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**Export Conditions of Myanmar Mango:
Hindrances and Opportunities in the Supply Chain**

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**EXPORT CONDITIONS OF MYANMAR MANGO:
HINDRANCES AND OPPORTUNITIES IN THE SUPPLY CHAIN**

**BY
KAUNG MYAT**

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This thesis represents the original work of the author, except where otherwise stated.
It has not been submitted previously for a degree at this or any other university.

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DEDICATION

This thesis is dedicated to my beloved mother, **Daw Khin Po** and late beloved father, **U Ba Than Sein** who showed me that education is the most important gift that parents can provide to their children and motivated me to participate in rural communities development activities.

ABSTRACT

Mango (*Mangifera indica* Linn) plays a central role as fruit crop among the horticultural fruits in Myanmar. This research is the first-of-its-kind in the area of mango supply chain and exporting in Myanmar. It mainly focuses on hindrances and opportunities of mango exporting faced by growers, marketers and exporters. In this research, two different regions, Mandalay Division and Southern Shan State, were selected as study areas in Myanmar. An exploratory research approach was applied to investigate hindrances and opportunities in mango supply chain. By using purposive and snowball sampling procedure, thirty-two respondents were recruited, including 12 growers, 8 marketers, 6 exporters and 6 experts from Yangon Division, Mandalay Division and Shan State. In-depth interviews combined with participatory observations in the field were conducted along the mango supply chain from February to May 2012. Data processing was performed by a content summarizing approach of the interview transcripts and the creation of conceptual map. Most growers have the strong intention for export. They could not produce more quality fruits due to the lack of cold storage facilities, systematic packing facilities, cool chain facilities and the absence of Good Agricultural Practices (GAP) standards. Inadequate infrastructure and investment, mango fruit fly, seed and pulp weevil infection are main determinants for insufficient quality in the fruits production tier. The marketers said, however, that higher quality produce could not always get higher price due to oversupply conditions. Establishing one collecting point in Muse border trade and applying auction system can help stabilizing price and controlling oversupply. Exporters want the improvement of current transportation facilities. They need the technology for oversea shipment to reduce transportation cost. To improve mango fruit quality, government supporting relevant technologies and establishing processing factories are still needed. Information flow among stakeholders is very important from the expert's point of view. Collaboration between the stakeholders, implementation of GAP standards, exhibition and promotion activities are crucial. Government should support loan scheme to the growers, integrated pest management (IPM) and post-harvest practices trainings, supporting agri-business knowledge and sharing knowledge on the quarantine system to meet the requirement of the export target countries. Myanmar mango exporting can be improved by changing trade policies and plant quarantine policies and inviting foreign direct investment. Inclusion of consumers in the future studies is highly recommended in order to span boundaries of knowledge provided by this research study which includes growers, marketers, and exporters.

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LIST OF ABBREVIATIONS

AFTA	Association of Southeast Asian Nations Free Trade Area
ASEAN	Association of Southeast Asian Nations
ASEAN-6	Brunei, Indonesia, Malaysia, Philippines, Singapore and Thailand
ASEANGAP	ASEAN Good Agricultural Practices
CLMV	Cambodia, Laos PDR, Myanmar and Viet Nam
DAR	Department of Agricultural Research
DBT	Department of Border Trade under Ministry of Commerce
DOA	Department of Agriculture
FAO	Food and Agriculture Organization of the United Nations
FAOSTAT	The FAO Statistical Database
GAP	Good Agricultural Practices
GATT	General Agreement on Tariff and Trade
GDP	Gross Domestic Product
GLOBALGAP	Global Good Agricultural Practices
HACCP	Hazard Analysis Critical Control Points
HWT	Hot Water Treatment
ISO	International Organization for Standardization
MFVP M	Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (Mandalay)
MFVP SSS	Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (Southern Shan State)
MFVP	Myanmar Fruit, Flower and Vegetable Producers and Exporters Association
MMG M	Myanmar Mango Group (Mandalay)
MMG SSS	Myanmar Mango Group (Southern Shan State)
MOAI	Ministry of Agriculture and Irrigation
MRL	Maximum Pesticide Residual Levels
NTBs	Non-trade Barriers
SPS	Sanitary and Phytosanitary
TBT	Technical Barriers to Trade
UMFCCI	Union of Myanmar Federation of Chambers of Commerce and Industry
VHT	Vapour Heat Treatment
WTO	World Trade Organization
YAU	Yezin Agricultural University

1. INTRODUCTION

1.1 General background

Myanmar is a tropical country located between latitudes 9° 28' and 28° 29' and longitudes 92° 10' and 101° 10'. The country's total area is 676,577 square kilometers or 67,659 million hectares of which about 12.1 million hectares (17.9 %) was cultivated in 2009 (Aquastat, 2010 and MOAI, 2011). The total population of the country was estimated as 59.13 million in 2010 (MOAI, 2011). The majority of the population depends directly or indirectly on income streams generated by the agriculture sector which plays a key role in economic development. According to MOAI (2011), the agriculture sector contributes 32% of GDP, and 17.5% of total export earnings in 2009-10. It remains the leading sector with its job absorption ability with an employment of 61.2% of the country's total labor force (MOAI, 2011).

The country covers a wide range of agro-climatic zones including delta region, coastal region, hilly region and central dry zones. Due to the advantages of varying agroecological zones, it provides various choices of crops for growers (Bo, 2003). Among the cultivated crops, the ranking of horticultural crops is the fifth in Myanmar agriculture sector (Tun, 2004). In general, except from rice, the staple food of the nation, horticultural crops provide essential nutrition for inhabitants in the country. The area devoted to horticultural crops is estimated at 17%, in which culinary crops are of 1% and fruit, vegetables and other horticultural crops are 16% (MOAI, 2011).

Among the horticultural fruits, mango (*Mangifera indica* Linn., Family Anacardiaceae) plays a central role as fruit crop in Myanmar. The total mango production area was 70,084 hectares in 2010-2011. It occupied 11.85 % of total horticultural area (DOA, 2011). The majority of mango is consumed as fresh dessert fruit in the ripening stage, as salad in the immature stage, i.e. with the endocarps not yet hardened, and as various types of pickles (Naing, 2003). People in temperate regions are also increasingly fond of mangoes, due to its attractive flavor, taste, aroma, texture and nutritional value.

Chomchalow and Songkhla (2008) mentioned that mango is native to Indo-Myanmar region and has been cultivated for more than 4000 years. Nowadays, mango is cultivated throughout the tropical and subtropical world for commercial fruit production, as a garden tree, and as a shade tree for livestock. In 2009, India, Mexico, Thailand,

Brazil, and Pakistan produced the largest amount of fresh mango for export among the mango growing countries. In fact, Asia was the main exporter with 46.27% of global mango production in 2009 (FAOSTAT, 2012).

Within Asia, India, Pakistan, Thailand, the Philippines and Indonesia have large growing area of mango (PHDEB, 2005). Among the ASEAN (Association of South East Asia Nation) countries, Thailand, Philippines, Malaysia, Indonesia, Viet Nam, Myanmar and Singapore exported fresh mangoes, but Brunei Darussalam, Cambodia and Lao PDR are limited to producing for domestic consumption. According to FAOSTAT (2012), ASEAN countries exported 173,897 metric tons of mangoes in 2009. Thailand took the major share of fresh mango export with 82.85%, followed by Philippines as 12.35%, Malaysia as 3.72% and Indonesia with 0.81%. Viet Nam could export 0.15% (265 metric tons) and Myanmar and Singapore have less than 0.1% of ASEAN countries' total export.

FAOSTAT provides data about total production and percentage export of total production among ASEAN countries during 2009. Thailand had the largest percent of ASEAN export market share, although it exports only 5.83% of its total production. Philippines ranked second in share of exported mangoes, and exports 2.78% of its total production. Therefore, Thailand and Philippines have the highest potential to increase export quantity due to the low percentage export of total production. Although Malaysia had only 3.72 % of ASEAN market share, it exports 26% of its total production. However, it may have imported from neighbor countries to redistribute and export to the Middle East region (Evans and Mendoza, 2009).

Among the seven mango producing countries in ASEAN, FAO estimates that Myanmar ranked the sixth. According to DOA (2011) and DBT (2012), total mango production amount and percentage export of total production was calculated for the years 2007-2010. The share of exported mangoes from Myanmar increased from 3.37% in 2007, to 5.00% in 2008, 9.90% in 2009 and reached 6.8% in 2010. Myanmar may well have the potential to further increase the quantity of mangoes exported (DBT, 2012).

Myanmar mangoes are mainly exported to China through Muse border trade. Myanmar exporters have few other places to sell their produce when the mango supply exceeds the quantity for local consumption. Myanmar marketers received buying prices by Chinese marketers depending on the fruit quality, but some Chinese marketers are willing to pay a higher price if the quality is high. Generally, the marketers try to select the mangoes traded in Muse border trade to include only the superior quality. Still, as a

consequence of unstable prices, economic return to the growers is fairly low. There may be a range of possible reasons why the marketers in Myanmar do not achieve higher and more stable prices, including the cultivated and exportable mango cultivars, the current production system (pre- and post-harvest factors), marketing system and export of fresh mango.

1.2 Statement of problem

In Myanmar, mangoes are a popular fruit tree among fruit growers and can grow well in various climate conditions. In 2010-2011, the total planted area for mango was 79,908 hectares and the area of fruit harvest was 70,084 hectares with total production of 503,676 metric tons (DOA, 2011). Main mango producing areas are observed in the southern region (Ayeyarwaddy, Bago and Yangon Divisions), in the central region (Mandalay and Sagaing Divisions) and in the east region (Southern Shan State). Exportable quality cultivars are mainly produced in the central and east region, and the remaining planting areas produce mango for local consumption (Soe, 2006) and mentioned in Figure (3.1) (Win, 2008).

There are about 300 varieties and 20 kinds of mango species in Myanmar. Among them, there are only a few cultivars such as ‘Sein Ta Lone’, ‘Yin Kwe’, ‘Shew Hin Thar’, and ‘Mya Kyauk’ are exportable quality including high sweetness level (Naing, 2003; Soe, 2006). Other cultivars, namely ‘Aung Din’, ‘Khaung Kyoe’, ‘Ma Chit Su’, ‘Pan Swal’, ‘Sein Myet Kone’, ‘Byoke’, etc., are produced as fresh fruit and value added products for local consumption (Win, 2008). Fresh mangoes are mainly exported to China by border trade and to Singapore by overseas trade (Wai, 2004; Win, 2008).

Generally, the growers are not excessively concerned about fruit marketing in Myanmar. The marketers, in most cases, go to a growers’ farm and pick up the produce at a pre-determined price. In Myanmar, mango growers find two possible ways to sell their mango. On one hand some growers sell mango standing on the tree stage to local marketers who are responsible for picking, packing, and reselling. On the other hand growers harvest their produce and sell it at local and border markets (Wai, 2004). There are problems associated with the harvesting mango for domestic consumption. They include picking immature fruits, unsystematic grading, and using inappropriate containers such as bamboo baskets. However, export quality produce is usually appropriately packaged in paper or wooden crates (Soe, 2006).

Win (2008) described that highly perishable fruits like mango must be handled with the greatest care during and after harvesting. Pre-harvest (production practices) and post-harvest factors affect the share of mangoes that will be exportable. During the seasons of bumper crops, the grower is confronted with surpluses of produce and low price. The price of mango mainly depends on the season, supply and quality of the fruit (Soe, 2006). The main constraints for mango export include lack of technical knowledge on proper orchard management, lack of information about exportable quality of mango, transportation facilities, and handling systems including packaging after harvest and post-harvest storage (Wai, 2004; Soe, 2006).

Moreover, Oo (2007) pointed out that an efficient agricultural production and marketing system is an important means for raising the income levels of farmers and for promoting the economic development of the country. Win (2008) also described that the relationship among farmers, primary collectors, town wholesalers, suppliers of city markets and retailers play an important role in the marketing of mangoes. The main potential export markets for Myanmar mangoes are China and Singapore, and possibly Malaysia. The market is very competitive because of the large scale producers such as Thailand, India, Pakistan and the Philippines. Therefore, mango growers in Myanmar face tremendous challenges in marketing and exporting their mangoes.

There are some studies with a focus on mango post-harvesting in Myanmar (e.g. Naing, 2003; Soe, 2006). However, few of these studies emphasize mango marketing and export. It is imperative for participants in the mango supply chain to know about marketing and exporting mango. Providing knowledge and education about marketing mango can contribute to improvements in quantity and quality of export mango. This in turn will increase the income of mango growers in Myanmar and improve their socio-economic status. Therefore, the aim of this research is to conduct a study on mango marketing and export conditions to systematically investigate the problems associated with the market requirements. This will allow generating a set of feasible hypotheses of strategies, policy measures and interventions with the aim to improve the marketing and export conditions.

1.3 Research questions

In reference to the problems associated with the marketing and export of mango in Myanmar, the three research questions are as follows:

- (i) Why does Myanmar experience low price of mango export compared with other countries in ASEAN region?
- (ii) Which factors influence export conditions of Myanmar mango and the ability of Myanmar mango marketers to explore new markets?
- (iii) What are feasible strategies for Myanmar mango growers and sellers to enhance their competitiveness in export market?

1.4 Objectives of the study

The overall objective of the research is to assess the current production, marketing and exportation of fresh mango along with the supply chain management. The specific objectives of the study are:

- (1) To identify potential and constraints of mango production and supply chain management in Myanmar,
- (2) To analyze factors influencing Myanmar mango export conditions and
- (3) To generate recommendations to improve marketing activities in the future

1.5 Materials and methods

For this research, two different regions – the Mandalay Division and Southern Shan State – were selected as study areas, based on the major production area for exportable mango cultivars and a high potential for mango production development in Myanmar.

An exploratory research design was applied to investigate hindrances and opportunities in mango supply chain. This research focused mainly on each tier along the supply chain. By using purposive and snowball sampling procedure, thirty-two respondents selected as 12 growers (6 – disconnected with mango export and 6 – connected with mango export), 8 marketers, 6 exporters from the selected mango growing areas and 6 expertises from Horticultural Research Centre, university lecturer from Department of Horticulture, government service personnel from Department of Agriculture, members of Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (MFVP). Face to face in-depth interview with semi-structured questionnaires was used for this research during 26th February – 11th May 2012. Field work and observation were conducted to understand the general situation of the study areas. A content summarizing approach of the interview transcripts was applied to data processing which produces a conceptual map.

1.6 Organization of the Study

This study is organized in seven chapters. This first Chapter presents the background of the study, defining problem, research questions and objectives. It is followed by Chapter two, which provides an overview of mango production worldwide as well as in Myanmar and neighboring countries based on the relevant literature. In Chapter three, the research methods are described. Chapter four presents the research findings and respondents' view and perspectives throughout the mango supply chain. In Chapter five, the research findings are discussed in light of other publications and various points of view are explored. Chapter six offers conclusions, recommendations and discusses limitations of the research, as well as suggestions for further research.

2. LITERATURE REVIEW

2.1 World mango production and trade

Worldwide mango production occurs in over 100 countries. Although only a relatively small proportion (3.25%) of total mango production enters international trade. In 2009, the mango volume traded has been increasing substantially since the late 1990s (FAOSTAT, 2012). Evans and Mendoza (2009) said that this may be affected by several factors for instance the increased mango production, year-round availability, longer shelf life for perishables, changes in food consumption preferences, consumers' interest in healthier foods, lower price for local consumption, low trade, and more horticultural trade barriers.

Asia accounts for approximately 76.49 % of global mango production, and the Americas and Africa account for approximately 12.62 % and 10.77%, respectively in 2010 (FAOSTAT, 2012). In 2010, world production of mango reached 38.67 million metric tons, increase from 35.62 million metric tons recorded in the previous year. Between 2000 and 2010, production grew at an average annual rate of 4.78%. Table 2.1 shows the world's major mango producing countries, which account for about 84.78% of the world's production.

India was the largest producer among the mango producing countries, accounting for 42.25% of global production in 2010 with a yield of 16.34 million metric tons, followed by China and Thailand at 4.35 million metric tons (11.25%) and 2.55 million metric tons (6.60%), respectively. Other leading mango producing countries and their respective share of world production in 2010 include Pakistan (4.61%), Mexico (4.22%), Indonesia (3.40%), Brazil (3.07%), Bangladesh (2.71%), the Philippines (2.14%), Nigeria (2.04 %), Egypt (1.31%) and Peru (1.18%), respectively (FAOSTAT, 2012).

While currently only 3.52% of the world production of mango is traded globally (Evans and Mendoza, 2009), the noticeable export quantities were increasing since the late 1990s. Evans and Mendoza (2009) mentioned that Mexico, Brazil, Peru, Ecuador and Haiti were the main supplier of North America's imports. The export market share of the West Asian was predominated by India and Pakistan. Thailand, Indonesia and the Philippines were the main suppliers and owned more export share from Southeast Asian

countries. South America and Asia countries were the main sources of European Union (EU) buyers.

In 2009, the world total mango export quantity reached 12.56 million metric tons that was slight increase of 0.37% compared to the previous year, and were valued at 9.97 million US\$ (FAOSTAT, 2012). The top ten major mango-exporting countries were shown in Table 2.2. According to steadily increasing of mango harvested area, India takes the largest fresh mango export market share from 2008. However, up to 2007 Mexico was the number one exporter of the fresh mango export market. India and Mexico are the dominators of global fresh mango export market since 2003. In 2009, India accounted for a share of 22.84 % of total world export followed by Mexico (18.53%), Thailand (11.47%), Brazil (8.79%) and Pakistan (5.86%). Other major exporters include the Netherlands (major re-exporter), Peru, Ecuador, the Philippines, and Guatemala (Evans and Mendoza, 2009 and FAOSTAT, 2012).

Table 2.3 shows the world's top mango exporting countries' total production and percentage export of total production from 2005-2009. Although India occupied the largest percentage of world export market share, the country could export only 2.12% of total production. During the 2005-2009 periods, India increased the percentage export of total production. It is very clear that India has high export potential in the future. In 2009, Mexico exported fresh mango up to 15.41% of the total production. Interestingly, fresh mango exporting of Peru reached 41.43% of the country total production in 2009. Similarly, Ecuador and Guatemala have increased export quantity yearly even though they are not included in the lists of major mango producers in Table 2.1 (FAOSTAT, 2012).

According to FAO statistics 2009, the quantity of imported mango increased from 5.65 million metric tons in 1999 to 8.61 million metric tons in 2009. The USA is the number one importer of mango. During the 2007–2009 periods, the USA imported 1.87 million metric tons, or approximately 33% of the total world mango imports (Table 2.4). The Netherlands become the second importing country and traded 1.14 million metric tons (13.24%) of the total mango imports even though most of the imported mango was redistributed throughout the EU (Evans and Mendoza, 2009). Besides, United Arab Emirates (5.69%), Saudi Arabia (4.53%) and Malaysia (4.76%) are prominent importing countries, and also the major redistributors targeted to the Middle East. However, China seems to be a major importer of Asian market by occupying

2.56% of total market in 2009 although the imported fresh mango quantities have been declining since 2004. In 2002, the imported mango quantity to China was 3.7 million metric tons and subsequently decreased to 2.2 million metric tons in 2009. Evans and Mendoza (2009) assumed that this could be due to the increasing domestic production in response to the increasing domestic demand driven by rising per capita income. Other prominent importers are the UK (5.57%), Germany (4.76%), France (3.25%) and Belgium (2.09 %).

Table 2.1 World's major mango producers, 2000–2010 (Production quantity in 1000 metric tons)

Countries	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
India	10,504	10,057	10,020	12,733	11,490	11,830	12,538	13,501	13,649	13,557	16,337
China	3,211	3,273	3,513	3,571	3,842	4,250	4,091	3,715	3,977	4,140	4,352
Thailand	1,623	1,654	1,776	1,955	1,975	1,803	2,094	2,303	2,374	2,470	2,551
Pakistan	938	990	1,037	1,035	1,056	1,674	1,754	1,719	1,754	1,728	1,784
Mexico	1,559	1,577	1,523	1,362	1,573	1,679	2,046	1,911	1,855	1,509	1,633
Indonesia	876	923	1,403	1,526	1,438	1,413	1,622	1,819	2,105	2,243	1,314
Brazil	538	782	850	925	950	1,002	1,217	1,272	1,155	1,198	1,189
Bangladesh	187	188	187	243	243	622	640	767	803	828	1,048
Philippines	848	882	956	1,006	987	1,003	919	1,024	884	771	826
Nigeria	730	741	789	839	898	731	732	734	750	831	790
Egypt	299	325	287	319	375	380	597	532	466	534	506
Peru	125	145	180	198	278	235	320	294	323	167	454
Others	3,414	3,609	3,934	4,058	4,373	4,521	4,662	4,739	4,882	5,172	5,412
World Total	24,878	25,179	26,483	29,831	29,532	31,205	33,297	34,401	35,466	35,624	38,666

Source: FAOSTAT (2012)

Table 2.2 World's ten major mango-exporting countries, 1999–2009 (Export quantity in 1000 metric tons)

Countries	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
India	38	39	46	42	179	156	223	232	236	275	287
Mexico	204	207	195	195	216	213	195	257	241	226	233
Thailand	11	9	11	9	8	33	10	12	61	62	144
Brazil	54	67	94	104	138	111	114	115	116	134	110
Netherlands	37	35	43	33	58	51	69	70	81	95	82
Pakistan	38	49	53	48	60	82	49	106	62	69	74
Peru	20	21	27	35	40	60	58	83	83	83	69
Ecuador	16	26	34	30	38	40	40	49	41	35	48
Philippines	35	40	39	36	38	36	32	27	29	22	22
Guatemala	10	13	8	6	6	6	14	12	21	20	21
Others	106	117	106	128	147	126	139	166	193	176	167
World Total	567	622	654	665	928	913	942	1,128	1,163	1,196	1,256

Source: FAOSTAT (2012)

Table 2.3 World's top mango exporting countries' total production and percentage export of total production, 2005 –2009

Countries	2005		2006		2007		2008		2009	
	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production
India	11,830	1.88%	12,538	2.05%	13,501	1.78%	13,649	2.01%	13,557	2.12%
Mexico	1,679	11.62%	2,046	11.36%	1,911	12.35%	1,855	12.19%	1,509	15.41%
Thailand	1,803	0.08%	2,094	0.54%	2,303	2.65%	2,374	2.59%	2,470	5.83%
Brazil	1,002	11.36%	1,217	9.42%	1,272	9.14%	1,155	11.60%	1,198	9.21%
Pakistan	1,674	2.92%	1,754	6.02%	1,719	3.61%	1,754	3.95%	1,728	4.26%
Peru	235	24.48%	320	25.79%	294	28.02%	323	25.62%	167	41.43%
Ecuador	117	34.30%	155	31.38%	157	26.36%	160	21.63%	182	26.22%
Philippines	1,003	3.23%	919	2.98%	1,024	2.83%	884	2.47%	771	2.78%
Guatemala	92	15.35%	105	11.25%	108	18.91%	108	18.77%	109	18.92%

Note: *MT – metric tons

Source: FAOSTAT (2012)

Table 2.4 World's ten major mango importing countries, 1999–2009 (Import quantity in 1000 metric tons)

Countries	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
United State of America	219	235	238	263	278	276	261	293	295	298	287
Netherlands	63	62	70	72	91	76	98	112	112	128	114
United Arab Emirates	48	39	31	52	62	58	32	50	66	56	49
United Kingdom	23	22	27	24	32	37	47	55	57	56	48
Germany	24	23	25	28	32	33	37	35	47	52	41
France	31	26	26	27	32	35	35	35	39	32	28
Saudi Arabia	9	28	37	35	40	42	51	48	46	99	39
Malaysia	25	20	27	31	26	45	19	23	23	21	41
China	33	32	34	37	36	28	19	24	23	19	22
Belgium	11	16	10	10	11	11	12	25	24	21	18
Others	79	117	113	104	164	161	144	151	166	176	175
World Total	565	622	637	683	804	800	755	851	898	957	861

Source: FAOSTAT (2012)

2.2 Mango productivity and export of ASEAN and neighboring countries

Mango production season begins from mid-February in the southern part of Myanmar through April to June in the central part of Myanmar and ends in July-September in Southern Shan State at high altitude (DOA, 2002 and Soe, 2006). Mango harvested seasons in ASEAN and some neighbor countries are compared in Table (2.5). Within the ASEAN region, most countries harvest mainly April-June. Myanmar could not compete with Thailand and the Philippines for exporting due to the similar harvesting period. Myanmar has a chance to export China market up to July. Another chance is to export to Malaysia, Indonesia and Singapore in the late harvesting period (August and September) but it will have to compete with Thailand in the regional market.

Productivity of fresh mango in ASEAN and some neighbor countries from 2000 to 2010 are shown in Table (2.6). In 2010, Thailand produced mango with highest production rate (2.55 million MT) from March to November, followed by Indonesia (1.31 million MT), Philippines (0.83 million MT) and Viet Nam (0.57 million MT). Philippines mango production starts from April to August and Indonesia produces mango at different seasons among the ASEAN countries from November to January. Viet Nam produced mango from mid of March to July (Table 2.7). Mango production in Myanmar was 0.54 million MT in 2010 and the production was less than that of Thailand, Philippines, Indonesia and Viet Nam. It was higher than that of Cambodia, Malaysia and Laos. However, India produced triple amount of ASEAN countries' production, China production was near to ASEAN's and Bangladesh produced one-fifth of ASEAN production (Table 2.6).

Among ASEAN countries, in 2009, Malaysia was the main importer as it imported 57.17% of total ASEAN imports, followed by Singapore (30.19%) and Laos (9.08%), respectively (Table 2.7). Trading between the regional countries depends on the harvesting periods. However, Singapore did not produce mango in the country and Malaysia re-exported as a distributor to Singapore, Hong Kong, Japan and countries in the Middle East (Huey, 2000) because Malaysia exported 26.36% of the country's production in 2009 (Table 2.8). Thailand exported 5.83% of total production and the Philippines had 2.09% of the country's total production. These two countries are likely to increase export quantity in future because they currently export only a few amount of

total production. Besides, Myanmar exported 5.0% (2008) and 9.9% (2009) of total production. It has increased amount of exports compared within the regional countries.

However, Table 2.9 shows that Myanmar fresh mango received the lowest average price per metric ton among the ASEAN exporting countries. Viet Nam and Singapore got the highest average price for produce among the region, followed by Philippines, Indonesia, Thailand and Malaysia. This meant that export quantity is not so important and export value is depending on the quality of produce, higher market price and exporting market places.

When comparing with neighbor countries, India traded about 2% of the total production and the export value amount is twice of ASEAN countries' exportable income from mango in 2009. It is sure that India is a world leading exporter as well. Bangladesh had no mango trading since 2005. Its production is only enough for local consumption. China exported the produce about 0.11 % of country production in 2009 and received the higher average price per metric ton (Table 2.9).

Table 2.5 Mango harvested seasons in ASEAN and some neighbor countries

Country	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Thailand			√	√	√	√	√	√	√	√	√	
Indonesia	√										√	√
Philippines			√	√	√	√	√	√				
Viet Nam			√	√	√	√	√					
Myanmar			√	√	√	√	√	√	√			
Cambodia				√	√	√	√					
Malaysia				√	√	√	√					
Lao PDR				√	√	√						
Bangladesh						√	√	√				
India				√	√	√	√					
China							√	√	√	√		

Source: Courtesy Trade & Transport Facilitation Project, UNCTAD in PHBED (2005), and Personal Communication from ASEAN Community

Table 2.6 Productivity of fresh mango in ASEAN and some neighbor countries, 2002–2010 (Production in 1000 metric tons)

Countries	2002	2003	2004	2005	2006	2007	2008	2009	2010	% of ASEAN production in 2010	% of World production in 2010
Thailand	1,776	1,955	1,975	1,803	2,094	2,303	2,374	2,470	2,551	47.63%	6.60%
Indonesia	1,403	1,526	1,438	1,413	1,622	1,819	2,105	2,243	1,314	24.53%	3.40%
Philippines	956	1,006	987	1,003	919	1,024	884	771	826	15.42%	2.14%
Viet Nam	227	264	338	368	370	471	542	554	574	10.72%	1.48%
Myanmar	-	-	-	458	452	448	435	448	504	9.41%	1.30%
Cambodia	46	49	49	49	52	58	59	59	56	1.05%	0.14%
Malaysia	20	20	20	25	26	27	24	25	26	0.48%	0.07%
Lao PDR	4	3	3	3	3	4	4	4	3	0.06%	0.01%
Singapore	-	-	-	-	-	-	-	-	-	-	-
Brunei Darussalam	-	-	-	-	-	-	-	-	-	-	-
ASEAN	4,434	4,828	4,813	7,127	7,544	8,161	8,435	8,583	7,864	100.00%	13.85%
Bangladesh	187	243	243	622	640	767	803	828	1,048	19.57%	2.71%
India	10,020	12,733	11,490	11,830	12,538	13,501	13,649	13,557	16,337	305.10%	42.25%
China	3,513	3,571	3,842	4,250	4,091	3,715	3,977	4,140	4,352	81.26%	11.25%

Source: DOA (2011) and FAOSTAT (2012)

Table 2.7 Import quantities of fresh mango in ASEAN and some neighbor countries, 2001–2009 (Importing in 1000 metric tons)

Countries	2001	2002	2003	2004	2005	2006	2007	2008	2009	% of total ASEAN import in 2009	% of total World import in 2009
Malaysia	27.18	31.03	26.1	44.7	18.88	22.74	23.09	21.2	40.68	57.17%	4.25%
Singapore	16.78	13.66	17.4	18.04	16.21	16.03	19.41	18.42	21.48	30.19%	2.24%
Lao PDR	0.09	0.31	-	0.53	0.03	0.69	2.08	4.85	6.46	9.08%	0.67%
Cambodia	-	-	-	0.15	0.01	-	1.52	1.28	1.27	1.79%	0.13%
Indonesia	0.19	0.25	0.35	0.69	0.87	0.97	1.09	0.97	0.82	1.15%	0.09%
Thailand	-	-	0.01	0.1	0.59	0.26	0.75	0.16	0.26	0.36%	0.03%
Brunei Darussalam	0.69	0.46	0.33	0.51	0.31	0.43	0.71	0.25	0.18	0.25%	0.02%
Philippines	-	-	0.04	-	0.02	0.02	0.02	0.02	0.01	0.01%	0.00%
Myanmar	-	-	-	-	-	-	-	-	-	-	-
Viet Nam	-	-	-	-	-	-	-	-	-	-	-
ASEAN	44.93	45.7	44.21	64.73	36.91	41.13	48.67	47.14	71.14	100.00%	7.43%
Bangladesh	21.3	14.15	42.79	36.76	-	-	-	-	-	-	-
India	0.02	0.06	0.05	0.01	0.1	0.11	0.1	0.17	0.3	0.42%	0.03%
China	-	-	-	-	-	0.03	0.61	0.66	-	-	-

Source: DOA (2011) and FAOSTAT (2012)

Table 2.8 Total production and percentage export of total production in ASEAN and some neighbor countries, 2005 – 2009

Countries	2005		2006		2007		2008		2009	
	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production	Total production (1000 MT)	% export of total production
Thailand	1,803	0.84%	2,094	0.54%	2,303	2.65%	2,374	2.59%	2,470	5.83%
Indonesia	1,413	0.07%	1,622	0.07%	1,819	0.07%	2,105	0.09%	2,243	0.06%
Philippines	1,003	3.23%	919	2.98%	1,024	2.83%	884	2.47%	771	2.78%
Viet Nam	611	0.02%	370	0.03%	471	0.03%	542	0.05%	554	0.05%
Myanmar	458	4.59%	452	5.34%	448	3.73%	435	5.00%	448	9.90%
Cambodia	368	0.00%	52	0.00%	58	0.00%	59	0.00%	59	0.00%
Malaysia	49	8.07%	26	5.98%	27	7.74%	24	22.55%	25	26.36%
Lao PDR	25	0.00%	3	0.00%	4	0.00%	4	0.00%	4	0.00%
Singapore	-	-	-	-	-	-	-	-	-	-
Brunei Darussalam	-	-	-	-	-	-	-	-	-	-
ASEAN	5,122	1.81%	5,538	1.63%	6,152	2.07%	6,426	2.09%	6,574	3.99%
Bangladesh	622	0.00%	640	0.00%	767	0.00%	803	0.00%	828	0.00%
India	11,830	1.88%	12,538	2.05%	13,501	1.78%	13,649	2.01%	13,557	2.12%
China	4,250	0.02%	4,091	0.11%	3,715	0.13%	3,977	0.08%	4,140	0.11%

Source: DOA (2011) and FAOSTAT (2012)

Table 2.9 Export quantity, value and average price of fresh mango in ASEAN and some neighbor countries, 2007–2009

Countries	2007			2008			2009		
	Export quantity (1000 MT)	Export value (1000 US\$)	Average price (US\$/MT)	Export quantity (1000 MT)	Export value (1000 US\$)	Average price (US\$/MT)	Export quantity (1000 MT)	Export value (1000 US\$)	Average price (US\$/MT)
Viet Nam	0.2	462.0	2,310.0	0.30	571.0	1,903.3	0.30	571.0	1,903.3
Singapore	0.2	276.0	1,380.0	0.10	184.0	1,840.0	0.10	181.0	1,810.0
Philippines	29.0	38,770.0	1,336.9	21.90	27,055.0	1,235.4	21.50	24,897.0	1,158.0
Indonesia	1.2	1,004.0	836.7	1.90	1646.0	866.3	1.40	1,161.0	829.3
Thailand	61.0	34,231.0	561.2	61.60	37,375.0	606.7	144.10	71,410.0	495.6
Malaysia	2.1	951.0	452.9	5.30	2,956.0	557.7	6.50	2,907.0	447.2
Myanmar	16.7	6990.0	418.6	21.80	6,620.0	303.7	44.40	11,935.0	268.8
Cambodia	-	-	-	-	-	-	-	-	-
Lao PDR	-	-	-	-	-	-	-	-	-
Brunei Darussalam	-	-	-	-	-	-	-	-	-
ASEAN	110.4	82,684.0	748.9	112.9	76,407.0	676.8	218.3	113,062.0	517.9
Bangladesh	-	-	-	-	-	-	-	-	-
India	240.9	163,622.0	679.2	274.9	224,979.0	818.4	286.8	210,556.0	734.2
China	4.9	9,664.0	1,972.2	3.3	10,223.0	3,097.9	4.5	9,779.0	2,173.1

Source: DOA (2011), DBT (2012) and FAOSTAT (2012)

2.3 Myanmar mango production, marketing and trade

As a kind of native fruit in Myanmar, mango can grow well throughout the country under the various climatic conditions. It plays as the first major fruit crop in Myanmar and shares 11.85 % of the total fruit production of the country followed by cashew nut (DOA, 2011). Main mango producing areas are observed in the southern region (Ayeyarwaddy, Bago and Yangon Divisions), in the central region (Mandalay and Sagaing Divisions) and at high altitudes (Southern Shan State). There are about 300 cultivars and 20 kinds of mango species, only a few cultivars such as ‘Sein Ta Lone’, ‘Shwe Hin Thar’, ‘Yin Kwe’ and ‘Mya Kyauk’ are exporting due to the high sweetness level, good quality and high yield (Naing, 2003; Soe, 2006). Other cultivars are mainly used for local consumption as fresh fruit and value-added products (Win, 2008).

Soe (2006) mentioned that the majority (45%) of mango farms in the country was occupied by large farmers, followed by (25%) of the government estate and (30%) of the backyard farms and small farmers (3 ha and below). The planted area, harvested area, yield and production of mango (from 2005 – 2006 to 2009-2010) are shown in Table 2.10. Gross area planted and harvested steadily increased year by year. Mango production in Myanmar was 447,768 metric tons, 435,103 metric tons and 482,235 metric tons in the years 2007, 2008 and 2009, respectively. However, the average yield remains stable. Mango production yield per hectare is still very low comparing to ASEAN and neighbor countries.

Table 2.10 Planted area, harvested area, yield and production of mango in Myanmar (From 2005 – 2006 to 2009-2010)

Year	Area Planted (ha)	Area Harvested (ha)	Yield (MT)	Production (MT)
2005-2006	70,938	65,063	2.85	458,398
2006-2007	76,011	68,130	2.68	451,796
2007-2008	77,270	70,197	2.59	447,768
2008-2009	78,009	69,087	2.55	435,105
2009-2010	79,228	71,534	2.73	482,235

Source: Win (2008) and Department of Agriculture Report (2011)

Despite the fact that mango can produce throughout the country, mangoes from Mandalay Division are considered to be the best quality because of the region's prevalently hot climate. Wai (2004) stated that, "The fruit yield of mango in hotter regions is about four times that of cold regions. The reduction in yield in the colder regions is associated with the temperatures below 23°C and higher altitudes of over 200 meters above sea level". Nevertheless, fruits from the higher altitudes where has late maturity of mangoes (July, August and September), can achieve a higher price due to the scarce supply of the fruits at the end of the season (Wai, 2004). It is sure for long-term benefits with growing market condition; fruit growers are investing in the mango production and extending more planting areas in the central region and at the higher altitudes, currently.

The variation of mango harvest period occurs in Myanmar due to the different climatic conditions and ecological zones. About mango harvest period, Soe (2006) states that, "Mango fruit could be available starting from February to March in Tanintharyi Division and Mon State, April to May in Ayeyarwaddy, Yangon and Bago Divisions, and April to July in Mandalay, Sagaing and Magway Divisions". After then mango fruit could be obtained starting from June up to September at the high altitudes as Southern Shan State (Soe, 2006).

The seasonality of mango can cause price fluctuations throughout the year. At the beginning of harvesting in March and April, the price is high. The price goes down very sharply and reaches its lowest point in May and June, after which it goes up again to the end of the season in August and September because of scarcity. FAO (2000) mentioned that the market price not only depends mainly on the supply and season, but also on the size and quality of the fruit. However, the popular cultivars like 'Sein Ta Lone' receive incredibly high prices at the beginning and late seasons (FAO, 2000).

The marketing channels for the harvested mango are varying according to harvesting period from south to north of the country. There are many different types of marketing agents such as contract buyers, primary collectors, brokers, township wholesalers and retailers or supermarket buyers operating in the mango supply chain. As the post-harvest technologies are still in its infancy, mango is normally transported in bamboo basket locally and sold by single piece or 10 pieces in the local market (FAO, 2000). Wai (2004) identified that the marketing flow of fresh mango for the local consumption and export market, according to mango harvest period, are as follows:

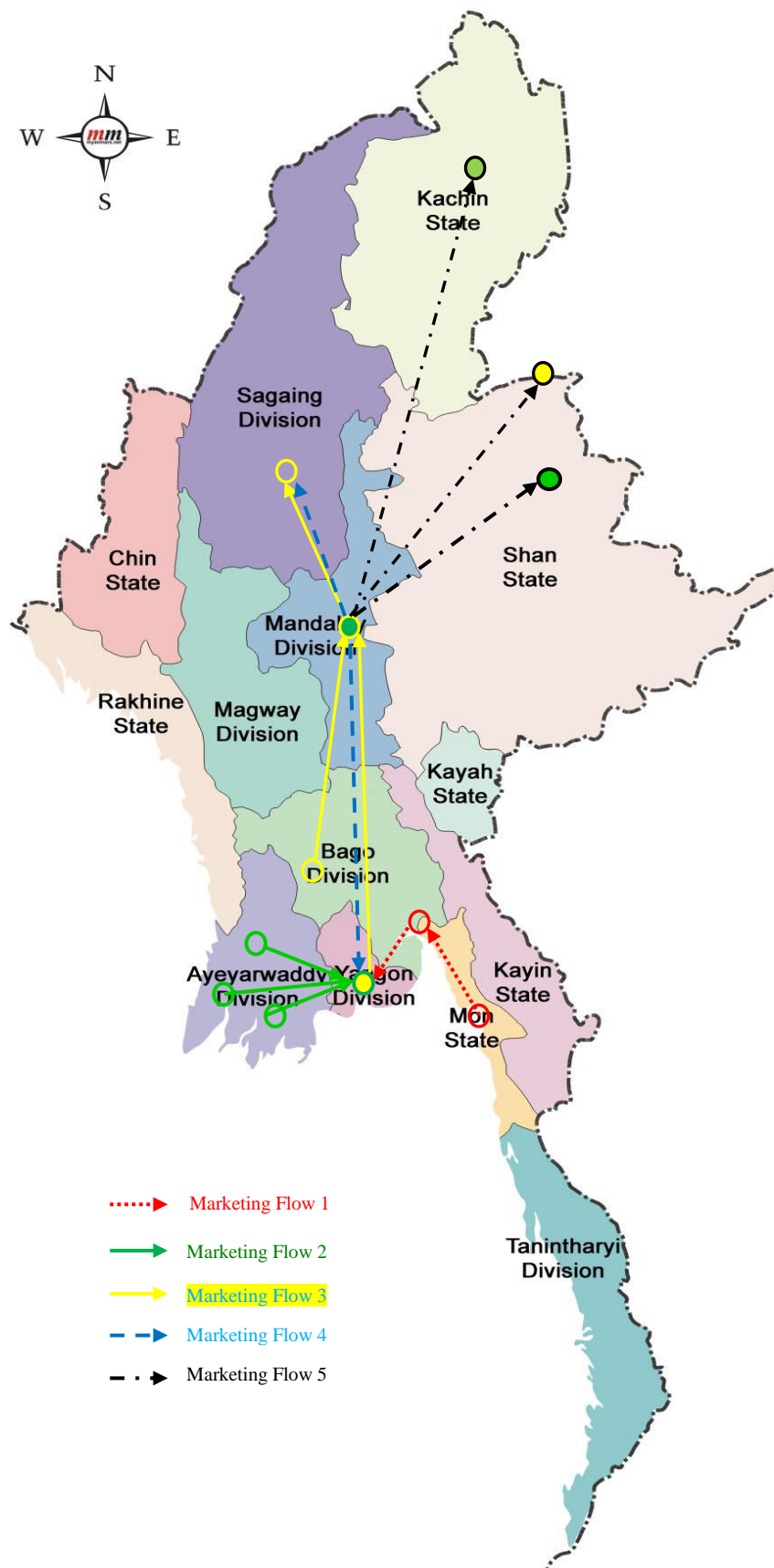


Figure (2.1) Marketing flow of fresh mango for the local consumption and export markets (Source: Wai, 2004)

1. From Mawlamyine, Mon State to Thiri Mingalar wholesale market in Yangon Division;
2. From Ayeyarwaddy Division to Thiri Mingalar wholesale market in Yangon Division;
3. From Yangon and Bago (West) to Sagaing market and Mandalay market;
4. From Mandalay (chief production area of 'Sein Ta Lone' mango) to Monywa and Shwebo markets in Sagaing Division and Thiri Mingalar wholesale market in Yangon Division; and
5. From Mandalay to Kachin State, Northern Shan State and China through Muse border trade.

Fresh mangoes are mainly exported to China through Muse border trade and to Singapore by overseas trade (Win, 2008). For export market, mangoes are wrapped with a sheet of white paper and transported in paper crates (Soe, 2006). The exportable mango quality is mainly produced from Mandalay Division and it was sent to China by truck via Muse border trade and to Singapore via Yangon International Airport. Myanmar mango export was first sent to Malaysia and Singapore with 1.3 ton in 1997-1998 (Wai, 2004). After 1998, fresh mango mainly exported to China through Muse border trade and could not continue for Singapore market (Wai, 2004). The exported volumes, average price and value of fresh mango from Myanmar (2007-2008 to 2011-2012) are shown in Table 2.11. Myanmar fresh mango export steadily increased year by year. China is currently the main importing country for Myanmar mango. Attempting to increase Myanmar mango export, export market was reconnected to be Singapore in 2010 (Lai, Personal Communication, 2012). However, projected export quantity to Singapore is low comparing to China's market due to its requirements for high quality products with international standard price.

Table 2.11 Exported volumes, price and value of fresh mango from Myanmar, from 2007-2008 to 2011-2012

Year	Export volume (1000 MT)	Average price (US\$ / MT)	Export value (million US\$)	Major country
2007-2008	16.704	418.70	6.994	China
2008-2009	21.761	304.21	6.620	China
2009-2010	44.361	269.04	11.935	China
2010-2011	34.276	313.16	10.734	China. Singapore
2011-2012	39.913	337.66	13.477	China, Singapore, Thailand

Source: Department of Border Trade Report (2012)

2.4 Cultural practices of mango production in Myanmar

Myanmar has the favorable weather conditions and the soil types are highly suitable for mango cultivation. Most of the mangoes are grown at home and at farms where they show luxuriant growth and good yields without any fertigation because of good soil fertility and good water availability (Soe, 2006).

Mango trees can survive for several hundred years and can reach a height of 40 m or more (Mukherjee and Litz, 2009). Mango reproduces naturally by seed. In Myanmar, for many centuries, the mango has been largely propagated from seed (Soe, 2006). Seed propagation system does not ensure to yield a true-to-type plant and it was extensively used before knowing methods for mango vegetative propagation (Ram and Litz, 2009). Currently, in old fruit orchards and old fruit trees, seedlings of known and unknown origin are traditionally grown. However, the selected mango cultivars such as 'Sein Ta Lone', 'Shwe Hin Thar' and 'Mya Kyauk', 'Ruby' are highly productive and mostly preferred by most of consumers and by orchard owners and grown throughout the country by vegetative propagation. Splice, cleft and approach grafting methods are commonly used for mango propagation (Soe, 2006). Trees propagated by grafting onto seedling rootstocks usually flower after 3 or 4 years in comparison to the 5–10 years for seedling trees (Ram and Litz, 2009).

Planting systems are square planting, hexagonal, contour methods depending on the land types and topography. DOA (2002) mentioned that growers mainly use square method and common spacing types are 10 x 10 m (100 plts/ha), 7.6 x 7.6 m (173 plts/ha) and 6 x 6 m (278 plts/ha), respectively. Sometimes, hexagonal and contour methods are used depending on the soil type, planting area and sloping land. Pinto and Ramos (1998) agreed that plant spacing and density are influenced by climate, soil type and depth, rootstock and scion vigor, growth habit and the targeted tree size. The dimension of each hole is 1 x 1 x 1 m (width x length x depth). Planting time is mainly doing in the rainy season (from June to July). Owing to the wide spacing, mango can be intercropped for 5–6 years with banana, papaya, pineapple, vegetables and/or other crops (Soe, 2006).

Fertilizer management is based on soil and leaf analysis. Crane et al. (2009) described that the quantity and type of fertilizer application varies from the orchard establishment period (vegetative growth) to the orchard production period. Normally fertilizer application is done at early and late rainy season (June and September) by

broadcasting, banding, side dressing and hole-application. Low application rate of farm yard manure and chemical fertilizers, no systematically application of pesticides and fungicides are leading to get low yield and low quality fruits (DOA, 2002). Irrigation practices are very rare to apply in mango production due to lack of knowledge and facilities.

Generally, growers use light pruning and heavy pruning system throughout the production period. Light pruning is used to establish the initial tree architecture prior to starting mango production (Win, 2008). Crane et al. (2009) described that “Pruning systems include cleaning, skirting of the lower canopy, lateral, central and top-canopy pruning, and pruning to correct poor canopy development and maintain adequate canopy after production commences”. However, few growers who know well about the benefits of pruning system are actively doing after harvesting.

Myanmar mango cultivars flower between mid-December to mid-January in the tropical climate of southern part of Myanmar, whereas flowering is delayed in subtropical area such as upper Myanmar beyond Yangon Division by 15-20 days (DOA, 2002; Soe, 2006). However, flowering time of commercial mango cultivars is the entire month of January. Late flowering occurs during February in southern Shan State, where cool climate prevails due to hilly situation (increase in altitude). Therefore, duration of flowering period occurs from mid-December to mid-February from south to north Myanmar (Soe, 2006).

According to the flowering time, variation of mango production season occurs from March-April in the southern part of Myanmar, April-June in the central part of Myanmar and ends in July-early September in Shan State at high altitude. The latest harvesting cultivar in Myanmar is ‘Yin Kwe’ in hilly region of Southern Shan State (Soe, 2006; Win, 2008). Depending on the production age of trees and cultivars, about 500-1000 fruits per plant can be picked (Win, 2008).

Diseases and pests management are essential to get good quality fruit and high yield in mango production (Htein, 2011). Fruit fly (*Bactocera dorsalis*) is one of the most serious pests and damages the inner tissue of mango fruit. It can be controlled by individual wrapping of fruit by paper bag (Soe, 2006; Htein, 2011). Bagging is wrapping to the individual developing fruit with newspaper or paper, 55-65 days after flowering to produce quality fruits and can prevent or reduce latex burns, fruit fly infestation,

mechanical damage (scratches, abrasions, scars) and fungal spots (Soe, 2006; Johnson and Hofman, 2009). Other serious pests are jassid hoppers, stem borers, mango hairy caterpillars, seed weevils and sucking insects. The most occurring diseases are sooty mold, anthracnose, powdery mildew, and stem end rot and anthracnose (Htein, 2011). Systematic control of pests and diseases are very important to get quality fruits (Win, 2008).

Harvesting is generally done by hand, and ladder or picking pole, hook with basket and/or container held open by a ring are used when the plant is high (Soe, 2006). Crane et al. (2009) stated that “Harvesting is one of the most expensive operations in mango production because fruit do not mature synchronously, and trees require multiple pickings”. However, Myanmar mango growers and marketers harvested mature and immature fruits together without trying to pick next time (Soe, 2006; Win, 2008). Time of harvesting depends upon cultivar, the intended market and market demand.

Practice of precooling is very rare at the farm level. After picking, the fruits are piling under the shading tree because lack of packing house facilities. The harvested and selected mangoes are packed with paper and placed in the wooden or paper crate for Yangon wholesale market and in the hard paper crate and plastic baskets for export through border trade (Wai, 2004). Various types of traditional packages are used in different mango growing countries to provide a means to reduce mechanical injury during transportation.

Soe (2006) mentioned that “During packing there is hardly any grading; while little sorting is usually done and is designed to place the best few fruits at the top of the package”. After then the fruits are sent to Yangon wholesale market, Mandalay market and Muse border trade by trucks. Currently, mango grading is doing mainly on the fruit size and regardless for other qualities such as sweetness, color, shape and smell, etc. According to Soe (2006), the mangoes can be graded into-

1. Special superior quality for export (7-9 cm in diameter)
2. Superior quality (6-7 cm in diameter)
3. Special (5-6 cm in diameter)
4. Big size with good quality (5 cm in diameter)
5. Medium size with marketable quality (less than 5 cm in diameter)

2.5 Barriers to export fresh mango from developing countries

International trade has expanded tremendously over the last decades due to the changing consumer behaviors and tastes, developing in high-value food products, transportation and other supply chain technologies (The World Bank, 2005). Even though a wide range of developing countries have successfully expanded their exports of agricultural and food products, there is growing concern that a serious lack of food safety and agricultural health standards could undermine this progress. The World Bank (2005) stated that “It mainly reflected that the emerging product and process standards amount to a barrier to the trade of developing countries and, in particular, to small producers and agro-enterprises.”

Mango is an important fruit crop exported mainly from Asia, Africa, and Latin America. About 90 percent mango producing countries are from the developing world (Ghafoor, 2010). Good performance of many leading mango exporting countries in international trade is a benefit of adoption of Good Agricultural Practices (GAP), post-harvest management and enhancing market arrivals of mangoes. They adopt the market oriented approach with effective advertisement and promotion to enhance export mangoes in international markets. However, importing countries are demanding of international standards such as the Hazard Analysis Critical Control Points (HACCP), GLOBALGAP and ISO 9001 (UNCTAD, 2004; Ghafoor, 2010). These standards are mainly imposed by developed countries and increasingly established by large food processing and distribution companies. These standards act as new barriers for exportation of developing country, however, some argue that these can be a catalyst for the upgrading and modernization of developing country's food supply systems and for export growth (FAO, 2008).

Agricultural trade has become liberated to a great extent under the General Agreement on Tariff and Trade (GATT) and then under the auspices of World Trade Organization (WTO). Non-tariff barriers (NTBs) became the focal point of trade negotiations among trading partners. WTO member countries have adopted two multilateral agreements to deal with NTBs, namely Agreement on Sanitary and Phytosanitary (SPS) measures and Agreement on Technical Barriers to Trade (TBT) (Rastogi, 2011).

The World Bank (2005) mentioned that “The SPS Agreement permits measures that are “necessary to protect human, animal or plant life and health,” yet requires

regulators to: (1) base measures on a scientific risk assessment; (2) recognize that different measures can achieve equivalent safety outcomes; and (3) allow imports from distinct regions in an exporting country when presented with evidence of the absence or low incidence of pests and diseases.” A country can follow SPS measures to protect human, animal, and plant health and life from imported foods and/or agricultural products (Rastogi, 2011).

WTO Members have been reducing tariffs as part of their commitments in the multilateral trading system as establishing Free Trade Areas. However, NTBs are increasingly emerging as trade barriers of developing country exports. Kumar (2005) described that South Asian and South East Asian countries may find their export markets restricted because of inadequate infrastructure to deal with these standards and technical regulations. The US banned import of Indian mango in 1989 on account of excessive usage of pesticides and fear of invasion of fruit flies and stone weevils. India tried to reduce pesticide levels and offered Hot Water Treatment (HWT) as a viable measure of pest control. In 2006, after prolonged negotiations, the US permitted import of Indian mangoes with nuclear irradiation and routine inspection only (Rastogi, 2011).

Lemeilleur (2011) stated that exports need to respect the Codex Alimentarius and maximum pesticide residual levels (MRL) for both the US and EU markets. However, some the major constraint from the US market is a public norm: a hydrothermal treatment is required to kill fruit flies. For the case of Peru, it still faces a problem in complying with the need for hydrothermal treatment of mango to export to the US relates to a public norm. Opposed to the US, Europe does not require hydrothermal treatments and more relative to private standards: at the plant level, HACCP is essential; at the production level, GLOBALGAP has been becoming a *de facto* standard since 2007, organic certification and ISO 22000 has spread (Bignebat et al., 2011; Lemeilleur, 2011). For Pakistan mango exports, ISO 9001 certificate (UNCTAD, 2004) was only the parameter to evaluate impact of standardization. Ghafoor (2010) said that lack of infrastructural facilities and weak diplomatic efforts and appropriate regulatory systems are affected for less market share of Pakistan in the world exporting market.

India’s mango had been banned by Australia, China and Japan on fear of invasion of fruit flies and stone weevils. Japan demands only the vapour heat treatment (VHT) procedure for export of mangoes and other fruits. Pakistan’s mangoes continue to

face a prohibition by the US. Lately, Australia, Germany and Japan have also banned imports of Pakistan mangoes due to the case of fruit flies (Kumar, 2005).

In African countries, non-tariff barriers are a bigger obstacle to free trade than tariffs within the Regional Economic Communities (RECs). African countries themselves also have high barriers to trade in agricultural products due to the reasons of limiting trade opportunities, increasing costs of food, and causing waste of scarce food resources. By lifting these barriers, it will enable to trade in agricultural products of African countries (Krist and Sewell, 2011).

The World Bank (2005) pointed out that “Agri-food processors and traders in developing countries clearly need to incorporate current and expected SPS and other standards requirements (for multiple markets) into their commercial strategy decisions, including those related to markets and products, the design and adjustment of product procurement systems, and possible investments in processing and marketing facilities.”

Firms should foresee changes in official and private requirements in their major export markets and attempt proactive and preemptive measures to maintain or improve market positioning. Jaffee and Henson (2004) claimed that “there is also concern that many developing countries lack the administrative, technical, and scientific capacities to comply with emerging requirements, presenting potentially insurmountable barriers in the short and medium term.” Therefore, the firms should work together with industry and trade organizations to build awareness, encourage adoption of good practices and codes of practice, and otherwise strengthen food quality and SPS management throughout the private sector (The World Bank, 2005).

Under the implementing of ASEAN Free Trade Agreement 1992 (AFTA), the aims were to achieve zero tariff for all products by 2010 for the ASEAN-6 (Brunei, Indonesia, Philippines, Thailand, Singapore and Malaysia) countries and 2015 for the CLMV (Cambodia, Laos, Myanmar and Viet Nam) countries. ASEAN economic integration process started with liberalization of trade in goods through the reduction and elimination of tariffs within ASEAN free trade area.

2.6 Constraints of mango production and export in Myanmar identified in previous research

The main constraints of mango exportation are transportation facilities, handling systems including packaging after harvest and postharvest storage (Soe, 2006). Growers can probably manage pre-harvest practices to get higher yield. However, advanced post-harvest practices are very rare at the growers and marketers level. Even exporters, who export to Singapore, could not conduct the required post-harvest practices due to the lack of facilities (Soe, 2006 and Win, 2008).

Wai (2004) and Soe (2006) identified the key constraints of Mango production and export from Myanmar as follow:

1. Only a few mango cultivars have the required quality features and are suitable for export.
2. Adequate investment is required to establish new mango orchards with exportable quality.
3. Technical knowledge is lacking on plant protection, cultural practices and post-harvest handling from production, through harvest, to shipping.
4. Transportation facilities and infrastructure are poor for exporting mango fruit such as cargo and cool chain system to border area.
5. Systematic marketing training is needed to avoid excessive losses of fruits.
6. The occurrence of disease (powdery mildew, anthracnose and stem end rot) and pest (fruit fly) problems can affect fruit quality.

Subsequently, Wai (2004) suggested some recommendations to improve mango export from Myanmar as follows:

1. The new orchards should establish with high quality exportable mango cultivars;
2. Off-season mango production practice should apply in suitable areas to get higher price;
3. Adequate control of pest and diseases are in need in order to higher quality and yield;
4. Post-harvest handling practices should be concentrated after harvesting; and
5. Marketing knowledge sharing is necessary to strengthen regional and foreign trade.

3. RESEARCH METHODOLOGY

3.1 Overview of research design

The overall aim of the research was to identify problems within the current production, marketing and export of fresh mangoes. Once identified, it will allow to provide recommendations to increase the export quantity and quality of fresh mangoes. Previously, no detailed market research had been conducted to assess the requirements of the mango supply chain.

To analyse the hindrances and opportunities within the supply chain of mango export in Myanmar, an exploratory research design was used (Myers, 2009). As Hair et al., (2003) described the usage of exploratory research that “Exploratory research design was applied when the research purposed to obtain background information of specific aspects and to clarify problems for hypotheses to be tested in further research” and Joppe (2012) mentioned that “Exploratory research is often used when a problem has not been clearly defined as yet, or its real scope is as yet unclear. This approach can support the researcher to familiarize with the problem or concept to be studied, and perhaps generate hypotheses to be tested”.

In this study, qualitative approach was used to explore the thoughts, reasoning, and experiences of various actors in the marketing chain (Imms and Ereaut, 2002). This approach could provide the reasons behind the current production system, marketing system and exportation of fresh mangoes. However, Wongprawmas (2010) suggested that a follow-up conclusive research based on quantitative data is required to test the hypotheses that came out from exploratory research based on qualitative data.

To investigate the hindrances and opportunities in mango supply chain, background and general context data was collected from secondary data sources, while primary data was collected from the semi-structured qualitative interviews. Field work and observation was conducted to investigate and understand the general situation of the study areas. Data processing was performed by a content summarizing approach of the interview transcripts and the creation of conceptual maps.

3.2 Individual in-depth interview – qualitative data collection techniques

According to Joppe (2012), exploratory research is a form of qualitative approaches. It includes informal approaches by discussing with consumers, employees, management or competitors, and formal approaches through in-depth interviews, focus group discussion, projective methods, case studies or pilot studies. This suggests that there is a variety of methods in qualitative research.

Keegan (2009) described that interviewing people individually, in pairs, or in groups is the common method that can be conducted face to face, by phone, internet, letter, blog or other methods. Actually, interview is a form of conversation to collect the required information during the conversation. The group discussion can collect and explore different ideas of the group members in the short duration (Keegan, 2009).

However, in-depth interview is one-to-one sessions with an interviewee and can gain and note an insight into individual reasons and evaluations. An in-depth interview may last about an hour, but this will vary according to the respondent's experiences and eagerness to answer with interviewer during the conversation (Borden and Abbott, 2011). Sometimes, in-depth interviews are conducted in the respondent's home or work place. Therefore respondents are more comfortable in their own environment and can provide a wealth of information (Keegan, 2009).

The interviewer should have considerable interviewing experience and knowledge about the cultural norms. This allows to achieve a shared exploration between researcher and participant (Keegan, 2009). Aaker et al. (2007) also described that interviewing is a kind of the conversation between the persons who unfamiliar each other, the interviewers should communicate familiarly to collect the required information from the interview. Myers (2009) and Guion et al. (2011) suggested that the interviewer should be flexible and responsive, patient, observant, and a good listener in order to comfort participants to open up and talk what they truly think about this topic.

Face-to-face in-depth interview with semi-structured questionnaires was used for this research. This technique in this case is preferable to the other usual qualitative techniques mainly because it is difficult to gather businessmen and other supply chain operators in a room to organize a focus group discussion. In addition, it is sometimes important for such type of subject to avoid sharing information with their peers or competitors.

The use of personal face-to-face interviews should allow the researcher to get the information about the factors influencing the quantity of Myanmar mango exporting throughout the supply chain.

A structured interview schedule has been considered preferable in this case, because it allows the participants and the researcher to stay focused on the topic, to spare time and to provide guidance to an inexperienced interviewer. In fact, some advantages of the structured interview are that all interviewees are asked the same questions in the same order and eliminate fluctuations in the data that result from differences in when and how questions are asked. This also makes it easier to summarize and analyse the responses from a semi-structured interview (Borden and Abbott, 2011).

During the conversation, the researcher can skip the specific questions if the interviewee has already answered in the preceding questions. Wongprawmas (2010) said that “the advantage of this technique is that the researcher can fix the important issues that are expected to be treated during the interview by interview guideline, without constraining the respondent into a pre-defined sequence of topics that may influence his responses”. In-depth interviews were conducted so that the researcher asked the questions and took field notes; and the interview was audio recorded.

3.3 Selection criteria of the study area

In Myanmar, mangoes can be grown throughout the country. However, Ayeyarwaddy, Bago (East and West), Mandalay, Sagaing, Yangon Divisions and Southern Shan State have more planting areas than other States and Divisions in Table 3.1 and Figure 3.1. For this research, two regions – the Mandalay Division and Southern Shan State – were selected as study areas, based on following criteria:

- It is a major production area for exportable mango cultivars in Myanmar;
- It has a high potential for mango production development;
- It allows to compare the effect of bio-physical conditions based on different ecological zones;
- There are different harvesting periods and marketing approaches; and
- There are different production periods of mangoes and knowledge of growers, marketers and exporters in these two areas

The two selected study areas produced 15% of the mango production of the country in 2010-2011 (DOA, 2011). In-depth interviews were conducted in these two areas with growers, marketers (primary collector, brokers and wholesalers), exporters and experts along the mango supply chain from 26th February to 11th May 2012. The aim was to identify the potential and constraints of export mango production.

Table 3.1: Mango growing area and harvesting area in Myanmar (2010-2011)

No	State / Division	Gross Area Planted (hectare)	Gross Area Harvested (hectare)
1	Ayeyarwaddy	18,041	15,999
2	Bago (East)	10,448	10,445
3	Mandalay	7,552	5,320
4	Yangon	7,458	7,365
5	Sagaing	6,030	6,029
6	Shan (South)	5,742	3,275
7	Bago (West)	5,230	5,069
8	Rakhaine	4,032	3,333
9	Kachin	3,560	2,946
10	Mon	3,212	2,658
11	Magway	2,422	2,393
12	Tanintharyi	2,332	2,051
13	Shan (East)	1,297	989
14	Kayin	1,163	1,030
15	Chin	697	623
16	Shan (North)	573	440
17	Kayah	121	121
	Total	79,908	70,084

Source: Department of Agriculture (DOA) Report (2010-2011)

Table 3.2: Similarities and differences in characteristics of the selected areas

No	Characteristics	Mandalay Division	Southern Shan State
1	Geography	Semi-arid region	High-land region
2	Elevation (Above sea level - m)	130 – 210	900 – 1400
3	Total mango growing area (ha)	7552	5742
4	Soil type	Sandy loam	Clay soil
5	Rainy day	41 – 53	81 – 98
6	Mean annual rainfall (mm)	866	1468
7	Mean maximum (°C)	39	30.65
8	Mean minimum (°C)	14	5.58
9	Major mango varieties	Sein Ta Lone, Yin Kwe, Shwe Hin Thar	Sein Ta Lone, Yin Kwe
10	Harvesting Time	April – July	June – September

Source: Egashira and Than, 2006 and Aung, 2011

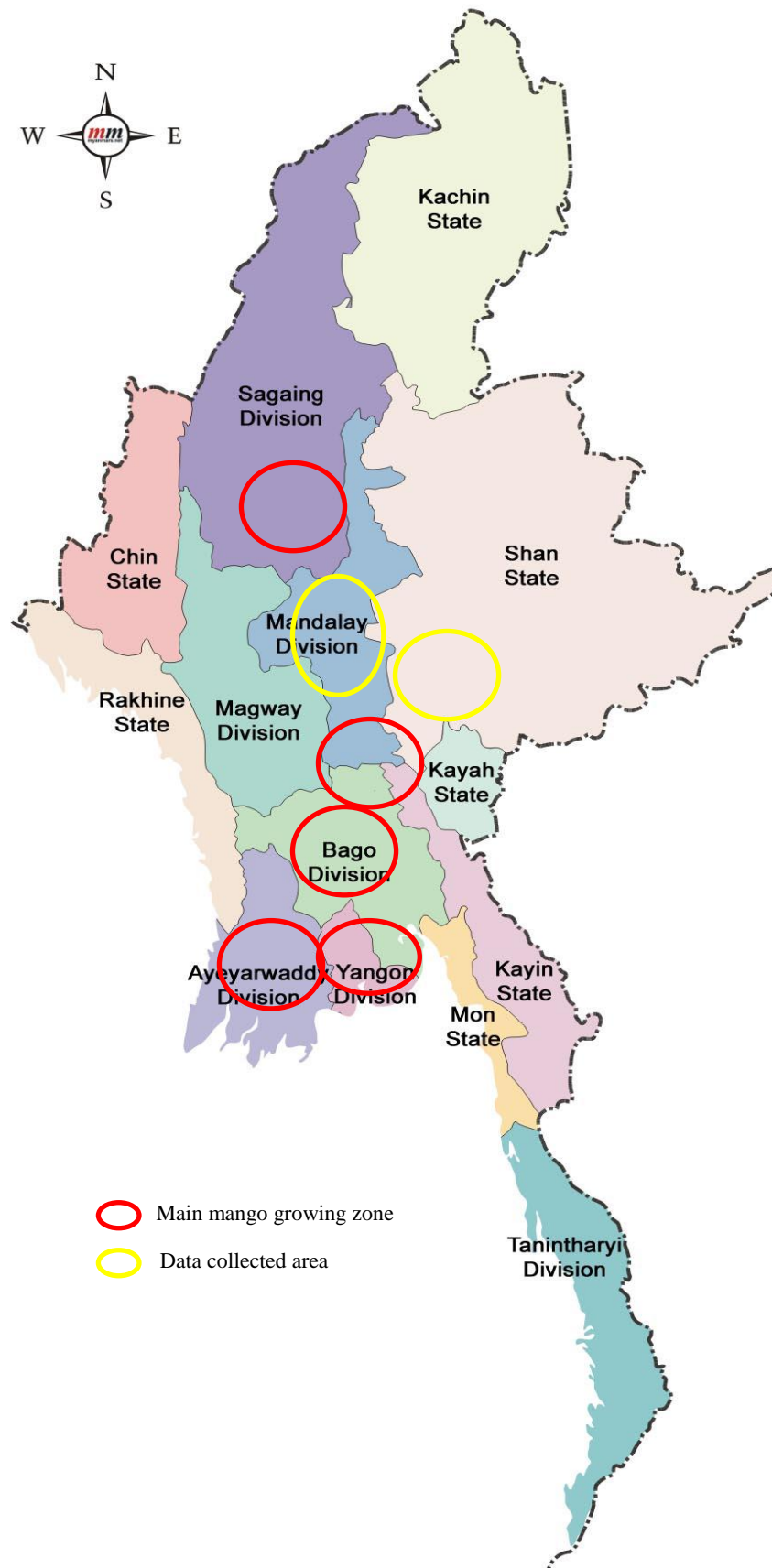
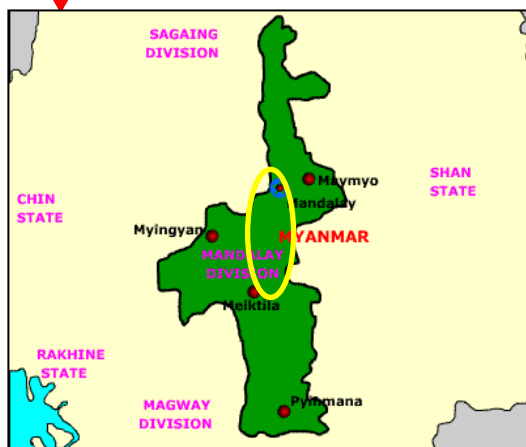
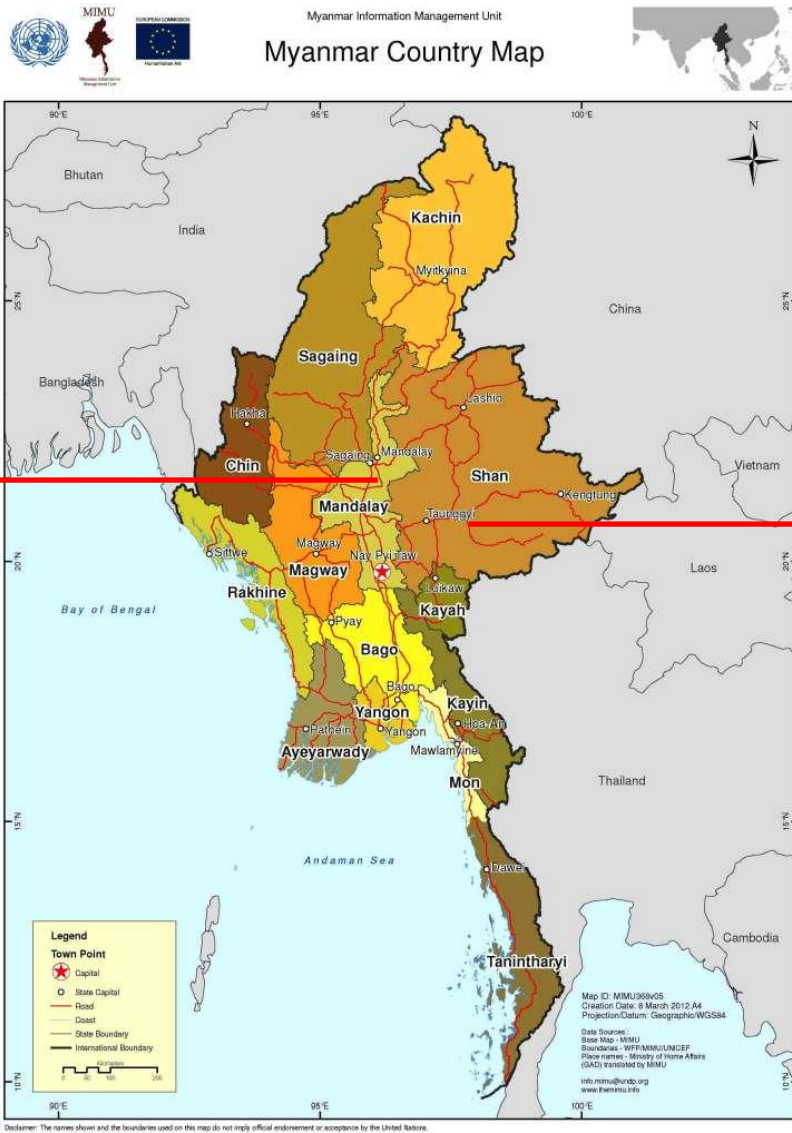


Figure (3.1) Main export mango growing zones in Myanmar (Source: Win, 2008)



Mandalay Division



Shan State

Data Collected area

Figure (3.2) Map of study area

(Sources: <http://www.mapzones.com/> and <http://themimu.info/>, 2012)

3.4 Survey design

The survey was designed to get information about the potentials and constraints of export mango production and suggestions to increase export quantity. The target groups are growers (disconnected with export and connected with export), marketers (primary collectors, brokers and town wholesalers), exporters along the supply chain and the mango field of expertise. Joppe (2012) pointed out that when conducting the exploratory research, the results although helpful for decision-making are not always conclusive. Differently, the results may be generalized and may be thought that these samples are not representative of the whole population being studied.

Therefore key informants, who have experience dealing with mango production and marketing well, were carefully selected. The interview guideline is also designed for structured interview in this step. Survey design comprised two main sections: (1) recruitment of interviewees and (2) interview guideline design.

3.4.1 Recruitment of interviewees

The purposive sampling was seen as the most appropriate method, when the knowledgeable and experienced respondents were required (Trochim, 2006). Because this study needs respondents who are well experienced and knowledgeable in mango, the purposive sampling was applied. First, a list of possible interviewees was prepared by contacting some experience persons in mango trading and cultivation. The main information sources for preparing the list was personal connection via Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (MFVP) under the Union of Myanmar Federation of Chambers of Commerce and Industry (UMFCCI).

Based on the possible initial list of interviewees, more respondents were added into the list by using snowball sampling procedure. According to Hendricks et al. (1992) the snowball sampling provides practical benefits if the study aim is primarily explorative and qualitative. Atkinson and Flint (2001) discussed, "Snowball sampling is used most frequently to conduct qualitative research, primarily through interviews and is especially useful when you are trying to reach populations that are inaccessible or hard to find". Miller et al. (2011) supported that using snowball sampling is more suitable and effective than many other non-random sampling techniques and can provide detailed information and characterizations of unknown population when conducted carefully. It is a type of purposive sampling. Mack et al. (2005) described that in the snowball sampling

method the respondents use their social networks and point the researcher to other people who could potentially participate in the study.

Finally, thirty two key informants were recruited in face-to-face in-depth interviews: 12 growers (6 disconnected with mango export and 6 connected with mango export), 8 marketers, 6 exporters from the selected mango growing areas and 6 experts (from the Horticultural Research Centre, a university lecturer from Department of Horticulture, government service personnel (Department of Agriculture), members of Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (MFVP). The detail of location and activities of the interviewees are shown in Table 3.3.

Table 3.3: Profile of the respondents, location, and their activities in the sample

No	Interviewee	Location	Activity	Date of interview
Growers (Disconnected with mango export)				
1.	A	Yak Sawk Township Southern Shan State	3 years of experience in mango production with 13 acres, attended many trainings in DOA and MFVP, Central executive committee member of MFVP SSS	27.03.2012
2.	B	Yak Sawk Township Southern Shan State	11 years of experience in mango production with 40 acres, attended many trainings in DOA, MFVP and Thailand, Central executive committee member of MFVP SSS	27.03.2012
3.	C	Taunggyi Township Southern Shan State	3 years of experience in mango production with 20 acres, attended many trainings in DOA and MFVP, Central executive committee member of MFVP SSS	04.04.2012
4.	D	NyaungShwe Township Southern Shan State	3 years of experience in mango production with 13.3 acres, attended many trainings in DOA and MFVP, Central executive committee member of MFVP SSS	05.04.2012
5.	E	Madaya Township Mandalay Division	4 years of experience in mango production with 4 acres, GAP trainer, Central executive committee member of MFVP M	07.04.2012
6.	F	Kyaukse Township Mandalay Division	12 years of experiences as a mango marketers, 6 years of experience in mango production with 5.5 acres and a nursery owner of mango tree, has widely connected with growers and marketers	20.05.2012

Table 3.3 (Cont.) : Profile of the respondents, location, and their activities in the sample

No	Interviewee	Location	Activity	Date of interview
Growers (Connected with mango export)				
7.	A	Ywangan Township Southern Shan State	4 years of experiences in mango production with 250 acres as a estate manager, mainly target to export, Chairman in MMG SSS, Central executive committee member of MFVP	22.03.2012
8.	B	ShweNyaung Township Southern Shan State	6 years of experiences in mango production with 10 acres, export to China through Muse border trade and send to Yangon market wholesalers	02.04.2012
9.	C	ShweNyaung Township Southern Shan State	6 years of experiences in mango production with 3 acres, export to China through Muse border trade and send to Yangon market wholesalers	02.04.2012
10.	D	Amarapura Township Mandalay Division	10 years of experiences in mango production with 3 acres, 2 years of export to China through Muse border trade and send to Mandalay market wholesalers	07.04.2012
11.	E	Madaya Township Mandalay Division	10 years of experiences in mango production with 6 acres, mainly export to China through Muse border trade and send to Mandalay market wholesalers	11.04.2012
12.	F	Amarapura Township Mandalay Division	18 years of experiences in mango production with 4 acres, export to China through Muse border trade and send to Yangon and Mandalay local market wholesalers	13.04.2012

Table 3.3 (Cont.) : Profile of the respondents, location, and their activities in the sample

No	Interviewee	Location	Activity	Date of interview
Marketers				
13.	A	Taunggyi Township Southern Shan State	5 years of experience in mango trading mainly to China through Muse border trade, 1 year connected with Singapore market	06.03.2012
14.	B	Yak Sawk Township Southern Shan State	20 years of experience in fruit trading, 9 years in mango, ware house owner, mainly connected with Yangon market wholesalers	26.03.2012
15.	C	Yak Sawk Township Southern Shan State	20 years of experience in fruit trading, 12 years in mango, mainly connected with Yangon market wholesalers	29.03.2012
16.	D	Chanayethazan Township Mandalay Division	30 years of experience in fruit trading, 12 years in mango, ware house owner, mainly connected with local market wholesalers and retailers throughout the country, Chairman of MFVP M	08.04.2012
17.	E	Chanayethazan Township Mandalay Division	35 years of experience in fruit trading, 22 years in mango, Broker house owner, mainly connected with local market wholesalers and retailers throughout the country	08.04.2012
18.	F	Kyaukse Township Mandalay Division	22 years of experience in mango trading, mainly send to China through Muse border trade and connected with Yangon market wholesalers	20.04.2012
19.	G	Chanayethazan Township Mandalay Division	22 years of experience in fruit trading, mainly send to China through Muse border trade and connected with Yangon market wholesalers	25.04.2012
20.	H	Muse Township Northern Shan State	24 years of experience in fruit trading, ware house owner in Muse township, connected with local growers, marketers and Chinese marketers	08.05.2012

Table 3.3 (Cont.) : Profile of the respondents, location, and their activities in the sample

No	Interviewee	Location	Activity	Date of interview
Exporters				
21.	A	Kyimyindaing Township Yangon Division	Owner of Fruit Export and Import Trading Company, experience in mango export to Singapore since 2005, one of the pioneer in Myanmar fruit exporting	10.03.2012
22.	B	Kamayut Township Yangon Division	Owner of Agricultural trading company, 5 years of experience in mango export to Singapore, Vice Chairman of MFVP	10.03.2012
23.	C	Shwe Nyaung Township Southern Shan State	12 years of experience in mango production, export to China through Muse border trade and send to Yangon market wholesalers and super-market, a main organizer for export in their growing area	31.03.2012
24.	D	Taunggyi Township Southern Shan State	6 years of experience in mango production with 100 acres, owner of fruit trading company, 5 years export to China directly contact with wholesalers from Kunming, attended many trainings in DOA and MFVP, Chairman of MFVP SSS	06.04.2012
25.	E	Sintgaing Township Mandalay Division	30 years in mango trading, mainly contacted with Chinese marketers, initiated to change wooden crate to paper crate among marketers	07.04.2012
26.	F	Chanayethazan Township Mandalay Division	15 years of experience in mango production, Owner of fruit trading company, 9 years export to China through Muse border trade, 2 years connected with Singapore market, Chairman of MMG M	07.04.2012

Table 3.3 (Cont.) : Profile of the respondents, location, and their activities in the sample

No	Interviewee	Location	Activity	Date of interview
Experts				
27.	A	MFVP, UMFCCI Yangon Division	Mango grower, marketer, consultant, GAP trainer, attended many trainings in DOA, MFVP and Thailand, Central executive committee member of MFVP	08.03.2012
28.	B	MFVP, UMFCCI Yangon Division	28 years of experience in mango production, Owner of fruit tree nursery, attended many trainings in Thailand, Secretary of MFVP	09.03.2012
29.	C	Yezin Agricultural University (YAU), Zeyathiri Township, Nay Pyi Taw, Mandalay Division	Lecturer of Department of Horticulture, YAU, studied about mango postharvest practices in master and doctoral degrees	12.03.2012
30.	D	Department of Agriculture (DOA), Dekkhinathiri Township, Nay Pyi Taw, Mandalay Division	Deputy Director General in Horticulture section, DOA, well connected with FAO and MFVP (Yangon, Mandalay and Southern Shan State)	10.05.2012
31.	E	Department of Agricultural Research (DAR) , Zeyathiri Township, Nay Pyi Taw, Mandalay Division	Director of Bio-technology, Seed Bank and Plant Protection sections (DAR), former Deputy Director in Horticultural Section, conducted as a National Consultant in FAO	11.05.2012
32.	F	Department of Agricultural Research (DAR) , Zeyathiri Township, Nay Pyi Taw, Mandalay Division	Senior Researcher in DAR, 14 years of experience in mango production and research, studied about mango postharvest practices in master degree and doing doctoral degree in mango postharvest practices also	11.05.2012

3.4.2 Interview guideline design

The findings of the study *“Review and analysis of the competitiveness of Myanmar Mango and Chilli”* by Wai (2004) provided background information on the marketing chain both for the domestic market and constraints of export mango production. These findings, together with the information gathered from exporters, helped to prepare the semi-structured qualitative interviews for the study.

The main purpose of preparing interview guidelines was to collect and gather information that could provide answers to the research objectives. Key points in the guidelines are identified as:

1. Practices the pre- and post-harvest handling
2. The quality of mango
3. The current mango supply chain
4. The key factors that may hinder current mango export quantity and price, and
5. The potential of Myanmar mango export.

During the interview, the interview guidelines were strictly followed in order to ensure that all relevant and necessary information were collected during the interviews. However, Wongprawmas (2010) suggested that it is not necessary to follow the guideline sequentially. The conversation should be flexible, and adapt to the issues raised by the respondent.

In this study, based on Boyce and Neale (2006) and Wongprawmas (2010), the interview guidelines were structured as follows:

- (1) Short introduction and explanation of the projects topic, purpose of the interview, and research methods

(a) what is the project about: Master thesis in agri-food marketing in the framework of the International Master Program in Horticulture, under research title ‘Export conditions of Myanmar mango: hindrances and opportunities in the supply chain’. This thesis is the collaboration between University of Bologna (UNIBO), Bologna and the University of Natural Resources and Applied Life Sciences (BOKU), Vienna.

(b) what is the purpose of the interview: This research focuses on how the constraints of mango production and supply chain management that effect on the export quantity, how is the potential of Myanmar mango export, and to give the recommendations to improve export mango quantity and the marketing activities in future.

(c) what is the research method: Exploratory research approach and a qualitative data collection technique through individual in-depth interviews to practitioners will be applied, using the snowball sampling method. The information collected from the interview will be processed using a content summarizing approach within each tier.

(2) Address terms of confidentiality: Explain that there is no sensitive questions (e.g. on income) and that the informants' names will be anonymous and that the data will be used for the research only.

(3) Explain the format of the interview and its nature: The interview will be structured as a conversation-like dialogue, while following a semi-structured interview outline. Questions are open-ended to enable the respondents to raise topics or issues which were most salient to them. The interview will take 30-60 minutes depending on the respondents' experience and ask the respondents for permission to record the conversation.

(4) Ask the informants: If they have any questions before getting started with the interview.

(5) Outline of interview: For each tier, a different semi-structured interview outline was designed (for details see Appendix I). However the interview guideline covered the following issues:

(a) Short overview on the characteristics of Interviewee's business

- Business type, size and their distribution network
- Business environment, customers and supply chain

(b) Is there intent to export mangoes

(c) Awareness of pre- and post-harvest handling practices

(d) Factors that influence the price of mangoes

(e) Usual conditions for mango trading

(f) Export fruit standardization and price

- (g) Importance of quality mango and ideas to improve mango quality
- (h) Factors hindering current mango export quantity
- (i) Potential of Myanmar mango in future
- (j) Suggestions to improve mango export quantity

With the guidelines specified above, appointments were scheduled with the respondents for face-to-face in-depth interview in advance. The entire interviews were conducted in Myanmar (Burmese) language.

3.5 Field work

During the field work, observation allows me to gather additional information such as general situations of the study areas, environmental conditions, and characteristics of the farms, growers, primary collectors, wholesalers and exporters. This overall situation of mango production and merchandising information was helpful for the researcher in analysing interview scripts from interviewees.

The personal interviews were administered during 26th February – 11th May 2012. In total, 32 key informants participated in face to face interviews (4 interviews were held in Yangon Division, 15 in Mandalay Division, 12 in Southern Shan State and 1 in Northern Shan State). The interviews lasted between 20 and 90 minutes depending on the respondents' knowledge and experience. All interviewees agreed to the interview being tape-recorded. At first, the interviewer used a rapport building techniques to establish a friendly and relaxing atmosphere with the respondents in order to encourage interviewees to enhance their willingness to talk on issues related to the focus of the study. The researcher took notes of important information and observations. The entire interviews were tape recorded.

3.6 Data analysis

The analysis was carried out in 6 steps as follows:

- (1) **Transcription of the interview:** For each question, the most relevant answers were transcribed from the tape recording (in Myanmar language).
- (2) **Validation of the interview:** The core quotes for each question were read to the respondent, to ask for their feedback. If any additional information was added, the researcher noted it and read it back to ask for confirmation by the respondent.

(3) **Write the summary report:** Summary reports of each interview were written based on the validated interview (see summary reports in Appendix II). These reports comprised: characteristic of informants' businesses and the most relevant topics and idea emerged during the interview.

(4) **Coding:** The validated transcription of the interview was coded to allow for comparison between interviews. Non-verbal communication was not considered in this step.

(5) **Content summarizing approach:** The coded transcripts from the validated conversations were analysed under each category through content summarizing approach within each tier. Wongprawmas (2010) suggested, "The researcher should emphasize important categories by highlighting the direct quotes from participants. All key aspects and issues raised by key informants were highlighted in this analysis regardless to number of informants with similar ideas".

(6) **Concept mapping:** Based on the categories of each tier, the conceptual map of 'Factors influencing on Myanmar mango export quantity and price' was created in order to mention the concepts and connections along the supply chain. Davies (2011) described that "Concept mapping allows students to understand the relationships between concepts and hence understand those concepts themselves and the domain to which they belong". Students can manipulate a complex set of relationships in a diagram and can represent to understand easily. Therefore, this conceptual map will be useful to explain the factors hindering the current mango supply chain and export conditions.

(6) **Synthesis:** After many aspects in this topic were discussed and explored, hypotheses were synthesized for further research.

4. RESULTS

This research is aimed at getting relevant qualitative information throughout the mango supply chain which includes production field, wholesale markets, and border trade. The results were raised by conducting semi-structure interviews with growers (disconnected and connected with export), marketers (primary collectors, brokers, and township wholesalers), exporters (mainly to China through Muse border trade and Singapore wholesalers) and experts. Therefore, findings are grouped by each tier of mango supply chain guided by semi-structured interview guidelines and the form of sematic category.

The significant and relevant topics were highlighted through respondents' verbatim quotes according to a content summarizing approach. All different points of view of respondents in each tier represent various possibilities to improve Myanmar mango export in the future and toward research questions. These would allow the researcher to explore the core problem of this research and lead to hypotheses genesis for further research. In general, it is not possible to establish whether an opinion is more important, frequent, and representative of general sentiment than other using a qualitative approach. Therefore all the opinions expressed are to be considered relevant, even though some were expressed by only one respondent.

As explained above, this research was based on the two different mango growing areas. The respondents from Mandalay area have more years of experience in producing, marketing, and exporting mango than those respondents in Southern Shan State. Other differences in the selected two study areas include purposes of mango growing, age of mango trees, mango varieties, mango fruit quality, weather conditions, accessibility to Muse border trade and Yangon wholesaler market, and so on. Therefore, the varying results were anticipated due to differing experiences of the respondents. Based on the field observation and in-depth interviews, mango supply chain of these two areas is presented in figure 4.1 and 4.2.

The results were categorized into four sections: (1) Growers' view on mango marketing and exporting, (2) Marketers' view on mango marketing and exporting, (3) Exporters' view on mango marketing and exporting, and (4) Experts' view on mango marketing and exporting. Each section included the different sub topics based on their participation in the mango supply chain.

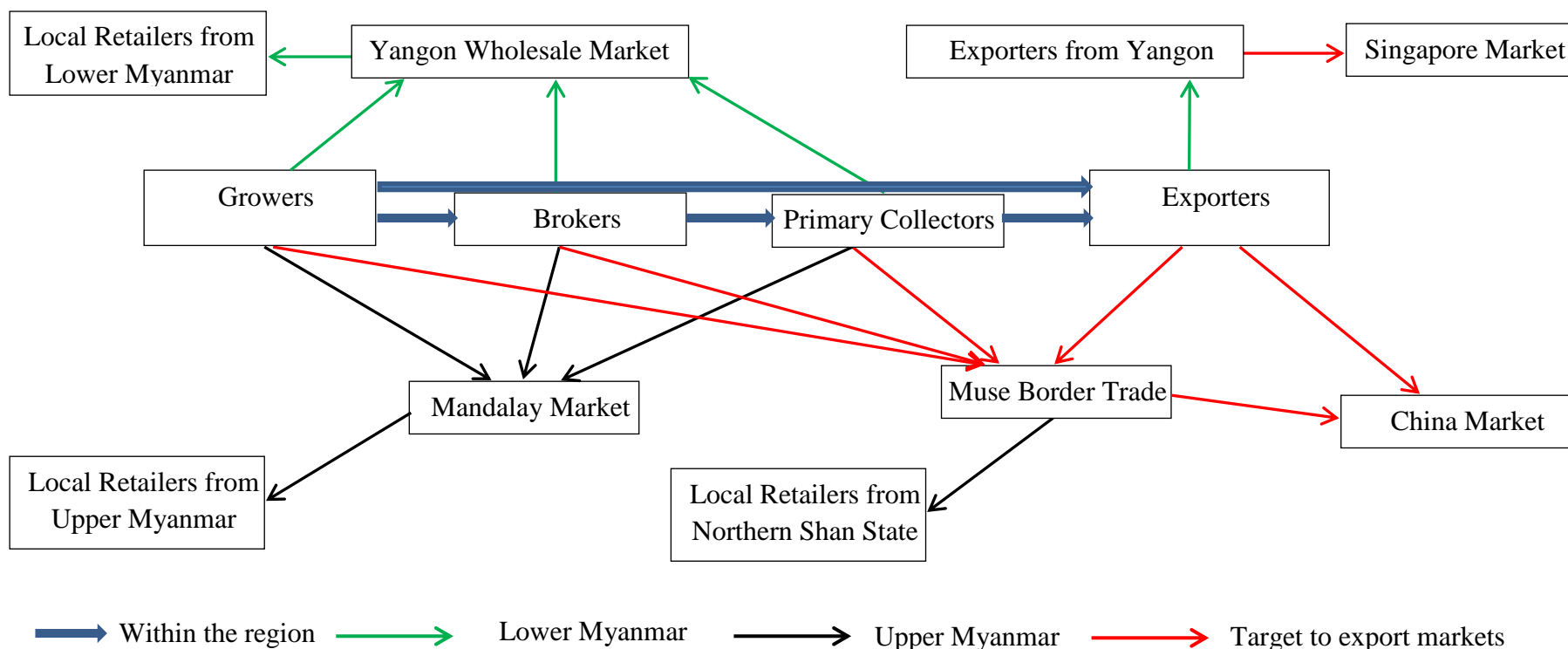


Figure 4.1 Mango supply chain of Southern Shan State mango growing area

In this figure, mango supply chain of Southern Shan state can be seen clearly as (1) connection of stake holders within the region, (2) connection to Yangon wholesale market (distribute in lower Myanmar portion) and exporters from Yangon to send Singapore market, (3) connection to Mandalay market (distribute in upper Myanmar portion) and (4) connecting Muse border trade to distribute in Northern Shan State and to send China market.

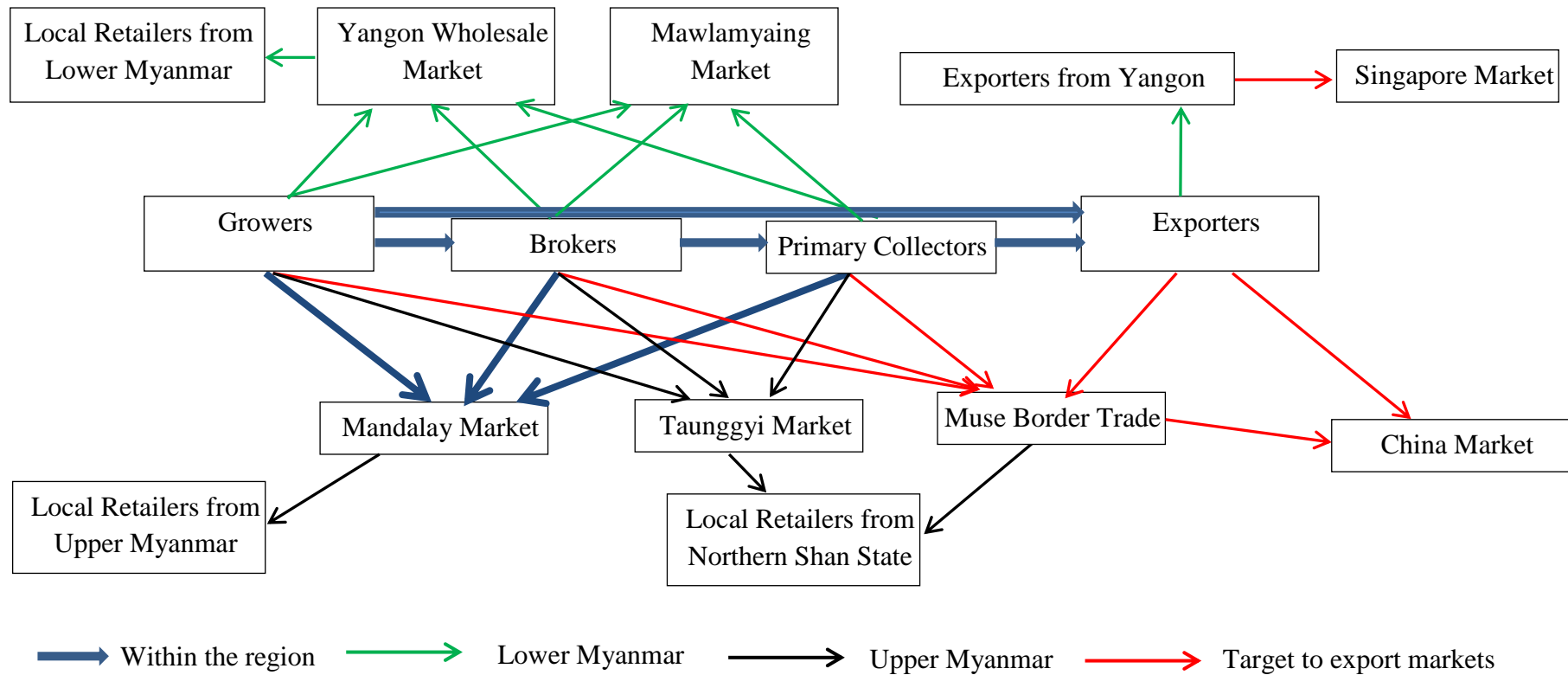


Figure 4.1 Mango supply chain of Mandalay Division mango growing area

In this figure, mango supply chain of Mandalay Division can be seen clearly as (1) connection of stake holders within the region and distribute to upper Myanmar via town wholesalers from Mandalay market, (2) connection to Yangon wholesale market (distribute in lower Myanmar portion), to Mawlamyaing market (distribute in Mon State, Kayin State and Tanintharyi Division) and exporters from Yangon to send Singapore market, (3) connection to Taunggyi market (distribute in Northern Shan State) and connecting Muse border trade to distribute in Northern Shan State and to send China market.

4.1 Growers' view on mango marketing and exporting

In this tier, growers from the two different growing areas can be categorized into two groups: (1) growers disconnecting with export; and (2) growers connecting with export. Respondents' opinions are represented as follows:

4.1.1 Intention for mango exporting

Most of the growers said that they have strong intention for export. However, the differences among growers who connected/disconnected with exporters do exist. Although growers from Southern Shan State have intention to export, they face many difficulties. At the moment, they produce low quality fruits and the production is low. As a result, their products are mainly sent to Yangon wholesale market.

“I have very strong intention to export. Therefore I grow more exportable mango cultivars and more acreage. At the moment, production is very low and I just send to Yangon wholesale market.” (Grower from Southern Shan State)

“The quality of my produce is not so good to reach exportable conditions. If I can control pest and disease problems, fruit quality will be increased and I will be able to export.” (Grower from Southern Shan State)

They think that if they can produce more quantity of higher quality fruits in the coming years, they intend to send products to export markets because they are facing oversupply of production in local market. However, growers need to follow the Good Agricultural Practices (GAP) standards. Without applying GAP standards, they have no chance to export more fruit quantity in the future.

“I have strong intention to export because of the exceeding supply over local consumption; therefore, they must be exported. But we couldn't have a chance due to the causes of unqualified product to export requirement. We must change to get GAP Standard to export and our farmers will have higher price and income. If we couldn't do it, our farmers will face losses always. We need to change the way of mango production and marketing.” (Grower from Southern Shan State)

Similarly, the respondent who is disconnected with exporting from Mandalay Division said that he is willing to export value-added products such as juice, pulp, butter than fresh fruit always. He would like to find out the ways and opportunities to produce value-added products.

“I have intention to export. I am targeting to produce processing products such as juice, pulp, butter and so on. So we can send anywhere and anytime. If we send only the fresh fruit, we will get low price ever.” (Grower from Mandalay Division)

However, one respondent has no intention to undertake mango exporting due to his willingness and preference to sell in local market because he perceived high risk (e.g. fluctuating price) in export markets. Other limitations are the transportation cost and lack of appropriate post-harvest technology.

“Normally, I don’t want to export because I more prefer to sell to local market wholesalers. Sending [produce] to Muse border trade is more risky for the growers like us who have not enough investment for transportation charges and packing materials. After then price in Muse border trade is always fluctuated and it is not sure to give profits. I don’t want to take that kind of risk.” (Grower from Mandalay Division)

On the other hand, the growers who have connected with exporting said that they tried to export their produces by selecting the most exportable quality fruits. But they have to take care well to produce the quality fruits. Currently they are more connected with Chinese marketers through Muse border trade.

“I have sent to Muse border trade for about 4 years. Here the weather conditions are favourable than other areas of Southern Shan State. So, I could produce quality fruits but I have to emphasis on pest and diseases control.” (Grower from Southern Shan State)

“Our products have been mainly sending to Muse border trade during last 3 years and some have been sold directly to DAS Wholesalers Company, Kunming by connecting with our group of companies.” (Grower from Southern Shan State)

The growers from Mandalay Division answered that they have two possible channels to export their produces. One is Singapore market through Yangon and another one is China market through Muse border trade. For local market, they can send to Mandalay wholesalers, Taunggyi wholesalers and Yangon wholesale market.

“I have 2 years of experience to export to China wholesalers through Muse border trade and 1 year experience with exporting to Singapore from the Mandalay Mango Group (MMG).” (Grower from Mandalay Division)

4.1.2 Criteria to choose compatible marketers

Most growers have similar criteria to choose their marketers. Some criteria are confidence in marketers, suitability of marketers, better communication, reasonable price offers and trust in money matter. The growers from Southern Shan State are mainly connected with marketers from Yangon wholesale market while the growers from Mandalay Division have more chances to connect with marketers from Mandalay, Yangon and Muse.

“I have long-term relationship with the wholesalers from Yangon. Before, I chose better communicated one among the wholesalers. Later, I have knowledge to select depending on their characters such as (1) Is he a ware house owner? (2) Could we confidence on money matter? (3) Could I get advance money if I need for production cost? (4) Could he have more demand and better connection with retailers? If I can’t meet these conditions, I have to change other wholesalers.” (Grower from Southern Shan State)

“I always send the best quality fruit mainly to the fixed ware house in Muse border trade. And I send the low quality fruit to the Yangon wholesaler who is relative with ware-house owner from Muse. They are flexible in communication, confident for money matter and can provide the suitable price for my produce. The price can change depending on the mango supply in Yangon wholesale market. But it is not so different in Muse border trade.” (Grower from Mandalay Division)

However, some growers have different criteria to choose. They do not trade with only one marketer but they will choose the suitable one when they send their produce to the market.

“I send mangoes to the Muse border trade where there are thirty-four ware houses. I don’t have the fixed marketers. I learn and choose the fairest marketer who looks carefully between the growers and marketers from China. If he looks for his profit only, I will not contact with him.” (Grower from Southern Shan State)

“At the moment I couldn’t produce more fruit and just selling to retailers who send to Yangon and Tachileik. If the production increases, I will contact with exporters form Taunggyi to export China. I also have a plan to send to supermarkets in Yangon.” (Grower from Southern Shan State)

Some growers choose marketers depending on their preference and suitability with their farms. Some send their products to Taunggyi market or sell fruits since they were on the tree.

“I am selling [mangoes] mainly to Taunggyi wholesalers who I am confidence that they will have no problem about payment and they may get more orders from their retailers. I get higher price in Taunggyi market than in Mandalay market.” (Grower from Mandalay Division)

“I sell my crop standing on the tree stage to a local marketer who is buying our products every year. [In this case,] I can get only 2/3 of the normal income. But I have got the advantages such as low labour charges, free from transport charges, free from over workload on picking, packaging and marketing, I don’t need to worry about marketing stress and can do other kind of works.” (Grower from Mandalay Division)

Nevertheless, some growers have connected with so many marketers from different places. They can, therefore, choose the most suitable one according to their produces quality and abilities of the marketers.

“I sell fruits to Yangon wholesale market, Mandalay ware houses and Muse border trade. Before selling produces, I inquire the most suitable ware house. Then I choose the ware house based on the confidence of money matter, more demand and connection with retailers. The most important [thing] is to get the cash payment immediately. In Muse, I could not know the exact amount of selling price because I don’t understand what they are talking about when the ware house owner and Chinese marketers spoke with Chinese language. We should not depend only on the Muse border trade. This is why I would like to get more chances to export to other countries. If we have more demand, we will get higher price and profit from the production.” (Grower from Southern Shan State)

4.1.3 Pre-harvest handling practices

Pre-harvest handling practices are different depending on the growing regions. Flowering time (period) in Mandalay Division is about two months earlier than in Southern Shan State. And the weather condition is also different during fruit growing season. Therefore, growers from Southern Shan State need to use pesticides and fungicides longer than those growers from Mandalay Division.

“I have to start from pruning. After harvesting the fruits, I start pruning the trees in September. Hormones and foliar fertilizers are applied to induce flowering. Fertilizer application is done in October, late monsoon season. Smudging, fill with dense smoke in order to control is done in January. In Southern Shan State, thrip and mango fruit fly are the major pests and... using pesticides 15 days interval from the end of March until bagging. Fungicide application is depending on the weather condition. Irrigation is done at least two times in April and May. No bagging does for ‘Yin Kwe’ cultivar and only bagging for ‘Sein

Ta Lone' at April to control fruit fly, seed and pulp weevils' problems." (Grower from Southern Shan State)

Actually, the growers from Mandalay Division are favoured for the optimal weather condition than another mango growing areas. They can produce the best quality mango with bright colour and higher sweetness (°Brix) under low maintenance facilities.

"Pruning is done in August. Chemical fertilizers are applied in September. Major pests are aphid and thrip. Pesticides application is done about two times throughout the season. We are bagging fruits around February and March. After then, I sell [fruits] to the marketer when they standing on the tree stage" (Grower from Mandalay Division)

"Pruning is done one month after harvesting. During bud induction stage, pesticide is applied if needed. About December, we must control fungus diseases. No bagging is done for my produces when I have to sell only in local market." (Grower from Mandalay Division)

4.1.4 Post-harvest handling practices

Although most respondents have well knowledge about post-harvest technologies, they do not systemically follow post-harvest practices. Many of them did not pay attention to fruit quality. This may depend on the marketing knowledge and possibilities to access post-harvest facilities. Growers from Mandalay Division have the better chance to get higher quality fruits due to favourable weather condition. However, they have difficulties to harvest because the trees are as high as 10 meters. Therefore, they used bamboo pole for harvesting which did not allow them to pick selectively ripen fruits. Therefore, their harvest included both mature and immature fruits. In Southern Shan State, growers can selectively harvest the fruits which are ripe because the plants are not so high and they have practiced pruning system well.

"Harvesting period of 'Sein Ta Lone' is first week of June to second week of July. For 'Yin Kwe', harvesting period starts from mid of August to first week of September. The first harvesting is done in the right ripening stage. The fruits are cut with cutter by leaving about 2 inches of pedicel together with bag. And then putting on the baskets and moving to the shade house. Open the bag and cut the pedicel with 0.5 inches in fruit and precooling. And then cleaning is done with wet clothes and grading. The individual fruit is wrapping with net sack. The packaged fruits are put in the hard paper carte with two layers. After packaging, it is ready to be sent to the collecting point." (Grower from Southern Shan State)

Actually, most growers do not apply hot water treatment (HWT) to control diseases after harvesting. Although they know the advantages of HWT, they cannot apply this system because of frequent electricity supply shortages.

“In our level, HWT is difficult because it is hard to control the temperature manually. As we know, HWT can control some diseases as anthracnose, but we couldn’t cover the cost. If we get about 0.6-1 US\$ per fruit, we can do it. Now the price is only 0.25-0.3 US\$ per fruit.”
(Grower from Southern Shan State)



Figure (4.2) Conducting in-depth interview with a grower



Figure (4.3) Mango trees in Yak Sawk, Southern Shan State



Figure (4.4) Mango tree in Sintkaing, Mandalay Division



Step (1)



Step (2)



Step (3)



Step (4)



Step (5)



Step (6)

Figure (4.5) Preparation of mango packaging to send to Muse border trade

4.1.5 Criteria on mango grading

Experience plays an important role in grading mango. In both regions, growers did not use weighting scale. Grading criteria vary depending on the particular market practices. In Yangon wholesale market, Mandalay market and Taunggyi market, fruits are normally sold in terms of quantity of fruit. They do not use weighting system. However, in Muse wholesale market and in Muse border trade market, fruits are sold in 15-kg boxes. Growers used to put fruits the box is roughly filled. They never use a scale to measure weight. In general, a box may weigh between 15.5 and 16 kg. Most common grading criteria include fruit size and free from damage, pet and disease.

“When I am sending [mangoes] to Taunggyi market, I sort mango into three grades: More Special (Htoo-shal), Special (Shal) and Large size (Kyii). Prices also vary depend on the size.”
(Grower from Mandalay Division)

“When I send to Muse border trade, I use three grades under the two main types of bagging as bagging and un-bagging. Really, bagged fruits get higher price than unbagged one. Three grades are Special one (above 300 gm), large one (250-300 gm) and small one (less than 250 gm).” (Grower from Mandalay Division)

4.1.6 Importance of mango quality

Most growers from both growing areas said that fruit quality reflects price. There was a strong relation between quality and price in general. Some growers answered that if they can produce good quality fruits, they will get higher price. However, in some cases, the price is determined by market's supply and demand conditions. This grower mainly sends to the Muse border trade.

“I understand that quality means free from damages and pests and diseases problems according to our market condition. Sending good quality fruits are very important. If we can produce good quality fruit, we will get higher market price even get more demand from the market.” (Grower from Southern Shan State)

In contrast, one respondent said that the amount of supply in the market is more important than quality of fruits. Actually, he sends his produce to the local market. So it will be affected by the different markets.

“If there is over supply condition in the market, we can't get good price even for higher quality fruits. Therefore market supply is very important for us. We have to check ever before harvesting our fruit to avoid over supply and lower price.” (Grower from Mandalay Division)

One grower discussed in details about the importance of quality fruit production when he has targeted for exporting. Because the current production system could not produce exportable quality mangoes, hence, they have to change and prepare well to compete with the other mango producing countries in terms of fruit quality and they have to introduce GAP standards.

“Currently production couldn’t produce [mangoes] with exportable quality and nobody imported our fruits. We are not ready to export because we will need to invest more to get prepared for exportation. Still, we have no certification system and we don’t contact with any organizations that can provide certification. For example, our fruits could not export to Japan according to their regulation. Perhaps, we can compile with GAP standard; however, we don’t have cold room facilities, cold chain logistics and availability of flights connection or over sea connection. If we have completed facilities, we can export more quantity of fruits. But our farmers are not enabling for this capacities. Perhaps, we have abilities to do, we must get organizational or institutional supporting.” (Grower from Southern Shan State)



Figure (4.6) A farm implementing GAP standard in Mandalay Division

4.1.7 Importance of market information

All respondents said that marketing information is important for mango production and their income. One grower discussed that marketing information is very important and can affect their income because they can adjust the harvested quantity to avoid losing their income.

“Market information is essential during harvesting period. We have to contact with marketers about price, supply and demand conditions. Because if over supply occur, our produce price will fall down and plenty of fruits in Yangon wholesale market. Therefore, we have to postpone harvesting fruits. In local market, price could not be controlled easily; it depends on supply from the growers and marketers. So, market information is very important for us.” (Grower from Southern Shan State)

“Market information is very important and can give advantages to farmers. We need to prepare higher quality fruits and we must always have phone contact with marketers from Muse border trade during harvesting season. Because mango is a perishable fruit and we can’t store [them] long time because we don’t have cold room facilities.” (Grower from Mandalay Division)

“Market information is 100% important for farm income. We have to compare market price by collecting information from the different sources. If we know that there is a higher price in Mandalay or Yangon than Muse border trade, we will not send to Muse border trade. Therefore, we have to collect market information every day.” (Grower from Southern Shan State)

4.1.8 Ideas to improve mango quality

Improving mango quality was important for future exportation. The interviewees discussed that using post-harvest technology would improve fruit quality. They had ability to apply pre-harvest conditions and control pests and diseases problems. However they could not follow systematically for the post-harvest handling practices. Reliable transportation system and facilities were seen important and determinant in generating income. Current transportation facilities were not reliable yet and better facilities were in need.

According to their experiences, ways to improve mango quality differ from one region to another. The growers from Mandalay area preferred pruning and harvesting practices to

care on pest and disease control. However, in Southern Shan State, the growers had to do carefully in every process to get high quality fruits.

“I am planning to use heavy pruning system because the mango trees are very high and it can reduce number of higher quality fruits due to damage during harvesting. Systematic pruning will give quality fruits. If we couldn’t do it and change our practices, our area will have no possibility to produce exportable quality fruits and we will get the normal price ever.”
(Grower from Mandalay Division)

“As we are different from Mandalay, we have to take care about pests and diseases problem in Southern Shan State. We need to understand well about integrated pest management (IPM). Training about IPM will be needed to give us knowledge as much as possible. Here, flowering period is in December and January with very cold weather condition, fruit setting is very low for ‘Sein Ta Lone’ cultivar. We would like to learn more fruit setting techniques related to our high altitude region. If we can balance these two points, we will get high yield and income too.” (Grower from Southern Shan State)

One grower expressed his idea about the importance of GAP standards to improve mango quality in future. Due to the surplus of local consumption, they would like to sell their products abroad. The other grower said that supporting relevant technologies, supporting loan and opening wholesale market in Mandalay could lead to improvement of fruit quality.

“We are facing surplus of mango in local consumption. It happens every year. So, we would like to get export connection. We get only 0.25-3 US\$ per fruit. If we have over supply in the wholesale markets, we will lose our income and we will have over ripening fruits left. So, we are planning to establish mango juice factories. Currently we send our fresh produces to Chinese marketers through Muse border trade. They don’t ask for GAP standards at this moment. Later, they may ask for GAP standards and good quality fruits that are free from fruit fly, pulp and seed weevils. If we have certain demand and buyers or market guarantee, we can produce fruits that meet exportable quality by GAP standards, but not with organic system which is so expensive.” (Grower from Southern Shan State)

4.1.9 Potential of Myanmar mango exporting

A grower stated that potential mango exporting was effected by a country political, economic and currency exchange rate. He saw that Myanmar had a potential to export mango to several countries if the government could manage to improve economic sanctions which were long imposed by the US and EU. The requires genuine reform

efforts by the country's leaders because the US and EU countries had repeatedly mentioned that the sanctions were to be removed with the positive changes towards establishing democratic political system and cease fires agreement with the ethnic minority groups in Myanmar. Farmers need to change the production system and make necessary preparation for 2015 Asean Free Trade Area (AFTA). Only changing production system would lead to alleviating poverty and increased export because it would ensure quality improvement and opportunities for export.

"We have potential to export in near future because we have more extended growing areas during last three years. But, we must extend mango export market and couldn't depend only on Chinese marketers because they give low and fluctuated price." (Grower from Mandalay Division)

"We have potential to increase exportation. 'Sein Ta Lone' is more attraction than other cultivars. To send standard quality fruits, we should not depend only on traditional ways or techniques. We must learn and apply the advanced techniques for harvesting, packaging and transportation such as packing house system, cold storage facilities, and logistic conditions. In the collecting points [Yangon and Muse border trade], we must construct cold storage packing house. So fruit shelf life will increase and will be under control before exporting. At the moment, we don't have such facilities and we couldn't send the standard export quantity. Now the government is trying to develop in every sector and we expect to get more export demand in future." (Grower from Southern Shan State)

4.2 Marketers' view on mango marketing and exporting

In this second tier, the respondents were selected from both mango growing areas as primary collectors, brokers and township wholesalers. All marketers are well experienced persons in their field of fruit trading. They had willingness to discuss about mango trading, how to improve the exportable quality and how to increase the export quantity in the future. Based on the in-depth interviews, the sub-topics can be categorized as follows:

4.2.1 Intention for mango exporting

Some marketers had connected with export and they saw a need to improve mango trading in the future. One marketer discussed about his opinion for exporting that the growers needed to develop pre- and post-harvest practices in order to produce good quality fruits.

“According to my knowledge, I have very clear vision about our mango market place in China. At the moment, shelf life of mango is not so long, only a week. Therefore, we could send [them] only to the border area of Yunnan Province, China. If we can produce the exportable quality fruits, we have to prepare well and use logistic facilities to send to the mainland of China, where there are more population and higher demand for mango. We have to take the opportunity of market availability by sending our produces. However, our growers need to demonstrate how we could get the higher quality fruit. Therefore, I established one mango farm in Mandalay Division since last 3 years. Hope they can follow well.” (Marketer from Muse, Northern Shan State)

In contrast, some respondents argued that they did not want to export because they had no connection with export and they did not want to take a risk in export markets. They were used to trading in local market and felt more comfortable to continue what they had been doing in the past. However, they were still open to exporting in the future.

“I don’t want to export. I am always busy about fruit trading in Mandalay. I have connected with so many retailers throughout the country. Sending mango to export market is more risky than local market. I would like to work peacefully in local.” (Marketers from Mandalay Division)

“Currently, I don’t have any intention to export. It is easy to trade in local market and I become used to trading in local conditions. I just send the fruits by trucks and I don’t need to go to the market by myself. Price is not so fluctuated and it is not risky. For exporting, I need to invest more. Exporting also require higher quality fruits. Perhaps, I am not going to think about mango export currently. If the conditions favour, I will think about it later.” (Marketer from Southern Shan State)

4.2.2 Usual conditions in mango trading

Generally, there were two types of fruit trading according to the nature of growers. The first type referred to trading by growers who harvested their fruits and sold them in local or export market. The latter one allowed marketers to sell their fruits on the tree state to marketers 3 or 4 months before harvesting.

Many marketers in this survey were mainly involved in trading in the local market, and they were connected with the first type of growers. Others who were connected with foreign marketers were mainly connected with the second type of growers. Trading requirements in the market can vary depending on the ways of trading, customary, payment systems, packaging and using wooden or paper carte.

“I am just a broker and help growers by giving information and supporting packing material. After packing the fruits, growers send [them] to me from the farms. They can’t go to Yangon market. I collect and send [fruits] to wholesalers in Yangon wholesale market. I have to give back their [farmers] money after a week.” (Marketer from Southern Shan State)

“The growers will send their produces to my ware-house. I have connected regularly with the growers from Mandalay Division and Southern Shan State. For money matter, we are using payment system afterwards selling and not using for immediate payment.” (Marketers from Mandalay Division)

“I am an owner of ware-house in Muse. The growers and marketers send their produces from Mandalay Division and Southern Shan State to me. I sell their fruits to Chinese marketers. I just take 5% of income of the growers and marketers but I have to pay them by cash at the time they bring fruits to me. After selling [fruits] within a week, Chinese marketers will give back money to me. Between me and Chinese marketers, it is very rare immediate payment. Therefore, I have to choose the trustiest marketers who I have long-term relationship as well.” (Marketer from Muse, Northern Shan State)

The second type of growers, marketers prepare the farm from pre-harvesting up to mango harvesting time. The growers were entitled to have two-third of income portion. They enjoyed advantages of reducing their work from harvesting to post-harvesting and stressful marketing work. Marketers said that they cannot get quality fruits without preparing pre- and post-harvest practices themselves even though they have no farms. It is a kind of temporary ownership during the production period.

“Mango fruits can be picked up in September in Yak Sawk area. So we will get higher price. I always buy fruits on the tree stage from growers. I send 'Yin Kwe' cultivars to Yangon wholesale market and 'Sein Ta Lone' cultivars to Mandalay market. It is better to send directly to Yangon than Mandalay where we need to do transit.” (Marketer from Southern Shan State)

“I always buy fruits on the tree stage from the growers who would like to sell [fruits] 3-4 months before harvesting. I pay 1/3 of payment in the first instalment and have to pay the rest after selling the fruits. And then I have to prepare the whole farms. Without doing like this, it is so difficult to get quality fruits to send to Muse border trade. The targeted areas produced 'Sein Ta Lone' cultivar from the main growing areas such as Kyaukse, Sintkaing, Myintthar in Mandalay Division and Pinphyet, Yadanarpone area in Southern Shan State.” (Marketers from Mandalay Division)

4.2.3 Requirement for different markets

Many respondents sent their produces to only one market place, either Yangon, Mandalay or Muse border trade. However, one of them who traded fruits in Muse border supplied Yangon marketer who is sending fruits to Singapore market.

Local marketers did not emphasis fruit quality. The price was determined by the fruit size. Sometime the price was determined by both fruit size and quality. When the quality of fruits was higher than normal, higher price were offered. The similar price determination was applied in Muse border trade. When the fruits were large in size, free from damage, pest and disease, higher price was offered. In Singapore market, the price was highly influenced by SPS certificate, high fruit quality, and perfectness.

Although quality is important factor for export market but it is not the sole factor to define the premium price, the marketer such as Chinese marketers are the ones who decide the price both from quality and quantity of supply in the market.

“To get higher price, quality of fruits and market demand are very important. Singapore marketers demand only the quality fruits. So quality can decide the price. However, even if fruit quality is very high, we can’t get higher price in the oversupply condition in the Muse border trade. Chinese marketers are looking for quality but it is not so important. If market supply is very low, they give higher price. When we can’t control market supply from mango growing areas, price is always fluctuating. In Muse border trade, Chinese marketers decide the market price.” (Marketer from Southern Shan State)

4.2.4 Post-harvest handling practices

Marketers were highly aware of post-harvest practices which ensure fruit quality and better price. They realized that less good post-harvest practices led to lower market price. With the awareness, in practice, they are still using the traditional ways such as using bamboo baskets, not doing precooling and directly wrapped with paper, grading the fruits with their experience without scale, etc. They wanted to do post-harvest practices with completed facilities but there were not sufficient investment in packing houses and sorting machines.

“After harvesting, the fruits are complying under the shade and precooling is done. And then cleaning is done with wet clothes and grading the fruits. The fruits wrapped with paper and put into hard paper carte and don’t close immediately to get air circulation. It will close later.” (Marketers from Mandalay Division)

“To harvest the right maturity stage is very important for quality fruit. After harvesting, fruits are put under the shade tree. Fruits are harvested up to noon. And then the harvested fruits are precooling and cleaning. During cleaning, grading is done. The fruits wrap with newspaper and put into the hard paper carte.” (Marketers from Mandalay Division)

4.2.5 Criteria on mango grading

Different markets had different grading criteria. In Muse border trade market, marketers grade mangoes into two sizes, whereas in local markets, there were three or four sizes. In practice, grading was done by experience and eyesight without using weight scale. In local markets, they traded fruits in terms of quantity whereas marketers in Muse border market traded fruits by weight (15 kilograms in a paper crate).

“We mainly use wooden boxes to send Yangon wholesale market. However, some marketers use hard paper carte nowadays. The size of the wooden box is 30cm x 30 cm x 30 cm. Four types of grading are (1) Special: 65-67 fruits per box, (2) Large: 75-78 fruits per box, (3) Medium: 90-92 fruits per box, and (4) Small: 110-120 fruits per box. We still using the quantity of fruits and don't have weighting system. Depending on the size, price will differ averagely 1 US\$ for each size. For example, If special get 12 US\$ per box, Small will get 9 US\$ per box. Quality is also important to get higher price. In Southern Shan State, there are more pest and disease problems and we must control well. Without pesticides application, we can't get good quality and higher price.” (Marketer from Southern Shan State)

“We grade [mangoes] into two sizes as Special and Large under the bagged and unbagged fruit types. Special size: 40 fruits per 15 kg box and Large size: 48-50 fruits per 15 kg box. ‘Sein Ta Lone’ cultivar has average 3 fruits per kilogram and ‘Shwe Hin Thar’ cultivar has average 3-4 fruits per kilogram.” (Marketers from Mandalay Division)

“Currently, grading is categorized into two sizes as special and large. But it will be separated into two groups as bagged and unbagged fruits. Price is fluctuating and variable depending on the demand, supply and quality.” (Marketer from Muse, Northern Shan State)

4.2.6 Importance of mango quality

Many marketers have knowledge about the quality fruits. The importance of mango quality are different between local and export markets. While specific quality (such as colour, size, sweetness, freshness, and free from diseases and pests) was deemed important for exports, quality seems not so important for local market.

“To harvest the right maturity fruits are very important. Size and grading will affect the price. The marketers and retailers expect to get quality fruits which are free from disease, fruit fly, and physical damages.” (Marketer from Southern Shan State)

“Colour and fruit size are equally important for fruit quality. Sweetness, freshness and the right ripening stage are also important.” (Marketers from Mandalay Division)

“It should be the same size, free from damage, free from spot on the skin, together with 0.5 inch of pedicel, the same colour and the same cultivars. If quality is low, price will be differing more.” (Marketers from Mandalay Division)

Some marketers discussed that quality mango was important to market extension and future market demand, especially in the export markets. They would like to explain the importance of quality fruit to the growers and would like to trade only high quality mango fruits.

“Before harvesting, fruit quality is very good on the tree. Due to the lack of knowledge and inadequate of facilities, mango fruit quality is very low and shelf life is very short when it arrives to Muse market. They don’t know that they are destroying their fruits quality themselves. Currently, market is not so expanded and production is increasing year after year. If we didn’t take care about post-harvest practices well, we should be worry for the future market demand.” (Marketer from Muse, Northern Shan State)

“We have to try to get attractive fruits with shining colour. ‘Sein Ta Lone’ cultivar is produced more acreage in Southern Shan State. Their produces could not send to Muse border trade because quality is not so good so that they mainly depend on the local market. MFVP [Myanmar Fruit, Flower and Vegetable Producer and Exporter Association] (Southern Shan State) couldn’t support for suitable market at the moment. We are trying to organize and start for trainings. We expect to get a good connection by trying our association, later. If we can prepare well to get the requirement of Singapore marketers, we have many potential to export.” (Marketer from Southern Shan State)

However, some marketers explained their experience on a quality fruit should possess as CBFWSTP: colour, beauty, freshness, weight, size, taste and packing. They always shared the requirement of market in the growers’ level, why they need to improve the quality and how it will affect their income. They have desire to improve the growers’ conditions.

“To get higher price, fruit must possess the characters of CBFWSTP, which are colour, beauty, freshness, weight, size, taste and packing. If we can produce quality fruits, we can get higher price and increase our income. I am willingness to develop the growers’

economic condition. Our growers have to strive well too. They need to develop their pre- and post-harvest practices carefully.” (Marketers from Mandalay Division)



Figure (4.7) Conducting in-depth interview with a marketer



Figure (4.8) Requirements of export quality fruit (showing at Muse Border trade)



(a)



(b)



(c)



(d)



(e)



(f)

Figure (4.9) Processes from packaging of mango to final selling in Muse border trade

4.2.7 Importance of market information

Some marketers answered that they always shared the marketing information to the growers. Without knowing the market requirements, growers could not produce quality fruits. Without knowing current market price, growers could not get the optimum price. With lack of sufficient market information, they could possibly earn less than they could optimally do when they encountered oversupply conditions in the market.

“I always shared the quality requirement of market and important facts for quality improvement and it will affect our income as well.” (Marketers from Mandalay Division)

“I have always talked about market information with the marketers from Myanmar and China.” (Marketer from Muse, Northern Shan State)

“During I am working, if they come and asking about the information, I explain fully the using system and requirement of market as well.” (Marketers from Mandalay Division)

4.2.8 Factors hindering current mango exports

The marketers discussed about their difficulties in current trading and their opinion on how to improve mango export in the future. The factors hindering current mango export are (1) low quality fruits production, (2) using poor post-harvest practices, (3) high transportation cost, (4) lack of cold room facilities and cold chain logistics, (5) rely on only one market to sell their produce, (6) lack of other export markets, (7) oversupply and low price, and (8) pests of mango fruit fly, seed and pulp weevils.

“Most mango trees are very high in Mandalay Division. It is difficult to harvest. It can't avoid wind storm that normally happened about March and April in Kyaukse, Sintkaing and Myintthar Township. Without doing systematic packing house, quality is defected. And if we used HWT, it is better for shelf life and diseases control. Transportation charges are very high that is 700 US\$ per tons of fruits for 400 km that type of transportation charges can't have other countries.” (Marketer from Muse, Northern Shan State)

“For exporting, we have no facilities for cold room, cold chain logistics. And then we should organize well as co-operative company or government to get exportable quality fruits. At the moment, we can't send more amounts of quality fruits even Muse border trade, so we get lower price. Packing and post-harvest technology is affect for exportation.” (Marketers from Mandalay Division)

Some marketers shared their experience in Muse border trade and they would like to connect with more exporters from other places than China. One of the marketers stated

the problems of Southern Shan State mango production systems as harvesting, packaging, pest and disease problems, and high transportation cost, etc.

“To prepare good quality fruits, it is not so difficult. In Muse border trade, we could not get the premium price even for high quality fruits. Chinese marketers are checking the supply of fruits in Muse border trade. If more supply is available, they will give [us] lower price than before. Sometimes we are so disappointed about them. However, I have another way to sell the produces. If we send to local markets, we can’t get money immediately due to their back payment system and less demand. In Muse border trade, we can sell more quantity at one stop and can get money within one day but we can’t get good price. Simply say, we have to go to only Muse border trade at the moment. We must search out other export market.”
(Marketers from Mandalay Division)

“Mango harvesting period is very short and we can’t control the supply. It is very important to send the required quantity to the market. We still need technology to prolong shelf life and delay production. Harvesting and packaging are not systematically and logistic facilities are not suitable for exporting. In Southern Shan State, weather condition is unfavourable; quality is not good enough to send to Singapore market. Important determinants are fruit fly and seed weevil infection in the fruits. Fruit colour can’t compete with the fruits from Mandalay Division. Transportation system can affect the quality and market price. They need higher mango quality from their produces and still required the technology for mango production.” (Marketer from Southern Shan State)

4.2.9 Ideas to improve mango quality

All marketers would like to improve Myanmar mango quality. They mainly point out advantages of pruning system for commercial production and preparing for prolonging fruits' shelf life. They also mentioned that the growers need to change their mind if they want to do commercial production because most of growers are growing mango trees as a part-time work to get extra income and do not put emphasis on plant management.

“We have to change planting system to be higher density for the new established farms. For the old mango farms, we must do heavy pruning practice mainly in Mandalay Division. The growers don’t like to change this system. They prefer more shady, big and high trees. In commercial production, using systemic pruning practice is very important to get exportable mango quality and higher income. Another point is we have to care the fruits along the supply chain for prolonging their shelf life. Current practices are affecting on shorter shelf life of mango.” (Marketer from Muse, Northern Shan State)

“We should start to prune mango trees in our mango growing area. And then we should do the heavy and light pruning yearly to avoid the damage of wind storm. I am sure, without pruning we can't produce the good quality fruits and we can lose our market demand later. Nowadays, growers are planting mango trees as extra income and they do not take care to get quality fruits. However, they want to get higher price at the harvesting period. We should have [this fact] in mind and change [farmers' state of mind] as it is a commercial production and they should emphasis well in quality improvement. Doing intensive care and using systematically technologies on trees can avoid damages from seasonal wind storm and we will get exportable quality fruits.” (Marketers from Mandalay Division)

4.2.10 Potentials of Myanmar mango export

Marketers discussed that Myanmar has opportunities to increase export mango quantity in the future because production and supply are increasing every year. The improvement of country's political view and the connection within the ASEAN regions and other countries will help to improve the export. Technology improvement was urgently required to produce quality fruits.

“Mango production will increase yearly. If we have more opportunities to choose export countries, it will be most advantages for grower from our area. Only muse border trade channel, we have no expectation because the supply increase ever year and we always receive lower price. If our country's political condition improve and open the sanctions from the US and EU, we will get more opportunities to export our fruits. However, we have to learn and prepare well according to their quality control standard and regulation. It can conclude that Myanmar mango exportation will increase anyway.” (Marketers from Mandalay Division)

One marketer said that Myanmar's popular mango cultivars could compete with other countries' mango cultivars. If the growers could produce these cultivars with GAP standards, they would reap full potentials to export.

“'Sein Ta Lone' cultivar has more potential in exporting due to its appearance, colour, sweetness, size, and smell attraction can compete with other countries' mango cultivars. 'Shwe Hin Thar' and 'Yin Kwe' cultivars have more potential to export. But we must use GAP standard to get the license to entry to the export market. According to my experiences, if we can follow the requirement of Singapore marketers, we have higher potential for mango exporting.” (Marketer from Southern Shan State)

One marketer said that mango production increased yearly. The price of 0.5 US\$ per fruit would place them in a better financial position. If there were specific zones for growing export quality mangoes, Myanmar could significantly increase income from mango trading.

“Mango exporting will increase. However we need to strive for exportable quality fruits. They must do pruning system and they have to learn systemic packaging. Myanmar can be a rich country only from mango trading income if we take care well in each fruit. Currently, so many losses occur. We are so lucky for the most favourable weather conditions to get higher quality mango fruits when compared with Yangon, Bago and Southern Shan State. We have potentials for mango exporting, I can say surely.” (Marketers from Mandalay Division)

“As I said before, I see the clear market demand in my eye and I don’t worry for the market place. We have a very big market in China. If we can produce higher quality fruits, we can extend our mango market to the mainland of China. I am sure that the potential of Myanmar mango export will be increased.” (Marketer from Muse, Northern Shan State)



Figure (4.10) Preparing for ‘Sein Ta Lone’ cultivar for exporting to Singapore market

Source: Marlarmyaing Export and Import Company

4.3 Exporters' view on mango marketing and exporting

In this last tire of respondents, the interviewees were selected based on the snowball sampling method in Yangon Division, Mandalay Division and Shan State. All exporters were currently trading the fresh fruits to Singapore and China markets. They discussed about mango trading, importance of the exportable quality and potential of Myanmar mango exporting in the future. The sub-topics could be categorized, based on the in-depth interviews, are as follows:

4.3.1 Usual conditions in mango trading

Depending on their targeted markets, the exporters prepared well to meet the requirements of the market. One exporter said that the cooperative efforts and higher quality fruits produced by GAP standards practices were very important in getting into a new market. When marketers could reduce transition steps in getting into a market, they could significantly increase their income.

“Firstly, I send mango from my own orchard to Muse border trade. According to [my] experiences, I am feeling that I must organize with other growers to explore new market. So, our five companies organized and sent 30 metric tons of mangoes to Kunming [China] by contacted with DAS Company, last year [2011]. We need to send to Muse border trade to change the truck. That kind of direct exporting can avoid one step of transition from Muse marketers and need to pay 5%. However, we must use GAP standards and post-harvest practices well. Without using GAP standards, we have no expectation to export. I have prioritized on the market because only stable market can give the certain price.” (Exporter from Southern Shan State)

Some exporters collect the fresh fruits from the growers who were already known the requirement of markets. Then they were doing post-harvest handling practices to ensure exportable quality fruits for their already related marketers. In reality, they acted as brokers or middlemen without having their own farms, but collecting the fruits and preparing for final marketing stage.

“I built small packing house and grading and cleaning after collecting the fruits from the growers. Low quality mangoes are separated for making mango pulp. High quality fruits are given hot water treatment (HWT) for standard packing system to send Yangon marketer who connected with Singapore buyers. I am planning to extend China market through Muse border trade. However, Singapore market can get higher and certain price. For China

market, the price can be variable depend on the mango supply.” (Exporter from Mandalay Division)

“I have connected with the growers and supporting packaging materials and required information for quality. I receive either the already packed fruits or only the fruits. For the first case, I just checked and recorded to send Muse border trade. For the latter case, I have to clean, grade and pack well to send Muse border trade or to Yangon marketer who is exporting to Singapore market.” (Exporter from Mandalay Division)

4.3.2 Requirement for different export markets

One of the exporters discussed his opinion on different requirements of Singapore and China markets. This respondent pointed out why more quantity of mangoes could not be sent to Singapore market and what the weaknesses were. Singapore market needed high quality fruits. The market was in higher competition with India, Malaysia and Thailand mangoes. In China market through Muse border trade, high fruit quality was important for price determination, but it was also dependent on supply conditions in the market. The market was observed with unstable price always.

“For Singapore market, it needs higher quality. We can’t send more quantity to Singapore where there is higher competition in market price with India, Malaysia and Thailand mangoes. Myanmar ‘Sein Ta Lone’ cultivar has higher fruit quality and price than other ones. One of the reasons is because transportation and transition cost from farm to Singapore market is higher in double than India. Due to the unqualified logistic facilities and unsystematic post-harvest handlings, fruits shelf life is not so long when compared with R2E2 cultivar [from Australia]. In Muse border trade, I think they are using the wrong system. We do not send fruits according to the order. We are sending and selling what we have. It is buyer market and we will receive only buying price from them. It is very different from Singapore market.” (Exporter from Yangon Division)

Moreover, one exporter who mainly connected with China market said that he did indirect export via Chinese marketers and he received a very low price. As a result, he was willing to find out ways to directly export to foreign markets.

“Buyers at Muse border trade need only bagged fruits. It can be longer shelf life and bright colour of fruit. By doing for bagging in the right time (55-60 days after fruit setting), we might get fruit fly and seed weevil free fruits. We are producing and sending fruits as raw material to the China market through Muse border trade. Currently, we don’t have direct export market and rely only on the Chinese buyers. Actually, they are just the middle men and they give very low price. We need to find the direct market for our produces.” (Exporter from Mandalay Division)

4.3.3 Criteria on mango grading

Grading system can vary depending on the markets. Exporter who only distributed through china market channel from Southern Shan State said that products were graded into two sizes for China market as S-special and L-large under the bagged and unbagged fruit categories. Depending on the oversupply condition, market price varied in China market. Moreover, the fruits, less than large size, were sent to Yangon supermarket.

“To send muse border trade, it [mango] has two sizes, Special - above 400 grams and Large – 350-400 grams. Market price can vary depend on the oversupply condition. Fruit, Less than 350 grams, will be sent to Yangon Supermarket. I prefer to send [mangoes] to Yangon supermarket because price is stable there than at Muse border trade. But we could not send more quantity to Yangon” (Exporter from Southern Shan State)

Similarly, one exporter explained the grading system for Singapore market and difference of market price between the different sizes.

“When I am sending to Singapore market, grading is done as Small- less than 300 grams, Medium – 300-350 grams, Large – 350-400 grams, and Jumbo – above 400 grams. Price will differ 200 US\$ between the sizes.” (Exporter from Mandalay Division)

4.3.4 Importance of mango quality

All exporters said that higher mango quality is essential in exportation. They are mainly compared the quality fruit on colour, taste, sweetness (°Brix), fruit size. According to their experience, they explained difference fruits quality sources in Myanmar as fruits from Mandalay area have better quality than other mango growing areas. However, fruit size of ‘Sein Ta Lone’ cultivar is bigger in Southern Shan State than other areas. One exporter discussed about using GAP standards in producing quality fruits and related of market price.

“Higher quality is important to get higher price. For international market, fruits weight should have at least 0.33 kg, three fruits per kilogram. Sweetness, early ripening and smell are better in the cultivar from Mandalay Division than the cultivar from Southern Shan State. But the size of the fruit from Southern Shan State is bigger. Therefore, price can vary depend on the fruit quality and different production places.” (Exporter from Yangon Division)

‘The produces should meet the requirement of markets. It can vary depending on the export markets. If we can produce higher quality fruits based on the GAP standards, it is sure to get higher price and stable market demand. Here, GAP standards fruits must have four points: good quality, free fungus, free chemical residue, and able to treat back. Firstly, we should emphasis to produce higher quality fruits. After then we should access to export markets. Without producing quality fruits, we should not think about exportation and to get higher price.’ (Exporter from Southern Shan State)

4.3.5 Factors hindering current mango exports

All exporters have the same opinion about the difficulties of mango exporting. The main factors are high transportation cost, lack of cold storage facilities, low amount of exportable quality fruits, and imprecisely follow of post-harvest handling practices, current exchange rate, etc. Mango farms from Mandalay Division did not use pruning system that can negatively affect fruit quality.

“We meet difficulties in logistic from farm to Muse border trade. Currently, about 80% produce from Mandalay Division and 25% from Southern Shan State are sending to Muse border trade but quality fruits are very low. Market competition from other competitors did not see yet in Muse border trade. But we cannot say that in 2015 when there is AFTA [ASEAN free trade area], we can have market competition. Also exchange rate can affect the export quantity.” (Exporter from Southern Shan State)

“The main problem is poor logistic facilities. We cannot get higher quality fruits from Mandalay Division due to the height of plants. They should use pruning system and bagging. It will need institutional and governmental supporting for the post-harvest facilities and training activities. Then low currency exchange rate [high value of Myanmar currency] can affect the export quantity. It is very weak in research and development of mango exportation. The growers’ lack of agri-business knowledge can effect on the quality mango production.” (Exporter from Yangon Division)

Some exporters discussed current market conditions and market share. If they had technology to prolong the shelf life of mangoes, they would like to send via overseas trade. They suggested that the growers should change the harvesting system to get better quality fruits.

“We still don’t have real export market. Consumers do not know taste and quality of ‘Sein Ta Lone’ cultivar. The higher volume of exportable quality cannot produce due to the requirements of cold storage facilities and less of following up post-harvest practices. If we

could not prepare well and produce quality fruits, we can lose current market share. The transportation charges per kilogram of fruits are higher than other countries.” (Exporter from Mandalay Division)

“We could not supply more than two metric tons per day when we only use passenger flight and cost is very high. It is better to send via oversea trade. But we still need the technology to prolong shelf life [of fruits] when we use the low cost flights, so that, we can compete for the market price in Singapore market. The growers harvest the fruits (mature and immature) at the same time. They need to change harvesting practices. It is difficult to grading without using sorting machine. And then we do not have commercial packing house and cold storage facilities.” (Exporter from Yangon Division)

4.3.6 Ideas to improve mango quality and exporting

Some exporters stated that quality requirement of the export markets must be shared in the growers’ level. Collaboration between the stakeholders can control the problem of oversupply. One exporter suggested that applying auction system should conduct in turn of all marketers from Muse border trade and it could prevent the receiving of buying price.

“It is essential to share the quality requirement of the other marketers in the growers’ level. Collaboration has to be organized among the stakeholders in the supply chain. Research and development is very important to improve in the mango exportation.” (Exporter from Yangon Division)

“We should organize and adjust well for the market supply quantity by organizing MFVP. We should open one collecting centre in Muse border trade and accept all supplied mango from the growers and marketers. And then we will use auction system for the produces. Every Chinese marketer must buy from this collecting centre. The marketers from Muse border trade [from 38 ware houses] should conduct in turn. We can control oversupply and to get stable price for our produce in this way.” (Exporter from Mandalay Division)

Similarly, some exporters also suggested that applying a win-win situation within the stakeholders could be successful in producing higher fruit quality and exploring the new markets. Sorting machine and qualify packing house should be built up to get higher quality fruits.

“We need to apply quality control system or using GAP standard. We must change the harvesting system. We should organize well to explore new market. We need to use sorting

machine and qualify packing house. We still need the technology for oversea trade.”
(Exporter from Yangon Division)

“Government needs to support loan system to the growers to improve fruit quality and to build up small scale processing factories. We should apply win-win situation within the supply chain stakeholders. Firstly, we should emphasis on producing higher quality fruits. After then we should access to export markets. Without producing quality fruits, we should not think about exportation and to get higher price.” (Exporter from Southern Shan State)

4.3.7 Potential of Myanmar mango exporting

Myanmar mango has potential to develop in future due to the extended mango growing areas and the increased production year after year. Surplus of mango in the local consumption could lead to increased sales in export markets. There were potentials to expand market share in the Singapore market as well as UAE and Russia markets via Singapore marketers. However, one exporter discussed that the market share may lose soon if the grower could not produce the exportable quality fruits.

“According to the supporting of bagging method by FAO, it is improve in fruit colour and reduce in fruit fly damage. We need to reduce the transportation period from farm to market. If we could export well to Singapore, we can explore other markets to UAE and Russia. For Japan, we must need very good quality fruits and use Vapour heat treatment (VHT).”
(Exporter from Yangon Division)

“If I say as a grower, I expect the best opportunity for exports. Increasing in planting areas and production of mango can happen on the product oversupply for local consumption. The growers will find out the ways to export. If I say as an exporter, the growers produce low quality fruits, we can’t export long-term and we will lose our market share soon.” (Exporter from Southern Shan State)

One exporter suggested that research and development, marketing strategy and logistic in the supply chain were important and effective supply chain management was in need. In addition, producing value-added products were also important.

“Currently, mango growing areas are extending and production will increase yearly. We have potential for mango exporting. But we need to develop in research and development, marketing strategy, good management from harvesting to retail markets. We have to think about value-added products.” (Exporter from Yangon Division)

4.4 Experts' view on mango marketing and exporting

This section attempted to search experts' point of view on Myanmar mango marketing and exporting. The respondents had years of trading, research, and development activities. Respondents' opinions were represented as follows:

4.4.1 Compare Myanmar mangoes qualities with other competitors

The experts said that Myanmar mango qualities by comparing with other countries' cultivars such as 'Nam Doc Mai', 'Irwin' and 'R2E2' cultivars. According to their experience, Myanmar 'Sein Ta Lone' cultivar had higher sweetness level than 'Nam Doc Mai', 'Irwin' and 'R2E2' cultivars. However, it had shorter shelf life than 'R2E2'.

"'Sein Ta Lone' has attractive smell, kidney shape, and bright yellow colour. Sweetness is about 23.5 °Brix, no fibre, higher protein and long shelf life." (Expert from MFVP)

"According to my experience and researches, Myanmar 'Sein Ta Lone' has higher sweetness level (23.8 °Brix) than 'Irwin' (14-15 °Brix) and 'Nam Doc Mai' (10-11°Brix)." (Expert from YAU)

"It may be our Myanmar's preference on our fruits then other ones. Myanmar 'Sein Ta Lone' can compete with 'Nam Doc Mai' cultivar. Sweetness of 'Sein Ta Lone' is higher than 'Nam Doc Mai'. However, 'R2E2' has attractive colour and good keeping quality, longer shelf life, and larger fruit size." (Expert from DAR)

However, 'Nam Doc Mai' cultivar from Thailand was popular for many years. To compete with other countries' cultivars in the international market, promotional activities and suitable marketing strategy should be applied well.

"Fruit quality includes as fruit shape, size, colour, smell, odour and taste. Compared with other countries' mango cultivars, Myanmar mango cultivars such as 'Sein Ta Lone', 'Shwe Hin Thar' have stronger points. In Malaysia, they accept the quality of 'Sein Ta Lone' and called "Solatel" [Rare diamond in Malaysian language]. It has shorter shelf life than 'R2E2' (40 days). 'Sein Ta Lone' cultivar has the highest sweetness level among the other cultivars. 'Shwe Hin Thar' cultivar can compete in sweetness with 'Nam Doc Mai' cultivar [from Thailand]. But 'Nam Doc Mai' cultivar has been popular for more than 20 years ago. Myanmar mango cultivars need to advertise and should use suitable marketing strategy for new market exploring." (Expert from MFVP)

4.4.2 Factors hindering current mango exports

The experts discussed frankly their opinion on the problems of current mango exporting. The main factors are difficulties in transportation, inadequate investment and infrastructure, short harvesting period and oversupply, imprecisely following post-harvest handling practices, lack of cold storage facilities, electricity scarcity to apply hot water treatment, low investment to use vapour heat treatment, etc. One expert said that government should provide the loan system for the small-scale growers.

“Main point is the growers are not following post-harvest practices due to low investment, difficulties in finding required materials, difficulties in infrastructure. Above 95 % of growers could not conduct cold storage. In brief, due to inadequate investment, they can't follow all practices. Currently, using vehicles are not suitable for vegetable transportation and lead to reduce fruit quality and reduce the export quantity. All factors are related to each other. If one factor is missing, we can't get higher quality.” (Expert from MFVP)

“The growers have inadequate infrastructure. Quality packing materials are unavailable in our country. It affects the quality of fruits. The small growers need small loan system from government. No one invest in infrastructure development and cold storage, packing house and cool chain facilities.” (Expert from DOA)

Some experts discussed the concept and desire of the growers in mango production. The growers have no target for commercial production and are not intensive care to get quality fruits. The training of post-harvest practices and using GAP standards should be provided for the growers and marketers as much as possible.

“The result of lower fruit quality is coming from the difficulties in transportation and can't follow post-harvest handling practices. Our weakness is to implement GAP standards Certification. Most growers have no target for commercial production and no intensive care. They should use commercial system as close spacing, pruning and training, systemic irrigation, fertilization, so the good quality fruits will get.” (Expert from DAR)

“The growers from other countries targeted for export market. Myanmar mango growers are just growing for quantity and do not targeted for quality fruits. So they could send [fruits] only to China market who accepts the produces with loosely standard. But they will ask the GAP certification later on. If we want to send [fruit] to international market, it is not possible with the current mango quality.” (Expert from MFVP)

Similarly, some experts stated that the growers should know the quarantine system and requirement of the exported countries. High transportation cost, lack of marketing knowledge in the growers' level, low investment, oversupply condition, and country's trading policies would affect the mango exporting.

“High transportation cost, many steps in supply chain, growers get lower price and no intention to produce good quality fruits and lack of marketing knowledge can affect the exportable mango quality. And then trading policies and government management systems still need to be change.” (Expert from MFVP)

“In conclusion, what are the quality criteria of intended countries, Institutional supporting, logistic facilities, transportation, extension to the grower level are very important to get higher quality. If fruit quality is increased, export quantity will be higher automatically.” (Expert from YAU)

“We could not use vapour heat treatment (VHT) due to very high investment. Without using VHT, we have no possibility to export to Japan. They don't accept normal fungicide treatments. Therefore we can't get higher price even we could export higher quality fruits. Other reasons are transportation and cold storage facilities requirement. Due to the unsure market price in Muse border trade, growers have no intention to produce high quality fruit. In peak season, quality is not so related to get higher price because of oversupply condition.” (Expert from DOA)

4.4.3 Potential of Myanmar mango exporting

All experts have a shared vision on potential of Myanmar mango exporting. With the current extended mango growing areas and the increased production, the growers would find out new market themselves. Surplus of mango in the local consumption could also lead to selling in new markets.

“There is increasing in mango planting areas. Production will not be only for local market. If we can apply IPM, bagging and post-harvest handling practices well, mango quality will improve and consequently [export] quantity will increase.” (Expert from DAR)

Similarly, one expert discussed that foreign investment would impacts on Myanmar mango exporting in coming years. The respondent expected changes in growers' concept and desire towards more commercial mango production and improvements in exportation.

“I expected, foreign investors will invest in horticultural section due to the development of our country conditions. India investors would like to invest in mango juice factories. So our

growers and marketers will increase their knowledge and the potential of mango exporting will be good in future.” (Expert from DOA)

“Myanmar mango exporting has the opportunities to increase more than last year. Some marketers from Malaysia and Singapore came and discussed for mango exportation. China border trade will be regular. According to the extension of growing areas, growers will try to find new market opportunities and will target to produce exportable quality fruits. We have very near market as China where we have more market share. Pakistan and India are trying to send their mango to China. If we can produce higher quality fruits, we will get more market share in China market.” (Expert from MFVP)

4.4.4 Suggestions to improve mango export quantity

They gave the valuable suggestions to improve Myanmar mango exporting. The growers should follow pre- and post-harvest handling practices well and use GAP standards in mango producing. Government should support a loan scheme. Quality and safety fruit production, IPM trainings should be conducted as much as possible in the grower level.

“Pre and post-harvest training should give more than current condition to the growers and marketers. It will need to build up good infrastructure. Government should support loan to the growers. It will need cold storage truck and facilities along the supply chain. Myanmar GAP Standards should implement as soon as possible. Controlling fruit fly, seed and pulp weevils and anthracnose disease are also important to improve mango fruit quality.” (Expert from MFVP)

“To increase quality and quantity of exporting, all stake holders from supply chain must have awareness. We should learn another countries’ production system and need to invite foreign investors. One thing is that we should not depend only on fresh mango exportation and we should think about value-added products. We should use marketing strategy to promote export market and prepare attraction of our products such as logo, brand, name, etc.” (Expert from DOA)

Some experts have the same ideas about the training and to distribute their research finding to the growers’ level. They believe that knowledge and ideas improvement in the grower level is the basic thing to improve mango exporting.

“We should have better communication with growers to share our research and development findings. We need to educate the growers to use GAP standards and post-harvest technologies. If the growers use only their knowledge, development will be slow.

Institutional and governmental supporting is better to improve in that field.” (Expert from DAR)

“It still needs to conduct more training about pre and post-harvest practices in the whole supply chain of the stakeholders including the labours. If we can prepare, the export quantity will increase soon.” (Expert from YAU)

“The growers need to change from their traditional practices to the international production practices. We still need to give more training as possible. Growers should study tours from another countries’ production system. The growers and traders need awareness to reduce transition cost.” (Expert from MFVP)

Some experts said trading policies and plant quarantine policies should change to improve Myanmar mango exporting. It should invite foreign investors to invest in the field of infrastructure development. Cold storage and cool chain facilities must be used to get higher quality produces. Information flow is also important. Marketing strategies such as exhibition and promotion activities via different media are crucial too.

“Regarding plant quarantine policies, it should change availability to access everyone [countries]. Foreign supporting and investment also will be needed. Cold storage system, cool chain facilities must be built.” (Expert from YAU)

“Trading policies is very important to increase export quantity. Government need to support in research and development. We should do mango exhibition and promotion activities. Present condition is the most suitable period to develop. Information flow is essential. Media such as radio, TV, Newspaper, Journals should show more about Myanmar mango. Post-harvest technologies need to be applied in the practically with supporting investment and factories. If we can build up well for every factor, Myanmar mango exporting will be increased.” (Expert from MFVP)

4.5 The conceptual map of factors influencing on Myanmar mango export quantity and price

In this figure, factors influencing on Myanmar mango export quantity and price can see clearly. This conceptual map is constructed using the information given by the respondents. Fruits quality is the main factors for lower export quantity and price. Other important factors are inadequate investment, inadequate infrastructure, high transportation cost, lack of transportation facilities, lack of cool chain logistic, lack of cool room facilities, lack of quality packing houses, low quality packaging materials, concept and desire of the growers, agri-business knowledge of the growers, oversupply

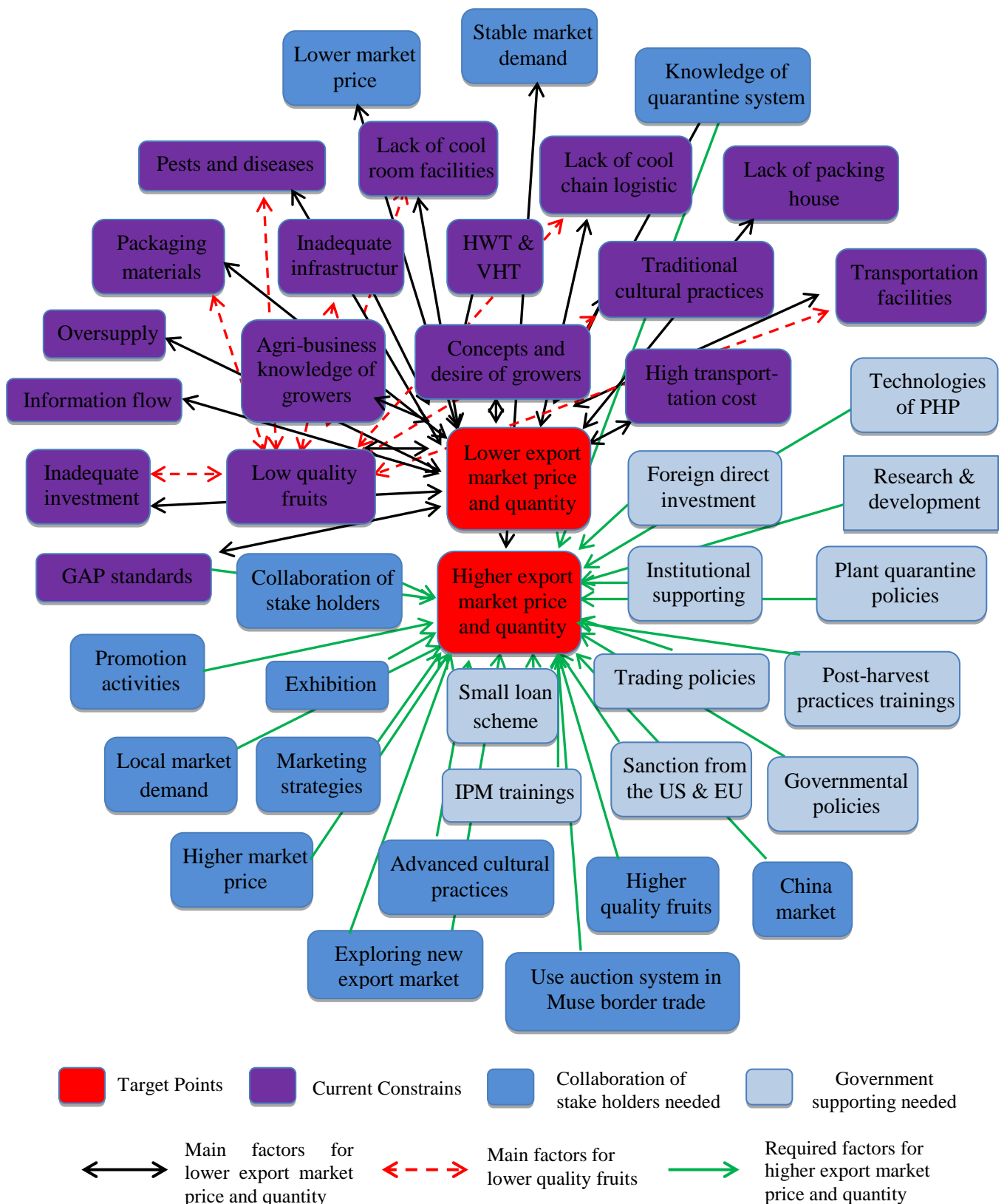


Figure 4.11 Factors influencing on Myanmar mango export quantities and price. This conceptual map obtained from information given by the respondents.

information flow, mango fruit fly, seed and pulp weevils problems, unavailable to conduct hot water treatment and vapour heat treatment, GAP standards.

To overcome the current constraints, some suggestions were made by the respondents. Participation from both of government and stake holders along the mango supply chain was necessary. The stakeholders should collaborate more in events such as marketing strategies, promotion activities, exhibition, exploring new export markets, applying advanced cultural practices, using auction system in Muse border trade to avoid buying price from Chinese marketers and to get higher market price, control oversupply, etc.

The government should provide supports in solving issues by providing a small loan scheme, IPM trainings, post-harvest handlings practices trainings, relevant technologies for overseas shipment, changing for trading policies, plant quarantine policies, governmental policies and related to sanctions from the US and EU, inviting for foreign direct investment, and requiring for research and development in the mango production and marketing area.

5. DISCUSSION

Mango is one of the most popular and important fruits in tropical and subtropical countries. It is also a popular fruit tree among fruit growers in Myanmar. Gradual increase in planting area and production is observed year after year. However, Myanmar has experienced low price of mango export compared with other countries in ASEAN region. There are a range of constraints for mango growers in Myanmar to achieve higher and more stable prices, including the selection of cultivated and exportable mango cultivars, the weakness in current production system, requirement of marketing system and export of fresh mango.

The overall objective of the research is to assess the current production, marketing and exportation of fresh mango along within the supply chain management. The present study clearly described that there are so many constrains in each tier along the mango supply chain. In this section, the specific related topics are discussed based on the literature cited and on the in-depth interviews administered during the field work in Myanmar.

5.1 Intention to undertake mango exporting

Basically, export interest and intention of the growers is very important for the fruits exporting. Most of the growers have strong intention to export. Although growers from Southern Shan State have intention to export, they produce low quality fruits and the production is low. As a result, their products are mainly sent to a local market - Yangon wholesale market. If they can produce more quantity of higher quality fruits in the coming years, they intend to send their products to export markets because they are facing oversupply of production in local market. Jaffee and Henson (2005) agreed that purposely producing the crops for the targeted market is very important. If the growers, in developing countries, are not producing for the targeted markets and their products are unable to compile with the standards, result in failure to export which demolish all their efforts.

Some growers observed that without using GAP standards, they have no chance to export more. Some marketers also discussed that there is a need to develop pre- and post-harvest practices at the grower level to improve export quality fruits. If they cannot produce the exportable fruits, their market is still stagnant.

However, intention to export is not generalized; for instance in Mandalay area, some growers have no intention to export and they are willing to sell their produces in the local market only, because they perceive high risk and uncertainty regarding market requirements and price in export markets. One marketer also said that he does not want to export because he is used to trade in local market and it is more convenient for him trading in the local condition. However, if he has a chance for exporting, he would think about it.

5.2 Pre-harvest handling practices

There are differences in pre-harvest handling practices depending on the growing regions. Flowering period in Mandalay Division is about two months earlier than in Southern Shan State, a difference that is also due to different climate conditions. Pre-harvest handling practices start after the harvest in this year before the next harvest in the following year. Pruning, fertilizer application, irrigation, pest and disease control, fruit thinning, bagging and harvesting, are done sequentially. The study of Maqbool and Mazhar (2007) reported that pre-harvest handling practices may influence on fruit quality, development and maturation processes by inducing susceptibility to physiological and pathological breakdown. Therefore conducting pre-harvest practices is important at the grower level.

In both growing areas, most growers do not have so much attention toward fruit quality. This may depend on the marketing knowledge and possibilities to access post-harvest facilities. Growers from Mandalay Division have difficulties to harvest because the trees are very high, more than 10 meters. Therefore, they are using picking poles for harvesting. They harvest mature and immature fruits together without any selection of the ripening stage. In Southern Shan State, growers can selectively harvest the fruits which are ripe because the plants are not so high and they have practiced the appropriate pruning system.

Medina and García (2002) mentioned that mango harvest criteria can vary depend on the local consumption patterns and distance to the market. Waiting too long for picking may shorten the shelf life of the fruits and lower the sale price. This balance can determine the grower's income as a critical factor. This confirm with the study of Maqbool and Mazhar (2007) that states as mangoes must be fully mature before harvesting and should be harvested in a green mature stage. Harvesting period of 'Sein

Ta Lone' cultivar is from mid-April to mid-June in Mandalay Division. In Southern Shan State, it will be from first week of June to second week of July. For 'Yin Kwe' cultivar, harvesting period starts from mid-August to first week of September. One study mentioned that during harvesting, the fruits should not be injured because can effect to other fruits during packaging and storage. Harvested fruits should be placed in plastics trays and move to the shade. It needs to take care well because rough handling can damage the skin (Maqbool and Mazhar 2007).

5.3 Post-harvest handling practices

Ledger (1991) stated that "Post-harvest handling has two basic elements – management of quality and preparation of the product to facilitate distribution. Post-harvest must be developed as part of the marketing system and not in isolation." The objective of the post-harvest handling depends on where the customers are located and what product they want. Typical operations of post-harvest handling after harvesting are de-stemming, de-sapping, washing, fungicide application or hot water treatment or vapour heat treatment, polishing, quality grading, sizing, packing, palletizing, cooling and transporting (Ledger, 1991).

The growers from Mandalay Division harvest the mango fruits up to noon. After harvesting, fruits are put in the shade. And then the harvested fruits are precooling and cleaning. During cleaning, grading is done. The fruits are wrapped with newspaper and put into the hard paper carte. In Southern Shan State, the fruits are selected for the right ripening stage and cut with cutter by leaving about 2 inches of pedicel together with bag. Harvested fruits are putting on the baskets and moving to the shade house for precooling by opening the bag. And then the fruits are cleaning with wet clothes and grading is done. The individual fruit is wrapped with net sack and/or paper. The packaged fruits are put in the paper crate with two layers.

Actually, most growers do not apply hot water treatment (HWT) to control diseases after harvesting. Although they know the advantages of HWT, they cannot apply this system due to lack of consistent electricity supply system and also depend on the market. The hot water treatment is being used successfully in many of the major mango producing countries of the world. Export and processing corporations applied the hot water treatment technology since the beginning of the mango operation. HWT is the most effective quarantine method in preventing anthracnose and stem-end rot on fresh

mango exporting (Aveno and Orden, 2004). Depending on fruit size, variety and country of origin, an effective treatment is 46.4 °C for 65 to 90 minutes. After completion of the treatment, cool water showers or force cold air should be provided to return the optimum temperature (Kitinoja and Kader, 2003). At the growers and marketers level, HWT is not so popular in Myanmar. They need to apply HWT for diseases control, quality improvement and longer shelf life. So, HWT can affect the quantity of export mango.

5.4 Importance of market information

According to the growers and marketers from both growing areas, marketing information is an essential one during harvesting period. It is important for mango production and can benefit for their income. The growers and marketers always contact with marketers from Yangon, Mandalay and Muse and ask about price, supply and demand conditions. If over supply condition occurs, they will postpone harvesting the fruits. In local market and Muse border trade, price could not be controlled easily; it depends on supply from the growers and marketers. In Singapore market, market price is stable and only high quality fruits can export. One grower discussed that marketing information is very important and can affect their income. They can adjust the harvested quantity when they know supply condition in the market.

Efficient marketing information flow and marketing information sharing is the requirement in the fruits producing and trading. If they do not know the market requirement, growers cannot produce quality fruits. Without knowing current market price, they cannot get the optimum price and they will lose their income when they encounter oversupply condition. This confirmed that accurate and timely market information need to be established on farmers and marketers on the current supply of mango output, demand and prices at national and regional levels (Tadesse, 2011). Weinberger and Lumpkin (2005) pointed out that lack of market access, market information, and lack of systematic documented knowledge can hinder for expanding the scale of the horticultural production and export marketing.

5.5 Importance of mango quality

Most growers and marketers from both growing areas are well aware that fruit quality is an important factor to get the higher price and for future exportation. The importance of mango quality is different between local and export markets. Some

marketers explained that a quality fruit must possess the characters of CBFWSTP, which are colour, beauty, freshness, weight, size, taste and packing. However, they are mainly putting emphasis on the size of fruits, and on the requirements that they are free from damage, pest and diseases only. They provide better quality fruits with specific quality to China market through Muse border trade. However, they also send lower quality produce to local market. They said that market supply is more important for them. If there is over supply condition in the market, they cannot get good price even for higher quality fruits. Medina and García (2002) agreed that greatly exceeding market requirements may not provide higher prices and can cause the fruits losses and lead to be a waste of labour and resources.

The growers, marketers and exporters also realized that the current production system could not produce exportable quality mangoes without implementing of GAP standards, cold room facilities and cold chain logistics. They have to change and prepare well to compete with the other mango producing countries in terms of fruit quality and they are worried for future export market demand. Currently, GAP trainings are giving in the growers' level by leading the trainers from MFVP. Some mango orchards are implementing for GAP standards.

Development of mango export industry must be recognized that the exportable quality fruits must be exceptional. Highest possible quality can improve the chances that it can withstand the rigors of processing, handling, shipping and distribution through the supply chain to the consumer ultimately (Haines, 1991). Currently, food safety and quality standards are very important for exporting produces to meet the market demands of consumers in international markets (Henson, 2006). Food safety and agricultural health standards can be a basis for the competitive repositioning and enhanced export performance of developing countries by upgrading capacity and by making necessary adjustments in the structure and operation of their supply chains (Jaffee and Henson, 2004).

5.6 Ideas to improve mango qualities and exporting

Actually, fruit quality is affected by the pre- and post-harvest practices. The growers and marketers discussed that they have ability to follow pre-harvest practices and pests and diseases control. They mainly point out advantages of pruning system for commercial production and preparing for prolonging fruits' shelf life. From the exporter

point of view, higher mango quality is essential in exportation. The produces should meet the requirement of markets. Producing quality fruits according to GAP standards can expect to get higher price and stable market demand, particularly from international markets. In respondents' opinion, GAP standards fruits should possess four main properties: good quality, free from fungus, free from chemical residue, and traceable.

However, they could not do post-harvest practices because of lack of cold storage packing house, cool chain facilities and logistic systems. The growers and marketers need to organize well in order to invest these facilities. Sorting machine and qualified packing house should be built up to get higher quality fruits. After then they still need the technology for over-sea trade. If they face unexpected delay of truck, they will be sure to lose their fruits' quality. They would like to see the changes of current transportation facilities. In the study of Sangho et al., (2010) mentioned that the potential of export capacity has been considerably increased for Malian mangoes by the upgrading transportation system.

To improve mango fruit qualities, they need further support from the government such as supporting relevant technologies, supporting loan scheme. Opening wholesale market in Mandalay would provide alternative distribution channel for producers instead of relying only on exporting to Muse Border trade. Some respondents pointed out that the growers should change their traditional cultural practices to adopt advanced practices. In addition, if producers want to get more return from mango production, they should change their state of mind from running mango orchards as part-time job to be more committed and may consider them as commercial production. Using systematical technologies and intensive care on trees can produce the exportable quality fruits.

Sharing information about quality requirement of the export markets is essential in the growers' level. Applying win-win situation and establishing proper collaboration between the stakeholders can lead to the successfulness in providing higher fruit quality and to increase the possibility to explore new markets. One exporter suggested that establishing only single collecting centre in Muse border trade and applying auction system can prevent the current dependence from the buying price set from Chinese marketers. It can also help control oversupply and stabilize price for the produces.

To increase the quality and quantity of mangoes exported, there are many interventions need to conduct in Myanmar. Sangho et al. (2010) maintain that in order to improve Malian exportable mango qualities and quantity, a wide range of interventions was conducted, including cold chain infrastructure improvements, phytosanitary improvement programs (especially the control of fruit fly infestation), certification programs, traceability programs, training in orchard management practices, and post-harvest handling training programs. Jaffee et al. (2011) proposed to use the different levels of upgrading strategy, which can be broadly associated with particular “types” of markets or value chains of horticultural products. The situation suggests the logic of a repetitive strategy toward capacity building and upgrading, with producers moving step-by-step from lower- to higher-value markets. This change is accompanied by increasingly implement stricter food safety, quality, and other requirements. Figure (5.1) illustrates the stages of quality requirements in export horticulture (Jaffee et al., 2011).

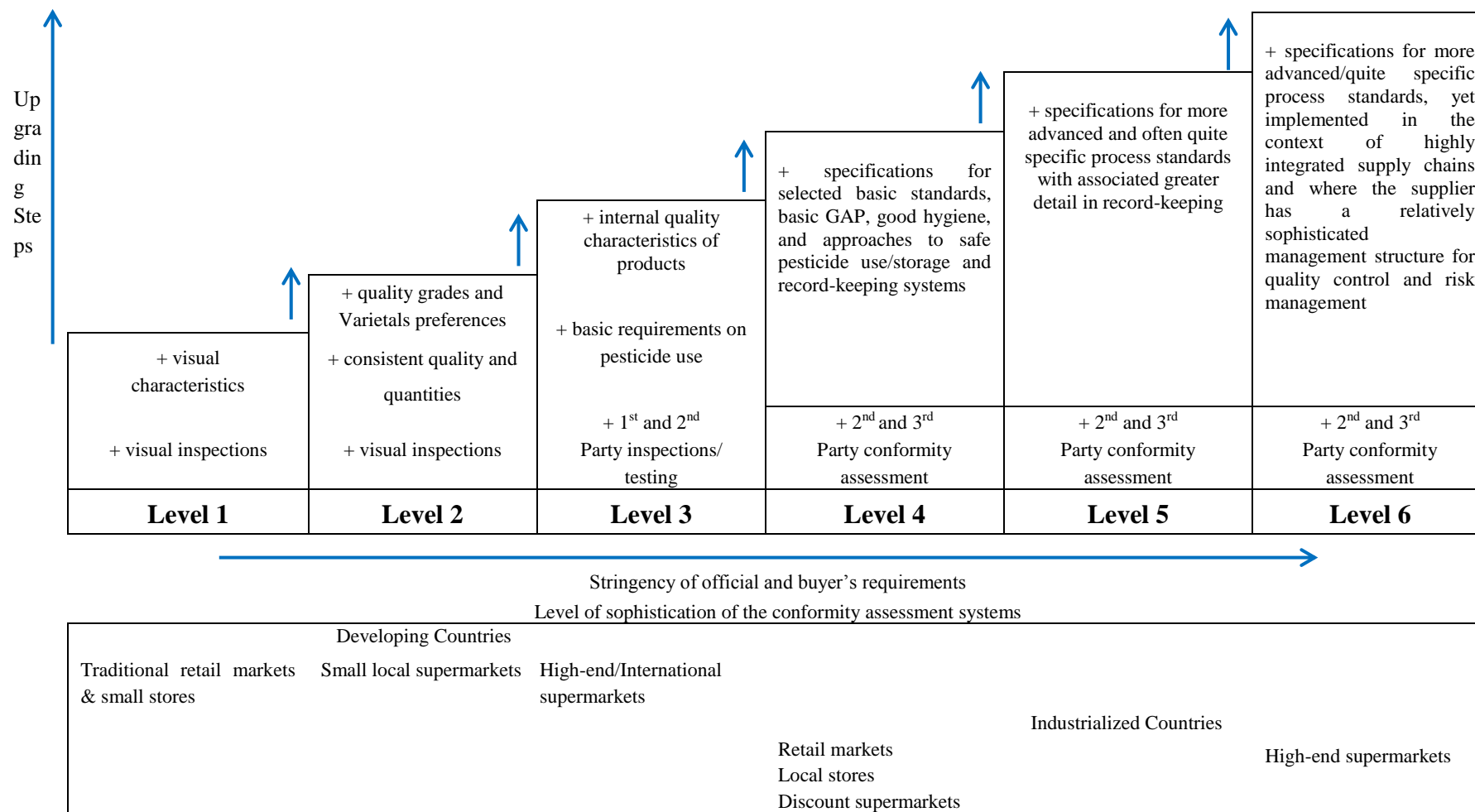


Figure 5.1 Continuums of commercial and regulatory requirements in horticulture

Source: Jaffee et al. (2011)

5.7 Factors hindering current mango exports

Marketers and exporters discussed the opinion about the difficulties in current mango trading. The major factors which are currently hindering the development of the mango export can be categorized according to tiers in the supply chain: at the farm level, the marketing level, and the exporting level.

The growers harvest the fruits (mature and immature) at the same time. The growers need to change the harvesting system to get better quality fruits. It is difficult to grading without using sorting machine. Lack of knowledge in grower level in post-harvest practices, lack of technology to prolong shelf life and delay production occur. Ghafoor (2010) agreed with that short shelf life of mangoes compared to other suppliers is a limiting factor for mango exporting. The growers' lack of agri-business knowledge and lack of knowledge on the quarantine system and requirement of the exported countries can affect the quality mango production. The growers have inadequate infrastructure. Technology improvement is urgently required to produce quality fruits. World Bank and UNIDO (2006) in which they found that inferior post-harvest management can affect quality and volume of marketable surplus.

Other factors are lack of facilities such as commercial packing house and cold storage facilities, electricity scarcity to apply hot water treatment, low investment to use vapour heat treatment, etc. Harvesting and packaging are not systematically and logistic facilities are not suitable for exporting. The transportation charges per kilogram of fruits are higher than other countries. Transportation system can affect the quality and market price. FAO (2003) agreed this point that the poorly developed transport infrastructure is a major constrain at the marketing stage. High transportation cost can reduce the perishable fruits export competitiveness of the country in international market (World Bank and UNIDO, 2006). Important determinants are mango fruit fly infestations, mango pulp and seed weevil infection in the fruits.

At Muse border trade, the marketers and exporters could not get the premium price even for high quality fruits in the occurrence of an oversupply. When compared to local markets, by sending the produce at the Muse border trade they can sell more quantity at one stop and can get money within one day but cannot get good price. In local markets, they can send less quantity due to lower demand and cannot get money immediately when marketers are using payment system afterwards selling and not using

for immediate payment. Therefore, the growers expect other export markets. Exchange rate can affect the exportation. Trading policies and government management systems of the country will have effect on the mango exporting. Due to the uncertain market price in Muse border trade, growers have no intention to produce high quality fruit for this market. Currently, there are a few research works in the field of mango exportation.

5.8 Potential of Myanmar mango exporting

The respondents discussed that Myanmar has the opportunity to increase export mango quantity in the future because production and supply are increasing every year. The improvement of country's political view and the connection within the ASEAN regions and free from the sanctions of the US and EU will improve the export. If they have more opportunities to choose export countries, it will be most advantages for the grower. Farmers must change the production system and prepare well for 2015 Asean Free Trade Area (AFTA). Without changing the production systems and further improvement for the export, they will depend only on local market and will stay in the poverty cycle. The respondents expected the changes of the growers' concepts and desire into commercial mango production results in improving in exportation.

'Sein Ta Lone' cultivar has more potential in exporting due to its appearance, color, sweetness, size, and attraction can compete with other countries' mango cultivars. 'Shwe Hin Thar' and 'Yin Kwe' cultivars also have more potential to export when compared with other countries' mango cultivars. If the growers can produce these cultivars with GAP standard, they will have the potential in exporting. According to one marketer, China is a very big mango importer for Myanmar mango growers. If they can produce higher quality fruits, they can extend the mango market to the mainland of China.

According to the extended mango growing areas and the increased production, the growers will try to find out the new market themselves. Surplus of mango in the local consumption can lead to new markets finding by the growers. Inviting foreigner investment will increase and can have an effect on the Myanmar mango exporting in coming years.

5.9 Suggestions to improve mango export quantity

In order to improve the export of Myanmar mango, joint efforts from the growers, marketers, exporters and government are needed. There are many valuable suggestions that will help to improve Myanmar mango exporting. Pre- and post-harvest practices and IPM trainings should be conducted as much as possible in the growers and marketers level. Myanmar GAP standard (based on ASEANGAP) should be implemented as soon as possible. Controlling fruit fly, seed and pulp weevils and anthracnose disease are also important to improve mango fruit quality. The growers need to change from their traditional practices to the international production practices. Knowledge and ideas improvement in the grower level is the basic thing to improve mango exporting.

To increase quality and quantity of exporting, all stake-holders from supply chain must have awareness and should visit as the study tour to learn other mango producing countries' production and marketing systems. Cold storage and cool chain facilities must be used to get higher quality produces. Information flow is very important along the supply chain. Establishment of value-added products factories should be considered to extend the production line for exports. They should use marketing strategy to promote export market and prepare attraction of their products such as logo, brand, name, etc.

Institutional and governmental supporting is needed. Coque et al., (2003) agreed that the government could take actions in favour of supply concentration by supporting the training, promotion, upgrading quality and standard compliance. The government's support is needed to build up good infrastructure. Government should support loan scheme to the fruit tree growers. Normally, Myanmar Agricultural Development Bank supports to the rice growers and not put emphasis for the fruit tree growers. Trading policies and plant quarantine policies should be changed to improve Myanmar mango exporting. It should invite foreign investors to invest in the field of infrastructure development.

Research and development of marketing strategy and logistic in the supply chain are importance and are need to be developed in Myanmar. Media such as radio, TV, Newspaper, Journals could be used as the channels for promotion and public relation about Myanmar mango. Marketing strategies such as exhibition and promotion activities

via different media are crucial too. This conforms to the study of Eltoum (2009). It had described that to develop the marketing strategy; the exporters should manage the marketing channels by developing the warehouses, cool chain transportation, making marketing promotion in the foreign markets and having available information about these markets.

Coque et al., (2003) suggested that applying a “learning-by-doing” approach could improve in Sudan mango exporting. According to current Myanmar mango supply chain processes and exporting, adopting a “learning-by-doing” approach is more suitable. This way could avoid the short-term export orientation; therefore, they could plan better export activities to the target export markets for the long-run. It is better to start with small volumes and tries to create a good reputation in the target markets. Experience in these markets is extremely helpful to get the know-how that naturally will lead to successful contacts and exports to the targeted markets (Coque et al., 2003).

6. CONCLUSIONS AND RECOMMENDATIONS

In the present study, there are many constraints in each tier along the supply chain of Myanmar mango. Most of the growers interviewed have a strong intention to export. They are aware that if they can produce fruits complying with export quality requirements, they will have good chances to export their fresh mango. They already have the required ability to implement the appropriate pre-harvest practices and pests and diseases control. However, they could not still implement post-harvest practices systematically because of lack of cold storage packing houses, cool chain facilities and logistic systems. Harvesting and packaging are not systematical and logistic facilities are not suitable for exporting.

Due to the inadequate infrastructure and investment, they could not use hot water treatment and vapour heat treatment for controlling mango diseases. If they can do these treatments, they have more chances to produce exportable quality fruits. Institutional and governmental support is needed to the growers' level such as small farmer loan system, IPM and post-harvest practices trainings, supporting agri-business knowledge and sharing knowledge on the quarantine system to meet the requirement of the exported countries, etc. The growers must change their traditional cultural practices to switch to advanced practices and they must convert from the current concept of mango production as an extra income job to a truly professional production for commercial purposes.

Some marketers are doing pre-harvest and post-harvest handling practices when they bought the fruits on the trees from the growers. Most marketers currently implement the proper operations of post-harvest handling practices to get high quality fruits. They believe that quality fruits is an important factor to get the higher price and for the exportation. They send the collected fruits to China market through Muse border trade and also send to local markets. Market supply is more important than fruit quality for them. If over supply condition occur in the market, they cannot get better price even for higher quality fruits.

Marketers clearly realize that the current production system could not produce exportable quality mangoes without using of GAP standards, cold room facilities and cold chain logistics. Marketers can send more quantity fruits at one stop and can get money within one day in Muse border trade. In local markets, they can send less quantity

and can't get money immediately. Therefore they have very strong desire to search out other export market.

From the exporter point of view, higher mango quality is essential in exportation. Producing quality fruits according to GAP standards can be expected to get higher price and stable market demand, particularly from international markets. In 2010, they could send only 20 metric tons of fruits to Singapore market because of a ban due to anthracnose disease problem and consequently oversupply occurred in the local markets. They are worried for future export market demand. Exporters maintain that is necessary to change current transportation facilities and to reduce transportation cost. They still need the technology for oversea shipment to reduce the transportation cost. They also maintain that to improve mango fruit quality, they need further support from the government such as supporting relevant technologies, supporting loan, establishing of processing factories (e.g. mango juice factory).

They also suggested that growers should change their traditional mango tree-growing practices to adopt more advanced practices. Using systematical technologies and intensive care on trees can produce the exportable quality fruits. To get stable prices and to control oversupply, one single collecting point should be established in Muse border trade and should use an auction system to help Myanmar distributor to set fair prices when dealing with Chinese marketers. Mango exporting can be affected by the trading policies and government management systems of the country.

The experts provide recommendations for the current Myanmar mango supply chain as well as for exporting. The basic measure to improve mango exporting is increasing knowledge transfer and innovation at the grower level. Information flow is very important and collaboration among stakeholders along the supply chain can be a key factor to be successful in producing higher quality fruits and exploring the new markets. Marketing actions such as participation to exhibitions and promotion activities implemented via different media are key points of a suitable development strategy. The experts maintain that Myanmar's operators should learn from mango production and marketing systems adopted in competing countries. Myanmar GAP (based on ASEANGAP) standards should be implemented in fruits and vegetable production. Value-added products factories should be established to extend the production line for exports.

Trading policies and plant quarantine policies should be changed to improve Myanmar mango exporting. It should invite foreign investors to invest in the field of infrastructure development. Research and development of marketing strategy and logistic in the supply chain are importance and need to be developed in Myanmar. According to experts, adopting a “learning-by-doing” approach is the better solution to improve the current mango supply chain and exporting facilities.

The problems highlighted above are the main current constrains of Myanmar mango export, and they have been identified by the respondents as the main reason why Myanmar mango experience low prices compared with other countries in ASEAN region. Once the factors influencing the current export conditions have been identified in each tier along the supply chain, it is possible to analyse them more in depth and to propose solutions. Some possible solutions have been put forward by the respondents themselves.

6.1 Limitations of the research

This research was conducted in the main export mango cultivars growing areas among other mango growing areas in Myanmar. By using snowball sampling methods, the respondents are selected for in-depth interviews from each tier of the mango supply chain. Due to the time constraints, this research could be conducted only among growers, marketers and exporters. Consumer’s level still needs to be investigated. Due to a scarce availability of research on mango marketing in Myanmar, it was not possible to make reference to previous studies on Myanmar mango. The database of Myanmar fruits and vegetables production, exporting, importing and value are also not completely implemented and it is difficult to access and to analyse its content.

A strong limitation is also a lack of reliable baseline and statistical information about the mango production system. Further improvements are still required in the collection of data about production and yield per area in each mango growing area.

6.2 Suggestions for further research

This study is mainly conducted on each tier along the supply chain as growers’ level, marketers’ level and exporters’ level. Basically, a supply chain should end up at the consumers’ level. Therefore, a follow up quantitative research focused on consumers could be of great interest. Consumer’s preferences in the domestic market need to be

analysed in order to understand whether they would appreciate and be willing to pay a higher price for mango fruits of export quality. This may be relevant information for growers who want to convert their mango orchards to new varieties but are not sure that they can find the appropriate marketing channel to reach the export markets. In addition, the analysis of consumers in the importing countries (for instance, Chinese consumers) could be beneficial to understand the main requirements, needs and wants of these consumers and to develop a tailored strategy.

Research on mango in Myanmar is very scarce and it is mainly focused on the post-harvest handling practices. The following research fields still need to be investigated more in depth, in order to develop Myanmar mango industry in the future.

1. Systematically pruning and high density planting systems
2. Practices for quality improvement of mango
3. Control measurements of mango fruit fly, pulp and seed weevils
4. Hot water treatment of exporting mango cultivars
5. Research for low-value cold storage materials
6. Exports and sanitary and phytosanitary (SPS) compliance
7. Mango value chain analysis of Myanmar
8. Marketing strategies for the selected export markets of mango

For these research works, it should be collaborated within Department of Horticulture (Yezin Agricultural University), Horticulture section (Department of Agricultural Research), Horticulture section (Department of Agriculture), and Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (MFVP) and stakeholders of mango supply chain.

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Appendix I. Semi-structured interview outline

TITLE - Export Conditions of Mangoes from Myanmar: Hindrances and Opportunities in the Supply Chain

Qualitative Questionnaires for Farmers (6 respondents connected with exporters and 6 respondents disconnected with exporters)

1. Business characteristics

- Which varieties of mangoes do you have?
- How long have you been in mango farm/ production?

2. Where do you (or could you) sell your produce? Are you targeting for export mango?

- Do you package or store your (high quality) mangoes in a special way?

3. Do you have a good, long-term relation with trader(s) (marketers or exporters)?

- Do you look for the best price/conditions every time you sell, or you prefer to deal with the usual producers?
- What are the main conditions you consider to evaluate a partner?

4. Could you please explain something about pre- and post-harvest handling practices that are using on your farm and affecting for fruit quality?

- Awareness of pre-harvest practices (e.g. bagging, smudging, girding, effect of harvesting time) on fruit quality
- Awareness of post-harvest practices to ensure high quality of mangoes (e.g. grading, cold storage, hot water (phytosanitary) treatment, etc.)
- Do you think you will get a better price for higher quality product?

5. What do you think about the standards for export mangoes?

- How do you receive information on quality standards?
- Do you think mango marketing information (price, marketing quality) is very important to get more income from the orchard?
- Idea to improve the quality

Appendix I (Cont.) Semi-structured interview outline

TITLE - Export Conditions of Mangoes from Myanmar: Hindrances and Opportunities in the Supply Chain

Qualitative Questionnaires for Primary collectors, Town wholesalers and Brokers (6 respondents)

1. Could you please explain about your business and network?

- How long have you been in this business?
- Do you specialize in mangoes? What other fruits/foods/things do you trade with?
- Whom do you buy mangoes from? (Farmers, other traders?)
- Where do you buy mangoes from (directly from the farm? From markets?)
- Do you have connection with exporters?

2. Which kinds of factor are important for mango price?

- What does quality measure for you?
- Please describe what a ‘good quality’ mango is?
- What are the usual conditions in mango trading (payments, delivery, transportation, insurance, etc.) ?

3. What do you think about the export fruit standardization and price?

- Is information on quality standards easily available and how?
- Is this information also available to other actors (e.g. the producers) to make sure they provide you the quality you need?
- As there any problems with the quality of mangoes you get from farmers?
- Do you get a different price for different qualities of mangoes?

4. What difficulties do you have to secure a supply of export-quality mangoes and to sell them?

- E.g. lack of credit, unreliable transportation, poor roads, price fluctuation, lack of cold storage, lack of knowledge of post-harvest techniques, market competition, etc.,
- How do the problems be overcome?

5. How do you think the potential of Myanmar mango in Future? Please give me your opinions.

Appendix I (Cont.) Semi-structured interview outline

TITLE - Export Conditions of Mangoes from Myanmar: Hindrances and Opportunities in the Supply Chain

Qualitative Questionnaires for Exporters (6 respondents)

1. Could you please explain about your business and network?

- How long have you been in this business?
- How important are mangoes in your business? What else do you trade in?
- Distribution network: from where do you get mangoes, whom do you sell them to?
- What are the usual conditions in mango trading (payments, delivery, transportation, insurance, etc.)?

2. How do you think the qualities of mango are important to get higher price? Could it be change depending on the export countries?

- What are the criteria to grade mangoes (best quality to poorest quality)?
- Do you pay different prices for different mango qualities?
- Do you receive different prices for different mango qualities?
- What is quality for you?
- What is important in the different markets?

3. Which factors hinder current export of mangoes from Myanmar?

- Fruit Quality and post-harvest handling practices
- Poor transportation
- Unclear / too many rule and regulation
- High export taxes
- High competition on the market for mangoes (from which countries?)
- Poor links between trade intermediaries (poor flow of information)
- Currency fluctuation
- Lack of quality control system

4. Do you think that Myanmar has a high potential to export mangoes? Why?

- If yes: where could they be sold to (which countries? For fresh consumption or processing?)
- If no, why?
- What quality expectations do these customers have?
- What could be done to increase export quantity?

Appendix I (Cont.) Semi-structured interview outline

TITLE - Export Conditions of Mangoes from Myanmar: Hindrances and Opportunities in the Supply Chain

Qualitative Questionnaires for Experts (6 respondents)

1. What is your main activity? How would you describe your knowledge about the export of mangoes from Myanmar?

- Marketing experience
- Trainings about mango exporting and post-harvest technologies
- Research about mango

2. How Myanmar mango quality can be compared with other countries' products?

- Physical - Appearance, taste, odour, colour, etc.,
- Others (because usually export is not only about quality of products)

3. Which factors are hampering the ability of Myanmar to export mangoes?

- Of the factors you mention, which is the most important?

4. What do you think about Myanmar's potential to export mangoes?

5. Your suggestions will be very valuable for mango exporting in future. Could you make suggestions to develop export conditions? What are the future developments in trade that may affect mango export?

- Fruit Quality and post-harvest handling practices
- Cold storage and quality control system
- Transportation
- Rule and regulation
- Marketing strategy
- Institutional support for marketing

Appendix II. Summary reports of each interview (32 interviews)

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): A
Date, time: 27.03.2012, 6:20 – 6:58 pm (GMT+6:30) (37 min)
Place: Yat Sawk Township
Location: Southern Shan State

Characteristics of Interviewee's business:

3 years of experience in mango production with 13 acres, attended many trainings in DOA and MFVP, Executive committee member of MFVP SSS.

Intention for mango exporting

I have strong intention to export because of the exceeding supply over local consumption; therefore, they must be exported. But we could not have a chance due to the causes of unqualified product to export requirement. We must change to get GAP Standard to export and our farmers will have higher price and income. If we could not do it, our farmers will face the losses always. We need to change the way of mango production and marketing.

Criteria to choose compatible marketers

I mainly connect with one broker house from Yangon wholesales market due to the confidence for money transfer. One of their sharer members was in Yat Sawk. So we do not need to worry about money matter. It is very important one and an advantage for the growers.

Pre-harvest handling practices

To get good quality fruits, it is mainly depending on the pest and diseases control well. Before flowering, I reduce the frequency of pesticide application. After flower induction (about 1 inch) pesticide and fungicide application is done. If flowering period is starting, I do not use any chemical application and also irrigation. And then I waited up to the flowering stage. The fruits arrive to marble size; I apply pesticide and followed by fungicide 3 days later. We decided the reapplication of fungicide depending on the weather condition. At the cloudy condition, I have to apply fungicide again. Before mid of April, bagging is done. Depending on the different flowering periods, we have to do two times of bagging.

Post-harvest handling practices

The first harvesting is done in the right ripening stage. If the suitable time is arrived, the first time of bagged fruits are harvested and send to Yangon wholesale market round about first week of June. The fruits are cut with cutter by leaving about 2 inches of pedicel together with bag. And then putting on the baskets and moving to the shade

house. Open the bag and cut the pedicel with 0.5 inches in fruit and precooling. And then cleaning is done with wet clothes and grading. The individual fruit is wrapping with net sack. The packaged fruits are put in the hard paper carte with two layers. After packaging, it is ready to be sent to the collecting point.

Criteria on mango grading

Grading is done on three types (special, large and Medium) during cleaning by experience. We did not use scale to weight.

Importance of mango quality

Current production could not produce [mangoes] with exportable quality. We are not ready to export because we will need to invest more for exportation. Still, we have no certification system and we don't contact with any organizations that can provide certification. For example, our fruits could not export to Japan according to their regulation. Perhaps, we can compile with GAP standard; however, we do not have cold room facilities, cold chain logistics and availability of flights connection or over sea connection. If we have completed facilities, we can export more quantity of fruits. But our farmers are not enabling for this capacities. Perhaps, we have abilities to do this, we must get organizational or institutional supporting.

Importance of market information

Market information is very important. It can specify our income and can solve our farmer's economic conditions.

Ideas to improve mango quality

We are facing surplus of mango in local consumption. It happens every year. So, we would like to get export connection. We get only 0.25-0.3 US\$ per fruit. If we have over supply in the wholesale markets, we will lose our income and we will have over ripening fruits left. So, we are planning to establish mango juice factories. Currently we send our fresh produces to Chinese marketers through Muse border trade. They do not ask for GAP standard at this moment. Later, they may ask for GAP standard and good quality fruits that are free from fruit fly, pulp and seed weevils. If we have certain demand and buyers or market guarantee, we can produce fruits that meet exportable quality by GAP standard, but not with organic system which is so expensive.

Potential of Myanmar mango exporting

It depends on the country conditions such as political, economic and currency exchange. Myanmar has the potential to export mango to several countries if the government has good management and free from the sanctions of the US and EU. The country and citizens need to change these conditions. Farmers must change the production system and prepare well for 2015 Asean Free Trade Area (AFTA). Without changing the production systems and further improvement for the export, we will depend only on local market and will stay in the poverty cycle. Therefore not only our farmers need to change but the condition of our country will need to be developed in every sectors.

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): B
Date, time: 27.03.2012, 5:30 – 6:04 pm (GMT+6:30) (32 min)
Place: Yat Sawk Township
Location: Southern Shan State

Characteristics of Interviewee's business

11 years of experience in mango production with 40 acres, attended many trainings in DOA, MFVP and Thailand, Executive committee member of MFVP SSS

Intention for mango exporting

I have a strong intention to export. Therefore I grow more exportable mango cultivars and more acreage. At the moment, production is very low and I just send to Yangon wholesale market.

Criteria to choose compatible marketers

I have long-term relationship with the wholesalers from Yangon. Before, I communicated one among the wholesalers. Later, I have experienced to select depending on their characters such as (1) Is he a ware house owner? (2) Could we confidence on money matter? (3) Could I get advanced money if I need for production cost? (4) Could he have more demand and better connection with retailers? If I cannot meet these conditions, I have to change other wholesalers.

Pre-harvest handling practices

I have to start from pruning. After harvesting the fruits, I start pruning the trees in September. Hormones and foliar fertilizers are applied to induce flowering. Fertilizer application is done in October, late monsoon season. Smudging, fill with dense smoke in order to control is done in January. In Southern Shan State, thrip and mango fruit fly are the major pests and using pesticides 15 days interval from the end of March until bagging. Fungicide application is depending on the weather condition. Irrigation is done at least two times in April and May. No bagging does for 'Yin Kwe' cultivar and only bagging for 'Sein Ta Lone' at April to control fruit fly, seed and pulp weevils' problems.

Post-harvest handling practices

Harvesting period of 'Sein Ta Lone' is first week of June to second week of July. For 'Yin Kwe', harvesting period starts from mid of August to first week of September. Fruits are harvested with bamboo pool. We have to take care on physical damage fruits. And then fruits are putting and precooling under the shade. Cleaning with wet clothes and grading is done. After wrapping with newspaper, the fruits are putting to the wooden carte and send to collection center. In our level, HWT is difficult because it is hard to control the temperature manually. As we know, HWT can control some diseases as anthracnose, but we could not cover the cost. If we get about 0.6-1 US\$ per fruit, we can do it. Now the price is only 0.25-0.3 US\$ per fruit.

Criteria on mango grading

When I send only to local market, the fruits grade three types as Special, large and Medium. We do not have weight system and using quantity system. According to types of fruits, we grade as special – 50 no. of fruits per box, for large – 60 no. of fruits per box and Medium – 70 no. of fruits per box.

Importance of mango quality

If we can produce good quality fruits, we will get higher price than others. Good quality and higher yield can increase our income.

Importance of market information

Market information is essential during harvesting period. We have to contact with marketers about price, supply and demand conditions. Because if over supply occur, our produces price will fall down and plenty of fruits in Yangon wholesale market. Therefore, we have to postpone harvesting fruits. In local market, price could not be controlled easily; it depends on supply from the growers and marketers. So, market information is very important for us.

Ideas to improve mango quality

To improve fruits quality, we should follow and apply systematically of post-harvest technologies. It is the best way to get good quality fruits.

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): C
Date, time: 04.04.2012, 10:30 – 10:51 am (GMT+6:30) (21 min)
Place: Taunggyi Township
Location: Southern Shan State

Characteristics of Interviewee's business

3 years of experience in mango production with 20 acres, attended many trainings in DOA and MFVP, Executive committee member of MFVP SSS

Intention for mango exporting

At the moment, production is very low from my farm. If I can produce more, I will have export markets.

Criteria to choose compatible marketers

At the moment I could not produce more fruit and just selling to retailers who send to Yangon and Tachileik. If the production increases, I will contact with exporters from Taunggyi to export China. I also have a plan to send to supermarkets in Yangon.

Pre-harvest handling practices

Last year, the more rainy days affected for fungus diseases and yield losses occurred. So this year, I like to use fungicides and pesticides well to control the pests and diseases before bagging. After bagging we do not use pesticides application. Afterwards, the weak point is we do not understand the correct concept of chemical fertilizer application and just putting cow dung to the plant. Coming year, I will take care about fertilizer application to get higher yield.

Post-harvest handling practices

Harvesting is done by using bamboo pole. And then the damaged and pest infected fruits are removed. After grading, the fruits send to the retailers.

Criteria on mango grading

Grading is done by experience without using the scale.

Importance of mango quality

Fruit quality can affect our income. Bagged fruits have higher price than unbagged fruits.

Ideas to improve mango quality

To increase fruit quality, we must control well pests and diseases in our region. On one hand, systematic pruning and regular fertilizer application is also important. According to the knowledge from GAP training, we have so many required things to improve such as post-harvest facilities, using GAP practices, marketing conditions and currency exchange, etc. We just know the techniques to improve idea, but we could not apply yet because of uncover the cost and profits.

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): D
Date, time: 05.04.2012, 2:15 – 2:38 pm (GMT+6:30) (18 min)
Place: Nyaung Shew Township
Location: Southern Shan State

Characteristics of Interviewee's business

3 years of experience in mango production with 13.3 acres, attended many trainings in DOA and MFVP, Executive committee member of MFVP SSS

Intention for mango exporting

The quality of my produce is not so good to reach exportable conditions. If I can control pest and disease problems, fruit quality will be increased and I will be able to export.

Criteria to choose compatible marketers

I always send to one broker house in Yangon wholesaler market because it is easy to communicate with them. If I can produce exportable fruit quality and more fruits, I can export to China from Taunggyi.

Pre-harvest handling practices

Controlling the pest and disease is the most important matter to get the good quality fruits. Smudging is done at December – January. Bagging is done about April.

Post-harvest handling practices

The fruits are harvested at the right ripening stage. The selected fruits are cut with cutter and put to the baskets and moving to the shading place. Precooling and cleaning is done. During cleaning, grading is done. The fruits are wrapping with newspaper and putting in wooden box to send Yangon wholesale market.

Criteria on mango grading

I have only two grades. No. 1 is 45 fruits per wooden box and No. 2 is 60 fruits per wooden box.

Importance of mango quality

If over supply condition occurs in the market, we cannot get good price even higher quality fruits. So market supply is more important than fruit quality for sending local market.

Importance of market information

Market information is important. It can support to prepare marketable quality and can adjust the harvesting amount. If we could adjust well with market information, our income will improve.

Ideas to improve mango quality

To improve mango qualities, we must use suitable technologies but it is mainly depending on the weather condition for us.

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): E
Date, time: 07.04.2012, 7:30 – 7:57 pm (GMT+6:30) (27 min)
Place: Mandalay Township
Location: Mandalay Division

Characteristics of Interviewee's business

4 years of experience in mango production with 4 acres, GAP trainers, Executive committee member of MFVP M

Intention for mango exporting

I have intention to export. I am targeting to produce processing products such as juice, pulp, butter and so on. So we can send anywhere and anytime. If we send only the fresh fruit, we will get low price ever.

Criteria to choose compatible marketers

I sell my crop standing on the tree stage to a local marketer who is buying our products every year. [In this case,] I can get only 2/3 of the normal income. But I have got the advantages such as low labor charges, free from transport charges, free from over workload on picking, packaging and marketing, I do not need to worry about marketing stress and can do other kind of works.

Pre-harvest handling practices

Pruning is done in August. Chemical fertilizers are applied in September. Major pests are aphid and thrip. Pesticides application is done about two times throughout the season. The fruits have to bag fruits around February and March. After then, I sell [fruits] to the marketer when they standing on the tree stage.

Importance of market information

Market information sharing is very important and it can affect our income.

Ideas to improve mango quality

We must apply pruning system and must do bagging to improve fruit quality. Using GAP standards are very important and can give quality fruits for higher exporting.

Interview Summary Report

Grower (Disconnected with mango export)

Name (Code): F
Date, time: 20.05.2012, 10:30 – 11:20 am (GMT+6:30) (50 min)
Place: Kyaukse Township
Location: Mandalay Division

Characteristics of Interviewee's business

Starting as a mango marketers last 12 years, 6 years of experience in mango production with 5.5 acres and a nursery owner of mango tree, has widely connected with growers and marketers

Intention for mango exporting

Normally, I do not want to export because I prefer to sell to local market wholesalers. Sending [produces] to Muse border trade is more risky for the growers like us who have not enough investment for transportation charges and packing materials. After then price in Muse border trade is always fluctuated and it is not sure to give profits. I do not want to take that kind of risk.

Criteria to choose compatible marketers

I am selling [mangoes] mainly to Taunggyi wholesalers who I am confidence that they will have no problem about payment and they may get more orders from their retailers. I get higher price in Taunggyi market than in Mandalay market.

Pre-harvest handling practices

Pruning is done one month after harvesting. During bud induction stage, pesticide is applied if needed. About December, we must control fungus diseases. No bagging is done for my produces when I have to sell only in local market.

Post-harvest handling practices

After harvesting, the fruits are given by ethereal 3% treatment and then grading. When the fruits are dry, the fruits put into the bamboo baskets by putting banana leaves.

Criteria on mango grading

When I am sending [mangoes] to Taunggyi market, I sort mango into three grades: More Special (Htoo-shal), Special (Shal) and Large size (Kyii). Prices also vary depend on the size. We must know the market requirement well.

Importance of market information

We have to contact always with marketers. If market has so many supplies, we have to stop the fruit harvesting. So market information is very important for farm income.

Ideas to improve mango quality

Technological portion is very important. If we can control shelf life of fruits, we can get higher price. We can adjust for market requirement. Farmers must be knowledge of post-

harvest technologies. More training will need to give as possible. We need to emphasis in three places: (1) supporting technologies, (2) supporting the loan or small scale credit, (3) opening the main whole sale center and trading the fruits. Without wholesale center, we cannot control supply and price will low down and affect to lower income in grower level. We should use cold chain facilities to control shelf life and other advanced technologies in the same time.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): A
Date, time: 22.03.2012, 8:30 – 8:49 am (GMT+6:30) (19 min)
Place: Shwe Naung Township (The orchard is in Ywangan Township)
Location: Southern Shan State

Characteristics of Interviewee's business

4 years of experiences in mango production with 250 acres as an estate manager, mainly target to export, Chairman in Myanmar mango group (SSS), Executive committee member of MFVP

Intention for mango exporting

Our products have been mainly sending to Muse border trade during last 3 years and some have been sold directly to DAS Wholesalers Company, Kunming by connecting with our group of companies.

Criteria to choose compatible marketers

I send mangoes to the Muse border trade where there are thirty-four ware houses. I do not have the fixed marketers. I learn and choose the fairest marketer who looks carefully between the growers and marketers from China. If he looks for his profit only, I will not contact with him.

Pre-harvest handling practices

Pruning is done one month after harvesting. Smudging is done around January. After flowering, we must apply pesticides and fungicides regularly. About April, fruits reach to egg size and start to do bagging.

Post-harvest handling practices

After harvesting, the fruits are precooling and cleaning with dry clothes. Grading depends on weight system as three types: Special – above 600 gm, Large – 400-600 gm, and Medium – 350-400 gm.

Importance of mango quality

I understand that quality means free from damaged and pests and diseases problems according to our market condition. Sending good quality fruits are very important. If we can produce good quality fruit, we will get higher even get more demand from the market.

Importance of market information

Market information is 100% important for farm income. We have to compare market price by collecting information from the different sources. If we know that there is a higher price in Mandalay or Yangon than Muse border trade, we will not send to Muse border trade. Therefore, we have to collect market information every day.

Ideas to improve mango quality

As we are different from Mandalay, we have to take care about pests and diseases problem in Southern Shan State. We need to understand well about integrated pest management (IPM). Training about IPM will be needed to give us knowledge as much as possible. Here, flowering period is in December and January with very cold weather condition, fruit setting is very low for 'Sein Ta Lone' cultivar. We would like to learn more fruit setting techniques related to our high altitude region. If we can balance these two points, we will get high yield and income too.

Potential of Myanmar mango exporting

We have potential to increase exportation. 'Sein Ta Lone' is more attraction than other cultivars. To send standard quality fruits, we should not depend only on traditional ways or techniques. We must learn and apply the advanced techniques for harvesting, packaging and transportation such as packing house system, cold storage facilities, and logistic conditions. In the collecting points [Yangon and Muse border trade], we must construct cold storage packing house. So fruit shelf life will increase and will be under control before exporting. At the moment, we don't have such facilities and we couldn't send the standard export quantity. Now the government is trying to develop in every sector and we expect to get more export demand in future.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): B
Date, time: 02.04.2012, 5:35 – 5:53 pm (GMT+6:30) (18 min)
Place: Shwe Nyaung Township
Location: Southern Shan State

Characteristics of Interviewee's business

6 years of experiences in mango production with 10 acres, export to China through Muse border trade and send to Yangon market wholesalers.

Intention for mango exporting

I have sent to Muse border trade for about 4 years. Here the weather conditions are favorable than other areas of Southern Shan State. So, I could produce quality fruits but I have to emphasis on pest and diseases control.

Criteria to choose compatible marketers

I always send the best quality fruit mainly to the fixed ware house in Muse border trade. And I send the low quality fruit to the Yangon wholesaler who is relative with ware house owner from Muse. They are flexible in communication, confident for money matter and can provide the suitable price for my produces. The price can change depending on the mango supply in Yangon wholesale market. But it is not so different in Muse border trade.

Pre-harvest handling practices

One month after harvesting, pruning is done. Before bud stage, I used pesticides. After flowering, I do not apply. And then I apply pesticides and fungicides 15 days interval from small fruit to marble size. Bagging is done in this stage. We cannot do for irrigation.

Post-harvest handling practices

The harvesting fruits are placed under the shade. Precooling is done. And then the fruits are cleaning and grading 3 types as Special, Large and Medium. The fruits are wrapped with paper and send to Yangon Wholesale market or Muse border trade. We used paper carte for both markets.

Importance of mango quality

Good quality fruits only send to Muse border trade. Chinese marketers buy only the good quality fruits and low demand for damaged fruits. For Yangon wholesale market, the marketers can accept a little damaged fruits.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): C
Date, time: 02.04.2012, 6:00 – 6:19 pm (GMT+6:30) (19 min)
Place: Shwe Nyaung Township
Location: Southern Shan State

Characteristics of Interviewee's business

6 years of experiences in mango production with 3 acres, export to China through Muse border trade and send to Yangon wholesale market

Intention for mango exporting

If I have more produce with good quality fruits, I send to Muse border trade. If it is not, I send to Yangon wholesale market.

Criteria to choose compatible marketers

I have connected with only one ware house in Muse border trade and Yangon wholesale market. I just follow with my neighbor farmers. The marketers have good news.

Pre-harvest handling practices

After harvesting period, heavy pruning is done to get sunlight. Before bud induction stage, pesticides application is used and stopped in flowering stage. If the fruit reaches the marble size, I applied pesticide and fungicide at 15 days interval. Irrigation could not do when my orchard has on the hill side.

Post-harvest handling practices

The harvested fruits sent to house from the farm. The fruits are cleaning with dry clothes and grading is done. The fruits are wrapping with paper and putting to the paper crate. For Yangon wholesale market, the price can get by quantity (no. of fruits) and can get by weight in Muse border trade.

Importance of mango quality

We send good quality and bright color fruits (not including damaged fruits) to Muse border trade. For Yangon wholesale market, we can send low quality (after selecting for Muse border trade) produces. In Muse border trade, we can spend more quantity within one day and very low quantity in Yangon wholesale market in long times (about 3-5 days). But both market, the marketers asked to send better quality fruits.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): D
Date, time: 07.04.2012, 3:15 – 3:33 pm (GMT+6:30) (18 min)
Place: Amarapura Township
Location: Mandalay Division

Characteristics of Interviewee's business

10 years of experiences in mango production with 3 acres, 2 years of export to China through Muse border trade and send to Mandalay market wholesalers

Intention for mango exporting

I have 2 years of experience to export to China wholesalers through Muse border trade and 1 year experience with exporting to Singapore from the Mandalay Mango Group (MMG).

Criteria to choose compatible marketers

I have connected with only one ware house in Muse border trade. This ware house is my relative owned, so I choose to send.

Pre-harvest handling practices

One month after harvesting, light pruning is done. Some years, heavy pruning system is using. Pesticide application is done before flowering. Smudging is done about November - December. If the fruit reaches the marble size, I have to apply again pesticides and foliar fertilizer. Bagging is done when the fruit reach at the egg size. After then pesticide application is stopped.

Post-harvest handling practices

Harvested fruits are putting under the shade and doing precooling, hot water treatment, and grading. The fruits are wrapped with paper and putting into the paper crate.

Importance of mango quality

For Singapore market, we get higher price than compared with Muse border trade. In Muse border trade, even we send the good quality fruits; price may be low depending on the market supply. Sometimes, market price depends on our fortune in China market. For Singapore market, we already have demand and we can get the price depend on the quality.

Ideas to improve mango quality

I am planning to use heavy pruning system because the mango trees are very high and it can reduce number of higher quality fruits due to damage during harvesting. Systematic pruning can give quality fruits. If we couldn't do it and change our practices, our area will have no possibility to produce exportable quality fruits and we will get the normal price ever.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): E
Date, time: 11.04.2012, 8:45 – 9:22 am (GMT+6:30) (37 min)
Place: Madaya Township
Location: Mandalay Division

Characteristics of Interviewee's business

10 years of experiences in mango production with 6 acres, mainly export to China through Muse border trade and send to Mandalay market wholesalers

Intention for mango exporting

I have the main intention to export since I built up this mango farm.

Criteria to choose compatible marketers

In Mandalay market, I send 2 or 3 ware houses depending on the fruits quantity because they cannot spend more quantity in a few days. I always send high quality fruits to one ware-house in Muse border trade. Whenever I send to Muse market, I always get higher market price. It is mainly depending on the fruit quality.

Pre-harvest handling practices

Heavy pruning is done in June. After flowering stage, I applied fungicides one or two times. Fertilizer application is done in October and irrigation is done at least two times in February and March. Before bagging, I apply EM as pesticide for pest control.

Post-harvest handling practices

The harvested fruits are precooling under the shade and cleaning. The fruits are wrapping with paper and putting in paper crate and then send to Muse border trade. Low quality fruits will send to Mandalay market.

Criteria on mango grading

When I send to Muse border trade, I use three grades under the two main types of bagging as bagging and un-bagging. Really, bagged fruits get higher price than unbagged one. Three grades are Special one (above 300 gm.), large one (250-300 gm.) and small one (less than 250 gm.).

Importance of mango quality

If there is over supply condition in the market, we can't get good price even for higher quality fruits. Therefore market supply is very important for us. We have to check ever before harvesting our fruit to avoid over supply and lower price.

Ideas to improve mango quality

The growers need to follow GAP standards well. Without using it, we cannot get exportable quality fruits. When I went to exhibition in Thailand, they would like to get 500 metric tons. But we could not support the exportable quality. So farmers need to organize and emphasis well for producing exportable quality fruits.

Interview Summary Report

Grower (Connected with mango export)

Name (Code): F
Date, time: 13.04.2012, 2:40 – 3:16 pm (GMT+6:30) (36 min)
Place: Tada-U Township
Location: Mandalay Division

Characteristics of Interviewee's business

18 years of experiences in mango production with 4 acres, export to China through Muse border trade and send to Yangon and Mandalay local market wholesalers

Intention for mango exporting

I always send to China wholesaler market through Muse border trade.

Criteria to choose compatible marketers

I sell fruits to Yangon wholesale market, Mandalay ware houses and Muse border trade. Before selling produces, I inquire the most suitable ware house. Then I choose the ware house based on the confidence of money matter, more demand and connection with retailers. The most important [thing] is to get the cash payment immediately. In Muse, I could not know the exact amount of selling price because I do not understand what they are talking about when the ware house owner and Chinese marketers spoke with Chinese language. We should not depend only on the Muse border trade. This is why I would like to get more chances to export to other countries. If we have more demand, we will get higher price and profit from the production.

Pre-harvest handling practices

Pruning is not doing in my orchard. Fertilizers are applied in September and October. If it is needed, irrigation is done. Pesticides and fungicides application is done about 3 times up to bagging. But plants are very high and we can bag only 2/3 of the fruit tree.

Post-harvest handling practices

Harvested fruits are precooling. Grading is done with experience. The fruits are wrapped with paper and put in the paper crate. 45-50 fruits can put in 15 kg paper crate.

Importance of market information

Market information is very important and can give advantages to farmers. We need to prepare higher quality fruits and we must always have phone contact with marketers from Muse border trade during harvesting season. Because mango is perishable fruit and we can't store [them] long time because we don't have cold room facilities.

Potential of Myanmar mango exporting

We have potential to export in near future because we have more extended growing areas during last three years. But, we must extend mango export market and could not depend only on Chinese marketers because they give low and fluctuated price.

Interview Summary Report

Marketers

Name (Code): A
Date, time: 26.02.2012, 1:40 – 2:44 pm (GMT+6:30) (63 min)
Place: Maynigone Township (Marketer is from Taunggyi Township)
Location: Yangon Division

Characteristics of Interviewee's business

5 years of experience in mango trading mainly to China through Muse border trade, 1 year export to Singapore market wholesaler.

Intention for mango exporting

I have connected with the exporters who send to Singapore market. And I also send to Muse border trade.

Requirement for different markets

To get higher price, quality of fruits and market demand are very important. Singapore marketers demand only the quality fruits. So quality can decide the price. However, even fruit quality is very high, we cannot get higher price in the oversupply condition in the Muse border trade. Chinese marketers are looking for quality but it is not so important. If market supply is very low, they give higher price. When we cannot control market supply from mango growing areas, price is always fluctuated. In Muse border trade, Chinese marketers decide the market price.

Importance of mango quality

We have to try to get attractive fruits with shinning color. 'Sein Ta Lone' cultivar is produced more acreage in Southern Shan State. Their produces could not send to Muse border trade because quality is not so good so that they mainly depend on the local market. MFVP [Myanmar Fruit, Flower and Vegetable Producer and Exporter Association] (Southern Shan State) could not support for suitable market at the moment. We are trying to organize and start for trainings. We expect to get a good connection by trying our association, later. If we can prepare well to get the requirement of Singapore marketers, we have potentials to export.

Factors hindering current mango exports

Mango harvesting period is very short and we cannot control the supply. It is very important to send the required quantity to the market. We still need technology to prolong shelf life and delay production. Harvesting and packaging are not systematically and logistic facilities are not suitable for exporting. In Southern Shan State, weather condition is unfavorable; quality is not good enough to send to Singapore market. Important determinants are fruit fly and seed weevil infection in the fruits. Fruit color cannot compete with the fruits from Mandalay Division. Transportation system can

affect the quality and market price. They need higher mango quality from their produces and still required the technology for mango production.

Potentials of Myanmar mango export

'Sein Ta Lone' cultivar has more potential in exporting due to its appearance, color, sweetness, size, and smell attraction can compete with other countries' mango cultivars. 'Shwe Hin Thar' and 'Yin Kwe' cultivars have more potential to export. But we must use GAP standard to get the license to entry to the export market. According to my experiences, if we can follow the requirement of Singapore marketers, we have higher potential for mango exporting.

Interview Summary Report

Marketers

Name (Code): B
Date, time: 26.03.2012, 10:20 – 11:03 am (GMT+6:30) (43 min)
Place: Yak Sawk Township
Location: Southern Shan State

Characteristics of Interviewee's business

20 years of experience in fruit trading, 9 years in mango, Broker house owner, mainly contacted with Yangon market wholesalers

Intention for mango exporting

At the moment, I am just trading in the local market. For export market, I do not have any connection.

Usual conditions in mango trading

I am just a broker and help growers by giving information and supporting packing material. After packing the fruits, growers send [them] to me from the farms. They cannot go to Yangon market. I collect and send [fruits] to wholesalers in Yangon wholesale market. I have to give back their [farmers] money after a week.

Importance of mango quality

To harvest the right maturity fruits are very important. Size and grading will affect the price. The marketers and retailers expect to get quality fruits which are free from disease, fruit fly, and physical damages.

Factors hindering current mango exports

According to my knowledge, low maximum residue limit (MRL), free disease, standardized size and required quantity must have. Actually mango is not their main income crop, so they cannot emphasis only on mango. They have other business for income. They get higher income from mango, I am sure they will prepare well to get exportable quality fruits. We have to motivate the growers. We need to try for continuously and possibility to give higher price for labor. So the labor will try well intensively. Currently, we cannot give the good salary for our labor; therefore, they try only for doing intensively and get the low quality produces. In this way poverty cycle will continue.

Potentials of Myanmar mango export

We have many mangoes growing area. You can see as a mango sea in our area. If we have more opportunities to export, growers will extend more acreage. So labor problems can be solved automatically. If we can contact earlier with export market, it is better to improve our growers' condition.

Interview Summary Report

Marketers

Name (Code): C
Date, time: 29.03.2012, 2:10 – 2:42 pm (GMT+6:30) (32 min)
Place: Yak Sawk Township
Location: Southern Shan State

Characteristics of Interviewee's business

20 years of experience in fruit trading, 12 years in mango, mainly contacted with Yangon market wholesalers

Intention for mango exporting

Currently, I do not have any intention to export. It is easy to trade in local market and I become used to trading in local conditions. I just send the fruits by trucks and I do not need to go to the market by myself. Price is not so fluctuated and it is not risky. For exporting, I need to invest more. Exporting also require higher quality fruits. Perhaps, I am not going to think and emphasis about mango export. If the conditions favor, I will think about it later.

Usual conditions in mango trading

Mango fruits can be picked up in September in Yak Sawk area. So we will get higher price. I always buy fruits on the tree stage from growers. I send 'Yin Kwe' cultivars to Yangon wholesale market and 'Sein Ta Lone' cultivars to Mandalay market. It is better to send directly to Yangon than Mandalay where has to send indirectly.

Criteria on mango grading

We mainly use the wooden box to send Yangon wholesale market. However, some marketers use hard paper carte nowadays. The size of the wooden box is 30cm x 30 cm x 30 cm. Four types of grading are done on (1) Special: 65-67 fruits per box, (2) Large: 75-78 fruits per box, (3) Medium: 90-92 fruits per box, and (4) Small: 110-120 fruits per box. We still using the quantity of fruits and do not have weighting system. Depending on the size, price will differ averagely 1 US\$ for each size. For example, If special get 12 US\$ per box, Small will get 9 US\$ per box. Quality is also important to get higher price. In Southern Shan State, there are more pest and disease problems and we must control well. Without pesticides application, we cannot get good quality and higher price.

Potentials of Myanmar mango export

In my opinion, fruit production will be increased. To get the higher quality, it is depending on the weather condition for our region. But it is sure; we have the potential for exporting when we can control well pest and disease problems.

Interview Summary Report

Marketers

Name (Code): D
Date, time: 08.04.2012, 8:10 – 8:52 am (GMT+6:30) (42 min)
Place: Chanayethazan Township
Location: Mandalay Division

Characteristics of Interviewee's business

30 years of experience in fruit trading, 12 years in mango, Broker house owner, mainly contacted with local market wholesalers and retailers throughout the country, Chairman of MFVP M

Intention for mango exporting

I want to export more quantity of mango. Actually I have more connection with local retailers throughout the country. If I have a chance, I will try to export.

Usual conditions in mango trading

The growers will send their produces to my ware house. I have connected regularly with the growers from Mandalay Division and Southern Shan State. For money matter, we are using payment system afterwards selling and not using for immediate payment.

Post-harvest handling practices

To harvest the right maturity stage is very important for quality fruit. After harvesting, fruits are put under the shade tree. Fruits are harvested up to noon. And then the harvested fruits are precooling and cleaning. During cleaning, grading is done. The fruits wrap with newspaper and put into the hard paper carte.

Criteria on mango grading

In 15 kg paper box, large – 28-30 fruits, medium – 30-35 fruits, small – 40 fruits.

Importance of mango quality

‘Sein Ta Lone’ quality fruits should be the same size, free from damage, free from spot on the skin, together with 0.5 inch of pedicel, the same color and the same cultivars. If quality is low, price will be differing more.

Factors hindering current mango exports

To test residue maximum limit, FBI has only in Yangon. It is one kind of determinants and delay for export processes. If we use bagging, MRL will have lower amount during harvest period. Farmers need to practice GAP standards as much as possible.

Potentials of Myanmar mango export

Potential of Myanmar mango have to increase. Farmers must have the knowledge about quality fruit. ‘Sein Ta Lone’ cultivar is top one when compared with other cultivars. If we can try well to produce higher or exportable quality fruits, it is sure to increase export quantity.

Interview Summary Report

Marketers

Name (Code): E
Date, time: 08.04.2012, 10:50 – 11:13 am (GMT+6:30) (23 min)
Place: Chanayethazan Township
Location: Mandalay Division

Characteristics of Interviewee's business

35 years of experience in fruit trading, 22 years in mango, Broker house owner, mainly contacted with local market wholesalers and retailers throughout the country

Intention for mango exporting

I do not want to export. I am always busy about fruit trading in Mandalay. I have connected with so many retailers throughout the country. Sending mango to export market is more risky than local market. I would like to work peacefully in local.

Usual conditions in mango trading

Mangoes are sending to the ware house from Mandalay and Sagaing Divisions. And then I have to redistribute to Muse, Lasho, Pakokku, Myinn Chan, Magway, and Minbu etc.

Criteria on mango grading

Grading is done three types as Large, Medium and Small. We are selling the number of fruits or quantity system.

Importance of mango quality

Color and fruit size are equally important for fruit quality. Sweetness, freshness and the right ripening stage are also important.

Factors hindering current mango exports

It is not easy to send for exporting. It will need good transportation, cool chain facilities, and it has more risky than local market.

Potentials of Myanmar mango export

We need more service in post-harvest practices. We should build up cold room facilities and then arrangement for harvesting to get the target quantity by the lists of orchards. I think exporting mango quantity can increase in coming years.

Interview Summary Report

Marketers

Name (Code): F
Date, time: 25.04.2012, 1:35 – 1:56 pm (GMT+6:30) (21 min)
Place: Kyaukse Township
Location: Mandalay Division

Characteristics of Interviewee's business

22 years of experience in fruit trading, mainly send to China through Muse border trade and contacted with Yangon market wholesalers

Intention for mango exporting

I always send to China market through Muse border trade.

Usual conditions in mango trading

I always buy fruits on the tree stage from the growers who would like to sell [fruits] 3-4 months before harvesting. I pay 1/3 of payment in the first installment and have to pay the rest after selling the fruits. And then I have to prepare the whole farms. Without doing like this, it is so difficult to get quality fruits to send to Muse border trade. The targeted areas produced 'Sein Ta Lone' cultivar from the main growing areas such as Kyaukse, Sintkaing, Myintthar in Mandalay Division and Pinphyet, Yadanarphone area in Southern Shan State.

Post-harvest handling practices

After harvesting, the fruits are complying under the shade and precooling is done. And then cleaning is done with wet clothes and grading the fruits. The fruits wrapped with paper and put into hard paper carte and do not close immediately to get air circulation. It will close later.

Criteria on mango grading

In my cases, we grade only two types; No.1 and No.2. by size. The market price is difference depend on the grade. If No.1 get 60 Yuan (Chinese currency), No.2 will get 35-40 Yuan. But market price may change according to the fruit quality.

Importance of mango quality

To get higher price, fruit will be freshness, free from damaged at least 3 fruits per kilogram, free from spot on the skin, the right maturity stage. Color and sweetness are perfect in our area. But bagged fruits can get higher price than unbagged ones.

Importance of market information

During I am working, if they come and asking about the information, I explain fully the using system and requirement of market as well.

Factors hindering current mango exports

To prepare good quality fruits, it is not so difficult. In Muse border trade, we could not get the premium price even for high quality fruits. Chinese marketers are checking the supply of fruits in Muse border trade. If more supply is available, they will give lower the price than before. Sometimes we are so disappointed about them. However, I have another way to sell the produces. If we send to local markets, we cannot get money immediately due to their back payment system and less demand. In Muse border trade, we can sell more quantity at one stop and can get money within one day but we cannot get good price. Simply say, we have to go to only Muse border trade at the moment. We must search out other export market.

Potentials of Myanmar mango export

Mango production will increase yearly. If we have more opportunities to choose export countries, it will be most advantages for grower from our area. Only muse border trade channel, we have no expectation because the supply increase ever year and we always receive lower price. If our country's political condition is improve and open the sanctions from the US and EU, we will get more opportunities to export our fruits. However, we have to learn and prepare well according to their quality control standard and regulation. It can conclude that Myanmar mango exportation will increase anyway.

Interview Summary Report

Marketers

Name (Code): G
Date, time: 20.04.2012, 5:40 – 6:15 pm (GMT+6:30) (35 min)
Place: Tada-U Township
Location: Mandalay Division

Characteristics of Interviewee's business

22 years of experience in mango trading, mainly send to China through Muse border trade and contacted with Yangon market wholesalers

Intention for mango exporting

I mainly send to China market through Muse border trade.

Usual conditions in mango trading

I always buy the fruits on the tree stage from the growers who would like to sell 3-4 months before harvesting. I was a representer of one ware house from Muse border trade. I distribute paper crate and another required accessories for packing materials to the growers. And then accepting the package from the growers and preparing to send to ware house from Muse.

Criteria on mango grading

We grade [mangoes] into two sizes as Special and Large under the bagged and unbagged fruit types. Special size: 40 fruits per 15 kg box and Large size: 48-50 fruits per 15 kg box. 'Sein Ta Lone' cultivar has average 3 fruits per kilogram and 'Shwe Hin Thar' cultivar has average 3-4 fruits per kilogram.

Importance of mango quality

To get higher price, fruit must possess the characters of CBFWSTP, which are color, beauty, freshness, weight, size, taste and packing. If we can produce quality fruits, we can get higher price and increase our income. I am willingness to develop the growers' economic condition. Our growers have to strive well too. They need to develop their pre- and post-harvest practices carefully.

Importance of market information

I always shared the quality requirement of market and important facts for quality improvement and it will affect our income as well.

Factors hindering current mango exports

For exporting, we have no facilities for cold room, cold chain logistics. And then we should organize well as co-operative company or government to get exportable quality fruits. At the moment, we cannot send more amounts of quality fruits even Muse border trade, so we get lower price. Packing and post-harvest technology is affect for exportation.

Ideas to improve mango quality

We should start to prune mango trees in our mango growing area. And then we should do the heavy and light pruning yearly to avoid the damage of wind storm. I am sure, without pruning we cannot produce the good quality fruits and we can lose our market demand later. Nowadays, growers are planting mango trees as extra income and they do not take care to get quality fruits. However, they want to get higher price at the harvesting period. We should have [this fact] in mind and change [farmers' state of mind] as it is a commercial production and they should emphasis well in quality improvement. Doing intensive care and using systematically technologies on trees can avoid damages from seasonal wind storm and we will get exportable quality fruits.

Potentials of Myanmar mango export

Mango exporting will increase. However we need to strive for exportable quality fruits. They must do pruning system and they have to learn systemic packaging. Myanmar can be a rich country only from mango trading income if we take care well in each fruit. Currently, so many losses occur. We are so lucky for the most favorable weather conditions to get higher quality mango fruits when compared with Yangon, Bago and Southern Shan State. We have potentials for mango exporting, I can say surely.

Interview Summary Report

Marketers

Name (Code): H
Date, time: 08.05.2012, 7:50 – 8:26 pm (GMT+6:30) (36 min)
Place: Muse Township
Location: Northern Shan State

Characteristics of Interviewee's business

24 years of experience in fruit trading, Broker house owner in Muse Township, connected with local growers, marketers and Chinese brokers

Intention for mango exporting

According to my knowledge, I have very clear vision about our mango market place in China. At the moment, shelf life of mango is not so long, only a week. Therefore, we could send [them] only to the border area of Yunnan Province, China. If we can produce the exportable quality fruits, we have to prepare well and use logistic facilities to send to the mainland of China, where there are more population and higher demand for mango. We have to take the opportunity of market availability by sending our produces. However, our growers need to demonstrate how we could get the higher quality fruit. Therefore, I established one mango farm in Mandalay Division since last 3 years. Hope they can follow well.

Usual conditions in mango trading

I am an owner of ware house in Muse. The growers and marketers send their produces from Mandalay Division and Southern Shan State to me. I sell their fruits to Chinese marketers. I just take 5% of income of the growers and marketers but I have to pay them by cash at the time they bring fruits to me. After selling [fruits] within a week, Chinese marketers will give back money to me. Between me and Chinese marketers, it is very rare immediate payment. Therefore, I have to choose the trustiest marketers who I have long-term relationship as well.

Criteria on mango grading

Currently, grading is categorized into two sizes as special and large. But it will be separated into two groups as bagged and unbagged fruits. Price is fluctuated and variant depending on the demand, supply and quality.

Importance of mango quality

Before harvesting, fruit quality is very good on the tree. Due to the lack of knowledge and inadequate of facilities, mango fruit quality is very low and shelf life is very short when it arrives to Muse market. They do not know that they are destroying their fruits quality themselves. Currently, market is no so expanded and production is increasing year after year. If we did not take care about post-harvest practices well, we should be worried for the future market demand.

Importance of market information

I have always talked about market information with the marketers from Myanmar and China.

Factors hindering current mango exports

Most mango trees are very high in Mandalay Division. It is difficult to harvest. It can't avoid wind storm that normally happened about March and April in Kyaukse, Sintkaing and Myintthar Township. Without doing systematic packing house, quality is defected. And if we used HWT, it is better for shelf life and diseases control. Transportation charges are very high that is 700 US\$ per tons of fruits for 400 km that type of transportation charges can't have other countries.

Ideas to improve mango quality

We have to change planting system to be higher density for the new established farms. For the old mango farms, we must do heavy pruning practice mainly in Mandalay Division. The growers do not like to change this system. They prefer more shady, big and high trees. In commercial production, using systemic pruning practice is very important to get exportable mango quality and higher income. Another point is we have to care the fruits along the supply chain for prolonging their shelf life. Current practices are affecting on shorter shelf life of mango.

Potentials of Myanmar mango export

As I said before, I see the clear market demand in my eye and I do not worry for the market place. We have a very big market in China. If we can produce higher quality fruits, we can extend our mango market to the mainland of China. I am sure that the potential of Myanmar mango export will be increased.

Interview Summary Report

Exporters

Name (Code): A
Date, time: 10.03.2012, 10:35 – 11:12 am (GMT+6:30) (37 min)
Place: Kyimyindaing Township
Location: Yangon Division

Characteristics of Interviewee's business

Owner of Fruit Export and Import Trading Company, experience in mango export to Singapore since 2005, one of the pioneer in Myanmar fruit exporting

Requirement for different export markets

For Singapore market, it needs higher quality. We cannot send more quantity to Singapore where there is higher competition in market price with India, Malaysia and Thailand mangoes. Myanmar 'Sein Ta Lone' cultivar has higher fruit quality and price than other ones. One of the reasons is because transportation and transition cost from farm to Singapore market is higher in double than India. Due to the unqualified logistic facilities and unsystematic post-harvest handlings, fruits shelf life is not so long when compared with R2E2 cultivar [from Australia]. In Muse border trade, I think they are using the wrong system. We do not send fruits according to the order. We are sending and selling what we have. It is buyer market and we will receive only buying price from them. It is very different from Singapore market.

Importance of mango quality

According to the supporting of bagging method by FAO, it is improve in fruit color and reduce in fruit fly damage. We need to reduce the transportation period from farm to market. If we could export well to Singapore, we can explore other markets to UAE and Russia. For Japan, we must need very good quality fruits and use Vapour heat treatment (VHT).

Factors hindering current mango export

The main problem is poor logistic facilities. We cannot get higher quality fruits from Mandalay Division due to the height of plants. They should use pruning system and bagging. It will need institutional and governmental supporting for the post-harvest facilities and training activities. Then low currency exchange rate [high value of Myanmar currency] can affect the export quantity. It is very weak in research and development of mango exportation. The growers' lack of agri-business knowledge can effect on the quality mango production.

Ideas to improve mango quality and exporting

It is essential to share the quality requirement of the other marketers in the growers' level. Collaboration has to be organized among the stakeholders in the supply chain. Research and development is very important to improve in the mango exportation.

Interview Summary Report

Exporters

Name (Code): B
Date, time: 10.03.2012, 1:10 – 2:22 pm (GMT+6:30) (72 min)
Place: Kamayut Township
Location: Yangon Division

Characteristics of Interviewee's business

Owner of Agricultural trading company, 5 years of experience in mango export to Singapore, Vice Chairman of MFVP

Usual conditions in mango trading

I connected with marketers from Mandalay Division to get the required amount of mango quantity. On this side, I have contracted with the Singapore buyer.

Requirement for different export markets

I send only to Singapore market, and I did not have another market requirement yet.

Importance of mango quality

Higher quality is important to get higher price. For international market, fruits weight should have at least 0.33 kg, three fruits per kilogram. Sweetness, early ripening and smell are better in the cultivar from Mandalay Division than the cultivar from Southern Shan State. But the size of the fruit from Southern Shan State is bigger. Therefore, price can vary depend on the fruit quality and different production places.

Factors hindering current mango export

We could not supply more than two metric tons per day when we only use passenger flight and cost is very high. It is better to send via oversea trade. But we still need the technology to prolong shelf life [of fruits] when we use the low cost flights, so that, we can compete for the market price in Singapore market. The growers harvest the fruits (mature and immature) at the same time. They need to change harvesting practices. It is difficult to grading without using sorting machine. And then we do not have commercial packing house and cold storage facilities.

Ideas to improve mango quality and exporting

We need to apply quality control system or using GAP standard. We must change the harvesting system. We should organize well to explore new market. We need to use sorting machine and qualify packing house. We still need the technology for oversea trade.

Potentials of Myanmar mango export

Currently, mango growing areas are extending and production will increase yearly. We have potential for mango exporting. But we need to develop in research and development, marketing strategy, good management from harvesting to retail markets. We have to think about value-added products.

Interview Summary Report

Exporters

Name (Code): C
Date, time: 31.03.2012, 4:25 – 5:09 pm (GMT+6:30) (44 min)
Place: Shwe Nyaung Township
Location: Southern Shan State

Characteristics of Interviewee's business

12 years of experience in mango production, export to China through Muse border trade and send to Yangon market wholesalers and super-market, a main organizer for export in their growing area

Requirement for different export markets

To send muse border trade, it [mango] has two sizes, Special- above 400 grams and Large – 350-400 grams. Market price can vary depend on the oversupply condition. Fruit, Less than 350 grams, will be sent to Yangon Supermarket. I prefer to send [mangoes] to Yangon supermarket because price is stable there than at Muse border trade.

Importance of mango quality

If it is oversupply conditions in Yangon wholesale market, we cannot get higher price even we send higher quality. Muse border trade, we can send more quantity but higher fruit quality must be needed.

Potentials of Myanmar mango exporting

I think mango exporting can be increased in the future. We know the technologies for improvement, but we have unfavorable weather condition. Now we are using bagging method. If we can control fungus diseases, fruit-fly, pulp and seed weevils problems, we can produce exportable quality fruits. We must apply IPM and post-harvest practices in the practical field.

Interview Summary Report

Exporters

Name (Code): D
Date, time: 06.04.2012, 8:05 – 8:34 pm (GMT+6:30) (29 min)
Place: Taunggyi Township
Location: Southern Shan State

Characteristics of Interviewee's business

6 years of experience in mango production with 100 acres, owner of fruit trading company, 5 years export to China directly contact with wholesalers from Kunming, attended many trainings in DOA and MFVP, Chairman of MFVP SSS

Usual conditions in mango trading

Firstly, I send mango from my own orchard to Muse border trade. According to [my] experiences, I am feeling that I must organize with other growers to explore new market. So, our five companies organized and sent 30 metric tons of mangoes to Kunming [China] by contacted with DAS Company, last year [2011]. We need to send to Muse border trade to change the truck. That kind of direct exporting can avoid one step of transition from Muse marketers and need to pay 5%. However, we must use GAP standards and post-harvest practices well. Without using GAP standard, we have no expectation to export. I have prioritized on the market because only stable market can give the certain price.

Importance of mango quality

The produces should meet the requirement of markets. It can vary depending on the export markets. If we can produce higher quality fruits based on the GAP standard, it is sure to get higher price and stable market demand. Here, GAP standard fruits must have four points: good quality, free fungus, free chemical residue, and able to treat back. Firstly, we should emphasis to produce higher quality fruits. After then we should access to export markets. Without producing quality fruits, we should not think about exportation and to get higher price.

Factors hindering current mango export

We meet difficulties in logistic from farm to Muse border trade. Currently, about 80% produce from Mandalay Division and 25% from Southern Shan State are sending to Muse border trade but quality fruits are very low. Market competition from other competitors did not see yet in Muse border trade. But we cannot say that in 2015 when there is AFTA [ASEAN free trade area], we can have market competition. Also exchange rate can affect the export quantity.

Ideas to improve mango quality and exporting

Government needs to support loan system to the growers to improve fruit quality and to build up small scale processing factories. We should apply win-win situation within the supply chain stakeholders. Firstly, we should emphasis on producing higher quality

fruits. After then we should access to export markets. Without producing quality fruits, we should not think about exportation and to get higher price.

Potentials of Myanmar mango export

If I say as a grower, I expect the best opportunity for exports. Increasing in planting areas and production of mango can happen on the product oversupply for local consumption. The growers will find out the ways to export. If I say as an exporter, the growers produce low quality fruits, we cannot export long-term and we will lose our market share soon.

Interview Summary Report

Exporters

Name (Code): E
Date, time: 07.04.2012, 2:40 – 3:40 pm (GMT+6:30) (60 min)
Place: Sintgaing Township
Location: Mandalay Division

Characteristics of Interviewee's business

30 years in mango trading, mainly contacted with Chinese marketers, initiated to change wooden carte to paper carte among marketers

Usual conditions in mango trading

I have connected with the growers and supporting packaging materials and required information for quality. I receive either the already packed fruits or only the fruits. For the first case, I just checked and recorded to send Muse border trade. For the latter case, I have to clean, grade and pack well to send Muse border trade or to Yangon marketer who is exporting to Singapore market.

Requirement for different export markets

Buyers at Muse border trade need only bagged fruits. It can be longer shelf life and bright color of fruit. By doing for bagging in the right time (55-60 days after fruit setting), we might get fruit fly and seed weevil free fruits. We are producing and sending fruits as raw material to the China market through Muse border trade. Currently, we do not have direct export market and rely only on the Chinese buyers. Actually, they are just the middle men and they give very low price. We need to find the direct market for our produces.

Criteria on mango grading

Grading has three sizes as special, large and medium.

Importance of mango quality

Mango fruit quality is very important to get higher price.

Factors hindering current mango export

We should have prioritized the requirement of buyers or export markets. If we can produce and prepare according to their standards, we will get higher price. Low exchange rate can affect the export quantity.

Ideas to improve mango quality and exporting

We should organize and adjust well for the market supply quantity by organizing MFVP. We should open one collecting center in Muse border trade and accept all mangoes from the growers and marketers. And then we will use auction system for the produces. Every Chinese marketer must buy from this collecting center. The marketers from Muse border trade [from 38 ware houses] should conduct in turn. We can control oversupply and to get stable price for our produce in this way.

Interview Summary Report

Exporters

Name (Code): F
Date, time: 07.04.2012, 7:45 – 8:42 pm (GMT+6:30) (57 min)
Place: Chanayethazan Township
Location: Mandalay Division

Characteristics of Interviewee's business

15 years of experience in mango production, owner of fruit trading company, 9 years export to China through Muse border trade, 2 years connected with Singapore market, Chairman of MMG M

Usual conditions in mango trading

I built small packing house and grading and cleaning after collecting the fruits from the growers. Low quality mangoes are separated for making mango pulp. High quality fruits are given hot water treatment (HWT) for standard packing system to send Yangon marketer who connected with Singapore buyers. I am planning to extend China market through Muse border trade. However, Singapore market can get higher and certain price. For China market, the price can be variable depend on the mango supply.

Requirement for different export markets

For Singapore market, we need higher quality fruits than China market, we have to apply HWT and Cold water treatment (CWT) to control diseases and prolong shelf life. We are planning to do for both markets coming seasons. Packing system will change to single layer with quality paper crate of plastic box. We have a plan to reduce frozen mango.

Criteria on mango grading

When I am sending to Singapore market, grading is done as Small- less than 300 grams, Medium – 300-350 grams, Large – 350-400 grams, and Jumbo –above 400 grams. Price will differ 200 US\$ between the sizes.

Factors hindering current mango export

We still do not have real export market. Consumers do not know taste and quality of 'Sein Ta Lone' cultivar. The higher volume of exportable quality cannot produce due to the requirements of cold storage facilities and less of following up post-harvest practices. If we could not prepare well and produce quality fruits, we can lose current market share. The transportation charges per kilogram of fruits are higher than other countries.

Ideas to improve mango quality and exporting

Government should support small loan system to the growers. The growers should use GAP standards and pre- and post-harvest practices well.

Potentials of Myanmar mango export

Myanmar mango potential has increased. Currently more extending mango growing area, more training from DOA, MFVP and supporting from government and FAO are still needed.

Interview Summary Report

Experts

Name (Code): A
Date, time: 08.03.2012, 10:24 – 11:50 am (GMT+6:30) (86 min)
Place: MFVP, UMFCCI
Location: Yangon Division

Characteristics of Interviewee's business

Mango grower, marketer, consultant, GAP trainer, attended many trainings in DOA, MFVP and Thailand, Executive committee member of MFVP

Compare Myanmar mangoes qualities with other competitors

Fruit quality includes as fruit shape, size, color, smell, odor and taste. Compared with other countries' mango cultivars, Myanmar mango cultivars such as 'Sein Ta Lone', 'Shwe Hin Thar' have stronger points. In Malaysia, they accept the quality of 'Sein Ta Lone' and called "Solatel" [Rare diamond in Malaysian language]. It has shorter shelf life than 'R2E2' (40 days). 'Sein Ta Lone' cultivar has the highest sweetness level among the other cultivars. 'Shwe Hin Thar' cultivar can compete in sweetness with 'Nam Doc Mai' cultivar [from Thailand]. But 'Nam Doc Mai' cultivar has been popular for more than 20 years ago. It needs to advertise and should use suitable marketing strategy for new market exploring.

Factors hindering current mango export

The growers from other countries targeted for export market. Myanmar mango growers are just growing for quantity and do not targeted for quality fruits. So they could send [fruits] only to China market who can accept the produces with loosely standard. But they will ask the GAP certification later on. If we want to send [fruit] to international market, it is not possible with the current mango quality standard. High transportation cost, many steps in supply chain, growers get lower price and no intention to produce good quality fruits and lack of marketing knowledge can affect the exportable mango quality. And then trading policies and government management systems still need to be change.

Potentials of Myanmar mango export

Myanmar mango exporting has the opportunities to increase more than last year. Some marketers from Malaysia and Singapore came and discussed for mango exportation. China border trade will be regular. According to the extension of growing areas, growers will try to find new market opportunities and will target to produce exportable quality fruits. We have very near market as China where we have more market share. Pakistan and India are trying to send their mango to China. If we can produce higher quality fruits, we will get more market share in China market.

Suggestions to improve mango export quantity

The growers need to change from their traditional practices to the international production practices. We still need to give more training as possible. Growers should study tours from another countries' production system. The growers and traders need awareness to reduce transition cost.

Trading policies are very important to increase export quantity. Government need to be supported in research and development. We should do mango exhibition and promotion activities. Present condition is the most suitable period to develop. Information flow is essential. Media such as radio, TV, Newspaper, Journals should show more about Myanmar mango. Post-harvest technologies need to be applied in the practically with supporting investment and factories. If we can build up well for every factor, Myanmar mango exporting will be increased.

Interview Summary Report

Experts

Name (Code): B
Date, time: 09.03.2012, 1:40 – 2:41 pm (GMT+6:30) (61 min)
Place: MFVP, UMFCI
Location: Yangon Division

Characteristics of Interviewee's business

28 years of experience in mango production, Owner of fruit tree nursery, attended many trainings in Thailand, Secretary of MFVP

Compare Myanmar mangoes qualities with other competitors

'Sein Ta Lone' has attractive smell, kidney shape, and bright yellow color. Sweetness is about 23.5 °Brix, no fiber, higher protein and long shelf life.

Factors hindering current mango export

Main point is that the growers cannot follow post-harvest practices due to low investment, difficulties in finding required materials, difficulties in infrastructure. Above 95 % of growers could not conduct cold storage. In brief, due to inadequate investment, they cannot follow all practices. Currently, using vehicles are not suitable for vegetable transportation and lead to reduce fruit quality and reduce the export quantity. All factors are related to each other. If one factor is missing, we cannot get higher quality.

Potentials of Myanmar mango export

Myanmar mango exporting has potential to increase due to more production area and awareness of the growers to produce exportable quality fruits. Myanmar mango cultivars are higher qualities than other countries' cultivars. If the consumers have eaten our fruits, they will prefer, surely.

Suggestions to improve mango export quantity

Pre and post-harvest training should give more than current condition to the growers and marketers. It will need to build up good infrastructure. Government should support loan to the growers. It will need cold storage truck and facilities along the supply chain. Myanmar GAP Standard should implement as soon as possible. Controlling fruit fly, seed and pulp weevils and anthracnose disease are also important to improve mango fruit quality.

Interview Summary Report

Experts

Name (Code): C
Date, time: 12.03.2012, 1:30 – 4:03 pm (GMT+6:30) (93 min)
Place: Yezin Agricultural University (YAU),
Zeyathiri Township, Nay Pyi Taw
Location: Mandalay Division

Characteristics of Interviewee's business

Lecturer of Department of Horticulture in YAU, studied about mango postharvest practices in master and doctoral degrees

Compare Myanmar mangoes qualities with other competitors

According to my experience and researches, Myanmar 'Sein Ta Lone' has higher sweetness level (23.8 °Brix) than 'Irwin' (14-15 °Brix) and 'Nam Doc Mai' (10-11°Brix).

Factors hindering current mango export

In conclusion, the quality criteria of intended countries, Institutional supporting, logistic facilities, transportation, extension to the grower level are very important to get higher quality. If fruit quality is increased, export quantity will be higher automatically.

Potentials of Myanmar mango export

There is increasing in mango planting areas. Production cannot enough only with local market. Connected with foreign countries will be increased in future. If the required technologies can apply well, their [growers] market will be sure in 2015 AFTA. If it is not, we must give our market share to other mango producing countries.

Suggestions to improve mango export quantity

It still needs to conduct more training about pre and post-harvest practices in the whole supply chain of the stakeholders including the labors. If we can prepare, the export quantity will increase soon. Regarding plant quarantine policies, it should change availability to access everyone [countries]. Foreign supporting and investment also will be needed. Cold storage system, cool chain facilities must be built.

Interview Summary Report

Experts

Name (Code): D
Date, time: 10.05.2012, 3:40 – 4:26 pm (GMT+6:30) (46 min)
Place: Department of Agriculture (DOA),
Dekkhinathiri Township, Nay Pyi Taw
Location: Mandalay Division

Characteristics of Interviewee's business

Deputy Director General in Horticulture section, DOA, well connected with FAO and MFVP (Yangon, Mandalay and Southern Shan State)

Factors hindering current mango export

The growers have inadequate infrastructure. Quality packing materials are unavailable in our country. It affects the quality of fruits. The small growers need small loan system from government. No one invest in infrastructure development and cold storage, packing house and cool chain facilities.

Potentials of Myanmar mango export

Currently, our country is moving to develop in every sector. FAO is supporting to develop in agricultural portion. I expect that foreign investors will invest in horticultural section. India investors want to invest in mango juice factory. So our growers and marketers will increase their knowledge and the potential of mango exporting will be good in future.

Suggestions to improve mango export quantity

To increase quality and quantity of exporting, all stake holders from supply chain must have awareness. We should learn another countries' production system and need to invite foreign investors. We should not depend only on fresh mango exportation and we should think about value-added products. We should use marketing strategy to promote export market and prepare attraction of our products such as logo, brand, name, etc.

Interview Summary Report

Experts

Name (Code): E
Date, time: 11.05.2012, 8:05 – 8:32 pm (GMT+6:30) (27 min)
Place: Department of Agricultural Research (DAR),
Zeyathiri Township, Nay Pyi Taw
Location: Mandalay Division

Characteristics of Interviewee's business

Director of Bio-technology, Seed Bank and Plant Protection sections (DAR), former Deputy Director in Horticultural Section, and National Consultant in FAO

Compare Myanmar mangoes qualities with other competitors

It may be our Myanmar's preference on our fruits than other ones. Myanmar 'Sein Ta Lone' can compete with 'Nam Doc Mai' cultivar. Sweetness of 'Sein Ta Lone' is higher than 'Nam Doc Mai'. However, 'R2E2' has attractive color and good keeping quality, longer shelf life, and larger fruit size.

Factors hindering current mango export

We could not use vapour heat treatment (VHT) due to very high investment. Without using VHT, we have no possibility to export to Japan. They do not accept normal fungicide treatments. Therefore we can't get higher price even we could export higher quality fruits. Other reasons are transportation and cold storage facilities requirement. Due to the unsure market price in Muse border trade, growers have no intention to produce high quality fruit. In peak season, quality is not so related to get higher price because of oversupply condition.

Potentials of Myanmar mango export

There is increasing in mango planting areas. Production will not be only for local market. If we can apply IPM, bagging and post-harvest handling practices well, mango quality will improve and consequently [export] quantity will increase.

Suggestions to improve mango export quantity

For new growers, they should choose suitable places, soil types for mango, weather conditions and transportation. Closed spacing must apply for all growers. They should apply fertilizer application, pest and disease management, pre- and post-harvest practices, they will get good quality fruits. The main one is to follow good post-harvest handlings and processing portion. Post-harvest practices training should give as possible in the growers and marketers level. We should need cold storage facilities and institutional supporting. We need to explore new export market.

Interview Summary Report

Experts

Name (Code): F
Date, time: 13.04.2012, 2:40 – 3:16 pm (GMT+6:30) (36 min)
Place: Department of Agricultural Research (DAR),
Zeyathiri Township, Nay Pyi Taw
Location: Mandalay Division

Characteristics of Interviewee's business

Senior Researcher in DAR, 14 years of experience in mango production and research, studied about mango postharvest practices in master degree and doing doctoral degree in mango postharvest practices also

Compare Myanmar mangoes qualities with other competitors

I think we can explore international market with our fruit qualities. However, the growers must follow the quality improvement practices.

Factors hindering current mango export

The result of lower fruit quality is coming from the difficulties in transportation and cannot follow post-harvest practices. Our weakness is to implement GAP standard Certification. Most growers have no target for commercial production and no intensive care. They should use commercial system as close spacing, pruning and training, systemic irrigation, fertilization, so the good quality fruits will get.

Potentials of Myanmar mango export

Growers are affecting oversupply condition in the market. If they understand as the fruit quality is the most important for exporting, they will emphasis to produce quality fruits and find out the new markets for their produces. So we will have potential for mango exporting.

Suggestions to improve mango export quantity

We should have better communication with growers to share our research and development findings. We need to educate the growers to use GAP standard and post-harvest technologies. If the growers use only their traditional knowledge, development will be slow. Institutional and governmental supporting is better to improve in that field.

