In 2005, total production by China amounted to about 98.8 million tonnes and accounted for 54.4 percent total Asian production and 35.8 percent of total world production.

Exports of tropical fruits from the Asian region rose by 71.3 percent from 2.7 million tonnes in 1996 to 4.6 million tonnes in 2005. However, in 2005 only about 2.5 percent of Asian's production is exported. The quantity

exported by the region in 2005 accounted for only about 15.4 percent of the total world export quantity. The export value of tropical fruits from Asia rose by 20.3 percent during the last decade. The region's tropical fruit export was valued at about USD752.3 million in 2005, accounting for about 6.2 percent share of the global export value. The major fruits exported by the region were bananas; watermelons; lemons and limes; mangoes and pineapples. The major exporting countries were Philippines followed by Turkey, India, Malaysia and China.

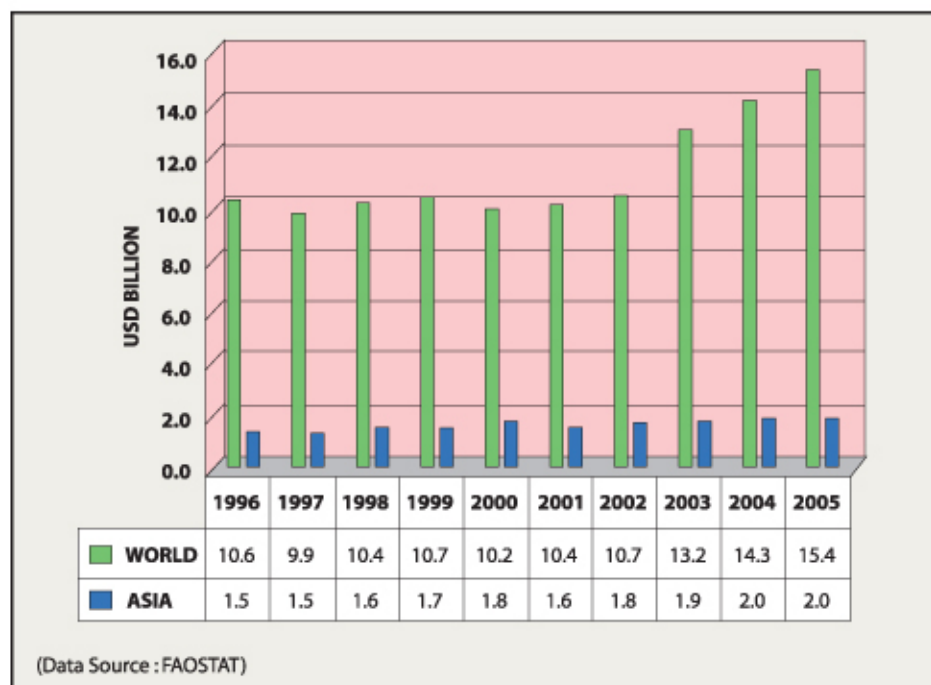


**Asia's Share of World Production, 1996 - 2005**



**Asia's Share of World Export Quantity**

Asian's import of tropical fruits increased by 39.7 percent from 3.2 million tonnes in 1996 to 4.5 million tonnes in 2005. Asia's import quantity in 2005 accounted for 17.5 percent share of the total world import quantity. In terms of value, imports by countries in the region amounted to USD2.0 billion in 2005. The major importing countries in Asia were Japan, followed by China, Saudi Arabia, Republic of Korea and United Arab Emirates. The major fruits imported by these countries were bananas; watermelons; grapefruits and pomelos; pineapples and mangoes.



**Asia's Share of World Import Value**

The tropical fruit sector in Asia faces a number of constraints in production and marketing. The sector is characterized by small and scattered farms with generally low productivity due to poor farm management practices. Production is very often not market driven and smallholders lack knowledge of domestic and international quality standard demands. There is also a lack of post harvest handling activities leading to high post harvest losses and poor quality produce from the smallholder sector.

As fruit cultivation is an important livelihood enterprise in most Asian countries, there is a need for national governments to organize the smallholder fruit sector into commercial, viable and sustainable entities. Organizing these smallholders into cooperatives is a viable option to enhance productivity and provide the opportunities for them to participate in marketing activities as a collective entity.

With increasing stringent demands to meet international food safety and quality assurance standards, the extension delivery system should include the adoption Good Agricultural Practices and transfer of post harvest handling technologies to the smallholders.

To further enhance the development of tropical fruit industry and income of the stallholders in Asia, more R&D and innovation for new and processed products should be conducted to meet the increasing consumer demand for diversity, variety and choice. The inherent nutritional and health values of tropical fruits also warrant further R&D.

The International Tropical Fruits Network (TFNet) with its membership network of 91 members in 24 countries has a potential role in developing the tropical fruit industry. TFNet has and will continue to organise international and regional conferences, seminars, workshops and training to provide the platform for the exchange and sharing of information and experiences among experts. Technical and market information will be disseminated through the TFNet website, newsletters and publications. There are also potential opportunities for member countries to conduct joint projects to promote the development of the industry.

<sup>1</sup> *Opportunities and Challenges in the World Markets for Fruits and Tropical Products, FAO/CFC Workshop, Guangzhou, China, 29 - 30 Nov. 2007*

<sup>2</sup> *Chief Executive Officer, International Tropical Fruits Network (TFNet)*

<sup>3</sup> *Project Officer, International Tropical Fruits Network (TFNet)*

# Guava Intercropping - Management for Citrus Greening Disease

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## ABSTRACT

The most practical management for citrus greening disease (CG) is to control tentatively the vector psyllid, *Diaphorina citri*. Though it often results in severe infection of CG after several years. In the past decade, some farmers in Mekong Delta Region of Vietnam found few or no CG occurrences in their guava intercropped (GI) citrus orchards. Fewer CG-infected trees (< 10%) were detected by PCR, compared to non guava-intercropped (NG) orchards, even chemical-control ones (> 20%). A field experiment was carried out to evaluate the effect GI-intercropping on the occurrence of CG. After 12 months, no symptomatic trees were visually seen nor the pathogen detected by PCR in the GI-intercropped orchard. Conversely, the proportion of infected trees in the NG-intercropped orchard rose to 30% in a half year. Therefore, planting citrus intercropped with guava is a practical way of managing the CG problem.

## INTRODUCTION

*Candidatus Liberibacter asiaticus* which causes CG in Asian countries is transmitted by small psyllid, *Diaphorina citri* (Da Garca, 1991; Hung et al., 2004, Bove, 2006). Since there is no effective control of the pathogen, control of vectors by systemic chemicals, especially neonicotinoid insecticides, is currently the most practical measure in Vietnam's Mekong Delta Region, even chemical-controlled orchards are often infected and destroyed by CG after several years.

In early 2004, four farmers of Cai Be, Tien Giang Province, Southern Vietnam found that GI citrus holdings are less susceptible to CG (Koizumi et al., 1997). These farmers intercropped their citrus crop with guava to obtain earlier income, not expecting CG reduction. It usually takes one and half to two years for the first harvest of king mandarin, while guava produces fruits after several months. Our brief observations of CG occurrences in their GI orchards and nearby NG orchards concurred with the observations of the farmers. Thus we decided to examine GI on the occurrence CG in king mandarin orchards. A meeting with experts from Vietnam, Japan and Australia was held in December 2006 at the Japanese International Research Center for Agricultural Sciences, Ishigaki, Okinawa-den, Japan. It was reported that GI citrus negated infestations of Asian citrus psyllid which consequently reduced CG disease. They relayed that there were such interplantings in Vietnam but their effects against psyllids went unnoticed. Beattie et al., 2007 indicated that there were interest and research on GI based on farmers observation for the past 15-20 years.

## MATERIALS AND METHODS

### 1. CG occurrences in GI citrus orchards conducted by farmers

We visited three GI orchards in Cai Be region of Southern Vietnam in early 2005. Ten to twenty trees were randomly selected from each orchard and from which 5 leaves were randomly sampled per tree. Then tree leaves of the five leaves from each tree were examined for CG infection by PCR (Hung et al., 2004). Since = 80% of the trees in the neighboring NG orchards showed symptoms of CG, no leaf samples were taken for PCR determination. For comparison a visit to the above region was made to collect leaves from two chemical, two biological and two non-treated orchards. Also, the orchard owners were enquired whether they planted disease-free seedlings. From the total of 11 orchards examined, only two GI orchards were planted with non disease free seedlings. Then 10 GI and 10 NG orchards were visited in early April 2007. From each orchard 10 to 20 trees were randomly selected and visually examined for occurrences of psyllids and CG. These occurrences were separated into four classes: for psyllids no, few (fewer than 1 psyllid/tree), moderate (1 to 10); for CG, no, low (< 10% of trees symptomatic), moderate (10 to 50% symptomatic), and high (>50% symptomatic).

### 2. Field Experiment

To elucidate further the effect of GI on CG incidences, two orchards were established (GI intercropped and NG intercropped) in Cai Be on 24th May 2005. In GI orchard, guava trees were planted at 2.5 m planting distance one year earlier. Consequently, when king mandarin seedlings were planted, the guava plants were already 1 m high. In the nearby orchards where the guava seedlings were planted with planting distance of < 10 m, 10-100% of the citrus became infected with CG.

Meanwhile, new shoots, psyllid adults and nymph colonies were counted monthly on all trees in GI and NG orchards. At the same time, canopy size and leaves were harvested as above (1) from 12 trees in GI and 15 trees in NG respectively, for CG infection by PCR.

## RESULTS AND DISCUSSION

### 1. CG occurrences in GI orchards conducted by farmers

The incidence of CG was lower in GI orchards planted with disease-free seedlings than in other orchards (Table 1). The CG infection was higher in chemical-control than in GI orchards, but still lower than in other orchards. Biological control was almost ineffective whilst CG infection in GI orchards with non disease-free seedlings was almost equivalent to the control orchards. Evidently, GI would reduce CG infection but could not cure infected trees. Since both psyllid and CG occurrences were fewer in GI orchards, it can be suggested that GI could reduce CG in citrus orchards (Table 2).

Table 1. Proportions of infected citrus trees in orchards where various control methods were undertaken.

Treatment (on Citrus)	Years after planting	Infection proportion (%)
Guava Intercrop	3	9.1
Guava Intercrop	2	5.6
Guava Intercrop	3	5.0
Guava Intercrop	3	33.3
Guava intercrop	3	26.7
Chemical	2	15.4
Chemical	3	25.0
Ants (as predators)	3	54.5
Ants (as predators)	2	76.9
No control	4	64.3
No control	1	33.3

Table 2. Effect of repelling psyllids of difference height citrus tree to height above guava tree in Tien Giang and Ben Tre

Control	No. citrus	Average number psyllids per citrus tree	
		H.citrus-H.Guava (0- 30cm)	H.citrus-H.Guava > 30 cm
G1	100	0	163.50 +/- 52
G2	100	0	24.7 +/- 12

Note: G1: King madarin variety ( 3 years old ) and Xa li guava variety (4 years old) ; G2 : Da xanh Pomelo variety ( 3 years old ) and Bom guava variety (4 years old) H.citrus : Height of citrus ; H.guava : height of guava

### 2. Field Experiment

New shoots are preferred food and egg-laying resource for psyllids (Yasuda et al., 2005) which occurred throughout this study. The crown size was significantly larger both between orchards (GI and NG) and months, but vice versa for psyllid colony numbers (Figure 2b and 2c). These results suggest that GI can protect citrus from CG infection. Weaver ant (*Oecophylla smaragdina*) was reported to be beneficial for controlling various pests of citrus in Mekong Delta (Val Mele et al., 2002) but did not reduce CG incidence (Table 1). Predation effect by ladybird beetles on psyllid density (Pluke et al., 2002) was not apparent. Natural enemies hardly contribute to significant reduction of CG (Halbert and Manjunath, 2004) since one vector can transmit pathogens to many plants (Yang et al., 2006). Reduction of damage is unapparent unless vectors are controlled to a very low density (Emden and Service, 2004). Orchards intercropping (Andow, 1991) with other fruits like banana, longan, mango, durian, etc., did not apparently reduce CG. Similarly, resource discontinuity hypothesis (Kareiva, 1986, Andow, 1990) was not applicable in our observations. Repellent or visual interruption hypothesis (Finch and Collier, 2000) is more likely explains our results. If guava trees emit volatile repellents, psyllid invasion in GI orchards is lesser than in NG orchards. If this hypothesis is applicable, trees located near the margins of NG orchards are more likely protected from CG. The edge effect was absence in this study might be due to less volatile repellents produced, if any. Visual interruption seems to be possible, whereby the psyllids are agitated visually by the contrast reduction or diffused reflection by guava leaves. Consequently, they are distracted from entering and feeding on the plants in the orchards. However, the effect of GI on CG reduction in citrus orchards still remains as a debate.

Our field observations and experiment indicate significant reduction of CG by GI. Consequently, the Southern Fruit Research Institute is attempting to extend this culturing technique to farmers an expecting an increase of citrus yield though yield increase is a future issue.

### ACKNOWLEDGEMENTS

This study was conducted as a collaborative work for control of CG in Vietnam's Mekong Delta between Southern Fruit Research Institute of Southern Vietnam and Japan International Research Center for Agricultural Sciences. We thank Dr. L.T.T. Hong, Dr. K. Yasuda, and Dr. M. Koizumi for their suggestion on this study.



Lime (with HLB) foreground, white guava left, pummelo taller in back.



White guava fruits.

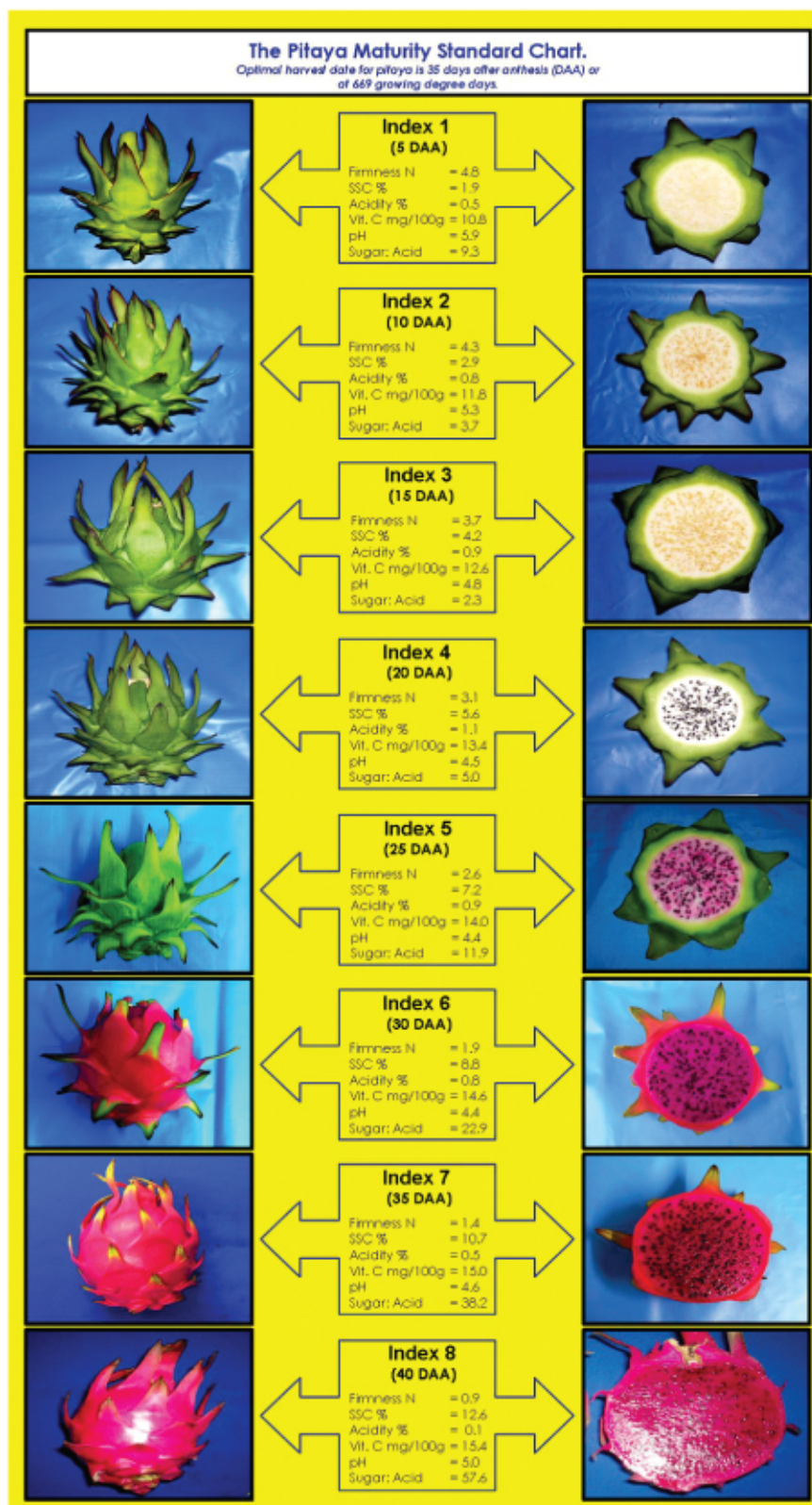
# Maturity Standard and Physico-Chemical Characteristics of Red Pitaya (*Hylocereus polyrhizus*)

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Maturity standard is an important postharvest criterion in determining harvesting time of the pitaya, a new fruit crop that is becoming popular in the tropics. The "Pitaya Maturity Standard Chart" provides farmers with 8 maturity indices of red pitaya for direct visual comparison of colour and instant information on quality characteristics to determine optimal harvest date. Fruit maturity at harvest greatly influences the eating quality and storage life of the fruit. Pitaya is a non-climacteric fruit, so it has to be harvested at the optimum edible stage of maturity. However, information about its harvesting time is lacking even though it can be cultivated successfully. Timely harvest is critical to achieve the best eating quality of the pitaya. In this study we have been able to determine optimum harvest time by using a maturity standard based on measurements of the fruits physico-chemical characteristics. Fruit growth and changes in physico-chemical characteristics of red pitaya (*Hylocereus polirhizus*) were monitored for 40 days following anthesis. We found the optimum harvest date to be at 35 days after anthesis or at 669 growing degree days. If harvesting is delayed after 40 days, the fruit became susceptible to cracking, decay, shriveling and scales degreening. After 25 days of anthesis, changes in physico-chemical characteristics started to occur but at a slow growth phase. These include changes in skin and pulp colour, firmness, soluble solids concentration, citric acid, vitamin C and pH. The changes in the physico-chemical characteristics provided the maturity standard for harvesting of pitaya.



# Potential Applications of Nanotechnology in the Tropical Fruit Industry

by Yacob Ahmad

The prefix 'nano' is derived from the Greek work meaning 'dwarf'. Technically, 'nano' is defined as 'one billionth of something' or 10<sup>-9</sup>. Nanotechnology is generally used to describe materials between the size of 0.1 to 100 nanometers.

Nanotechnology is the manipulation of matter at the atom or molecular level to create materials, products or devices that have entirely different properties, for applications in nanoengineering, nanoelectronics and nanostructures. It is a relatively new technology, which is now the focus of developed and some developing countries. This technology presents unlimited possibilities in developing the future, in the fields of medicine, electronics and engineering, agriculture and food industry.

In the agriculture and food industry, nanotechnology has the potential to be developed as a component in the packaging industry which can benefit producers and consumers. With specific nanostructures, the water and gas permeability of plastics can be engineered to preserve fruit, vegetables and other food. Nanostructured film can also enhance food safety by preventing the invasion of bacterial and microorganisms.

According to a recent study, three years ago, there were less than 40 nanopackaging products in the market, as compared to the 400 now. The study also indicated that the major trends in nanopackaging included improving shelf life of produce, incorporation of antibacterial functions and making packaging interactive.

In the food industry, there is extensive research done on the application of nanotechnology, from the production aspect to packaging.

In the tropical fruit industry, the potential of nanotechnology can be realized in the use of packaging material, as a means to manage pests and as a component in the supply chain.



Packaging utilizing nanotechnology for minimally processed fruit and vegetables - by the National Nanotechnology Centre, Thailand (the Bangkok Post, 29 Oct.2007)

Some examples of development in nanopackaging with can be applied to the fruit industry are plastic films that are being developed that will allow the produce to stay fresh longer. Foils or membranes based on polymer nanocomposites offer adjustable gas permeability which can help to protect the food longer. Nanosilicates are packed in these films to reduce the flow of oxygen into the package and the leaking of moisture out of the package. In a recent development, the National Nanotechnology Center of Thailand has developed a nanopackage that can help prolong minimally processed fruit or fresh fruit.

There are also nanosensors being developed to detect pesticides on fruit and vegetables. Presently researchers are working on pesticides encapsulated in nanoparticles, which only releases the chemical in an insect's stomach, thus minimizing the contamination of the plants themselves. Nanosensors can also detect gases given off by food when it goes bad, where the packaging itself changes color progressively as the produce in it deteriorates.

Another exciting potential of nanotechnology in the fruit industry is the application of tagging and monitoring of fresh produce. This can be incorporated in the supply chain to improve the traceability of the produce from farm to fork.

While there is much excitement about the potential of nanotechnology, issues pertaining to possible risks to consumers have surfaced. However, as further research and development, as the technology matures, these issues will not be insurmountable.

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Competitiveness Study on 6 fruit types in 5 countries:  
Organic banana production and packaging  
by farmers in Lumajang, East Java.



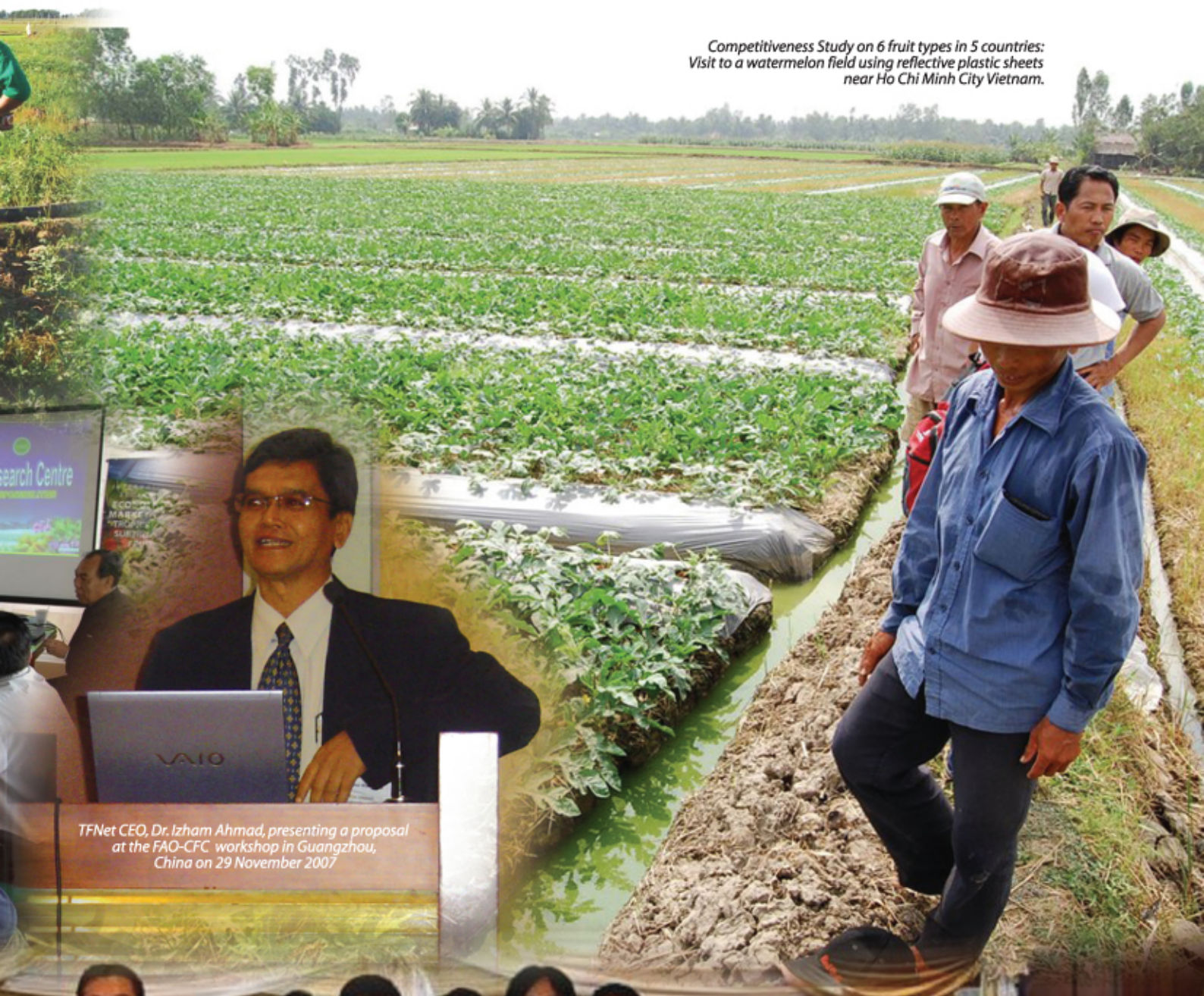
Competitiveness Study on 6 fruit types in 5 countries:  
Visit to a watermelon plot near Los Banos, Philippines.



Briefing on TFNet and Malaysian Agricultural Research  
and Development Institute (MARDI) activities to visitors  
from Vietnam Garden Society and Government  
Officials from Vietnam.



*Competitiveness Study on 6 fruit types in 5 countries:  
Visit to a watermelon field using reflective plastic sheets  
near Ho Chi Minh City Vietnam.*



*TFNet CEO, Dr. Izham Ahmad, presenting a proposal  
at the FAO-CFC workshop in Guangzhou,  
China on 29 November 2007*



*Course participants from Regional Training Workshop on  
Young Coconut Water Bottling in Bangkok, Thailand from 12 – 13 December 2007.*

# FAO/AFMA/KMUTT Regional Training Workshop on Young Coconut Water Bottling

The Agricultural and Food Marketing Association for Asia and the Pacific (AFMA) and King Mongkut's University of Technology (KMUTT) and the FAO, organised a 2-day young coconut processing workshop at the SD Avenue Hotel, Bangkok, Thailand from 12 -13 December 2007. Sixteen (16) participants from Cambodia, Laos, Indonesia, Malaysia, Myanmar, Thailand and Vietnam, attended the workshop. Mr. Yacob Ahmad, TFNet Technical Officer was also invited to attend the workshop, which was officiated by the course coordinator, Dr. Rosa Rolle, Agricultural Industries Officer, FAO, Rome.

The main objective of the workshop was to inform and enlighten participants of the commercial potential of bottling coconut water.

The workshop highlighted the various steps along the coconut water chain that are required to ensure that the processed products are fresh, free of contamination and have a longer shelf life. A video on the bottling of coconut water in the Caribbeans was shown. This was followed by oral presentations by Dr. Rosa Rolle on the technology aspects and the young coconut production and market by Ms. Orawan Vichilak, DOAE Thailand. Participants were brought to visit a commercial young coconut farm in Samutsakorn which supplies fresh coconut for the local market. Workshop participants were also involved in a hands-on practical session on Good Management Practice (GMP) in the postharvest technology laboratory at KMUTT. The focus was on extracting the coconut water from young coconut in a sterilized environment and cooling it for storage.



*Dr. Rosa Rolle giving the opening address.*

Before the end of the workshop, participants broke into three groups to deliberate and report on how this program can be encouraged and implemented in countries with ample resources of coconut.



Recommendations from the workshop included the grouping of farmers in coconut areas with potential, the establishment of a simple, but clean coconut processing centre, the training of farmers, which should incorporate subjects on sanitation to minimize contamination, hygienic bottling operations and storage in a cool environment. The marketing aspect of the products was also discussed during the workshop. Participants were given a certificate of attendance each by Dr. Rosa Rolle at the end of the workshop.



*Hands-on-session in the laboratory at KMUTT.*

# FAO/CFC Workshop on Opportunities and Challenges in the World Markets for Fruits and Tropical Products

The FAO/CFC Workshop on Opportunities and Challenges in the World Markets for Fruits and Tropical Products hosted by Agricultural Trade Promotion Centre of the Ministry of Agriculture, China was held in Guangzhou from 29 November to 1 December 2007. The workshop was attended by 34 participants from FAO, CFC, and 20 countries in Africa, Asia and Pacific, Southern American and Europe.

The short to medium term Market Prospects, Opportunities and Challenges for bananas, citrus and tropical fruits were presented by FAO. Referring to these fruits, the current market situation and challenges facing different countries were then discussed, during the workshop.

Among the papers presented at the workshop were:

1. 'Market prospects, opportunities and challenges for tropical fruits' by Mr. Kaison Chang, FAO, Rome.
2. 'Supply management: Latest development for selected fruits and tropical products and their impact on growers' by Prof. Errol Hewett, Massey University, NZ.
3. 'Challenges facing the banana industry and their impact on trade' by Dr. Agustin B. Molina, Bioversity International, Philippines.
4. 'Transaction cost and supply chain management: The case of export mango and small-hold banana marketing in the Philippines' by Dr. A. P. Aquino et. al, PCARRD, Philippines.
5. 'Development of citrus and tropical fruits in China' by Dr. Ni Hongxing et. al, ATPC, China.
6. 'Management of flowering and harvesting of mangoes in Ecuador and Nicaragua to improve quality and competitiveness' by Mr. Anthony Burgos, Mango Ecuador Foundation.
7. 'Evolution of SPS measures for fruits and tropical food products originating in developing countries' by Mr. Samuel Asfaha, South Centre.
8. 'Markets for value-added certified products' by Mr. Pedro Arias, FAO, Rome.
9. 'World banana market development and mid-term prospects' by Mr. Shangnan Shui, FAO, Rome.

TFNet was represented by the CEO and Project Officer at the workshop. The CEO presented a paper entitled "Opportunities and Challenges for Smallholders: Issues and Constraints in Production, Processing and Trade and Their Effect on Rural Development and Income Generation in Asia".

A number of proposals were discussed for potential funding from the CFC. TFNet took the opportunity to propose three projects, which will be submitted for consideration.

The projects proposed were:

1. Quality assurance and enhancing competitiveness of tropical fruits in the Asia Pacific Region.
2. Development of tropical fruits market information system in Asia.
3. Capacity building for efficient supply chain for tropical fruits in Asia.



Delegates attending the CFC workshop in Guangzhou, China.

## TFNet / Syngenta Training on GAP

TFNet and Syngenta together with the Regional Centre, International Centre for Management of Pest Fruit Flies for Fruit Fly (ICMFF) and Croplife, with the assistance of the Department of Agriculture Malaysia, organised two training sessions on Good Agricultural Practice (GAP) in the States of Negri Sembilan and Melaka.

The first training was held at the community center in Mantin , Negeri Sembilan on 25 October 2007. The session was attended by 70 participants who were starfruit farmers, farm workers and extension officers from the State Agriculture Department. Training was conducted by Mr. Halim Baharol from Syngenta who lectured on the pesticide management on starfruit and the safe handling of pesticides and equipment, Mr. Shaharuddin Shariff who introduced the participants on the control of fruit flies by using protein bait, and Ms Lidya Elani Meor Azamuddin from Croplife who spoke on the recycling of pesticide containers.

The other training was held at the Sungai Udang Agricultural Center in Melaka on 22 November 2007. The session was attended by 85 extension officers from the Melaka Department of Agriculture. The speakers and topics for the training was similar to the one held on the 25 October, except that this session dealt more with pest management on mango.



*Participants at the GAP course on pesticide management in starfruit , fruit fly management and disposal of pesticide containers.*



*Participants from the Melaka Department of Agriculture with trainers who attended the GAP course on mango, fruit fly control and pesticide container disposal.*

# Hands-on Enhancement Workshop and Study Visit to East and Central Java

A hands-on enhancement workshop and study visit on fruit and food processing was organised by TFNet and SPAT (Sentra Pengembangan Agribisnis Terpadu) SPAT of East Java, Indonesia for 24 participants comprising mainly entrepreneurs and extension officers from the Department of Agriculture, Malaysia on 4 - 11 November 2007. This twice a year joint workshop was conducted at the SPAT center in Malang, East Java, where participants were trained to process vacuum fried fruit chips using the water injector vacuum fry equipment.

During the study visit, participants visited and observed some successful projects on processed food in the districts of Batu, Kediri, Jombang and Mojokerta.

These included products made from banana, soybean, cassava and local herbs. Participants also had the opportunity to visit a traditional food fare in the district of Kediri.

A similar workshop and study tour was organised on 21 - 27 November 2007, for 10 participants from the KETARA Intergrated Agricultural Development Project, Malaysia which focused on food processing and development of coconut based products. After a workshop on processing at Malang, and visit to a starfruit project in Probolinggo, East Java, participants proceeded to Central Java to visit a coconut processing center. The center produces a variety of products including virgin coconut oil, nata de coco and activated charcoal. Participants also visited project areas producing organic rice and organic 'snakefruit' or salacca, *zalacca edulis*.



Vacuum fried fruit chip entrepreneur promoting her products.



Products from starfruit produced by group farmers at Blitar, E. Java.

# TFNet - AFMA Study Tour for Malaysian Farmers and Extension Officers

TFNet, together with Agricultural and Food Marketing Association for Asia and the Pacific (AFMA) organised a study visit for 15 progressive farmers and five extension officers from the Department of Agriculture, Malaysia to commercial farms and an agricultural wholesale market in Thailand from 25 to 30 November 2007.

The objectives of the study visit were:

- To acquaint the farmers and officers on new agricultural technologies which are adopted by farmers in Thailand, and to make a comparison with the technologies practiced in Malaysia
- To encourage Malaysian farmers to establish networking contacts and share their experiences with farmers from Thailand.
- To generate interest among the farmers on the important aspects of good agricultural practices, hydroponics and crop rehabilitation programs.



*The farm manager explaining to the participants the field practices for mango.*

The study visit included a 160 hectare commercial mango farm at Sakaew which specializes in all year production of mango. There are a few popular varieties grown here, however, specifically the 'golden nam dok mai' variety is predominant and grown for its high demand, locally and overseas

The group was then brought to visit the collection, grading and packing facility of the farm which is situated at Bangkla. This grading and packaging facility is run by the Chachoengsao Mango Exporters Group. The mangos which are graded and packed at this facility are for the local market and some are exported to Japan.

Participants of the study visit were also brought to a commercial asparagus project run by a group of young entrepreneurs at Ratchaburi. The asparagus, grown on former paddy land, are grown for the domestic and export market. Grading and packaging are also done on-farm.

Another interesting project visited was the banana farms at Pathumthani, where participants observed good agricultural practice (GAP) in the production of the 'gros michel' variety of banana. The banana farms have been established on land which were previously planted with citrus, which failed due to problems associated with the devastating citrus greening disease.



*Packing mangoes for export at a packing centre, Bangkla.*

This group farming project is headed by a young entrepreneur who organises and trains the farmers to produce good quality bananas. The entrepreneur also assists the farmers to market their products. The quality banana produced is also supplied to the National carrier 'Thai Airways'. Participants also observed a demonstration of the way banana suckers are planted along the waterways. The banana suckers are placed in planting holes filled with mud from the waterways. This ensures that the suckers do not dehydrate.

At the Pipat Hydroponic Farm at Nonthaburi, participants were introduced to the commercial production of lettuce and other leafy brassicas using hydroponics, specifically the nutrient flow technique. The fresh produce are packed and marketed at the local supermarkets. This farm also doubles as an agrotourism center for visitors.

The group also had the opportunity to observe the operations at the biggest fresh wholesale market in Asia - Talaad Thai at Pathumthani. This 80 hectare, 24 hour wholesale market complex houses twenty market sections, which include citrus, mixed fruit, seasonal fruits, coconut, water melon, rice, fresh water fish, pets, flowers, vegetables

and other ornamentals and a one stop service center for perishables. The participants were shown the daily operations of the market, plus the one stop centre for the export of produce.

Gauging from feedback received by the participants, the study visit had been an informative and useful experience. TFNet and AFMA will continue organising such study visits to expose participants to commercial agricultural activities, especially those related to tropical fruit production, good agricultural practices and marketing of agricultural products.



*The project initiator explaining about GAP techniques for banana production in the field.*



*Farmer demonstrating packing of banana in the field at Rangsit.*

## Mango Deluge in Indonesia - November 2007



Mango sold in a wholesale market  
Malang, East Java.



Sorting, grading and packing mango at a village  
collection centre, Probolinggo, East Java.



Mango on display and sold at a village collection  
centre, Probolinggo, East Java.



Vendors selling mango at the  
Pasar Baru market, Bandung, W. Java.



Mango for sale in a supermarket  
in Bandung, W. Java.



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Website : http://www.itfnet.org

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I / We wish to apply/renew the membership of TFNet as :

Choose Membership Category :

- Country [ ]
- Associate [ ]
- Ordinary [ ]

Name of Government / Organization / Individual \_\_\_\_\_

Correspondence Address \_\_\_\_\_

City \_\_\_\_\_ Postcode \_\_\_\_\_

State/Province \_\_\_\_\_

Country \_\_\_\_\_

Telephone \_\_\_\_\_

Fax \_\_\_\_\_

E-Mail \_\_\_\_\_

Payment Enclosed : **USD** \_\_\_\_\_

Authorised Signature : \_\_\_\_\_

Name :

Designation :

Date :

#### Membership Fees (effective from 24 August 2006)

- Country Membership dues : USD 5,000 for one calendar year (for government only);
- Associate Membership dues : USD 500 for one calendar year; and
- Ordinary Membership dues : USD 50 for one calendar year

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

Swift Code : MBBEMYKL

## TFNet organizes GAP briefing for agriculturalists from Vietnam

A group of agriculturalists from Vietnam visited Malaysia in early November 2007, to study the Good Agricultural Program that is being implemented. The visit on 7 November, was jointly arranged by TFNet and member Selangor Oil Palm Industries Corp., which operates a commercial fruit farm. The visitors included Dr. Vo Mai, President of the Vietnam Gardening Association, Prof. Dr. Nguyen Tho, Vice President of Vietnam Plant Protection Association, Prof. Dr. Ngo The Dan, Vice Chairman, Vietnam Gardening Society, Prof. Dr. Mai Van Quyen, President of Consulting Council Binh Dien Fertilizer Company and Dr. Bui Si Doanh, Deputy Director General, Plant Protection Department, Ministry of Agriculture and Rural Development (MARD), Vietnam.

The main objective of the visit was to find out about how GAP is being implemented in Malaysia, since Vietnam has also embarked on a similar program. By comparing the system in Malaysia and other countries in the region, Vietnam hopes to establish a system that could easily be harmonized with other GAP systems.

In the visit program, they were first given a briefing by Dr. Mohammad Salleh, from Malaysian Agricultural Research Institute (MARDI) the on focus and agricultural research program undertaken by MARDI. Mr. Yacob Ahmad, TFNet's Technical Officer for TFNet gave a briefing on the activities of TFNet. Later an official from the Quality Division of the Department of Agriculture gave a talk on the implementation of Good Agricultural Practice in Malaysia. Besides discussing about the system, other related requirements for GAP implementation, including human resource development, documentation, promotion, accreditation and certification were also discussed during the briefing.

The visitors also took the opportunity to visit the Selangor Fruit Valley in Rawang and some related fruit research plots at the MARDI station.



*Visitors from Vietnam with Dr. Mohammad Salleh from MARDI, Mr. Aziz Sakiman from Selangor Fruit Valley and Yacob Ahmad from TFNet.*