

CHAPTER III

MANGO PRODUCTION AND TRADE

Mangifera indica or mango is the most popular fruit of the Orient, which has been grown in the foothills of the Himalayas in eastern India for 4,000 years. This kind of fruit is known as the oldest fruit in India; in other words, it is the so-called "National Fruit of India". Westerners named it "Tropical Apple" and also called it the "King of Fruits". Today mango is found growing in tropical regions all over the world. The optimum climate for mango ranges from monsoon tropics to the frost-free subtropics, with a dry (or cool) season of at least three months. The major growing areas are Africa, South America, Mexico, Mali, Brazil, Argentina, USA, Italy, Spain, Malaya, Java, India, the Philippines, Myanmar, Thailand, Yunnan, Cambodia, Cuba, Hawaii, Jamaica, Barbados, etc. In 1992, India was the largest producer - nine million tons from a million hectares. Still, the major exporters are Mexico and Mali. (FAO, 1993.)

3.1 World Mango Production

The mango is said to be the most widely grown fruit on this globe. Refer to the FAO Production Yearbook (1993), the mango is the most important fruit of Asia. Moreover, it is currently the fifth in total production among the chief fruit crops worldwide, after Musa (banana and plantains), Citrus (all types), grapes and apples. Table 3.1 represents the world mango production in 1993, which was estimated to be over 17,744,000 metric tons. Obviously, Asia is the largest mango producer estimated at 13,485 thousand metric tons.

Table 3.1 World Mango Production⁸ (1993) (1000 metric tons)

Continent	Country	Production
Africa	Egypt	180
	Madagascar	205
	Nigeria	500
	Sudan	135
	Tanzania	186
	Zaire	212
	Other	366
	Total	1,784
Asia	Bangladesh	184
	China	613
	India	10,000
	Indonesia	750
	Pakistan	794
	Philippines	350
	Thailand	615
	Other	79
	Total	13,485
Australia	-	-
North America	Dominican Republic	192
	Haiti	230
	Mexico	1,130
	Other	186
	Total	1,738
South America	Brazil	396
	Venezuela	136
	Other	163
	Total	705
World		17,744

Source: FAO Production Yearbook, 1993

⁸ including all producers with more than 100,000 metric tons per annum

3.1.1 Varieties of Mango from Various Continents (Wangnai, 1986) (Appendix A).

1) Africa.

The major mango producing countries in Africa are Egypt, Madagascar, Nigeria, Sudan, Tanzania, and Zaire; however, there is little documentation about the important cultivars in some of these countries. Traditional Indian and local varieties are grown in Egypt and Kenya. Egypt has produced a large amount of mangoes, but exports a small amount of them. Nigeria grows cultivars from Florida, India and Egypt, together with some local selections. South Africa, Ivory Coast, Burkina, Faso, Gambia, Guinea, and Mali are also large producers. In addition, they were the chief mango exporters to the European Union (EU). South Africa's season is January through May, and production in Ivory Coast and the other countries of West Africa appears in March through July, peaking from mid-April to late June.

2) Asia

From table 3.1, the leading mango producers in Asia are Bangladesh, China India, Indonesia, Pakistan, the Philippines and Thailand. As mentioned, India has traditionally been the world's largest producer of mangoes, with approximately 10,000,000 metric tons or 56% of the world production. The peak season occurs from April through August. Following

August. The fourth largest mango producer was Indonesia (750,000 metric tons in 1993). India, Pakistan, Indonesia, and China grow mangoes for domestic consumption, while Israel, Philippines and Thailand grow mangoes for both domestic consumption and exportation.

3) Australia

The production in Australia has increased substantially from 22,370 metric tons to 35,000 metric tons in 1993 and 1994, respectively. The basic variety was Kensington Pride; nevertheless, many of varieties from Florida are currently undergoing experimental field.

4) North America

Total mango production in North America in 1993 was 1,738,000 metric tons. The leading mango producing countries were the Dominican Republic, Haiti and Mexico. Mexico was the world's second largest producer (1,130,000 metric tons in 1993) and biggest exporter of fresh mangoes. The foremost mango cultivars are Florida selections, Manila and La Criolla. Peak production turns out from April through September.

5) South America

Total mango production in South America in 1993 was 705,000 metric tons. Brazil and Venezuela were the largest producing countries with annual production of 136,000 metric tons in 1993. Both Florida selections and local cultivars were grown in Brazil, whereas Florida cultivar was grown in Venezuela. During the past few years, Mango production in Ecuador and

Peru has increased rapidly; mainly Florida cultivar production. While Brazil's mango season is from October to March, in Peru it is from November through March.

3.1.2 Varieties of Mangoes Exported Throughout the World

In the past two decades, mangoes have become important in international trade. High quality fresh fruits were shipped to expand markets in North America, Japan and Europe (FAO, 1993). Though more than 500 mango varieties exist, only a few are considerable in the world trade (table 3.2).

In North America, the export of fresh mangoes to the USA and Canada reached 139,465 metric tons with an export value of US\$ 115,350,00 in 1994. The size of this market doubled between 1990 and 1994. Most of them were shipped from Mexico (March through September) to North America, which valued at US\$ 89,800,000 in 1994. Small amounts were exported from Venezuela (March through July), Guatemala, and Peru (January through December). The most popular varieties were Haden, Keitt, Kent and Tommy Atkins. Prices for Haden ranged from c. \$6.00-9.00 per carton (April through June) to \$9.00-13.00 (January through March). Tommy Atkins fetched from c. \$4.50-9.00 per carton (April through August) to \$18.00 (October). Late in this season, Keitt earned c. \$4.50-6.50 (June through September).

Regarding the European market, mango shipment from non-EU countries reached 45,118 metric tons (US\$ 53,000,000) in 1994, representing 65% increase

from 1990. The major suppliers were Brazil (12%), South Africa (12), Ivory Coast (11%), and the USA (11%), with smaller amounts from Mexico, Pakistan, Israel and Venezuela (all approximately 7%). The EU mango market favors Tommy Atkins, Haden, Keitt, and Kent with smaller amounts of Amelie being imported into France from Ivory Coast and Burkina Faso and Alphonso and Pairie imported into the UK from India and Pakistan. Brazil ships mangoes to the EU mainly during November through January; followed by shipping from South Africa (January through April). Ivory Coast ships to France (March through June), with shipments from the USA arriving from June through October. Exports from Pakistan to India are on the market in the UK from April through August. In 1993-1994, exports of fresh mangoes from India were 22,124 metric tons worth US\$ 13,900,000. The UK imported approximately 83% of Indian mangoes shipped to the EU (1,265 metric tons). In 1994, Pakistan was the largest supplier of fresh mangoes to the US (3,000 metric tons), with total export of mangoes to the EU at 3,277 metric tons. Venezuelan mangoes are available from April to July. Israeli mangoes enter the EU market in August through October.

For Asian market, Hong Kong, Japan and Singapore are the major mango importing countries, particularly Hong Kong, which imported 27,895 metric tons of fruits in 1993 (US\$27,400,000). The Philippines supplied more than 80% of fruits, the rest are from Thailand and Australia. Japanese imports of mangoes have been generally increased since 1990, and were at 7,606 metric tons (US\$ 4,600,000) in 1994. Most of the mangoes in the Japanese market were shipped from the Philippines; the dominant varieties on the market were Tommy Atkins, Keitt and Haden.

Table 3.2 Varieties of the World Exporting Mangoes.

Varieties	Exporting countries
Alphonso	India
Apple	Kenya
Borido	Kenya
Carabao	The Philippines
Haden	South Africa, Mexico, Israel, etc.
Julie	Trinidad
Kent	South Africa, Mexico
Adam Francis	Haiti
Manita	Mexico
Maya	Israel
Ngome	Kenya
OK Rong	Thailand
Nam Doc Mai	Thailand
Nangklangwan	Thailand
Zill	South Africa

Source: Wangnai, 1985

3.2 Thai Mangoes.

3.2.1. Five Major Varieties of Mango are Grown in Thailand:

1) Kaew Variety

In 1994, the total production area for this variety accounted for 477,436 rai with a total production at 382,110 tons and reached a yield of 1,153 kg. /rai. Many fruit processing factories demand this variety; consequently prices were relatively high. For this reason, large number of farmers has switched to growing this variety instead of growing crops.

Chaiyaphoom, Nakornrachasima, Tak, Surint, Khonkaen, Buriram, Prajuabkirikan, and Srisakase are essential cultivate areas.

2) Khiow Sweuy Variety.

This variety is in great demand, as well as production area. The total cultivated area in 1994 was 378,475 rai with a total production of 189,908 tons and 795 kg. /rai as an average yield. Suitable areas for producing this variety are Nakornsawan, Nakornrachasima, Supanburi, Chacheongsao, Cholburi, Leuy, Petchaboon, and Nakornpatom. Besides the central region, the northern part of Thailand is also a major production area.

3) Nam Doc Mai Variety

Normally, this variety tastes good for ripe consumption. The total production area in 1994 soared to 215,955 rai with 113,215 tons (average yield per rai was 845 kg.). The major sources for this variety cover Nakornrachasima, Chacheongsao, Smutprakarn, Supanburi, Cholburi, and Petchburi.

4) Ok Rong variety

In addition to Nam Doc Mai, Ok Rong is another variety for ripe consumption with a high market demand. The total planting area was 176,588 rai with 155,991 tons of production and yielded 1,123 kg. / rai in 1994. The main sources are Roy Ed, Kalasint, Nakornpanom, Chacheongsao, Nakorn Nayog, and Petchburi.

5) Rad Variety

In 1994, the cultivated area was 77,157 rai with total production of 64,837 tons; and 1,236 kilograms yield. Chacheongsao, Petchaboon, Kanjanaburi, and Supanburi are major production areas.

6) Choke Anand Variety

Choke Anand is an all-year-round variety of mangoes. It has been grown widely in Chiang Mai and Srisakate and is good at tolerance for drought. In general, it weighs from 300-400 grams per fruit. Its thickness of peel averages at 0.25 cm. In case of mature mango fruit, this variety can be kept for 15 days (Radanchaless and Thamdee, 1999).

3.2.2 Thai Mango Production

As can be seen from the previous section on major varieties of mangoes, it is obvious that mangoes can be grown in all eight regions – north, northeast, east, south, southeast, west, southwest, and northwest (OAE, 1998). From 1988 through 1997, the area of mango cultivation has increased gradually from 1,147,133 rai to 2,249,986 rai with a growth rate of 8.23 percent (table 3.3). As a result, the growth rate of mango production upward to 12.37 percent (422,237 tons in 1988 to 1,216,429 tons in 1997) (figure 3.1). In other words, the average yield per rai per annum has been improved from 546 kilogram per rai per annum to 857 kilogram per rai per annum in 1988 and 1997, respectively (4.296 % growth rate) (OAE, 1998) (figure 3.2).

3.2.3 Farm-Gate Price

The minimum farm-gate price observed in 1988 was 5.50 Baht per kilogram (Kaew variety is excluded because its price at 2.50 Baht per kilogram is a normal price). In recent years, an observed minimum price was 7.17 Baht per kilogram (inflation rate included). (Table 3.4).

Table 3.3 Total production area, total production and average yield per rai per annum from 1988 to 1997.

Year	Total production area (rai)	Total production (tons)	Avg. yield / rai / annum
1988	1,147,133	422,237	546
1989	1,160,538	440,297	580
1990	1,230,455	885,387	1,110
1991	1,330,704	894,266	1,036
1992	1,472,910	1,110,995	1,167
1993	1,914,707	1,232,862	1,151
1994	1,757,050	1,259,989	1,061
1995	1,887,168	1,207,568	959
1996	1,983,551	1,201,913	964
1997	2,249,986	1,216,429	857
Growth rate (%)	8.230	12.366	4.296

Source: OAE, 1998.

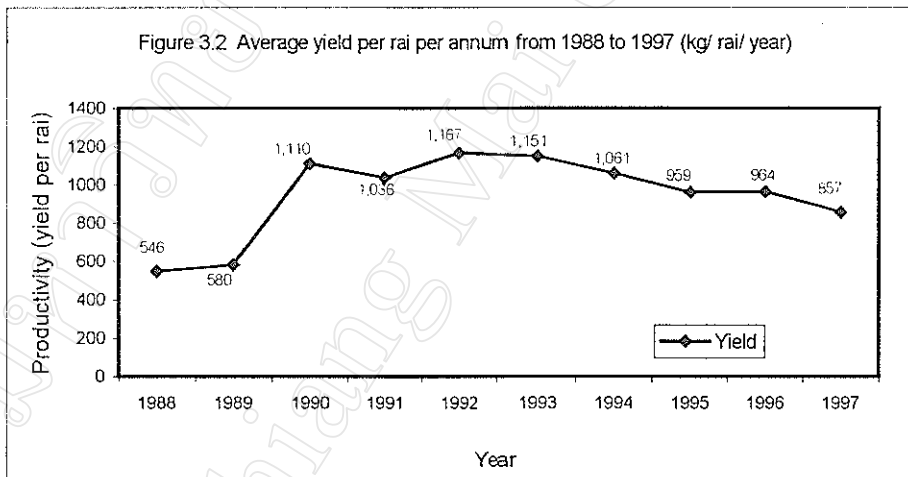
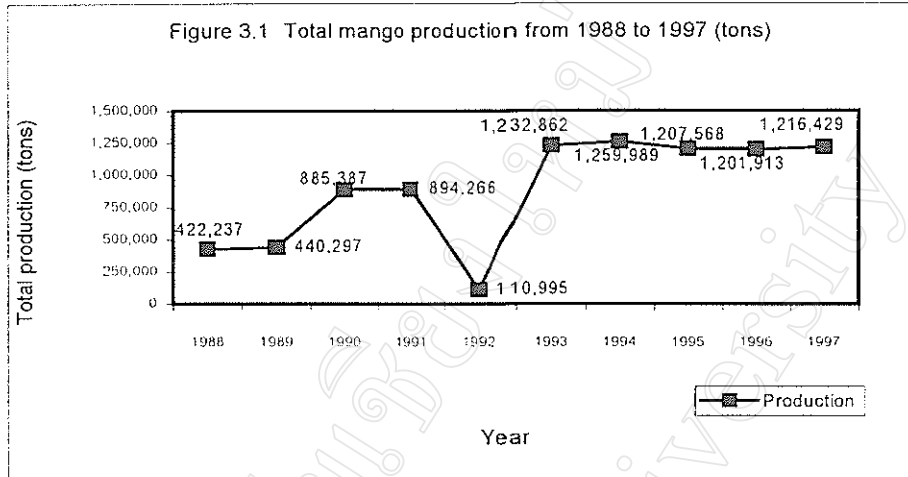


Table 3.4 Monthly farm-gate price for mangoes from 1994 to 1998 (Baht / kg.)

Items	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
<i>Year 1994</i>													
Khiow Saweuy	-	40.88	43.75	37.50	20.63	-	-	-	-	-	-	-	35.69
Rad	-	28.50	27.50	16.25	10.00	-	-	-	-	-	-	-	20.56
Kaew	-	-	-	-	2.50	-	-	-	-	-	-	-	2.50
Thongdum	-	18.00	21.00	17.50	10.00	-	-	-	-	-	-	-	16.63
Ok Rong	-	16.50	15.00	9.50	6.88	-	-	-	-	-	-	-	11.97
Nang klangwan	-	-	-	-	5.00	-	-	-	-	-	-	-	5.00
Nam Doc Mai	-	29.50	43.75	29.13	12.50	-	-	-	-	-	-	-	28.72
<i>Year 1995</i>													
Pimsen	-	6.00	8.25	7.67	-	-	-	-	-	-	-	-	7.31
Khiow Saweuy	65.00	41.25	30.00	31.67	16.75	-	-	-	-	-	-	-	36.73
Rad	32.50	15.25	23.75	24.33	10.00	-	-	-	-	-	-	-	21.17
Kaew	-	-	-	-	4.00	-	-	-	-	-	-	-	4.00
Thongdum	-	-	-	-	10.00	-	-	-	-	-	-	-	10.00
Nongsang	-	-	-	-	-	-	-	-	-	-	-	-	-
Ok Rong	-	-	-	-	-	-	-	-	-	-	-	-	-
Nang klangwan	-	-	-	-	-	-	-	-	-	-	-	-	-
Nam Doc Mai	-	25.30	29.33	34.00	20.00	-	-	-	-	-	-	-	27.16
<i>Year 1996</i>													
Khiow Saweuy	-	-	39.25	24.54	10.00	9.00	-	-	-	-	-	-	20.70
Nam Doc Mai	-	-	32.50	23.88	22.00	2.0	-	-	-	-	-	-	26.13
Rad	-	-	27.50	9.70	4.58	0	-	-	-	-	-	-	13.93
Kaew	-	-	7.50	4.28	2.44	-	-	-	-	-	-	-	4.05
<i>Year 1997</i>													
Khiow Saweuy	-	40.00	38.99	25.98	16.90	-	-	-	-	-	-	-	30.47
Thongdum	-	-	16.25	-	2.00	-	-	-	-	-	-	-	9.13
Nam Doc Mai	-	30.00	32.62	18.17	11.14	-	-	-	-	-	-	-	22.98
Kaew	-	-	12.50	2.50	2.17	2.50	-	-	-	-	-	-	4.92
Rad	-	20.00	22.97	14.30	7.47	-	-	-	-	-	-	-	16.19
Ok Rong	-	-	22.50	3.38	3.33	-	-	-	-	-	-	-	9.74
Nong Sang	-	-	20.75	-	-	-	-	-	-	-	-	-	20.75
<i>Year 1998</i>													
Khiow Saweuy	-	40.00	41.54	31.56	40.00	-	-	-	-	-	-	-	38.28
Nong Sang	-	15.00	29.00	17.50	-	-	-	-	-	-	-	-	20.50
Nam Doc Mai	-	32.50	43.73	23.46	30.00	-	-	-	-	-	-	-	32.42
Kaew	-	-	9.33	5.00	-	-	-	-	-	-	-	-	7.17
Ok Rong	-	-	-	7.50	-	-	-	-	-	-	-	-	7.50
Thongdum	-	-	-	15.00	15.00	-	-	-	-	-	-	-	15.00

Source: OAE, 1998

3.2.4 Export

Volume and value of exporting fresh mangoes have improved from 4,205 tons and 30.17 million Baht in 1989 to 10.21 tons and 201.49 million Baht in 1998 with average annual growth rate of 9.76 and 24.29 percent, respectively (table 3.5 and figure 3.3A and 3.3B). Even though growth rates are positive; mangoes are still a nontraditional export – i.e. less than 1% of total production commodities, compared with rice, tobacco, and rubber. Malaysia is the biggest mango importer, followed by Singapore, Hong Kong, Japan, Taiwan, Laos, Brunei, New Calidonia, etc. (table 3.6 and figure 3.4A and 3.4B). China has imported Thai mangoes indirectly via Laos, Myanmar, and Hong Kong.

Table 3.5 Value and volume of fresh mangoes exported from 1989 to 1998 (tons and million baht)

Year	Volume	% of total production	Value
1989	4,205	0.96	30.171
1990	5,724	0.65	37.358
1991	3,236	0.36	26.132
1992	3,947	0.36	31.615
1993	2,940	0.24	26.110
1994	3,411	0.27	48.455
1995	3,658	0.30	42.174
1996	8,250	0.69	120.135
1997	8,522	0.70	148.939
1998	10,209	0.75	201.489
Growth rate	9.762	9.762	24.291

Source: Customs duty 1999

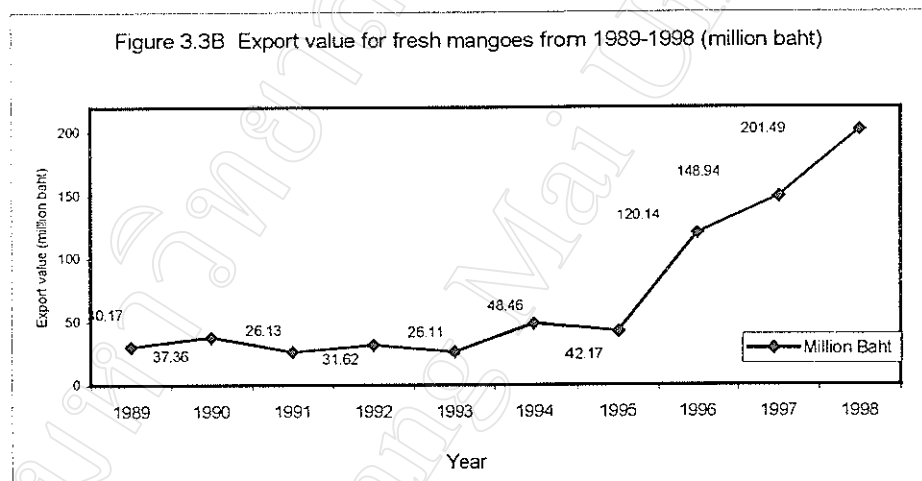
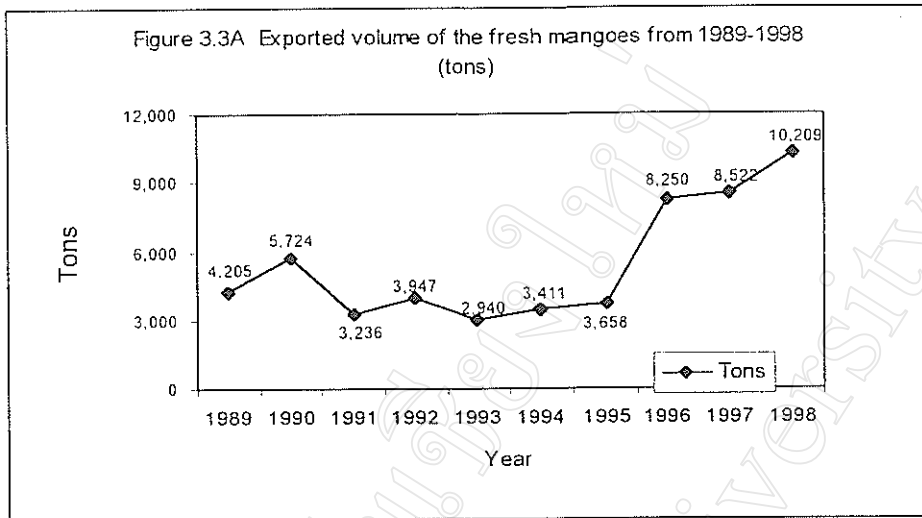


Table 3.6 Volume and value of Thai fresh and dried mangoes to importing countries from 1995-1998 (tons and million baht).

Importing countries	1995		1996		1997		1998	
	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.
Malaysia	1,051	142.01	3,921	75.08	5,539	120.06	7,303	162.73
Singapore	1,943	10.88	2,935	14.98	2,178	11.77	2,333	13.19
Hong Kong	293	6.11	803	12.08	458	6.01	229	3.74
Japan	112	5.14	107	3.87	95	4.32	145	12.76

Table 3.6 (continued)

Importing countries	1995		1996		1997		1998	
	Vol.	Val.	Vol.	Val.	Vol.	Val.	Vol.	Val.
Taiwan	81	3.36	205	9.24	70	3.28	26	1.35
Lao	120	1.16	179	1.77	128	1.49	28	0.13
Brunei	28	0.36	23	0.31	-	-	1	0.10
New Calidonia	3	0.16	5	0.28	-	-	-	-
Others	27	0.99	72	2.53	54	2.01	144	7.18
Total	3,658	42.17	8,250	120.14	8,522	148.94	10,209	201.49

Source: OAE, 1999.

3.2.5 Current Production and Marketing Problems (OAE, 1997-2001).

The problems of mangoes were split into two main parts - production problems and marketing problems.

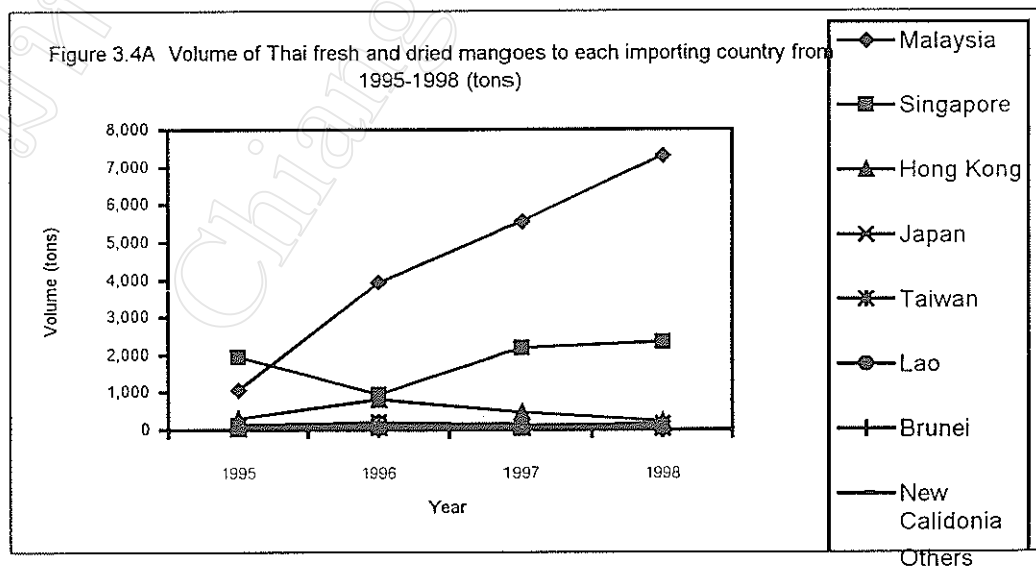
3.2.5.1 Current Production Problems can be Classified into Three Aspects

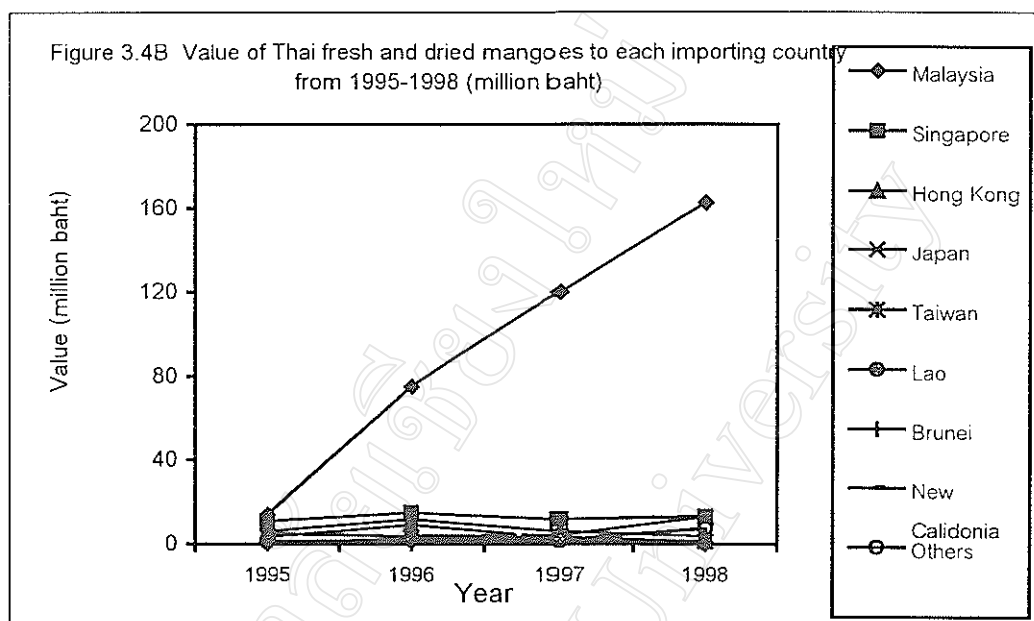
In order to identify current production problems, Agricultural Extension Office arranged them into three major features as followed (OAE, 1998).

- 1) Low productivity: Due to an absence lack of appropriate treatment leading to low yield per rai. Additionally, farmers have not improved varieties for consumer preferences. One reason is labor and capital are shortage during the growing season.
- 2) Technology application: Large number of farmers do not really understand the effective way of using chemicals – i.e. fertilizers, pesticides, insecticides, and other chemicals. Apart from this chemical application, harvesting technique, packaging, and distribution have been operated inefficiently, that

results high cost of production. Thus, they cannot meet the existing market demand.

- 3) Disease and insects: These two enemies harm the production and quality of mango overtime. Regarding mango disease, Anthracnose, a serious one which can abuse a process of fruit bearing and its quality, is caused by *Colletotrichum gloeosporioides* Perz (Vijttranont, 1998). It is the major pre- and post-harvest disease of mangoes in all mango-producing areas of the world and is associated with high rainfall and humidity (Fitzell and Peak, 1984; Jeffries, 1990; Dodd, 1992, Cited by Vijttranont, 1998). It affects young leaves and flower panicles (blossom blight), and forms quiescent infections on fruit which develop further upon ripening during the post harvest period (Muirhead and Grattidge, 1986; Dodd et al., 1989, Cited by Vijttranont, 1998). The initial symptoms on young leaves of mango trees are small dark brown spots, and curled leaves in some cases.





In addition to Anthracnose, Powdery mildew is another harmful disease. It is caused by *Oidium mangiferae Benth* (Vijttanont, 1998), which appear in most mango producing areas. It can cause up to 80-90 % losses of the crop (Schoeman, 1995, Cited by Vijttanont, 1998). The fungus can also influence young leaves and fruit. Besides Anthracnose and Powdery mildew there are Black mildew, and Sooty Moulds caused by *Capnodium sp.*, *Meliola sp.*; Algal disease caused by *Cephaleuros virescens Kunze*; Pink disease caused by *Corticium salmonicolor Berk et. Br.*; and Blossom Blight caused by *Colletotrichum sp.*, *Fusarium sp.*, *Cladosporium sp.*, *Alternaria sp.*, *Pestalotiopsis sp.* Moreover, Mango scab, Stem end rot, Dieback, Aspergillus rot, Pestalotia rot, Leaf blight, Bacteria leaf spot, and Gummosis are dangerous diseases that agriculturists are currently dealing with.

Apart from mango diseases, insects are another important enemy. For example Mango leaf hopper, Fruit flies, Mango weevils, Mango seed weevil, Mango leaf twister, Mango leaf cutter, Stem-boring grubs, *Hypomeces squamosus* F., Mango seed borer, Mango shoot borer, Mango leaf-eating, Caterpillaro, Mango leaf gall maker, Mango seals and mealy bugs, Mango mites, Termites, Red ant and thorps.

3.2.5.2 Current Marketing Problems (OAE, 1998)

Marketing problems for mangoes were identified in terms of price, quality, farmers groups management, marketing management, and logistics management.

- 1) Price: Farmers face an uncertain price, depending on the quality, varieties, time and market supply.
- 2) Quality: Thai mango quality is lower than the market standard set by consumer preferences, who prefer reddish skinned mangoes with thick peel
- 3) Farmers Groups: Farmers do not form groups to empower price negotiations and quality management
- 4) Marketing management: Farmers do not know how to manage the market; for this reason, they rely on middlemen who have an advantage over the farmers.
- 5) Logistics management: Efficient packaging and distribution system is still poor. Products are easily damaged and rot during transportation.

3.3 Summary

India, Kenya, The Philippines, South Africa, Mexico, Israel, Trinidad, and Thailand are leading mango-exporting countries. Popular varieties in the world market include Alphonso, Apple, Borido, Carabao, etc. Not only are those major varieties, Thai varieties such as Ok Rong, Nam Doc Mai, Nangklangwan are counted in leading varieties of the world exporting mangoes. From past to present, Thai mango production has increased gradually while farm gate prices (inflation rate included) were fluctuated and relatively low. Though Thai mangoes have been exported since 1989, the volume of trade was less than 1%. Disease, insects, quality, marketing management and logistics management are the notable production and marketing problems for Thai mangoes.