

# **Fruit and Vegetables for Health Workshop**

**Enhancing Production and Consumption of Safe and High-quality  
Fruit and Vegetables  
In  
East Asian Countries**

**15-16 August 2006, Seoul, Korea**

## TABLE OF CONTENTS

<b>SUMMARY</b> .....	1
<b>1. INTRODUCTION</b> .....	1
1.1 Background.....	1
1.2 Objectives of the workshop.....	2
1.3 Approach and Strategy	
1.4 Structure of the report	
<b>2. WELCOME ADDRESS</b> .....	3
<b>3. INTRODUCTORY PRESENTATIONS</b> .....	17
3.1 Introductory Features and Goals of the Workshop.....	17
3.2 Increasing Consumption of Tropical and Subtropical Fruits.....	19
3.3 Human Health Effects of FAV: A new paradigm in horticultural collaborative research.....	19
3.4 Overview of FAO/WHO's joint involvement in the Global Fruit and Vegetables for Health Initiative .....	19
<b>4. COUNTRY CASE PRESENTATIONS</b> (Fruit and Vegetables Promotion in East Asian Countries).....	23
4.1 Indonesia : Fruit and Vegetable Development Program for Human Health in Indonesia.....	23
4.2 Korea : Production and consumption of horticultural products in Korea and cancer chemopreventive activity of fruit and vegetables.....	26
4.3 Malaysia : Tropical fruits and vegetables in Malaysia ; Production and impact on health.....	28
4.4 Philippines : .....	28
4.5 Thailand.....	
4.6 Vietnam : Development of fruits and vegetables in relation to the nutrient situation in Vietnam.....	
<b>5. DISCUSSION</b> .....	35
5.1 Working Group 1.....	35
5.2 Working Group 2.....	35
<b>6. CONCLUSIONS AND RECOMMENDATIONS</b> .....	72

## SUMMARY

The meeting was hosted and financially supported by the Government of the Republic of Korea from 15-16 August 2006 with technical support from FAO, Cirad and International Horticultural Congress 2006. The programme of the meeting is appended as annex to this report. At the opening, the Director General of Ministry of Agriculture and Forestry of the Republic of Korea underscored the importance of this meeting where the ideas and elements for implementing the “Framework for promoting fruit and vegetables at national level” – to be elaborated through this workshop – would serve individual East Asian countries, including Korea, to further develop and consolidate their own programmes and to provide feedback and further guidance to FAO, WHO, Cirad and other partner organizations for rolling out the Fruit and Vegetable Initiative.

The meeting essentially covered two main aspects:

- (i) Main features of each country’s ongoing programmes and projects related to enhancing production and consumption of fruit and vegetable in terms of health and agriculture aspects
- (ii) Elaborating elements of interdisciplinary national action plans and strategy options, based on consideration of actual issues and problems encountered in the course of F&V programmes in and around different East Asian countries

The workshop was attended by a total of 55 participants, originating mainly from East Asian countries such as Vietnam, Indonesia, Philippines, Malaysia, Thailand and the Republic of Korea. Many other IHC 2006 participants from other regional countries have also attended the workshop because the workshop was open to any Congress participant.

FAO/AG contributed with the participation of 3 headquarters staff members who composed the secretariat. FAO further sponsored the participation of 10 delegates from the following 5 East Asian countries with the fund from the Government of Republic of Korea (two experts from each country, one from agriculture and the other from health side): Vietnam, Indonesia, Philippines, Malaysia, Thailand: as well as one international resource person.

Besides FAO staff, the workshop was attended by resources persons from CIRAD, International Tropical Fruits Network (TFNet), University of Laval (Québec, Canada) and International Society of Horticultural Science (ISHS).

In addition to the presentation of the background papers by FAO, the workshop programme also included the presentation of two keynote papers that were presented by resource persons as a further contribution from FAO. These papers raised considerable interest since they contributed to a better understanding of the consumption trend of fruit and vegetables in the East Asian areas, as well as human health effects of F&V.

For the formulation of the elements of a guiding framework for action and policy and strategy options at national level, the participants split into two working groups to facilitate consideration of the specific characteristics and needs of the proposed thematic elements:

The workshop was chaired by Dr. Somchai Durongdej, Professor of Department of Nutrition, Faculty of Public Health, MAHIDOL, Thailand. He was assisted by 2 working group chairs. The

reporting requirements were covered by two rapporteurs with assistance from the FAO secretariat.

The workshop was successful in that it enabled the formulation of elements of a framework for interdisciplinary action at country level to support the rational development of an initiative on F&V for health and its associated supply chain/s, addressing strategy and policy needs. The framework is based on the following main components:

- Guiding principles: what is intended by F&V for health
- Commonalities and differences among country cases
- Stakeholders and their role in F&V for health
- Interventions (useful entry points) for fruit and vegetable promotion programmes
- Securing product safety quality and environment preservation through GAP

The draft framework has been streamlined and edited by the drafting committee on the basis of the working group reports and their discussion in plenary session and is attached in this report.

The main workshop conclusions and recommendations are summarized below:

- There are major differences among participating countries and population groups in the kinds of nutrition-related problems ranging from under-nutrition to over-nutrition or undergoing an important nutritional transition which jeopardize the already high F&V consumption. Therefore, intervention strategies to promote increased fruit and vegetable consumption need to be sensitive to these differences.
- The quality of F&V varies considerably among different Asian countries. Therefore, there is a need to improve sufficient production and supply of good quality F&V. In particular, the post-harvest quality management of F&V needs to be improved in most countries to ensure access to quality F&V in sufficient quantities.
- Government investment in the development of the human resources and institutional capacities is essential in order to convey the message about increasing the consumption of F&V to the population and to translate this information in efficient and simple terms.
- Efforts should be made to bridge an apparent communication gap between the F&V production side and the health professionals and more precisely the nutritionists and medical doctors.
- Evaluating projects is essential in order to learn what works and what does not and to avoid wasting time and resources on inappropriate approaches.
- Close collaboration among the different actors and stakeholders is desirable in order to achieve synergies and effective implementation of strategies; the Government (Central, Regional and Local), NGOs to convey the importance of F&V to the local populations, distribution food chains and supermarket who have the capacity to advertise, professional associations dealing with health and medias

# **1. INTRODUCTION**

## **1.1 Background**

There is strong evidence that a high consumption of fruit and vegetables may help to prevent several non communicable diseases such as cardiovascular diseases, diabetes type 2 and certain cancers. The WHO World Health Report 2002 identified low fruit and vegetable consumption as a key risk factor and subsequently activities were started to promote fruit and vegetable consumption.

WHO and FAO launched a joint Fruit and Vegetable Promotion Initiative in Rio de Janeiro in November 2003. In September 2004 the first Joint WHO/FAO Workshop on Fruit and Vegetables for Health was held at the WHO Kobe Centre for Health and Development in Kobe, Japan. This Workshop brought together more than 50 experts from the fields of health, nutrition, agriculture and horticulture, mainly from developing countries that developed a framework to promote fruit and vegetables at the national level. This framework was published in March 2005.

WHO and FAO have worked with interested countries during 2005 and beyond to support them in the implementation of the framework. In September 2005 the 1<sup>st</sup> workshop to study and discuss the possibility of implementing this framework was held in Lisbon/Portugal, with participants from the health and agriculture sectors from all lusophone countries.

In January 2006, the Government of Republic of Korea (Ministry of Agriculture & Forestry) accepted the offer to host and financially support the workshop with technical support from FAO ,Cirad and IHC 2006.

## **1.2 Objectives of the workshop**

The main goals of the workshop, which took place in Seoul, Korea from 15 to 16 August 2006, were to:

- Review the existing fruit and vegetables (F&V) policies, programmes and activities already ongoing in East Asian countries;
- Characterize fruit and vegetables production and consumption in Asian countries;
- Develop ideas for country specific programmes/action plans on implementing the "WHO/FAO Framework for promoting fruit and vegetables at national level";
- Foster and strengthen the collaborative work between health and agriculture sectors for fruit and vegetable promotion

Expected outputs are increased capacity building and awareness raising on development and implementation of effective national programs for enhancing production and consumption of safe and high-quality fruit and vegetables, addressing strategy and policy needs as well as technical know-how transfer:

1) Concrete action plans for each participating country to implement the "WHO/FAO Framework for promoting fruit and vegetables at national level".

2) Background document containing information on: the nutritional status of the population and relationship between diet and Non-communicable diseases (NCDs); nutrition policies; dietary patterns and fruit and vegetable production and consumption in Asian countries.

### **1.3 Approach and Strategy**

The workshop was held during the International Horticultural Congress 2006 and open to any Congress participant, as well as invited country participants. Technical, business and policy people from fruit and vegetables sectors were welcome to attend.

To achieve the objectives and expected outputs as specified in the work plan, two main approaches were adopted as workshop strategy. First, during the plenary introductory session, a series of stage-setting presentations was delivered by invited speakers and members of the organising group. The introductory session was followed by brief presentations from selected country participants. Presentations were based on the goals and expected output and shaped by consultation with main stakeholders in each country's ongoing programmes and projects related to the Fruit and Vegetables for Health initiative for enhancing production and consumption of safe and high-quality fruit and vegetables. The second step entailed simultaneous working group sessions. Participants broke out into two working groups to elaborate elements of a guiding framework for action and policy and strategy options at national level, based on consideration of actual issues and problems encountered in the course of Fruit and Vegetables for Health programmes in different countries.

The two working groups was asked to consider the specific characteristics and needs of the following three thematic elements:

- Securing product safety, quality and environment preservation through implementation of good agricultural practices along the supply chain
- Considering commonalities and differences among country cases and pinpoint barriers to increased consumption
- Identifying possible interventions and developing interdisciplinary national action plans for promoting F&V

### **1.4 Structure of the report**

Following the introduction, chapter three shows the introductory presentations made by resource persons as well as FAO, focusing especially on a better understanding of the joint WHO/FAO fruit and vegetables promotion initiative, consumption trend of fruit and vegetables in the East Asian areas, as well as the human health effects of fruits and vegetables. Chapter four describes the country case presentations from six selected countries from East Asian region (Indonesia, Korea, Malaysia, Philippines, Thailand and Vietnam), describing its horticultural sector, particularly fruit and vegetables promotion trend, its institutional context and services, key policies and existing national programmes related to the sector. Chapter five presents the results of two working group discussions, which serves as a basis for the formulation of the elements of a guiding framework for action and policy and strategy options at national level.

## 2. WELCOME ADDRESS

By Dr. Jong Ha Bae

Director General, International Agriculture Bureau, Ministry of Agriculture and Forestry, Republic of Korea

Distinguished delegates

Ladies and Gentlemen,

It is my great honor to have this opportunity to speak at the opening ceremony of the workshop on Fruit and Vegetable Promotion in East Asian Countries.

On behalf of Korea government, I would like to extend my warmest welcome to all the distinguished delegations and participants from each member country, the CIRAD and the FAO.

<Significance of the fruit and vegetable Workshop>

According to the WHO and FAO reports on food consumption trends, fruit and vegetables consumption in Asia has been on the decrease due mainly to westernized lifestyle and income increase in East Asia. Over-nutrition, a result of such changes in food consumption, is one of the reasons for the increase in adult diseases in this area, such as diabetes and heart-related diseases.

Recognizing the seriousness of the situation, FAO and WHO jointly launched a fruit and vegetable promotion initiative in Rio de Janeiro in 2003, and the related workshops were held in Kobe, Japan in 2004, and in Lisbon, Portugal in 2005. Now is Korea's turn to carry the baton in this relay race.

<Contribution of KOREA to international organization>

Korea has continued to promote international cooperation in this effort with FAO and WHO. Korea is the 10<sup>th</sup> to 11<sup>th</sup> largest contribution country to FAO in view of the regular budget, and held a workshop with FAO entitled "Rapid growth of selected Asian economies, lessons and implications for agriculture and food security" last year. Dr. LEE Jong-wook, late WHO Director General, (who passed away on the morning of 22 May 2006 following a sudden illness) is another good example of Korea's cooperation with international organizations. He was an outstanding leader who successfully performed the mission to help people around the world attain the highest possible level of health.

<Korea's Domestic Policies relating to Fresh Products>

The Korean government is pursuing a wide range of policies in order to satisfy consumers' need for products that are of safe and high-quality and to stabilize farmers' income.

Particularly for safe and fresh food supply, the government is operating Good Agricultural Practices (GAP) system that helps prevent contamination with pathogens during growing, harvesting, sorting and packaging process to ensure safe fresh food supply. The government has traceability system in place to manage the information related to individual products over the entire product lifecycle.

To improve freshness and marketability of fruits and vegetables, the government establishes Agricultural Products Processing Centers equipped with facilities for sorting and packaging as well as low temperature storing systems on the main production sites, and let well packed fresh products be directly shipped to the market. The government is also encouraging farmers to form a joint marketing body to enhance their competitiveness against large distribution companies and thus stabilizing farmers' income.

#### < International Cooperation >

Meanwhile, over 30% of fresh agricultural products in tropical area are gone away due to poor treatment under hot weather condition. This is also one of big obstacles preventing people in tropical region from consuming fresh fruit and vegetables. So, technology development to keep fruit and vegetable fresh is emerging as a new task for policymakers in these countries.

Korea has already initiated cooperation with ASEAN countries in this area. Korea Food Research Institute carried out 8 week human resource development programs in Korea for ASEAN countries, and has dispatched experts on post harvest technology of fresh products to ASEAN countries since 2004.

Korea will continue with this cooperation to meet the needs of neighboring countries.

#### < Conclusion >

“The Shorter, The better” is also true for the opening speech. So, I'd like to wrap up my speech here by welcoming you all once again, and expressing my sincere hope that Seoul workshop will serve as a precious venue to provide fruitful discussions on ways to promote production and consumption of fruit and vegetables.

Thank you.

### 3. INTRODUCTORY PRESENTATIONS

#### 3.1 Introductory Features and Goals of the Workshop

By Jacky GANRY, *Deputy Director Research*  
CIRAD [www.cirad.fr](http://www.cirad.fr)  
FAO visiting scientist

Fruits and vegetables are now recognized as important components of a healthy diet and their sufficient daily consumption could help prevent major chronic diseases such as heart disease, cancer, diabetes and obesity, as well as prevent and alleviate several micronutrient deficiencies.. Such are the conclusions of a recently published WHO/FAO report following an Expert Consultation in 2003 and the Kobe meeting in 2004.

But the consumption is far below the recommended 400g *pday/cap* in many developing countries.

WHO estimates that worldwide 2.7 millions lives could be saved through a better nutrition with Fruits and vegetables, stressing the attention on the fact that low fruit and vegetable consumption is among the top 10 selected risk factors for global mortality

**The WHO & FAO fruit and vegetable promotion initiative** has two main pillars:

- to promote production and consumption of fruits and vegetables so as to promote and improve health and to help prevent non communicable and other diseases or deficiencies;
- to encourage science in the areas of fruit and vegetable production, distribution, increased consumption, and benefits for health.

#### Activities:

##### 1) The WHO/FAO workshop, Kobe/Japan, Sept 04

It was the first time a joint workshop between health, nutrition and horticulture specialists was organized.

It was attended by approximately 50 participants from more than 20 countries.

The main goal was to develop a framework to promote fruit and vegetables at national level

**This framework** gives the guiding principles for a fruit and vegetable programme based on availability, accessibility, affordability, acceptability of the products with a concern of equity, in a holistic approach

It gives basic elements

- to analyse the consumer domains and the fruit and vegetable supply networks, their characteristics, entry points and barriers ,
- to identify the main stakeholders : agriculture or horticulture, nutrition, public health, education, finance, the private sector , farmers' unions or

other producer associations, consumer associations, women's groups, academic sector, community leaders

The main activities at national level are expected to be:

- the setting up of a national coordinating team with a clear definition of its constitution and roles
- the identification of national goals and objectives
  - goals should be realistic and timeframes need to be established according to circumstances at national level
  - they are focused on health, nutrition, production and/or distribution ,
  - they must address short-term, medium and long-term objectives
- the definition of activities at national level, based on existing national policies and action plans and on possible interventions at national level
- the identification of sources of data and data collection
- the monitoring and evaluation of the process, outcomes and impacts

## **2) The Lisbon Workshop on fruit and vegetables promotion in portuguese speaking countries, Sept 2005**

The workshop's goals were

- to study and discuss the possibility of implementing the WHO/FAO Framework for Promoting Fruit and Vegetables at the national levels
- to revise past and ongoing activities to promote fruit and vegetable consumption in participating countries.

It was attended by participants from the health and agriculture sectors from all Portuguese speaking countries : Portugal, Brazil, Angola, Cape Verde, Mozambique, Sao-Tome & Principe, Guinea Bissau, Timor.

Two documents were produced in portuguese: a background document and the meeting report

## **3) Recent activities of the WHO & FAO fruit and vegetable promotion initiative**

**More recently was held a meeting in** Montpellier, France, on March 2006 in order to prepare with potential contributors a workshop for French speaking countries to be held in Yaounde, Cameroon, on January 2007.

Another small meeting was organized for Mozambique last July 2006 in Maputo on occasion of a meeting on Urban and peri-urban horticulture in Eastern-southern Africa.

And now we are in Seoul where six countries from East Asia are going to share their experiences and perspective on Fruits, Vegetables and Health .

*The goals are the same as in Lisbon*

The aim is to look at the implementation of the "Framework for promoting fruit and vegetables at national level" in East Asian countries.

The objectives are:

- To review the existing fruits and vegetables policies, programmes and activities already ongoing in Asian countries
- To characterize fruits and vegetables production and consumption in Asian countries;
- To develop country specific programmes/action plans on implementing the "WHO/FAO Framework for promoting fruit and vegetables at national level"; and
- To foster and strengthen the collaborative work between health and agriculture sectors for fruit and vegetable promotion

The expected output is an increased capacity building and awareness for enhancing production and consumption of fruits and vegetables, addressing strategy and policy needs as well as technical know-how transfer:

- 1) Concrete action plans for each participating country to implement the "WHO/FAO Framework for promoting fruit and vegetables at national level".
- 2) Background document containing information on: the nutritional status of the population and relationship between diet and NCDs; nutrition policies; dietary patterns and fruit and vegetable production and consumption in Asian countries

**Literature cited :**

FAO. 2002, Food Balance sheet

FAO-WHO, 2004. Fruit and Vegetables for Health. Report of a Joint FAO/WHO Workshop, 1-3 September 2004, Kobe, Japan.

## **3.2 Increasing Consumption of Tropical and Subtropical Fruits**

By  
Izham Ahmad<sup>1</sup> and Chua Piak Chwee<sup>2</sup>

The tropical and subtropical fruit industry is an important sector in many countries in generating income and employment, provides foreign exchange earnings and as an important source of nutrition and dietary requirements for a healthy population. It is a vibrant sector with progressive expansion in production, international trade and consumption.

### **Global Production**

During the last five years (2000-2004), global production of tropical and subtropical fruits registered an annual growth rate of 3.5 percent. The production of all fruit types has increased by 19.2 percent, from 227 million tonnes in 2000 to 270 million tonnes in 2004. Watermelon registered the largest production volume in 2004. With an annual growth rate of 4.8 percent, watermelon production of 95.3 million tonnes in 2004 accounted for 35 percent of global tropical fruit production. The other major fruits with significant production volumes and annual growth rates are bananas, mangoes, pineapples and papayas.

Asia is the largest tropical fruit producing region, with a production of 178 million tonnes in 2004 which accounts for 66 percent of total global production. The other major regions are America (53 million tonnes) and Africa (25 million tonnes). Among the Asian countries, China is the world's largest producer of tropical fruits. Total production by China in 2004 amounted to 96.3 million tonnes which accounted for 54 percent of total global production.

### **Export of Fresh Tropical Fruits**

During the last five years, there has been significant growth in the international trade of tropical and subtropical fruits. The volume exported has increased by 31 percent from 27.5 million tonnes in 2000 to 35.9 million tonnes in 2004. In terms of value, the global export market in 2004 is estimated at USD15 billion. The export market is dominated by bananas and pineapples. In 2004, the export of bananas (15.8 millions tonnes valued at USD6.7 billion) accounted for 44 percent of the global export trade. The export value of pineapples in 2004 is estimated USD2.4 billion.

---

<sup>1</sup> Chief Executive Officer, International Tropical Fruits Network (TFNet)

<sup>2</sup> Project Officer, International Tropical Fruits Network (TFNet)

Trade data for the last five years indicate that although Asia is the largest producing region, it ranks second to America in terms of exports. The export value from America in 2004 was estimated at USD6.1 billion as compared to Asia's export value of USD2.5 billion. America's export in 2004 accounted for 46 percent of total global exports, with an increase of 6.6 percent from 14.4 million tonnes in 2000 to 16.5 million tonnes in 2004. The major fruit exported by the American region is bananas, especially from Ecuador (4 million tonnes) and Costa Rica (1.84 million tonnes). In the Asian region, the major exporting countries are the Philippines (bananas and pineapples) and Thailand (pineapples).

### **Imports of Tropical Fruits**

On the demand side, global imports of tropical and subtropical fruits during the last five years have expanded by 25 percent from 28 million tonnes in 2000 to 35 million tonnes in 2004. Global imports in 2004 was estimated at USD18 billion, with the major European countries (Germany, Netherlands, France and United Kingdom) accounting for about 50 percent of these imports. USA is the single largest importing country in 2004 with a volume of nine million tonnes valued at USD3.4 billion. In the Asian region, Japan is the largest importing country, particularly for bananas, grapefruits and pineapples.

### **Consumption of Tropical and Subtropical Fruits**

Fruits constitute an important nutritional component in the daily diet. The FAO/WHO Expert Consultation Meeting in 2003 has recommended a daily intake of more than 400 grams of fruits or 150 kg per person per year.

There is a healthy increasing trend in the consumption of tropical and subtropical fruits during the last five years. Global consumption has increased by 18 percent from 193 million tonnes in 2000 to 228 million tonnes in 2004, representing an average annual per capita consumption of 34.4 kg. The average per capita consumption in 2004 is estimated at 36 kg which is equivalent to 24 percent of the recommended intake of all fruits. Watermelons and bananas rank the highest in terms of global intake of tropical and subtropical fruits. The per capita consumption of watermelons and bananas in 2004 is estimated at 12.3 kg and 9.3 kg, respectively.

Regionally, Asia registered the highest consumption quantity with an annual average of 137 million tonnes. This can be attributed to the fact that Asia is the largest producer of tropical fruits. In terms of per capita consumption of tropical fruits, Asia ranks third in the world with an average of 36 kg/cap/yr.

## **Nutrition and Health Properties of Tropical and Subtropical Fruits**

Tropical and subtropical fruits are important sources of vitamins and minerals and many of these fruits are also high in dietary fibre. Research findings also indicate that these fruits contain micronutrients, phytochemicals and antioxidants which could contribute to human well-being and health. In many countries, these fruits are also used for the prevention and as healing remedies for a number of illnesses and diseases. With these properties, there is a vast potential for innovation and development of new products from these fruits in the functional food and nutraceutical industries.

Various campaigns to promote fruit consumption have been initiated by WHO and national organisations. The most prominent campaign is the “5 A Day Programme” promoting the consumption of at least five servings of fruits per day and increasing the availability of fruits in schools and worksites.

## **Conclusion**

The tropical and subtropical fruit industry has registered healthy expansion in production, international trade and consumption trends. This important sector has the vast potential for further exploitation for the development of new products, especially processed products as tropical and subtropical fruits are highly perishable with short storage life. There is also commercial potential for the extraction of phytochemicals, nutraceuticals and metabolites from these fruits.

The following partnership projects are proposed for further development of the tropical and subtropical fruit sector:

- Tropical Fruit Consumption Campaign and Human Health
- Conservation and utilization of traditional fruit species
- Nutritional studies such as nutrient contents of fruit species, epidemiological studies, and phytochemicals / metabolites in fruits.
- Organic fruit cultivation
- The development of a Global Information System for Tropical and Subtropical Fruits (production, trade, consumption, and nutritional and health information).

### **3.3 Human Health Effects of FAV: A new paradigm in horticultural collaborative research**

### **3.4 Overview of FAO/WHO's joint involvement in the Global Fruit and Vegetables for Health Initiative**

## **4. COUNTRY CASE PRESENTATIONS**

(Fruit and Vegetables Promotion in East Asian Countries)

### **4.1 Indonesia :**

#### **Fruit and Vegetable Development Program for Human Health in Indonesia<sup>3</sup>**

**Ahmad Dimiyati and Sri Kuntarsih<sup>4</sup>**

#### **Introduction**

Indonesia is an agro-based country with tropical climate suitable for growing various horticultural crops including tropical fruits and vegetables. They are cultivated in different business scales and cultivation systems. In Indonesia, each farmer mostly possesses a small scale farm unit in house yard or in the farm. The crops may also be grown either on the ground or in the pots.

Horticulture has multiple functions, since it has a high economic value, rich in nutritional elements needed for human's health, and gives positive physiological and psychological effects. Furthermore, it has tremendous prospects as growing "back to nature" trend of the modern society wherein consumption of healthy food is increasing. Growing tourism industry has also triggered the demand for fresh fruits and vegetables. This is hastened by increasing demand for tropical fruits and vegetables in the international market as the awareness of the society is also growing. Consequently, consumer's preference for good quality and healthy produces both in domestic and foreign markets is also increasing.

Growing economy has changed people's life style. In the global tight competition, people get busier and they are more likely to consume unhealthy food, with unbalanced nutrition. This has caused increasing trend of the non-communicable diseases, such as heart disorder, kidney failure, liver malfunction, high cholesterols, diabetes, etc. On the other hand, many people live under the wealthy standard and it is difficult for them to fulfill their nutritional need. Therefore, malnutrition is commonly happening in this society. To alleviate this problem, Indonesian government through the Ministry of Health proclaimed the Healthy Indonesia 2010 Program. The Ministry of Agriculture through the Directorate General of Horticulture, supports the program by formulating various national programs in developing fruit and vegetable industries to fulfill the consumer's need.

There are various tropical fruits and vegetables available throughout the year or seasonally. Banana, pineapple, papaya, citrus, star fruit, snake fruit, melon, and watermelon, are among tropical fruits available all year round; whereas, durian, mango, mangosteen, and lansium are among tropical fruits seasonally available.

---

<sup>3</sup> Paper presented at a Joint Workshop Food and Agriculture Organization-Ministry of Agriculture Fishery and Forestry, Republic of Korea, Seoul 14-16 August 2006

<sup>4</sup> Director General and Director of Fruit Production, respectively, Directorate General of Horticulture, Ministry of Agriculture, Republic of Indonesia

## THE BENEFITS OF FRUITS AND VEGETABLES FOR HUMAN HEALTH

The main advantages of fruits and vegetables for human health are as sources of vitamins, minerals, fiber, fat and carbohydrates. The essential vitamins are Vitamin A, C, and B. The important minerals for human health include calcium, magnesium, potassium, phosphorous and zinc. The contents of essential substances in several fruits is described in Table 1, 2 and 3.

Table 1. Content of vitamins in 100 g of fruit

Fruits	Vitamin A	Vit. B1 (mg)	Vit. B2 (mg)	Vit. C (mg)	Niacin (mg)
Aple	24.00 RE	0.04	0.03	5.00	0.10
Grapes	66.00 SI	0.05	0.02	3.00	200.00
Avocado	70.00 RE	0.05	0.06	13.00	0.90
Star Fruits	18.00 RE	0.03	0.02	33.00	400.00
Longan	-	0.05	-	9.00	-
Durian	890.00 SI	0.50	0.20	40.40	-
Guava	4.00 RE	0.05	0.04	87.00	1100.00
Carambola	-	-	-	5.00	-
Pamello	30.00 RE	0.50	0.02	44.00	200.00
Mandarin	160.00 RE	0.60	0.03	29.00	300.00
Mango	185.00 RE	0.90	0.07	46.00	800.00
Mangosteen (sirup)	-	0.05	0.05	2.90	0.29
Melon	640.00 SI	0.30	0.02	34.00	800.00
Pineapple	20.00 RE	0.08	0.04	20.00	200.00
Jack fruit	51.00 RE	0.07	0.09	7.00	700.00
Papaya	56.00 RE	0.30	0.04	74.00	500.00
Banana	45.00 RE	0.04	0.04	3.00	0.60
Rambutan	1200 SI	0.08	-	58.00	-
Snake fruit	-	0.04	-	2.00	-
Sapodilla	9.00 RE	0.01	-	21.00	-
Water melon	50.00 SI	0.20	0.03	7.00	200.00
Soursop	1.00 RE	0.07	0.04	20.00	700.00
Annona	0.60 RE	0.08	0.04	22.00	200.00

Tabel 2. Content of minerals in 100 g of fruit

Fruits	Calcium	Magnesium	Potassium	Phosphor	Zinc
Aple	6.00			10.00	1.3
Grapes	6.00			24.40	0.40
Avocado	16.00			24.00	0.80
Star Fruits	8.00			22.00	0.80
Longan	18.00			9.00	0.90
Durian	21.10			44.30	1.10
Guava	14.00			28.00	1.10
Carambola	7.50			9.00	1.1
Pamello	26.00			16.00	0.70
Mandarin	18.00			10.00	0.10
Mango	10.00			19.00	0.60
Mangosteen (sirup)	12.00	13.00	48.00	8.00	0.30
Melon	15.00			25.00	0.50
Pineapple	19.00			9.00	0.20
Jack fruit	20.00			19.00	0.90
Papaya	34.00	10.00	204.00	11.00	1.00
Banana	8.00	29.00	393.00	28.00	0.80
Rambutan	16.00	10.00	140.00	16.00	0.80
Snake fruit	28.00			18.00	4.20
Sapodilla	25.00			12.00	1.00
Water melon	8.00			7.00	0.20
Soursop	14.00		293.00	27.00	0.60
Annona	27.00			20.00	0.80

Tabel 3. Content of carbohydrates, fibers and fat in 100 g of fruit

Fruits	Energy (calorie)	Carbohydrates (gram)	Fiber (gram)	Protein (gram)	Fat (gram)
Aple	58.00	14.90	0.70	0.30	0.40
Grapes	75.00	19.70	1.70	0.40	0.36
Avocado	93.00	10.50	1.40	0.90	6.20
Star Fruits	35.00	7.70	0.90	0.50	0.70
Longan	63.00	16.10	?	1.00	0.20
Durian	140.50	26.50	1.60	2.70	3.10
Guava	49.00	12.20	5.60	0.90	0.30
Carambola	46.00	11.80	?	0.60	0.20
Pamello	46.00	10.10	0.40	0.80	0.80
Mandarin	28.00	7.20	0.20	0.50	0.10
Mango	63.00	16.40	0.40	0.60	0.20
Mangosteen (sirup)	73	17.91	1.80	0.41	0.58
Melon	21.00	5.10	0.30	0.60	0.10
Pineapple	50.00	13.00	0.40	0.40	0.20
Jack fruit	106.00	27.60	0.90	1.20	0.30
Papaya	48.00	12.10	0.70	0.50	0.30
Banana	99.00	25.80	0.60	1.20	0.20
Rambutan	?	18.10	?	1.00	0.30
Snake fruit	77.00	20.90	?	0.40	0.00
Sapodilla	92.00	22.40	?	0.50	1.10
Water melon	28.00	7.20	0.50	0.10	0.20
Soursop	65.00	16.30	2.00	1.00	0.30
Annona	101.00	35.20	0.70	1.70	0.60

## OBJECTIVES OF THE PROGRAM

The objectives of the fruit and vegetable development program for health are:

1. Increasing the supply of fruits and vegetables to consumers by establishing additional production centers and improvement of the existing production centers
2. Increasing grower's income
3. Improving product quality by implementing the Good Agricultural Practices (GAP) and the Standard Operational Procedure (SOP) in supplying safe products for consumers
4. Widening the market for tropical fruits and vegetables
5. Increasing the awareness of consumers on nutritional and healthy foods by promoting the consumption of fruits and vegetables

## PROBLEMS TO BE SOLVED

The following problems are encountered in developing fruits and vegetables for human health

1. Low quality products
2. Low consumption rate
3. Expensive price
4. Lack of public awareness on nutritional benefits of fruits and vegetables

## STRATEGIC PLAN OF ACTIONS

Development of the horticultural agribusiness is part of the national economic development. It is aimed at fulfilling the local and export markets, for fresh consumption and raw materials for industries, in order to improve the welfare of the growers, traders and consumers.

The main fruits are banana, citrus (for domestic markets), durian, mango and mangosteen (for domestic and export markets), whereas the main vegetables are shallot, chilies, potato, cabbage and tomato. The production centers of tropical fruits and vegetables are located throughout the country. The fruit and vegetable production is increasing (Table 4). Fruit production increased from 8.9 million tons in 2001 to 14.3 million tons in 2004. On the same period of time, the vegetable production increased from 794,033 tons in 2001 to 977,552 tons in 2004.

Table 4. Fruit and vegetable production in Indonesia from 2001 to 2004

	(ton)			
Year	2001	2002	2003	2004
Commodity				
Fruit	8,959,032	11,663,517	13,551,435	14,348,458
Vegetable	794,033	824,361	913,445	977,552

Source: Directorate General of Horticulture, 2006

1. Poor maintenance causes low quality produce

Most Indonesian farmers have small scale farming units, in their house yard or in the farm nearby. Lack of capital owned by the farmers and limited knowledge cause limited

technology input and poor maintenance of their crops. In fact, some fruit crops, such as durian, pineapple, bananas and mangosteen, are grown for years, without any necessary maintenance. These have caused low quality horticultural produces. For example, farmers do not give the necessary fertilizers, rarely prune their fruit trees, and they do not cover the fruits. Consequently, their crops have low productivity, small fruit size and unattractive appearance. This is even worsen by poor post harvest handling.

To overcome this problem, Indonesian government has developed the Good Agricultural Practices called Indo-GAP. Through the implementation of GAP, hopefully farmers will improve their cultivation system to produce good, safe, and healthy horticultural produces. This GAP has been harmonized with the ASEAN-GAP and is being harmonized with Eurep-GAP, so that we can supply tropical fruits and vegetables for both domestic and export markets. Another approach is to improve the Indonesian National Standard (SNI) in accordance with the International standards such as CODEX Alemantarius. Strategic programs to improve quality of tropical fruits and vegetables are follows:

a. Improvement of quality (on-farm)

Improvement of the product quality is achieved by implementing the Good Agricultural Practices (GAP) and the Standard Operational Procedures (SOP). Through these programs, good quality and safe produces will be produced using environmentally friendly technologies and considering the workers health and wellbeing. At this moment, the Indo-GAP has been socialized and 40 location-and crop-specific SOPs have been formulated, verified and implemented especially for banana, mandarin, clementine, mangosteen, mango, snake fruit, star fruit, papaya, melon, watermelon, rambutan, pineapple, pamello, avocado and durian.

Table 5. The comparison of productivity of some fruit commodities from the farm which is GAP and non GAP implemented

Commodity	Productivity*)	
	GAP (ton/ha)	Non GAP (ton/ha)
Citrus	25.6	13
Mango	9.61	5
Mangosteen	12.7	6
Durian	8.45	4

\*) Survey was conducted in 2005

b. Improvement of harvest and post-harvest handling

Harvesting should be done at the correct time, to avoid deterioration of products when they are reaching consumers. Furthermore, determination of the optimum harvesting time is based on the targeted us of the harvested product either for fresh consumption or for processing. Generally, growers do not give a special post harvest handling, so that the losses are high during transportation and distribution. Only recently, some fruit growers have done the post harvest activities, such as washing, grading, labeling and packaging. Banana growers in Lumajang (East Java), Mango growers in Situbondo, Probolinggo, Pasuruan (East Java) and Indramayu (West java), Mangosteen growers in

Purwakarta (West Java), Citrus growers in Pontianak (West Kalimantan) are the examples.

c. Improvement of processing

In the high season, when horticultural produces are abundant, these produces should be processed to prolong their shelf life. Processing horticultural products is also aimed at increasing food diversity and added values. Generally fruits are processed into juices, syrups, sweets, chips, crisps, jam, puree, and cocktails. Therefore, this is also a good challenge for the industry and requires strong technological and managerial supports.

The processing industry may be established as small scale processing units located in the production sites or as large scale processing factories. Home industries may open better job opportunities for the rural areas and better improve farmer's income.

d. Implementation of supply chain management

The concept of supply chain management has been introduced since 2003. More efficient and effective supply chains of horticultural produces require six important prerequisites, namely: (1) Understanding customers' and consumers' needs, (2) Getting the product right, (3) Creating and sharing added values, (4) Effective logistics and distribution systems, (5) Information and communication and (6) Effective relationships among members of the chain (Woods et al 2000).

Figure 1 illustrates the comparison of the traditional supply chain and the improved one. In the traditional supply chain, growers usually sell their produce in bulk without any post harvest treatments. The produce is packed in simple containers and without grading. In the process the produce passes through long and complex chains from growers to consumers. Therefore, loss is high leaving only 55-60% good quality produce.

On the other hand, with improved supply chain, growers sell their produce to the grower association, who has partnership with the traders who will sell the produces to the modern markets. The benefits of this improved supply chain are: 1) modern market's standards are imposed to the growers through the intermediaries encouraging growers to practice SOPs for good quality produces as demanded by consumer's and 2) improved supply chain has shorter marketing channels and thus reducing losses about 30%. As a result, more good quality produces can be supplied to consumers.

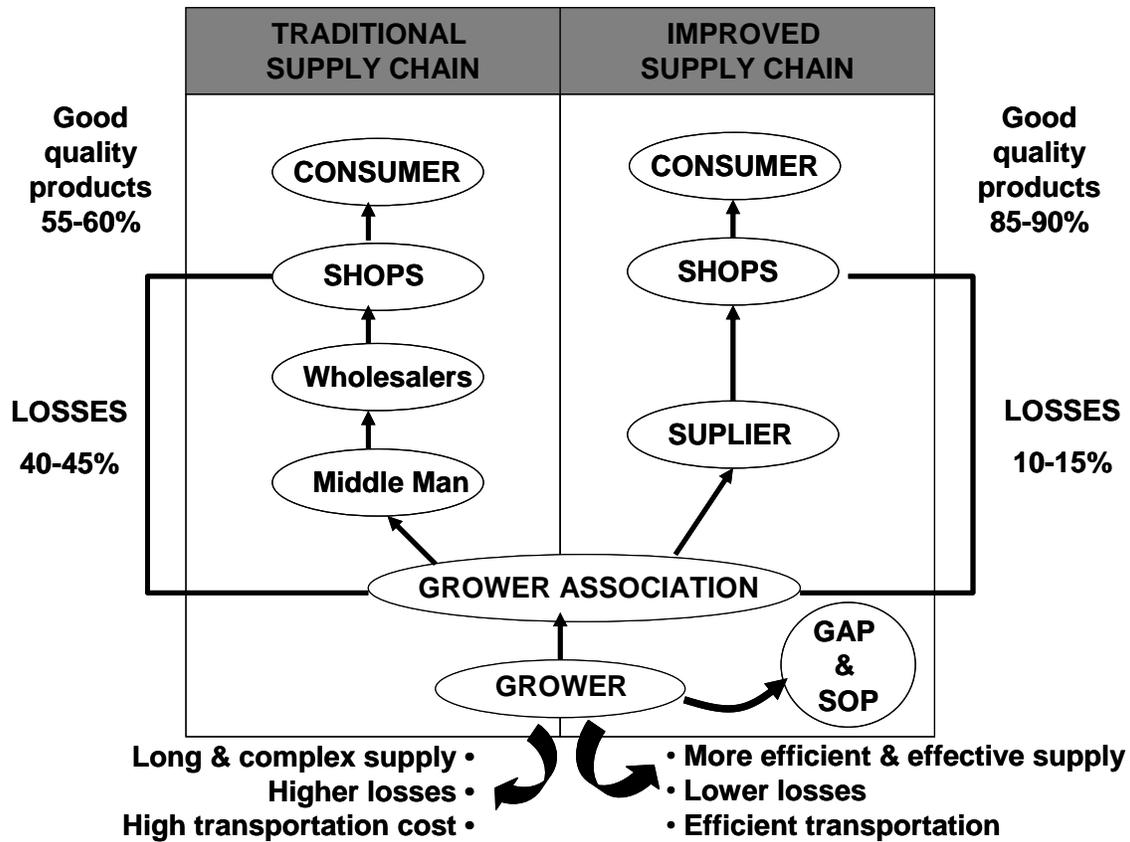


Figure 1. Comparison of the Traditional Supply Chain and the Improved Supply Chain from grower to consumer

Based on the survey in 2005, efficient supply chain of fruits has increased the additional value by reducing transportation cost about 20%, as shown in Table 3 bellow.

Table 3. Decrease in the transportation cost of some fruits by more efficient supply chain

Commodity	Transportation cost (IDR/kg)	
	3 chains*)	4 chains*)
Citrus	160	200
Mango	280	300
Mangosteen	150	200
Durian	325	400

\*) This is an example of the transportation cost in the northern coastal area of Java Island

## 2. Inefficient production causes expensive price

In order to achieve high productivity, most of the time growers apply chemicals inefficiently. They apply fertilizers without considering the requirement of each crop as no soil or crop testing is accomplished to determine the nutritional status and requirement. Generally growers also depend on pesticides to control pests and diseases. These inefficient production systems, high chemicals prices and high transportation cost result in the expensive price of many horticultural produces. This has caused low purchase of horticultural produces, especially by the lower class of the society.

To overcome this problem, we have introduced the farmers' field course on the sustainable and efficient production systems. Successful field course was undertaken, among others, on apple orchard management in Malang, East Java. The curricula in the field course include pruning method and management of productive branches, organic farming, integrated pest management, organic fertilizers, bio-insecticides, bio-fungicide, multiplication of biological agents, post harvest handling, and marketing. Efficient production system has reduced the production cost up to 60%.

Efficiency in the pre and post harvest management as well as in the transportation, marketing and distribution may reduce the selling price. This can be achieved by empowering the grower's organization. At the moment, many grower organizations have been established but have not functioned as expected. Therefore, it needs more active role of the extension experts and practitioners to guide and supervise growers in starting and strengthening the partnership between growers and agro-businessmen, to help growers in negotiation, and to assist growers for accessing capital resources..

## 3. Low consumption rate

The availability of fruits and vegetables in the year of 2005 was higher than the previous year. The fruit availability per capita increase from 54 kg/capita/annum in year 2004 up to 63.78 kg/capita/annum in year 2005 which is equivalent to the 18.11% increase. Fruit and vegetable consumption in Indonesia is increasing, but it is lower than that of other countries. The consumption in year 2005 was about 30-35 kg/capita/annum (Table 6). This is about half of the FAO recommendation, which is 65.75 kg/capita/annum. In Asian countries such as Philippines and Malaysia the fruit consumption are 67 and 52 kg/capita/annum. On the other hand, the fruit consumption in developed countries such as the Netherlands and USA are 72 and 100 kg/capita/annum.

Table 6. Fruit and vegetable consumption per capita in Indonesia

Commodity \ Year	(kg/cap/annum)			
	1996	1999	2002	2005
Fruit	24.67	18.70	29.38	31.56
Vegetable	37.12	31.67	32.89	35.30

Source: BPS-Statistic Indonesia, 2004

The consumption pattern is different between the urban and the rural societies. This is illustrated by differences in their monthly expenditures. Table 1 shows that people in the urban areas spent more money for protein, while people in rural areas spent more money for carbohydrate. In both societies, people consume vegetables more than fruits, and people

in rural areas consume more vegetables than in urban areas. The consumption of fruits and vegetables in year 2004 is shown in Table 7.

Table 7. Expenditure for vegetables and fruits in Indonesia in year 2004

	Urban		Rural	
	(IDR)	(%)	(IDR)	(%)
Carbohydrate *)	21,985	14.17	25,562	23.64
Protein **)	38,336	24.71	23,580	21.81
Vegetables	11,282	7.27	9,378	8.67
Fruits	8,254	5.32	4,518	4.18

\*) Rice, tubers

\*\*) Fishes, meats, eggs, milk, legumes

Source: BPS-Statistic Indonesia, 2004

Table 8. The average consumption of vegetables and fruits in urban and rural areas, in year 2004

	Urban (kg)	Rural (kg)
Vegetables	39.52	44.51
Fruits	30.26	25.12

Source: BPS-Statistic Indonesia, 2004

The highest demand of vegetable in both urban and rural areas is chili, as this is the most favorable ingredient for Indonesian cuisines. The most favorable leafy vegetables are kangkong and cassava leaves, in urban and in rural areas, respectively. Meanwhile, the most favorable fruits are banana, papaya and citrus.

#### 4. Lack of awareness of nutritional benefits of fruits and vegetables

Fruits and vegetables are the most important sources of nutrition that are good for human health, including vitamins, minerals, fibers, anti oxidant, etc. By consuming enough fruits and vegetables, it can balance the human diets. However, lack of awareness of these benefits has caused lower rate of consumption of fruits and vegetables in Indonesia.

In order to increase the consumption rate, we create programs such as exhibitions and promotions. The yearly exhibition program is ITF2 (Indonesian Tropical Fruits Festival). Through this program, we promote the variety of tropical fruits from different provinces. Moreover, public campaigns have been run for promoting consumption of fruits and vegetables by common people and school students.

The campaigns is done by distributing poster, leaflets, and booklets about varieties of the Indonesian tropical fruits and their benefits for human health. Our motto is "**Indonesian Tropical Fruits, the national asset and pride**". Several themes of the publications are:

- I like, I love, and I eat the Indonesian tropical fruits
- 2 bananas per day = healthy body

- By consuming Indonesian Tropical Fruits, our body is healthy and our farmers are happy
- The advantages of fruits for healthy family
- Utilization of house yards to increase the vegetable production and consumption.

## CONCLUSION

The issue of low consumption rate of fruits and vegetables not only deal with possible impact on human health, but also deal with the improvement of people's awareness of the problematic situation, and increasing availability of the produce through betterment of production systems and various economic and political incentives. Comprehensive programs covering the areas of promotion of consumption, improvement of marketing efficiency, increasing production, improving quality, and providing sufficient production inputs should be accomplished in order to create a sustainable system of production, distribution and consumption of fruits and vegetables. Failure to accomplish one or more of the segments will jeopardize the whole system resulting in failure to improve health condition of the population. The whole system will require appropriate actions by different institutions in various government ministries and private sector. Coordination and synchronization of such actions are of vital importance.

## 4.2 Korea :

### Production and consumption of horticultural products in Korea and cancer chemopreventive activity of fruit and vegetables

Mok, Il-Gin<sup>1</sup> and Hyong Joo Lee<sup>2</sup>

<sup>1</sup> National Horticultural Research Institute, 440-706 Republic of Korea

<sup>2</sup> Seoul National University, 151-921 Republic of Korea

#### 1. Production and consumption of horticultural products in Korea

Fruit production in Korea quadrupled during last three decades and the total production reached more than 2.4 million tons in 2004 as shown in Fig. 1. The citrus held the biggest portion of 25%, followed by pears of 19%, apples and grapes of 15% each, and persimmons of 12%. The portion of apple was more than 50% in the 1970's, has decreased continuously, and now it takes only 15% of the total fruit production.

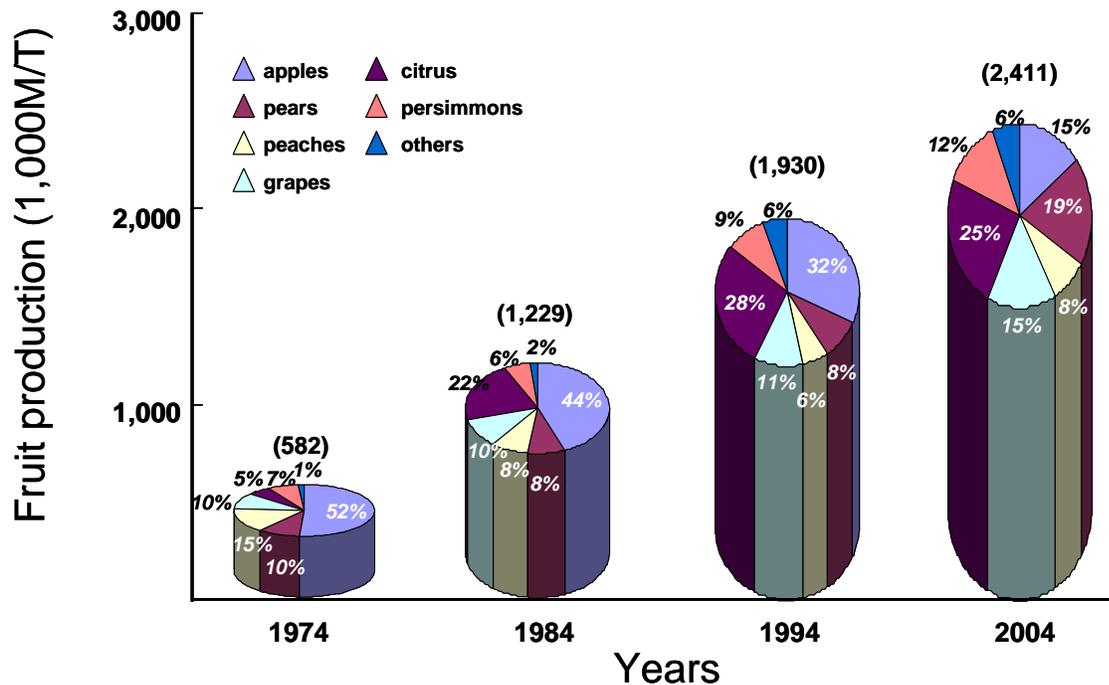


Fig. 1. Fruit production in Korea.

In the fruit trade, Korea imports more than 250,000 M/T of bananas and 120,000 M/T of oranges in 2004, and exports less than 60,000 M/T of pears, persimmons, and apples in total.

Fruit consumption pattern is summarized in Fig. 2. About 15 kg of citrus fruit per capita per year was consumed in 2003, however, consumption of the apple which has been most favorite fruit for decades, decreased to less than 10 kg/yr in recent years. Grape, pear, persimmon, and peach are other favorite fruits in Korea.

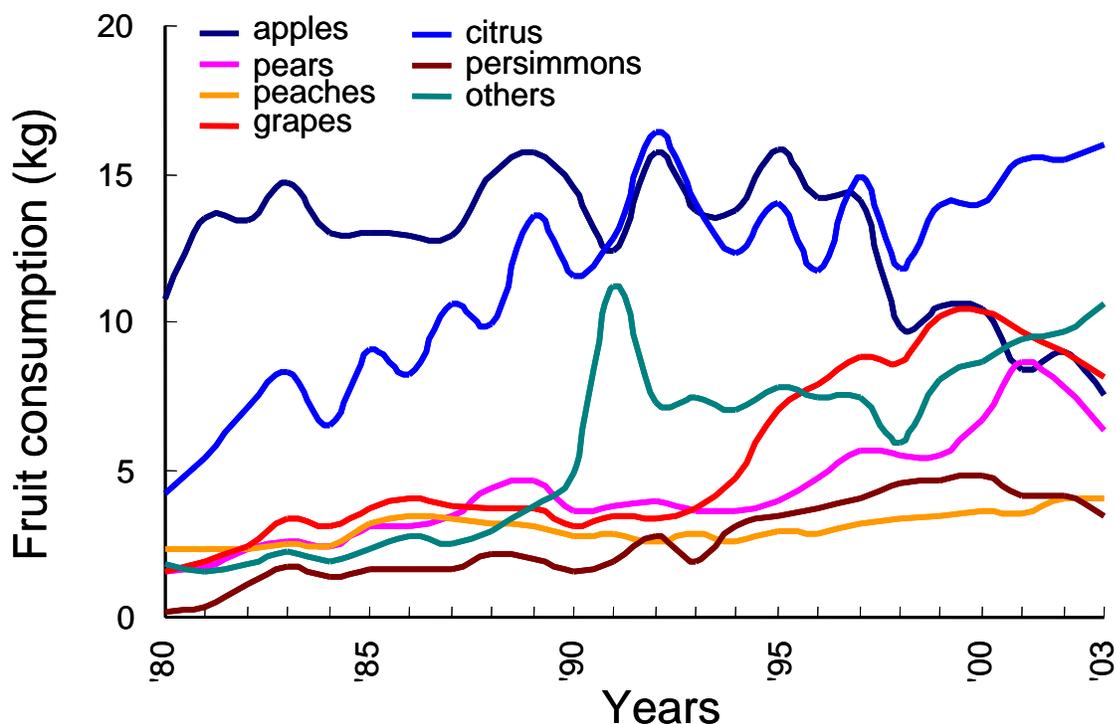


Fig. 2. Changes of fruit consumption per capita in Korea.

Total value of vegetable production in 2004 was about 7,700 billion Korean won, which is about 7,700 million U.S. dollars (Fig. 3). The total vegetable production comprised of 48% of fruit vegetables such as water melons and tomatoes, 30% of flavor and spice vegetables such as red pepper and garlic, 14% of leafy and stem vegetables, 6% of root vegetables, and 2% of western vegetables.

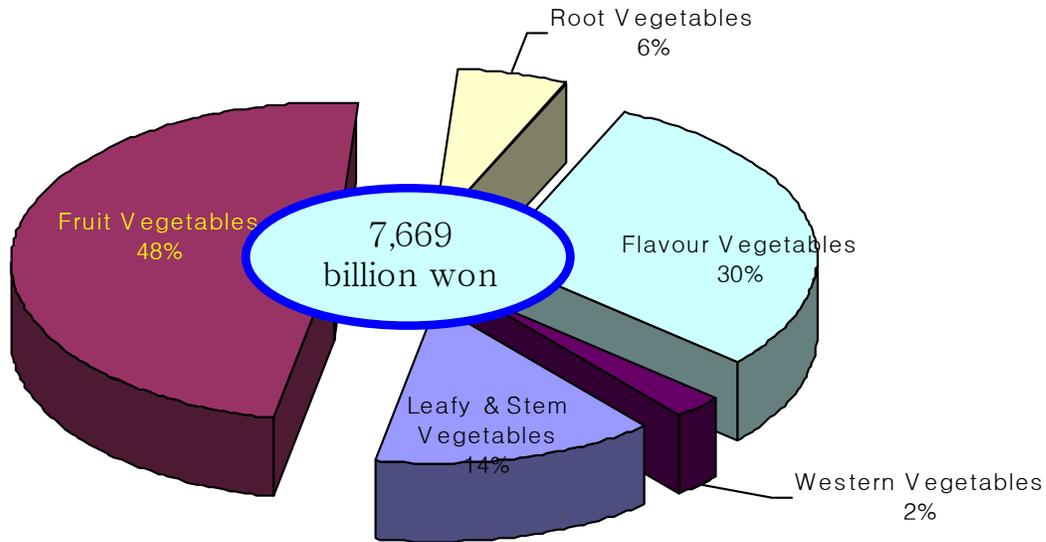


Fig. 3. Vegetable production in Korea (2004).

Fig. 4 shows the vegetable consumption pattern in Korea. Chinese cabbage and radish, which are two major raw materials to make kimchi, have been consumed in large amount ranging 20-40 kg/capita/yr. Of the spice vegetables, onion, garlic, and red pepper are major products that are consumed in significant amounts.

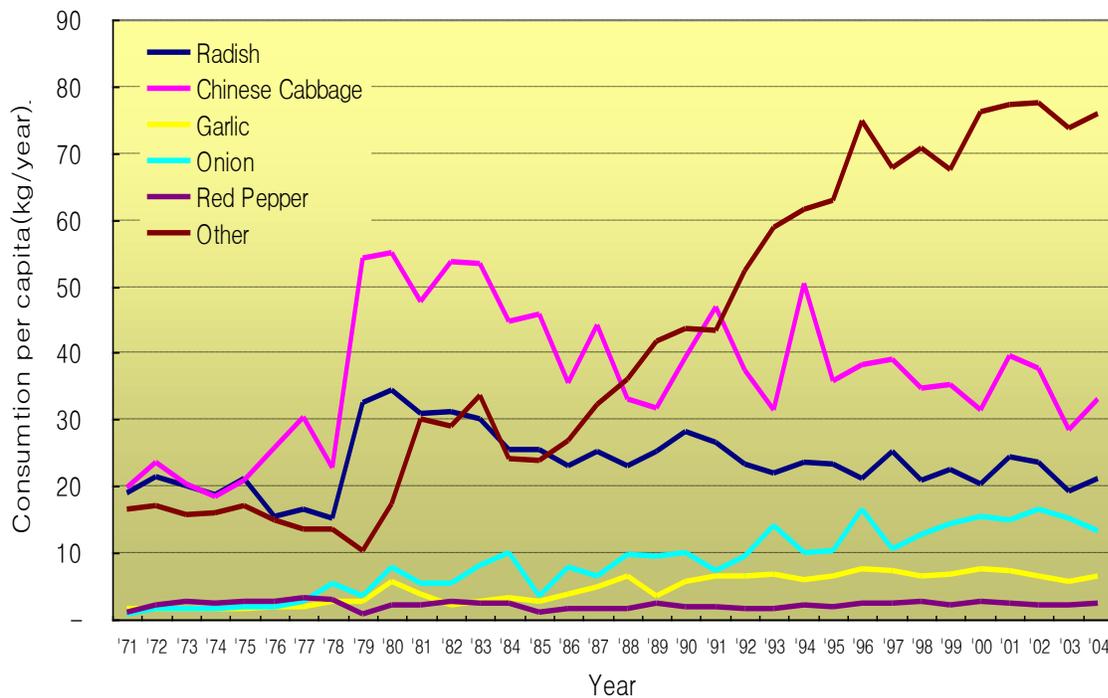


Fig. 4. Changes of vegetable consumption per capita in Korea.

The total production value of fruit vegetables in 2004 was about 3,682 million U.S. dollars. Important fruit vegetable crops include water melon (23.2%), strawberry (17.5%), tomato (16.0%), cucumber (12.5%), green pepper (11.9%), sweet melon (10.4%), pumpkin (7.4%), melon (1.5%), and eggplant (0.5%).

Production of spice vegetables reached 2,277 million U.S. dollars in 2004. Red pepper and garlic, major spice ingredient for making kimchi, were the two most important crops, and held 42% and 28% of total spice vegetables, respectively. Other important spice crops include welsh onion (17%), onion (11%), and ginger (2%).

In the leafy and root vegetable production of about 1,523 million U.S. dollars in 2004, again, the Chinese cabbage and radish were the two most important crops, and counted as 37% and 24 % of that category of vegetables. Lettuce (20%) is the third important crop because it is consumed in large amount mainly with barbequed meat food such as bulgogi or galbi in Korean diet. Spinach (5%), cabbage (5%), carrot (3%), parsley (3%), lotus root (1%), and burdock (1%) are other important leafy and root vegetable products.

## 2. Cancer chemopreventive activity of fruit and vegetables

It is well known that the food has three different functions including nutritional, sensory, and physiological function as shown in Table 1, and functional food is the food where this tertiary, health promoting function is emphasized. Of many food components that contribute to this tertiary function of food, the phytochemicals mainly originated from fruit and vegetables are probably the most important components.

Table 1. Function of foods.

Function	Effects	Components
1' function (Nutritional)	Physical strength	Nutrients (CHO, prot, lipid, vitamin, mineral)
2' function (Sensory)	Pleasant sensation	Flavor, color, texture
3' function (Physiological)	Health promoting	Phytochemicals, Peptides, lipids, probiotics, etc

Hundreds of phytochemicals have been studied for their different bioactivities. Many different phytochemicals in different chemical groups such as flavonoids, polyphenols, terpenes, sulfur compounds, and others exert numerous different physiological activities including antioxidant, antifungal, antiviral, and preventing cardiovascular diseases, cancer, osteoporosis, inflammation, hypertension, and thrombosis (Table 2).

Table 2. Phytochemicals and their bioactivities.

Phytochemicals		Bioactivities
Flavonoids	daidzein, genistein, glycitein	Antioxidant, Lowering cholesterol, Preventing cardiovascular diseases, cancer, and osteoporosis
Polyphenols	catechin, quercetin, epigallocatechin gallate, phytosterol, curcumin, proanthocyanidins	Antioxidant, antifungal, antivirus, and preventing inflammation, cancer, and cardiovascular disease
Terpenes	$\beta$ & $\alpha$ -carotene, lycopene, lutein, zeaxanthin	Cancer chemoprevention
Sulfur compounds	thioallyls, isothiocyanates, glucosinolates	Preventing hypertension, cancer, and thrombosis
Others	saponins, ginkgolides, inositol phosphates	Improving blood circulation, cancer chemoprevention

Cancer is the disease that ranks the first in death rate in most of the countries in the world. The death rate of heart disease decreased to about half level during the last five decades, but that of the cancer have remained almost same during the same period although so many health programs and research works have been concentrated to deal with this disease.

Many different factors have been reported to cause cancer, but it is well known that the diet is the No. 1 cause of cancer, which contributes about 1/3 of cancer deaths. Carcinogenesis is a multistage process including initiation, promotion, and progression. The promotion is a long-term, usually takes more than 10 years, and reversible process. Once the progression begins, it is very difficult to stop the process, and the best way of dealing cancer would be prevention at the promotion stage with, for example, phytochemicals. In this regard, the term “cancer chemoprevention” has been evolved and it is defined as “use of chemical agents that are designed to inhibit, reverse, or retard carcinogenesis.”

A lot of different components of food can contribute to the chemoprevention in the multistage carcinogenesis, and modes of action of these components are quite diverse. Mechanism of action includes suppressing oxidative stress, inflammation, inhibition of cell to cell communication, cell proliferation, and matrix metalloproteinases. Phytochemicals are involved in different levels of signal pathways. Phytochemicals such as genistein, quercetin, resveratrol, vitamins, and phenolic compounds may suppress either ligand binding to receptors, activation of protein kinases, generation of intracellular hydrogen peroxide, or down regulate the oncogenes, and transcription factors, or down-stream processes including inflammation, cell communication, and metastasis.

## **4.3 Malaysia :**

### **Tropical fruits and vegetables in Malaysia: Production and impact on health**

Dr. Mohamed Mohd. Salleh

*Deputy Director, Horticulture Research Centre, Malaysian Agricultural Research and Development Institute (MARDI).*

Dr. Rokiah Mohd. Yusof

*Associate Professor, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia.*

#### **Introduction**

Agriculture contributes 8.5%, which is worth about USD5.6 billions, to Gross Domestic Products (GDP) of Malaysia. Sixty-one percent of the contribution comes from industrial crops such as oil palm, rubber and cocoa, and 39% from agricultural food crops including fruits and vegetables. Malaysia has about 4 million hectares of agricultural land and only 20% is being cultivated with food crops. The export earnings from agricultural sector is about USD10 billions in 2004 and only 21.4% comes from food sector. Malaysia imports about USD3.5 billion worth of food each year and currently facing a deficit at about USD1.35 billions.

#### **FRUITS AND VEGETABLES PRODUCTION**

##### **Government Policies on Agriculture**

Agricultural development in Malaysia is governed by two major policies. Third National Agricultural Policy (1998-2010) recognizes agriculture as the third engine of growth, after manufacturing and service sectors. Ninth Malaysia Development Plan (2006-2010) on the other hand reemphasized the role of agriculture in the development for the country as well as targeting the balance of trade.

##### **Fruit Production**

Total area planted with fruits in Malaysia is about 310,000 ha. The production is at 1.8 million metric tons (mt) and export value of USD127.8 millions to mainly Singapore, Hong Kong and Middle East. Malaysia is still a net importer of fresh as well as processed fruits and the import value of fresh fruits is approximately at USD174 millions. Per capita consumption of fruits is currently at 39.2kg. Under 9th Malaysia Plan, fruit production will be increased from 1.59 million mt in 2005 to 2.56 million mt in 2010, i.e. an increase of 10% per annum. This means that Malaysia will increase in self sufficiency level (SSL) for fruits from current 117% to 138% by 2010. Eight major fruits given more emphasised for domestic as well as for export markets are pineapple, papaya, watermelon, starfruit, banana, citrus, mangosteen and durian (Table 1).

##### **Vegetable Production**

Total area planted with vegetables in Malaysia is about 44,000 ha. The production is at 637,000 million mt and export value of USD122.5 millions to mainly Singapore. Malaysia imports mainly temperate vegetables from China, Taiwan and Thailand at USD401.7 millions. Per capita consumption of vegetables is currently at 45.9kg. Under 9th Malaysia Plan, vegetable production will be increased from 771,300 mt in 2005 to 1.13 million mt in 2010, i.e. an increase of about 8% per annum. Self sufficiency level for vegetables will also be increased from current 74 to 108% by 2010. Popular vegetables to be promoted are as in Table 2.

Growers are slowly producing organic vegetables but the demand is still very small. In order to overcome the excessive use of pesticides, the government has institutionalised good agricultural practices through Malaysian Farm Certification Scheme for Good Agricultural Practice to both fruit and vegetable growers. The growers are encouraged to register for the scheme for free and the produce from these farms will be given priority for established hyper and export markets.

### **Strategies to Achieving Fruit and Vegetable Productions Targets**

Several strategies have been outlined to increase the production of both fruits and vegetables. Traditional farms will be converted into modern farms using latest technologies and knowledge-based production systems. Similarly, idle lands will also be consolidated and rehabilitated with improved infrastructures, drainage and irrigation facilities. Permanent food production parks will be set up to ensure sustainability of food production in the country. For priority fruits and vegetables, the Malaysian government will set up contract farms with guaranteed markets, minimum prices and easier access to markets. The government will also ensure adequate funds are available for investment and the farmers can get easier access to credits. The small and medium enterprises are also encouraged to process fruits & vegetables into ready to eat minimally processed or fully processed products.

## **HEALTH RELATED ASPECTS OF FRUITS AND VEGETABLES**

### **Dietary Pattern of Malaysians**

Fundamental changes in food supply patterns emerged in recent decades. Total calories available for consumption have increased by 21.3% over the past three decades. Major increase comes from vegetables oil, animal products, especially poultry meat, eggs, milk, fish and sugar. The lower income groups tend to depend on a limited range of food items for calories such as rice, flour, cooking oil and sugar. In contrast, people in higher income tend to consume a wider variety of food including more dairy products, fruits and vegetables

### **Benefits of Fruits and Vegetables**

Malaysian tropical fruits have many health benefits. Fruits in general are high in fibre which is necessary to improve digestion and prevent constipation and has no cholesterol. Malaysian tropical fruits contain a variety of micronutrients, vitamins, minerals, carotenoids, riboflavin, niacin and other phytochemicals. Some of these fruits are reputed to be able to prevent certain

non communicable diseases such as blood pressure, diabetes, lower cholesterol or even cancer. In another word, healthy diet of fruits and vegetable since young can build a strong immune system, and maintain a healthy body.

Like fruits, vegetables are also rich in fiber, no cholesterol and low in calories. They are rich in vitamin C and A, folic acid and minerals, which are necessary for growth and healthy body with sound mind. Vegetables can also help to improve skin tissues, eyes, bones and the brain. In Malaysia, it is not uncommon for the people to eat wild vegetables or herbs known as ulams, as salads. Some of these wild ulams are high in calcium, phosphorus, sodium, iron and potassium. Since ulams are eaten raw, their nutritional contents are not destroyed by heat.

### **Government Campaigns and Promotion of Healthy Nutrition**

The government does not have a campaign specifically meant to promote eating fruits and vegetables. However, there are numerous campaigns which include the promotion of fruit and vegetables for health. The green book campaign launched by the Ministry of Agriculture on 3 March 2006, promotes everybody to plant more fruits and vegetables as landscape around the house. This so call edible landscape is one way to encourage the Malaysians to eat more vegetables.

In 1997, Healthy Lifestyle Campaign with the theme of 'Food for health: Recipe for healthy life', amongst recommended diet for health includes diet high in legumes, fruits and vegetables. The campaign was targeted at the hotels, restaurants, fast food outlets, school canteens as well as the street hawkers. In this campaign, fruits are encouraged to be eaten as dessert and vegetable as part of every meal, if possible five servings a day. The public, especially the children were encouraged to drink fruit juices without sugar as part of breakfast or meal. Campaign eating fruits and vegetable was also aimed at young children. Under Balance Diet Campaign, children between the ages of 2-6 are encouraged to eat more fruits and vegetables. For children below the age of 2-6, two table spoon of vegetables and one or a piece of fruit per day. Bright Start Nutrition project started by Malaysian Nutrition Society is another dedicated nutrition education programme targeted to young children. This project emphasized the Food Guide Pyramid, where fruits and vegetable are positioned as the second level after carbohydrates to be consumed. Malaysian Nutrition Society as a non-governmental organization has done a lot of effort in promoting eating fruits and vegetables especially among the children through its website, Nutriweb.

### **CONCLUSION**

The fruit and vegetable industries in Malaysia have the potential to further grow and contribute to the expansion of the agricultural sector. The Third National Agricultural Policy has stressed that fruit and vegetable productions be upgraded to meet the growing domestic and export markets. Production is expected to increase through expansion in cultivation area as well as improvement in productivity per unit area of cultivation. Advances in research are needed in order for the vegetable and fruit industries to achieve the Ninth Malaysia Development Plan

targets. At the moment, Malaysia does not have a specific campaign to promote eating fruits and vegetables for health. Concerted efforts in promoting consumption of domestic fruits and vegetables must be properly planned and implemented for all stages of life, especially among the children. Research has shown that consumption of fruits and vegetables can prevent many non-communicable diseases if the consumption is started early and become part of dietary habit. There is a need to develop specific targeted programmes to increase the consumption of fruits and vegetables in Malaysia, especially among the children.

Table 1. Fruits given emphasises for domestic as well as for export markets in 9<sup>th</sup> Malaysia Development Plan (2006-2010)

Common Name	Scientific Name	Area Planted (ha)
<b><u>For Domestic and Export Markets</u></b>		
Pineapple	<i>Ananas comosus</i>	14,928
Papaya	<i>Carica papaya</i>	3,016
Watermelon	<i>Citrullus lanatus</i>	4,443
Starfruit	<i>Averrhoa carambola</i>	1,115
Banana	<i>Musa paridasiaca</i>	27,602
Citrus	<i>Citrus sinensis</i>	6,208
Mangosteen	<i>Garcinia mangostana</i>	6,633
Durian	<i>Durio zibethinus</i>	112,119
<b><u>For Domestic Market</u></b>		
Guava	<i>Psidium guajava</i>	1,827
Mango	<i>Mangifera indica</i>	9,389
Jackfruit	<i>Artocarpus heterophyllus</i>	2,975
Dokong	<i>Lansium domesticum</i>	36,263
Ciku	<i>Manilkara zapota</i>	1,049
Rambutan	<i>Nephelium lappaceum</i>	25,423
Cempedak	<i>Artocarpus champeden</i>	11,118

Table 2. Vegetables given emphasises for domestic market in 9<sup>th</sup> Malaysia Development Plan (2006-2010)

Common Name	Scientific Name	Area Planted (ha)
<b><u>Lowland Vegetables</u></b>		
Leaf mustard	<i>Brassica juncea</i> var. <i>foliosa</i>	10,397
Long bean	<i>Vigna sesquipedalis</i>	3,290
Cucumber	<i>Cucumis sativus</i>	2,870
Water convolvulus	<i>Ipomoea aquatica</i>	2,645
Spinach	<i>Spinacia oleracea</i>	2,474
Chilli	<i>Capsicum annum</i>	2,125
Lady's finger	<i>Abelmoschus esculentus</i>	1,537
Luffa	<i>Luffa acutangula</i>	1,175
French bean	<i>Phaseolus coccineus</i>	1,112
Chinese kale	<i>Brassica oleracea</i> var. <i>alboglabra</i>	1,108
<b><u>Highland Vegetables</u></b>		
Cabbage	<i>Brassica oleracea</i> Capitata group	1,4005
Lettuce	<i>Lactuca sativa</i>	994
Tomato	<i>Solanum lycopersicum</i>	753

#### 4.4 Philippines :

### **The Health and Nutrition Situation of the Philippines\***

**MARIO V. CAPANZANA, Ph.D.**  
Director  
Food and Nutrition Research Institute  
Department of Science and Technology

#### **FNRI Mandate**

The Food and Nutrition Research Institute of the Department of Science and Technology is the government's principal research arm in food and nutrition. It is mandated to define the citizenry's nutrition status, develop recommendations for the improvement of nutrition status, and disseminate research findings and recommendations.

#### **The National Nutrition Survey**

To fulfill its first mandate, the FNRI conducts the periodic **National Nutrition Survey (NNS)** every five (5) years. It has six (6) components, namely: a) **Anthropometric Nutrition Survey**; b) **Household Food Consumption**; c) **Awareness and Usage of Fortified Foods and Fortifiable Foods**; d) **Biochemical Nutrition Survey**; e) **Clinical Phase for the National Nutrition and Health Survey (NNHeS)**; and **Dietary Assessment among 0-5 year-old children, pregnant and lactating mothers.**

#### **Trends in the nutritional status based on the anthropometric survey**

Generally, there are decreasing prevalence rates of underweight, stunting and wasting, while there is an increasing prevalence rates of overweight from 1989-1990 to 2003 among 0-5 years old children.

Among 6-10 year-old children, trends show that from 1989-1990 to 1996, there are decreasing prevalence rates of underweight and stunting. However, from 1996 to 2001, the trend is increasing but rates drop in 2003. On the other hand, the trend of overweight is generally increasing from 1990 to 2003.

---

\* Paper presented at the Fruits and Vegetables for Health Workshop: Enhancing Production and Consumption of Safe and High-Quality Fruits and Vegetables, August 15-16, 2006 at the Pacific Hall Convention and Exhibition Center (COEX), Seoul, South Korea sponsored by FAO and Ministry of Agriculture and Fisheries (MAF), Korea.

Using the National Statistics Office (NSO) 2003 projected population data, the estimated number of 0-5 and 6-10 year-old children who are underweight, underheight and thin are as follows:

Nutritional status	Prevalence Rate (%)	Estimated No. (in million)*
<b>0-5 years old</b>		
Underweight	26.9	3.1
Underheight	29.9	3.4
Thinness	5.3	0.6
Overweight	1.4	0.1
<b>6-10 years old</b>		
Underweight	25.6	2.4
Underheight	35.8	3.3
Overweight	1.3	0.1

\*NSO 2003 Projected Population based on 1995 Census

Among adolescents, the prevalence of underweight rose from 1993 to 1998 and then decreased in 2003 for both males and females. The prevalence of overweight among males decreased from 2.6% to 1.2% in 1993 and 1998, respectively, and rose to 3.4% in 2003. In contrast, the prevalence of overweight among females increased from 2.2% to 4.7% in 1993 and 1998, respectively and dropped to 3.8% in 2003.

Lastly, among adults, the trend shows a constant increase in the prevalence of overweight and a constant decrease in the prevalence of chronic energy deficiency (CED) from 1993 to 2003. The prevalence is based on the WHO cut-off which is a body mass index (BMI)  $\geq 25$  for overweight and obese, and  $BMI \leq 18.5$  for CED.

*Trends in Iron Deficiency Anemia (IDA), Vitamin A Deficiency (VAD) and Iodine Deficiency Disorders (IDD)*

IDA remains to be a public health concern among children 6 months to 1 year old, pregnant and lactating women with prevalence of 65.9%, 43.9%, and 42.2% respectively in 2003.

**For VAD, prevalence rate is still of public health significance among 6 months to 5 year old children with 40.1%, pregnant women with 17.5 %, and lactating women with 20.1%, based on plasma retinol <20 micrograms/liter (deficient and low levels).**

In 2003, IDD is no longer a public health concern among children 6-12 years old and pregnant women. Prevalence rate among lactating women, however, is 23.7% prevalence and still a public health concern.

### *Trends in Household Food Consumption*

Based on the Food Consumption Survey Component of the 2003 NNS, the common diet of Filipino households at the national level is composed mainly of rice, fish and vegetables. Rice and cereals comprise almost half of the total one-day per capita food intake, followed by fish, vegetables, and meat and poultry. Fruits and vegetables, milk and milk products, and sugars, on the other hand, are lagging behind.

Consumption of energy-giving foods (e.g. rice and products, cereals and cereal products, starchy roots and tubers, sugar and syrups and fats and oils) show an increase from 1993 to 2003. This trend is also the same for body-building foods like milk and milk products, dried beans, nuts and seeds, eggs, fish and products, meat and products and poultry. In contrast, there is a declining consumption of fruits and vegetables. There was a slight increase from 106 to 110 grams in the consumption of vegetables from 1993 to 2003. However, this is still far behind the consumption in 1978. For the consumption of fruits, there has been a marked decrease from 1987 to 2003 from 107 grams to 54 grams.

**Findings of the 2003 NNS show that the first 30 commonly consumed food items in the Philippines include:**

Food Group/ Sup-group	Frequency	% Households Consuming
1. Rice, ordinary	2818	92.6
2. Coconut oil	2093	68.8
3. Salt, course	2091	98.7
4. Coffee, instant	1653	54.3
5. Sugar, refined	1584	52.0
6. Garlic	1461	48.0
7. Vetsin	1437	47.2
8. Onion, bombay	1409	45.3
9. Soy sauce	1136	37.3
10. Chicken eggs	981	32.2
11. Sugar, brown	941	30.9
12. Milk, powdered	779	25.6
13. Tomatoes	759	24.9
14. Pork, liempo	716	23.5
15. Softdrinks	682	22.4

Food Group/ Sup-group	Frequency	% Households Consuming
16. Pandesal	646	21.2
17. Vinegar, coconut	632	20.8
18. Eggplant	601	19.7
19. Sitaw	595	19.5
20. Milo	544	17.9
21. Instant noodle	513	16.9
22. Luya	493	16.2
23. Squash fruit	458	15.0
24. Pan de monay	430	14.1
25. Malunggay	426	14.0
26. Iodized salt	415	13.6
27. Bangus	359	11.8
28. Sardines in tomato sauce	359	11.8
29. Coconut cream	358	11.8
30. Okra	344	11.3

In terms of the nutrient adequacy of the food that Filipinos consume, findings reveal that calcium, iron, riboflavin, and vitamin C register the lowest prevalence of adequacy. The actual food intake among Filipinos has increased in 2003 with an intake of 1905 kilocalories (kcal), showing an upward trend from the 1684 kcal in 1993.

The bulk of the diet of 6 months to 5 year-old children consists of milk and milk products, and cereals comprising more than half of the one-day food intake. Fish, meat, fruits, and vegetables follow these food groups.

The following are the first 30 commonly consumed food items of 6-month to 5-year old Filipino children ranked by % of children who consumed the food item:

Rank	Food Group/ Sup-group	% of Total Subjects	Mean Intake (Raw, as Purchased, in grams)
1	Rice (well-milled, white)	88.8	108
2	Coconut oil ( <i>langis ng niyog</i> )	63.0	4
3	Sugar (white, refined)	37.2	9
4	Milk (powdered filled milk)	29.5	27
5	Sugar (brown)	25.9	10
6	Chicken egg	25.4	27
7	Pan de sal	20.0	29
8	Milo chocolate drink	19.0	7
9	Instant noodles	17.4	19
10	Galunggong	16.9	45
11	Coffee (instant, powder)	16.4	
12	Squash fruit	15.7	22
13	Stringbeans, green	15.7	25
14	Saba banana	14.7	89
15	Softdrinks	14.2	128
16	Pork belly, lean part	13.5	32
17	Rice gruel	13.1	
18	Pan de monay	12.5	35
19	Candy, hard	12.4	5
20	Coconut cream ( <i>niyog, kakang gata</i> )	11.6	11
21	Dried mungbeans	11.4	10
22	Cracker, salted	11.1	14
23	Horseradish tree, leaves ( <i>malunggay, dahon</i> )	11.0	15
24	Tilapia	9.7	62
25	Hotdog	9.6	24
26	Milkfish	9.6	39
27	Eggplant	9.5	19
28	Sardines in tomato sauce	9.5	14
29	Fruit juice drink, orange	9.1	119
30	Corn grits, white ( <i>mais, durog, puti</i> )	8.4	73

### *Trends in Non-Communicable Diseases*

The NNHeS was conducted to determine the prevalence of nutrition-related and lifestyle diseases and risk factors among Filipinos 20 year-old and above. In 2003, the prevalence of diabetes is 3 in every 100 adults, high blood cholesterol at 8 in every 100 adults, and hypertension at 22 in every 100 adults. Based on waist circumference, 18 in every 100 for adult females and 3 in every 100 for adult males are android obese. In addition, there seems to be a rise in the prevalence of dyslipidemia, hypertension, diabetes mellitus and impaired fasting blood sugar among adults which may be attributed to physical inactivity, low consumption of fruits and vegetables.

## **Policy Environment**

### *The Medium-Term Philippine Plan of Action for Nutrition (MTPPAN) 2005-2010*

The MTPPAN is the country's blue print of programs and projects for nutrition improvement. The plan is overseen by the National Nutrition Council (NNC) Governing Board, which includes the Department of Health (DOH), Department of Agriculture (DA), Department of Science and Technology (DOST), Department of Local Government (DILG), Department of Education (DepEd), Department of Labor and Employment (DOLE), Department of Social Welfare and Development (DSWD), Department of Budget Management (DBM), Department of Trade and Industry (DTI), National Economic Development Authority (NEDA), and non-government organizations and individuals namely, GMA Foundation, Inc., ABS-CBN Foundation, Inc., and Ms. Elisa C. Valdecantos.

The programs included in the MTPPAN are: home, school and community food production, food fortification, micronutrient supplementation, nutrition information, communication and education, food assistance, livelihood assistance, and nutrition in essential maternal and child health services. Specifically, the home, school and community food production, food fortification, and nutrition information, communication and education address the issues on fruits and vegetables consumption in the Philippines.

### *Suggested Food-Based Intervention*

The FNRI has developed and continues to develop food products addressing the nutritional problems of the country. Supplementary/nutrient-rich foods are developed,

particularly weaning foods, snack foods, foods for disaster or emergency, condiments, and nutritious soup blends. Staple foods such as rice, sugar, flour and oil are fortified with micronutrients to improve dietary intake. Lastly, functional foods such as high fiber, low fat foods and low sugar foods are also developed to address nutrition-related lifestyle diseases like diabetes and cardiovascular diseases.

The following are the food products already developed by FNRI:

<b>Protein-rich Foods</b>	<b>Micronutrient-rich Foods</b>	<b>Functional Food Products</b>	<b>Calamity/Disaster/ Combat Rations</b>
<ul style="list-style-type: none"> <li>❖ Curls (Extruded) <ul style="list-style-type: none"> <li>▪ Rice Mongo</li> <li>▪ Rice Soy</li> <li>▪ Corn Soy</li> <li>▪ Corn Mongo</li> </ul> </li> <li>❖ Crunchies/chips <ul style="list-style-type: none"> <li>▪ Rice Mongo</li> <li>▪ Corn Mongo</li> <li>▪ Squash</li> </ul> </li> <li>❖ Complementary Foods <ul style="list-style-type: none"> <li>▪ Instant Rice Mongo</li> <li>▪ Instant Gabi Paayap</li> <li>▪ Instant Rice Soy</li> <li>▪ Instant Corn Mongo</li> <li>▪ Instant Corn Soy</li> <li>▪ Rice Mongo Sesame</li> <li>▪ Banana Soybean</li> <li>▪ Banana Peanut</li> <li>▪ Camote Paayap</li> <li>▪ Banana Paayap</li> <li>▪ Germinated Rice and Mongo</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>❖ Fortified Bihon Noodles</li> <li>❖ Noodles (Canton Style &amp; In Cups) <ul style="list-style-type: none"> <li>▪ Squash</li> <li>▪ Seaweed</li> <li>▪ Saluyot</li> </ul> </li> <li>❖ Noodles with Squash (canton Style)</li> <li>❖ Noodles with Saluyot (Canton Style)</li> <li>❖ Squash Products</li> <li>❖ Dehydrated Vegetables <ul style="list-style-type: none"> <li>▪ Carrots</li> <li>▪ Sweet Pepper</li> <li>▪ Celery</li> <li>▪ Kangkong leaves</li> <li>▪ Alugbati leaves</li> <li>▪ Kamote leaves</li> <li>▪ Petsay leaves</li> <li>▪ Mushroom caps</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>❖ Carrot-Pineapple Juice</li> <li>❖ Carrot-Mango Juice</li> <li>❖ High-fiber Cookies</li> <li>❖ Soybean Spread</li> <li>❖ Fruit Juice Drinks</li> <li>❖ Soybean Gel</li> <li>❖ Vegetable Mixes</li> </ul>	<ul style="list-style-type: none"> <li>❖ Rice Crispy Bars</li> <li>❖ Instant Cream Soups</li> <li>❖ Compressed Food</li> </ul>

**Small and Medium-scale Enterprises (SMEs) have been recipients of FNRI's technology transfer program. Among them are, Farmtech, Dayapan Multipurpose Cooperative, Eagle Multipurpose Cooperative, Jojo's Noodle Center and Moonbake, Inc.**

The FNRI has also developed Vegetable Recipe Manuals like:

1. Mga Piling Lutuing Gulay – a compilation of vegetable recipes as main dish, snackfoods, dessert, and appetizers.

2. Squash Recipes – a compilation of squash recipes as main dish, snackfoods, dessert and appetizers.

In conclusion, there has been a general improvement between 1998 and 2003 in the country's overall nutrition situation of various population groups. There is, however, an increasing trend in overweight among adults as well as children. Nutritional anemia remains to be a major health problem among children 6 months to less than a year, and pregnant and lactating women. The iodine status of the 6-12 year-old children, pregnant and lactating women has improved. There is also increasing prevalence of non-communicable diseases among adults. Lastly, there is a significant reduction of fruits and vegetables consumption and low physical activity that may be associated with the increasing prevalence of non-communicable diseases.

Considering these, the FNRI recommends the following:

- ❑ Strengthening the targets set for 2004 in the MTPPAN and the Millenium Development Goals (MDGs) set for 2015 to reduce Protein-Energy Malnutrition, Chronic Energy Deficiency, Nutritional Anemia as well as arrest the increasing trend of overweight and obesity;
- ❑ Strict enforcement and proper implementation of the Food Fortification Law;
- ❑ Strengthen R&D efforts particularly on fruits and vegetable production and processing;
- ❑ Intensification of home food production; and
- ❑ Coordinated nutrition education and information campaign.

For more information, you may contact the Food and Nutrition Research Institute, Department of Science and Technology, DOST Compound, Bicutan, Taguig City or visit the FNRI home page at <http://www.fnri.dost.gov.ph>

## 4.5 Thailand

#### 4.6 Vietnam :

##### The development of fruits and vegetables in relation to the Nutrient situation in

##### Vietnam

*Ass.Prof. Vu Manh Hai*

Director of the Research Institute of Fruits and Vegetable  
Vietnam Agricultural Academy Institute

*Dr. Le Van Bam*

Deputy Director of Dept. of Science and Technology  
Ministry of Agriculture and Rural Development

*MSc. Bui Quang Dang*

Vice head of Fruit department, the Research Institute of Fruits and Vegetable  
Vietnam Agricultural Academy Institute

#### INTRODUCTION

Fruit and vegetable production in Vietnam has developed a great deal in recent years. This sector has experienced rapid growth because income per hectare from growing fruits is 4-8 times greater than from rice, and markets are expanding. As it has been easy to sell the products, producers have concentrated on quantity rather than quality. However, this system of production is likely to change, sooner or later, because traditional growing techniques that already applied are often irregular and inadequate, disease-control measures are poor, and markets are changing.

Following data is presented the rapid development of the fruit and vegetable crops in recent years when the problem of food lackage has been accordingly solved.

#### I. Fruit development in Vietnam.

**Table 1: Fruit area cultivated in regions in Vietnam**

No	Regions	1999		2004		Increased (%/year) 99-04	Compared to Gov. Plan	
		Ha	%	Ha	%		2010	%
	<b>Whole country</b>	<b>496</b>	<b>100</b>	<b>746,8</b>	<b>100</b>	<b>8,5</b>	<b>750</b>	<b>99,6</b>
1	Red River Delta	51,9	10,5	78,4	10,5	8,6	60	130,7
2	North Mountains	109,9	22,2	171,1	22,9	9,3	170	100,6
3	North Central Coast	42,3	8,5	56,2	7,5	5,8	70	80,3
4	South central Coast	20,8	4,2	28,9	3,9	6,8	60	48,2
5	Central Highland	12,9	2,6	22,6	3,0	11,9	50	45,2
6	South-East	66,9	13,5	127,5	17,1	13,8	90	141,7
7	Mekong River Delta	191,3	38,6	262,1	35,5	6,5	250	104,8

Total production of fruit in whole country is estimated of about 5.1 tons and per capita consumption is more than 60 kg, says, nearly 2 times higher than that in 1990. It can be said that the development of fruit crops takes very important part in decreasing the quantity of cereal food consumed and improving remarkably the daily nutrition of the people.

According to the unpublished data from GDS, the average quantity of food consumed in terms of rice and the others, via maize, cassava, sweet potato ECT...in recent year has been decreased sharply (estimated of about 60-70% in comparison with that in the eighty decades). It has also contributed partly in increasing the health status of the human, particularly the younger generation. With the new policy of the Government, farmers in various regions in whole country have planted fruit crops not only in their home orchards but also in the land where paddy rice were cultivated before, provided that the income should be higher.

**Table 2. List of Fruits of Vietnam**

**A. Major Fruits**

<b>Scientific name</b>	<b>Common name</b>	<b>Vietnamese / other SE Asian names</b>
<i>Anacardium occidentale</i>	cashew	Dao Lon Hot, Cay Dieu / Jambu Monyet (Ins), Gajus, Jambu Monyet (Mal), Kasoy (Phi), Mamuang Himmaphan (Tha)
<i>Ananas comosus</i>	pineapple	Dua', Dua Thom / Nanas, Danas, Naneh (Ins), Nanas, Nanas Pager(Mal), Nanas, Apangdan (Phi), Sapparot (Tha)
<i>Annona squamosa</i>	sugarapple	Na, Mang Cau Ta / Sirkaja, Sarikaja, Atis (Ins), ona sweetsop Sri Kaya, Buah Nona, Sri Kaya (Mal), Atis ((Phi), Noi Na (Tha)
<i>Annona muricata</i>	soursop	Mang Cau Xiem/Sirsak, Nangka Belanda, Nangka Seberang (Ins), Durian Belanda, Durian Benggaka, Durian Makkah (Mal), Guayabano, Atti, Illabanos (Phi), Thurian Thet, Thurian Khaek (Tha)
<i>Artocarpus altilis</i>	bread fruit	Sake [seedless] / Sukun [seedless], Kelur, Timbul [seeded] (Ins); Kelor [seeded] (Mal); Rimas [seedless], Kamansi [seeded] (Phi); Sake [seedless], Khanum Sampalo [seeded] (Tha)
<i>Artocarpus heterophyllus</i>	jackfruit	Mit / Nangka (Ins, Mal), Jak, Lanka (Phi), Khanun (Tha)
<i>Carica papaya</i>	papaya	Du Du / Pepaya , Gedang, Kates (Ins), Betek, Ketelah, Kepaya (Mal), Kapaya, Lapaya (Phi), Malako (Tha)
<i>Citrullus lanatus</i>	water melon	Dua Hau / Betek (Ins), Beteka (Mal), Taeng Mo (Tha)
<i>Citrus aurantifolia</i>	lime	Chanh Vo Mong, Chanh Ta / Jeruk Napes, J. Pecel (Ins), Limau Napes, L. Asam (Mal), Dayap (Phi), Manao (Tha)
<i>Citrus maxima</i>	pummelo	Buoi / Jeruk Bali, J. Besar (Ins), Limau Betawi, L. Bali, L. Besar (Mal), Lukban , Suha (Phi), Som O (Tha)
<i>Citrus medica</i>	citron	Thanh Yen / Jeruj Sukade, Sitrun (Ins), Limau Susu

		(Mal), Bulid (Phi), Manao Khwai (Thai)
<i>Citrus reticulata</i>	mandarin	Quyt / Jeruk Keprok, J. Maseh, (Ins), Limau Kupas, L. Langkat, L. Cembul, L. Tommbong, L. Hijau (Mal), Sintones, Dalangghita (Phi), Som Khieo Wan, Som .Saeng Thong (Tha)
<i>C. reticulata x</i>	King	Cam Sanh / Jeruk Jepun, J. Cina, J. Cina
<i>C. sinensis</i>	mandarin	Licin, J. Kondeh, J. Cempage, J. Kuwik (Ins), Lim Tangor Cina, L. Kupa Raja
<i>C. reticulata x C. maxima</i>		Cam Bo Ha
<i>Citrus sinensis</i> orange		Cam/ Jeruk Manis, Chula, Choreng, (Ins), Limau Manis sweet orange L. Langgat, L. Hupa, L. Wangkang (Mal), Kahel, Daladan (Phi), Som Tra, Som Klian (Tha)
<i>Cocos nucifera</i>	coconut	Dua/ Kelapa, Nyiur (Ins, Mal), Niog, Lobi, Inniug, Ongot, Gira-gira, I-ing, Ngot-ngot (Phi), Maphrao (Tha)
<i>Dimocarpus longan</i>	longan	Nhan / Lengkeng (Ins, Mal), Lamyai (Tha)
<i>Diospyros kaki</i>	persimmon	Hong / Kesemek, Buah Kaki (Ins), Buah Kaki Buah Samak (Mal), Phlap Chin (Tha)
<i>Durio zebethinus</i>	durian	Sau Rieng / Durian (Ins, Mal, Phi), Thurian (Tha)
<i>Fragaria x ananassa</i>	strawberry	Dau Tay / Arben (Ins), Strawberry (Mal), Freasa (Phi), Satroboery (Tha)
<i>Garcinia mangostana</i>	mangosteen	Mang Cut / Manggis (Ins, Mal, Phi), Mangkhut (Tha)
<i>Hylocereus undatus</i>	dragon fruit	Thanh Long / Kaeo Mangkon (Tha) (being a newly developed fruit, no local name in other country is available except for Thailand)
<i>Lansium domesticum</i>	langsap	Bon Bon / Langsat, Kokosan (Ins), Langsat, Langseh ( <i>Aglaia domestica</i> ) (Mal), Lansones, Boboa, Buah (Phi), Langsat (Tha)
<i>Litchi chinensis</i>	lychee	Vai / Litsi, Kalengkeng (Ins), Laici (Mal), Letsias, litchee Licheas (Phi), Linchi (Tha)
<i>Mangifera indica</i>	mango	Xoai / Mangga (Ins, Mal, Phi), Mamuang (Tha)
<i>Manilkara zapota</i>	sapodilla	Hong Xiem (N), Xaboche (S) / Sawo Manila, Ciku, chiku Sawo Londo (Ins), Ciku, Sau Menila, Zapote (Mal), Chico (Phi), Lamut, Lamut Farang (Tha)
<i>Musa</i>	banana	Chuo / Pisang (Ins, Mal), Saging (Phi), Kluai (Tha)
AA		lady's finger Chuo Ngu [King banana] (N), Chuo Gia (S) / Pisang Mas (Ins, Mal), Kluai Khai (Tha)
AAA	Cavendish	Chuo Gia / Pisang Ambol (Ins, Mal), Kluai Hom (Tha), Gros Michel.
BB	wild balbi	Chuo Hot (pig banana) / Butuhan (Phi), Kluai

		Tani siana banana (Tha)
AAB	plantain	Chuoi Bom / Pisang Tanduk (Ins, Mal), Kluai Klai (Tha)
ABB	bluggoe	Chuoi Tay / Pisang Awak, P. Rastali (Ins, Mal), Kluai Namwa (Tha)
<i>Nephelium lappaceum</i>	rambutan	Chom Chom / Rambutan (Ins, Mal, Phi), Ngo (Tha)
<i>Passiflora edulis</i>	passionfruit	Lac Tien / Buah Negeri, Pasi, Konyal (Ins), purple, Buah Susu, B. Selasih, Markisa (Mal), Pasionaria, granadilla Marafloa(Phi), Lin Mangkon, Katoklok Farang, Saowarot (Tha).
<i>Persea americana</i>	avocado	Bo / Adpukat, Avokat (Ins), Buah Mentega, Avokado, Apukado (Mal), Luk Noei, Awokhado (Tha).
<i>Prunus selicina</i>	Plum	Man / Ijas Jepang (Ins, Mal), Phlam (Tha)
<i>Psidium guajava</i>	guava	Oi / Jambu Batu, Jambu Biji (Ins, Mal), Bayabas, Guayabas, Kalimbahin, Biabas (Phi), Farang (Tha)
<i>Punica granatum</i>	pomegranate	Lu'u, Thap Lu'u / Delima (Ins. Mal), Granada, Dalima (Phi), Thapthim (Tha)
<i>Pyrus pyrifolia</i>	oriental pear	Le /Apel Jepang (Ins), Lai (Mal), Peras (Phi), Sali (Tha)
<i>Sandoricum</i>	santol	Sau / Kecapi, Ketuat, Sentul (Ins), Sentul, Kechapi koetjape (Mal), Santol, Santor, Katul (Phi), Krathon (Tha)
<i>Spondias cytherea</i>	ambarella	Coc (S), Sau Van Nam (N) / Kedongdong Manis (Ins), ( <i>S. dulcis</i> ) otaheite apple Kedongdong (Mal), Hevi (Phi), Makok Farang , Makok Thet (Tha)
<i>Syzygium jambos</i>	roseapple	Ly, Bo Dao, Roi / Jambu Mawar, Jambu Kraton (Ins Jambu Kelampok, Jambu Mawer (Mal), Tampoi, Bunlaun, Yambo (Phi)
<i>Syzygium</i>	Java apple	Man / Jambu Semarang, J. Klampok, J. Air Rhio (Ins)
<i>Samarangense</i>	wax apple	Jambu Air Mawar, J. Air Rhio (Mal), Makopa (Phi), Chomphu, C. Khieo, C. Nak, C. Kaem Maem (Tha)
<i>Tamarindus</i>	tamarind	Trai Me / Asam, Asam Jawa, Tambaring (Ins), Asam Jawa (Mal), Sambak, Sambalagi, Sampalok, Kalamagi, Salomagi, Salunagi (Phi),Makham (Tha)
<i>Vitis vinifera</i>	Grape	Nho / Anggur (Ins, Mal), Ubas, Papas, Parras (Phi), A-ngun (Tha)
<i>Ziziphus</i>	Jujube	Tau / Widara, Dara, Bidara (Ins), Bidara, Jujub, Epal <i>mauritiana</i> Indian jujube Siam, Kuku Lang (Mal), Manzanitas (Phi), Phutsa (Tha)

## Minor Fruits of Vietnam

Scientific name	Common name	Vietnamese / other names
<i>Averrhoa bilimbi</i>	bilimbi	Khe Tau / Belimbing Asam, B.Wuluh, B. Butuk (Ins, cucumber tree Mal), Kamias, Iba (Phi), Taling Pring (Tha)
<i>Averrhoa carambola</i>	star fruit	Khe / Belimbing Manis, B. Segi (Ins, Mal), Balimbin carambola (Phi), Mafeung (Tha)
<i>Baccaurea</i>	Burmese	Giau Gia Dat, Giau Tien, Dzau Mien Dzuoi / Mafai <i>ramiflora</i> grape Setambun, Tajam Molek (Ins), Pupor, Tampoi, Tempui (Mal), Mafai Farang (Tha)
<i>Chrysophyllum cainito</i>	caimito	Vu Sua / Sawo Ijo, Sawo Hijo, SawoKadu star apple (Ins), Saawu Duren, Pepulut (Mal), Caimito (Phi), Sata Appoen (Tha)
<i>Citrofortunella</i>	calamondin	Quat / Jeruk Peres, J. Kasturi, J. Potong, Limon Cina, <i>microcarpa</i> China orange, Limon Cui (Ins), Limau Kesturi, L. Chuit, L. Sambal (Mal),
<i>Citrus microcarpa</i>	golden lime	Kalamondin, Kalamansi, Limonsito, Aldonisis (Phi),
<i>C. madurensis</i>	musk lime	Som Chit, Som Mapit (Tha)
<i>Citrus hystrix</i>	porcupine	Jeruk Purut, J. Lemon Swanggi, Lemon Purut, orange Lemo Titigila, Limo Kambang, Lemo Karbau, Lemo Kabi (Ins), Limau Purut (Mal), Kabog, Amongpong, Katan, Kamugau, Buyak, Daruga, Malatbas, Kabuyan, Piris, Muntai, Pinukpok, Kobot (Phi), Makrut (Tha)
<i>Citrus limon</i>	lemon	Chanh Tay / Jeruk Sitrun, J. Ponderosa, J. Khatta (Ins), Limau Mata, L. Mata Kerbau, L. Susu (Mal), Manao Farang, Manoa Thet (Tha)
<i>Citrus medica</i>	Buddha's hand	Phat Thu / Limau Jari (Mal), Som Mu (Tha), var. <i>sarcodactylis</i> fingered citron
<i>Diospyros philippin</i>	butter fruit	Hong Nhung / Buah Mentenga, Bisbul, Mobolo (Ins)
<i>ensis (D. blancoi)</i>	velvet apple	Buah Mentenga (Mal), Tabang (Phi), Marit (Tha)
<i>Eriobotrya japonica</i>	loquat	Ti Ba Diep, Son Tra Nhat Ban, Nhot Tay / Lokwar (Ins, Mal), Lo-khwat (Tha)
<i>Flacourtia rukam</i>	rukam	Mung Guan Rung / Ganda Rukem, Rukam (Ins), Rukam Manis, Rukam Gajah (Mal), Amaiit, Aganas, Kalominga (Phi), Ta-khop Thai (Tha)
<i>Fortunella japonica</i>	kumquat	Quat, Kim Quat, Tac / Jeruk Kumquat, Lemon Marura (Ins), Limau Jepun (Mal), Kham Khwat (Tha)
<i>Limonia acidisssima</i>	wood	Can Thang / Kawista, Kusta (Ins), Belinggai, Gelinggai apple (Mal), Makhwit (Tha)
<i>Pithecellobium dulce</i>	guayamochil	Me Keo, Keo Tay / Assam Belanda, Asem Londo, Asam Manila tama- Koranji (Ins),

		Kamatsile, Kamachile (Phi), Makham rind Thet (Tha)
<i>Syzygium cumini</i>	Java plum	Voi Rung, Tram Moc / Jambu Jambolan (Ins, Mal), Duhat, Lumboi, Duatnasi, Dungboi (Phi), Wa (Tha)
<i>Syzygium malac</i>	Malay	Cay Dao, Cay Roi / Jambu Bol, Jamblang (Ins), Jambu <i>cense</i> apple Merah, Jambu Bol (Mal), Gubal, Mangkopa, Makopa, Yanbu, Tersana, Makopang-kalabaw, Samunagi (Phi), Chomphu Mamieo, Chomphu Saraek (Tha)

**Table 3. Area and production of major fruits grown on seven agro-economic zones of VN**

Zone	Area (ha)	Production (t)	Kinds of fruit*
North Middle Land	32,335	313,600	lychee, plum, peach, grape, orange, apple
Red River Delta	12,774	173,700	<u>lychee</u> , <u>longan</u> , banana
North Central Coast	14,430	131,100	orange, mandarin, pummelo,
South Central Coast	28,580	228,600	mango, cashew, pineapple, grape, <u>dragon fruit</u>
Central Highland	5,330	57,400	durian, rambutan, mangosteen, jackfruit, avocado, coffee, cocoa, sweetsop, jujube
South-East	27,060	318,000	-ditto-
Mekong Delta	204,568	2,276,300	orange, longan, sapodilla, mandarin, pumelo pineapple, durian, mangosteen, rambutan, guava, soursop, papaya, mango.
Total	325,077	3,3442,000	

The data from the above-mentioned tables showed that Mekong river delta region is considered to have high potential for the development of major fruit species and in fact, this area produced a big quantity of fruit used in domestic consumption and exported as well. The North Middle and mountainous land ranked the second, and, though the area under fruit cultivation is now much smaller than Mekong river delta, it has also a high capability for the development of fruit crops because of land availability and diversified climate condition.

## II. Vegetable development in Vietnam

**Table 4: Area, yield and production of vegetable in Vietnam**

No	Regions	Ha		Yield (Quintal/ha)		Production (Tons)		Compared to Gov. Plan	
		1999	2004	1999	2004	1999	2004	2010	%
	<b>Whole country</b>	<b>459,6</b>	<b>615,8</b>	<b>126,0</b>	<b>143,92</b>	<b>5792,2</b>	<b>8863,7</b>	<b>550</b>	<b>112</b>
1	Red River Delta	126,7	160,2	157,0	172,83	1988,9	2769,5	130	123,2
2	North Mountains	60,7	86,0	105,1	109,29	637,8	939,9	75	114,7
3	North Central Coast	52,7	68,8	81,2	93,28	427,8	641,8	60	114,7
4	South central Coast	30,9	41,4	109,0	132,99	336,7	550,7	60	69,0
5	Central Highland	25,1	44,2	177,5	196,15	445,6	867,0	35	126,3
6	South-East	64,2	60,6	94,2	101,77	604,9	616,7	70	86,6
7	Mekong River Delta	99,3	154,6	136,0	160,29	1350,5	2478,1	120	128,8

Per capita consumption of vegetable in 2003 is estimated of about 102 kg/year that is same the average one in the world whereas, 85 kg/capita/year is planed by the government of Vietnam by the year 2010.

Following is some data concerned to the development of the main vegetable crops in different regions throughout the country

**Table 5: Leading crops of vegetables cultivated in Vietnam**

	Cabbage		Tomato		Cucumber		Legume Vege.		Chili	
	Area (ha)	Pro. (tons)	Area (ha)	Pro. (tons)	Area (ha)	Pro. (tons)	Area (ha)	Pro. (tons)	Area (ha)	Pro. (tons)
Whole country	32,52 2	609,37 7	24,64 4	424,12 6	11,81 9	199,94	5,742	36,06 4	3,36 7	21,22 3
North Mountains	11,06 5	245,74 1	8,334	165,43 3	4,139	88,35	1,685	12,45 0	1,38 0	12,80 8
Red river delta	9,572	119,33 3	2.397	33,302	378	3,71	710	1,834	-	-
North central coast	2,403	34,166	1,565	12,025	673	6,47	320	2,510	1,14 5	5,003
South central coast	250	2,917	1,177	8,460	494	5,17	-	-	-	-
Central highlands	5,140	13,469	6,136	136,64 2	310	2,73	1,250	6,985	5	50
North-East	1,133	10,047	1.445	12,432	1,184	17,25	245	1,250	716	2,910
Mekong river delta	2,989	62,482	3,590	55,832	4,614	75,38	1,532	1,025	122	452

It can be considered that the production of vegetable in Vietnam has been concentrated into two main regions: Red river delta and central highlands (particularly Lam Dong province), where climatic condition and land fertility is adaptable for various species of vegetables including high value ones.

Generally, vegetables in Vietnam can be cultivated in two ways of production: rotated with the other crops, mainly food ones (rice, maize...) and monoculture in the same sites (various vegetable spices are planted continuously). Table 6 gives examples of 3 locations that are representatives for 3 production areas where vegetables have been commercially produced.

**Table 6: Main areas of commercial vegetable production in Vietnam (examples)**

Locations	Areas (ha)	Yield (tons)	Production (1000 tons)	Major spices
Hanoi (Red River Delta)	8,100	18.62	150.8	Leafy vegetables
Vinh Long (Mekong River)	643.5	0.35	0.2	Mushroom only
Lam Dong (Central Highland)	27,315	25.80	67.7	Cabbage, cauliflower...

### **III Orientation of the development of fruits and vegetable in coming period**

1. Development of fruits and vegetable must be based on the advantages of natural conditions of the regions in which, specific and diversiform climate should be considered.
2. The production must be closely linked with the consumption markets and commodities must have good competitiveness
3. The priority will be given to the production of specific species that have been traditionally cultivated in the region with high quality, productivity and benefit.
4. Strengthening the study on varieties improvement, GAP and post harvest to meet the increasing demands of the consumers

## 5. Discussion

### 5.1 Working Group 1

Facilitator: Mr. Wilfried Baudoin

Rapporteur : Dr. Jacky Ganry

#### Assignment of WG 1:

After an introduction on the scope and objectives of the WHO-FAO initiative, the participants agreed to open a debate on “understanding” of the “GAP” concept. **What are good agricultural practices ?**

In several countries are of the opinion that it is extremely difficult to impose GAP because it is associated and perceived as EUREPGAP. Participants commented that EUREPGAP was far too restrictive and had a high cost which made it difficult to adopt. Countries are moving towards developing local “GAPs” as “light formulas” of the EUREPGAP. Simultaneously there is a regional consultation going on to elaborate an “ASIAN GAP”.

This interesting exchange of views and experiences provide the opportunity for FAO to inform the audience about it’s working group on GAP and the current “guiding principles” based on the four pillars:

1. Product quality and safety
2. Environmental sustainability
3. Economic feasibility
4. Socio-ethical and general hygiene aspects

There was a consensus that the countries would consider two types (kinds) of GAP.

A) **The generic GAP** concept that would be promoted by the public sector to the benefit of all the consumers and producers. The generic GAP is based on the 4 guiding principles of the FAO and can be aimed at in order to ensure the supply of quality and safe food to the consumers (pillar 1) , while adopting the necessary measures to meet the other three criteria.

The minimum but sufficient product quality and safety standards are those defined in the Codex Alimentarius, reviewed and regularly updated by and international commission under the auspices of FAO and WHO.

In order to ensure the generic GAP is applied, there is need for proactive interventions on behalf of the public sector in relation to: dissemination of information, training, advocacy and capacity building.

The countries also agreed. Traceability of GAP is needed and certification system could be set up. Malaysia, Indonesia, Thailand, Korea, Vietnam have also started to set up national GAP.

B) One or more **specific market driven GAPs** in light of special requirements dictated by interest groups, market niches. That will be a contract between producers, wholesalers or retailers

Based on this common understanding of GAP, the following 8 points were reviewed and commented.

### *1. How advocate/ implement GAPs ?*

#### *1.1 At producers level*

- Intensify national training that has already started and is on-going in the different countries
- Ensure that GAP is cost effective
- Work through farmers association
- Introduce a GAP-Farmers registration system, at individual level or through a association: course, training, traceability
- Information: technical support
- Introduce labeling (brand name) procedure to ensure traceability and gain added product value

#### *1.2 At consumers level*

There is still a large proportion of the consumers that don't care of the quality and origin of the product and are not informed about the GAP process.

Recommendations:

- Sell labeled products to create client fidelity and product "distinctiveness".
- Need for consumer education/ information on what corresponds to GAP products

### *2. Policy intervention requirements :*

Most countries are already working on GAP.

Recommendations:

It would be adequate to refine and intensify the planning of training and advocacy related to GAP.

It would be appropriate to have at regular intervals a regional consultation meeting on the opportunities and constraints to GAP.

### *3. Scientific knowledge base:*

There is not that much research on GAP going on in the region, although interesting progress has been made to apply different production methods as IPM, ICM, IPP,.... and only recently GAP as a more comprehensive approach.

Recommendations:

- Need for exchange of experience: organize a regional workshop, to share experiences and learn from the IPM approach
- Need to establish a regional GAP network (informal working group) on GAP research and development to exchange information and foster coordinated research and development on GAP
- Ensure strong and immediate interaction between research and development

t at early stage

#### 4. Capacity building and resources development :

Most of the countries do not have sufficient staff trained in GAP and the economic assessment is not always available

Recommendations:

- Training of trainers is requires
- Make economic assessments of the proposed GAP procedures
- Adopt a participative training and demonstration approach ( Farmers'Field School Approach) to effectively involve the farmers (farmers empowerment) and involve the private sector (NGOs and pesticide dealers)

#### 5. Who are the stakeholders?

As support: Public sector: Ministry of agriculture, agricultural research, extension

As drivers: Private sector: farmers/ champions, consumers, retailers, wholesalers, input suppliers, certification/ auditing network

#### 6. National coordination

It was clarified that the implementation of the Kobe framework for action does not aim at establishing yet an other programme at Ministerial level. The idea is to enhance "action" supported by an " interdisciplinary task-force" that would drive and monitor the implementation of specific interventions. According to the countries the coordinating function would be assigned to one or the other of the lead stakeholders either from :

- Public institutions as in Thailand, Malaysia, Indonesia, Korea...: department of Agriculture, Ministry of Agriculture, Pesticides registration office  
or from
- Private sector: Farmers association; 5-a-day movement

#### 7. Data collection needs for monitoring and evaluation

Most of the countries have information available on GAP, but it is often not compiled in the form of baseline study. The countries agreed to set the baseline in order to facilitate the assessment of future progress and the possible impact on farmers' livelihood

Recommendations:

- Need for baseline study at individual country level
- Starting at registration of GAP - farmers

Among the parameters to register in the baseline the following were mentioned:

- At public and private support level: Staff involved in the GAP program
- At the marketing level: GAP products available for sale
- Pesticides use: trends, current figures and future decrease.

## 5.2 Working Group 2 (summary)

Facilitator: Mrs. Alison Hodder  
Rapporteur : Dr. Yves Desjardins

### **Mandate of the groups:**

To elaborate elements of a guiding framework for action, policies, and strategy options at national levels, based on consideration of actual issues and problem encountered in the course of fruit and vegetables for health programs in different countries.

### **Theme of groups 2:**

Developing interdisciplinary action plans as a basis for promoting and supporting increased fruit and vegetables production, availability and consumption.

### **1) Commonalities, and differences among country cases / Barriers to increased FAV consumption**

#### **At the consumer level:**

- Cultural specificities with respect to the consumption of fruits and vegetables (FAV) are very in the different countries and the perceptions toward the consumption of FAV.
- FAV are associated with functional or sensory attributes, and therefore are only consumed during certain meals. For instance, in Malaysia, FAV are classified in four groups (Cold, Hot, Sharp, Windy) and will be consumed at certain time of the day (e.g. some fruits are considered “windy” and are therefore not consumed in the morning).
- In Korea, the majority of the FAV consumption is essentially coming from processed commodities (Kimchi) and raw FAV are not readily consumed.
- Some countries will mostly consume FAV only in the cooked form and resent eating them in the raw form.
- A country like Korea, which ranks among the highest in the world in terms of FAV consumption, is currently undergoing an important nutrition transition which jeopardize the already high FAV consumption. Initiatives should be promoted to preserve the traditional lifestyle which, in a large proportion, makes place to FAV consumption. In this context, implementation of a traditional 5 a day programs would simply deter the country from its original good FAV trends and conduct to a reduction in overall consumption of FAV.
- Size of portions is poorly defined and might be varying considerably amongst the different Asian countries.

#### **At the production level**

- The need of the population in rural areas for earn a living leads to the sale of their entire domestic FAV production and consequently to a very low FAV consumption despite the fact that these commodities are readily available in quantity and quality.
- Rural population is hard to reach and there are no promotion at their level as to the benefit of FAV consumption.
- In many countries rural communities receive no monetary assistance to buy and consume more FAV.
- Rural population must have access to clean and safe commodities with no pesticides residues which is not the case at present.
- In some countries, supply of good quality FAV may not be sufficient and it will then be necessary to improve production and availability of these goods.

### **Public policies**

- There is an urgent need to translate in simple terms the information on the health benefits of FAV consumption and adapt this information to the cultural background of people in the different countries.
- The nutrition messages should be coherent with increasing the consumption of FAV. For instance, some countries promote milk consumption instead of FAV.
- Due to their high nutritive properties, consumption of indigenous FAV should be promoted. Information of the place occupied by indigenous FAV in the diet should be obtained from the different countries.
- Surveillance (monitoring) programs should be implemented to provide feedback on the efficacy of the governmental initiative to promote FAV consumption.

### **Distribution**

- The quality of FAV varies considerably between the different Asian countries. For some, the quality is higher in the country than in the cities while for other, the quality is better in the cities. Often, imported fruits are perceived as being better in terms of health quality.
- The price is the driving factor for consumption of FAV. In some countries, FAV are more expensive in cities than in rural communities essentially due to cheap imports from other countries. Overall, in most countries, the high price of FAV is a deterrent to higher consumption.
- The post-harvest quality of FAV must be improved in most countries to insure access to quality FAV in sufficient quantities.

## 2) Interventions (entry points) to address:

- Make sure to adapt regional FAV consumption programs to the cultural peculiarities of each countries, that is, be culturally sensitive when implementing a program
- Evaluate the cost effectiveness of “5 a day” programs
- Any interventions should concentrate its action on rural, “non-bankable” populations since it is the most vulnerable to malnutrition
- Special attention should be paid to the bottom-up approach of Thailand which has already successfully implemented at the regional level the terms of the initiative discussed at the last Kyoto meeting organized by FAO meeting. This country as decided to aim at the group of the society most likely to implement the changes in the future, the children. This was achieved by creating educational programs in schools.
- Establish partnerships with health related professional associations to develop positive actions with respect to the consumption of FAV.
- Organizing press conference on sensitive topics may be an efficient tool to pressure the governments into action, particularly with respect to the consumption of FAV.
- FAV consumption messages should be harmonized with other nutrition messages and initiatives of countries. For instance, Thailand has a very successful program called “Healthy menu” in participating restaurants where the items on the menu are accompanied with a quote or precisions on its nutritive value, that is, information on the presence of reduced salt and MSG, information on the sugar content, etc. Establishing a similar quote system for the number of portion of FAV contained in a meal should be easy to implement and a might be powerful tool to promote an increased consumption of FAV.
- Promotion programs to stimulate the consumption of FAV should not be restrictive to their nutritional aspects only but should also aim at increasing the awareness of the targeted population to the health functionality of FAV.
- Governments should invest in the development of the human resources and institutional capacities to convey the message about increasing the consumption of FAV to the population and to translate this information in efficient and simple terms.
- Efforts should be made to bridge an apparent communication gap between the FAV production side and the health professionals and more precisely the nutritionists and medical doctors.
- In order to be successful, national programs promoting the consumption of FAV should be allocated substantial funding or else they will fail.

## **Stakeholders**

- The ministry of health
- The ministry of education
- The ministry of rural development
- Professional associations dealing with health
- Regional and local government authorities
- Medias
- NGO's who must be taught on the importance of FAV to convey the message to the local populations
- Distribution food chains and supermarket who have the capacity to advertise and implement specific health promotion campaigns

## 5. CONCLUSIONS AND RECOMMENDATIONS

(i) The workshop was successful in that it enabled the formulation of elements of a framework for interdisciplinary action at country level to support the rational development of an initiative on F&V for health and its associated supply chain/s, addressing strategy and policy needs. The framework is based on the following main components:

- Guiding principles: what is intended by F&V for health
- Commonalities and differences among country cases
- Stakeholders and their role in F&V for health
- Interventions (useful entry points) for fruit and vegetable promotion programmes
- Securing product safety quality and environment preservation through GAP

The draft framework has been streamlined and edited by the drafting committee on the basis of the working group reports and their discussion in plenary session and is included in the attached report of the workshop

(ii) The main workshop conclusions and recommendations are summarized below:

- There are major differences among participating countries and population groups in the kinds of nutrition-related problems ranging from under-nutrition to over-nutrition or undergoing an important nutritional transition which jeopardize the already high F&V consumption. Therefore, intervention strategies to promote increased fruit and vegetable consumption need to be sensitive to these differences.
- F&V consumption messages need to be harmonized with other nutrition messages and initiatives of each country. Establishing, for instance, a nutritional quote system for the number of portion of F&V contained in a meal should be easy to implement and might be a powerful tool to promote an increased consumption of F&V.
- The quality of F&V varies considerably among different Asian countries. Therefore, there is a need to improve sufficient production and supply of good quality F&V. In particular, the post-harvest quality management of F&V needs to be improved in most countries to ensure access to quality F&V in sufficient quantities.
- Government investment in the development of the human resources and institutional capacities is essential in order to convey the message about increasing the consumption of F&V to the population and to translate this information in efficient and simple terms.
- There is an urgent need to adapt regional F&V consumption programs to the cultural peculiarities of each country that is culturally sensitive when implementing a program. Considering the case of promoting consumption of

indigenous F&V, information of the place occupied by indigenous F&V in the diet need to be obtained from the different countries.

- Efforts should be made to bridge an apparent communication gap between the F&V production side and the health professionals and more precisely the nutritionists and medical doctors.
- Evaluating projects is essential in order to learn what works and what does not and to avoid wasting time and resources on inappropriate approaches.
- Close collaboration among the different actors and stakeholders is desirable in order to achieve synergies and effective implementation of strategies; the Government (Central, Regional and Local), NGOs to convey the importance of F&V to the local populations, distribution food chains and supermarket who have the capacity to advertise, professional associations dealing with health and medias.