

Fruit classification and production



\n[[toc title="Table of Contents"](#)]\n

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1. [CLASSIFICATION OF FRUITS](#) \n \t
2. [WORLD PRODUCTION OF TROPICAL FRUITS](#) \n \t
3. [CONSUMPTION AND TRADE OF TROPICAL FRUITS](#) \n \t
4. [FRUIT PROCESSING](#) \n \t
5. [FRUIT INDUSTRY IN DEVELOPING COUNTRIES](#) \n \t
6. [QUALITY PRACTICES IN DEVELOPING COUNTRIES](#) \n \t
7. \n

\n[/toc]\n \n

The literature review carried out on this research contains information and data from different sources. Since there was very few numbers of literatures available on this topic locally, most of the information was gathered from the internet and through the internationally published journal articles. Some of the information was collected from locally published citations and through local institutions and organizations.

The literature review attempts to make some relevant information of fruit processing sector, namely, fruit industry, consumption and trade, fruit processing, type of processes, industry and quality practices in developing countries and quality issues related to fruit processing industry.

CLASSIFICATION OF FRUITS

Fruits can be commonly classified according to the growing region as follows: tropical, subtropical and temperate-zone (Kader and Barret, 1996). The quality of fruit is mainly affected on growing region and most significantly

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the environmental conditions specific to each region. Listed below are the examples of fruit grown in each region.

- Tropical Fruits

Major tropical fruits: banana, mango, papaya, pineapple

Minor tropical fruits: cashew apple, durian, guava, longan, lychee, mangosteen, passion fruit, rambutan, tamarind, sapota, carambola

- Subtropical Fruits

Citrus fruits: orange, lime, lemon, grapefruit, pummelo, tangerine, mandarin

Non-citrus fruits: avocado, pomegranate, cherimoya, fig, kiwifruit, olive

- Temperate-Zone Fruits

Small fruits and berries: grape (European and American types), strawberry, raspberry, blueberry, blackberry, cranberry

Pome fruits: Asian pear (nashi), European pear, apple, quince

Stone fruits: plum, peach, cherry, apricot, nectarine

Fruits are essential in the human diet. They contain compounds of nutritional importance, including vitamins which are not synthesized by the human body. Fruits serve as a rich source of energy, vitamins, minerals and dietary fibre. The U. S. Department of Agriculture Dietary Guidelines encourages consumers to choose fresh, frozen, dried or canned forms of a variety of colours and kinds of fruits. Fruits can be defined as the reproductive organs arising from the development of floral tissues with or without fertilization.

WORLD PRODUCTION OF TROPICAL FRUITS

The availability of detailed information and reliable statistics is very less on tropical fruit production and world trade (Chang, 2007). Therefore, it constitutes a major constraint in the analysis of supply and demand trends of tropical fruits in the world market (Kortbech- Olesen, 1997; Chang, 2007; and FAO, 2008a). Most fruit producing countries do not have proper routinely record or collect data regarding tropical fruits that are basically produced and/or traded in small quantities (Chang, 2007; and FAO, 2008a). Therefore, production and trade data from reporting countries suffer from a lack of uniformity (FAO, 2003).

Data on tropical fruit production, commercial applications and trade are difficult to be estimated when analysing the global reports, an attempt has been made in this dissertation report to analyse the global production, supply and demand trends of tropical fruits in the world market. In fact, the analysis gives much importance on the research study with regard to the development of fruit processing industry in our country to foresee the future of the fruit industry.

According to the research report published by the Philippine Council for Agriculture, Forestry and Natural Resources and Development has stated that worldwide fruit species of tropical and subtropical are estimated to be around 3, 000. Moreover, they have revealed that 500 out of total fruit species are found in Asia. In South East Asia around 120 major and 275 minor species of tropical and subtropical fruits and nuts are found. The most interesting part of that publication is that around 200 species of fruits are remained undeveloped and underused.

According to the report published by Food and Agriculture Organization of the United Nations (FAO), the world tropical fruits production reached 96.8 million tonnes in 2000 excluding banana. This production increased approximately 3.6% annually during the period 2000-2007 to reach 123.7 million tonnes in 2007 (FAO, 2008b). Tropical fruits production in 2004 represented 8.1% of the global world production of fresh fruits and vegetables (FAO, 2007). The annual increase of world production of tropical fruits has been estimated to be 1.7% (FAO, 2003; and Chang, 2007). The projected value of world production of tropical fruits is 139.2 million tonnes by 2014. Banana, mango, pineapple, papaya and avocado are the five major tropical fruit varieties produced and constitute the most important tropical fruit species produced worldwide which account for approximately 75% of the global fresh tropical fruit production (Chang, 2007). Asia consists of major producing region followed by Latin America and the Caribbean and Africa. The world production of tropical fruits from these countries is estimated to be 98% (Ramiro, 2000; FAO, 2003; and Centeno 2005).

CONSUMPTION AND TRADE OF TROPICAL FRUITS

Approximately, 90% of all tropical fruits produced worldwide are consumed domestically. The remaining 10% of tropical fruits produced is traded as fresh, accounting for 5% or processed tropical fruit products, accounting for 5%. These processed tropical fruit products include dried or dehydrated fruit, frozen fruit, fruit juice, concentrate, pulp and puree which is further referred to as fruit juice and concentrate and canned fruit (Kortbech-Olesen, 1996; FAO, 2003; CBI, 2007a; and Chang, 2007). Although, the proportionally small quantities of tropical fruits traded internationally, the trade value of them is

very significant. The total value of trade of fresh and processed tropical fruit products was estimated at 4. 0 billion US dollars internationally in 2004 (Chang, 2007). The total international trade value of fresh tropical fruits amount was 4. 7 billion US dollars in 2006. Moreover, an additional 1. 3 billion US dollars accounted for the processed tropical fruit products. On the other hand, the value of international trade of bananas and plantains reached 5. 6 billion US dollars in 2006 (Chang, 2008). Pineapple is the most dominating fruit in international trade in fresh and processed tropical fruits, with a significant growth in volume and value (Chang, 2007, 2008).

Asia is the leading supplier of processed tropical fruit products. According to the trade data, it shows that Latin America and the Caribbean as the major exporters of fresh tropical fruits (Ramiro, 2000). The European Union (EU) is the largest import markets for both fresh and processed tropical fruits making the United States of America (USA) as the second largest. The both import markets are together accounting for approximately 75% of import of tropical fruits in world production (FAO, 2003; and Chang, 2007). The import of fresh fruits in the EU reached 26. 4 million tonnes (8. 6%) and 21. 0 billion Euro (10. 7%) for the concerned tropical fruits. Import volume of fresh tropical fruits in the EU can be cascaded as follows: pineapple-56. 3%, mango-14. 7%, avocado-13. 2% and papaya-2. 2%. The total is accounting for approximately 86% of all fresh tropical fruits imported in the EU in the year 2007 (Eurostat, 2005, 2006, 2008). The processed fruit products in the EU increased during the period 2003-2007, accounting for 10. 5 million tonnes and 10. 0 billion Euros in total imports in 2007. Fruit juice and concentrate of about 62. 8% accounted for the largest group of processed

fruit products in 2007 in terms of volumes and other processed fruit products accounted for: canned of about 24.8%, dried of about 6.8% and frozen of about 5.6% fruit (Eurostat, 2008). From the total import volume of processed tropical fruits in 2003 constituted 15.4% and it increased to 17.1% in 2007.

One of the most internationally traded tropical fruit is banana which accounted for about one-fourth of 70.89 million tons in 2004 production sold overseas. The export of remaining tropical fruits is less than 10% of the total production. As the major exporters of banana, Ecuador, Costa Rica and the Philippines accounted for 85% of all tropical fruit exports. Volume of export grew up from less than 1% in 2002 to nearly 8% in 2004 (FAOSTAT, 2012). United States is the major market for banana, accounting 26% of world total production in 2004 followed by Germany and Japan.

Mexico, India and Brazil represented the bulk of mango exports. The total volume exported increased in 2004 by a modest 5% in contrast to an enormous increase of 41% in 2003. The total exported amount of mango by Mexico is about 190 kilotons while the Brazil is about 140 kilotons. USA is the major importer of mangoes accounting for 35% while the EU accounting for 20%.

Papaya is major tropical fruit with exports increased by 47% in 2004 compared with the year 2003. The largest exporter of papaya was Mexico accounting for 75 kilotons during the year 2004 followed by Malaysia accounting for 70 kilotons Brazil accounting for 40 kilotons. USA was the

major papaya importer that accounted for 50% of the world total papaya production.

Import demand for tropical fruits worldwide for the next decade is expected to increase, thus import volume is also projected to expand. The projected increase in exports of tropical fruits by FAO in 2014 indicates an annual increase in export volume by 1.4% for mango, 1.7% for pineapple, 2% for avocado and 5.6% for papaya while the USA, EU and Japan remain the largest import markets for tropical fruits. (Rita M. Fabro, S&T Media Service)

FRUIT PROCESSING

Fruits and vegetables are rich sources of many nutritional intakes to human beings and are widely consumed in varying amounts. Although it has been highly advised to have good consumptions of fresh, unprocessed fruit and vegetables it is not always realistic or possible. This may be due to the cost, availability and seasonality. Processing of fruits and vegetables is, therefore, necessary and in many ways desirable. The processed forms of fruits may be complemented the increase of overall consumption as well as enabling regular intake throughout the year instead of fresh produce. Fruits are highly perishable, therefore, they need kind of processing to aid their preservation. Processing (canning, drying, freezing, and preparation of juices, jams, and jellies) increases the shelf life of fruits and vegetables (Cantwell and Suslow, 1999). Processing steps include preparation of the raw material, cleaning, trimming, and peeling followed by dehydrating, canning, or freezing. Fruit processing extends not only the shelf life but also results in value addition, generation of employments. This also enables vertical integration and diversification. Processing will, further, help to combine different ingredients,

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removal of inedible parts and carrying out other steps that consumer would do at home.

- Fruit Products

Canned juices, pulps, fruit drinks, jam, cordials, jelly, dried and dehydrated fruit products are the products that can be considered as direct fruit products in the current consumer market which are available locally as well as globally. Individual quick frozen (IQF) products do not fall in to the direct product category. The IQF products are globally used as substance for baby food manufacturing (cereals), bakery productions and confectionary manufacturing (chocolate). Depending on their applications, dehydrated fruits are also considered as a substance for the derived products as IQF products.

- Types of Processes used in fruit processing

Within the current trend in behaviours of consumers, it can be seen that the healthy eating and drinking (Datamonitor, 2007; and Hughes, 2008) have shown growing potentials. When aiming at satisfying health-related consumer needs and demands, the number and variety of processed fruits have substantially increased in the recent past. With the recent development in the technology, updated and modernized processing and preservation methods such as heating, drying or dehydration and freezing together with more commercialized varieties of processing techniques continue to serve the consumers with the increased varieties of processed fruit products.

These achievements have been gained through new process protocols and products, new heating and freezing techniques, namely, microwave or ohmic

heating, cryogenic freezing and radiation treatments. The trend in recent processed fruits is value addition through the increase of taste or flavour while retaining their nutritional value, making a number of varieties of fruit products with longer and more consistent shelf life. The following describes the types of modern processing techniques those are being innovated and used by the developed countries in order to get competitive advantages over the developing countries in the international processed fruit market.

FRUIT INDUSTRY IN DEVELOPING COUNTRIES

It has been evident that there is high potential growth and trend in fruit processing industry in many of the developing countries in Asia, Africa and former Soviet countries.

QUALITY PRACTICES IN DEVELOPING COUNTRIES

- Hazard Analysis and Critical Control Point (HACCP)
- Good Manufacturing Practices (GMP)