

---

## Appendix 8.9

**This case study forms part of the overarching  
*2017–19 ACIAR Mango Agribusiness Research Program***

**Project:** Opportunities and strategies to improve biosecurity, market access and trade for selected mango markets

**Study:** Asia Pacific Biosecurity study

**Project number:** AGB/2016/008

**Date:** 30 October 2019

**Prepared by:** Peter Johnson, Griffith University  
Rob Duthie, Kalang



Australian Government  
Australian Centre for  
International Agricultural Research



---

# Contents

<b>Appendix 8.9</b> .....	<b>1</b>
<b>Contents</b> .....	<b>ii</b>
<b>1 Acknowledgements</b> .....	<b>1</b>
<b>2 Case summary</b> .....	<b>1</b>
<b>3 Introduction</b> .....	<b>2</b>
3.1 Project background .....	2
3.2 Study objectives .....	2
3.3 Study methodology .....	2
<b>4 Current import protocols and informal trade channels</b> .....	<b>3</b>
4.1 Mainland China and Hong Kong markets .....	3
4.2 Protocol for market entry to mainland China .....	4
4.3 Chinese governing bodies overseeing imports.....	5
4.4 Market-entry strategies for China imports.....	6
<b>5 Trade flows</b> .....	<b>10</b>
5.1 Mainland China trade.....	10
5.2 Exporting via Hong Kong through informal trade.....	11
5.3 Direct export to mainland China.....	12
<b>6 Technical barriers</b> .....	<b>15</b>
6.1 Key mango pest of concern for the China market .....	15
6.2 Fruit fly .....	16
6.3 Seed and pulp weevils .....	18
6.4 Red-banded mango caterpillar.....	19
6.5 Mango scale.....	19
6.6 Bacterial black spot.....	19
6.7 Swot analysis of market-entry systems .....	19
6.8 Regulatory requirements.....	20
6.9 Non-SPS impacts on trade .....	22
6.10 Quarantine and inspection services.....	24
6.11 Commercial issues.....	25
6.12 Future developments .....	26

<b>7</b>	<b>Technical issues and barriers for partner countries .....</b>	<b>27</b>
7.1	The Philippines .....	27
7.2	Vietnam .....	28
7.3	Australia .....	28
7.4	Common issues .....	29
<b>8</b>	<b>Industry consultation .....</b>	<b>30</b>
8.1	The Philippines .....	30
8.2	Vietnam .....	30
8.3	Australia .....	30
<b>9</b>	<b>Conclusion and recommendations .....</b>	<b>31</b>
9.1	Conclusion .....	31
9.2	Recommendations .....	31
<b>10</b>	<b>References .....</b>	<b>33</b>
<b>11</b>	<b>Supporting documents .....</b>	<b>36</b>
11.1	China Protocol Requirements for Importing Mangoes from Australia and Pakistan (DAWR, 2013) (AQSIQ, 2013).....	36
11.2	Trade agreements.....	40
11.3	HS and NTL codes, Australia and partner countries .....	42

## **Disclaimer**

This publication is published by ACIAR and Griffith University. Care is taken to ensure the accuracy of the information contained in this publication. However, ACIAR cannot accept responsibility for the accuracy or completeness of the information or opinions contained in this publication. You should make your own enquiries before making decisions concerning your interests.

© Australian Centre for International Agricultural Research (ACIAR) and Griffith University 2019. This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from Griffith University, 170 Kessels Road, Nathan Qld 4111.

---

# 1 Acknowledgements

This study report for the Mango Biosecurity project was prepared by Peter Johnson and Rob Duthie.

---

## 2 Case summary

A significant number of ACIAR partner countries are seeking to expand their mango export opportunities in China. Being a phytosanitary market, direct access to the Chinese market has historically been difficult, inconsistent and expensive. Some countries simply are not able to meet the requirements and others are struggling to meet the formal technical requirements. Exporters and importers have often used informal channels to access this market; however, recent legislative changes indicate that the formal channels will be required for future trade.

This study found the current trade situation in China is changing, with more countries and increasing volumes moving through the formal market-access channels (and therefore in alignment with the World Trade Organization's (WTO) sanitary and phytosanitary (SPS) standards). Supporting this change, large supermarkets are being incentivised to purchase through formal channels.

Fruit fly is still the most important market-access challenge in China, and heat treatment protocols are the main basis for negotiating market entry. China is yet to accept irradiation or other disinfestation techniques. Maximum residue levels (MRL) and traceability are key components of the formal channels. According to importers and retailers, mango-exporting countries have much work to do in order to meet market demand. Current trade challenges include: mixed mango quality, inconsistent maturity and lack of treatment facilities in exporting countries are current impediments to expanding formal trade.

The demand for high-quality mangoes within China remains strong and is increasing. China remains committed to formalising the import of fresh mangoes, though exporters from some countries are reluctant to adopt the formal export pathway given that the informal pathway via Hong Kong is still in operation, and is viewed as a lower-cost option. It is unclear if the informal Hong Kong pathway could ever be closed entirely, but border controls into mainland China have tightened significantly in recent years. Exporting countries should make efforts to educate home country (domestic) mango producers of the potential profitability, long-term market opportunity for the formal import of mangoes to China, and regulatory requirements needed to best achieve this.

This study has developed a series of recommendations for the short, medium and long term that will progress the development of the direct market access to China.

- Short term: stakeholder networks need to be developed at the supply and import end of the chains for a more coordinated approach to addressing access issues and market development.
- Medium term: revision is required of commercial trading material supporting market access and protocols, pesticide management, and traceability systems. Further research to improve preconditioning techniques will help mitigate quality issues associated with hot-water treatments (HWTs), thus enabling a cost-effective alternative.
- Long term: the progression of irradiation negotiations as a viable alternative to heat-based treatments should remain a key strategy. Country-specific protocols should be reviewed on a regular basis.

---

## 3 Introduction

---

### 3.1 Project background

The market fundamentals for mango in Asia, in particular the import market of mainland China, are promising. In the last decade, Asia-Pacific mango production has experienced tremendous growth, with the main producing regions located in India, Thailand, Vietnam and the Philippines. Increasing consumer demand for quality, safety, variety, seasonal availability and consistency are creating opportunities and possible barriers for smallholder farmers. Common to all is the struggle to access the lucrative market of mainland China.

---

### 3.2 Study objectives

The aim of this project is to identify opportunities and strategies to improve biosecurity, market access and trade for selected mango markets through a better understanding of knowledge and stakeholder gaps.

The study objectives are to:

1. examine and document the current import protocols and informal trade channels for the markets of mainland China (Shanghai) and Hong Kong
2. understand technical issues and barriers for both countries
3. document issues and opportunities (core group/country level)
4. Develop a detailed five-year plan that includes short-, medium- and long-term timelines for technical priorities and strategic development.

---

### 3.3 Study methodology

China was selected as the country for the main focus of this study, as several of the partner countries – the Philippines, Pakistan, Vietnam and Australia – have direct access to this market. Additionally, Indonesia and Cambodia view the Chinese market as one with future potential.

An online review was undertaken of mango protocols between partner countries and target markets; production, export and import data; and investigations into current barriers to trade with target markets of either a formal or informal nature.

Field research was undertaken in Shanghai, as it is one of the four approved entry points for the import of mango to China (PMA, 2016). This project worked in conjunction with the Mango Markets project, using semi-structured interviews targeted at importers, traditional and modern wholesalers, traditional and new retailers, supermarkets, and specialised fruit shops. The interviews provided information on market intelligence relating to mango procurement, distribution, origins, import pathways, clearance times, customs and inspection. They also expanded on issues such as buyer requirements and preferences, imports and pricing, logistics, marketing, consumption trends, quality, product damage, and other challenges and opportunities.

Several meetings were held with the China Entry-Exit Inspection and Quarantine Association (CIQA), which provided information on import protocols. Further discussions were held with the Chinese Academy of Tropical Agricultural Sciences (CATAS), which was able to add to and verify existing information.

Three case studies from the Philippines, Vietnam and Australia were undertaken to give an understanding of each country's present context and how they might develop their mango exports to China.

#### *Assumptions and limitations*

Market access and biosecurity can be politically sensitive issues at industry and policy levels. The initial project proposal was prepared on the assumption that information would be available and accessible from the relevant authorities. Where this was not possible, alternative methods were used to inform this study.

While it was important to understand the informal trade of mango in context of the total entry of product into the country and the potential impact it has on formal trade, the focus of this study is the direct market access of fresh mango into China.

Data used in this study have been sourced from the Harmonised System code (HS) 08.04.50, comprising guavas, mangoes and mangosteens, and includes fresh or dried mango. However, the code differs at the national tariff line levels of individual countries, especially depending on the level of transformation. As national tariff line codes differ between countries, analysis across multiple countries has been included from the six-digit HS code level (see Supporting Document 11.3).

---

## **4 Current import protocols and informal trade channels**

---

### **4.1 Mainland China and Hong Kong markets**

#### ***One country two systems***

Mainland China and Hong Kong share a relatively unique relationship based on the foundation of 'one country two systems', a national unification policy developed in the 1984 to aid the eventual reintegration of a number of territories that were once a part of the mainland. Although Beijing has a heavy influence on Hong Kong's political sphere, Hong Kong has particular economic and political freedoms and is able to forge external relations in a number of areas, including trade. Factors that have attributed to Hong Kong's economic power include a highly developed financial system and comparatively low taxes and regulations. Until 2015, it was ranked first in the world for trade as a percentage of GDP, and is now second to Luxembourg (World Bank, 2017).

Hong Kong has maintained close trading relationships with mainland China. Following the United States, Hong Kong is the mainland's second-largest trading partner and accounted for more than 8% of China's total trade in 2016. Hong Kong's economy is externally oriented and highly dependent on trade with the rest of the world – particularly mainland China. In 2016, 55% of its exports were destined for the mainland (ITC, 2017). Hong Kong plays an important entrepôt role for trade between the mainland and global partners; in 2016, the value of goods re-exported through Hong Kong from and to the mainland was approximately USD407 billion, accounting for 89% of Hong Kong's total re-export trade value (TID, 2017).

#### ***Rise of the middle class and informal economy***

In the year 2000, 4% of urban households in the mainland were considered middle class, with earnings between USD9,000 and USD34,000 per year. A report produced by consulting firm Mckinsley and Company notes that this percentage rose to 68% in 2012 and is predicted to reach over 75% by 2022. With this explosive growth in the middle class has come a consumer boom, and the report makes note of two distinct generations of

consumers. The consumption spending of the younger of the two is growing by 14% annually and is expected to account for 53% of total mainland consumption by 2020 (Barton, et al., 2013). With per capita spending on fresh fruit rising to 83.7% between 2011 and 2016, Chinese middle class consumers were projected to spend more than USD650 billion in 2017 (PMA, 2016). This presents lucrative trade opportunities for exporters, especially for commodities with high current demand and cultural significance, such as mangoes.

One of the key factors that has supported the mainland's economic growth and rise of the middle class is informal employment. Following state enterprise reforms and the subsequent mass redundancies beginning in 1978 and intensifying throughout the 1990s, the Chinese government (and the Shanghai Municipal Government in particular) has worked to support and promote the informal economy as a means to address unemployment (Becker, 2004). A report from the OECD Development Centre estimates that the informal economy in China accounted for approximately 47% of total urban employment in 2004, with approximately 125 million participants (although different definitions of informal employment provide differing totals) (Jütting & Xenogiani, 2007).

The informal economy has led to significant volumes of informal trade between China and a number of other countries, and especially between the target markets of this report: mainland China and Hong Kong. China has historically been a difficult horticultural import market to gain and maintain access to, especially for developing nations with a limited capacity to meet phytosanitary protocol (this is discussed further in Section 3.2). Therefore, many trading partners rely on the existence of the strong and consistent trade connection between the mainland and Hong Kong, both formal and informal.

Market access for mangoes to Hong Kong is much easier than to the mainland; Hong Kong is known as an open market and doesn't impose any phytosanitary protocols or tariffs on global trading partners. This has a number of negative effects, including typically lower prices for produce compared with prices fetched for potentially higher-quality products entering a phytosanitary market, as well as limited long-term sustainability.

The 2003 Closer Economic Partnership Arrangement (CEPA) between mainland China and its special administrative regions (SARs), including Hong Kong, began a series of processes that will restrict the volumes of informal trade between Hong Kong and the mainland as a consequence.

---

## **4.2 Protocol for market entry to mainland China**

International trade is regulated by the United Nations Food and Agriculture Organizations SPS Agreement. Trade is encouraged under this agreement, but importing countries have the sovereign right to protect plant and animal health through identification of risks and the imposition of risk management measures.

Most importing countries have some form of quarantine protocol in place for imported commodities, including fresh mangoes. The basis of the majority of importing-country requirements is a phytosanitary certificate, which accompanies the exported consignment and is issued by the exporting country's quarantine authority to confirm compliance with the importing country's quarantine requirements. Compliance with importing-country requirements requires a competent export authority and a private sector capable of applying and maintaining the required risk management measures. The costs of compliance are usually shared between the public and private sectors, although newly developed export pathways are often subsidised by governments or donor agencies to assist in the initial stages of establishment. Trading with an importing country that has quarantine requirements is more difficult and costly than trading with non-quarantine export destinations (where no phytosanitary certification is required). Hong Kong and Singapore are key non-quarantine import pathways, and they enable large amounts of product (at times of variable quality) to enter the market. Larger import volumes and

variable quality generally result in significant market saturation and lower income for the exporting nation.

Significant localised trade exists between China and its bordering nations that is not supported by quarantine protocols. Large volumes of mangoes move from Hong Kong and Myanmar into mainland China. Accurate volume figures for this informal trade could not be obtained as part of this study.

This study compares the phytosanitary requirements (protocols) for the export of mangoes from Australia, Pakistan and India to China through five generalised stages of produce export (see Supporting Document 11.1). This information has been left with its original wording wherever possible, though it has been rearranged for ease of comparison. It is also important to note that the Pakistan protocol has been translated from simplified Chinese.

---

## 4.3 Chinese governing bodies overseeing imports

### AQSIQ

The General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) is a ministerial administrative organisation directly under the State Council of the People's Republic of China. It is in charge of national quality, metrology, entry-exit commodity inspection, entry-exit health quarantine, entry-exit animal and plant quarantine, import-export food safety, certification and accreditation, standardisation, as well as administrative law-enforcement. The AQSIQ operates according to the following criteria:

- All countries are given the equal opportunity to apply for market access, with an internal minimum of one case per country being processed at any time.
- Preference and expedience are given to those categories and varieties of fruits with low pest-carrying risk.
- The applicant's product must be in compliance with existing AQSIQ requirements governing same or similar products from other regions and areas.
- The exported product must be in accordance with International Standards for Phytosanitary Measures (ISPMs) in order to conduct a PRA and PRM.
- Export application are processed depending on the ability of AQSIQ to employ its limited labour resources in processing applications and on the relative complexity of each application.

### CIQ

Directly under the administration of the AQSIQ is China Inspection and Quarantine (CIQ). CIQ operates under the mandate of the AQSIQ and retains roughly 35 offices across China, sometimes referred to as Entry-Exit Inspection and Quarantine Bureaus, which work to:

- maintain clear lines of communication with laboratories and local offices to ensure import quality standards are upheld
- function as entry/exit-port inspection agents with the power to seize goods from foreign exporters due to missing or incorrect certifications or documentation
- ensure that CIQ labels are attached to certain categories of imported goods before entry into the Chinese market.

### CIQA

The China Entry-Exit Inspection and Quarantine Association (CIQA) is a non-profit governmental societal organisation under China's Ministry of Civil Affairs and AQSIQ, comprised of Chinese enterprises, institutions, societies, and individuals who operate on a



volunteer basis. CIQA functions as a bridge between government and the private sector in the sphere of entry/exit quarantine and inspection, filling regulatory gaps as needed. Often operating on behalf of the AQSIQ overseas, CIQA also works bilaterally with foreign agencies in developing frameworks for coordination and cooperation. To this end, CIQA sponsors technical workshops, seminars, and presentations on increasing cross-sector cooperation, and has the authority to sign a Memorandum of Understanding (MoU) with bilateral partners to facilitate mutually beneficial engagement on issues of imports, exports, and international trade.

## **GACC**

The General Administrations of Customs of the People's Republic of China (GACC) plays a crucial role in the import and export of products following the AQSIQ inspection and quarantine process. GACC is the headquarters of China Customs and reports directly to China's State Council. General practice requires that the Chinese importer collects and submits the following documentation to China Customs: bill of lading, invoice, shipping list, customs declaration, insurance policy, purchase and sale contract, and, if applicable, the import quota certificate, import license and/or inspection certificates. The main responsibilities of the GACC in terms of imports and exports are:

- collection and enforcement of all relevant taxes and duties owed, including value added taxes (VAT), customs duties, tariffs, and various other taxes
- ensuring protection of intellectual property rights through the seizure of all suspected counterfeit, smuggled and patent- and copyright-infringing imports and exports
- administration and execution of anti-smuggling measures through the China Customs anti-smuggling police force
- inspection and verification of all relevant import/export documentation, including examination of discrepancies between the quoted invoice value of goods and actual value
- compilation, recording and analysis of trade statistics, including the value, origin, destination, trade and transport method of import and export goods.

---

## **4.4 Market-entry strategies for China imports**

The Produce Marketing Association's *Exporting Fresh Fruit and Vegetables to China* report notes that numerous market-entry strategies exist for foreign fruit and vegetable exporters looking to gain access to Chinese markets. The most suitable method of entry is dependent on a number of factors, such as the permissibility of the exporter's fruit and vegetable product to be imported into China, which distribution channels the exporter plans to operate along, and the exporter's choice of Chinese importing partner. It is advised that exporting parties contact their respective government departments and officials, hire a consulting company or law firm for intellectual property concerns, or seek other such external advice in addition to conducting their own research before settling on an entry method.

The first step for foreign exporters of fresh produce to obtain market access to China is to determine whether the product and country of origin is included among the list of fresh fruit and vegetables permitted for import. An official listing of all permissible fruits and countries of origin is maintained by the AQSIQ on its website, which is only available in Chinese (though is translated into English semi-regularly by groups such as The Produce Report). If both the intended export item and country of origin are listed, then technical market access has been achieved and the exporter explore their options concerning distribution channels and importers/import partners. If either the country of origin or specific product are not listed by the AQSIQ, then technical market access has not been

achieved and the exporter must initiate bilateral discussions between their own government and Chinese officials.

### Achieving technical market access

Foreign exporters must operate through their own countries' embassies in China to initiate a market-access dialogue with the AQSIQ. Cooperation with industry associations or groups can be highly advantageous in stimulating bilateral negotiations between the exporter's own government and Chinese officials. Exporters can operate through these industry associations and groups to work with their corresponding national agricultural department.

For Chinese import authorities, the biggest technical concern in granting market access is pest and disease control and quarantine procedures, with protection of China's domestic produce industry as the primary objective. Fruit (and vegetable) imports from countries with a high risk of (or ongoing) pest problems will have a much tougher and slower time gaining market access in China than lower-risk fruit imports. An excerpt from the Produce Marketing Association's (PMA) *Exporting Fresh Fruit and Vegetables to China* report outlines the fresh fruit market-access procedure while working with AQSIQ (see Figure 1).

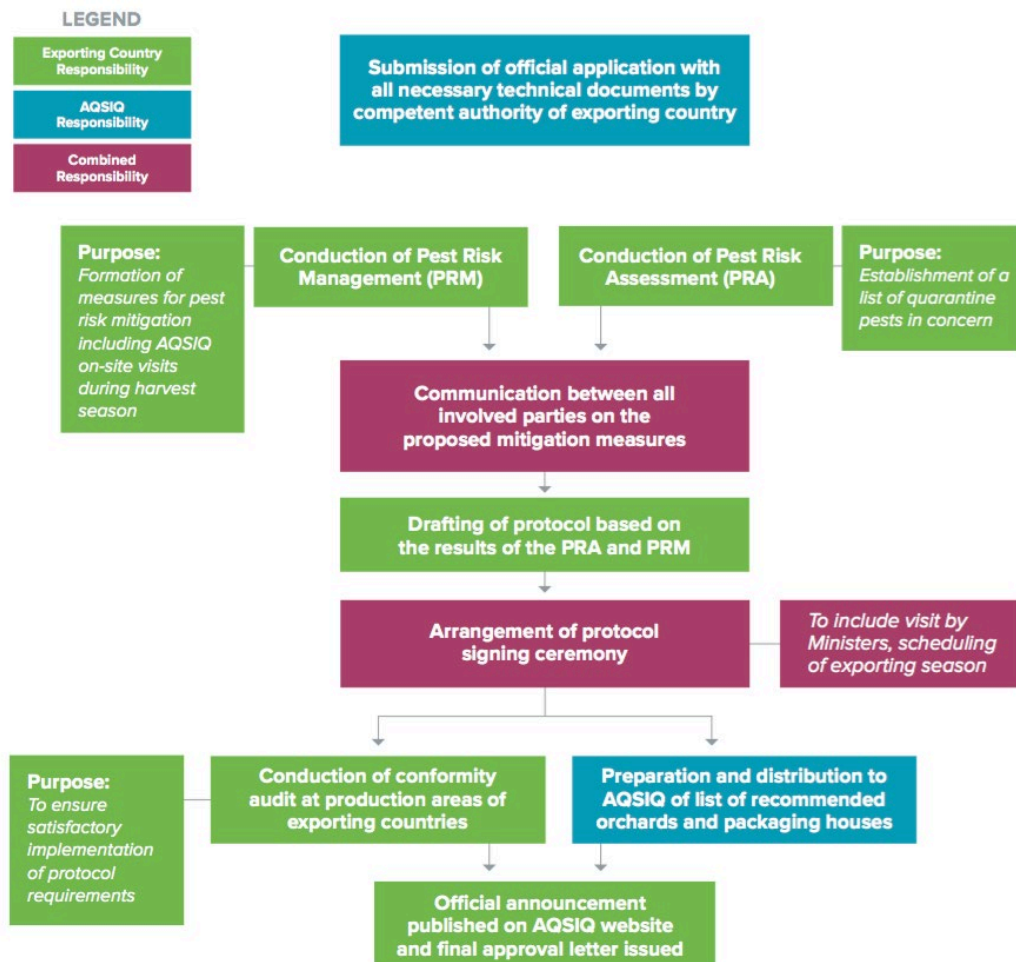


Figure 1. AQSIQ fresh fruit market access procedure

Source: PMA, 2016

### **Selling to importers, retailers and e-commerce**

In order to navigate China’s complex set of import rules and regulations and complicated supply chains, establishing networks and working through Chinese distribution and import partners are necessities for almost all foreign exporters, especially smaller organisations with little previous experience in China. The desired partner characteristics vary across the type of intermediary (see Table 1).

**Table 1. Potential Chinese import partners**

<b>Importers</b>	<b>Retailers</b>	<b>E-Commerce</b>
<ul style="list-style-type: none"> <li>• Networks and relationships with distributors</li> <li>• Governing import bodies</li> <li>• May operate as wholesaler or distributor</li> <li>• Handle customs’ import processes, manage product stock and inventory</li> <li>• Offer services to foreign exporters.</li> <li>• May operate as exclusive partners for specific foreign exporters</li> </ul>	<ul style="list-style-type: none"> <li>• Include supermarkets and hypermarkets with advanced distribution networks and established cold-chain infrastructure</li> <li>• Work with foreign exporters on in-store branding and marketing efforts</li> <li>• Premium boutique stores</li> <li>• Emphasis on close collaboration and direct-import opportunities</li> <li>• Direct-import sourcing</li> </ul>	<ul style="list-style-type: none"> <li>• Via distributors or direct importing</li> <li>• Operate primarily in major city markets with well-established cold-chain infrastructure and more affluent consumers with specific mango preferences</li> <li>• Provide 1–3 day complete order-to-delivery consumer services</li> <li>• Function independent of distributors, wholesale markets and retailers</li> <li>• React quickly to market fluctuations and import surpluses/shortfalls</li> </ul>

Source: PMA, 2016

### **Representative office**

Establishing a representative office (RO) in China is an effective and quick way to enter the Chinese market for certain businesses. ROs require minimal overhead investment and provide their parent company with the opportunity to conduct market research independent of Chinese importers and other partners; form networks and establish business contacts with distributors, retailers, and other clients on behalf of the parent company; coordinate parent company’s activities in China; and engage in quality control. ROs can also operate as a marketing agent and brand-builder for foreign exporters in China.

The RO’s function is relatively limited because they cannot engage in profit-making activities in China, are forbidden from signing contracts on behalf of the parent company, and cannot possess more than four employees. Most foreign fresh produce exporters would have minimal use for a China-based RO, but for larger fresh produce exporters or groups and associations of exporters seeking to expand their presence directly in China, establishing an RO in China can prove the first step in further, more expansive development.

### **Wholly foreign-owned enterprise**

A wholly foreign-owned enterprise (WFOE) is the most common form of foreign investment in China. WFOEs can import directly from their home country without the need to go through a third party, and may possess their own quality control and assurance mechanisms. The foreign exporter retains complete control over the company (no Chinese partner is involved) and is permitted to distribute its products throughout China. The exporter is itself responsible for all Chinese operations, such as maintaining local networks and connections and navigating the difficulties of customs processes conducted in Chinese. Previously, the initial prohibitive set-up cost, time-consuming and complex application processes, and overall difficulties of operating in China without a Chinese import partner were the main factors limiting the number of WFOEs in the foreign produce

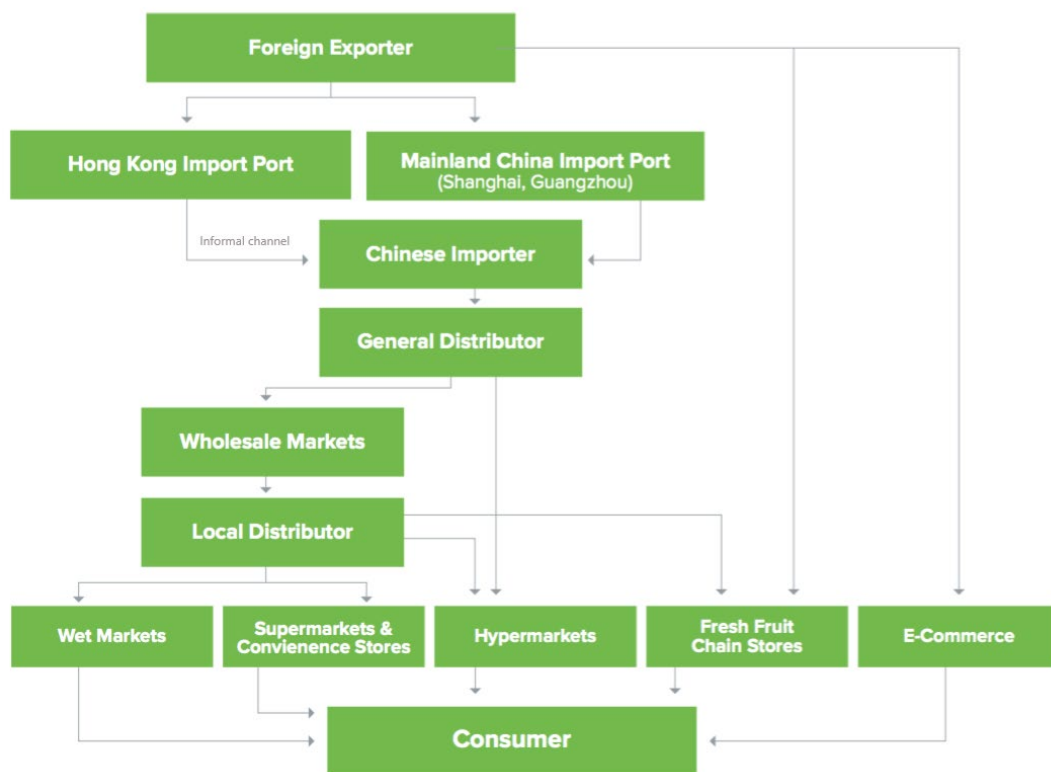
export sector. However, recent improvements in administration processes and overall ease of application have made it much easier for WFOEs to establish themselves in China, especially if the company is set up to operate in China's free-trade zones (FTZs).

### Joint venture

The major advantage to operating as a joint venture in China is the ability of the foreign exporter to use their Chinese partner's distribution and sales channels, workforce, facilities, and relationships and networks with government officials. However, this comes with its own drawbacks: the exporter is highly reliant on the Chinese partner and shoulders the cost and risk associated with potential differences in management styles, business interests and profit-sharing between companies. Fresh produce export joint ventures in China are rare. They are generally formed for cases in which a foreign entity wishes to set up domestic Chinese production facilities to supply domestic consumption. For the vast majority of foreign fresh fruit exporters, joint ventures are unnecessary when expanding into the Chinese market.

### Distribution channels

Traditionally, imports of foreign fresh fruit and vegetables into mainland China have followed the distribution model of import into Hong Kong that is followed by transit into mainland China via formal and informal distribution channels, transportation to major wholesale markets along the coast of China and distribution to markets in China's interior. This distribution model is characterised by numerous aggregators, vendors and distributors, sapping profits from the exporter and reducing value for the consumer. However, this model is evolving and is currently moving away from third-party aggregators, agents and distributors towards more direct distribution models, such as direct import to mainland China from foreign exporters and e-commerce. The PMA's *Exporting Fresh Fruit and Vegetables to China* report outlines an approximation of China's imported fresh produce distribution model (see Figure 2).



**Figure 2. Fresh mango imports, distribution, China**

Source: PMA, 2016

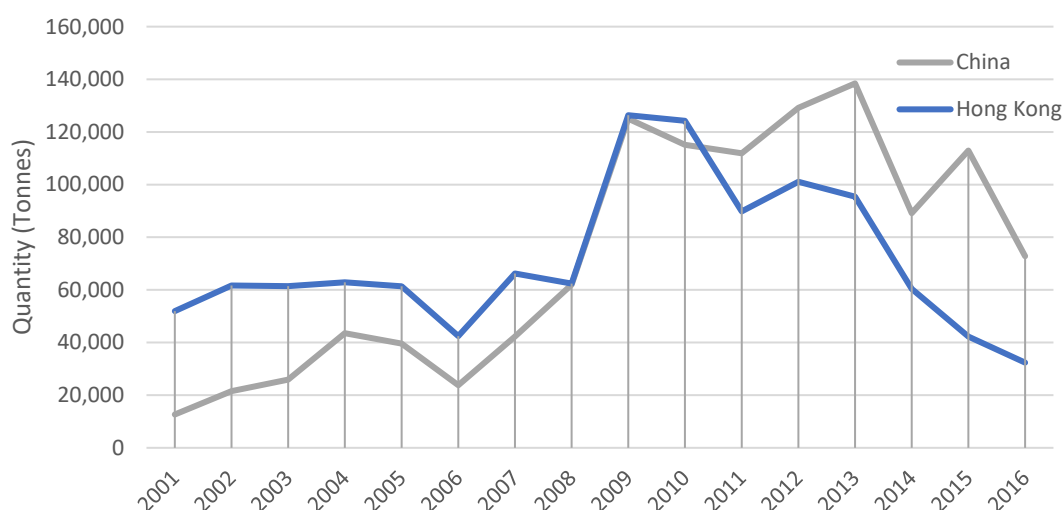
## 5 Trade flows

### 5.1 Mainland China trade

Historically, the mainland's economy was closed to other global economies until political reforms started taking place in the early 1980s, which led to the mainland becoming a member of the WTO in 2001. Since then, the mainland has been actively pursuing both bilateral and multilateral trade agreements across various nations. China currently has:

- 17 active trade agreements
- 11 trade agreements under negotiation
- 11 trade agreements under consideration (see Supporting Document 11.2).

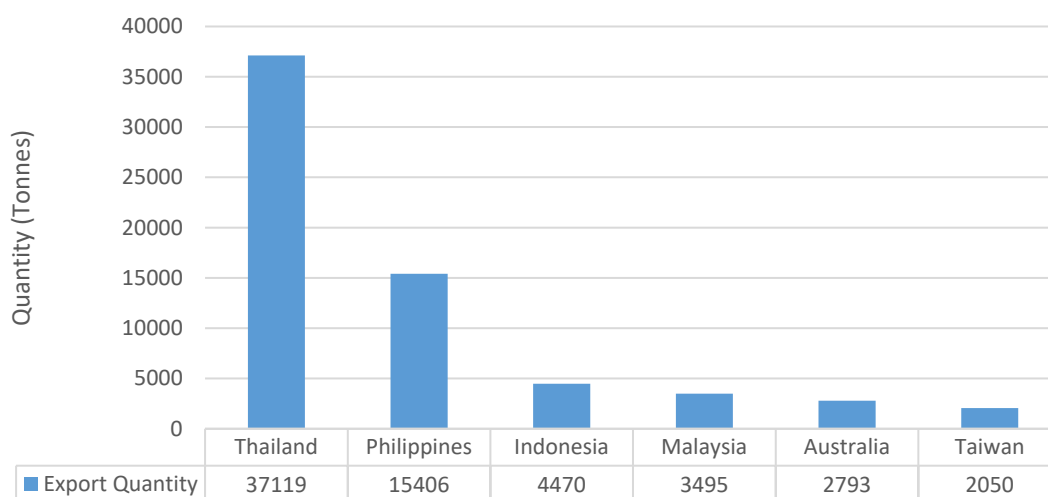
The mainland's mango imports have risen relatively steadily since becoming a member of the WTO and a more globally active trading partner (see Figure 3). It is important to note that trade statistics often don't provide a complete representation because some of the data may be estimates, due to an absence of data for a particular year or from a particular country. This is especially relevant in this instance, where a significant volume of informal trade occurs between the mainland and Hong Kong; therefore, Hong Kong's mango imports have also been plotted in Figure 3 for comparison.



**Figure 3. Mango imports, 2001–16**

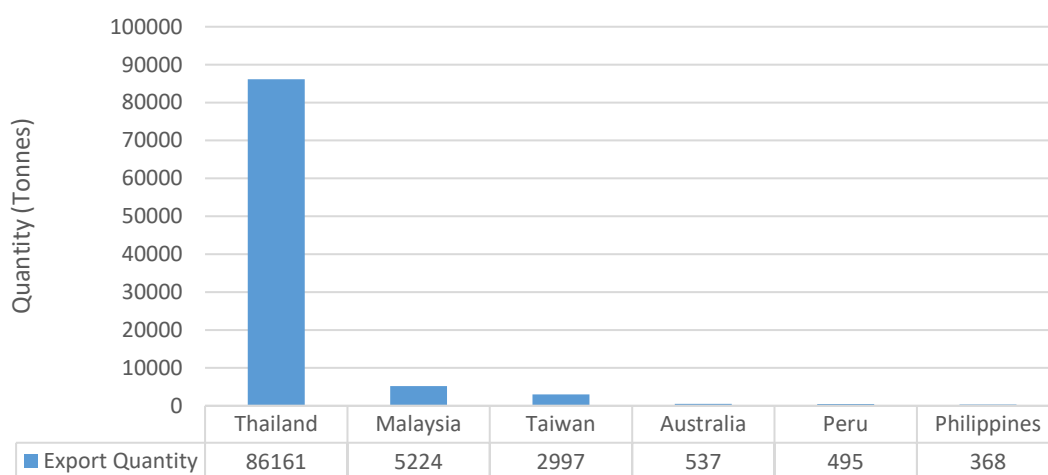
Source: ITC, 2017

The largest exporter of mangoes to Hong Kong and the mainland from 2012 to 2016 was Thailand (see Figure 4 and Figure 5). Mango imports from Thailand to Hong Kong experienced a drop from 2014, and the Philippines has since become the largest exporter, with a 39% market share in 2016 compared to Thailand's 21%.



**Figure 4. Mango exports to Hong Kong, (average) 2012–16**

Source: ITC, 2017



**Figure 5. Mango export to China, (average) 2012–16**

Source: ITC, 2017

## 5.2 Exporting via Hong Kong through informal trade

Foreign fresh fruit and vegetable exporters have long used Hong Kong as passage to the markets of mainland China because Hong Kong operates as an open market with zero tariffs and minimal trade restrictions. Fresh fruit exports using this channel are first imported to Hong Kong and then reimported into mainland China, more often than not through informal trade channels.

An informal channel refers to a distribution channel that is partially legal and partially unauthorised, in which imported goods avoid partial or full tariffs and duties and require partial or no compliance with phytosanitary and quarantine requirements.

Table 2 shows import volumes into Hong Kong between 2014 and 2017 for key exporting countries, where data was available.

**Table 2. Mango imports, Hong Kong, by value, 2014–17**

Country	Mango imports (USD'000)		
	2014/15	2015/16	2016/17
Philippines	21469	21732	19204
Australia	12289	13527	11841
Thailand	2434	1608	3281
Taiwan, China	5002	399	3112
India	200	266	344
Cambodia	0	86	330

Source: ITC Trade Map, 2019

Importers who use informal trade cite advantages such as timely market access for perishable products, evasion of tariffs, avoidance of lengthy Chinese quarantine and inspection procedures, and market access for categories of fruit from certain countries that have not yet been granted access to the Chinese market by the AQSIQ. However, the risks associated with the informal channel in China have continued to grow over the past decade, and crackdowns by Chinese authorities on imports using informal trade have become more frequent and more severe. Stimulated both by attempts by the central government to recover revenue lost from tariffs and duties as well as a more widespread anti-corruption drive following the 18th National Congress in November 2012, the legal ramifications of using informal trade channels to import products into mainland China have greatly increased.

Use of informal trade by importers has dropped in recent years not only due to increased enforcement by Chinese customs authorities, but also because China's import tariffs and duties have decreased as a result of its gradual implementation of WTO standards on imports, with tariffs even being fully waived for countries who have signed free-trade agreements (FTAs) with China.

### 5.3 Direct export to mainland China

Direct export to mainland China has become the principal distribution method for foreign exporters of fresh fruit and vegetables. Exporting directly to mainland ports, namely Guangzhou and Shanghai, is the most efficient market access method, as it eliminates the added complications of transport through and cold storage in Hong Kong. Furthermore, Chinese authorities established FTZs in Shanghai in 2013 and in Tianjin, Guangdong, and Fujian in 2015. These ports enjoy integrated quarantine and inspection, with a turnaround time ranging from six to 48 hours. This not only cuts costs for importers but also preserves product freshness and ensures swift delivery to customers. Shanghai remains the preferred entry port for fruit exports to China because other major ports such as Beijing suffer from longer and less convenient shipping routes and lengthier quarantine procedures.

Additionally, cold chain infrastructure and transportation has increased exponentially in China, growing from a cold storage capacity of 10,000,000m<sup>3</sup> and 12,000 refrigerated vehicles in 2007 to a capacity of 106,000,000m<sup>3</sup> and 89,000 vehicles in 2015 (Bosch, 2015). This rapid growth in cold chain infrastructure has been concentrated in major import ports and FTZs such as Shanghai, Guangzhou, Fujian and Tianjin, reducing Hong

Kong's importance as a port of entry for foreign fruit imports. With the rise of e-commerce in the Chinese imported fresh fruit market, risks previously associated with payment and credit, such as unreliability of payment from Chinese consumers and importers, and delays in full payments being received, have been lessened through reputable online payment methods directly connected to websites. For efficiency, spoilage prevention, lower costs and general ease of access, it is generally considered that fresh fruit exporters use direct export as their primary distribution channel to mainland China.

Countries that have official entry into China fall into two different categories. Those with protocols (which include Peru, Thailand, Philippines, Pakistan, Ecuador, India and Australia), and those that are allowed entry without any treatment required (Vietnam and Myanmar). The volume of official mango imports by value and volume into China, supplied by CATAS, is not consistent with reported export data (see Table 3 and Table 4).

Commodity inspection authorities are given the authority under legislation to issue certificates or go through the formalities of release, as shown on the AQSIS website and there are currently no mandatory biosecurity provisions in the plant protection and phytosanitary cooperation agreement between China and Vietnam (FAO, 2008). China shares a land border with some of these countries, and as such they also share many of the same mango pests and diseases, including *Bactrocera dorsalis*, although some – such as *Sternonchetus mangiferae* – are suspected to be confined to a few districts within China.

**Table 3. Mango imports, China, by volume, 2013–17**

Country	2013 (t)	2014 (t)	2015 (t)	2016 (t)	2017 (t)
Taiwan	1,442	2,104	4,696	537	1,831
Peru	0	0	30	959	1,138
Australia	74	?	60	83	80
Thailand	1,239	1,643	1,190	794	838
Philippines	393	522	371	284	106
Pakistan	2	22	15	5	8

Source: CATAS, 2018

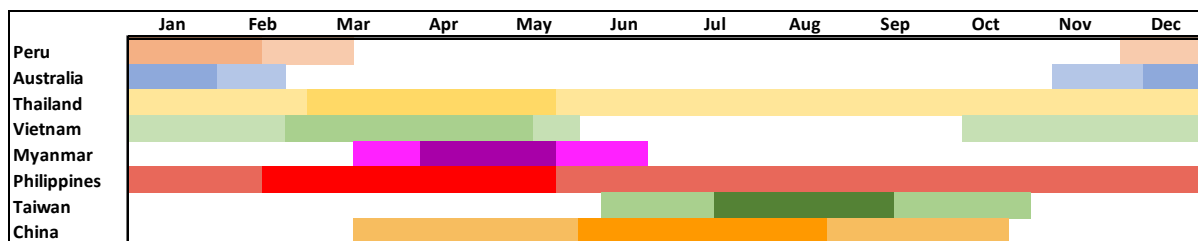
**Table 4. Mango imports, China, by value, 2013–17**

Country	Value of imported mango (USD,000)				
	2013/14	2014/15	2015/16	2016/17	2017/18
Thailand	4545	5442	4984	3146	3698
Taipei, China	2060	3221	9151	1674	5331
Peru	0	0	208	3370	3610
Philippines	2830	5198	3301	2083	873
Australia	408	3389	2752	7315	4878
Pakistan	6	24	15	18	26

Source: ITC Trade Map, 2019

Mango supply periods for countries shipping to China and Chinese domestic mango availability can be seen in Figure 6, where lightly shaded areas indicate shoulder periods (lighter supply).





**Figure 6. Domestic mango supply periods, China and key exporters to China**

Source: Author's analysis

### Peru

Peru supplies China for three months of the year, with its time of peak of supply occurring in January and early February and coinciding with the Chinese Spring Festival (New Year). Many of the importers, wholesalers and retailers interviewed indicated they were seeking more supply from Peru because they were not able to obtain their required quantities from Australian suppliers during the time of peak demand. Peru predominantly supplies the Kent variety, using a hot-water dip protocol to meet the market entry requirements. Kent is a robust variety and able to withstand HWT.

### The Philippines

The Philippines is able to supply China all year round due to its ability to produce off-season fruit; however, the main producing season is February to May – before the main Chinese domestic season. The Philippines has a long history of exporting the Carabao mango variety to China, particularly to Guangzhou. Consumers in Shanghai are less familiar with Philippine mangoes, although there are a number of wholesalers there that do regularly handle Philippine mangoes. The protocol developed for market entry is vapor heat treatment (VHT). Export into China is prohibited from the island of Palawan due to the presence of mango pulp weevil *Sternochetus frigidus*. All other parts of the Philippines are declared free from this pest. The Carabao variety, however, is a thin skin variety and can be susceptible to some levels of skin damage after VHT treatment. This can lead to high reject rates at the packhouse and other market problems. Comments from one Philippine exporter revealed they encountered buyer resistance in Guangzhou against fruit that has been treated with VHT, as it was perceived not to be fresh.

### Australia

Australia exports between November and February; however, the majority of exports occur in December and January. The protocol is either hot-water dip or VHT, but all exports to China from Australia are currently using VHT. This is primarily due to the sensitivity of the current varieties to hot-water dip treatment, with skin damage a real risk. Importers and retailers haven't reported too many quality issues associated with the heat treatment, other than advanced ripening in some cases.

### Pakistan

Pakistan produces from late May to early September; however, the optimum time for exporting is August to September (white Chaunsa variety). Current protocol for Pakistan is HWT. To date, Pakistan has not developed its exports to China, partly because it has only one facility registered for export to China, which is based in the south at Karachi, while the late production is in the north, thus creating a logistical challenge. Trail shipments sent during the ASLP project encountered numerous quality issues, which were exacerbated by the HWT.

## Thailand

Like the Philippines, Thailand is able to supply mangoes over a 12-month period, although March and April are the months of greatest supply. Thailand has been exporting to China for some time. Historically, much of this was going via Hong Kong; however, in recent years, most of Thailand's exports are direct to China using VHT protocol. Nam Dok Mai is the main variety, although it is often marketed under different names, such as honey mango. The variety is more robust than Carabao, and importers reported very little quality issues with the fruit that they could attribute to the heat treatment.

## 6 Technical barriers

### 6.1 Key mango pest of concern for the China market

The pests listed in Table 5 have been identified within the country-specific protocol for mangoes being imported into mainland China from Australia, Pakistan and India. Brief descriptions of pest groups and most common treatment methods are discussed in Section 6.2.

**Table 5. Quarantine pests of concern to China for mango imports**

Exporting country	Quarantine pest
Pakistan	Peach fruit fly ( <i>Bactrocera Zonata</i> ) Mango seed weevil ( <i>Sternochetus mangiferae</i> ) Mango pulp weevil ( <i>Stemochetus frigidus</i> ) Mango scale ( <i>Aulacas tubercularis</i> ) Armored scale ( <i>Parlatoria crypta</i> ) Croton mussel scale ( <i>Lepidosaphes tokionis</i> ) Guava fruit fly ( <i>Bactrocera correcta</i> ) Sooty mold ( <i>Capnodium ramosum</i> ) Fungal pathogen ( <i>Fusarium moniliforme</i> var. <i>Subglutinans</i> )
Australia	Armoured scale ( <i>Aulacaspis</i> sp.) Northern Territory fruit fly ( <i>Bactrocera aquilonis</i> ) Mango fruit fly ( <i>Bactrocera frauenfeldi</i> ) Jarvis' fruit fly ( <i>Bactrocera jarvisi</i> ) Lesser Queensland fruit fly ( <i>Bactrocera neohumeralis</i> ) Queensland fruit fly ( <i>Bactrocera tryoni</i> ) Mediterranean fruit fly ( <i>Ceratitidis capitata</i> ) Leaf blight ( <i>Coniella castaneicola</i> ) Sorghum head caterpillar ( <i>Cryptoblabe adoceta</i> ) Stem end rot of mango ( <i>Cytosphaera mangiferae</i> ) Dothiorella rot ( <i>Dothiorella</i> 'long) Mango dothiorella rot ( <i>Dothiorella mangiferae</i> ) Flour moths, dried fruit moths ( <i>Ephestia</i> sp.) Light brown apple moth ( <i>Epiphyas postvittana</i> ) Orange fruit borer ( <i>Isotenes miserana</i> ) Tortricid moths, vine moths ( <i>Lobesia</i> sp.) False mango scale ( <i>Phenacaspis dilatata</i> ) Stemphylium rot ( <i>Stemphylium vesicarium</i> ) Mango seed weevil ( <i>Sternochetus mangiferae</i> ) Bacterial black spot ( <i>Xanthomonas campestris</i> pv. <i>Mangiferaeindicae</i> )
India	Sooty mold ( <i>Capnodium ramosum</i> )

Sources: AQSIQ, 2013; DAWR, 2013; PPQS, 2004

## 6.2 Fruit fly

Fruit flies (*Tephritidae*) are a serious pest of numerous horticultural crops worldwide. Adult female flies lay eggs within the skin or flesh of the fruit, and larvae develop within the fruit (Allwood et al., 1999). The shipment of fresh fruit infested with live fruit fly eggs or larvae provides a high risk for the introduction of pest fruit fly species into an importing country. If an importing country does not have the pest fruit fly species or the species is within a controlled area, the importing country may impose risk management measures to ensure that the pest species does not enter with fresh fruit. Specified treatments to manage the risk of fruit fly infestation within the region are as detailed below.

### Hot-water dip (HWD)

This process involves the fruit being submerged completely in a hot water bath and gradually heated to a specified temperature and held at that temperature for a specified time. Temperatures and times vary between countries, fruit fly species and, in some cases, the size and weight of the fruit (see Table 6).

**Table 6. Importing country HWD requirements for fruit fly**

Importing country	HWD temperature (°C)	HWD time (minutes)
Australia	48	60–90
China	46	20
China	47	15
EU	48	60

Sources: BICON, 2016; MICOR, 2016; NZMPI, 2016; USDA, 2012 and USDA, 2015

### Vapour heat treatment (VHT)

VHT uses a similar concept to HWD, but hot water vapour is used rather than submergence in hot water. Throughout the process, a careful and precise control of humidity and temperature is required. Fruit will be treated at temperatures between 46.5°C for 30 minutes and up to 48°C for 20 minutes depending on the import country requirements (see Table 7).

**Table 7. Importing country VHT requirements for fruit fly**

Importing country	VHT temperature (°C)	VHT time (minutes)
Australia	46	10
Australia	46.5	30
Australia	47.5	20
EU	46.5	30
EU	47.5	20
Japan	47	15
Japan	47	20
Japan	47.5	20
New Zealand	47	20
New Zealand	46	10
New Zealand	48	20
USA	47	20

Sources: BICON, 2016; MICOR, 2016; NZMPI, 2016; USDA, 2012 and USDA, 2015

## Irradiation

Irradiation is the ideal technology for developing generic quarantine treatments because it is effective against most insect and mite pests at dose levels that have minimum impact of fruit quality. A generic dose of 150Gy has been found to be effective on all fruit fly species tested (Follet, 2004). Unlike other disinfestation treatments, irradiation only sterilises the insect. The fruit in a single consignment may not receive the same dosage, and so some protocols, such as that between Australia and the USA, have a dosage of 400Gy. This can lead to some issues with high dose areas occurring in the consignments, which may lead to quality problems. Principles for the use of irradiation as a phytosanitary measure are outlined within the International Standard for Phytosanitary Measures (ISPM) no. 18, *Guidelines for the use of irradiation as a phytosanitary measure* (FAO, 2003). Different fruit fly species of concern require specified dose rates (see Table 8).

**Table 8. Irradiation dose rates for fruit fly**

Importing country	Fruit fly species	Required dose rate (Gy)
Australia	<i>Bactrocera carambolae</i> , <i>Bactrocera correcta</i> , <i>Bactrocera dorsalis</i> (species complex) & <i>Bactrocera zonata</i>	150
Indonesia	Queensland fruit fly ( <i>Bactrocera tryoni</i> ), Jarvis fruit fly ( <i>B. jarvisi</i> ) & Mediterranean fruit fly ( <i>Ceratitidis capitata</i> )	150 minimum
USA	Fruit flies	400
USA	<i>Bactrocera cucurbitae</i> , <i>Bactrocera dorsalis</i> (species complex) & <i>Bactrocera occipitalis</i>	150 – 165

Sources: BICON, 2016; MICOR, 2016 and USDA, 2015

## Area freedom

Area freedom for a designated pest is established through base line surveys and ongoing monitoring and surveillance to verify that the pest is not present within a designated area. Principles for establishing the pest-free areas are outlined within ISPM no. 4 (FAO, 1996) and ISPM no. 26 (FAO, 2015). While Australia has established PFAs for Mediterranean fruit fly (*Ceratitidis capitata*) and Queensland fruit fly (*Bactrocera tryoni*), these do not coincide with the tropical mango production areas. No other country exporting mangoes to China has been able to establish and maintain fruit fly PFAs for mango exports.

## Systems approach

A systems approach to pest management consists of the use of two or more independent measures to reduce infestation of a pest within the mango to an acceptable level. Independent measures may include such things as in-field controls, post-harvest sampling, post-harvest treatments, and storage techniques that would harm or kill the pest, such as controlled atmosphere. Principles to develop and maintain systems approaches for pest management are outlined within ISPM no. 14 (FAO, 2012), *The use of integrated measures in a systems approach for pest risk management*, and ISPM no. 35 (FAO, 2012) *Systems approach for pest risk management of fruit flies (Tephritidae)*.

Most importing countries expect that mangoes will have zero or very close to zero infestation by fruit flies due to their significant economic impact should they establish and spread. To date, it has proven difficult for mango-producing countries to develop and maintain effective systems approaches against fruit fly for export-grade product. Importing countries have also been reluctant to accept this measure due to the difficulty in verifying absolute fruit fly freedom from the product.

## Fumigation

Fumigation with methyl bromide has been and remains the key emergency treatment should pests of quarantine concern be detected within an imported consignment. It is effective in penetrating fruit pulp and killing fruit fly larvae; however, it severely impacts on fruit quality and shelf life and hence is only used as an emergency measure.

Other fumigants have been trialled against fruit fly, such as ethyl formate – but these have not proven to be as effective as methyl bromide and do not provide surety that a consignment is freed from fruit fly. The use of less phytotoxic fumigants such as ethyl formate in combination with another measure, such as controlled atmosphere during storage and shipping, is also under investigation as a systems approach model, but this have not been widely adopted at this stage.

---

## 6.3 Seed and pulp weevils

Mango seed weevil (*Sternochetus mangiferae*) and pulp weevil (*Sternochetus frigidus*) infest the interior of mango fruits and are difficult to detect. The adult beetle lays eggs within the green mango skin and the larvae migrate to either the seed or the pulp, where they develop into mature adults (De Jesus & Gabo, 2000).

To manage the risk of these pests, some importing countries have endorsed the use of irradiation as a phytosanitary measure. If irradiation is not approved by the importing country, production area freedom or fruit cutting of a specified percentage of imported product to demonstrate freedom may be required (see Table 9). The mango protocol documentation sourced for this study doesn't make reference to irradiation as a possible treatment method for mangoes being imported by mainland China.

**Table 9. Risk management measures, seed and pulp weevil**

Importing country	Measures for seed and/or pulp weevil
Australia	Area freedom
Australia	Irradiation at 300 or 400 Gy for seed & pulp weevils
Malaysia	Irradiation at 300 Gy for seed weevil
USA	Area freedom
USA	Irradiation at 300 Gy (minimum) for seed & pulp weevils

Sources: BICON, 2016; MICOR, 2016 and USDA, 2015

### Property freedom, area freedom and product freedom

Property freedom and product freedom are accepted quarantine measures for mango seed weevil, and must be verified by a surveillance program. The surveys commence once the fruit is 3cm long and continues every week until the completion of harvest. Records of this surveillance must be kept and are auditable.

Area freedom has been granted to the Philippines for mango pulp weevil by China for all mango production areas other than the island of Palawan, where pulp weevil is known to be established. Area freedom was granted by China only after an extensive surveillance program was conducted across the whole country and results demonstrated that the weevil was not established in any other province, which is recognised internationally.

The systems approach to managing mango seed weevil involves maintaining orchard hygiene, the targeted use of chemical sprays, frequent monitoring activities and selective fruit cutting to verify orchard freedom from mango seed weevil (DAWR, 2017).

---

## 6.4 Red-banded mango caterpillar

Red-banded mango caterpillar (*Deanolis sublimbalis*) is an internal pest of mango. Adult moths lay eggs upon the fruit stalk. Eggs hatch and the larvae tunnel into the fruit, where they remain and develop to the pupal stage. The pupae leave the fruit and develop into adults within the soil (Plant Health Australia, 2013).

Risk management for importing countries that do not have this pest may be area freedom certification, a certified systems approach combined with fruit cutting, or treatment with irradiation at 300–400Gy (BICON, 2016).

---

## 6.5 Mango scale

Mango scale (*Aulacas tubercularis*) infests the exterior of the mango fruit and mango plant. It is present all year round, with overlapping generations throughout the year. Infested areas on leaves turn pale green or yellow and will eventually die. Heavy infestations kill leaves and branches and the fruit displays conspicuous blemishes. Monitoring and control in the lead-up to harvest is critical in the treatment of mango scale. Chemical control should be applied only when monitoring shows significant scale activity; pre-harvest application of systemic or growth regulators can be applied to prevent population increase (Holmes et al., 2015).

---

## 6.6 Bacterial black spot

Bacterial black spot (*Xanthomonas campestris pv mangiferaeindicae*) is a major constraint in many production areas, and fruit losses can be in excess of 50% (Ploetz, 2003). The disease is wide spread and reported in numerous countries in Asia. It has been highlighted by China as a disease of concern for market access. Good prevention practices are essential to maintain property freedom from the disease.

### **Property freedom**

Market access is conditional on the orchard verifying that it is free of bacterial black spot through an ongoing monitoring and surveillance program. This is verified by orchard inspections during the certification process by the NPPO or an accredited service provider.

---

## 6.7 Swot analysis of market-entry systems

### **Strengths**

- VHT: Less detrimental to quality on sensitive varieties, widely accepted internationally.
- HWT: Transfer of heat is more efficient than VHT therefore a quicker alternative, relatively cheap to install and able to treat large volumes rapidly.
- Irradiation: Quick treatment, very cost effective, able to maintain cold chain integrity.
- Fumigation: Quick and cost-effective minimal infrastructure required.
- Systems approach: Can be applied at the farm level, large-scale infrastructure investment in not necessary.

### **Weaknesses**

- VHT: Very expensive and can be damaging to fruit (can shorten shelf life).
- HWT: Only suitable for some varieties and can damage fruit (can shorten shelf life).

- Irradiation: Can cause fruit quality problems (ripening and scalding); not accepted by China as yet.
- Fumigation: Montreal Protocol aims at phasing out methyl bromide as it can damage fruit; not accepted by China for mango – new fumigations not effective enough for probit 9 (zero infestations within consignments).
- Systems approach: Not widely accepted as yet for fruit fly.

### **Opportunities**

- VHT: Costs of VHT plants are reducing and technical skills in exporting countries are improving, which reduces damage associated with heat treatments.
- HWT: New varieties are more heat tolerant and fruit damage is less likely.
- Irradiation: Technology is improving in managing quality through the process, thus helping minimise quality losses; more countries accepting as a phytosanitary treatment – possibility of China accepting irradiation as a treatment at some in the future.
- Fumigation: Low-dose methyl bromide treatment shows promise as an effective treatment (without fruit damage) against fruit fly. This method of methyl bromide fumigation is relatively new and will require further data to ensure efficacy and hence adoption by trading partners.
- Systems approach: Becoming more accepted as efficacy data is accumulated and processes proven to be effective against pests of quarantine concern.

### **Threats**

- VHT: High cost of the treatment makes it difficult for treated fruit to compete with informal trade; limited treatment facilities in some partner countries.
- HWT: Quality issues associated with treatments.
- Irradiation: Public perceptions of irradiation still tend to be negative. There are different varietal responses and quality impacts associated with the treatments. Inconsistent dose patterns across consignments has led to patches of blemished fruit that have received exceptionally high dose rate due to packing configurations.
- Fumigation: Methyl bromide is being phased out of use under the Montreal Protocol. Generally only used as an emergency measures for suspect consignments.
- Systems approach: Not being accepted at an international level.
- Geo-political issues have impacted upon trade in the past and are likely to continue to have impacts on trade into the future.
- As the pest and disease status of both importing and exporting countries change with time, protocols are likely to change to meet these new conditions. Exporting countries may struggle to meet new or modified requirements. This is often dependent upon the level of government support provided to producers.

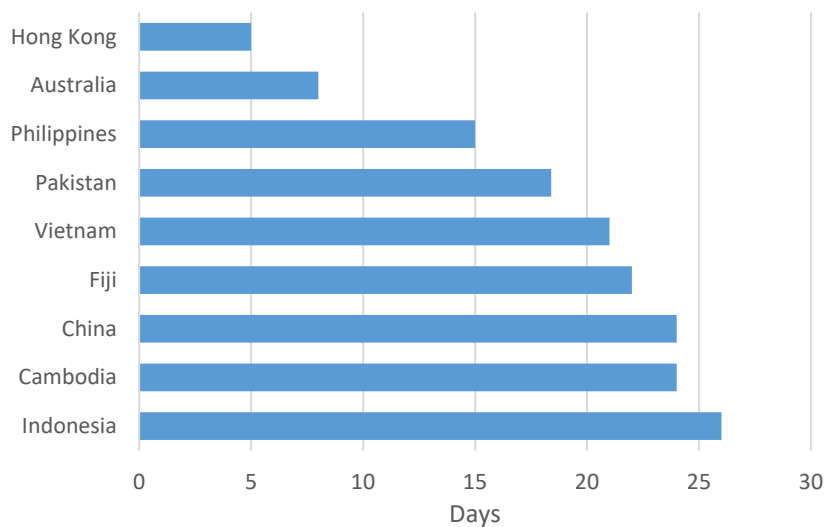
---

## **6.8 Regulatory requirements**

### **Time for imports**

Time for imports refers to the time necessary to comply with all procedures required to import goods recorded in calendar days. The time calculation for a procedure starts from the moment it is initiated and runs until it is completed. If a procedure can be accelerated for an additional cost, the fastest legal procedure is usually chosen by the applicant. Generally, neither the exporter nor the importer wastes time and each commits to

completing procedures without delay. Figure 7 shows the average time to import for nine relevant countries, based on data from the World Bank.



**Figure 7 Time to import country comparisons, 2014**

Source: World Bank, 2018

Note: As mango-specific time could not be sourced, the figure illustrates average across all imported goods for each country including all relevant ports

Indonesia has the largest time requirement out of the countries included, with an average of 26 days in 2014. Hong Kong took the least time on average, with an average of only 5 days in 2014. Many factors contribute to these results, in particular that Hong Kong does not enforce any phytosanitary requirements.

### **Maximum residue limits**

A maximum residue limit (MRL) is the highest amount of an agricultural chemical residue that is legally allowed in a food product, whether produced domestically or imported. MRLs are well below the level that could pose health and safety risks to consumers. Limits are set using internationally recognised methods and national scientific data, and each country sets its own limits via an informed responsible agency.

The USDA Foreign Agricultural Service completed an unofficial translation of mainland China's latest National Food Safety Standard: Maximum Residue Limits for Pesticides in Foods (see Table 10). The standard was released by the Chinese National Health and Family Planning Commission, the Ministry of Agriculture and the China Food and Drug Administration in December 2016, and was implemented in June 2017. When calculating the MRL for whole mangoes, the stone must be removed first.



**Table 10. Mango chemical maximum residue levels, mainland China**

Chemical	Type	MRL (mg/kg)
Difenoconazole	Fungicide	1.00
Pyraclostrobin	Herbicide	0.05
Profenofos	Pesticide	0.20
Mancozeb	Fungicide	2.00
Carbendazim	Fungicide	0.50
Paclobutrazol	Plant growth regulator	0.05
Spirotetramat	Pesticide	0.30*
Cyhalothrin	Pesticide	0.20
Lambda-cyhalothrin	Pesticide	0.20
Cypermethrin	Pesticide	0.70
Beta-cypermethrin	Pesticide	0.70
Prochloraz	Fungicide	2.00
Prochloraz-manganese chloride complex	Fungicide	2.00
Cyprodinil	Fungicide	2.00
Azoxystrobin	Fungicide	1.00
Thiabendazole	Fungicide	5.00
Tebuconazole	Fungicide	0.05
Deltamethrin	Pesticide	0.05
Ethephon	Plant growth regulator	2.00

Source: USDA, 2017

Note: Limit is temporary

### Labelling

Regulatory requirements apply to the labelling of cartons. Cartons or palletised units must be clearly marked with the grower (orchard/block) and packhouse approval number.

- Cartons must have markings to enable traceability to specific treatment lots.
- Sea freight pallets must be marked with the Chinese characters for 'Export to the People's Republic of China'.
- Air freight cartons must be marked with the Chinese characters for 'Export to the People's Republic of China' (DAWR, 2017).

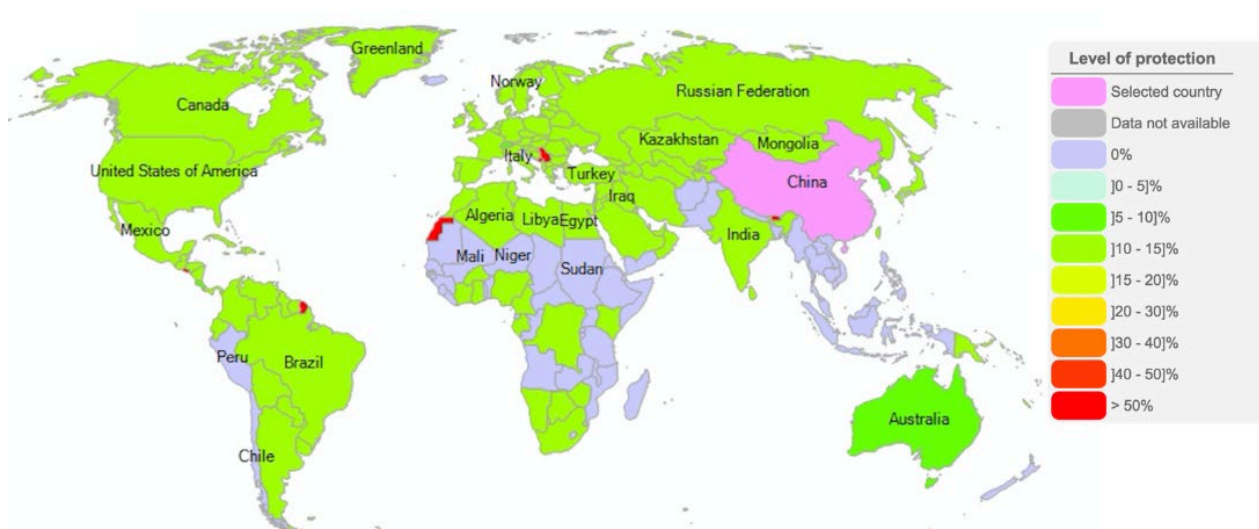
## 6.9 Non-SPS impacts on trade

Market access for fresh fruit and vegetable imports into China is both a technical and a political issue. Maintaining good bilateral relations is important in gaining timely market access, and is a difficult issue to remedy for exporters whose countries have less-than-satisfactory relationships with the Chinese government. Exporters whose countries have signed an FTA with China enjoy a large competitive advantage in the form of tariff waivers; the majority of these countries have tariff-exempt regimes or are progressing toward a tariff-free state for fruit imports. Exporters whose countries have not signed FTAs with China are far less competitive and face significant pricing challenges.

Reciprocal market access, especially for apples, pears and citrus, is sometimes sought by Chinese authorities as a condition for allowing fruit imports from a certain country into China. This issue is often out of the control of the exporter and can present a roadblock in negotiations, which has to be resolved either at a higher executive level or after certain concessions have been made (PMA, 2016). Outside of phytosanitary requirements, many issues impact on mango import/export pathways (as well as on all commodities). External factors have influenced trade of Philippine mangoes to China, for instance, such as shipping challenges in the South China Sea and the ongoing presence of pests such as western seed bug and pigeon fly.

### Tariffs

Mainland China imposes a broad spectrum of tariffs globally, and countries with a trade agreement generally have a very low tariff, if any all (see Supporting Document 11.1). Countries without a trade agreement that encompasses mangoes pay tariffs typically at 15%; 26 countries have an a significant tariff charge applied to mango exports to mainland China. Figure 8 and Table 11 present an overview of ad valorem tariffs (expressed as a percentage of the value of goods cleared through customs) or equivalent applied by mainland China to mango exporters in 2017.



**Figure 8. Geographic distribution of tariffs applied by mainland China to exporting countries**

Source: ITC Trade Map, 2017

**Table 11. Ad valorem tariffs applied by mainland China**

Exporting country	Tariff (%)
Hong Kong	15
Fiji	15
Australia	6
Indonesia	0
Philippines	0
Vietnam	0
Pakistan	0
Cambodia	0

Source: ITC, 2017

---

## 6.10 Quarantine and inspection services

All consignments are subject to an import inspection on arrival. Prior to inspection, the AQSIQ must be able to confirm that:

- a phytosanitary certificate has been issued with the necessary support documentation
- the markings on the pallet or carton include requirements and are not missing, incorrect or incomplete
- the carton or pallet is appropriately sealed
- no packages are broken
- the container seal was not broken or replaced, and that the seal number matches that on the phytosanitary certificate
- treatment records show that VHT was successful
- the container doors are completely closed.

In the case of non-compliance for one or more of the above requirements, the consignment will not be allowed entry into China. If any pests of quarantine concern are found upon arrival, the following measures may be taken:

- If mango seed weevil is detected, the consignment will be destroyed or re-exported. It may be reconditioned at the AQSIQ's discretion at the expense of the importer. The associated orchard and packhouse/treatment facility will be suspended until the department and the AQSIQ are satisfied that the cause of infestation is determined and corrective measures taken.
- If mango seed weevil is detected multiple times at import inspection, all exports of mangoes to China will be suspended until the department and the AQSIQ are satisfied that the cause of infestation is determined and corrective measures taken.
- If any other live pests of quarantine concern or other non-compliances are found, the consignment will be destroyed or re-exported. It may be reconditioned at AQSIQ's discretion at the expense of the importer. The associated orchard and packhouse/treatment facility will be suspended or AQSIQ will suspend all mango exports to China until the department and AQSIQ are satisfied that the cause of infestation is determined and corrective measures implemented (DAWR, 2017).

Recent initiatives from the Chinese government have aimed to improve the efficiency of inspections and customs services by creating FTZs (as discussed in Section 5.3). Within these zones, an integrated quarantine and inspection process follows an 'apply once, inspect once, release if qualified' logic. An example of this was the new Xijiao International market initiated by the Shanghai municipal government, where a distribution hub has been created that incorporates wholesale markets, exhibition centres, product inspection, logistics, cold chain warehousing, import and export, e-commerce and government services.

Most importers interviewed reported quick turnaround times ranging from six hours (if arriving on a weekday) to 48 hours (if arriving over the weekend). Comments were also made that the inspection and release process has improved significantly in recent years and that delays are rare. Previously delays of days, sometimes even more than a week, have been reported by exporters. E-commerce companies interviewed indicate that small shipments are cleared within three hours, and that they are able to source fruit directly from their suppliers within 18 hours.

---

## 6.11 Commercial issues

### *Importer*

Importers face a number of issues associated with imported fruit. Quality issues associated with phytosanitary treatments are reported that include white patches in the flesh (often referred to as rice-graining with the Philippine mangoes) which is a direct result of VHT treatment (Produce Report, 2019), and scalding and dehydration of the fruit, which are also exacerbated by heat treatments.

Phytosanitary treatments often accelerate the ripening process, and many importers reported inconstant mango ripeness within consignments creates difficulties with transportation and acceptance on import arrival. This is compounded by a lack of cool chain infrastructure, which leads to higher product loss and hampers the development of markets in tier-two and tier-three cities.

Some importers, particularly in Guangzhou, indicated a lack of aroma and freshness associated with fruit that had been treated with VHT. This may also be associated with refrigerated transport, which tends to suppress many of the aroma volatiles (Johnson et al., 2002).

Delays in consignments being released have historically formed a contentious issue for importers. However, all interviewees for this study reported significant improvements in this area, and most did not see delays as a major problem.

Competition with the informal trade has been one of the greatest challenges facing importers that are sourcing directly. Historically, it has been cheaper and quicker to access fruit via informal pathways, although all importers indicated that the quality was variable and losses higher. Most importers were optimistic about the prospects of importing more through direct channels in the future, although many reported difficulties in sourcing enough product.

### *Retailer*

Supermarkets (both international and domestic operators) have seen a rapid rise in the last five years, with growth capturing 50% of the market share, although this has slowed in recent years with the emergence of e-commerce and the rise of the fresh fruit specialty sector (PMA, 2016). Supermarkets are being actively encouraged to source product through formal channels; this is creating supply problems for some of the premium fruits simply due to limitations within supplying countries who have limited access to VHT or HWT plants. Many of the retailers reported difficulties in sourcing enough fruit, especially during periods such as the spring festival.

Large supermarkets, especially the high-end stores, are now actively seeking to directly import fruit from supplying countries to ensure supply, maintain better control over product quality and reduce costs by removing the middle men. Many of these larger retailers have invested in their own cool chains.

Mixed ripeness in consignments was a commonly reported issue by retailers. Other heat-related damage was not raised as a major problem, although this can vary between varieties. Several negative reports were associated with VHT impact on Carabao fruit from the Philippines.

Clearance and release of consignments has significantly improved in recent years, and most retailers indicated that it was rare to have a consignment delayed for extended periods.

## ***E-commerce***

E-commerce retailers are facing similar issues as other retailers. Tightening of regulations has led to the closure of e-commerce operators for using informal import channels. Some of the larger companies are directly sourcing from suppliers and are not reporting any negative impacts of treatments on quality, although the majority of businesses still source product through third-party suppliers. E-commerce traders tend to move product quickly, and while variable ripeness is an issue, this was attributed more to inconsistency with supply rather than heat treatment. Lack of treatment facilities in exporting countries was raised as an impediment to market expansion.

---

## **6.12 Future developments**

### ***Pests and diseases***

The pest and disease profile for mangoes from exporting countries and their associated risk management options seem relatively well defined. New pests may emerge, but the existing risk management measures are likely to cope with these. The ability of the exporting country to successfully apply risk management measures in a timely and cost-effective manner is another issue, and this will be touched on in the following section.

Irradiation as a phytosanitary measure is increasingly being adopted by trading partners globally. Costs associated with facility establishment and treatments are decreasing, leading to an increase in the volume of treated product. China has been reluctant to accept irradiation as a quarantine method to date, but negotiations are ongoing.

### ***Technological advances***

Apart from irradiation, there is no accepted technology that could be immediately applied as an alternative treatment to heat. A number of developments exist that, with additional research, may provide alternative treatments in the future. Systems approaches continue to be developed/refined, in order to satisfy biosecurity requirements. To satisfy biosecurity requirements, the cumulative effect of these measures needs to provide an outcome that is similar to a single-point treatment. Reassuringly, a number of domestic trade protocols within Australia already recognise a systems approach and the importance for growing areas where fruit flies are being effectively managed.

Current fumigation technology has yet to come up with an effective fumigant to replace methyl bromide, although work with low dose methyl bromide has shown promise as an alternative to high dose (the Montreal Protocol lists lower doses and higher temperatures as positive strategies) (Leach 2018). Hydrogen phosphide (phosphine) has proven phytotoxic in trial work. Natural plant volatiles such as ethyl formate may be effective in controlling insects on the surface of the host, but they do not penetrate sufficiently to kill fruit fly eggs and larvae in the fruit flesh (Armstrong, 1992).

Combination treatments such as a fumigant and controlled atmosphere are one way that fumigation technology could progress. Preliminary studies using a combination of propylene oxide and controlled atmosphere show some promise but requires further research.

### ***Formal versus informal pathways***

The transition from the informal to formal market is well underway. Hubs for rapid customs and quarantine clearance, supporting infrastructure such as cool chain, and distribution points are all developing rapidly in specific ports. As the Chinese market continues to mature, it is likely that the more consistent-quality fruits delivered via the formal channels will be highly sought after and the formal market will continue to grow. The use of the

informal market is likely to remain as an option for lower-quality fruit for some time to come.

### ***Geopolitical issues***

As China continues to develop as a global super power, geopolitical issues are likely to impact upon trade for some exporting countries (some current examples were discussed in Section 5.9). It would be prudent for exporters to ensure they have access to alternative markets at the same as developing their market access to China.

---

## **7 Technical issues and barriers for partner countries**

---

### **7.1 The Philippines**

#### ***Hong Kong remains preferred export destination***

Only a comparatively small volume of fruit is exported to China via formal export channels. This is largely because of the additional costs associated with production processes to produce unblemished, quality fruit; the increased need for cool chain management; additional transport and handling costs to have fruit treated via VHT; VHT treatment costs; and customs and quarantine costs. These factors combine to make the formal pathway relatively unprofitable for smaller exporters.

#### ***Contractor farming***

Many of the Philippines' mangoes for export are produced under a contractor farming arrangement of some kind. Either trees are leased directly to companies for a specified period, or the farmer plays some role in the production process alongside a contracted producer. This method of farming is sufficient for local production and supply; however, the inefficiencies associated with this production model do not support the consistent volume and quality that are required for export-grade mangoes.

A large portion of the mangoes are sourced from small holdings, which greatly increases the potential for variations in quality, shelf life and MRL breaches within consignments, as well as adding more complexities to traceability.

#### ***Adequate agronomic skills to produce quality fruit***

While the large mango producers follow best practice and supply high-quality, export-grade fruit, many small farmers require additional assistance and knowledge to manage fruit and tree production throughout the year. Some extension services are provided by government, but these tend to be declining in most areas. Large producers and exporters are also providing extension services, but currently these vary in the quality of advice and have patchy distribution. Pest and disease management tools and communications strategies to reach small farmers do exist, but they need to be applied in a more uniform manner.

#### ***MRLs***

Issues have arisen in other export markets, specifically Japan, that have led to the tightening of MRL standards and a more vigorously monitored program both within the Philippines and other importing countries. Currently, some inconsistencies in the accepted levels and enforcement of these levels exist between exporting and importing countries has been observed. It is alleged that cheaper and non-registered chemicals may be in use

at times within the mango production period leading to non-compliance and rejection of produce due to excessive MRLs or unregistered chemicals.

---

## 7.2 Vietnam

Vietnam has experienced rapid growth in exports to China in recent seasons, with cross-border trade dominating the development. Currently, only small amounts are exported to markets that require phytosanitary treatments, although Vietnam's capacity in VHT and irradiation facilities is significant.

### *Transition to formal market*

China has traditionally been an easy export destination for Vietnamese mangoes. However, both the Chinese and Vietnamese governments are working to formalise exports of mangoes into China. This has required a restructure of production, processing and treatment requirements for mango exports to China, and this process is still underway. From 1 January 2019, all fruits and vegetables exported to China from Vietnam must have clearly designated and traceable production areas, and must comply with all quarantine and food safety requirements. This represents a major transition from informal to formal market access.

The recent move for Vietnam to provide phytosanitary certificates for exports indicates the tightening of China's conditions on export mangoes from Vietnam. As Vietnam shares a common border with China, it is likely that protocol treatments will be needed as part of the phytosanitary access should regulations tighten further. Conversely, the issue of traceability poses a major challenge to the industry. The current moves into property PUC and Packhouse PHC codes is a positive step, but at this stage would not meet the level that is generally accepted internationally.

Chemical residue also poses an issue for Vietnamese exporters, as consignments are often made up from numerous small suppliers. Some countries have already imposed mandatory residue testing before the consignments are sent. While there is no indication that China is proposing testing at this level, future increases in testing requirements on fruit to be exported from Vietnam is almost a certainty. Current testing services in Vietnam are already operating at near capacity levels, so further investment in testing facilities will be needed.

---

## 7.3 Australia

This study clearly found that there is high demand for Australian fruit in China. With the recent changes to supermarkets regarding direct sourcing, the limited number of VHT treatment facilities in Australia has impeded the development of the direct-access pathways into China. Establishing new VHT facilities has proven difficult and time-consuming. This was partially exacerbated by the limited experience that regulatory authorities had with the process.

The current protocol between Australia and China has provisions for HWT, which is a cheaper and simpler system, but at this stage no facilities have been established. This is mostly due to the current varieties being considered too sensitive to damage under HWT.

### *Strong domestic market*

A high percentage of Australian mango exports to China is opportunistic. Exporting becomes favourable to mango growers in the peak of the Australian mango season, when production/harvest exceeds the Australian market demand and prices in Australia fall. It should be said that, at this time, the lower prices in these periods of high production do

not incentivise growers to invest in export-market access or development at an individual farm/enterprise level.

### ***Protocol compliance***

Australian producers feel that the time involved and costs associated to comply with property registration to supply treatment/protocol markets is a major barrier. Producers must maintain records of crop-monitoring programs, chemical controls, and pest and disease controls. These measures of compliance are easier to achieve for large-scale operations than for small-scale orchards.

---

## **7.4 Common issues**

### ***Fruit flies as key pest***

Fruit flies remain a key pest of quarantine concern for China, and all countries are required to conduct an end-point treatment to manage the risk of fruit flies. China currently accepts the use of VHT or HWD to treat the fruit for fruit fly larvae.

All countries report issues of fruit damage, premature ripening and reduced shelf life for some mango varieties using both VHT and HWD. Downgrades in quality directly attributed to the heat treatments can vary between less than 5 % to as high as 40%. Preconditioning and handling procedures prior to treatment can significantly improve the outcomes of treatments. Research is also underway to select more heat-tolerant varieties for export. However, the majority of producers and exporters report that the additional costs associated with fruit treatment (as well as additional transport and cool chain costs) challenges the economic viability of exports to China.

Interestingly, the majority of countries exporting mangoes to China accept the use of irradiation as a phytosanitary measure for fruit flies and other pests, while China does not accept irradiation at this stage. Dose rates and delivery mechanisms have been internationally accepted by the FAO and the International Plant Protection Convention (IPPC); however, costs for establishing an irradiation facility remain prohibitive.

### ***Protocol compliance***

The formal export pathway for mangoes to China requires a detailed package of documented compliance measures. Orchard management records, product traceability, heat-treatment records, compliance with Chinese MRL and food standards, and compliant labelling and packaging are all required. This is in contrast to the relatively simple informal pathway for exports into Hong Kong. However, the market remains strong for exporters willing to develop their export systems to suit Chinese requirements.

### ***Pesticide residue levels***

Both Vietnam and Philippines are encountering issues with MRLs. While China had not rigorously enforced monitoring in the past, the signs are there that this will change and supplying countries must be able to comply with the Chinese MRL regulations. Misuse of chemicals within the mango industry by either poor application methods, lack of understanding of integrated pest management and often incorrect or unregistered products have been key issues.



---

## 8 Industry consultation

---

### 8.1 The Philippines

#### *Government collaboration to be strengthened*

Government has a key role to play in both the provision of extension services and the certification of export products. This relationship between the public and private sector stakeholders needs to be strengthened and expanded if the Philippines are to continue to expand formal exports to China.

#### *The contract grower system*

Contracting mango production to a third party by farmers has led to quality and quantity challenges. This model is regarded as not being well suited to the establishment of a formal market niche within China for Philippine mangoes. A model of increased farmer engagement with exporters, in which quality product is produced by farmers and they in turn are rewarded with high prices for their fruit, should be developed.

---

### 8.2 Vietnam

#### *Transition to formal market*

China has traditionally been an easy export destination for Vietnamese mangoes with minimal requirements. However, both the Chinese and Vietnamese governments are working to formalise exports of mangoes into China. This has required a restructure of production, processing and treatment requirements for mangoes exports to China and this process is still underway.

#### *Need for increased farmer education*

Farmers need to better access to information and education regarding the need for increased compliance with Chinese regulations. Illegal chemical usage and MRLs remain a key issue for farmers, and training is required on the correct use of registered chemicals.

#### *Increased linkages between exporters, cooperatives and government authorities*

Strengthening collaboration through a national approach across the supply chain, including farmers' groups, produce suppliers, contractors, aggregators, treatment service providers and government certification authorities, is required if formal exports to China are to grow rapidly.

---

### 8.3 Australia

#### *Multiple protocols, multiple markets*

The complexity of multiple biosecurity requirements for domestic and foreign markets makes it difficult for growers to service multiple markets. Servicing multiple markets is costly, and the time required to implement and document pre-season requirements for export to protocol markets adds to these costs.

#### *Need for increased grower education*

This study identified training and education to better understand the benefits of exports to phytosanitary markets as key starting points for developing the formal export pathway to

China. Production manuals and administrative guidelines for export markets will be required to support this. Those already involved in the export pathway considered that the audit processes and administrative procedures need to be streamlined.

### **Alternatives to VHT**

Industry felt that VHT plants were not commonly available, and were relatively expensive and often damaging to fruit. Alternatives such as HWD or the use of irradiation as a phytosanitary measure for exports to China were raised.

### **A longer-term export strategy to China**

Only a comparatively small volume of fruit is exported to China via formal export channels. Australian exporters formed a US-exports-focused group some years ago, and it was suggested the same needs to occur if exports to China are to become a major focus for Australian industry. The consistent supply of quality product would be essential to establish and maintain a strong presence within the formal Chinese market.

---

## **9 Conclusion and recommendations**

---

### **9.1 Conclusion**

There is a strong desire by China to move from the informal and well-established import of mangoes (via Hong Kong) to a more formalised process based upon international rules and regulations for the safe movement of plant products. China and its exporting countries have conducted bilateral exchanges to determine pests and diseases of quarantine concern, and have developed mutually agreed protocols for the safe import of mangoes into China. Fruit flies remain a key pest for China, but the export protocols also require the management of a series of other pests based upon risk assessments.

The transition from formal to informal trade is clearly underway, and demand for high-quality mangoes into China is strong – indeed, at times it cannot be met (through formal import channels). Hubs for rapid customs and quarantine clearance have been set up at established ports, and delay times for product clearance largely eliminated. The necessary supporting cool chains and transport systems are also in place.

On the production side, there is still a preference for the cheaper and less demanding informal export pathway into China via Hong Kong. Farmers, producers and exporters struggle to justify the application of protocol requirements that eat into profit margins. However, domestic markets are also strong and exports to China (via Hong Kong) only occur at times of excessive mango supply.

The Chinese demand for mangoes is likely to continue to increase. It would be prudent for mango producers and exporters to continue to work towards efficient and cost-effective formal export pathways for mangoes into China as the informal pathway is likely to be restricted into the future. Efforts should be made by exporting countries to educate domestic mango producers of the potential profitability, long-term market potential and regulatory requirements for the formal export of mangoes to China.

---

### **9.2 Recommendations**

#### **Short term**

- Identify networks of exporters in each country with interests in establishing longer-term mango exports in China, or interest in the formation of such networks. Examples such as the Australia–US export working group should be replicated

across the partner countries for a more coordinated approach to developing direct access to the Chinese market.

- If national networks can be identified, explore funding sources for a small regional coordination unit to assist with national and regional efforts to build a viable exporter/importer consortium, with the long-term view to establish all year-round supply of mangoes into China.
- Develop direct linkages with supermarket and e-commerce buyers.

### **Medium term**

- Regional coordination authority to develop a business case for formal export pathways for mangoes to China for each country, if they do not currently exist.
- National and regional coordination units to engage with relevant government authorities to present this business case and seek collaboration and funding sources.
- Collate existing extension materials for mango production of export grade mangoes for each country and determine if they are fit for purpose. Revise documentation if required.
- Collate existing extension operations and materials and determine if they are fit for purpose. Revise as necessary. Transition extension operations to industry groups wherever possible, with the support of relevant government authorities.
- Governments or specialised third-party services to provide ongoing training on compliance with the Chinese protocol.
- Review existing VHT and HWD facilities and protocols to ensure they are operating cost-effectively. If needed, revise protocols or operating procedures to ensure cost-effective treatment and sound fruit quality.
- Explore the use of HWD as a relatively cost-effective fruit fly treatment.
- Conduct a review of previous research on fruit preconditioning to reduce the impact of HWT and VHT treatments on fruit quality.
- Governments of all mango-producing countries should promote a unified front for seeking the adoption of irradiation as a phytosanitary measure for mangoes by China.
- Consideration of a grower or exporter levy system to fund farmer education, extension varietal selection, etc.
- Develop training packages on appropriate chemical management and their application for export markets, focusing on a greater understanding of pesticide residue.
- Better harmonisation of chemical registration between local government authorities, industry needs and importing market requirements.
- Develop and implement traceability programs that are suitable for small-holder producers and will meet international standards.

### **Longer term**

- After a period of trade has occurred, country-specific protocols should be reviewed to remove any inefficiencies or redundant processes (subject to bilateral negotiation with China).
- If required, consideration should be given to the development of one or more irradiation and certification hubs for mangoes to China. Developing larger hubs within the region will likely be more cost-effective than each country developing numerous smaller units.
- Value-added mango products such as dried fruit to be developed and promoted on a regional scale for lower grades of fruit.
- The same model used for other tropical fruits could be adopted for the development of regional pathways into China.

---

## 10 References

- Allwood, A., Chinajariyawong, A., Kritsaneepaibon, S., Drew, R., Hamacek, E., Hancock, D., & Vijaysegaran, S. (1999). Host plant records for fruit flies (Diptera: Tephritidae) in Southeast Asia. *Raffles Bulletin of Zoology*, 1-92.
- AQSIQ. (2013). *AQSIQ On The Import of Pakistani Mango*. General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China. Viewed <[http://www.aqsiq.gov.cn/xxgk\\_13386/jlgg\\_12538/zjgg/2013/201309/t20130922\\_378025.htm](http://www.aqsiq.gov.cn/xxgk_13386/jlgg_12538/zjgg/2013/201309/t20130922_378025.htm)>
- Armstrong J. W. (1992) Fruit fly disinfestation strategies beyond methyl bromide, *New Zealand Journal of Crop and Horticultural Science*, 1992, Vol. 20, pp181-193
- Barton, D., Chen, Y., & Jin, A. (2013). *Mapping China's middle class*. McKinsey & Company. Viewed <<https://www.mckinsey.com/industries/retail/our-insights/mapping-chinas-middle-class>>
- Becker, K. (2004). *The Informal Economy*. Department for Infrastructure and Economic Co-operation. Sida.
- BICON. (2016). Australian Biosecurity Import Conditions Mango. Viewed <[bicon.agriculture.gov.au](http://bicon.agriculture.gov.au)>
- Bosch, P. (2015). *From Freight Trains to Cold Chains*. RaboResearch Food and Agribusiness. Viewed <<https://research.rabobank.com/far/en/sectors/fa-supply-chains/from-freight-trains-to-cold-chains.html>>
- DAWR. (2013). *Protocol for Phytosanitary Requirements for the Export of Mango Fruit from Australia to China*. Viewed <[https://micor.agriculture.gov.au/Plants/Documents%20%20Protocols/Protocols/Mangoes\\_Protocol/China%20Mangoes\\_Protocol/China\\_-\\_Mangoes\\_Protocol.pdf](https://micor.agriculture.gov.au/Plants/Documents%20%20Protocols/Protocols/Mangoes_Protocol/China%20Mangoes_Protocol/China_-_Mangoes_Protocol.pdf)>
- DAWR (2017) Work Plan Australian Mango Exports to the People's Republic of China. Viewed <<https://micor.agriculture.gov.au/Plants/Protocols%20%20Workplans/China%20Mango%20Work%20Plan.pdf>>
- De Jesus, L., & Gabo, R. (2000). Life history and host range of the mango pulp weevil, *Sternochetus frigidus* (Fabr.) in Palawan, Philippines. *Philippine Agricultural Scientist*, vol. 83, pp145-150.
- FAO. (1996) *Requirements for the Establishment of Pest Free Areas* ISPM No. 4. Viewed <[https://www.ippc.int/static/media/files/publication/en/2017/05/ISPM\\_04\\_1995\\_En\\_2017-05-23\\_PostCPM12\\_InkAm.pdf](https://www.ippc.int/static/media/files/publication/en/2017/05/ISPM_04_1995_En_2017-05-23_PostCPM12_InkAm.pdf)>
- FAO. (2003) *Guidelines for the use of irradiation as a phytosanitary measure*. Viewed <<http://www.fao.org/3/a-y4835e.pdf>>
- FAO. (2008). *Cooperative Agreement between the Government of the People's Republic of China and the Government of the Socialist Republic of Vietnam on Plant Protection and Plant Quarantine*. Viewed <<http://www.fao.org/faolex/results/details/en/c/LEX-FAOC175002>>
- FAO. (2012) *The use of integrated measures in a systems approach for pest risk management* ISPM No. 14. Viewed <<http://www.fao.org/3/a-y4221e.pdf>>
- FAO. (2012) *Systems approach for pest risk management of fruit flies (Tephritidae)* ISPM 35. Viewed <[https://www.ippc.int/static/media/files/publication/en/2018/10/ISPM\\_35\\_2012\\_En\\_FF\\_PostCPM-13\\_InkAm\\_2018-10-01.pdf](https://www.ippc.int/static/media/files/publication/en/2018/10/ISPM_35_2012_En_FF_PostCPM-13_InkAm_2018-10-01.pdf)>

- FAO. (2015) *Establishment of pest free areas for fruit flies (Tephritidae)* ISPM 26. Viewed <<http://www.fao.org/3/a-k7557e.pdf>>
- FAO. (2017). *FAOSTAT*. Viewed <<http://www.fao.org/faostat/en/#data/QC>>
- Follet, P (2004) Irradiation to control insects in fruits and vegetables for export from Hawaii, *Radiation Physics and Chemistry*, vol. 71, pp161–164
- Holmes, R., Weinert, M., Wittenberg, L., Pinese, B., Freebairn, C., Bally, I., & Frazer, M. (2015). *Managing Mango Scale*. Delivering Mango Technology, viewed <[https://dpiir.nt.gov.au/\\_\\_data/assets/pdf\\_file/0018/228015/mango\\_scale\\_management\\_poster.pdf](https://dpiir.nt.gov.au/__data/assets/pdf_file/0018/228015/mango_scale_management_poster.pdf)>
- ITC. (2017). *Compare Tariffs*. Viewed <<http://www.macmap.org/QuickSearch/CompareTariffs/CompareTariffsResultsMap.aspx?product=0804502001&country=156&isimporter=1>>
- ITC. (2017). *Trade Map*. Viewed <<https://www.trademap.org/Index.aspx>>
- ITC. (2019). *List of Supplying Markets for a Product Imported by Hong Kong, China*. Viewed <[https://www.trademap.org/Country\\_SelProductCountry\\_TS.aspx?nvpm=1%7c344%7c%7c%7c%7c08045020%7c%7c%7c8%7c1%7c1%7c1%7c2%7c1%7c2%7c1%7c1](https://www.trademap.org/Country_SelProductCountry_TS.aspx?nvpm=1%7c344%7c%7c%7c%7c08045020%7c%7c%7c8%7c1%7c1%7c1%7c2%7c1%7c2%7c1%7c1)>
- Johnson, P.R, Thon, L. & Gosbee, M. (2002) Mango Sea freight trials Integrated Logistics Network Combined report
- Jütting, J. & Xenogiani, T. (2007). *Informal Employment and Internal Migration: The Case of China*. Viewed <<http://slideplayer.com/slide/8361611/>>
- Leach, P. (2018) Market Access R&D presentaion Burdiken export forum Queensland Department of Agriculture and Fisheries.
- MICOR. (2016). Manual for importing country requirements Mango. Viewed <[micor.agriculture.gov.au/Plants/Pages/Search Results.aspx?k=Mango](http://micor.agriculture.gov.au/Plants/Pages/Search%20Results.aspx?k=Mango)>
- Ministry of Commerce. (2018). *China FTA Network*. Viewed <<http://fta.mofcom.gov.cn/english/index.shtml>>
- NZMPI. (2016). New Zealand Ministry of Primary Industries Importing requirements. Viewed <[www.mpi.govt.nz/importing/food/fresh-fruit-and-vegetables/steps-to-importing/](http://www.mpi.govt.nz/importing/food/fresh-fruit-and-vegetables/steps-to-importing/)>
- Plant Health Australia. (2013). *Fact Sheet: Red banded mango caterpillar*. Viewed <<http://www.planthealthaustralia.com.au/wp-content/uploads/2013/01/Red-banded-mango-caterpillar-FS.pdf>>
- Ploetz, R. (2003) *Diseases of tropical fruit*. CABI Publishing International pp332-335.
- PMA. (2016). *Exporting Fresh Fruit and Vegetables to China*. Produce Marketing Association, viewed <<https://www.pma.com/~media/pma-files/research-and-development/exporting-fresh-fruit-and-vegetables-to-china.pdf>>
- PPQS. (2004). *Guidelines for Export Inspection and Certification of Fresh Mango (Mangifera indica) Fruits to P. R. China*. Viewed <<http://phytosanitarysolutions.com/wp-content/uploads/2015/06/NSPM-10-Mango-China.pdf>>
- Produce Report (2019) *Exclusive Interview: Marketing Philippine Mangos in China*, viewed <[www.producereport.com/article/exclusive-interview-marketing-philippine-mangos-china](http://www.producereport.com/article/exclusive-interview-marketing-philippine-mangos-china)>
- Tan, Y. (2016). *South China Sea: Chinese social media urges mango boycott*. Viewed <<http://www.bbc.com/news/world-asia-china-36780967>>

TID. (2017). *Trade and Industry Development*. The Government of the Hong Kong Special Administrative Region, viewed  
<<https://www.tid.gov.hk/english/aboutus/publications/factsheet/china.html>>

USDA. (2012). *Import requirements*. Viewed  
<[epermits.aphis.usda.gov/manual/index.cfm?action=cirReportP&PERMITTED\\_ID=9124](http://epermits.aphis.usda.gov/manual/index.cfm?action=cirReportP&PERMITTED_ID=9124)>

USDA. (2015). *Treatment manual*. Viewed  
<[www.aphis.usda.gov/import\\_export/plants/manuals/ports/downloads/treatment.pdf?scheduleName=T105-a-3](http://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf?scheduleName=T105-a-3)>

USDA. (2017). *China Releases New Maximum Residue Limits for Pesticides in Food*. Global Agricultural Information Network Report, viewed  
<[https://gain.fas.usda.gov/Recent%20GAIN%20Publications/China%20Releases%20New%20Maximum%20Residue%20Limits%20for%20Pesticides%20in%20Food\\_Beijing\\_China%20-%20Peoples%20Republic%20of\\_4-28-2017.pdf](https://gain.fas.usda.gov/Recent%20GAIN%20Publications/China%20Releases%20New%20Maximum%20Residue%20Limits%20for%20Pesticides%20in%20Food_Beijing_China%20-%20Peoples%20Republic%20of_4-28-2017.pdf)>

World Bank. (2017). *Trade, 2008–2016*. Viewed  
<[https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS?end=2016&locations=HK-LU&start=2008&year\\_high\\_desc=true](https://data.worldbank.org/indicator/NE.TRD.GNFS.ZS?end=2016&locations=HK-LU&start=2008&year_high_desc=true)>

World Bank. (2018). *World Bank, Doing Business Project*. Viewed  
<<https://data.worldbank.org/indicator/IC.IMP.DURS?end=2014&locations=CN-HK-AU-PH-VN-PK&start=2014&view=bar>>

# 11 Supporting documents

## 11.1 China Protocol Requirements for Importing Mangoes from Australia and Pakistan (DAWR, 2013) (AQSIQ, 2013)

Orchards	
<b>Australia</b>	<ul style="list-style-type: none"> <li>• Mango fruits exported to China must come from growing areas or orchards found to be free of <i>Isotenes miserana</i> and <i>Xanthomonas campestris</i> pv. <i>Mangiferaeindicae</i>. Monitoring of orchards is required to achieve pest free area status. In the cases where the above-mentioned two pests are detected, the export of mango fruits from the affected growing areas or orchards to China shall be suspended for the export season.</li> <li>• For <i>Sternochetus mangiferae</i>, two options are available to manage this pest: (i) growing areas or orchards found to be free, which may be established by surveys using fruit-cutting, or (ii) a systems approach to ensure product freedom</li> <li>• The orchards must be registered to DAWR and designated by both AQSIQ and DAWR with the guidelines to systematic pest control practices provided to AQSIQ when needed.</li> <li>• Orchards that export mangoes to China must take compulsory pest control measures to minimise the occurrence of pests of quarantine concern to China.</li> </ul>
<b>Pakistan</b>	<ul style="list-style-type: none"> <li>• The Pakistani side should monitor and investigate the orchards during the growth and harvest of mangoes and ensure that the quarantine pests of interest to China are under control. Before or after the start of the export season, the two sides jointly or individually must conduct orchard monitoring. Pakistan should provide relevant annual reports to China.</li> </ul>
<b>India</b>	<ul style="list-style-type: none"> <li>• Prior to the export season, the Agricultural Products Export Development Authority of India (APEDA) shall undertake a pre-survey of mango orchards in areas identified for export and such surveys shall be carried out to coincide with the flower initiation stage and as per the international standards/guidelines on pest surveillance. The objective of pre-survey is to find out the occurrence of pests, intensity and distribution and to ensure package of practices to control the incidence of pests.</li> <li>• The relevant annual reports of survey in the prescribed format shall be provided to IMOA in advance for forwarding to AQSIQ. During the pre-survey the APEDA shall ensure that there is no occurrence of quarantine pests in the orchards in areas identified for export and any occurrence of Quarantine Pests in the orchards in the identified areas of export shall be reported to Ministry of Agriculture of the Republic of India (IMOA) for further immediate necessary action.</li> <li>• Further officers of Directorate of Plant Protection, Quarantine and Storage (Dte of PPQS) and APEDA shall associate with field inspections of mangoes for export to China during mango growing and harvest season carried out jointly with the inspectors of AQSIQ for a period of 15 days to ensure that there is no finding of quarantine pests as listed and to review the phytosanitary conditions of the orchards, packhouse and storage facilities so as to confirm meeting with requirements of Phytosanitary protocol. Such joint inspections shall be coordinated by APEDA. The relevant report of joint inspection shall be provided to IMOA for further action.</li> </ul>
<b>Processing and Packaging</b>	

<p><b>Australia</b></p>	<ul style="list-style-type: none"> <li>• The processing and treatment of mango fruits for export to China must be conducted under the supervision of DAWR or persons authorized by DAWR, and shall go through strict processes to ensure that mango fruits for exports to China are free of any live pests of quarantine concern to China</li> <li>• The packaging material for mango fruits for export to China must comply with the phytosanitary requirements of China and must be kept clean, sanitary and unused. Mango fruits for export to China must be free of any soil or plant material such as twigs, leaves and roots, and must be free of diseased or rotten fruits at the time of packing.</li> <li>• The packaging cartons for mango fruits for export to China must have markings to indicate the place of origin of the mango fruits and the registration numbers of orchards and packers so that the origin of shipment can be traced back if necessary. The pallets used to carry mango fruits must be marked with the Chinese characters 'Export to the People's Republic of China'. For air freighted consignments, the cartons must be marked with the Chinese characters 'Export to the People's Republic of China'</li> </ul>
<p><b>Pakistan</b></p>	<ul style="list-style-type: none"> <li>• All packaging plants and storage facilities must establish a traceability system to ensure that exported fruits can be traced back to registered orchards. If the packaging plant is separate from the HWT plant, it should be traced back to the orchard through the relevant processing plant.</li> <li>• Mango harvest packaging after handling must be under the strict supervision of the Pakistani side, to go through washing, drying and other processes. Such as the use of fungicides, should be consistent with China's national food safety standards.</li> <li>• Mangoes may not bring soil, insects, mites, mollusks, rotten fruits and plant debris. Mangoes have to be hot water treated to reduce the risk of peach fly transmission.</li> <li>• Mango packaging materials should be clean, unused, in line with China's phytosanitary and health and safety requirements. Each box shall be marked with 'Chinese products exported to the People's Republic of China' in Chinese and information on mango varieties, producing areas, orchards (producers), storage facilities, packing plants and HWT plants in English.</li> <li>• Mango must be used to transport closed containers, and add sealing seal. When the container arrived in China, the seal should be intact.</li> </ul>
<p><b>India</b></p>	<ul style="list-style-type: none"> <li>• The packhouses and storage facilities involved in export of mangoes to China shall be duly recognized by APEDA, an agency authorized by IMOA and shall meet the requirements as per the guidelines/standards for grant of recognition of packhouses and storage facilities developed by APEDA.</li> <li>• The inspecting Plant Quarantine officer shall ensure during the inspection of export mangoes to China at the recognized packhouses that such facilities are clean and hygienically maintained and the mango fruits shall be strictly manually sorted, desapped, cleaned, washed, hot-water treated and dried.</li> <li>• The rotten defects shall invariably be removed from the packaging area to a distant area and immediately be disposed. The inspecting Plant Quarantine officer shall verify the records related to receipt of mangoes for processing at packhouses and as well as post-harvest treatment.</li> <li>• The recognized packhouses involved in export of mangoes to China shall be responsible for: <ul style="list-style-type: none"> <li>○ Proper upkeep of packing and storage facilities so that they are clean and hygienically maintained</li> <li>○ Cooperate and extend necessary facilities to the inspecting officer for access to the facility and conduct inspection of consignment</li> <li>○ Proper maintenance of records related to receipt of fruits from various orchards and present for inspection, when required. Also log books related to temperature recording of treatment/storage facilities.</li> <li>○ Proper and timely removal of rejected consignment/rotten defectives from the packaging area to a distant area and immediately disposal to avoid cross infestation</li> <li>○ Abide by the instruction given by the inspecting officer to meet the requirements of phytosanitary protocol and implementation of quarantine regulations.</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>• The inspecting Plant Quarantine officer shall ensure that graded mangoes are packed in clean and unused or unsoiled packaging material and that each carton shall be appropriately labeled indicating the mango variety/species, the place of production, packaging and storage facilities.</li> <li>• The inspecting officer shall ensure that the pallets used are of good quality and if wooden pallets are used they should be appropriately treated and marked as per ISPM-15. The Plant Quarantine officer shall affix a quarantine label on each of the pallet, which is printed and supplied by APEDA and confirmed by AQSIQ</li> <li>• The inspecting Plant Quarantine officer shall supervise the loading of consignment into a refrigerated container and affix the seal after the completion of loading so as to ensure it is not broken till the arrival of consignment at Chinese port. The PQ officer shall ensure that the container is sound, clean and hygienic and free from extraneous matter before loading of the cargo and that the requisite temperature and humidity shall be maintained and a recorder is put along with each container to record the temperature and humidity at regular intervals for monitoring temperature conditions.</li> <li>• Each carton shall have the obvious Chinese words 'for the People's Republic of China' as well as markings to indicate mango's variety and species, place of production, packing house and storage facility and the pallet shall be affixed with quarantine label and containers shall bear the seal of agency authorized by APEDA and IMO A</li> </ul>
<b>Treatment Requirements and Inspection</b>	
<b>Australia</b>	<ul style="list-style-type: none"> <li>• Mango fruits for export to China must undergo heat treatment (vapour heat treatment (VHT), high temperature forced air (HTFA), or hot water dip (HWD)) shown to be efficacious against fruit flies under the supervision of DAWR or persons authorized by DAWR. The heat treatment must ensure that the mango fruit pulp attains a temperature of more than 47°C and remains for 15 minutes, or reaches a temperature of more than 46°C and remains for 20 minutes. It must comply with relevant technical requirements and operational procedures. The heat treatment facilities must be inspected on site and approved by experts from China.</li> <li>• Following the heat treatment, mango fruits will be packed into export cartons under full quarantine security which shall be monitored by DAWR officers to ensure compliance</li> </ul>
<b>Pakistan</b>	<ul style="list-style-type: none"> <li>• HWT facilities to be registered in Pakistan and the Chinese experts on-site test pass. Hot water temperature 48°C, the processing time of not less than 1 hour.</li> </ul>
<b>India</b>	<ul style="list-style-type: none"> <li>• The inspecting Plant Quarantine officer shall verify the hot-water treatment facilities and conduct audit checks of hot-water treatment of mangoes to ensure that the mangoes are given hot-water treatment at 48°C for one hour and the treatment shall be endorsed on the phytosanitary certificate after verification of treatment certificate provided by APEDA.</li> <li>• Further the mangoes shall be given a fungicidal treatment at 500 ppm of Benomyl or prochloroz or thiobendazole or any other fungicide as acknowledged by AQSIQ to exterminate <i>Capnodium ramosum</i>.</li> <li>• The inspecting PQ officer shall draw samples of mango fruits for inspection according to the following sampling regime: <ul style="list-style-type: none"> <li>○ &lt;100 = 100% of packages</li> <li>○ 11-100 = 10% of packages subject to a minimum of 5 packages</li> <li>○ 101-1000 = 2% or a minimum of 10 packages</li> <li>○ &gt;1000 = 1% or a minimum of 20 packages</li> </ul> </li> <li>• The entire fruits of sampled package shall be visually inspected for general hygiene and phytosanitary condition of consignment to ensure it is free from insect/mite infestation; mollusks; fungal infection residue of plant material such as leaves, stems, roots etc; soil contamination; blemishes and rotten defects.</li> <li>• The inspecting Plant Quarantine officer shall make thorough inspection to ensure the fruits are free from any signs of infestation/infection by quarantine pests. If any of quarantine pest is found the entire consignment shall be rejected for certification and further operations at the packhouse shall be suspended.</li> <li>• The inspecting Plant Quarantine officer shall submit a detailed inspection report at the end of each shipment to the Plant Protection Authority Dte of PPQS.</li> <li>• The packages of mango fruits are pre-cooled at 13±1°C with 90±2 % Relative Humidity for 8 hours and there after shall be transferred to the cold storage</li> </ul>

	maintained at 12-13°C with 85-90% Relative Humidity and the pallets are stored until they are loaded into the refrigerated container
<b>Phytosanitary Certification</b>	
<b>Australia</b>	<ul style="list-style-type: none"> <li>DAWR will sample 600 units (mango fruits) or 2% of cartons in a consignment for normal phytosanitary inspection for quarantine pests. In cases where live pests of quarantine concern to China are detected the whole consignment shall not be exported to China.</li> <li>After passing inspection, DAWR shall issue a phytosanitary certificate. The phytosanitary certificate shall certify that the shipment complies with the requirement of the Protocol and is free of any pests of quarantine concern to China, shall be complete with relevant information. DAWR shall supply AQSIQ with a template of the phytosanitary certificate in advance, which must be approved by AQSIQ before use.</li> </ul>
<b>Pakistan</b>	<ul style="list-style-type: none"> <li>Before exporting mango, Pakistan must implement the appropriate inspection and quarantine processes using qualified plant quarantine staff.</li> <li>After passing the inspection a phytosanitary certificate will be issued. An additional statement is to state that 'The Mango Fruit IS Inspected and treated to the requirements in compliance with the established protocol signed by China and Pakistan'.</li> <li>At the same time, the certificate should indicate the treatment methods and technical indicators. In addition, hot water temperature probe calibration reports and temperature records should be attached.</li> </ul>
<b>India</b>	<ul style="list-style-type: none"> <li>An official Phytosanitary Certificate (PSC) shall be issued by the appropriate authority in the format prescribed under IPPC. The PSC shall be issued in duplicate, provided that the export mangoes meet the requirements of phytosanitary protocol. If disapproved of export, he/she shall issue a rejection order giving grounds of rejection and ensure that under no circumstances the rejected cargo shipped and immediately be removed.</li> <li>The issuing officer shall incorporate the following additional declarations in the PSC: <ul style="list-style-type: none"> <li>the mangoes inspected and found free from quarantine pests as specified in Annexure;</li> <li>the mangoes covered by this phytosanitary certificate comply with the requirements established in the Phytosanitary Protocol on mangoes entry into China, which was duly signed between India and China on June 23, 2003.</li> </ul> </li> <li>One copy of PSC shall be placed in sealed cover and affixed to the side of the last pallet loaded into the container before door sealing of the refrigerated container. The PSC shall specify the port of entry viz., Beijing, Dalian, Tianjin, Qingdao, Shanghai &amp; Nanjing, as the case may be.</li> <li>The inspecting Plant Quarantine officer at the end of each shipment shall immediately submit a detailed inspection report along with the copy of relevant PSC issued to the Dte of PPQS for information and also information regarding any rejection of cargo for export to China providing the grounds of rejection and the action taken by the exporter.</li> </ul>
<b>Port of Entry Inspection</b>	
<b>Australia</b>	<ul style="list-style-type: none"> <li>CIQ, a branch of AQSIQ, shall conduct inspections and examine relevant certificates and markings as the mangoes for export to China arrive at the ports of entry in China.</li> <li>In cases where it is found that the mango shipment is not from the designated growing areas, orchards and packers, the shipment shall not be allowed entry into China</li> <li>If mango seed weevil is found, the consignment will be returned, destroyed or quarantine treated (only limited to cases where pests can be exterminated effectively). Accordingly, AQSIQ will suspend the eligibility of relevant orchards and/or processors for exporting mangoes to China or even suspend the whole program. Both parties shall conduct investigations to find out the causes and take corrective measures</li> </ul>

<b>Pakistan</b>	<ul style="list-style-type: none"> <li>• The Exit-Entry inspection agency will verify the phytosanitary certificate accompanying the consignment of mangoes upon arrival at the port of entry. The phytosanitary certificate must comply with all requirements aforementioned.</li> <li>• According to the provisions of the Manual of Inspection and Quarantine Work Manual, the inspection of imported mango shall be conducted. The effectiveness of the HWT shall be determined through examining the phytosanitary certificate, and the attached records detailing the hydrothermal treatment temperature and the temperature probe calibration report.</li> <li>• If the documentation does not meet the requirements of the agreement made between China and Pakistan, then the mango fruit will not be submitted for inspection.</li> <li>• The goods will not be allowed to enter China for the following reasons: <ul style="list-style-type: none"> <li>○ The HWT is found to be invalid;</li> <li>○ The shipment has come from an unapproved orchard, packing plant or storage or HWT facility;</li> <li>○ The packing does not conform with the relevant provisions; and</li> <li>○ It does not meet the national standards for food safety in China</li> </ul> </li> <li>• If quarantine pests of concern to China are found the shipment shall be returned, destroyed or quarantined for pest elimination. At the same time, China will immediately brief the relevant Pakistani agency and if necessary suspend the import of mango from the relevant orchards and packaging plants, or suspend the importation of the mango products from Pakistan until the parties find out the reason and take appropriate measures</li> </ul>
<b>India</b>	<ul style="list-style-type: none"> <li>• No specific information</li> </ul>

## 11.2 Trade agreements

### Free trade agreements with China, as at 2018

FTAs with China	Date Concluded	Category
Pakistan	2006	Bilateral with developing countries
Peru	2009	
Costa Rica	2010	
Maldives	2017	
Georgia	2017	
Australia	2015	Bilateral with developed countries
Switzerland	2013	
Singapore	2008	
Chile	2005	
South Korea	2015	
Iceland	2013	
New Zealand	2008	
ASEAN	2004	Multilateral
Hong Kong CEPA	2003	Domestic
Macau CEPA	2003	
Taiwan ECFA	2010	
Shanghai FTZ	2013	

Source: Ministry of Commerce, 2018

### Free trade agreements with China, under negotiation, as at 2018

FTAs with China	Negotiations Started	Category
Sri Lanka	2014	Bilateral with Developing Countries
Pakistan Phase 2	2016	
Mauritius	2017	
Moldova	2017	
Israel	2017	Bilateral with Developed Countries
Norway	2008	
Singapore Upgrade	2015	
New Zealand Upgrade	2017	
Japan-Korea	2012	Multilateral
Gulf Cooperation Council	2005	
RCEP	2017	

Source: Ministry of Commerce, 2018

### Free trade agreements with China, under consideration, as at 2018

Country	Feasibility study started	Category
Fiji	2015	Bilateral with developing countries
Colombia	2012	
Nepal	2016	
Papua New Guinea	TBA	
Bangladesh	TBA	
Mongolia	TBA	
Panama	2017	
Palestine	2017	
Peru upgrade	2016	
Canada	TBA	Bilateral with developed countries
Switzerland upgrade	2017	

Source: Ministry of Commerce, 2018

### 11.3 HS and NTL codes, Australia and partner countries

Country	HS Code	NTL code	Labelled product
Australia	080450	08045050	Fresh or dried guavas, mangoes & mangosteens
		08045045	Mangoes, fresh or dried
		08045092	Guavas & mangosteens, fresh or dried
Vietnam	080450	08045000	Fresh or dried guavas, mangoes & mangosteens
Indonesia	080450	0804503000	Mangosteens
		0804502000	Mangoes
		0804501000	Guavas
Pakistan	080450	08045020	Mangoes
		08045010	Guavas
		08045050	Mango Pulp
		08045090	Guavas, mangoes, mangosteens, fresh or dried: other
		08045040	Frozen mango
		08045040	Mangosteens
China	080450	08045020	Mangoes, fresh or dried
		08045010	Guavas, fresh or dried
		08045030	Mangosteens, fresh or dried
Hong Kong	080450	08045030	Mangosteens, fresh or dried
		08045020	Mangoes, fresh or dried
		08045010	Guavas, fresh or dried
Philippines	080450	08045000	Fresh or dried guavas, mangoes & mangosteens
India	080450	08045040	Mango Pulp
		08045020	Mangoes, fresh
		08045090	Guavas, mangoes, mangosteens, fresh or dried: other
		08045030	Mangoes, sliced dried
		08045010	Guavas, fresh or dried

Source: ITC, 2017