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COMMITTEE ON COMMODITY PROBLEMS

JOINT MEETING OF THE FOURTH SESSION OF THE SUB-GROUP ON BANANAS AND THE FIFTH SESSION OF THE SUB-GROUP ON TROPICAL FRUITS

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A CASE STUDY OF TROPICAL FRUITS IN ASIA, WITH SPECIAL REFERENCE TO MANGOES AND PINEAPPLES

I. INTRODUCTION

1. There has been a gradual increase in the production of tropical fruit from an estimated 64 million tonnes in 2002 to more than 72 million tonnes in 2007. The largest tropical fruit producing region is Asia followed by Latin America and the Caribbean, Africa and then Oceania. Mangoes and pineapples are the major tropical fruits produced, accounting for about 40 and 25 percent, respectively, of global production, with Asia alone accounting for 73 and 51 percent of all respective output.

2. The purpose of this study is to survey, compile and review information pertinent to the present state of mango and pineapple value chains. In doing so, the role of different actors along value chains is highlighted, including how information is passed between stages and how the value chain contributes to the welfare of farmers and other stakeholders. The study will also review the potential factors that limit the expansion of domestic consumption and exports, and how these might be overcome. Much of the focus is on smallholder farmers in countries including India, Indonesia, the Philippines and Thailand who make up more than 60 percent of the population.

II. THE TROPICAL FRUITS VALUE CHAIN

3. In recent years, conceptualizing activities from a value chain perspective has transformed the understanding of horticultural production and marketing systems. The value chain describes the chain of operations, services and actors in meeting market demand. It can assist in measuring the efficiency and competitiveness of horticultural crops, including tropical fruits. Understanding the value chain requires an understanding of the market system in its totality, from input suppliers, producers, buyers, those providing support services, all the way to consumers. Transaction costs occur along the chain, which compound towards the final product price. The

challenge of any value chain is to add value to the end product but at the same time to reduce transaction costs.

4. The tropical fruit value chain is similar to other horticultural chains, and differs depending on locality, market structure and actors involved. An important feature of the value chain is that its functioning is dependent on market structure and the type of demand. For instance, are the products going to be sold at the local market, in supermarkets, or are they to be exported? The end market determines the role of the actors in the chain, including growers, traders, wholesalers, suppliers, processors and exporters. With the popularity of supermarkets and the rising demand for quality and safe fruits, the traditional value chain is becoming more dynamic and market oriented.

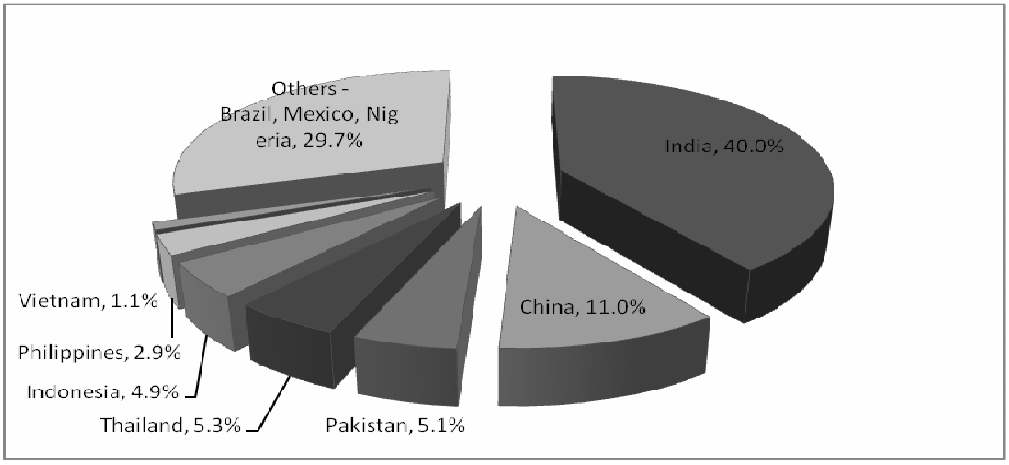
5. A typical tropical fruit value chain in Asian countries involves the following activities and actors:

a) Input suppliers – those who provide services and inputs along the chain from planting materials, fertilizers, equipment, transportation and financial services.
b) Growers – those who cultivate, harvest, assemble, sort and grade the fruits before field packing into containers. Growers may also sell their produce in limited amounts to retailers or consumers.
c) Farm collectors – buy fruits from growers. Fruits are re-sorted, re-graded and re-packed in collection centers. The farm collector may be an advanced grower in the producer community. The collector sells the products to the wholesaler.
d) Traders – typically mirror the operations of the collector. They buy fruit direct from growers by arranging pre-harvest contracts, or buy produce from the farm collector. Some traders also carry out re-sorting and re-grading.
e) Processors – typically add value to the products. They manufacture juice, dried, canned and jam products from the fresh product. Their role in the fruit chain is of particular importance in times of glut. Processors source their supplies direct from growers, traders and field collectors. The fruit grade is determined by the processor.
f) Wholesaler / distributor – buys fruit from traders or farm collectors. The wholesaler supplies the products to supermarkets, retailers and exporters. At this stage, the fruit products are already differentiated according to the degree of market segmentation.
g) Supermarket / retailers – define the direction of the value chain in terms of consumer preferences, quality and market demand.

III. MANGO PRODUCTION AND MARKET TRENDS

6. In 2007, seven of the top ten largest mango producing countries in the world originated in the Asian continent. India stood as the world's biggest mango producer accounting for almost 40 percent of the total production figure of 33,445,279 tonnes. The others in descending order were China (11 percent), Thailand (5.3 percent), Pakistan (5.1 percent), Indonesia (4.9 percent), Philippines (2.9 percent) and Viet Nam (1.1 percent). In most of these countries mango is a small-holder crop.

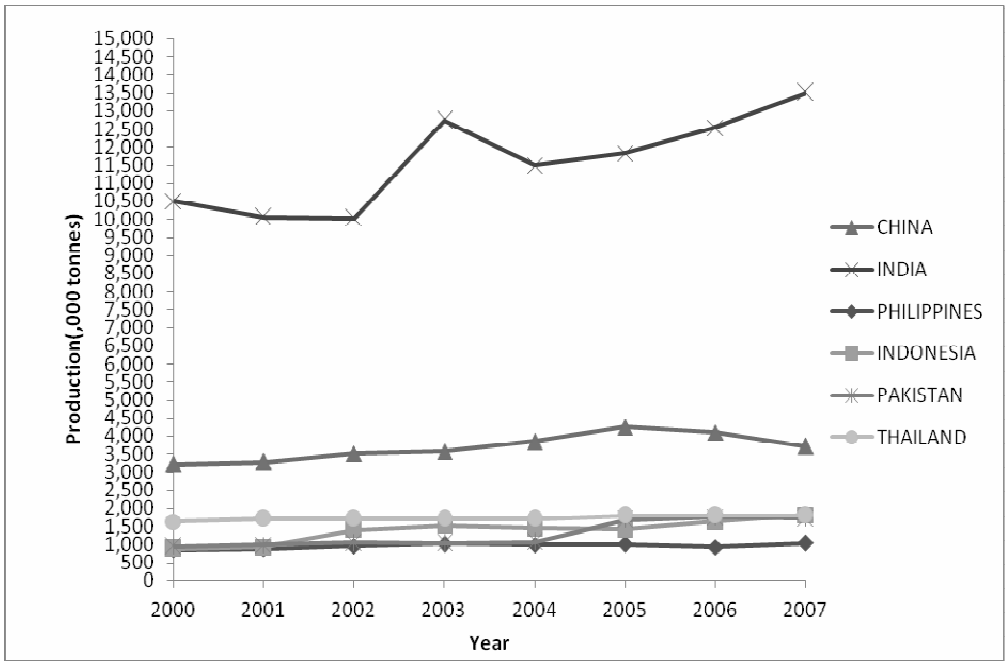
Figure 1: The top ten mango producing countries



Source: FAOSTAT.

7. For the past seven years, mango production shares in China, Philippines, Indonesia, Thailand and Pakistan, have been largely consistent, with India maintaining its role as the world's leading producer, gradually increasing production from 2005 to 2007 (Figure 2).

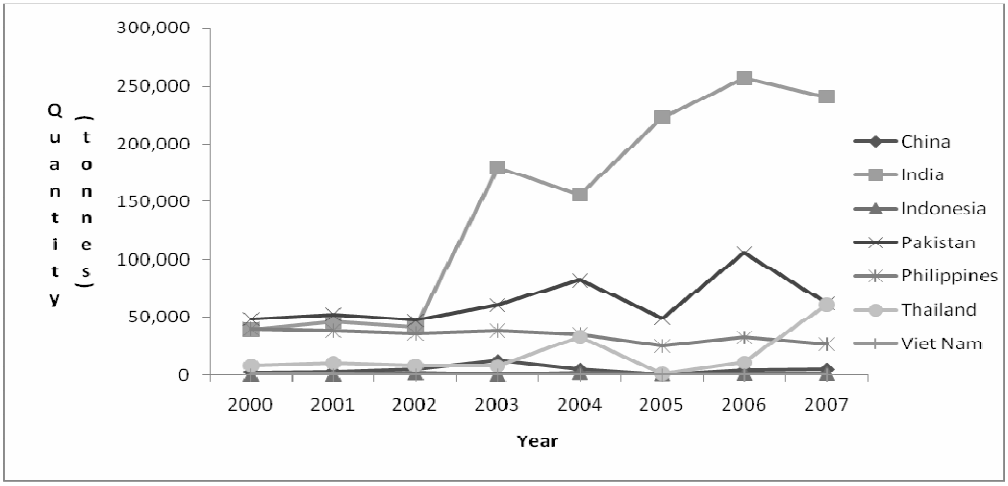
Figure 2. The top Asian mango producing countries



Source: FAOSTAT.

8. As for mango exports, India is the largest exporter followed by Pakistan. However, there has been a marked increase in supplies from Thailand (Figure 3).

Figure 3: Mango exports from main Asian producers



Source: FAOSTAT.

IV. THE MANGO VALUE CHAIN

9. The market for mangoes is usually segmented by the domestic, processed and export market. Such segmentation determines the mango varieties and quality requirements for the various markets.

10. Generally, mango prices are largely influenced by seasonal availability and by agro-climatic factors. The price is also determined by varietal preferences, grades, input costs and transaction costs that occur along the chain. While seasonal factors are beyond control, the other price determinants along the value chain can be targeted selectively.

11. The mango value chain is little different to other generic tropical fruit chains, where growers sell their fruits to farm collectors or traders, who then supply them to processors, wholesalers and distributors. The wholesalers in turn supply them to processors, retailers, supermarkets or to exporters, depending on the requirements set by the different markets. Alternatively, the fruits can be sold direct to traders who then deliver to processors and the wholesalers. To a lesser degree, there may be other marketing arrangements, such as farmers selling produce directly to retailers. Generally, the premium quality fruits are supplied to the exporters or supermarkets while other grades are destined for local domestic markets.

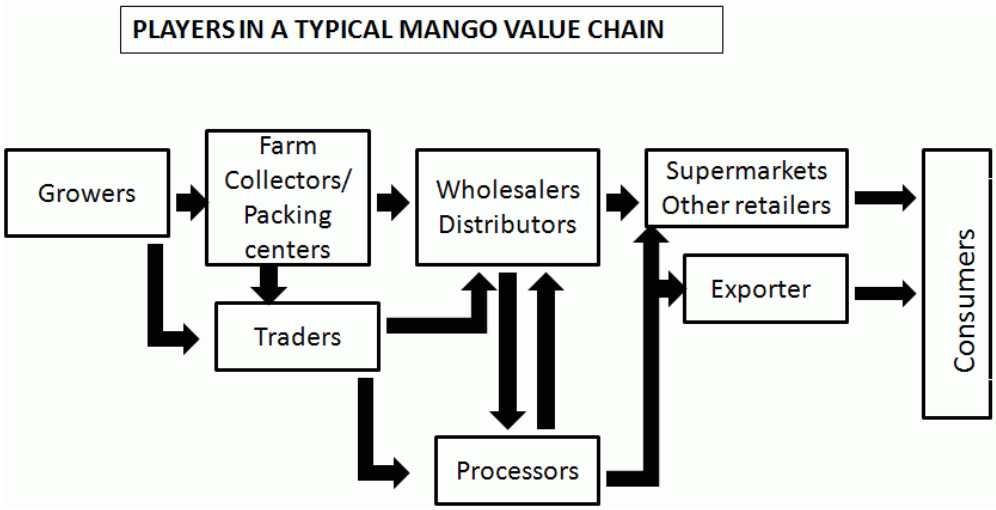
12. According to the results of a study conducted in India, the grower receives only 35 percent of the total retail price due to the high incidence of transaction costs along the chain. A typical mango value chain is illustrated in Figure 4.

13. Mango growers face considerable challenges in activities surrounding pre-harvest production, post harvest and marketing. These are related to the upstream and downstream stages in the value chain.

14. Producing quality and marketable mango, arguably remains the major challenge. Fruit quality is determined by the activities carried out during production and pre-harvest but more so during the post-harvest stage. Post harvest losses of 30 – 40 percent are not uncommon.

15. Poor crop maintenance prior to harvesting can give rise to an unsightly physical appearance of the fruit, such as scab, insect damage, wind scars and latex burn. The external appearance of the fruit reduces the marketability of the fruit, thereby reducing potential value and confining the product to the local market.

Figure 4: Mango value chain



16. Post-harvest handling losses in mango are related to:
   a) Harvesting practices – either hand-picked or using other means, cracks may occur from fall impact
   b) After sorting at the assembly site – exposure to the sun, use of unsuitable containers
   c) Rejection due to poor field transportation at trader or wholesaler centers
   d) Rough handling while sorting, grading, unpacking and repacking at trader or wholesaler centers

17. In traditional market structures at the farm level, the collector or trader dominates the transaction, since owing to a lack of information and bargaining power the farmer will tend to accept the price offered.

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19. In addition, some buyers pay less by opting to 'bulk' purchase the fruits, regardless of the grade. This is often in the context of the pre-harvest contract system where the purchase price for the whole tree is determined before actual harvest.

20. The interplay of many factors and the number of intermediaries results in an extended value chain and an increase in transaction costs. On average the price of mango at retail may be between 2.5 to 3.5 times more than the farm gate price (Table 1). Final prices also vary according to the quantity produced during the harvesting season.

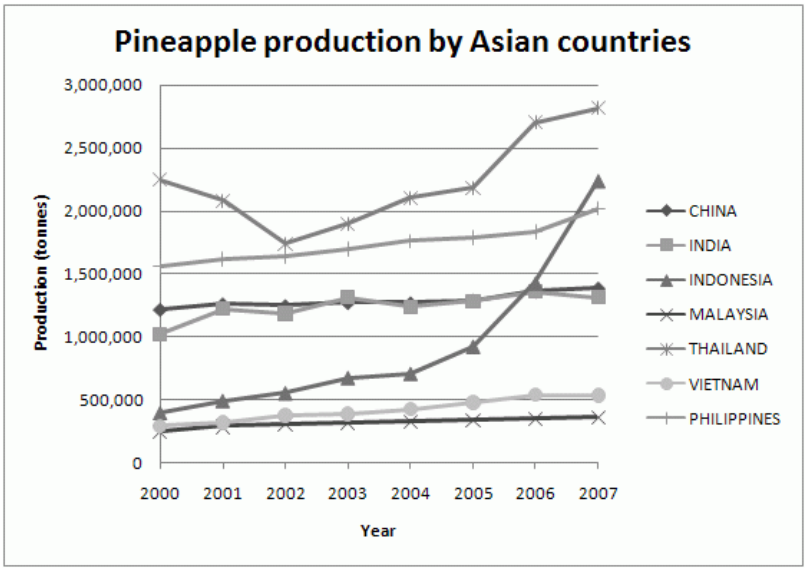
Table 1. Average retail to farm gate price ration for mango

Country	Farm gate price (USD)/kg	Wholesale price (USD)/kg	Retail price (USD)/kg	Retail to farm gate ratio
India	0.17	-	0.43	2.52
Philippines	0.33	0.84	1.26	3.81
Indonesia	0.26	0.52	0.83	3.19

V. PINEAPPLE PRODUCTION AND MARKET TRENDS

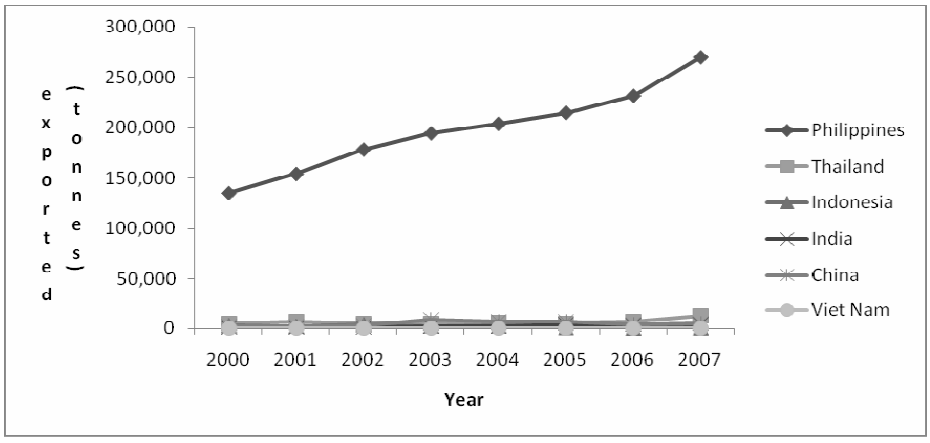
21. As for pineapples, production is dominated by Asia. The continent accounted for an estimated 50 percent of global production in 2007. The major players in the region are Thailand, Indonesia and the Philippines with production shares of 13, 10 and 8 percent, respectively. In the past few years, there has been increased production by the three countries, especially Indonesia (Figure 5). The export market in Asia is biased towards processed products, typically canned pineapple, compared to fresh fruit. Fresh pineapple is mainly consumed domestically. The principal exporter of fresh pineapple is the Philippines (Figure 6), with the involvement of multinationals such as Dole and Del Monte, the fresh product is exported by this country mainly to meet demand in Japan and the United Sates.

Figure 5: Main pineapple producers in Asia



Source: FAOSTAT.

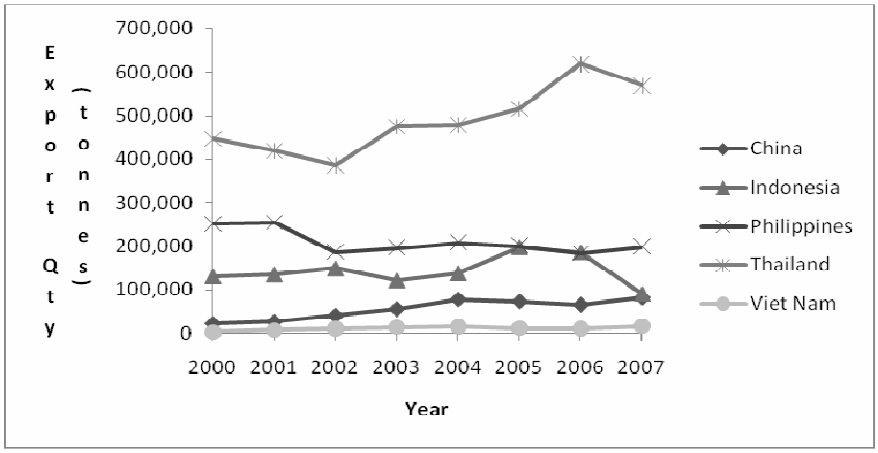
Figure 6: Export of fresh pineapples



Source: FAOSTAT.

22. Supply to the global market for canned pineapples is dominated by Thailand, followed by the Philippines. Indonesia is also a major player in the canned export sector but has seen its exports fall in 2007. China is currently increasing exports of canned pineapples (Figure 7).

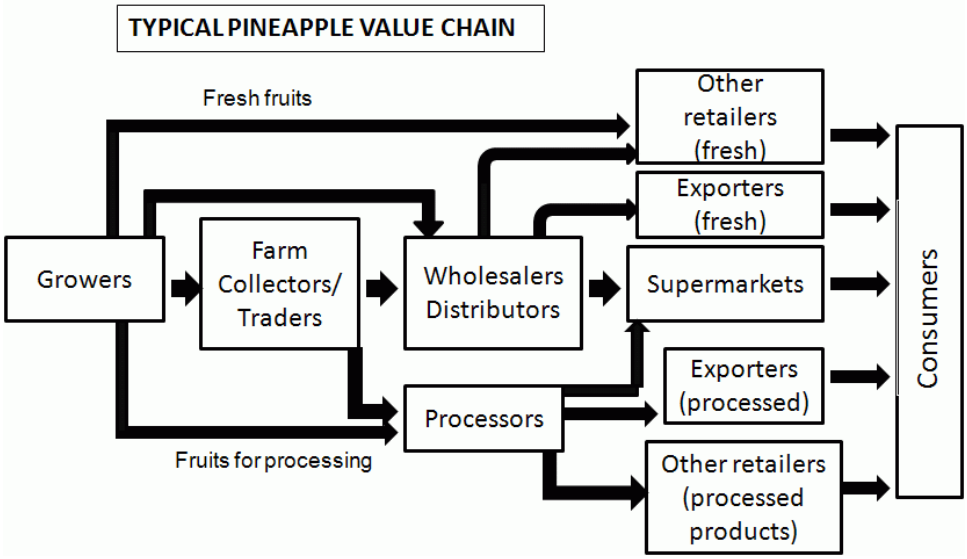
Figure 7: Major Asian exporters of canned pineapple



Source: FAOSTAT.

23. Pineapple is grown both for the fresh and processed market. Generally, varieties for these end uses differ; however, countries like Vietnam and Malaysia cultivate a single variety for the dual markets. Basically, the pineapple value chain is similar to the mango chain, whereby traders, wholesalers and distributors are involved in supplying the retailers with the fresh product. The difference is that pineapple output is not subject to seasonality. Thus production can be adjusted and organized according to planting schedules with the help of floral induction hormones. Other major differences are that a much greater share of production is processed and pineapple is a lower value fruit than compared to mango.

Figure 8: Players in a typical pineapple value chain



24. Pineapples produced for canning purposes are purchased directly from farms or through agents appointed by the factory. The price paid for pineapples to be processed is normally lower than that for the fresh market. For example in Viet Nam, pineapples destined for the factory are worth about 30 percent less than for retail.

25. While the farm-gate price for pineapple can be relatively stable, there is potential for a reduction in transaction costs by streamlining the number of intermediaries.

26. Pineapple is a 14 – 18 month crop and given its physical robustness is easier to handle than other tropical fruits such as mango. Pest and disease management is relatively straightforward and wrapping is not required. Post harvest losses occur mainly through handling and impact damage during transportation.

27. Since canned pineapple is an industry to itself, the biggest constraint faced by growers is the lower farm price typically paid for canning varieties. In countries such as Malaysia, due to low prices for canning varieties, farmers are switching to fresh varieties. The value chain for producing canned pineapples is also shorter as factories normally source the fruit direct from the growers or through their agents.

28. Growers of fresh varieties are still highly dependent on traders and collectors to market their produce. Generally the farm-gate price for fresh pineapple is about 40 – 50 percent of the retail price. Even though pineapple production can be scheduled, poor information flows can lead to a oversupply of the fruit which lowers producer prices.

VI. KEY OBSERVATIONS

29. The ”governance” aspect of value chains for tropical fruits can differ enormously. For instance, it can range from the very basic and compartmentalized grower-collector-wholesaler-supplier-retailer model where each component is run by different actors and supported by other actors in supply and logistic trade to the other extreme, where the farmer is empowered to play other roles, including that of as exporter.

30. For the mango and pineapple chain, the range of governance is determined by the market, location of production, the presence of ‘champions’, and the degree of domestic and export demand for the produce. However, in most of the countries observed, the ‘basic’ value chain model still dominates.

31. From a theoretical viewpoint, to ensure that farmers receive more remunerative prices for their fruit, transaction costs along the value chain need to be reduced. This necessarily implies that value chains have to be shortened by enhancing the role of the growers in the value chain for them to subsume the roles of some of the other players.

32. Greater farmer empowerment and streamlining has been carried out in some countries to a limited extent, this is because it takes time to reform traditional systems. With proper market networking and experience, farmers or farmer groups can act as collectors, traders and direct suppliers to supermarkets and retailers.

33. The increasing number of supermarkets, and large suppliers and exporters is indicative of the market power asymmetries that determine production volumes, quality standards and the coordination of activities along the chain. This can limit the role of wholesalers and small suppliers. However, as with other fruit sectors, the direct coordination by mango and pineapple buyers for consistent supplies with farmer groups or suppliers, reduces the length of the value chain, and results in extra income for the growers.

34. There are indications that the growers are now more receptive to the demand for quality fruits and are willing to adopt ‘good agricultural practices’ (GAP). Governments are also active in the process of ensuring that farmers are familiar and trained in GAP in order for them to be competitive. GAP in mango and pineapple cultivation form the bedrock of production models in several Asian countries.

35. The concept of group farming such as farmer cooperatives is being expanded to facilitate easier coordination, capacity building and input sharing. By integrating with farmer groups the activities of dominant buyers, training for farmers can be provided in grading and packaging. This adds to the benefits of a shorter, more efficient value chain. Direct links with anchor companies, which establish contract agreements with the farmer groups are also desirable.

36. In mango and pineapple trade, there are farmers who have already developed entrepreneurial capacity by undertaking the roles of collectors, processors and exporters. This enables them to receive more income to the benefit of the welfare of whole communities. In the Probolinggo district of East Java, Indonesia, for example, a farmer group has managed to export

their mangoes to Singapore. Another example is in Maharashtra State, India, where improvements made on the quality of the Alphonse variety of mangoes, coupled with activities linking farmers directly to markets, enabled them to gain 20 – 30 percent higher returns, and for those who exported their mangoes, they were able to gain about 50 percent more of the value share.

37. While there are some successful examples of fruit farmers who have benefitted by being more empowered along the value chain, many mango and pineapple farmers are still grappling with basic production problems which include pre harvest losses from pests and diseases, post harvest losses due to mishandling, unsuitable packaging, logistical constraints, a lack of institutional support and market information, including good agricultural practices and a lack of knowledge on MRLs, phytosanitary measures and the prudent use of chemicals. Besides this, it is important for them to understand the nature of demand for mango and pineapple around the production areas. For example, in the case of pineapples, staggering production can smoothen seasonality thus maintaining consistent intra-year farm prices.

VII. CONCLUSIONS AND RECOMMENDATIONS

38. The outlook for the tropical fruit sector in the coming years is positive. The demand for domestic and imported mangoes and pineapples is expected to increase on the back of rising population numbers and higher incomes. With the current trend towards to improved quality and greater safety, growers are gradually adapting to meet the emerging demands of the marketplace.

39. The high percentage of post harvest losses and low quality unmarketable fruits, provides growers with a foundation to gain higher revenues by introducing improvements to post harvest management practices and paying attention to quality. There is also great potential for mangoes and pineapple to be exported if they can conform to quality standards and phytosanitary requirements of key importing countries. For example, in Japan, vapour heat treatment (VHT) is a condition for exporting fresh mangoes, while radiation treatment is required for exports into the United States. The other challenge for Asian producers is to ensure that prices are competitive with other export sources including Brazil and Mexico.

40. Since pineapple is produced all year round, there are no major problems in meeting fresh demand throughout the year. However, in most of the Asian producing countries, domestic markets are saturated. Therefore, the fresh pineapple export market for pineapples looks more promising, especially penetrating new markets.

41. In countries such as India, Thailand and Indonesia, public and private measures are already in place to overcome the constraints faced by mango growers in producing good quality marketable fruits. Each country has a different operating model, which tries to address the primary goals of production of quality mangoes, increasing revenues for growers and raising exports. The major activities that need to be implemented to ensure that growers can gain better access to formal markets include capacity building on quality assurance, post harvest operations, organizational capabilities and the involvement of anchor companies.

A. KNOWLEDGE AND CAPACITY BUILDING ON QUALITY ASSURANCE

42. In recent years, producers of fresh horticultural crops in Asian countries have given due emphasis on the importance of Good Agricultural Practices, which is a prerequisite to quality assurance. The Good Agricultural Practice (GAP) concept together with food safety requirements, product standards and minimum residual levels for pesticides, sanitary and phytosanitary requirements are now the norm for exports. GAP accreditation is easier for private companies which are involved in the production, marketing and exportation of mango. Small growers have also reaped the benefits of GAP programmes, however, implementation to date has not been encouraging, since in some countries various constraints exist including a lack of knowledge and few trainers exist that can assist with organizational capacity at the farm level. Thus, capacity building activities for growers need to be emphasized and implemented. Besides this, training of

the growers in the areas of post harvest management and techniques need to be underscored and carried out.

B. FACILITIES FOR FARM HANDLING AND POST HARVEST OPERATIONS

43. More emphasis has to be given to post harvest operations since they contribute to most of the losses for mango and pineapple. Farm handling and post harvest operations involve the building of facilities for collecting, sorting and grading and finally packaging the fruits after being treated. Operations which include packaging are best done at the farm level. Any unpacking or repacking activities contribute to the increase in damage to the fruits. There has to be assistance from Governments in constructing collection centers, storage facilities and equipment for sorting and grading.

C. ORGANIZED GROWERS GROUP OR COOPERATIVES

44. One of the most effective mechanisms to assist small growers is to organize farmers into groups or cooperatives. In India, Thailand and Indonesia, such associations are the primary channel for which capacity building is implemented, the imparting of knowledge and synchronizing of operations for production. This is especially relevant if growers cultivate fruit on less than one hectare of land. Farmer groups can organize themselves efficiently in carrying out post harvest operations such as sorting, grading and packaging. In so doing, the packaged products can be sent direct to the wholesaler or even supermarkets or other retailers, thereby fostering greater income generation potential to small holders.

D. INVOLVEMENT OF ANCHOR COMPANIES

45. Another way to access markets is to directly involve anchor companies. These can constitute the wholesaler, exporter or a supermarket chain. Such companies usually formulate an agreement with farmers with regard to quantity, quality and price. The anchor company can also provide training to them on technical matters related to post harvest operations and standard requirements. To lower cost, anchor companies also provide farmer groups with packaging cartons so that the fruit can be packed at the collection centers. These companies also provide transportation services as well as providing infrastructure such as collection and packaging centers for growers. Supermarket suppliers and exporters may also directly co-ordinate with farmer cooperatives to secure supplies.

VIII. PROPOSED PROJECTS

46. International Tropical Fruits Network (TFNet), recognizes that there is much to be done to address the constraints that are affecting the production potential and access to markets for small mango and pineapple farmers. TFNet also believes that more should be done to increase the income shares of these farmers. Based on this understanding, it is proposed that projects that can address some of these constraints be undertaken by TFNet:

a) Studies to assess current practices along the mango or pineapple value chain in specific production zones in selected countries, with a view to identify deficient areas, create market driven interventions and improvement areas, while carrying out actual improvements through a participatory approach, which include pre-harvest operations, post harvest operations (field sorting and grading, packing, transportation, resorting and grading, post harvest disease control and storing). The project will also study the potential of expanding the domestic or export market for both types of fruit.

b) TFNet to organize capacity building activities:

- Capacity building in the form of training workshops on Good Agriculture Practices, Food Safety and Quality Assurance for extension officers
- Workshops on recent developments and techniques in post harvest management of mangoes and pineapples.
- Study visits for small holder farmers to group farms in selected countries which are practicing GAP and are carrying out their own pre- and post-harvest operations, besides packaging and supplying to retailers.
- Organize workshops on phytosanitary requirements in the export of mango and pineapples.