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## Appendix 8.5

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

<b>Project:</b>	<b>Challenges and opportunities for meeting the requirements of Chinese mango markets</b>
<b>Study:</b>	<b>The cross-border mango trade between China and Vietnam: Findings from a rapid market appraisal</b>
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# 1 Acknowledgements

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## 2 Introduction

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### 2.1 Project background

This study presents the findings from a rapid appraisal of the cross-border mango import trade between China and Vietnam. Conducted in the context of a small research project funded by the Australian Centre for International Agricultural Research (ACIAR), this study focused on the challenges and opportunities in Chinese mango markets. The study was a collaborative undertaking between Griffith University and the South China Agricultural University.

China's cross-border mango import trade with Vietnam isn't entirely understood. It has not been reflected in official Chinese statistics and there has been limited prior research. This study aims to address this gap by providing important contextual information about the regulatory framework that governs border trade transactions. It will also look at the critical evidence regarding the scale of cross-border mango imports from Vietnam, how these have evolved over the years, their varietal composition and seasonality, the origin of the fruit, and their quality, price-competitiveness and distribution within China. These elements are then combined to provide an assessment of Vietnam's competitive market position in China, impacts on both sides of the border, and possible future scenarios.

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### 2.2 Study methodology

This study draws upon a wide range of secondary sources from trade statistics and official documents to research papers, reports, and online news articles. Primary data was collected between 17 and 21 April 2018 when the cross-border mango import trade was at its annual peak. The fieldwork consisted of short visits to the Guangxi border and to markets and retail outlets in Nanning and Guangzhou. Pingxiang was the chosen location along the China–Vietnam border because of its dominant position as an entry point for mangoes and other fruit. Nanning, the capital of Guangxi Province, is the first important destination within China for fruit imported from Vietnam. This city of approximately four million inhabitants is located just 200 kilometres from the border. In Nanning, the study team visited the main fruit wholesale market and three wet markets. Guangzhou is one of China's largest cities and is a major fruit distribution centre and home to all three Chinese researchers involved in this study. Both a large and small wholesale fruit market, as well as four retail supermarkets were surveyed.

The visit to the border allowed the team to interview importers and observe logistical operations. Interviews with market traders and visits to supermarkets in Nanning and Guangzhou proved very important, not only for triangulation of the data and information collected from importers, but also for a better understanding of the competitiveness of mangoes imported from Vietnam. Additional insights were gained from Australian and Vietnamese experts with extensive knowledge of mango varieties, the profile of mango exporters, Chinese import protocols, and post-harvest fruit disinfestation treatments, among other issues.

Semi-structured interview methods were employed to collect data from importers, wholesalers and retailers. Previously prepared lists of key issues and questions (i.e. checklists) were used as interview guides. Direct observation was also employed as method for data collection and validation. Mere observations during the visits to the border, markets and supermarkets allowed the study team to develop a sense of the scale of the mango import trade with Vietnam, the range of varieties imported, the visual attributes of the fruit, and their presence in traditional and modern retail outlets.

It should be noted, that engagement with traders proved much more challenging than initially thought. The vast majority of importers who were approached at the border refused to participate in the study. The team had a similar response from market wholesalers and retailers in Guangzhou and Nanning. Only nine traders agreed to an interview, and even those were reluctant to discuss certain aspects of their business or spend time answering questions. Semi-structured interviews usually consisted of in-depth discussions around key topics, but this was rarely achieved. As a result, some important issues remain ambiguous, as discussed in the last section of this study.

This study is structured into four sections. Following this introduction, Section 2 reviews the relevant regulatory framework, emphasising the differences between standard trade and border trade channels. The cross-border mango import trade with Vietnam is described and analysed in Section 3. Finally, the results are reviewed and the implications discussed in Section 4. The fieldwork schedule is shown in the supporting documents, Section 6.1, while the number and type of key informants interviewed are indicated in Section 6.2, and the checklists used to guide the key informant discussions are included in Section 6.3.

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## **3 Regulatory framework – China**

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### **3.1 Legal market access**

Importers in mainland China have been approved to source fresh mangoes from 10 countries: Australia, Ecuador, India, Myanmar, Pakistan, Peru, the Philippines, Taiwan, Thailand and Vietnam (Produce Report, 2018a). Recently this list was even shorter; Pakistan secured access to the Chinese mango market in October 2013, whereas Ecuador only reached that milestone in January 2016 (AsiaFruit, 2013; AgChina, 2016).

For most countries, legal access to the Chinese mango market is governed by bilateral phytosanitary protocols; however, there are three exceptions. Chinese regulations on the importation of fruit from Taiwan contain no mandatory quarantine provisions (AQSIQ, 2006a). Myanmar and Vietnam have benefited from legislation granting quarantine inspectors the authority to treat border trade differently.<sup>1</sup> There are no mandatory pest and disease management provisions in the inspection and quarantine requirements for Myanmar mangoes (AQSIQ, 2007) that were announced in August 2007, or in the plant protection and phytosanitary cooperation agreement signed by China and Vietnam in June 2008 (Southern Rural News, 2018).

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## 3.2 Phytosanitary regulations

Hot water treatment (HWT) for fruit fly disinfestation is mandatory for mangoes imported from Ecuador, Pakistan, Peru and India (Agrocalidad, 2016; AQSIQ, 2013; SENASA, 2005; Ministry of Agriculture of the Republic of India, 2004). The fruit has to be fully immersed in hot water for one to two hours depending on the country in question, the weight of the fruit, and the cooling method used. A waiting period of approximately 24 hours between harvest and immersion in hot water is recommended to minimise possible negative effects of the treatment on fruit quality (Mitcham & Yahia, 2009). Before immersion the mangoes need to be carefully sorted by size or weight. Hydro-cooling after the HWT takes about 30 minutes, but fruit that is not hydro-cooled need to be left at ambient temperature for 12 to 24 hours before storage in a cold room (Mitcham & Yahia, 2009).

Australian, Filipino and Thai mangoes are subject to mandatory vapour heat treatment (VHT) (AQSIQ, 1998; AQSIQ, 2006b; DAWR, 2018). This consists of heating the fruit in a chamber containing hot air saturated with water vapour until insect pests are killed. Successful treatment requires careful management of temperature and humidity levels inside the chamber. The treatment lasts for four to five hours, with most VHT chambers designed to handle two to nine tonnes of fruit at a time.

Appropriate systems must be in place to ensure that mangoes are free from pests of concern to China. Taking Peru as an example (SENASA, 2005), only mangoes from designated orchards, packing houses and treatment plants can be exported to China, with farms and facilities subject to an annual approval process by SENASA (Peru) and AQSIQ (China) quarantine agencies. SENASA is then responsible for quarantine supervision of the fruit, including packing, storage and transportation. One fruit for every six 20-kilogram boxes of fruit, or one fruit for every 240 harvested fruits must be

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<sup>1</sup> Article 5 of Measures for the Inspection and Administration of Import and Export Commodities in Border Trade, issued on 22 April 1993: 'When accepting the inspection of import and export commodities for border trade, the commodity inspection authorities may, according to the characteristics of border trade in the region, proceed from the actual situation, treat them differently, and adopt flexible methods to timely inspect, issue certificates or go through the formalities of release'. This legislation can be consulted at the AQSIQ website: [http://www.aqsiq.gov.cn/xxgk\\_13386/jgfl/tgyws/200610/t20061027\\_9812.htm](http://www.aqsiq.gov.cn/xxgk_13386/jgfl/tgyws/200610/t20061027_9812.htm).

inspected before HWT, with the entire batch rejected if fruit fly is found. One in 100 mangoes are inspected after HWT; if no quarantine problems are detected SENASA will issue a phytosanitary certificate for that consignment. Relevant documentation will be reviewed and another quarantine inspection conducted at the Chinese port of entry. If living fruit flies are found, AQSIQ will suspend the importation of mangoes. If *Selenaspidus articulatus* or *Fusarium moniliforme* var. *subglutinans* are detected, exports from related orchards and/or packing houses will be suspended until the end of the export season. If other pests of concern are found, the shipment will be treated and returned or destroyed, and the importation of mangoes suspended.

Chinese phytosanitary regulations are an important source of costs and risks for exporters and importers, thereby posing a significant barrier to trade. First, in order to access the Chinese mango market, exporters must own or have access to heat treatment facilities. VHT plants are particularly expensive. Until 2017 only two companies in Australia had such facilities, with a third established in 2018 (Hort Innovation, 2017; Ian Baker<sup>2</sup>, personal communication). Hence, Australia's mango exports to VHT markets, including China, New Zealand, South Korea and Japan, have been largely confined to two companies. The number of companies in Thailand and the Philippines owning a VHT plant is also small (Panichsakpatana, 2013; Briones, 2013). Furthermore, Thai companies with VHT facilities largely focus on Japan as an export destination, while those in the Philippines prioritise the Japanese and South Korean markets. It should also be noted that in Thailand, mangoes and mangosteens compete for existing VHT capacity.

Second, post-harvest disinfestation treatments can damage mangoes (Mitcham & Yahia, 2009; Sivakumar et al., 2010) as they accelerate ripening and skin colour development. HWT methods can be particularly aggressive, although the extent of internal and external injuries depends on a number of factors, including variety, fruit size and maturity, treatment temperatures and times, pre-treatment waiting times, and post-treatment cooling practices. HWT will only work for certain varieties and under expert management.

Third, heat treatments inflate the cost of the fruit. Exporters must account for depreciation of facilities and equipment, pay for annual farm and packing house audits by national and Chinese officers, hire a certified orchard monitor, undertake control programs when target pests are found in the orchard, keep detailed farm and packing house records, implement traceability systems, and recruit additional labour to manage fruit treatment processes.

Quarantine inspections at the port of arrival in China may delay the release of consignments by several days, with negative impacts to fruit freshness. Turnaround times of 6–48 hours have been reported for Shanghai, Tianjin, Guangzhou and Fujian, with quarantine procedures in other ports typically lengthier (PMA, 2016). Inspections at arrival may even result in temporary bans on mango imports from certain origins or companies, as in the case of the Philippines in 2009–11 and 2016 (GMA News, 2011;

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<sup>2</sup> Ian Baker is a retired researcher and farm manager with over 30 years of mango sector experience in Australia and Asia.

Manila Bulletin, 2016). The risk of excessive delays at the port of entry, or even a temporary import ban, is highest when regional government dialogue is underway (Asia Sentinel, 2012; The Packer, 2018).

The development of a significant re-export trade in mangoes and other fruits from Hong Kong to mainland China was in part a consequence of Chinese phytosanitary regulations (AgChina, 2015; Collins & Sun, 2010). Unlike mainland China, Hong Kong does not have any mandatory quarantine requirements for imported fruit in place. As a result, over the years an unknown but significant quantity of mangoes imported into Hong Kong have been re-exported to China through informal trade channels, thereby evading phytosanitary controls. This trade is not reflected in Chinese or Hong Kong trade statistics.

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### **3.3 Tariffs and other import taxes**

Tariffs in China do not constitute a major barrier to the mango import trade. Taiwanese mangoes have been exempted from import tariffs for many years (MOF, 2011). As members of the China–ASEAN Free Trade Area, Thailand and the Philippines have enjoyed tariff-free access to the Chinese fruit market since 2010, and Myanmar and Vietnam since 2015 (MOFCOM, 2018). Mangoes from Pakistan and Peru are equally exempt as part of bilateral free trade agreements, while Australian mangoes will reach that milestone in 2019 (MOFCOM, 2018). Hence, of all 10 countries permitted to export mangoes to China, India and Ecuador will soon become the only ones that do not benefit from tariff-free market access: their mangoes are subject to a 15% import duty, in accordance with the most favoured nation (MFN) status (World Bank, 2018).

There is no consumption tax for fruit in China. A 13% value-added tax (VAT) is normally applied to fruit, but mangoes are subject to a lower rate of 10% (General Administration of Taxation, 2018).

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### **3.4 Cross-border trade**

Border trade in this study refers to the exchange of goods between permanent residents or enterprises in border areas. In China this trade is officially divided into two categories: 'barter trade' and 'small-scale trade' (UNDP, 2007). There is a third modality applied to border tourism and a fourth to technological and economic cooperation in border areas, including trade in services. Barter border trade refers to the exchange of goods between residents living within 20 kilometres of the border at government-sanctioned crossings or designated markets within specified values or quantities.

Small-scale border trade is conducted by enterprises in border counties or cities that are licensed to engage in commercial transactions with companies or trade agencies in border areas of adjacent countries. To be classified as small-scale border trade, the value of individual import transactions cannot exceed CNY8,000 (equivalent to

approximately USD1,280).<sup>3</sup> The mango import trade is organised to ensure that this condition is met. The fruit is transferred from large Vietnamese trucks to small Chinese mini-vans before customs clearance, and then loaded into large Chinese trucks for distribution across the country.

China's promotion of cross-border trade as a vehicle for economic and diplomatic engagement with their neighbours has a relatively recent history. It was only in 1992 that the Chinese government introduced a comprehensive set of reforms aimed at enabling trade along its borders (UNDP, 2007). That year the State Council established 13 open border cities, a move that had profound implications. Most commodities became eligible for cross-border exchanges. Export duties and licensing were abolished. Tariffs and VAT on goods imported through border trade channels were significantly reduced. For the first time, these goods could be sold anywhere in China, not just locally. Private companies were permitted to engage in border trade, alongside state-owned and collective enterprises. Over time, these and other favourable policy measures were accompanied by key public investment in roads and bridges, loading and unloading facilities, storage, physical markets, and other support infrastructure. This led to significant and sustained growth in border trade flows.

While cross-border trade is often associated with small informal transactions involving residents and petty traders, in China this accounts for a residual share of the total. Carrying boxes by hand through border crossings still occurs; however, the bulk of the border trade involves the long-distance transportation of large volumes of commodities from major production centres in the export country to markets located well beyond border regions in the neighbouring country. For example, large quantities of dragon fruit, longans and lychees are shipped from southern and northern Vietnam to the north-east border for subsequent distribution across China (Sakata & Takanashi, 2018). Large volumes of garlic, apples and pears from China's north-east region flow the other way, with some of the produce subsequently re-exported to Cambodia and Laos. Potatoes may come from as far away as Inner Mongolia, carrots from the remote north-west region of China, and shallots from Myanmar, as these crops cross the Yunnan and Guangxi provinces on their way to Vietnam.

Data on Vietnam's fruit and vegetable exports illustrate the dynamism and scale of border trade and its strategic importance to China's neighbours (Produce Report, 2018b). In 2017, Vietnam earned USD3.45 billion from exports of fruits and vegetables – a record high. China accounted for USD2.74 billion (about 80%) of that trade. Border trade channels contributed USD1.78 billion, with the remaining USD956 million classified as standard international trade. In other words, trade along the Chinese border represented more than half of Vietnam's total exports of fruits and vegetables. Myanmar presents a somewhat similar picture with a very large proportion of its agricultural export trade conducted through Muse, on the border of the Yunnan Province (Kubo, 2016).

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<sup>3</sup> On 24 May 2018, the central parity rate of the Chinese yuan exchange rate against the US dollar was 0.16 (<http://www.pbc.gov.cn/rmyh/108976/109428/index.html>).

Despite its scale and growing importance, the cross-border import trade in fruit is generally excluded from Chinese customs statistics. Instead, it falls under the unofficial or informal trade category. However, this is not synonymous with illegal trade as transactions are documented and declared in some way and goods pass through customs and other official checkpoints. A number of formalities have to be followed (Su & Wei, 2014) For example, importers must hold a business licence, a food distribution or trading licence, and a tax certificate. Border agents responsible for handling the paperwork on behalf of importers must have a customs registration certificate.

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## 4 Results and discussion

Fruits such as watermelon, dragon fruit, longans and lychees account for a disproportionate share of Vietnam's horticultural exports to China (ITC, 2018). Most of this trade is conducted through the Pingxiang land border in the Guangxi Province. In 2015, nearly 1.5 million tonnes of fruit entered China through this border – twice as much as in 2012. That year Pingxiang became China's main entry point for imported fruit, surpassing major international seaports such as Guangzhou, Shenzhen or Shanghai.

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### 4.1 Entry ports and border gates

Guangxi, a coastal province in south-west China, shares its western border with north-east Vietnam. Until recently the province only had two designated entry ports for imported fresh fruit: Pingxiang, on the land border with the Lang Son Province in Vietnam; and Guilin International Airport, near Liangjiang City. Fangcheng Seaport gained that status in June 2015 (China Daily, 2015). Since then AQSIQ has approved another four entry ports for fresh fruit in Guangxi, including Quinzhou Seaport (Produce Report, 2016a; Fresh Plaza, 2017; Produce Report, 2018b; 2019 Guangzhou International Fruit Expo, 2018). The other three ports are located along the Vietnamese land border: Dongxing is situated just across Mong Cai, Quang Ninh Province; whereas Longbang and Shuikou border Cao Bang Province, further to the north. Dongxing is an established channel for Vietnamese seafood, while Shuikou has developed into the main entry port for Vietnamese nuts (Produce Report, 2016b).

Approval of new entry ports for fresh fruit aims to relieve the current pressure on Pingxiang and create more favourable conditions for the future development of the horticultural trade between China and ASEAN countries. However, it is still too early to tell whether the recent increase in the number of entry ports will have significant impacts on the importation of mangoes and other fresh fruit from Vietnam. Dongxing is best positioned to become an important entry point for Vietnamese fruit because of its position along the main fruit trading route from Vietnam to China as well as its status as a border trade channel. The other two land ports are less favourably positioned geographically, particularly Longbang. On the other hand, it is unlikely that Vietnamese fruit exporters will use Fangcheng and Quinzhou seaports or Guilin Airport. These options would require a shift to sea or airfreight and from border trade to normal trade channels. Furthermore,

Vietnamese fruit export companies relying on air or sea freight are much more likely to send their produce directly to major consumption and distribution centres such as Guangzhou and Shanghai.

Within Pingxiang, the mango import trade is carried out through Puzhai. While Pingxiang's Nonghuai gate is also authorised to handle exchanges between border residents and enterprises, it is mainly used for exports of Chinese industrial goods such as garments, footwear, hardware appliances, machine parts, and electronics. There is a third gate in Pingxiang, known as Youyiguan or 'Friendship Pass', but this only services the standard international trade. Mangoes and other fruits from Thailand are imported through Youyiguan in the framework of a bilateral protocol signed in 2009 that stipulates that Thai fruit transiting Vietnam can only enter China via this gate. However, the volumes in question are very small as Thai exporters usually prefer airfreighting mangoes to Guangzhou or Shanghai.<sup>4</sup>

Over the years, Puzhai has benefited from considerable investments in logistical centres servicing the horticultural import and export trade. In Puzhai there are designated truck yards where the fruit is transferred to Chinese mini-vans before transportation to two logistics parks in the outskirts of Pingxiang City. Most consignments are handled at Wantong Logistics Park some eight kilometres from the border. This site is comprised of a customs clearance inspection building, a cargo supervision area, warehouses, container yards, processing and packaging areas, and loading and unloading docks, among many other facilities. In the last five years or so, its fruit trading and distribution centre has benefited from a series of expansions and now extends over 13 hectares. Since 2016 some importers have started using the facilities at the ASEAN Fruit City, a new logistics park that was established to promote trade in agricultural products between China and ASEAN countries. There are plans to expand this park from its current seven hectares to 47 hectares.

Trucks crossing Puzhai form long queues, which is not surprising in a context where one single gate accounts for a disproportionate share of the horticultural trade between China and Vietnam. As a result, drivers often wait long hours in these queues. On the other hand, customs and quarantine clearance is a relatively quick process once at the front of the queue, normally taking just 60–90 minutes. Customs clearance costs are low with importers paying around USD1.5 per 30 kg box, or USD0.05/kg.

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## 4.2 Volumes

According to official data from China Customs, there is very little importation of fresh and dried mango from Vietnam (ITC, 2018); only 12 tonnes were recorded in 2013. Official imports dropped to just 81 kilograms the following year and to zero in 2015 and 2016, before rising to 226 tonnes in 2017.

However, official export data from Vietnam tells a very different story (see Table 1). In 2010 the country exported less than 700 tonnes of mangoes and China did not even

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<sup>4</sup> In contrast, *Youyiguan is the most used point of entry for Thai mangosteens (Produce Report, 2017).*

feature in Vietnam’s mango export statistics. However, by 2016 Vietnam was exporting more than 80,000 tonnes to mainland China and around 3,000 tonnes to other markets. In just a few years the country had become one of the world’s leading mango exporters. In terms of volume, only four countries exported more mangoes than Vietnam in 2016: one in Asia and three in Latin America. Mexico stood out, with nearly 370,000 tonnes. Exports from Brazil, Peru and India ranged from 153,000 tonnes to 193,000 tonnes (ITC, 2018).<sup>56</sup>

**Table 1 Vietnam exports of fresh mango, 2010–16 (tonnes)<sup>7</sup>**

	2010	2011	2012*	2013	2014	2015	2016
China	0	12	n.a.	37,898	63,709	37,088	80,670
South Korea	459	1,181	n.a.	1,907	465	3,103	883
United Arab Emirates	0	76	n.a.	56	237	63	562
Canada	2	17	n.a.	203	175	514	444
Japan	51	934	n.a.	115	0	357	403
Hong Kong	0	95	n.a.	240	215	306	184
Other countries	141	413	n.a.	754	578	1,954	666
<i>Total</i>	<i>653</i>	<i>2,728</i>	<i>n.a.</i>	<i>41,173</i>	<i>65,379</i>	<i>43,385</i>	<i>83,812</i>

Source: ITC (2018)

Note: \*Vietnam Customs did not report any mango exports for 2012

These trends are consistent with the information collected from importers and their agents at the Pingxiang border and from mango wholesalers in Nanning and Guangzhou. Some key informants identified 2013 as the first year that mangoes from Vietnam started to cross the Guangxi border in significant quantities, while others believed that it was 2014. According to these informants, trade has since increased significantly. The fact that supplies from Vietnam were having a visible negative impact on farm-gate prices in China was used by some informants as a strong indicator that the volumes in question were indeed significant. The massive expansion of the border’s logistical infrastructure supporting the mango import trade was cited as another very visible growth indicator. Finally, the importers interviewed at the border mentioned that greater numbers of traders were taking advantage of the opportunity to import mangoes from Vietnam.

<sup>5</sup> Thailand is often listed as the world’s third- or fourth-largest mango exporter, due to the reporting of aggregated data that includes mangosteens, guavas and mangoes. Mangoes account for less than 20% of the total (between 30,000 and 45,000 tonnes per annum) depending on the years, whereas mangosteens contribute more than 80% (between 140,000 and 220,000 tonnes per annum) (Hnin, 2017).

<sup>6</sup> Recent estimates indicate that in 2016, Cambodia may have exported more mangoes than Vietnam on account of a thriving cross-border trade with Thailand and Vietnam (Vinning, 2016).

<sup>7</sup> While Chinese Customs provides disaggregated data for fresh and dry mangoes, in Vietnam, export statistics for fresh and dried mangoes are combined with fresh and dried mangosteen and guava data. This was not so problematic as mangosteen and guava exports were negligible. The data presented in this table can therefore be used as a proxy for mango exports.

According to key informants, mango inflows from Vietnam continued to expand in 2017 and 2018, and are currently much larger than what the official Vietnamese export data for 2016 shows. As explained below, the quantity of mangoes imported through Pingxiang was projected to reach between 130,000 and 160,000 tonnes in 2018, depending on the scenario.

This trade was conducted during a 10-month period from September to June. During April and May (the peak trading months) around 50 mango importers were stationed at the Pingxiang border. On average, each importer handled one truckload per day. Trucks transported mangoes from Pingxiang to different parts of China carrying approximately 28.5 tonnes of fruit (i.e. 950 plastic crates weighing around 30 kg each). In April and May an estimated 1,425 tonnes of fresh mangoes crossed the Puzhai border gate each day. In those two months alone, an estimated further 87,000 tonnes of fresh mangoes were imported through Pingxiang.

Estimating the number of mango importers at the border and the frequency with which each handled a truckload for the other months is difficult to speculate as the study team did not have the opportunity to visit Pingxiang and selected urban markets outside the peak export window. Monthly volumes are likely to vary considerably, depending on supply conditions in Vietnam. If a somewhat conservative assumption of 20 trucks per day during March and five trucks per day during the other seven import months were employed, then mango imports throughout the low season would reach approximately 47,000 tonnes. If we keep the same assumption for March but double the average daily number of trucks for the remaining seven months to a total of ten, then the level of imports during the off-season months would increase to nearly 70,000 tonnes.

A somewhat similar estimate was obtained based on the reported number of mini-vans carrying mangoes from the Puzhai border gate to two nearby logistical centres where the fruit was loaded into large trucks for transportation to different parts of China. Mangoes were brought to Puzhai in large Vietnamese trucks. At the border the fruit was transferred to small mini-vans with a load capacity of 56 plastic crates (1.68 tonnes of mango). Each day during the peak (April and May) months around 1,000 mini-vans transported imported mangoes to the two logistical centres. As a result, approximately 102,000 tonnes of fruit were imported during those two months alone. The average daily number of mini-vans may have dropped to around 300–400 in March and 50–200 during the other seven import months. Therefore, if we assume that the correct number is in the middle of those two intervals – say a daily average of 350 mini-vans in March and 100 in the other seven months – then 53,000 tonnes of mangoes were imported through the Puzhai border during the low season. The projected total for 2018 was 155,000 tonnes.

The development of this trade took place in the context of rising domestic production. According to official statistics, mango production in Vietnam has been growing for a number of years, increasing from 580,000 tonnes in 2010 to an estimated 788,000 tonnes in 2017 (GSO, 2018). More surprisingly, the development of a large import trade with Vietnam occurred during strong growth in Chinese production. Between 2014 and

2017 China’s mango crop expanded by 25%, from 1,437,000 tonnes to 1,799,000 tonnes, with all provinces experiencing an increase in production (Anonymous, 2018).

### 4.3 A comparative perspective

For reasons discussed later in this study, the contrast between the large volume of mangoes imported from Vietnam under the border trade modality, and the quantities that came through international seaports and airports in the framework of bilateral phytosanitary agreements could not be starker (see Table 2). Mangoes imported through phytosanitary channels averaged just 2,265 tonnes per annum between 2010 and 2013. This trade increased to 4,974 tonnes in 2014, peaked at 6,843 tonnes in 2015, fell to 3,958 tonnes in 2016 and 4,899 in 2017 – a very small fraction of the quantity brought in through the Guangxi border. Taiwan was the main trade origin in 2017 with 1,831 tonnes, followed by Peru (1,138 tonnes), Australia (970 tonnes), Thailand (838 tonnes), and the Philippines (106 tonnes). Pakistan exported only eight tonnes while Ecuador exported five tonnes.

The cross-border mango import trade with Vietnam has shown impressive dynamism by growing at unusually high rates for five or six consecutive years, whereas official imports have fluctuated around very modest levels. The development of imports from Australia since 2014 and Peru since 2016 have been the main recent changes in the standard mango import trade, but the volumes remain small. Imports from Thailand have continued to stall, and while imports from Taiwan did increase significantly between 2013 and 2015, they fell abruptly in 2016. The following year Taiwan regained its position as the main origin imported through standard trade channels, but volume was still significantly lower than in 2015. The Philippines have long enjoyed a leading position in the Hong Kong mango market; however, the country has never managed to replicate the success in the mainland. Imports from India, Pakistan or Ecuador have never taken off.

**Table 2 Chinese standard imports of fresh and dried mango, 2010–17 (tonnes)**

	2010	2011	2012	2013	2014	2015	2016	2017
Taiwan	546	589	450	1,442	2,104	4,696	537	1,831
Peru	64	36	0	0	0	30	959	1,138
Australia	34	27	34	74	683	541	1,355	970
Thailand	1,159	1,524	1,550	1,239	1,643	1,190	794	838
The Philippines	244	208	273	393	522	371	284	106
Pakistan	12	3	40	2	22	15	5	8
Ecuador	0	0	0	0	0	0	24	5
India	1	0	1	0	0	0	0	3
<i>Total</i>	<i>2,060</i>	<i>2,387</i>	<i>2,348</i>	<i>3,150</i>	<i>4,974</i>	<i>6,843</i>	<i>3,958</i>	<i>4,899</i>

Source: ITC (2018)

Vietnam is not the only country that takes advantage of the opportunity to export mangoes into China through border trade channels, with Myanmar also following suit

(Myat, 2012; Kubo, 2016). The fruit is transported by road to Muse Town, in Shan State, on the border of the Yunnan Province. Traded volumes are difficult to ascertain due to a lack of accurate official statistics; Chinese import data and Myanmar export data are not credible and do not match (see Table 3). According to China Customs data, annual imports of Myanmar mangoes averaged 23,412 tonnes between 2010 and 2013 but stopped altogether in the following years. According to Myanmar Customs, the country only exported large quantities of mangoes to China in 2013 when nearly 18,000 tonnes were recorded, with volumes dropping to less than 6,000 tonnes per annum thereafter. Available data for 2011–16 from the Myanmar Fruit, Flower and Vegetable Producers and Exporters Association (MFVP) is likely to provide the most accurate picture. According to this source, from 2011 to 2014 mango exports to China averaged 31,000 tonnes per annum, falling to 27,000 tonnes in 2015 and 25,000 tonnes in 2016.

Hong Kong is another special case. Between 20,000 and 25,000 tonnes of mangoes were imported into the territory within a normal year (ITC, 2018). Some were re-exported to mainland China, although it is not possible to determine the true scale of this trade and how it has changed over time as it is not reflected in official trade statistics. As mentioned, when shipping mangoes to the mainland, Hong Kong exporters tend to use unofficial trade channels to circumvent phytosanitary regulations.

**Table 3 Chinese cross-border mango imports, 2010–17 (tonnes)**

	2010	2011	2012	2013	2014	2015	2016	2017
<b>Vietnam</b>								
Vietnam data	0	12	n.a.	37,898	63,709	37,088	80,670	n.a.
China data	1	0	0	12	0	0	0	226
<b>Myanmar</b>								
Myanmar data	216	699	704	17,982	4,478	5,831	5,994	5,885
China data	21,843	25,491	25,209	21,106	0	0	0	0
MFVP data	n.a.	39,000	38,000	31,000	38,000	27,000	25,000	n.a.
<b>Hong Kong</b>								
HK data	970	694	344	n.a.	1,184	0	0	0
China data	0	0	0	0	0	0	0	0

Sources: ITC (2018); Kubo (2016, 2018)

## 4.4 Product origins

Mangoes imported through Pingxiang come from different regions within Vietnam. Geographical range allows for greater diversity in varietal portfolios, less volatile product flows, longer export seasons and greater economies of scale with favourable impacts on the export trade.

The Mekong Delta – the country’s leading growing region – is the largest provider of mangoes for the Chinese market. The region supplies several varieties throughout most of the year with March and April the peak harvest months (Roberts & Nguyen, 2018).

Khanh Hoa in the South-Central Coast region is the source of R2E2, an Australian variety introduced some 15 years ago (Khanh Hoa News, 2006). The main R2E2 harvest starts in April, peaks in May and June, and ends in July (Roberts & Nguyen, 2018). There is also a thriving mango export trade from Yen Chau, a district in the north-western Son La Province (Dr. Nguyen Minh Chau, personal communication).<sup>8</sup> This trade is concentrated during May and June. Daqing, or 'Taiwan mango' as it is known in Vietnam, is one of the varieties exported from Yen Chau.

Not all mangoes imported through Pingxiang are from Vietnam; around 5% or 10% originate from Cambodia. There is a significant informal mango trade from Cambodia to southern Vietnam with more than 50,000 tonnes estimated to cross the border per annum (Vinning, 2016). Some of these mangoes are subsequently re-exported to China through Vietnam's north-east border. Keo Romeat, Cambodia's main mango cultivar, accounts for the bulk of this trade. This variety is also grown in the Mekong Delta in southern Vietnam where it is known as 'Keo'. As a result, some of the Keo Romeat cultivar exported to China is likely to have originated from Cambodia and some from Vietnam.

It is possible that a very small quantity of mangoes from Laos is also imported through Pingxiang. During the border visit, the research team noticed some boxes that were identified by the importer as coming from Laos. The team did not have the opportunity to validate this information, although one of the researchers interviewed mentioned that Vietnam is currently investing in mango cultivation in southern Laos with a significant expansion in production expected over the coming years (Dr. Nguyen Minh Chau, personal communication). It is not unreasonable to assume that such developments are associated with, or even driven by, the emergence of a large cross-border trade to China and its impacts on market demand in Vietnam and beyond.

Finally, some Thai exporters may occasionally use Pingxiang as an entry port; however, these transactions are conducted under the framework of standard trade. Thai fruit transiting Vietnam can only enter China via Youyiguan, a border gate in Pingxiang that services the standard international trade. Fruit imported under the framework of border trade must enter the country via other land border gates.

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## 4.5 Seasonality

Vietnamese and Cambodian mangoes are exported across the Pingxiang border most of the year. Trade starts as early as September and continues over a 10-month period until June the following year with a peak from March to May (the main harvesting months in Vietnam and Cambodia). While a geographically dispersed and diverse production is conducive to an extended export season, the shipping of mangoes to China from September to February is only possible in an off-season cultivation context where farmers induce flowering and manage early fruiting successfully.

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<sup>8</sup> Dr. Nguyen Minh Chau is a Vietnamese mango researcher and the former Director of Vietnam's Southern Fruit Research Institute (SOFRI).

Having a main crop for export to China during the March–May months can be seen as a disadvantage as this period coincides with the mango season in Hainan (see Table 4). Located off the southern coast, this tropical island is China’s largest or second largest mango-producing province depending on the years; in 2017 Hainan accounted for 27% of the harvest, Yunnan for 25%, Guangxi for 23%, Guangdong for 13%, and Sichuan for 11% (Anonymous, 2018). Between March and May there is an abundant supply of cheap Hainan mangoes in the market, including Tainung, Guifei, Jinhuang, Shuixian, and Aroemanis.<sup>9</sup>

**Table 4 Seasonality in the marketing of domestic and imported mangoes in China**

	J	F	M	A	M	J	J	A	S	O	N	D
Vietnam	Mid	Mid	Mid	High	High	Mid			Mid	Mid	Mid	Mid
Cambodia	Mid	Mid	High	High	Mid	Mid			Mid	Mid	Mid	Mid
Hainan, China		Mid	High	High	High	Mid	Mid					
Yunnan, China				Mid	High	High	Mid					
Guangxi, China					Mid	High	High	Mid				
Guangdong, China					Mid	High	High	Mid				
Sichuan, China						Mid	High	High	Mid	Mid		
Myanmar				Mid	High	High						
Taiwan						High	High	High				
Thailand	No clear seasonal pattern											
The Philippines	No clear seasonal pattern											
Australia	High											High
Peru	High	High										High

Source: Field survey and ITC (2018)

Note: High  Mid 

In May, there is also an abundant supply from Yunnan, another major mango growing province. Many different mango varieties are produced in this province, including Tainung, Sannian, Guifei, Jinhuang, Siji and Saint-Dragon.<sup>10</sup>

Imports from Myanmar start in late April, with trade increasing significantly over the following weeks and remaining relatively high until mid-June. Some level of rivalry between Myanmar and Vietnamese mangoes is likely, particularly during May. Wholesalers in Nanning or Guangzhou were not very familiar with Burmese mangoes including Sein Ta Lone, the main variety imported from Myanmar. It is possible that these mangoes are largely consumed within Yunnan and other south-west provinces such as

<sup>9</sup> This is not the same variety as Harumanis, Indonesia’s most widely grown and popular mango variety in Indonesia. Harumanis is also grown in Malaysia.

<sup>10</sup> Saint-Dragon is Myanmar’s main export variety. Its Burmese name is Sein Ta Lone.

Guizhou, Sichuan and Chongqing, whereas most Vietnamese mangoes are shipped eastwards. This issue merits further research.

Guangxi and Guangdong only start supplying significant quantities from late May or early June, at a time when the cross-border import trade with Vietnam is dwindling. The harvest in Guangxi and Guangdong is in full swing around late June to early July; however, by then there is virtually no mangoes left on the trees in Vietnam or Cambodia. The harvest in Sichuan commences around June or July.

In theory, during the March–May period, Vietnam and Cambodia face competition from Thailand and the Philippines – the other two Southeast Asian countries with legal access to the Chinese market – as all four countries have very similar harvesting calendars. However, in practice, imports from Thailand and the Philippines are small and spread throughout the year (ITC, 2018).

Imports from Taiwan, Australia and Peru are also minimal and most of this trade is conducted at a time when both Vietnam and Cambodia have fewer supplies for the Chinese market. June, July and August are the peak import months for Taiwan. Most Australian mangoes are imported in December and January and Peruvian mangoes are available mainly during January and February (ITC, 2018).

While the fruit export trade is often driven by seasonal supply gaps or market-window opportunities where a country is able to take advantage of an abundant and affordable supply at a time when export markets are undersupplied, that is not the case for cross-border mango trade between Vietnam and China. The main mango season in Vietnam and Cambodia coincides with the peak harvest season in Hainan. Yunnan's abundant supply starts in May, and, therefore, Vietnamese exporters have to compete in a market that is well supplied with local mangoes.

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## 4.6 Varieties

Many different mango varieties are exported across the Vietnamese north-east border. This product diversity is an important source of competitive advantage, enabling importers to cater for the needs of consumers with different products and price preferences. Diverse varietal portfolios are usually associated with longer export seasons, as various cultivars often differ in their harvesting calendars as well as their response to off-season crop manipulation technologies. Finally, access to different varieties reduces the risk of supply shortages while also allows for greater flexibility of supply as mango portfolios can be adjusted in accordance with market conditions and opportunities on both sides of the border.

During the border and market visits, the study team found large quantities of Daqing mangoes from Vietnam. Originally from Taiwan, this variety is also grown in Hainan and other provinces of China. It is known in China as 'the big green mango' and in Vietnam as 'Taiwanese' and 'elephant' mango. The fruit is large, normally weighing more than one kilogram. Its skin is naturally green, which seems to contradict the commonly held belief that green-skinned mangoes cannot succeed in export markets because consumers

generally prefer yellow-skinned varieties. Factors such as price, shelf life, taste, and consumers' previous exposure to green-skinned varieties should be considered as well.

Chinese traders referred to Daqing mangoes that have light-yellow skin (because protective bagging was used during cultivation) as 'Jinhuang' meaning 'gold'. Jinhuang from Vietnam was widely available at the Pingxiang border and the wholesale markets visited by the research team, even though there was also locally supplied from Hainan and Yunnan. Jinhuang from Guangxi and Guangdong was harvested later.

There is also a sizeable cross-border import trade in Keo Romeat. Some of the fruit originates from Cambodia and some from Vietnam's Mekong Delta region. Chinese traders call this medium-sized green or yellow mango (depending on the maturity) 'Yu' meaning 'jade'. The traders that were interviewed called mature Keo Romeat with a lighter yellow skin (as a result of bagging during cultivation) 'Gaolemi'.

The fieldwork coincided with the early export season for R2E2 mangoes, an Australian cultivar grown in the central coast of Vietnam with the Chinese trade name 'Australian mango'. With a distinct roundish shape and orange-red skin, this variety is appreciated in China for its visual appearance. Australia also exports R2E2 mangoes to China but at a different time to Vietnam.

Tianxin and Yuwen were two other varieties from Vietnam available at the border and some markets; however, the quantities in question were relatively minimal. Tianxin is a small, green-skinned mango with a pink blush. Vietnamese farmers and traders call it 'Nha Trang', the name of the capital of central Khanh Hoa province (Nguyen Duy Duc<sup>11</sup>, personal communication). According to one informant, Yuwen mangoes (known in Vietnam as 'Ngoc Van') have a somewhat unusual brown-red skin colour and can weigh as much as 1.5 kilograms. Another large yellow-skinned variety known in Vietnam as 'Lê' (Nguyen Duy Duc, personal communication) or 'pear' was observed in some markets.

Ghep, the Vietnamese name given to another green-skinned variety, is also imported through Pingxiang. Although it is a common variety in some major mango growing districts in southern Vietnam, it does not have the same weight in importers' portfolios as Daqing, Keo or R2E2.

Surprisingly, during the border and market visits the study team did not find Hoa Loc, a widely grown and very popular variety among Vietnamese consumers. Price is likely to be an important factor as Hoa Loc mangoes much more expensive compared to most other varieties in Vietnam (Roberts & Nguyen, 2008). It is also more susceptible to quality losses during transportation (Nguyen Duy Duc, personal communication). Cat Chua which is widely grown in southern Vietnam was expected to be found in large quantities at the border and further down the supply chain; however, that was not the case. Instead, at the time of the survey, supply was very limited at best. Like Hoa Loc, this variety has yellow skin and the fruit is neither too big nor too small.

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<sup>11</sup> Nguyen Duy Duc is Deputy Director of the Vietnam Institute of Agricultural Engineering and Postharvest Technology (VIAEPT).

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## 4.7 Spatial flows

Mangoes imported through Pingxiang are sold across China. Some key informants even mentioned a small flow of Vietnamese mangoes to Russia through the north-east. When asked about the intermediary and final destinations of the fruit, importers and wholesalers mentioned all coastal provinces and metropolitan areas, including Guangxi and Guangzhou in southern China; Shanghai, Zhejiang, Jiangsu and Shandong in eastern China; and Beijing, Tianjin, Liaoning, Jilin and Heilongjiang in north-east China. Henan in central China, and Chongqing and Sichuan in the south-west region were also named as market destinations, but not Yunnan, just west of Guangxi. Likewise, no key informant mentioned provinces or cities in the north-west, a distant, poor and sparsely populated corner of China.

Quality is an important determinant of product flows, as highlighted by several key informants. A large share of first-grade fruit is sent to first-tier cities, namely Guangzhou, Shenzhen, Shanghai, Tianjin and Beijing, where consumers' ability to pay for quality fruit is highest. Many consumers in the most developed second-tier cities, such as Hangzhou, Nanjing, Chengdu, and Chongqing, are also increasingly able and willing to pay for quality. In contrast, smaller and less-developed provincial cities attract mostly second-grade and some third-grade fruit. Lower-quality fruit is also channelled to mango processing firms in provinces such as Guangxi and Guangdong. There is anecdotal evidence that this industry relies heavily on fresh mangoes imported from Vietnam (Nguyen Duy Duc, personal communication).

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## 4.8 Prices

During the cross-border survey the research team collected some comparative price data. The aim was to gain some perspective on price competitiveness. Data was gathered from three importers at Wantong Logistics Park in Pingxiang, three wholesalers in Nanning, and three wholesalers in Guangzhou.

The data shows that Vietnamese mangoes are price competitive. On 20 April 2018, at the peak of the mango cross-border trade in Pingxiang, importers were wholesaling most Vietnamese and Cambodian mangoes for less than USD1.50/kg (see Table 5). Ao (R2E2) mangoes were the most expensive, with prices for grades 1 and 2 ranging from USD1.25 to USD2.03 per kilogram. Yuwen was the second most expensive with first-grade fruit wholesaled at the border for USD1.80–1.88, second-grade fruit for USD1.39–1.41, and third-grade fruit for USD1.10. Depending on variety and grade, the price of other mangoes varied between USD0.63 and USD1.25.

**Table 5 Wholesale prices at Wantong Logistics Park, Pingxiang, 20 April 2018 (USD/kg)**

Varieties	Grades	Importer 1	Importer 2	Importer 3	Price discount (compared to grade 1) (%)
Ao (R2E2)	Grade 1	2.03	1.88	2.03	
	Grade 2	1.56	1.25	1.41	23–31
	Grade 3	0.55	—	1.10	46–73
Yuwen	Grade 1	1.88	1.80	1.88	
	Grade 2	1.41	1.39	1.41	23–25
	Grade 3	—	—	1.10	41
Gaolemi (Keo)	Grade 1	1.25	1.06	1.25	
	Grade 2	1.02	0.91	0.94	14–25
	Grade 3	0.78	0.78	—	26–38
Jinhuang (Taiwan)	Grade 1	1.10	1.14	1.10	
	Grade 2	0.86	1.02	0.94	11–22
	Grade 3	—	—	—	n.a.
Daqing (Taiwan)	Grade 1	1.10	0.99	1.10	
	Grade 2	0.86	0.78	0.78	21–32
	Grade 3	0.63	0.63	0.63	36–43
Tianxin (Deo)	Grade 1	0.94	0.86	0.89	
	Grade 2	0.74	0.70	0.78	15–21
	Grade 3	—	—	—	n.a.
Yu (Keo)	Grade 1	0.94	0.99	0.86	
	Grade 2	0.78	0.75	0.70	16–24
	Grade 3	—	—	—	n.a.

Source: Field survey

Note: A 1:0.16 exchange rate was used to convert prices from Chinese yuan into US dollars.

**Table 6 Wholesale prices, by variety, at Nanning and Guangzhou, mid-April 2018 (USD/kg)**

Origins and Varieties	Grades	Haijixing Market, Nanning**			Jiangnan Market, Guangzhou**			Price discount
		Wholesaler 1	Wholesaler 2	Wholesaler 3	Wholesaler 1	Wholesaler 2	Wholesaler 3	
<i>Vietnam and Cambodia</i>								
Ao (R2E2)	Grade 1	2.19	2.50	1.88	1.97	1.72	2.03	
	Grade 2	1.88	2.03	1.72	1.31	1.56	1.72	9–34%
	Grade 3	—	1.41	1.33	1.10	1.25	—	27–44%
Jinhuang	Grade 1	1.41	0.94	1.10	1.25	1.33	1.20	
	Grade 2	1.10	0.78	0.94	1.10	1.10	1.00	12–22%
	Grade 3	—	—	0.78	—	1.00	0.78	25–35%
Daqing (Taiwan)	Grade 1	1.10	1.10	1.10	1.22	1.25	—	
	Grade 2	0.94	0.94	0.94	1.10	1.10	0.94	10–15%
	Grade 3	—	0.78	0.78	0.94	—	0.78	23–29%
Gaolemi (Keo)	Grade 1	1.41	1.56	1.25	1.25	1.25	1.17	
	Grade 2	1.17	1.25	1.10	0.94	1.10	0.98	12–25%
	Grade 3	—	—	—	0.78	0.94	—	25–38%
Tianxin (Deo)	Grade 1	1.10	1.22	1.25	1.00	0.94	0.94	
	Grade 2	1.00	0.78	0.94	0.94	0.91	0.78	3–36%
	Grade 3	—	—	—	0.78	0.78	—	17–22%
<i>China</i>								
Shuixian	Grade 1	—	—	—	1.56	1.72	1.56	
	Grade 2	—	—	—	1.49	1.56	1.41	4–9%
	Grade 3	—	—	—	—	—	—	n.a.
Guifei	Grade 1	0.70	0.78	0.94	—	—	—	
	Grade 2	0.59	0.63	0.78	—	—	—	16–19%

	Grade 3	—	0.47	—	—	—	—	40%
Large Tainung No.1	Grade 1	0.94	1.02	1.10	0.86	0.94	0.94	
	Grade 2	0.78	0.86	0.94	0.78	0.86	0.78	9–17%
	Grade 3	—	—	—	—	—	—	n.a.
Small Tainung No. 1	Grade 1	0.56	0.63	0.78	0.56	0.63	0.63	
	Grade 2	—	—	—	—	—	0.28	56%
	Grade 3	—	—	—	—	—	—	n.a.

Source: Field survey

Notes: A 1:0.16 exchange rate was used to convert prices from Chinese yuan into US dollars.

\*\*Prices at the Jiangnan Market (Guangzhou) and Haijixing Market (Nanning) were recorded on 17 and 19 April 2018, respectively.

Wholesale prices in Guangzhou (17 April) and Nanning (19 April) were within similar ranges (see Table 6). The six wholesalers interviewed in these two cities were selling grade 1 Ao mango (R2E2) for USD1.72–2.50. For other varieties, the prices of grade 1 were as follows: USD1.10–1.56 (Yuwen); USD0.94–1.41 (Jinhuang/Daqing, i.e. Taiwan); and USD0.94–1.25 (Yu/Gaolemi, i.e. Keo). These prices were more or less aligned with the price of local mangoes with the same traders wholesaling grade 1 Shuixian for USD1.56–1.72 and grade 1 Guifei for USD0.70–0.94. The wholesale price of large and small Tainung was USD0.86–1.10 and USD0.56–0.78, respectively.

Mangoes imported through standard trade channels were far more expensive (see Table 7). According to official Chinese data, the Philippines is the most costly country of origin with CIF (cost, insurance and freight) prices for one kilogram of mangoes averaging USD8.9 in 2015, USD7.3 in 2016, and USD8.2 in 2017. This was the average annual price at arrival after insurance and transportation costs from the Philippines to an international seaport or airport in China were added. While the price figures may be somewhat inflated by the inclusion of dried (processed) fruit, the high cost of Filipino mangoes in China was consistent with their small market presence. High prices are a consequence of the difficulties that Filipino exporters face accessing fruit that meets the quality specifications of Chinese buyers, the off-season nature of much of their exports to China, and the high VHT and transportation costs incurred (Ian Baker, personal communication).

**Table 7 Average CIF import prices in China for different origins (USD/kg)**

Origin	2015	2016	2017
The Philippines	8.9	7.3	8.2
Australia	5.1	5.4	5
Thailand	4.2	4	4.4
Peru	6.9	3.5	3.2
Taiwan	2	2.1	2.9

Source: Authors' analysis

According to official Chinese data, average annual import prices for Australian mangoes are within the USD5–5.5/kg range.<sup>12</sup> Australia is an expensive origin due to high production and airfreight costs, as well as the need to undertake costly post-harvest VHT for fruit fly control. Marketing costs and profits along the supply chain in China further inflate the price of Australian mangoes. At such high prices, the fruit can only be sold in premium niche markets such as the gift-giving segment.

Thai mangoes are also expensive. CIF import prices averaged USD4.2/kg in 2015, USD4 in 2016 and USD4.4 in 2017. As in the case with Australia mangoes, the fruit is normally air-freighted after undergoing VHT. Surprisingly, Peru is a less expensive

<sup>12</sup> Estimated fruit arrival costs would be even higher if Australian export data had been used (ITC, 2018).

origin than Thailand, at least according to China Customs data. Lower export prices may compensate for higher airfreight costs. Furthermore, Peruvian exporters only have to apply hot water dip treatments, a much cheaper fruit disinfestation method than VHT. Taiwan is the cheapest of all standard trade origins as exporters in this country are able to take advantage of their proximity to the Chinese market and low sea freight costs. Nevertheless, Taiwanese mangoes are considerably more expensive than Vietnamese or Cambodian mangoes.

In short, Vietnam's ability to supply a diverse portfolio of mango varieties at highly competitive prices has been key to the development of a large cross-border export trade with China. Vietnamese exporters have been able to take advantage of low production costs domestically, while geographical proximity has made cheap and quick transportation by truck possible. Furthermore, unlike competitors in countries such as Thailand, the Philippines, Peru or Australia, those exporters have not had to comply with complex and expensive fruit disinfestation treatments, which are a major market access barrier.

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## 4.9 Quality

The cross-border mango import trade with Vietnam would not have developed to the extent it did, and over such a short period of time, if the fruit did not meet certain quality standards with regards to shelf life, visual appearance, and taste.

While a comprehensive fruit quality assessment was not envisaged as part of this study, during the border and wholesale market visits the research team were given an opportunity to see and handle mangoes that had been imported from Vietnam. Generally speaking, the fruit was firm and its skin remarkably clean, irrespective of grade. The mangoes exhibited no signs of compression, anthracnose, stem end rot, or major visual defects caused by sap burn, scratches and rub marks.

These outcomes could not have been achieved if the supply chain from the farm to the Pingxiang border was not well organised. Fruit bagging for protection against rain, disease, pests and tree rubbing must be common practice, while fruit grown without the use of paper bags must be subjected to intensive chemical spraying programs. Careful picking of the fruit to keep the stem on and thus avoid sap from spilling and causing skin browning must be the norm in the export chain. More generally, skin cleanliness must be a key criterion for the selection of mangoes for the Chinese market. It is likely that exporters use post-harvest dips for disease control. Some have started to invest in cool rooms (Peter Johnson & Nguyen Duy Duc, personal communication).

While importers at the border knew very little about upstream quality management practices, they did mention that large refrigerated trucks are increasingly used to transport mangoes from southern Vietnam. According to one wholesaler, it takes about two days for the fruit to be harvested, sorted, packed, and loaded into trucks, and another three days for it to reach Guangzhou. Most mangoes come wrapped in paper, while foam socks are used for some higher-priced, grade 1 mangoes to

provide better protection during transportation and handling. The fruit is transported in 30-kilogram plastic crates.

At the Vietnamese end, mangoes are typically graded according to size. The fruit may then be re-graded by wholesalers in China using size as the main criterion. Ao (R2E2) mangoes seem to be an exception in that skin colour is also a key quality feature. This variety is highly appreciated for its dark orange colour and bright pink and red blush; fruit that lacks these vibrant colours is sold for a significant discount. During visits to the border and wholesale markets the research team noticed considerable variations in the size and colour of Ao mangoes from Vietnam, perhaps because it was still early in the harvesting calendar. Most Ao mangoes are harvested in the Khanh Hoa province from late April to late June.

Size standards in the export trade are likely to be larger than in domestic markets. At the time of this survey, most mangoes that crossed the Pingxiang border to be sold in fresh fruit markets were classified as grade 1 or 2. As shown in Table 5, the three importers who provided price information were selling seven different types of mangoes; however, only two or three varieties were grade 3. Likewise, when interviewing wholesalers in Nanning and Guangzhou, the research team could never obtain a complete set of grade 3 prices as the traders in question did not always have the lowest category fruit (which is normally sold at a large discount). It is possible that lower grade fruit for the mango processing industry was distributed through other channels.

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## 4.10 Marketing channels

During the fieldwork the research team did not have the opportunity to learn much about chain governance, in part because of the reluctance, or even unwillingness, of key informants to discuss their business dealings. The way Chinese importers first came into contact with Vietnamese suppliers, and how business relations between these two parties evolved over time are important but poorly understood concepts. The level of stability and diversity in business linkages between exporters and importers, and the way transactions are negotiated, incentives structured and risks distributed between them requires further study.

The Pingxiang mango trade is typically conducted by family-owned, traditional trading businesses. Many Vietnamese exporters are assembly traders based in major production areas (Peter Johnson & Nguyen Duy Duc, personal communication). Mangoes are shipped from their local packing house to different domestic markets and the Chinese border. Likewise, traditional fruit trading businesses are involved in the importation of mangoes from Vietnam. A few stakeholders combine this activity with the wholesale of mangoes in cities such as Guangzhou and Shanghai, with one or two family members based at the Pingxiang border and others running the wholesale business for domestic markets.

From Pingxiang, mangoes are shipped to wholesale markets across the country, often in first-tier cities such as Shenzhen, Guangzhou, Shanghai or Beijing. In those

markets, wholesalers will service local retailers as well as secondary wholesalers within and outside the city. Many will also sell to consumers through e-commerce platforms such as *tao bao* and *jingdong*.

While much of the fruit will end up in traditional retail outlets such as market stalls and local fruit shops, a significant share will be sold to consumers in middle to low-end supermarkets. At the time of the survey, Vietnamese mangoes were available in several supermarkets in Nanning and Guangzhou, including Carrefour, Wanjia and Pufenglianhua. On the other hand, high-end specialty stores and supermarkets were likely to opt for more highly reputed origins such as Thailand, Peru or Australia. Unlike most border channel mangoes, fruit from these countries is usually labelled.

Interestingly, at the supermarkets visited by the researchers, the origin of Vietnamese or Cambodian mangoes was often hidden from consumers. Only occasionally was Vietnam listed as the source of the fruit. There were many instances where the research team was fairly confident the mangoes were from Vietnam due to the variety; however, either there was no mention of origin or the fruit was displayed as 'Hainan mango'. This practice may indicate that Vietnam does not have a strong reputation as an origin among Chinese consumers.

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## 5 Conclusion and recommendations

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### 5.1 Conclusion

In the past five years, Vietnam has developed a significant mango trade with China, becoming one of the world's largest exporters. Mangoes are transported by truck through the Pingxiang border in the Guangxi Province for subsequent distribution across China, particularly to the southern, eastern and north-eastern coastal regions. This trade was projected to reach 130,000–160,000 tonnes in 2018, with an estimated 5–10% of the fruit originating from Cambodia. In comparison, around 25,000 tonnes are imported from Myanmar and another 5,000 tonnes or so from all other origins combined.

The Pingxiang mango import trade has developed to an extent where it has visible impacts on both sides of the border and beyond. According to study estimates, this trade is equivalent to approximately 20% of Vietnamese and nearly 10% of Chinese mango production.<sup>13</sup> The channelling of large quantities of fruit to China must be have a positive effect on market prices in Vietnam, thus benefitting Vietnamese mango growers but having a detrimental effect on the local mango processing industry and consumers. However, these impacts are mitigated by mango imports from Cambodia, with some of the fruit channelled into the cross-border export trade

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<sup>13</sup> According to official statistics, Vietnam produced 728,100 tonnes of mangoes in 2016, with preliminary figures for 2017 showing a record harvest of 788,200 tonnes (GSO, 2018). China's 2017 mango crop amounted to 1,799,000 tonnes (Anonymous, 2018).

and a larger quantity marketed within Vietnam. Over time, price pressures are likely to be further reduced, or even reversed, by farmers' responses to market incentives. Faced with increased demand and steady prices for their mango crops, farmers in Vietnam (and neighbouring Cambodia and Laos) are expected to adopt more intensive farm management practices and plant new mango trees, thereby expanding production. It is also possible that certain technical and management innovations linked to the export trade may spill over to the domestic marketing system, potentially benefitting both producers and consumers.

In China, mango growers have to cope with lower market prices as a result of large imports from Vietnam, whereas processors and consumers gain access to an increased, more diverse and more affordable supply. The Pingxiang import trade is concentrated during the April and May months. For this reason, mango farmers in Hainan are the most affected, followed by those in Yunnan. On the other hand, mango growers in Guangxi, Guangdong and Sichuan have little or no exposure to imports from Vietnam as they harvest their crops at a later time.

Sharing a land border with China is a major source of competitive advantage that results in low marketing costs and efficient distribution times. Traders in major production areas are able to take advantage of cost-effective transportation using trucks as well as simple procedures at the border, with the fruit arriving at the final destination markets in China within a week from harvest. They also benefit from a special border trade regime whereby the fruit is not subjected to strict phytosanitary standards and controls. Myanmar is the only other country currently enjoying these same advantages. Mangoes from other origins fall under the standard trade category, thereby having to undergo heat disinfestation treatments. The fruit is often airfreighted – an expensive option but one that reduces quality losses during transportation and ensures a commercially viable shelf life after arrival.

The significance of quarantine regulations as a barrier to trade cannot be overemphasised. Phytosanitary requirements impose considerable costs and risks along the supply chain, while at the same time slowing trade. For some varieties, post-harvest disinfestation treatments may affect fruit quality. It is no coincidence that India, the world's second-largest mango exporter, has made no inroads in the Chinese market. Likewise, Thailand's shipments to China are only a small fraction of that country's mango exports. The contrasting success of Vietnam in the Chinese market and its difficulties in developing a significant export trade to phytosanitary markets such as Japan or South Korea provides further evidence of the extent to which strict quarantine regulations (and distance to market) can act as trade barriers.<sup>14</sup>

Price competitiveness is at the heart of Vietnam's success in the Chinese market. The peak supply period for Vietnamese (and Cambodian) mangoes coincides with the Chinese mango season. Therefore, Vietnamese exporters have to compete in a market that is well supplied with local and affordable mangoes. They are able to do

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<sup>14</sup> *Japan and South Korea also enforce strict legislation on maximum chemical residue limits (Chen, 2017).*

so by offering a variety of good-quality fruit at very competitive prices, which is only possible due to low farm production costs, geographical proximity, and low phytosanitary barriers to trade. Competitors such as Australia, Peru, Thailand and the Philippines do not enjoy these same advantages, and therefore cannot compete on price. This limits their ability to develop large-scale export trade with China.

By managing a diverse portfolio of varieties, Vietnamese exporters are able to cater to the needs of processors and consumers with different product preferences. Diversified varietal portfolios also offer greater flexibility of supply, allowing for adjustments in its composition in accordance with market conditions and opportunities on both sides of the border. In contrast, exports from other countries to China are often concentrated on just one or two varieties, such as Sein Ta Lone (Myanmar), R2E2 (Australia), Nam Doc Mai (Thailand), and Carabao (the Philippines).

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## 5.2 Recommendations

It should be noted that Vietnamese traders meet the quality standards required for the development of a large-scale trade with China. During fieldwork the research team was impressed with the appearance of Vietnamese and Cambodian mangoes; the fruit was firm and the skin remarkably clean, most of which were grade 1 or 2. A detailed assessment of quality management systems along the chain would provide useful insights into how these outcomes were achieved. Further research is also needed to determine how mangoes from Vietnam and Cambodia fit with the specific needs and preferences of different segments of the Chinese market, including different types of processing firms and consumers. Market preferences are likely to differ between categories of users, regions, income level and age, for example. Understanding these differences is important for the development of a supply that is better aligned with market opportunities.

Varietal portfolios are much more complex than anticipated. Further research is needed to provide a better understanding of varietal issues. Poor knowledge of demand and preferences across consumer segments, fruit processing industries and regions is an important gap. The level and timing of supply of different varieties, not only from different regions in Vietnam, but also from different provinces in China, is also poorly understood. Finally, it would be helpful to see whether export trade dynamics influence varietal choices in Vietnam and Cambodia.

It would also be interesting to learn how quality management practices in the cross-border export chain differ from those adopted in domestic market chains within Vietnam. Emerging investment into cold storage and increased use of refrigerated trucks by exporters is certainly an important difference. Furthermore, domestic and export chains may differ in other aspects including the extent to which bagging is applied during cultivation, the care with which the fruit is harvested, or the quality standards applied during the fruit selection and sorting stages.

At the same time, the domestic and border trade systems seem to share many features. There is a strong presence of traditional, family-owned fruit trading

businesses at both the export and import ends. Transactions are based on trust instead of formal contracts, with the agreed terms constantly changing to be in line with spot market conditions. As in the case of domestic marketing systems, the highly flexible or adaptive nature of border trade is one of its competitive strengths, but such systems are not designed for access to premium segments of the market. These are governed very differently; formal contracting is the norm, quality standards are strict and rigid, and buyers usually impose heavy sanctions on suppliers for non-compliance with the terms of the contract.

It appears that most mangoes imported from Vietnam are either channelled to the processing industry or sold in traditional outlets such as market stalls and local fruit shops. While the fruit is also present in some middle- to low-range supermarkets, higher-end specialty stores and supermarkets are likely to sell only labelled mangoes that have been imported through standard trade channels. A study of different market channels and segments in China with a particular focus on Vietnamese and Cambodian mangoes would shed light on the current importance of different uses and outlets, as well as market upgrading opportunities and requirements.

The future of the Pingxiang mango import trade will depend largely on production trends in Vietnam. Vietnamese farmers will only be able to meet rising domestic demand and at the same time generate a surplus for export in a context of continued growth in mango production. Less favourable production scenarios will impact negatively on exports via rising farm-gate prices, unless imports of cheaper mangoes from countries such as Cambodia, and possibly Laos, increase to compensate for the shortfall. Production levels in China, particularly in provinces such as Hainan and Yunnan, also matter. A bumper crop in these provinces will reduce the need to import fruit from Vietnam, whereas a poor harvest will make local mangoes more expensive, a context that is more conducive to imports.

Production conditions aside, the current levels of mango imports from Vietnam will only be sustainable if China maintains its favourable border trade regime. A move towards mandatory fruit disinfestation treatments would be particularly damaging due to the costs and risks to Vietnamese exporters.<sup>15</sup> Furthermore, the number of suitable export varieties could fall as some might not respond well to heat treatments and fruit quality could also suffer. The overall impact on the mango import trade, and the mango sub-sector in the Mekong region including Vietnam, Cambodia and Myanmar, would be severe. The Chinese fruit processing industry would also be affected, particularly as stricter regulations would reduce access to a whole range of fruits imported from Vietnam, not just mangoes.

Anticipating the scope and extent of policy change in China is a highly speculative exercise. Additional elements are necessary for an informed assessment of future scenarios and risks and justifies an in-depth policy study. A dynamic perspective

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<sup>15</sup> *Compliance with strict legislation on maximum residue limits would be equally challenging, as it would require significant changes in cultivation, farm monitoring, and vertical chain coordination systems.*

showing how trade regulations and their implementation and enforcement have evolved over the years, but also taking into consideration recent border cooperation agreements between China and its neighbours and relevant public statements by Chinese and Vietnamese officials, is essential.

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## 7 Supporting documents

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### 7.1 Fieldwork schedule

Locations	Date	Sites
Guangzhou	17 April 2018	Jiangnan Wholesale Market and Tianpingjia Wholesale Market Carrefour, CP Lotus Supermarket, Dongcheng Garden Fruit Supermarket, and Wanjia Supermarket
Nanning	19 April 2018	Haijixing Wholesale Market Xiangsi, Xixiangtang and Chendong retail markets
Pingxiang	20–21 April 2019	Puzhai Border Gate Wantong Logistical Park and ASEAN Fruit City Logistical Park

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### 7.2 Key informants

#### Number, type and location of key informants

	Pingxiang	Nanning	Guangzhou	Vietnam	Australia	Total
Importers	3	0	0	0	0	3
Wholesalers	0	3	3	0	0	6
Retailers	1	3	0	0	0	4
Researchers	0	0	0	2	2	4
<b>Total</b>	<b>4</b>	<b>6</b>	<b>3</b>	<b>2</b>	<b>2</b>	<b>17</b>

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### 7.3 Checklists for key informant interviews

#### Border Agents / Importers

##### Introduction

Explain the survey to the key informant; provide an indication of the likely duration of the interview and reassure the key informant that the names of the people interviewed will not appear in any report

##### 1. Regulations

- Rules and regulations governing the cross-border import trade including imports through formal channels and imports through informal channels

Note: Include in the discussion tariffs, inspection and quarantine, and customs clearance formalities. Discuss both the formal regulations and their implementation in practice.

- In the last ten years, have there been any important changes in cross-border import regulations for mangoes?
- Expected future changes in cross-border import regulations

##### 2. Border gates

- List all border gates in Guangxi. Which of these gates serve as entry points for mangoes?
- What are the differences between these border gates in terms of import regulations, origin of mangoes, and import volumes?

### 3. Varieties

- List and describe all mango varieties imported through the Guangxi border

Note: If the key informant does not know the name of the varieties, s/he should indicate the name or names used in the trade.

Imported mango varieties	Description of the variety (colour, size, shape, flavour, fibre content ...)
1.	
2.	
3.	
4.	
5.	
6.	

### 4. Origins

- Origin of mango varieties imported through the Guangxi border

Note: Some Cambodian mangoes may be imported through informal channels. Thai mangoes may cross the border through formal channels.

Imported mango varieties	Country
1.	
2.	
3.	
4.	
5.	
6.	

### 5. Seasonality

- Periods of the year when mangoes are imported through the Guangxi border
- Peak and off-peak import periods for each variety

Imported mango varieties	Import periods
1.	
2.	
3.	
4.	
5.	
6.	

### 6. Prices

- Current selling prices for different varieties and grades.

Imported mango varieties	Price range by grade (Yuan/kg)

## 7. Volumes

- Ask the key informant to rank the different varieties imported through the Guangxi border by volume (in descending order).
- Reasons why some varieties are imported in greater quantity than others.

Imported mango varieties	Rank (volume)	Reasons
	1	
	2	
	3	
	4	
	5	
	6	

## 8. Spatial flows

- Destination (provinces, cities) of mangoes imported through the Guangxi border
- Which destinations are most important in terms of volume?
- Are there spatial flow differences between varieties?

Imported mango varieties	Market destinations

## 9. Structure and conduct of the cross-border mango import trade

- Ask the key informant to draw a value chain diagram for imported mangoes showing all the stakeholders involved.
- Use the diagram to discuss how the cross-border trade is organised

## 10. Recent trends

- When did the cross-border mango import trade start?
- When did each imported variety first appear in the Chinese market?
- What was the volume trend for mangoes imported through the Guangxi border during the last five years? Has the volume increased, decreased, or remained relatively stable? What were the reasons behind those trends?
- How have import trends differed between varieties? What were the reasons for these differences?

Mango varieties	Volume trends	Reasons behind trends
1.		
2.		
3.		
4.		
5.		
6.		

## 11. Future prospects

- Likely future changes in mango imports from Vietnam
- Main reasons behind the key informant expectations
- Varieties with greatest market development potential and reasons behind such assessment **Wholesalers / Retailers**

### Introduction

Explain the survey to the key informant; provide an indication of the likely duration of the interview and reassure the key informant that the names of the people interviewed will not appear in any report.

#### 1. Mango varieties available in local markets

- List and describe all mango varieties available in local markets throughout the year.
- Note: If the key informant does not know the name of the varieties, s/he should indicate the name or names used in the trade.

Mango varieties	Description of the variety (colour, size, shape, flavour, fibre content ...)
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
(...)	

#### 2. Mango origins

- Origin of each mango variety

Note: For imported mangoes, origin is the country where the mango comes from. For Chinese mangoes, origin consists of the main provinces where the mangoes come from.

Mango varieties	Country / Provinces
1.	
2.	
3.	
4.	
5.	
6.	
7.	
(...)	

### 3. Seasonality of supply

- Periods of the year when each variety is available
- Peak and off-peak supply periods for each variety

Mango varieties	Availability periods
1.	
2.	
3.	
4.	
5.	
(...)	

### 4. Knowledge of Vietnamese mangoes

- Is the key informant knowledgeable about Vietnamese mangoes? Is he or she aware of these mangoes? Have they seen them?

Note: This question should be skipped if the key informant has already mentioned and described Vietnamese mangoes in the previous questions

Note: The interview should come to an end if the informant is unaware of Vietnamese mangoes

- If the key informant knows about Vietnamese mangoes, how has s/he acquired that knowledge? Was it by trading those mangoes? Was it through discussions with other traders? Was it by seeing those mangoes in markets?

### 5. Cross-border import trade with Vietnam: Varieties

- Check again with the key informant the varieties imported from Vietnam, just to make sure the information provided earlier is accurate and comprehensive. If some varieties have not been mentioned before, ask the informant to describe them.

Mango varieties	Description of the variety (colour, size, shape, flavour, fibre content ...)
1.	
2.	
3.	
4.	
5.	
(...)	

- Ask the key informant to rank these different varieties in terms of marketed volumes (in descending order).
- Competitive strengths and competitive weaknesses of each variety imported from Vietnam (e.g. quality, price, seasonality). Ask the key informant to be as specific as possible.

Mango varieties	Main strengths	Main weaknesses
1.		
2.		
3.		
4.		
5.		
(...)		

- Competitive position of these varieties vis-à-vis other varieties and origins available in the market at the same time (e.g. Chinese, Myanmar, Thai, Philippines).

Note: Throughout the discussion, ask the key informant to elaborate and to be as specific as possible.

#### 6. Cross-border import trade with Vietnam: Seasonality

- Check again with the wholesaler the period of the year when each variety imported from Vietnam is available in local markets, just to make sure the information provided earlier is accurate.
- Peak supply and off-peak supply periods for each of these varieties.

Mango varieties	Availability periods
1.	
2.	
3.	
4.	
5.	
(...)	

#### 7. Market segments for mangoes imported from Vietnam

- Retail outlets where mangoes imported from Vietnam are typically sold (e.g. traditional markets, fruit shops, street vendors, supermarkets).
- Which types of retail outlet are more important in terms of volume?
- Are mangoes from Vietnam often served in hotels and restaurants?

#### 8. Spatial flows for mangoes imported from Vietnam

- Does the key informant sell mangoes imported from Vietnam?
- If yes, what is the location of their clients (cities and provinces) for these mangoes?
- How do these locations rank as market destinations for mangoes from Vietnam?
- Are there differences in spatial flows between varieties? If yes, why?

#### 9. Prices

- Current selling prices for different origin, varieties and grades

Mango varieties	Price range by grade (Yuan/kg)
(...)	

### 10. Chain structure and conduct

- Ask the key informant to draw a value chain diagram for mangoes imported from Vietnam, showing all the stakeholders involved.
- Use the diagram to discuss how the trade is organised.

### 11. Recent trends in the trade of mangoes imported from Vietnam

- Does the key informant remember when s/he first saw each of the different varieties imported from Vietnam in local markets?

Mango varieties	First year in the market
1.	
2.	
3.	
4.	
5.	
(...)	

- Supply trends for mangoes imported from Vietnam during the last five years. Has the volume available in local markets increased, decreased, or remained relatively stable?
- Reasons behind these trends. Why has the quantity available in local markets increased, decreased or remained relatively stable?
- How have these trends differed between varieties? What were the reasons for these varietal differences?

Mango varieties	Volume trends	Reasons behind trends
1.		
2.		
3.		
4.		
5.		
(...)		

### 12. Future market prospects for mangoes imported from Vietnam

- Likely future changes in the marketing of mangoes imported from Vietnam, and the main reasons behind the key informant's expectations.
- Varieties with greatest market development potential and reasons.