

QUALITY ASSESSMENT TOWARDS VHT *HARUMANIS* MANGO FOR COMMERCIAL TRIAL TO JAPAN

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ABSTRACT

The availability of imported tropical mangoes in Japan renders the need to look into the potential of marketing fresh mango. In 2007, from a survey conducted and also from previous observations, it was unveiled that Japanese have very favorable attitude towards mango and most likely make purchase with its availability. However, the quality of Harumanis mangoes from Malaysia has not been able to achieve the Japanese fruit import quality. As agreed through Government to Government Trade Agreements in previous years, Malaysia has to adhere to the Japanese procedures to lift the ban of importation. Thus, advance research is now needed to gauge Japanese perception on the effect of Vapour Heat Treatment (VHT) with regards to the quality of Harumanis upon arrival in Japan. Malaysia has already undertaken 6 out of the 13 steps involved. It is envisaged that mango is the most promising fruit currently to be marketed matching that of India and Australia that were recently approved the export of mangoes to Japan. Based on the research conducted in 2007 on consumer preferences, Harumanis mango has been stipulated as the premium fresh fruit that would satisfy the focused market demand and is presently gaining popularity among the Japanese.

Keywords: quality, VHT, *Harumanis*, mango, Japan

INTRODUCTION

The agriculture sector has contributed significantly to the growth and development of the Malaysian economy hence, it is appropriate for the agriculture and food sector to be boosted as the third engine of Malaysia's economic growth. In fact, Malaysia's quest to be a net exporter of food by 2010 renders for the reinventing of its agriculture sector. To ensure that this sector's contribution to the national economy and its global competitiveness remain strong in future, the Third National Agricultural Policy (NAP3) was established as a framework for future growth. Therefore, agriculture should continue to sustain as an important sector in the economic development of the country. The policy was essentially guided by the objectives and strategies of the National Development Policy which incorporates several strategies and action plans to deal with expected challenges and changes to the international economy.

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In Japan, it was reported that the fruit growers satisfied only 60 percent of the market demand (Japan Trade Directory, 2005). Thus, this offers a promising opportunity for foreign exporters. A wide variety of fresh fruits are imported to Japan of which the most common one are bananas, pineapples, oranges, grapefruits and mangoes. With a strong economic background of Japanese households, the demand for other fresh fruits keep on increasing. The domestic production has run at 3.0-3.2 million tons a year whilst imports' share of total fresh fruit supply is approximately 35 percent, about 1.6 million tons.

This proposed research will be a follow-up study of our first which was conducted in October 2006 and completed in August 2007 (Faridah et al., 2007). The core findings revealed that currently fresh fruits are prohibited to be exported to Japan under Plant Protection Law. It requires Malaysian fruits to be frozen at -17.8C or vapor heat treated or VHT (approved fumigation method) to eliminate fruit flies. After several meetings, the Ministry of Agriculture and Agro-Based Industry (MOA), Department of Agriculture (DOA), Malaysian Agricultural Research and Development Institute (MARDI) and Federal Agricultural and Marketing Authority (FAMA) decided to proceed with the mission to enter the Japanese market. Concerted efforts were taken to proceed and adhere with the procedure for lifting the ban of importation for *Harumanis*. Finally, the ban was lifted in 2008 and the first sample of VHT fruits was sent in April 2010. It is hoped that the commercialisation will take place in the very near future.

It should be noted that the Japanese consumers in general are not price sensitive with regard to fresh fruits. Since the importance of fruit is unique to the Japanese culture, quality, aesthetics and safety are more important than price. In fact, Japan is the world's second largest market economy after USA. But the Japanese people generally are well recognised as a 'health conscious' society. The Japanese are very conscious of fruit quality, it is often noted that the Japanese 'eat with their eyes', that is, if a product does not look good, it does not sell. Hence, they possess the economic power to demand and pay for premium quality. Fruit is considered a luxury item and plays an important and elaborate ritual part in Japan's extensive gift giving practices (Shim et al., 2001).

Problem Statement

Although it is an attractive avenue to embark on export marketing specifically lucrative markets such as Japan, however, tremendous amount of effort, time and money have to be invested to implicitly understand the market and ultimately gaining market accessibility. Therefore, thorough knowledge of the importing procedures and the Japanese distribution system, their business practices and Japanese fruit consumption behavior is imperative in order to gain market accessibility successfully. In short this research is based on the following issues:

- Even though the ban has been lifted, Malaysia was unable to make a trial shipment in 2009 because the premise for installing VHT machine was not ready by end of April 2009. This situation has impeded the effort of FAMA to make a trial shipment of *Harumanis* to Japan this year.

- In the past the quality of *Harumanis* mangoes has not been able to achieve the Japanese fresh fruit import quality.
- In response to these issues, advance research to gauge Japanese perception on the effect of VHT with regards to quality of *Harumanis* upon arrival to Japan is crucial. In addition, it is very important to assess the market preference and acceptability of *Harumanis*.

Objectives

Generally, this research is to conduct quality assessment towards *Harumanis* mango for commercial trial to Japan.

Specifically, the research objectives in terms of quality assessment are to:

- Examine the quality (physical properties) of *Harumanis* after the VHT.
- Conduct the shelf life and storage study upon arrival in Japan.
- Identify the distinct differences between *Harumanis* and other established imported mangoes in the Japanese market.
- Suggest strategies for effective commercialisation.

Significance of the Study

The significance of the research findings to FAMA is undoubtedly crucial at this point of time. The knowledge gained on the quality assessment could possibly assist FAMA in terms of strategic penetration into the international market more effectively. In brief various focuses would be ascertained and these are:

- Quality produce
- Data of the quality control study can be discovered.
- Identify factors affecting the acceptance/rejection of *Harumanis* mangoes.
- Recommendation on strategies of *Harumanis* mangoes.

LITERATURE REVIEW

Trade in fruits has steadily become more important over the last decade. The composition, volume and direction of this trade have changed as income and insistence on quality have grown on the demand side, while technology and trade agreements have influenced the supply side. Lower prices and greater availability of produce year-round, in tandem with increasing incomes have enhanced the array of fruits in the global consumer's consumption. Other factors such as concern for a healthy diet and improved handling and transportation, have furthered the globalisation of fruit trade.

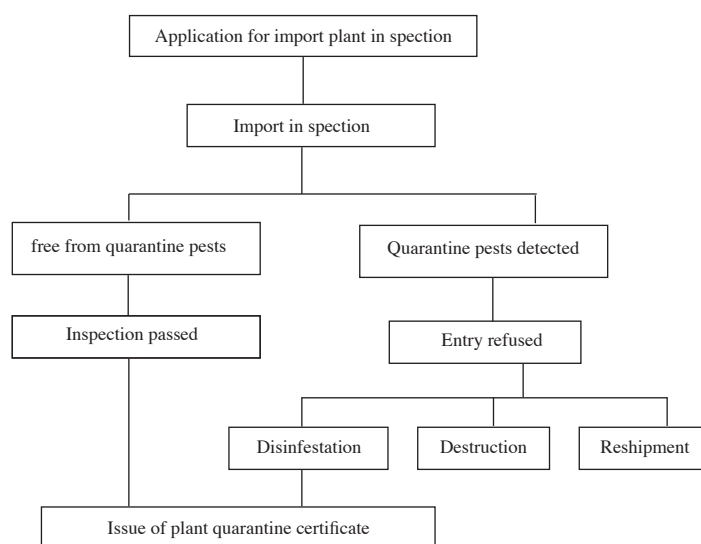
Global imports are forecasted to reach 4.3 million tons by 2010 with 87 percent or 3.8 million tons destined from developed country markets. On the other hand, the export market for fresh fruits is highly competitive among the top exporters. Gaining access to

foreign markets is critical to countries that are large exporters. Free trade agreements are means to provide increased market access and encourage increased exports. In addition to negotiation of trade agreements, top exporters also use various export promotion and marketing techniques to increase their market share in foreign markets.

In Japan, there are guidelines for the development of heat disinfestation treatments of fruit fly host commodities. It is known as Asia and Pacific Plant Protection Commission – Regional Standard for Phytosanitary Measures (APPPC). The APPPC Regional Standard for Phytosanitary Measures was endorsed during the 23rd Session of the APPPC held on 4-8 August 2003 in Kuala Lumpur. Phytosanitary measures are often required for imported commodities to prevent the introduction of quarantine pests (Figure 1).

Phytosanitary measures are normally developed on a country/commodity/pest specific basis through a process of bilateral negotiation between the National Plant Protection Organisations (NPPOs) of the importing and exporting countries.

- The purpose of the standard is to provide a sound basis for APPPC member countries when developing heat disinfestation treatment against quarantine fruit flies in host commodities.
- The development of a heat disinfestation treatment involves a number of steps.
- There must be confirmatory trials to demonstrate the efficacy of the treatment to the level required by the importing country.



Source: Department of Agriculture (2006)

Figure 1: Import Quarantine Procedures

The consideration of other factors that reduce the risk of entry and establishment may allow the heat disinfection treatment to be used as a component of a systems approach.

Vapour Heat Treatment

When importing tropical fresh fruit such as mango for commercial purposes, sterilisation for fruit flies is compulsory under the Plant Quarantines Law in Japan. A special vapour heat treatment system has been developed to replace conventional fumigation treatment systems, which employ chemicals and thus present environmental and health hazards such as below:

1. Sterilisation is performed without using chemicals, so there are no harmful effects on human health, and the quality of fruit is assured. This vapour heat treatment system helps to protect consumer health while also preserving the global environment.
2. Treatment is performed in saturated vapour, so transpiration of water is prevented and there is no shrinkage of fruit skin or loss of heat through vaporisation
3. When used on fruit at natural temperatures, high-temperature vapour greatly improves treatment efficiency, as condensation increases the surface area treated. The result is a highly effective insecticide treatment.
4. The differential pressure mechanism involves the forced supply of heated vapour, and achieves superior temperature and humidity distribution, whereby large volumes of fruit can be sterilised in a single process with high reliability.

METHODOLOGY

In data collection, different approaches have been used in order to gather the relevant information to fulfill the above mentioned research objectives. Research methodologies adopted comprise formal meetings with the retailers, personal interviews, customer surveys, field visits, analysis of official documents, seminar presentation and visiting relevant websites to gather current and pertinent information. With regard to primary collections, most of the work will be carried out in Japan whilst the secondary data will be collected both in Malaysia and Japan.

Specific methods to meet the objectives will be handled in the following steps:

- Examine the quality (physical properties) of *Harumanis* after the VHT via sensory evaluation to be conducted after export at the retail store
- Conduct the shelf life and storage study upon arrival in Japan via observation
- Identify the distinct differences between *Harumanis* and other established imported mangoes in the Japanese market via comparative study and visits
- Suggest marketing strategies in terms of product, place, price, promotion for effective commercialisation via personal interviews, customer surveys and formal meetings. Some customers' demand will be centered to the physical appearance, varieties and convenience.

FINDINGS

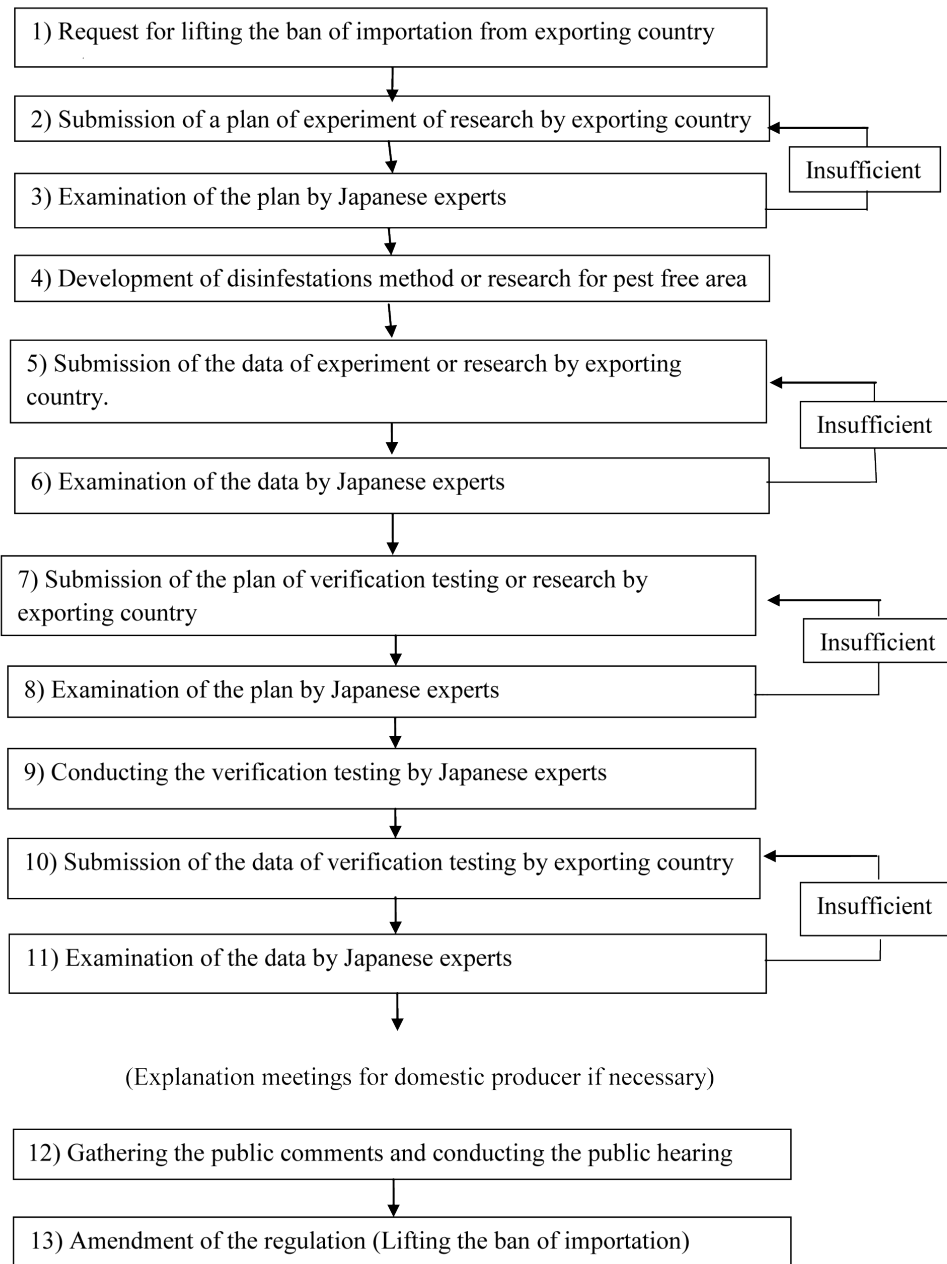
Mangoes are projected to be produced mainly by Thailand and Philippine in the year 2014. Since Malaysia and Japan have a Government to Government agreement on *Harumanis* mango, Malaysia should strategise on exporting this special species as requested by Japan. It is a 'breakthrough' agreement before exporting other potential fruits that may not be available in Japan. Food safety standards and traceability have become important concerns in the marketing and export of quality agricultural produce of many trading nations. There are stiffer food safety regulations, increased productivity, improved efficiency, transparency and branding. Sanitary and Phytosanitary (SPS) measures are technical regulations designed to prevent a potentially adverse impact of international trade on animal or plant life or health. The purpose is to protect consumer as well as national health and safety. The agreement on the Application of Sanitary and Phytosanitary Measures (the SPS Agreement) entered into force with the establishment of the World Trade Organization on 1 January 1995.

Lately, Japan is willing to buy fair-trade and organic fruits even if their cost is higher (Gold, 2008). They are ready to pay a premium above the regular price if they are guaranteed that the fruits they are consuming are produced under sound environmental and social conditions. The premium may go from 30 percent to 80 percent of the normal international price. Following these consumer demands, supermarkets are orientating their fruit business in this direction, with an increasing growth and presence of this kind of products in their outlets. As suggested by the Japanese Ministry of Agriculture, Malaysia must complete step 7-13 on the Procedures for Lifting the Ban of Importation (Figure 2).

On the other hand, quality packaging addresses successfully the three P's of packaging: pleasing, practical and protective. Packaging must be seen as an investment to build a positive image and a means to differentiate. Packaging is designed to

- offer maximum protection to our fruit
- transport our fruit in the most freight-efficient manner
- enable impact merchandising at retail level

The packing house process begins from the moment of the product's arrival until it is loaded into the air craft or container. A great emphasis is in every stage of the utilisation of correct washing procedures, quality and class packing, correct labeling and internal/external quality control checks. This guarantees that each consignment is packed and labeled correctly so that the consumer can enjoy the quality fruit as fresh as possible.



Source: Department of Agriculture (2006)

Figure 2: Procedures for Lifting the Ban of Importation

Fruit quality in the Japanese market place is defined by four main characteristics:

- **Fruit colour and appearance**
The appearance of fruits is one way that the Japanese might assess the fruit extrinsic qualities (taste and freshness). The colour should be typical to mango, which is yellowish or reddish. However, in the case of *Harumanis* it is yellowish greenish. The colour is unique as mangoes from Taiwan, Miyazaki and Mexico are rich red, while those from Thailand and Philippines are yellowish. *Harumanis* will be quite similar to the colour of American and Australian mangoes. The fruit should be free of major blemish or black spot.
- **Fruit taste**
Flavour should be well developed and the sugar level is currently a major importance in the definition of fruit taste. Greater than 15 brix is preferred.
- **Fruit size**
Fruit size is one of the major characteristics that defines whether the fruit is sold in the gift shop or the supermarket. Large sized fruit are not desired at the supermarket level as this could erode the need for gift shops. On average *Harumanis* weighs approximately 500 grams per fruit and such weight is considered acceptable in the gift shop or supermarket.
- **Health and safety**
Information pertaining to vitamin content is important and high level of sugar levels may become a health problem thus this may lead towards a demand for less sugar in fruit.

It was suggested in the previous research that Malaysia conducts fruit demonstration to show how to peel, to eat, and even to dispose (environmental concern) or recycle for other uses.

In terms of marketing strategies of quality *Harumanis* mangoes, before shipping a new product to Japan, it is suggested that a small sample be imported to the Japanese customs and Ministry of Health, Labor and Welfare (MHLW) port inspectors' office with a certificate guaranteeing compliance with required product regulations (Figure 3).

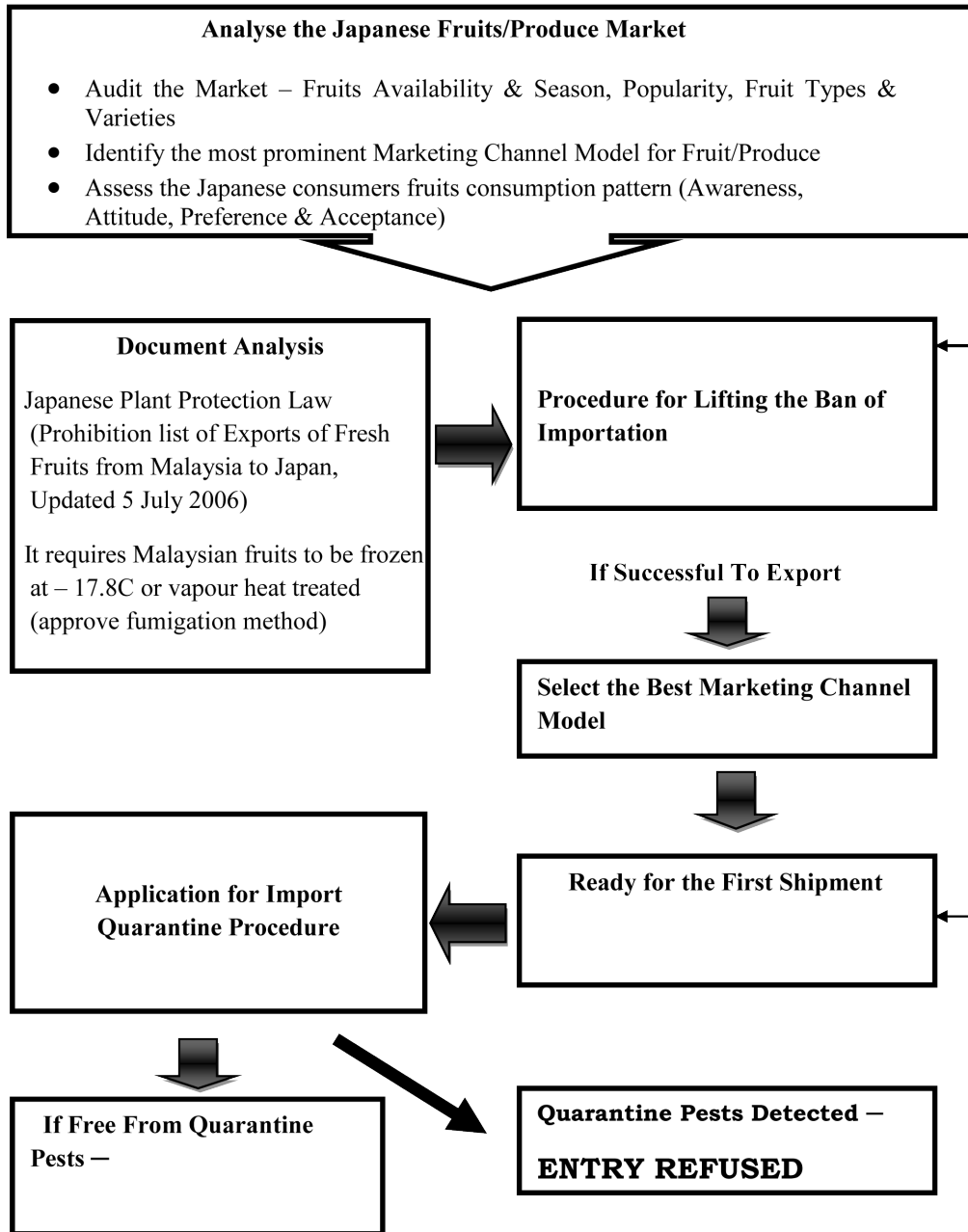


Figure 3: JAP-ENT (Japan-Entry) Model (Export of Fresh Fruits/Produce)

Competitors

Australia's capacity to export quality mangoes to Japan has also increased significantly due to a new Vapour Heat Treatment (VHT) facility at Giru in North Queensland. The state government has said VHT helps to control the problem of fruit fly and is critical to market access in Asia. Acting Minister for Primary Industries, Fisheries and Rural and Regional Queensland, Peter Lawlor, said that in the first week of operation at the new facility, 10 tons of mangoes were treated and exported to customers in Japan (James, 2010). Previously there were only two VHT facilities in Australia - one near Darwin and the other near Mareeba and another important VHT facility is now under construction in South East Queensland, which will boost the export capacity even further. It was given operational approval on 13 November 2009 by the Australian Quarantine and Inspection Service (AQIS) and the Ministry of Agriculture, Forestry and Fisheries Japan. The first shipment of mangoes from this site landed in Tokyo one week after the approval date.

The opening of the new VHT facility was built on the efforts of the Queensland Government over the past three seasons to develop new markets and expand existing markets. The Department of Employment, Economic Development and Innovation (DEEDI) works with mango producers and exporters, interstate governments and government agencies to expand export opportunities in Japan, China, UK, Europe, New Zealand, Middle East, Singapore and Hong Kong. Market and supply chain analysis is being conducted to develop more effective relationships with supply chain partners, and improve knowledge of the market for mangoes in Japan. The value of the Queensland mango industry last season was approximately \$50 million, with exports totalling 2,618 tons and a value of \$11.8 million.

In Thailand, it is important to conduct the quality assessment test as according to the research done, a major problem of mango production for export is deterioration of quality and short storage life after arriving at the destination markets. For export to Japan, mango must be subjected to VHT, which may damage fruit quality by the incidence of fruit injury such as internal breakdown. Despite the effectiveness of the treatment, the quality problem of VHT-treated fruits has been associated with many factors such as maturity, ripening stages, temperature and mineral contents of the fruits, and storage temperature. Low temperature storage is considered to be the most effective method to preserve quality and to prolong storage life. Therefore, to export mango to a distant market, it is very important to find means to maintain fruit quality to avoid fungal disease to attack the mango fruit after storage, chilling injury, skin browning, and abnormal ripening. VHT should reduce disease and increase peel colour. Chilling injury after VHT benefits fruit performance. Maturity at harvest is also one of the important factors that determines storage life and fruit quality when mango fruits are subjected to heat treatment followed by low temperature storage. Therefore, mango fruit for export should be harvested at a proper maturity and then treated with VHT before storage at the optimum temperature for maximising fruit quality. When sending to distance markets, the fruits should be separated according to the different maturity stages. As in Thai mango, the production region and mineral content of the soil exerted a profound influence on the occurrence of physiological disorders and chilling injury, as reported by Jacobi et al. (1996) and Bond (1984). There

existed high positive correlations between Ca concentration in soil and fruit, and the storage life of the fruits taken from different sites and showing different maturities. Thus mineral composition in soil and fruits is an important factor controlling fruit quality. There is a relationship between soil and fruit mineral nutrition, and postharvest fruit quality. It is then possible to predict the storage quality by means of preharvest mineral analysis. Based on the result of research done in Thailand, the soil nutrient in preharvest condition can greatly influence the storage life of mango fruits. The commercial practice with Thailand mangoes is usually to harvest the fruits before full maturity, which results in poorer quality and storability. Thus, to minimise the occurrence of physiological disorders after storage, mature fruits should be harvested with careful postharvest management. Acceleration of the ripening stage to a more-ripened stage before VHT is recommended in order to reduce chilling injury in low temperature storage during pre storage conditions. If the appropriate pre storage conditions have been met, it is possible to prolong the storage life at much lower temperatures without any damage.

In India, in an effort to improve mango exports to Japan, the country invested Rs 30 crore to set up four new vapour heat treatment (VHT) plants in Maharashtra, Uttar Pradesh and Andhra Pradesh. In Maharashtra, Mumbai will get the plant while in Andhra two plants will be built, including one in Tirupati. The Agriculture and Processed Food Products Export Development Authority (APEDA) is planning to increase the mango export to Japan almost seven-fold with the setting up of these plants. These plants which were ready in March 2008 mainly cater to Japanese and Chinese markets. The VHT units are for disinfecting the fruits from fruit flies. Infrastructure constraints are the biggest challenge for APEDA to send mangoes to other countries. For the Japanese market, India has to meet their import and quality regulations. India, which has only one VHT plant, exported only 138 tons of mangoes to Japan in 2007. Factors such as late clearances in the fag-end of the season resulted in low exports to Japan. The new four plants will have an overall capacity of 15 tons per batch. With five VHT plants, India will be able to export more than 1,000 tons of mangoes to Japan. In 2007, the country exported around 75,000 tons of mangoes globally, which could jump to around 90,000 tons in 2008.

In Philippines, new vapor heat treatment plants in southern Mindanao are enabling local mango suppliers to improve the post-harvest quality of their fruit to meet the strict quarantine standards of key export markets. Southern Philippines Fresh Fruits Corporation began operating its new vapor heat treatment plant in 2006. The P52-million facility is capable of processing 12 metric tons (MT) of mango per vapor heat treatment run with each run lasting about 18 hours. Southern Philippines Fresh Fruits Corporation exported 21 metric tons of vapor heat treatment-treated fresh mangoes to Japan in a trial shipment in December 2007. Japan has very stringent standards, both in terms of hygiene and fruit quality and the corporation was happy when the whole shipment made it through quarantine. The corporation was assisted by USAid's Growth with Equity in Mindanao (GEM) Program in establishing links with growers of high-quality mango. Japan is the biggest market for Mindanao mangoes. In 2007, the island-region shipped 1,092 metric tons (MT) of high-grade fresh mangoes valued at US\$2,750,328 directly to Japan, according to the National Statistics Office (NSO). In the period 2006-2007,

the total volume of fresh mango exports from Mindanao rose 46.8 percent (from 1,357 MT to 1,992 MT), while the value of fresh mango exports doubled (from US\$1,795,653 to US\$3,592,770). The number of importing countries increased from 11 to 14. Other major buyers of Mindanao mango in 2007 included South Korea (484 MT -US\$484,408), United States (28 MT- US\$154,810), Hong Kong (185 MT - US\$88,850), Iran (17 MT - US\$43,950), Malaysia (4 MT - US\$23,149), and China (128 MT - US\$21,439). Vapor heat treatment is a requirement for all mangoes exported to Japan, South Korea and the US. Until recently, only 20 percent of Mindanao mangoes produced for export met Japan's standards. Diamond Star, one of the country's biggest fresh mango exporters, has also constructed a vapor heat treatment plant in Mindanao located in Carmen, Davao del Norte. Mindanao is typhoon-free, which gives the region a major advantage. Mindanao growers can produce mangoes from July to December, the period when production in Luzon and the Visayas drops due to the prevalence of typhoons. The Mindanao Fruit Industry Council (Minfruit), in partnership with the GEM Program, has assisted farmers in developing off-season mango production and has worked with industry proponents to strengthen the production supply chain. Growing mangoes during the rainy off-season may be more costly but this can be offset by meeting the high import standards of markets like Japan which pays as much as P85 per kilo. With the new VHT facilities and the entry of other processing plants, Mindanao mangoes have a better chance of finding their way onto the shelves of lucrative foreign markets. These are exciting times for the mango industry.

CONCLUSION

In conclusion, the physiological response of *Harumanis* mango fruit to vapor-heat treatments should be explored. Mango fruit apparently has the capacity to recover from vapor-heat quarantine treatments. VHT helps to control the problem of fruit fly and is critical to market access into Japan. The Ministry of Agriculture and Agro-based Industry, DOA, MARDI and FAMA should work with mango producers and exporters/importers, state governments and agencies like the Australian Department of Employment, Economic Development and Innovation (DEEDI) to expand export opportunities in Japan and also other parts of the world such as China, UK, Europe, New Zealand, Middle East, Singapore and Hong Kong. As in Japan, market and supply chain analysis should be conducted to develop more effective relationships with supply chain partners, and improve knowledge of the market for mangoes.

In emulating Thailand, it is important for Malaysia to also conduct the quality assessment test in accordance to the research done by Thailand, a major problem of mango production for export is deterioration of quality and short storage life after arriving at the destination markets. Despite the effectiveness of the treatment, the quality problem of VHT-treated fruits has been associated with many factors such as maturity, ripening stages, temperature and mineral contents of the fruits, and storage temperature. Therefore, to export mango to a distant market, it is very important to find means to maintain fruit quality to avoid fungal disease to attack the mango fruit after storage, chilling injury, skin browning, and abnormal ripening. VHT should reduce disease and increase peel colour. Chilling injury after VHT can benefit fruit performance.

Maturity at harvest has also been of the important factors that determines storage life and fruit quality when mango fruits have been subjected to heat treatment followed by low temperature storage. Therefore, mango fruit for export should be harvested at a proper maturity time and then treated with VHT before storage at the optimum temperature for maximising fruit quality. In case of the preference of fruit taste after export, mineral composition in soil and fruits is another important factor controlling fruit quality. Finally, if the appropriate pre storage conditions have been met, it is possible to prolong the storage life at much lower temperatures without any damage. If India plans to increase the mango export to Japan almost seven-fold after entering Japan in 2008 and also facing a rejection in 2009 due to chemical residue, then there is a great potential for Malaysia to enter the market with a promising future, especially when Japan has experienced the typhoon in the last few years in Miyazaki where mango is planted. If Australia and India, the newcomer exporter of mangoes with their distinct feature can enter Japan in the last two years, Malaysia will also have a good future with the distinctive aromatic and sweet high quality tasteful *Harumanis* fruit for Japanese to savor.

In terms of pricing, it is best to close a deal with a direct importer from Japan in order to gain maximum return. This is to minimise the cost of middlemen. Once a full trust and faith is given by a Japanese importer, it is obligatory for Malaysia to adhere the requirement carefully at the right time with the best product. Doing business with our Japanese partner is to honour the agreement as stated as a priority in winning strategy. If Malaysia can deliver accordingly, the Japanese importer is more than willing to support with the consistent quality assurance. Thus business for both countries will be a long term partnership. If other Asian countries can do it, Malaysia Boleh too!

References

- Bond, E. (1984). *Manual of fumigation for insect control, FAO plant production and protection papers – 54*. Rome: Food and Agriculture Organization of the United Nations.
- Faridah, H.H., Rosidah, M., Jamaliah, M.Y., & Jamaluddin, Y. (2007). *Towards internationalisation and commercialisation of Malaysian fruits: Assessment of international consumers' awareness, acceptance, attitude and preferences (Japanese market), laporan penyelidikan kerjasama FAMA-IPTA*. Selangor, Malaysia: Federal Agricultural Marketing Authority.
- Gehrt, K. & Shim. S. (1998). The role of fruit in the Japanese gift market: Situationally defined markets. *Agribusiness*, 14 (5),389-402.
- Gold, M. (2008). *Guide to international trade in organics: Law and regulations, Food and Agriculture Organization of the United Nations, Commodities and Trade*. Beltsville, MD: Alternative Farming Systems Information Center, National Agricultural Library, Agricultural Research Service, U.S. Dept. of Agriculture.

- Jacobi, K.K., Wong, L.S. & Giles, L.E. (1996). Effect of hot air disinfestation treatment in combination with simulated air freight conditions on quality of 'Kensington' mango (*Mangifera indica* linn). *Australian Journal of Experimental Agriculture*, 36(6), 739 – 745.
- James, F. (2010, January 14). Australian Mango exports set to rise, Australian Food News. Retrieved from <http://www.ausfoodnews.com.au/2010/01/14/australian-mango-exports-set-to-rise.html>
- Mitcham, E.J. & McDonald, R.E. (1993). Effects of quarantine heat treatment on mango fruit physiology. *Acta Hort. (Ishs)*, 343, 361-366.
- Miyauchi, Y. & Perry, C. (1999). Marketing fresh fruit to Japanese consumers: Exploring issues for Australian exporters. *European Journal of Marketing*, 33(½), 196-205.
- Plotto, A., Jinhe, B., Brecht, J., & Baldwin, E. (2003). Effect of pre treatment on intact 'Kent' mango with ethanol vapor, heat or 1-methylcyclopropene on quality and shelf life of fresh cut slices. *Proceedings of Florida State Horticultural Society*, 394-400.
- Shim, S., Gehrt, K. & Lotz, S. (2001). Export implications for the Japanese fruit market: Fruit specific lifestyle segments. *International Journal Retail and Distribution Management*, 29 (6), 300-316.
- World Trade Organization (2001). *Text of the agreement: The WTO agreement on the application of sanitary and phytosanitary measures (SPS agreement)*, *Sanitary and Phytosanitary Measures*. Geneva: WTO.