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Litchi industry comparison between Taiwan and Thailand

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ABSTRACT

The litchi (*Litchi chinensis* Sonn.), belonging to *Sapindaceae* and native to southern China, is now a commercially grown subtropical fruit crop worldwide. The production area of litchi is mainly located in southern and central of Taiwan. The planting area, yield and value for the litchi in Taiwan are 12,000 ha, 95,440 metric tons and US\$97.3 million, respectively in 2009. The harvesting season begins from May to August, depending on geographic locations and cultivars. The litchi in Thailand can be divided into two types according to temperature requirements. Litchi production is located in the northern, central, southern and eastern parts of Thailand. The production area is 24,579 hectares with total production of 82,808 metric tons and valued at about US\$24.3 in 2009. In Thailand, eighty percent of fresh fruit total production is marketed domestically while the remaining twenty percent is exported. Diversify cultivars and extend harvesting period with early and late varieties, establish reliable techniques to ensure stable production and set up sound handling, shipping and storage procedures to extend storage life of litchi fruits are the goals to improve the litchi industry for both Taiwan and Thailand.

INTRODUCTION

The litchi has its origin in South China where they have been planted for more than 2,000 years. Litchi is a day-neutral subtropical evergreen species. Although it grows on many different soils, the litchi thrives on deep and fertile soils with pH ranges from 5.0 to 5.5. The species does not tolerate flooding. High temperature and frequent rainfall induces new growth of litchi plants. New flushes diminish and flower buds initiate and develop during the dry and low temperature months. The height of litchi trees can be up to 20 meters. The flower is small, no petals, green, white or pale yellow, aromatic. The color, smell and taste of litchi fruits are so wonderful and have been regarded as a delicacy.

LITCHI PRODUCTION IN TAIWAN

The litchi in Taiwan was originated from Guangdong and Fujian more than 200 years ago. Except for the original varieties, there are some new varieties being released in recent years (Teng, 2005). The planting area is about 12,000 hectares. The varieties can be classified into 5 categories according to harvesting time. The Extreme Early variety is 'Sanyuahong' and 'Tainong No. 2'; Early varieties are 'Yuhobaw', 'Nunsi Early' and 'Tainong No. 1'; Mid-season varieties are 'Hakip', 'Saken' and 'Tainong No. 4'; Late varieties are 'Nomichi' and 'Tainong No. 5'; Extreme late varieties 'Guawei' and 'Tainong No. 3'. 'Hakip' comprises about 70% of the total production area due to its stability in yield and superior adaptation ability under different environmental conditions. 'Yuhobaw', being an early and high price variety, occupies about 20% share, is the most fast growing variety. The major production area ranges from Pingtung (South) to Taichung (Central Taiwan). The harvest season ranges from late April to early August.

Air layering and grafting are common practices for litchi propagation. Higher survival rates could be achieved if planting in the Fall. The planting distance is about 2 m x 3 m for high density planting system and 4-5 m x 5-6 m for standard planting system.

As litchi could spread into 20 m huge trees under natural condition, adequate training and pruning to control tree height under 3 m is very important for spray, pruning and harvesting. Adequate training to open up tree crown helps receiving enough sun light and prevent pest flourish.

High temperature and frequent rainfall before or during flower formation period induces new shoots and thus impede flower formation. Girdling of 3-5 mm on the trunk prevents new shoots growth. Hand pruning or ethephone spraying at 1200-2000 times, depending on varieties and time, to defoliate the new leaves are the common practices for handling new shoot growth after October. However, inadequate girdling or sprays may weaken the tree. 'Yuhobaw', although produces flower easily, sets fruit poorly sometimes. Adequate panicle pruning or flower thinning improves fruit setting.

There are no suitable cultural techniques to produce off-season litchi fruits for the same variety in a particular location. However, using different variety which needs different flower initiation temperatures and planting at different locations, either altitude or latitude, could produce off-season litchi fruits in a geologically identical area.

The harvesting maturity of litchi is generally determined on the basis of peel color. 'Yuhobaw' is harvested at the stage of half-green and half-pink. Other varieties are harvested at full- or nearly full-pink stage. When mature, the total soluble solids (TSS) content of the flesh (aril) exceeds 16 °Brix for essentially all commercial varieties. The acidity of the fruit varies substantially among varieties, however.

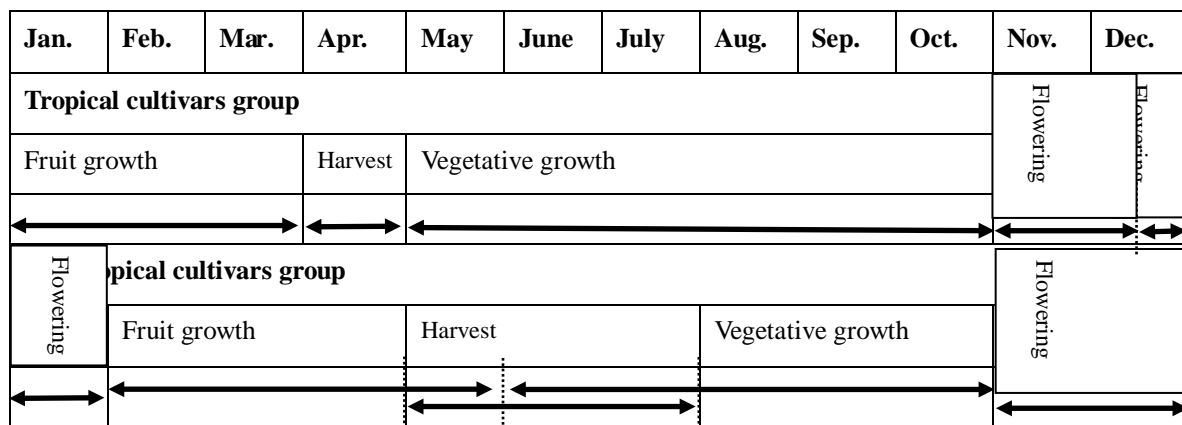
Fresh litchi is highly perishable without proper handling. The attractive pink color quickly turns brown in hot summer, particularly in the dry air. The peel is also very susceptible to fungal diseases; and the flesh can easily develop off-flavors at high temperature conditions. Therefore, litchi is shipped and marketed promptly after harvest. The marketable life span is only a few days without refrigeration. However, litchi can be kept in good condition and quality for more than two weeks if properly handled and refrigerated.

LITCHI PRODUCTION IN THAILAND

Litchi is one of the major economic fruit crops in Thailand. This crop was first introduced from China and planted in the north and central part of Thailand and later spread to the south and eastern regions of the country (Anupunt, and Sukhvibul, 2005). Litchi is divided into two types according to temperature requirements. The first type is the subtropical cultivars, including ‘Hong Hauy’, ‘Kim Cheng’, ‘Ow Hia’, ‘Kwang Jao’ and ‘Chakraphat’. These cultivars are grown in the northern region and require a short period of low temperature for flowering. The second type is the tropical cultivars, including ‘Kalok Baiyao’, ‘Samphao Kaeo’, ‘Saraek Thong’, ‘Jeen’, ‘Jeen Yak’, ‘Thai’, ‘Thai Yai’, ‘Cho Rakam’ ‘Kheaw Wan’, ‘Daeng Phayom’, ‘Krathone Thong Phrarong’, ‘Kalok Bai Dam’ and ‘Khom’. These cultivars are grown in the central, western and eastern part of Thailand requiring even less low temperatures for flower induction. Figure 1 shows the growth cycle of litchi in Thailand. In 2009, litchi production in Thailand was 82,808 metric tons, totally about US\$24.3 million at the farm gate (Thai Office of Agricultural Economics Online, 2007). The total production matches the estimation Thailand has the potential to produce as much as 82,000 metric tons annually (Evans and Degner 2005). Litchi production occurs mainly in the northern region of the country in the provinces of Chiang Mai and Chiang Rai, with the official harvesting season running from April to July. Due to strong competition from China, most of the litchi produced in Thailand is sold locally. In 2007, less than 15% of the crop was exported as fresh fruit, totaling about US\$5 million.

Litchi has a very short shelf life which lasts for only 3-5 days at room temperature after which it starts to deteriorate but can store for up to 5 weeks when kept in the refrigerator. Processed products are frozen, canned with syrup, dried and some are made into wine. Eighty percent of fresh fruit total production is marketed domestically in important cities such as Bangkok, Chiang Mai and Chiang Rai while the remaining twenty percent is exported. During the off-season period Thailand imports litchi to supply the local demand. The main challenges in litchi production in Thailand are: low flowering percentage and fruit set due to the overlapping of vegetative flushes in the early cycle of flowering, fruit cracking, skin discoloration and short shelf life and the low and fluctuating market price.

Figure 1 Growth cycle of litchi in Thailand



LITCHI INDUSTRY COMPARISON BETWEEN TAIWAN AND THAILAND

The climate for Taiwan is subtropical while Thailand has a tropical environment for wax apple production (Table 1). Taiwan has a longer harvesting season than that of Thailand. Although Thailand has larger production area than Taiwan, the yield, total production and production value for Taiwan is greater than that of Thailand. ‘Kakip’ and ‘Yuherbow’ are the major varieties for Taiwan, while ‘Hong Huay’ and ‘Kim Cheng’ are important cultivars in Thailand. Thailand litchi seems to have bigger and sweeter fruit, although the fruit weight and TSSC ranges are greater for the litchi in Taiwan. Fruits with shriveled seed have higher flesh to seed ratio. Shriveled seeds percentage for litchi varieties in Taiwan ranges from 0% to 100% (Table 1).

Table 1. A Brief Comparison of Litchi Industry between Taiwan and Thailand (2009)

	Taiwan	Thailand
Climate	Subtropical	Tropical
Harvesting season	Late April-early August	Early April-July
Area (ha)	12,000	24,579
Yield (ton/ha)	7.0	2.7
Total production (m.t.)	95,400	82,808
Value (US\$ million)	97.3	24.3
Cultivar	‘Kakip’ ‘Yuherbow’	‘Hong Huay’ ‘Kim Cheng’
Fruit weight (g)	16 ~ 44	25 ~ 40
TSSC %	16 ~ 21	18 ~ 20
Shriveled seed (%)	0 ~ 100	0 ~ ?

CONCLUSIONS

Litchi is an important subtropical fruit crop. However, there are many problems need to be solved for better litchi production, harvesting, shipping and storage, such as: Poor flowering and fruit set - due to the overlapping of vegetative flushes in the early cycle of flowering.

1. Unstable production and low yield of the small-seeded high quality fruit cultivars, such as ‘Yuherbaw’ and ‘Nomichi’.
2. Concentrated harvesting season.
3. Fruit cracking – probably due to unbalanced water supply and great variation of temperature.
4. Postharvest quality, such as skin discoloration and short self life.
5. Low and fluctuating market price.

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