Horticulture Innovation Australia

Final Report

Market analysis and strategy: broccoli to Japan

Bronwyn Warfield
Trade and Investment Queensland

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Name	Organisation
Hayden Moore/ Michael Coote	AUSVEG
Kees Versteeg	Qualipac
Brad Ipsen	Twin Lakes
James Terry	Momack Produce
Robert Nave	Fragapane Farms
Gavin Foord	HorticultureWA
Rachel Lancaster	Department of Agriculture and Food WA
Chris Warr	Tony Warr International Pty Ltd
Darren Wood	Withcott Seedlings
Justin Heaven	Department of Agriculture and Fisheries (DAF)

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Executive Summary

Market Analysis and Strategy: Broccoli to Japan was funded by Horticulture Innovation Australia (HIA) in 2014. The research presented in this report is the result of the collaborative efforts of Trade & Investment Queensland (TIQ), Griffith University (GU) and the Department of Agriculture and Fisheries (Queensland) (DAF).

The objective of the research was to undertake an in-depth market analysis to determine if potential exists for Australian broccoli exports to Japan. The research focused on the following areas: current market size and growth trends of the broccoli market (fresh and frozen); market access; market segments; competitors; supply chains; consumer research; and economic analysis.

A combination of factors has placed Australia in a position to re-enter the Japanese fresh broccoli market and target the retail and high end food service segments. These factors include: falling supply and quality issues with United States sourced broccoli; the ratification of the Japan Australia Economic Partnership Agreement (JAEPA); and the falling value of the Australian dollar. This combination of circumstances is providing a window of opportunity for Australia to re-establish exports to Japan.

Consultation

Instrumental to this project has been a coordinated national approach and industry consultation. At the outset of the project in June 2014 an Industry Seminar was held to which industry participants from around Australia were invited to provide input into the research methodology. A national project steering committee was formed to oversee the research including representatives from businesses, vegetable associations and government from Queensland, Western Australia and Victoria.

Australia's broccoli industry/ export history

The Australian broccoli industry produces around 48,500 tonnes per annum with the key production states being Victoria, Queensland, Western Australia and Tasmania. In 2014, Australia exported approximately 3,300 tonnes of broccoli valued at A$8M, with 70 percent of exports going to Singapore.

Australia exported broccoli to Japan through the 1990s until they ceased in 2006. In June 2014, an Industry Seminar was held at which participants requested that the project team investigate Australia's history of exporting broccoli to Japan. Twenty years of Japanese import data was analysed. The assessment found that from 1994 to 2006 (when Australia's exports ceased), Australian exports to Japan averaged between 100-300 tonnes per month. These shipments were mainly supplied during Japan's summer season. In contrast, the United States was exporting 6,000 tonnes per month at that time. From 1994 to 2004 Australia enjoyed a price premium over the United States achieving between A$4.00-$6.00/kg. From 2000 prices for broccoli from both the United States and Australia declined until they reached A$2.20 per kilogram in 2006. The fall in the weighted average prices,

rather than exchange rates, appears to have contributed to the termination of Australia's exports.

Market access requirements/tariffs

Japan is a quarantine market and, as such, broccoli imports require a phytosanitary certificate. Imported broccoli is inspected by the Ministry of Agriculture, Forestry and Fisheries (MAFF) for quarantine pests and is tested by the Ministry of Health, Labour and Welfare (MHLW) to ensure compliance with Japan's MRLs for chemicals. If a quarantine pest if found then the product is fumigated. According to MAFF and MHLW only 10 percent of United States broccoli is fumigated and there have been no MRL issues since 2009.

Tariffs ranging from 3-5 percent apply to fresh broccoli and 6 percent for frozen broccoli arriving in Japan. In January 2015 the implementation of JAEPA saw the elimination of the tariff on fresh Australia broccoli and is to be followed by the phasing out of the tariff on frozen broccoli over the next 5 years. Product from the United States continues to attract these tariffs.

Broccoli market

Over the past 6 years, the total broccoli market (domestic production and fresh and frozen imports) in Japan has ranged between 176,000 and 208,000 tonnes per annum. Since 2009, the market has grown by 9 percent. Annual domestic Japanese production accounts for around 64 percent of the market and has stabilised at around 120,000 tonnes. The remainder is made up of imports. Over the past six years, fresh broccoli imports have averaged around 36,000 tonnes and frozen broccoli 31,000 tonnes per annum.

The main market segments for United States sourced broccoli are retail and high end food service sectors. These are the segments for Australia to target with high quality product. Most retailers offer consumers two options being: the domestic product which retails at a higher price of between ¥239 --¥398 per piece; and, the United States sourced product selling for ¥110 - ¥199 per piece. Product is visually differentiated with the Japanese broccoli, sold with the petioles attached, whereas the United States sourced broccoli is trimmed.

Importers in Japan are key supply chain partners to these segments and will be key partners in building a presence in the market for Australian broccoli. There are around 13 broccoli importers and four of these import 10 or more 40 foot containers per week. The key specification required by most importers is for product to be supplied in wax cartons and 38 head count per carton. Broccoli in Japan is sold by the piece rather than by kilogram, hence the focus on count. Existing Styrofoam cartons were found to be unsuitable as they do not allow for fumigation. Wax cartons are re-iced and slotted into Styrofoam crates in Japan before being transported to customers.

The frozen broccoli market is dominated by China and Ecuador, with most product going into the food processing segment. The focus in this segment is on price with one importer quoting prices of Chinese broccoli being as low as US$9-10/10kg carton.

Pricing

Prices paid by Japanese importers of fresh broccoli typically range between US$15-17/10 kg wax carton paid by large importers (sourcing 10 or more, 40ft containers a week) and US$18-22/10 kg for small importers (sourcing 1 to 5, 40ft containers a week). However, in September 2014 most importers were paying between US$8-10 per carton more. Most importers stated that Australian exporters would need to aim at between US$17-20/10 kg wax carton in order to be competitive

An economic analysis of both sea and airfreight out of Brisbane found that sea freighting broccoli to Japan is the most viable option given the proposed CIF/CFR prices.

Competitors

Japan's local production is the main competitor dominating the market. Since 1994, Japan's production has increased by 71 percent, during which time there has been a corresponding decline in fresh broccoli imports.

In terms of fresh broccoli imports, the United States dominates with 96 percent market share in 2014. In the 1990s, imports from the United States were around 6,000 tonnes per month, however, imports now average around 3,000 tonnes per month. The USA is a large scale, low cost producer and has been the leading supplier of fresh broccoli to Japan for more than 20 years. The United States supplies all year round, with peak supply during Japan's summer season. China and Mexico supplement supply with small volumes over Japan's winter/spring period.

Consumers

Preliminary consumer research found that broccoli consumption is increasing, although overall vegetable consumption is declining. The core socio-demographic group for broccoli consumers is aged over 35 years, with a high (>¥9 million) annual household income. The research also found no strong image of Australian vegetables in terms of quality or safety. This represents an opportunity to build an image of Australian vegetables as being high quality and safe.

Export Development Strategies

Seven key factors have been identified as critical to re-establish Australian broccoli exports to Japan into the retail and high end food service sectors. These are: relationships; supply chains and product quality; production; differentiation; product opportunities; market development; and, competitors. The focus should be on differentiating Australian broccoli from competitors on the basis of high quality, consistent supply and food safety issues. Significant support will be needed to resume Australia's exports to this market, as it will require a shift from air to sea freight logistics, a focus on quality and shelf-life, building relationships and gaining an in-depth understanding of the needs of Japanese customers and consumers so that Australian broccoli can be successfully differentiated from its competitors.

1 Introduction

1.1 Background

This project originated from the Horticulture Australia Limited (HAL) funded project VG12042 *Domestic and Export Market Access and Trade Viability Issues – A Strategy to Address*. This report identified that Australia may have potential to export broccoli to Japan and recapture 10 percent of the market.

The project team successfully tendered for the project and used a value chain approach. A project steering committee comprising businesses and organisations along the value chain from Queensland, Victoria and Western Australia oversaw the research activities.

1.2 Objectives

Produce an in-depth analysis of the broccoli market in Japan and, pending Industry Advisory Committee endorsement, develop a three year export investment strategy to develop broccoli exports to Japan.

Stage 1

a) Work in a collaborative partnership with vegetable levy payers and exporters to direct and oversee the project activities and actively participate in in-market activities.
b) Conduct desktop research to determine market demand, competitors, market access, barriers to entry and foodservice, retail and consumer trends.
c) Map the supply chains from grower to final consumer for imported broccoli to gain knowledge of market specifications, develop relationships and document costs.
d) Conduct consumer research in Japan to assess consumption habits, consumer demographics, usage and attitudes to imported broccoli.
e) Undertake an economic analysis to evaluate the cost of exporting from farm gate to market including a return on investment.
f) Develop and implement an extension and communication plan throughout the project and collaborate with existing HAL projects (ie National Export Opportunity Symposium) and AUSVEG communications.

Stage 2 – Pending interim report

a) Develop a three year Market Development Investment Program for broccoli exports to Japan.
b) Prepare a new project to implement the Market Development Investment Program.

1.3 Methodology

1.3.1 Work in a collaborative partnerships

Three key activities were undertaken as part of establishing a collaborative partnership with industry. These included a grower survey, industry symposium and formation of a project steering committee.

At the outset of the project, a survey was circulated to growers to gain their input as to what information they were seeking from the project. This survey was sent out via a link through AUSVEG's e-newsletter, through personal networks and by state vegetable associations in Victoria and Western Australia.

Industry involvement was also facilitated by an industry symposium involving businesses along the supply chain, from seedling suppliers through to exporters and freight forwarders, which was held on 17 June 2014 in Brisbane. Twenty seven people attended. Some industry representatives and project team members linked-in via three video conference sites (Western Australia – Perth and Manjimup), Sydney and Tokyo. Industry attendees were from Queensland, Victoria and Western Australia.

The symposium was structured into morning and afternoon sessions. The project team and guest speakers delivered presentations in the morning and a workshop was held in the afternoon to gain input from attendees regarding the research objectives and outputs. The project team presented their methodologies and objectives and the following guest speakers presented:

Gavin Foord,	HorticultureWA – Case study WA carrot exports
Mike Titley,	Australian Horticulture Research (AHR) – Case study broccoli exports to South East Asia and Japan
Scott Bretherton,	Department of Agriculture – Phytosanitary certification for broccoli to Japan
Dr Jenny Ekman,	AHR – Better broccoli – maximising storage life and quality

Guest speakers were included in the program to stimulate ideas and discussion and identify areas for collaboration. The project team continued to collaborate with Dr Jenny Ekman to research the potential to differentiate and reduce the cost of exports Australian broccoli on the basis of using alternative packaging.

Updates on key project outputs were later circulated to the database of contacts developed for the symposium (Appendix 1).

After the seminar, businesses and associations were contacted to participate in the project steering committee. The committee's selection criteria were aimed at ensuring the entire supply chain was represented including growers/exporters who had expressed interest in the project. A committee of 10 was formed including four growers/exporters from Queensland, Victoria and Western Australia. The committee recommended that the growers/exporters participate in the in-market research visit which was conducted in September 2014. All

growers were approached to participate, however only Kees Versteeg from Qualipac was available at the time.

1.3.2 Conduct desktop research into the Japanese broccoli market

An extensive desktop study was undertaken to collect the statistics and data contained in this report. In response to feedback from attendees at the symposium held in June 2014 historical import and production data for Japan was collected from 1994 through to 2014. At the request of industry, information on Australia's historical exports to Japan were analysed to determine possible reasons for them ceasing in 2006.

Data was collected on Japan's imports of fresh and frozen broccoli, production and consumption of broccoli and other vegetables. In addition, data on Australia's exports and competitors' production was also collected. This data was sourced by TIQ's Tokyo office and analysed by Bill Johnston (DAF) and Lachlan Huggins (TIQ). A full listing of references is contained in this report, however the main sources used include FAOSTAT, Japanese Ministry of Agriculture Fisheries and Forestry, Trade Statistics Japan, Foreign Agriculture Services (FAS) and the United States Department of Agriculture (USDA).

1.3.3 Supply chain mapping, competitor analysis, market segments

A market visit to Asia Fruit Logistica (AFL) Hong Kong and Japan was undertaken in September 2014. Interviews were conducted with competitors at AFL and with a range of businesses along the broccoli supply chain in Japan including growers (Dole Farm visit, Hokkaido), importers, wholesalers and retailers.

In Japan, in-depth interviews were undertaken with 13 current importers of fresh broccoli, one importer of frozen broccoli, one past importer of fresh broccoli and one leading supermarket retailer of broccoli. These businesses were engaged to gather market intelligence relating to broccoli procurement and distribution, buyer requirements and preferences, import costs and pricing, logistics, marketing, consumption trends, competitors' strengths and weaknesses, and opportunities for differentiation. The businesses engaged included:

Organisations	
Union Corporation	Royal Co
IPM Nishimoto	Tokyo Seika Trading Co
Itochu Corporation	Ishihara Corporation
MVM Shoji	Sun Globe Food
Smile Corporation	Funasho Shoji Co
Watari	KI Fresh Access Inc
H&F International Co	Daymon Worldwide Co
Consumer Grocery Council	Aeon
Dole Japan	

In September 2014, visits were undertaken to over 10 mid-upper tier supermarket and department store chains, as well as a number of independent grocery outlets. At these

outlets, broccoli in both fresh and frozen form was examined to assess price, packaging, appearance, quality, labelling and country of origin.

1.3.4 Consumer research

A combination of desktop research and primary research was undertaken for this section of the project. The desktop research explored food sufficiency, market situation, consumer landscape, key food values, vegetable and broccoli consumption patterns, lifestyle, communication and retail trends.

The primary research involved a Computer Assisted Telephone Interview (CATI) which was conducted in September and October 2014 in the two main metropolitan areas of Kanto (Tokyo-Yokohama-Saitama-Chiba) and Keihanshin (Kyoto-Osaka-Kobe). The initial sample involved 2,400 respondents, who were required to meet the following criteria:

- Purchased broccoli within last 2 months
- Aged between 20 and 59 years
- Not a student

Non buyers were excluded from the initial sample, bringing the number of respondents to 1,010 (488 Tokyo/Kanto and 522 in Keihanshin). The follow up interview with respondents explored socio-demographic characteristics of the buyers, purchase frequency, attributes of broccoli that consumers perceive as important, shopping preferences for place of purchase of broccoli, intended use of broccoli and Japanese consumers' motivations towards purchasing Australian produce.

1.3.5 Economic analysis

The economic assessment of the supply chain for broccoli considered both seafreight and airfreight from a packhouse in the Lockyer Valley. All visible costs along the supply chain were collected including processing and packaging, transport to point of export, freight forwarders fees, shipping charges, quarantine and inspection costs and related fees and charges incurred along the chain.

For the purpose of this study, the chain was assumed to terminate at the arrival port in Japan, with the seller bearing all costs in line with CIF (Cost, insurance, freight) or CFR/CNF (Cost and freight). The analysis delivered potential breakeven farm gate prices which exporters could use to determine the viability of exporting broccoli to Japan, based upon their expected production costs. To ensure a robust and considered analysis, a risk analysis was incorporated to capture fluctuations in the expected price and exchange rates. Five point distributions were developed for each risk examined in order to provide a range of profit outcomes for broccoli exports along the identified chain. This provided a broader understanding of the potential viability.

To further investigate the potential profitability of the supply chain an analysis of opportunities behind the farm gate gross margin was undertaken (gross revenue – variable costs). That formed the basis of an estimate of total cost of production at the farm gate. This in turn provides some indication of what margins may exist for growers.

An export calculator has been generated as a tool from this project. This enables businesses to calculate the potential returns using various exchange rates and input their own individual costs of production and air and sea freight costs.

1.3.6 Extension and communication activities

A wide range of communication and extension activities were undertaken during the course of the project. The target audience for communications were growers, exporters and industry associations.

A range of strategies was used including dissemination of profiles from each key section of the report, committee meetings, industry seminar/symposium and articles in industry e-newsletters and via posts on TIQ's website. Videos of key presentations delivered at the symposium held in June 2014 were also circulated to industry. Project team members also attended key industry events including the AUSVEG convention in Cairns, AsiaFruit Logistica and Malaysia and UAE Export Symposium and the HIA's Vegetable Market and Value Chain Development Advisory Panel Meeting.

The key findings from the project were delivered to industry at a seminar held in Brisbane on the 25 March 2015. Mr Nishikawa, General Manager of the Vegetable Department from Union Corporation participated in the panel at the seminar and recorded an interview on the opportunities in Japan for broccoli and other vegetables. Interviews were also conducted with the project steering committee. Videos of all presentations and interviews from the seminar were posted on TIQ's website for industry to view.

1.3.7 Three year market development investment program

A draft SWOT analysis was presented at the Project Steering Committee meeting held on 5 December 2014. Input was canvassed from committee members and the project team. The final SWOT analysis, on which the three year market development and investment plan will be based, is outlined in this report. Preliminary strategies are outlined in this report to provide the framework for re-establishing Australia's exports of broccoli to Japan and to develop opportunities for other vegetables in this market.

1.4 Limitations/Scope

The market size data for imports of fresh and frozen has only focused on the main suppliers. Data which is statistically insignificant from intermit or small suppliers has not been included. For example for fresh imports to Japan from 2009 to 2012 Taiwan (46 tonnes), Ukraine (4 tonnes), Australia (2 tonnes), Philippines (30kg) and New Zealand (8 tonnes) supplied small or one-off imports which have not been included in the analysis. Similarly for frozen imports to Japan, Spain, Taiwan, Thailand, France, USA, Poland and Turkey have supplied intermit or small volumes totalling 826 tonnes over the 6 years 2009 to 2014.

Primary research in this report has been mainly obtained from interviews with organisations involved in the broccoli industry in Australia and Japan. It should also be noted that only a

small sample of interviews were conducted with the trade in Japan; therefore, the views expressed in this report may not be representative.

1.5 List of terms

CAGR – compound annual growth rate
cbm/h – cubic meter per hour
CFR, CNF – cost and freight
CIF – cost insurance freight

2 Industry collaboration and consultation

2.1 Grower survey

DAF designed a survey to gauge growers' and industry's research priorities from this project. Nine multiple choice questions were placed on Survey Monkey. The survey was promoted through state vegetable associations, AUSVEG's electronic newsletter and through personal networks.

A total of 12 businesses filled in the survey. As Figure 1 illustrates, 9 of the 12 businesses were growers; most of whom also pack and export. Six respondents were from Queensland, three from Victoria and three from Western Australia. As presented in Figure 2, the key information sought from respondents, in order of priority, included: market specifications; wholesale prices; market access requirements; and analysis of competitors' capacity to supply. As outlined in Figure 3, the key barriers were seen to be: price received; Australia's costs of production; and competitors.

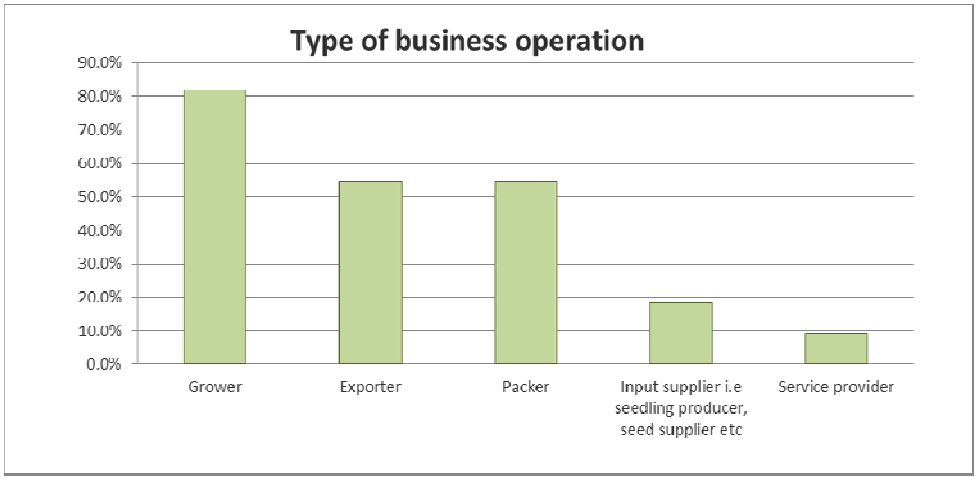


Figure 1: Type of business operation

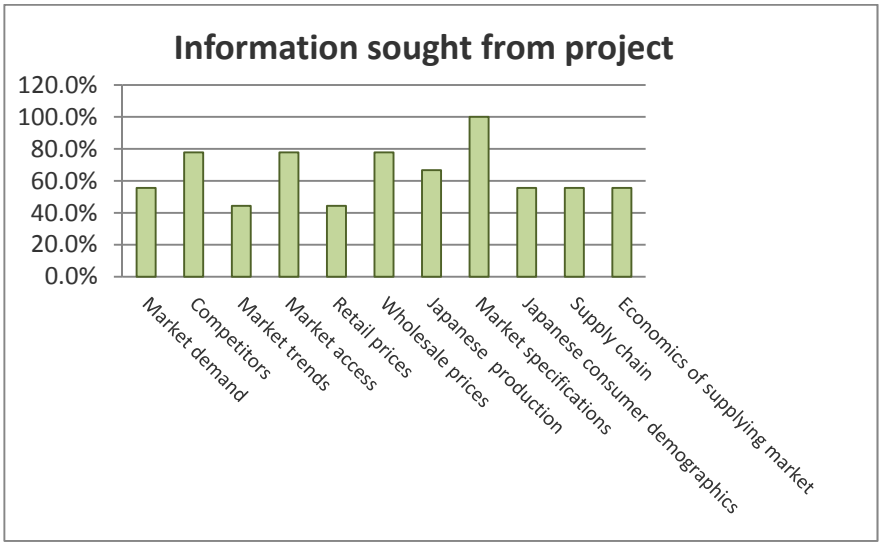


Figure 2: Key information to search

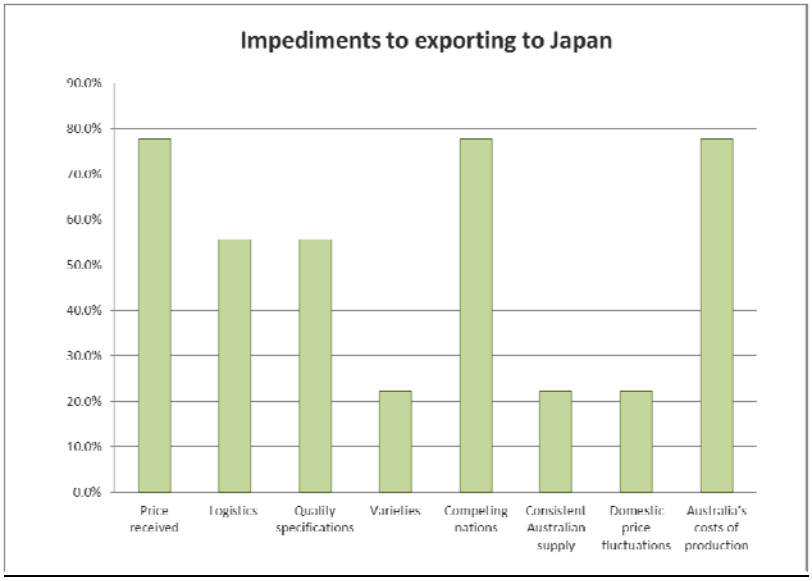


Figure 3: Impediments to exporting broccoli to Japan

The survey indicated that the project team would need to determine whether Australia can successfully compete in the Japanese market given Australian production costs and the prices Japanese buyers are willing to pay.

2.2 Project Steering Committee

As part of the methodology, a steering committee was formed to direct and oversee research activities. At the outset of the project, a seminar was held involving businesses and organisations from along the supply chain and from around Australia.

From this industry seminar businesses and organisations were approached to participate in the project steering committee. The committee's selection criteria was aimed at ensuring that the entire supply chain was involved and that businesses from the three participating states were represented. The members of the committee are listed in Table 1:

Table 1: Project steering committee members

Name	Organisation
Hayden Moore/ Michael Coote	AUSVEG
Kees Versteeg	Qualipac, Qld
Brad Ipsen	Twin Lakes, WA
James Terry	Momack Produce, Vic
Robert Nave	Fragapane Farms, Vic
Gavin Foord	HorticultureWA
Rachel Lancaster	Department of Agriculture and Food WA
Chris Warr	Tony Warr International, Qld
Darren Wood	Withcott Seedlings, Qld
Justin Heaven	Department of Agriculture and Fisheries, Qld

Interaction and consultation with the committee occurred throughout the project via teleconferences, webinars, seminars, email updates and committee meetings. The committee members also played a key role in assisting in the dissemination of the project's results. The terms of reference of the committee are in Appendix 2.

3 Australian industry

3.1 Production

In 2011/12 Australia produced 48,472 tonnes of broccoli from a total production area of 7,369 hectares. Broccoli is Australia's tenth largest vegetable crop in terms of value, with a gross value of AUD$101.2 million in 2008/09 (AUSVEG, 2014).

Based on 2011/12 the key production states in order were Victoria, Queensland, Western Australia and Tasmania.

Table 2: Total Australian broccoli by area, production and yield, 2005-06 to 2011-12

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Area (ha)	6,403	7,135	6,326	6,269	n.a.	7,090	7,369
No. businesses	n.a.	n.a.	347	406	n.a.	487	432
Production (t)	48,398	46,031	46,125	44,420	n.a.	49,112	48,472
Yield (t/ha)	7.6	6.5	7.3	7.1	n.a.	6.9	6.6

Source: Australian Bureau of Statistics, Agricultural Commodities, Australia 2005-06 to 2011-12

Table 3: Key production statistics Australian broccoli 2011-12

State	NSW	Vic	Qld	SA	WA	Tas	Total
Area (ha)	213	3,849	1,592	213	865	637	7,369
No. businesses	122	130	84	17	52	27	432
Production (tonnes)	946	27,135	10,144	289	5,650	4,308	48,472
Yield (t/ha)	4.4	7.0	6.4	1.4	6.5	6.8	6.6

Source: Australian Bureau of Statistics, Agricultural Commodities, Australia 2011-12

A report by Clarke (2013) suggested Australia should aim to secure 10 percent of the Japanese broccoli market (approximately 5,000 tonnes). Using the average yield in Table 3 for 2011/12 (in tonnes per hectare) of 6.6 tonnes/hectare, this target equates to 758 hectares of additional production. As outlined in Table 2 from 2008/09 to 2011/12 the number of hectares under cultivation increased by 1,100. In the one year period from 2005/06 to 2006/07 there was an increase in land under cultivation of 732 hectare. Given this, there would be capacity to quickly increase production by the target of an additional 758 hectares. However, other issues such as profitability and industry capability to supply the Japanese market may limit any potential expansion.

3.2 Research

In the past 10 years the Australian vegetable industry has invested in four key areas. These include: productivity and added value; pests and disease management; chemicals, pesticides and chemical residues; and market development and supply chains (Infoveg, 2014).

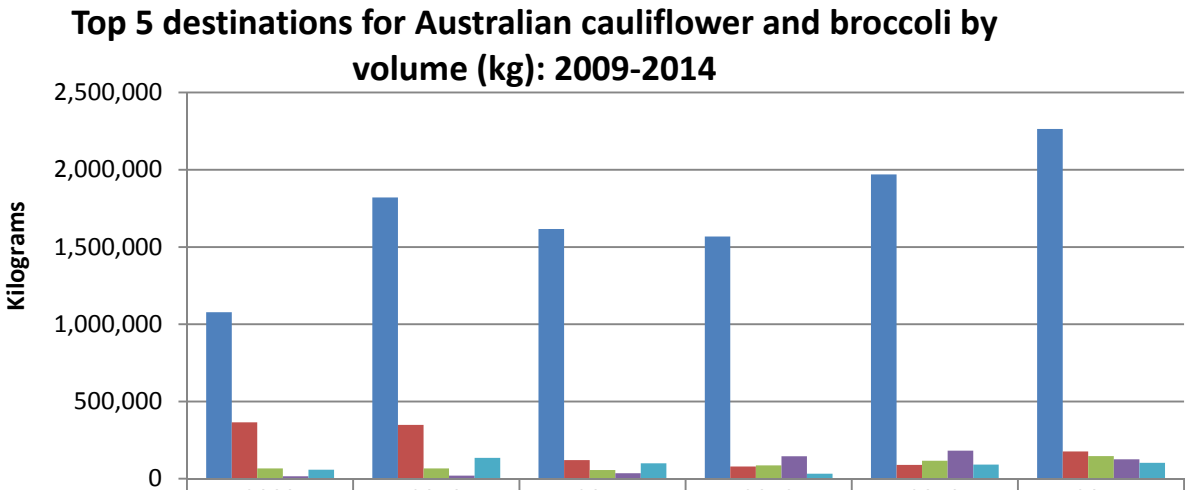
Currently, there are three projects which may be pertinent to developing exports to Japan. These include two projects run by Dr Jenny Ekman, which includes VG06045 on maintaining vegetable quality for export and VG13086 on preserving peak freshness through the supply chain. Dr Ekman presented her results from VG06045 at the broccoli seminar held in Brisbane on the 17 June 2014. She has provided ongoing advice to this project on packaging options for broccoli exports.

A further project, VG13081 on prioritisation of vegetable crop commodities and activities for mechanisation, may also have useful learnings for the broccoli industry to reduce Australia's harvesting costs and increase our cost competitiveness with the United States. Broccoli has been shortlisted for a case study as part of VG13081.

3.3 Australian exports

3.3.1 Current export markets

In 2014, Australia exported 3,291 tonnes of broccoli, valued at AUD$8.2 million. As outlined in Figure 4, the main export destination was Singapore, with around 70 percent market share. Export volumes in the last three years have grown by 21 percent.



	2009	2010	2011	2012	2013	2014
Singapore	1,077,477	1,820,962	1,616,500	1,568,173	1,969,695	2,264,040
United Arab Emirates	364,979	348,027	120,614	79,079	89,412	176,492
Malaysia	66,686	66,724	56,590	86,631	116,114	146,140
Papua New Guinea	15,263	19,717	34,964	144,911	181,074	126,016
Saudi Arabia	57,848	135,028	99,816	31,864	91,904	102,873

Total Exports	**1,910,924**	**2,672,231**	**2,341,087**	**2,132,350**	**2,876,755**	**3,291,631**

Figure 4: Exports of fresh broccoli and cauliflower by Australia
Source: Australian Bureau of Statistics, Foreign Trade, unpublished data, 2014

3.3.2 Historical exports to Japan

Australia has a history of exporting fresh broccoli to Japan during our winter production period, taking advantage of the counter-seasonal market window during the Japanese summer. However, Australian exports of broccoli to Japan ceased by 2006 (with the

exception of a couple of small shipments in the late 2000s). Figure 5 shows export of fresh broccoli to Japan from 1994 to 2014.

One obvious point to note is the volume of broccoli being exported. During Australia's peak export periods volumes ranged between 100 and 300 tonnes per month, with the exception of some extraordinary peaks. At that particular time the United States was averaging 6,000 tonnes per month.

Figure 5 also outlines the exchange rates AUD/JPY and the USD/JPY over the 20 year period. There may have been some correlations between the cessations of Australia's exports and the rising exchange rates from 2004 to 2006. However the exchange rates were at a higher level from 1996 to 1998 and there was no corresponding drop in Australia's export at that time. Figure 6 which outlines average weighted prices for Australia's broccoli indicates that the fall in real prices as opposed to exchange rates may have been the primary reason for the termination of Australia's broccoli exports to Japan in 2006.

It is also interesting to note that between January 2014 and April 2015 the USD/JPY (1USD:120JPY) has comparatively raised to a point which is higher than the AUD/JPY (1AUD:90JPY), which presents an opportunity for competitive Australian prices.

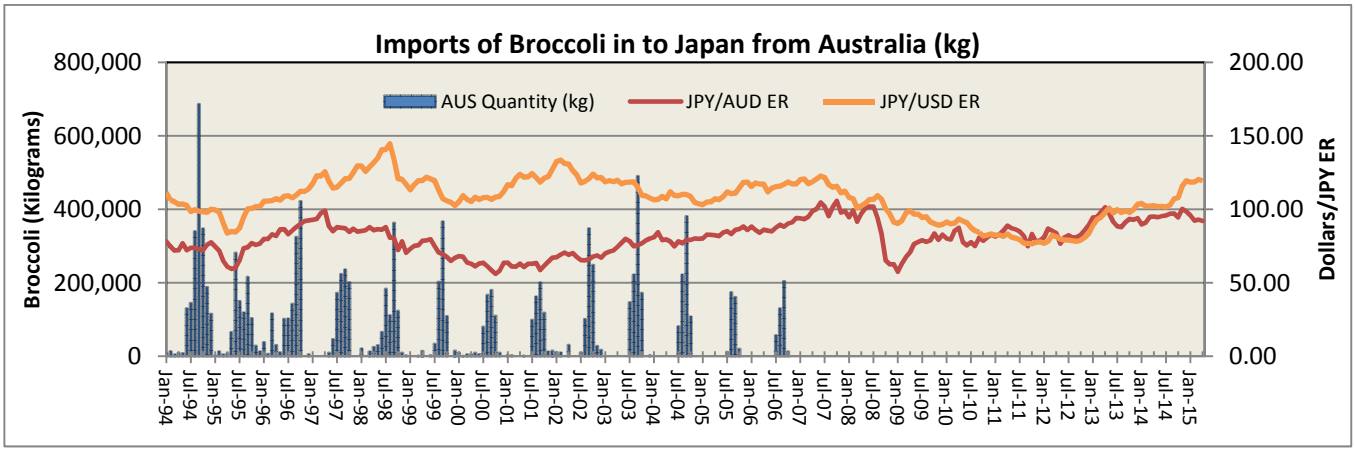


Figure 5: Imports of fresh broccoli by Japan from Australia January 1994 to April 2015
Source: Trade Statistics Japan, 2014

The entry of a significant competitor in the Japanese market may also have had a negative effect on prices. However, data provided by Trade Statistics Japan does not show that hypothesis to be true. The United States experienced a decline in export volume to Japan from 1994 to 2014 as Japanese production expanded.

As stated, the United States has remained the leading exporter of broccoli to Japan over two decades and, although prices and volumes have declined over that period, the United States has maintained dominance of the market.

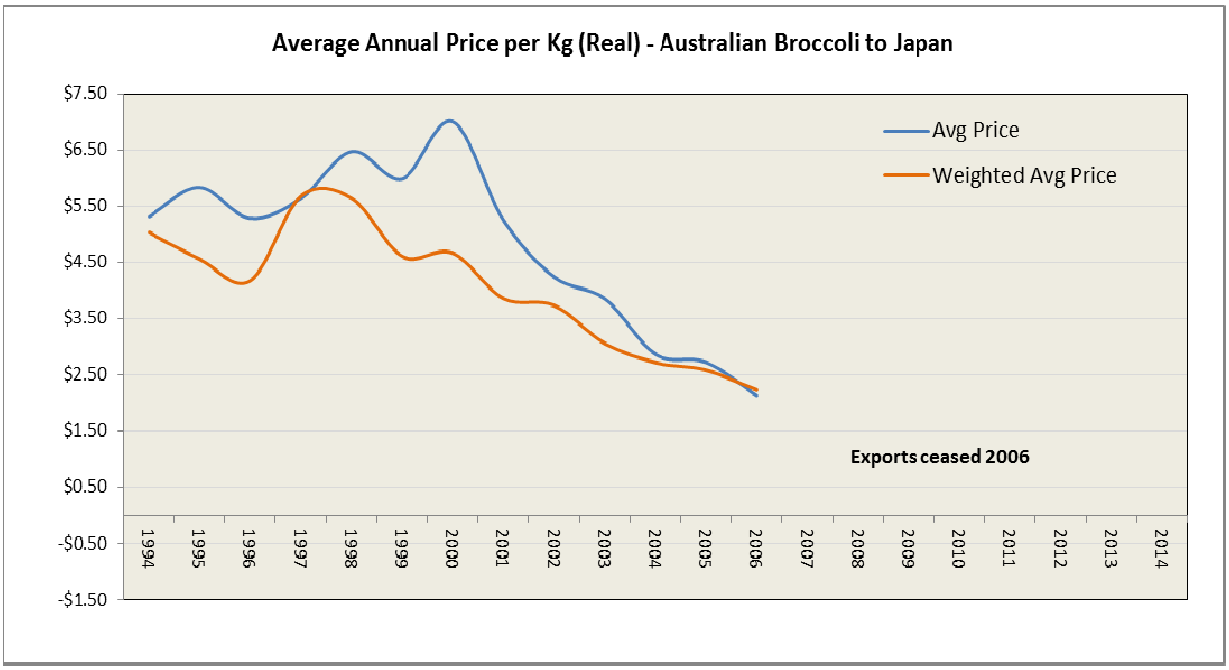


Figure 6: Average and weighted average price per kilogram (real) of fresh broccoli exported to Japan
Source: Trade Statistics Japan, 2014

Figure 7 shows the price of broccoli over the past two decades for the United States and Australia. Figure 7 also illustrates that Australia had maintained a price premium over the United States through the 1990s. As volumes declined in the early 2000s, the price premium that had been realised in the 1990s disappeared until the end of Australian exports in 2006.

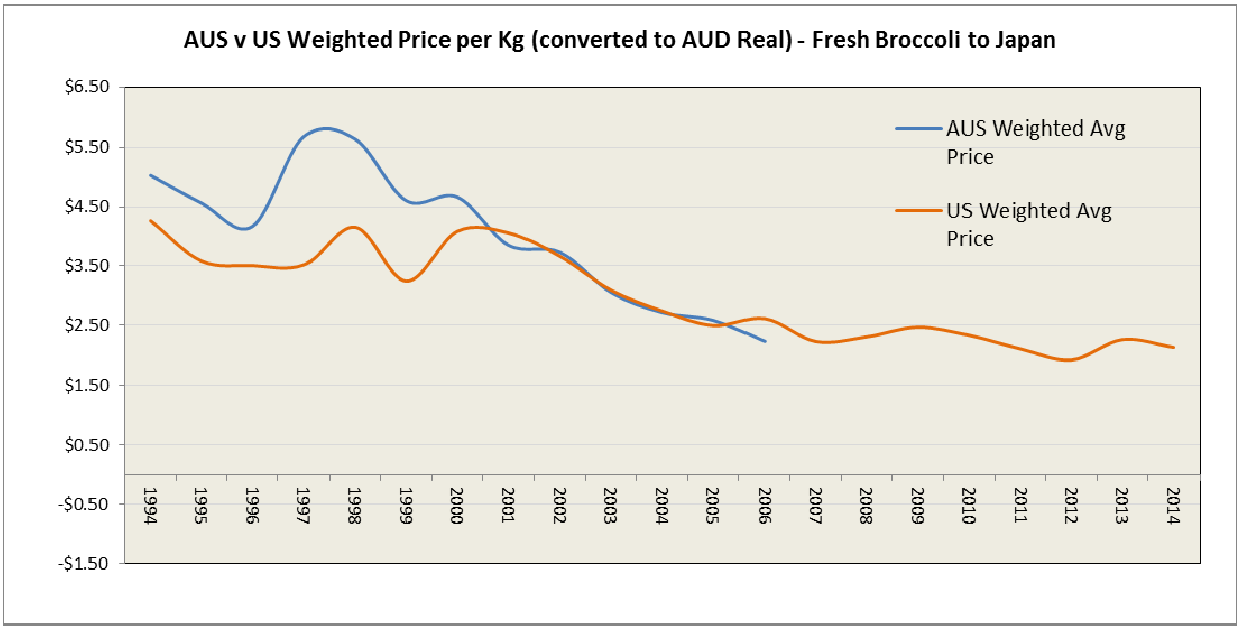


Figure 7: Australian weighted price per kilogram of fresh broccoli exported to Japan as compared to the United States (shown in real AUD)
Source: Trade Statistics Japan, 2014

3.4 Australian export supply chain to Japan

Harvest

Australian broccoli is harvested in all seasons at various locations. Estimated yields in Australia average 6.6 tonnes/ha (ABS, 2012). Hand harvesting by knife is the primary method with some experimental mechanical harvesting occurring in recent years. Broccoli is harvested into bins or crates for transfer to a cooling and packing facility as soon as possible after harvesting. The time between harvest and cool room must be less than two hours to prevent loss of quality (DEPI, 2014).

The core temperature of broccoli should be reduced to below 5°C as quickly as possible (Ekman 2015, pers.comm. February). For export broccoli, the temperature should then be lowered to 0 – 2°C and held at this point for at least 24 hours (Ekman 2015, pers. comm. February). Cooling methods in Australia include hydro cooling, forced air cooling and vacuum cooling.

Packing

Packing is done rapidly in a cool place and the packed product returned immediately to the cool room to minimise temperature rises. A fully waxed fibreboard carton is recommended for sea freight to Japan, similar to that which is used by United States producers. Styrofoam or other cartons can be used but often depend on customer requirements. Cartons are packed to customer specifications and iced.

Quarantine procedure in Australia

Prior to export from Australia the Japanese Ministry of Agriculture, Forestry and Fisheries requires a phytosanitary certificate, issued by the Department of Agriculture (DOA), for each consignment (Department of Agriculture, 2014). Authorised Officers either from DOA or industry inspect a representative sample of either 2 percent of the shipment or 600 pieces for pests prior to the container being shipped from Australia (Bretherton, 2015 pers. comm. May).

Types of containers used

Containers used for sea freight of broccoli must be refrigerated. Two size containers with refrigeration, or reefers, are available from Australia; a 20ft standard reefer, or a 40ft reefer (Maersk Group, 2014).

A 40ft reefer is the standard container used for sea freight to Japan for United States broccoli and is the preferred option for Australian broccoli. Palletised broccoli is loaded into the container using a forklift; 960 cartons (depending on carton size and type) fit into the container and may be hand stacked to increase number of cartons. The recommended set points of a reefer with advanced fresh air management are temperature (0°C) and fresh air exchange (setting 20-60 cbm/h) (Hamburg SÜD).

Quarantine inspection in Japan

On arrival in Japan Australian broccoli is subject to a quarantine inspection and a chemical residue test. These are performed by the Japanese Ministry of Agriculture Forestry and Fisheries and the Ministry of Health, Labour and Welfare.

A positive identification of a quarantine pest will require return shipping or enforced fumigation of the broccoli by methyl bromide. This is usually paid by the importer. The price varies between USD$600 and USD$1000. Appendix 3 contains the current quarantine pest list of Japan. The Ministry of Health, Labour and Welfare implements the Imported Foods Monitoring Plan whereby all imported foods are tested for chemical residues (MHLW, 2014). Refer to Market Access 5.1

Shipping time from Australia

Various shipping routes operate from Australia to Japan. Most shipping lines have a one day cut off period where a container needs to be at the port before being loaded onto a ship. Shipping times vary from 10 to 33 days from Australia, depending on whether it is a direct or indirect route.

Most common direct routes to Japan are from Australian east coast ports of Brisbane, Sydney and Melbourne. Connections can come from Fremantle to Melbourne, alternatively Fremantle to Japan routes may be investigated that transit via Singapore, Hong Kong or other Asian ports.

Shipping time to Yokohama port in Japan is 10-11 days from Brisbane, 10-14 days from Sydney, 16-17 days from Melbourne and 21-23 days from Fremantle (transhipped via Singapore). It is then shipped to Japan (refer US supply chain 6.2.7 for more details) (Maersk, 2014 and NYK lines, 2015).

4 Japanese market overview

4.1 Japanese economy

Table 4: Economic overview of Japan and Australia

Japan	
Capital	Tokyo
Population (2013)	127.3M
GDP per capita (2014)	37,540 (USD)
Principal fresh broccoli import sources (2014)	United States 96%, China 3%, Mexico 1%
4 Major Metropolitan Areas (MMA)	Kanto (Tokyo and including its 23 special wards, Yokohama, Saitama, Chiba))
	Keihanshin (Kyoto-Osaka-Kobe)
	Chubu (Nagoya)
	Kitakyushu - Fukuoka
Australia	
Capital	Canberra
Population (2013)	23.3M
GDP per capita (2014)	62,822 (USD)
Principal fresh broccoli export destinations (2014)	Singapore (68%) United Arab Emirates (5%) Malaysia (4%) Papua New Guinea (4%) Saudi Arabia (3%)

Source: Australian Bureau of Statistics, 2014; Department of Foreign Affairs and Trade, 2012; Statistics Bureau of Japan, 2013; OECD, 2015.

5 Japanese broccoli market

5.1 Market access

Australia's exports of broccoli to Japan are governed by Japan's market access requirements. Specifically, these include phytosanitary and pest and chemical regulations.

5.1.1 Import tariffs

Exports of fresh broccoli from Australia and Mexico hold an advantage in the market with a zero tariff, arising from existing Free Trade Agreements in place with Japan. Imports of fresh broccoli from the United States are subject to a three percent tariff.

With the implementation of JAEPA in January 2015, the six percent tariff applied to frozen broccoli will be reduced to zero over the next five years.

The United States is currently negotiating the Trans Pacific Partnership Agreement with Japan in relation to a 12-nation pact on trade concessions covering a quarter of the world's trade. The United States is hopeful of gaining major concessions on agriculture despite Japan's influential and protectionist farm lobby opposing greater liberalisation of its key agricultural markets.

Table 5: Tariffs applied to leading export nations of fresh broccoli to Japan

Top nations exporting broccoli to japan	FTA with Japan	Tariff – fresh	Tariff – frozen
US	No	3.0%	
China	No	5.0%	
Mexico	Yes	0%	
Australia	Yes	0%	6.0% (reduced to 0% over 5 years with FTA)

Source: Ross, 2014 and O'Toole, 2014

5.1.2 Phytosanitary requirements

Australia's broccoli exports to Japan require a phytosanitary certificate. An import permit or additional declaration or endorsement is not required for imported broccoli. In general, consignments must be free from pests, soil, weed seeds and extraneous material (DAFF, 2014). Authorised Officers either from DOA or industry inspect a representative sample of either 2 percent of the shipment or 600 pieces for pests, prior to the container being shipped from Australia (Bretherton, 2015 pers. comm.,May).

5.1.3 Pest and chemical residue requirements

The Japanese Ministry of Agriculture Forestry and Fisheries (MAFF) and the Ministry of Health, Labour and Welfare (MHLW) are the primary authorities for inspection of agricultural and food imports. MAFF and MHLW agents undertake inspections of all imported foodstuffs at the

port of entry. Inspections are carried out as a security measure against quarantine pests and excessive chemical residues on food products.

5.1.4 Pest inspection for broccoli imports

The number of cartons inspected at the port of entry is based on the total volume (kg) of the consignment. An indication of the volumes inspected based on weight range is provided in Table 6.

Table 6: Inspection samples for quarantine pests

Weight	Inspection sample (minimum)
1,000kg – 10,000kg	20kg – 50kg
10,000kg – 120,000kg	70kg – 130kg
Over 120,000	160kg

Source: Ministry of Agriculture, Plant Protection Station (2014)

If pests are detected in a consignment, an assessment is then made as to whether the pests are classified as 'quarantine' or 'non quarantine' (Appendix 3). A consignment with quarantine pests detected will require fumigation. Fumigation is undertaken in warehouses that are approved for the treatment of foodstuffs. These warehouses are usually located near the port of entry.

As the majority of imported broccoli is freighted via sea, inspections are typically carried out at container yards in Japan's major ports – Tokyo, Yokohama and Osaka. Cartons are selected at random by MAFF agents and inspected for live pests. Some broccoli may also be cut during the inspection process.

According to MAFF, around 10 percent of broccoli consignments imported from the United States are fumigated due to the detection of quarantine pests. There is zero tolerance with regards to foreign quarantine pests.

For fumigation to be effective, broccoli cartons need to be designed with holes to ensure that the chemical agents used in the fumigation process can flow through the cartons efficiently. According to Mr Nakagawa of MAFF Japan, if broccoli is imported in Styrofoam cartons without holes, the contents of the cartons may need to be emptied or carton lids may need to be removed to the satisfaction of MAFF agents on duty (Nakagawa, 2014, pers. comm., September).

5.1.5 Pests detected in consignments of fresh Australian broccoli in the past

In 2006, cabbage aphids *(Brevicoryne brassicae*) were found in fresh Australian broccoli upon arrival in Japan. Similarly in 2004-2005, *Myzus persicae* and *Thrips tabaci* were detected in broccoli imported from Australia (Imagawa, 2014, pers. comm., September). As these pests are currently not considered quarantine pests for fresh broccoli they are not subject to any quarantine measures.

5.1.6 Chemical residue inspection for food imports

Inspection and testing is carried out on imported vegetables to Japan to ensure minimum chemical residue levels are not exceeded. Tests are undertaken on consignments at the port of entry. Japanese local governments also perform tests on products at wholesale markets and retail outlets. Before 2006, MLHW only tested for chemicals listed on the negative list, however, after 2006 they began testing for all chemicals (both negative and positive listed). The inspection system in Japan is complex. There are several different ways inspections are undertaken (refer to Appendix 4 and 5 for flowcharts). The three key methods include guidance and inspections, monitoring inspections and inspection orders.

A number of key findings related to the chemical testing process are listed below:

- With ordered inspections consignments are held in customs, whereas for monitoring inspections consignments can continue to move through the supply chain. Results of tests can take up to three days.
- If there is a chemical residue breach, the costs of inspection tests are paid by the importer. The importer's consignments are not allowed to pass customs before receiving the results of the inspections. Ordered inspections generally cost between US$50-100 depending on the issues detected.
- Consignments with excessive levels of chemical residue are destroyed or sent back to the exporter. If this occurs, the exporter is issued with a warning. After three warnings, the exporter is banned from exporting to Japan. Asparagus exports from New Zealand reportedly breached MRL levels in 2005 and they have not regained a presence in the market since (Terry, 2015, pers. comm., May).
- No chemical issues have been detected on imported broccoli from the United States or China in recent years. Five years ago there were some issues with chemical residues detected on United States broccoli but there have been no issues since.

5.2 Market size and growth

As outlined in Figure 8 the total broccoli market[1] for 2013 in Japan was 192,954 tonnes. Since 2009, the broccoli market in Japan has grown by 9.17 percent.

Between 2009 and 2013 Japan's total average annual production of broccoli was approximately 120,000 tonnes.[2] Domestic production over this period was approximately 64 percent of the total market size. In the same time period, Japan's total average annual imports of broccoli equalled approximately 67,000 tonnes (imports of fresh broccoli averaged approximately 36,000 tonnes per annum, while frozen broccoli averaged 31,000 tonnes per annum for the same period).

Japan's production data for 2014 is presently unavailable hence the total market size has only been calculated up until 2013. However, as outlined in Figure 9 import volumes of fresh broccoli continued to fall in 2014 which supports the information collected from the primary

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1 Imported fresh and frozen broccoli, and broccoli produced domestically.
2 Shipped

research. This research found that United States broccoli supply (which had 96 percent of the Japanese market for imported fresh broccoli in 2014) is being significantly impacted due to water shortages and strikes on the wharfs in California (Importer interviews, 2014). Figure 15 also shows steady growth in imports of frozen broccoli from 2009 (explained further below at 5.2.2).

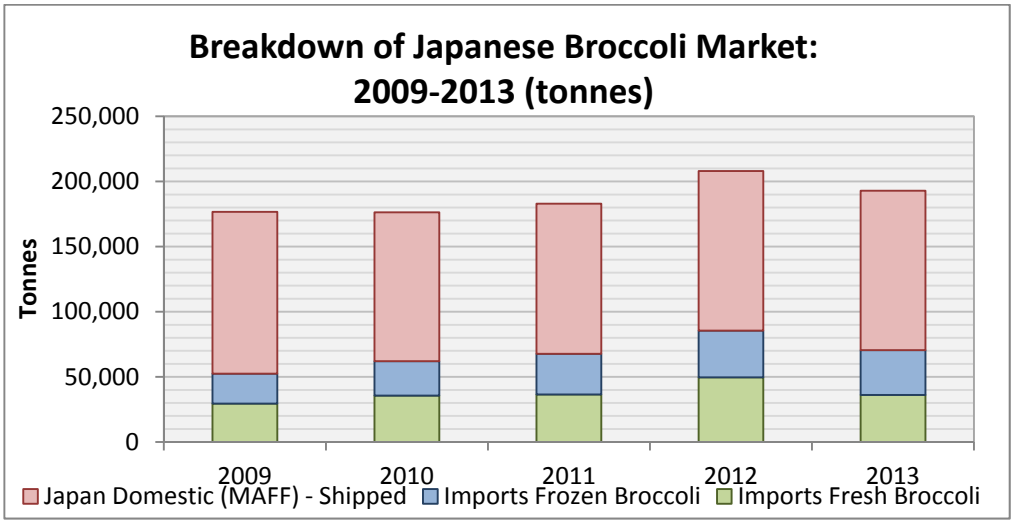


Figure 8: Breakdown of the Japanese market for broccoli comparing total imports with total domestic production
Source: Trade Statistics Japan, 2014 and MAFF, 2012

5.2.1 Imports – fresh broccoli

Market size and growth

Observing the last six years, imports have averaged approximately 36,000 per year or approximately 3,000 per month. In 2009 Japan imported 29,531 tonnes of fresh broccoli valued at ¥4.8 billion. At this point in time, only the United States was supplying product to Japan. There was a spike in imports in 2012 with imports rising to approximately 50,000 tonnes. In 2014 imports were 30,384 tonnes valued at ¥6.5 billion with the United States continuing to be the main supplier (96 percent market share).

The quantity of fresh broccoli imported over the last six years has grown by 2.89 percent in terms of volume, and 34.32 percent in terms of value. The marked difference in these growth rates may indicate that there is strong demand for fresh broccoli but a lack of supply.

However, over the long term (from 1994-2014), total imports have declined by an average of 4 percent per year (CAGR). In 1994 total imports were approximately 72,000 tonnes and averaged approximately 6,000 tonnes per month. This long-term decline in imports was paralleled with an increase in domestic production, which has stabilised since 2008.

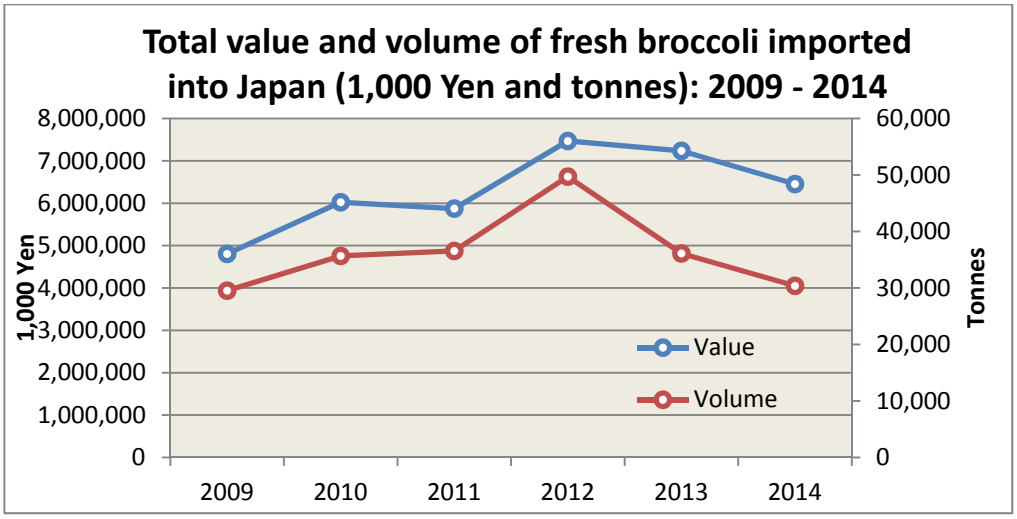


Figure 9: Total value and volume of imports of fresh broccoli into Japan (1,000 Yen and tonnes) from 2009 to 2014.

Source: Trade Statistics Japan, 2014

Market share

Figures 10 and 11 show that the import market for fresh broccoli in Japan is dominated by the United States, with both China and Mexico supplying small volumes. By 2014, the United States held 96 percent (29,000 tonnes) market share, followed by China with 3 percent (1000 tonnes), and Mexico with 1 percent (270 tonnes). Mexico's market share of 1 percent has remained static in the last 2 years whereas China's market share fell from 11 percent in 2013 to 3 percent in 2014. According to importers there is reticence to purchase Chinese broccoli due to highly publicised food safety scandals.

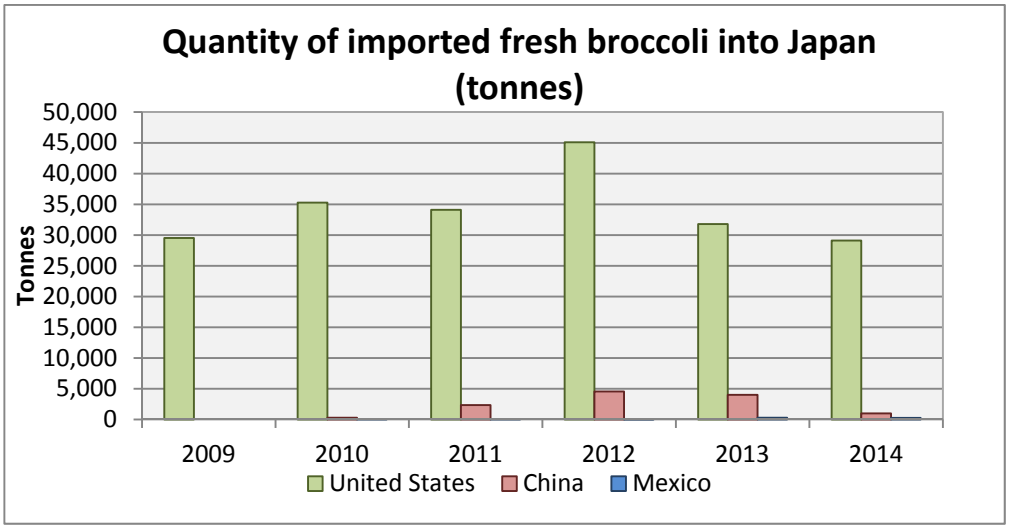


Figure 10: Quantity of fresh broccoli imported into Japan by country
Source: Trade Statistics Japan, 2014

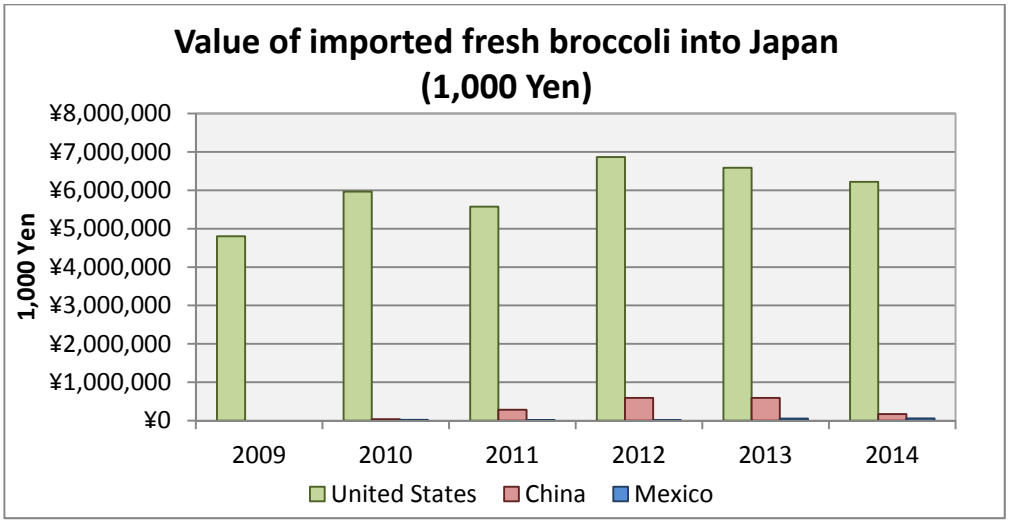


Figure 11: Value of fresh broccoli imported into Japan by country
Source: Trade Statistics Japan, 2014

Seasonality

Although data has been gathered from 2009 to 2014, the pattern of imports remains similar. Mexico entered and China re-entered the market in 2010 but more consistent imports can be seen from 2011 onward. Figure 12 shows the last full year of data (2014) for Japanese imports of fresh broccoli from the top three countries.

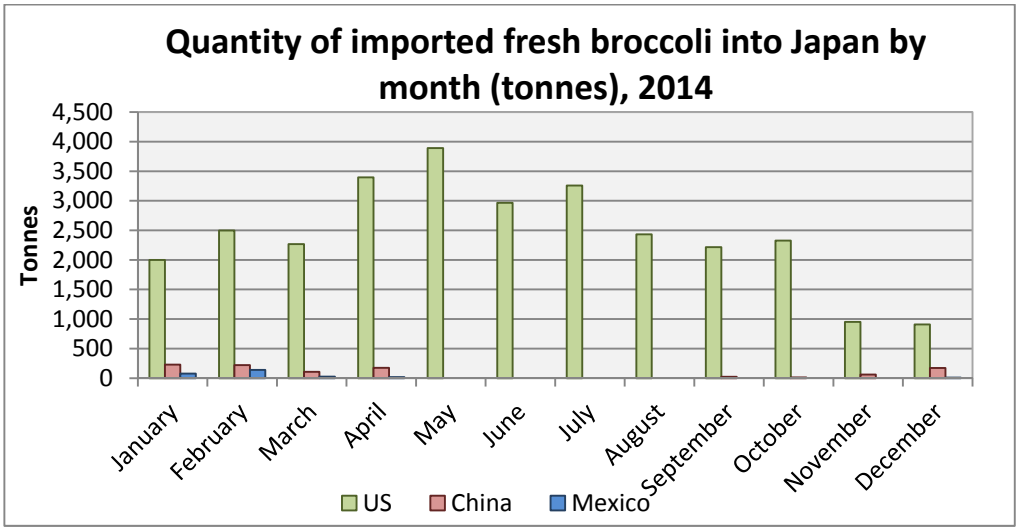


Figure 12: Quantity of imported fresh broccoli by month for 2014 (tonnes)
Source: Trade Statistics Japan, 2014

Figure 12 shows that while the United States exports broccoli to Japan all year round, it dominates the fresh broccoli market from April through September. This activity captures the market window during the Japanese summer which counters the domestic production season from October through March. Both China and Mexico export to Japan during Japan's peak domestic season.

Market feedback indicates that Japanese buyers are seeking year round supply from Australian exporters. Such supply would require a coordinated national approach.

Pricing

As outlined in Figure 13, the average prices for fresh broccoli in 2014 were A$2.34/kg for Mexico, A$1.80/kg for China and A$2.24/kg for the United States.

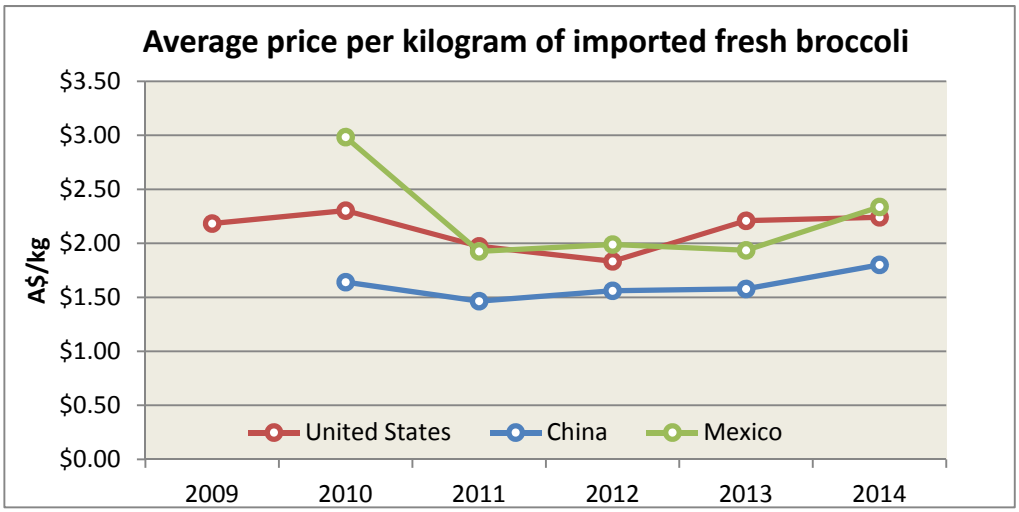


Figure 13: Estimates of A$ per kilogram of fresh broccoli imported into Japan (CIF)
*Figures derived imports statistics value by volume.
Source: Trade Statistics Japan, 2014

However, looking from a historical perspective as outlined Figure 14, CIF prices received by the United States (in real A$) from 1994 to 2014 have declined. Figure 14 shows that prices became relatively stable from the mid-2000s following the decline in prices that began early that decade. From 2005 to 2014 the weighted average price was approximately A$2.30 per kilogram (real A$). The United States has been able to maintain profitability in the Japanese market.

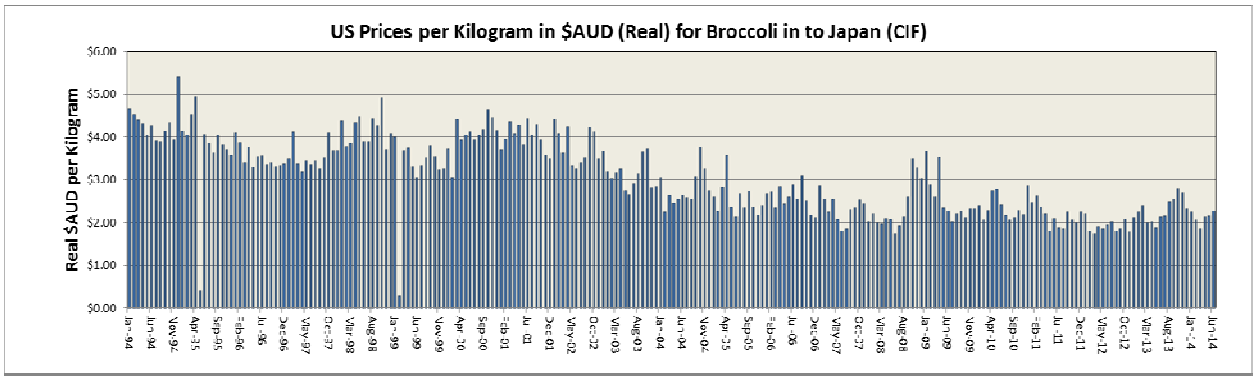


Figure 14: CIF prices received by the US for fresh broccoli (shown in real A$) exported to Japan
Source: Trade Statistics Japan, 2014

5.2.2 Imports – frozen broccoli

Market size and growth

Observing the last 6 years, imports of frozen broccoli have averaged approximately 31,000 tonnes per year or 2,500 per month. In 2009, Japan imported 23,011 tonnes of frozen broccoli valued at ¥3.5 billion. During the last 5 years, imports increased to 38,574 tonnes in

2014, valued at ¥7.5 billion. Again, there was a spike in imports of frozen broccoli in 2012. The quantity of frozen broccoli imports grew by 68 percent in terms of volume and 114 percent in terms of value over the period from 2009 to 2014.

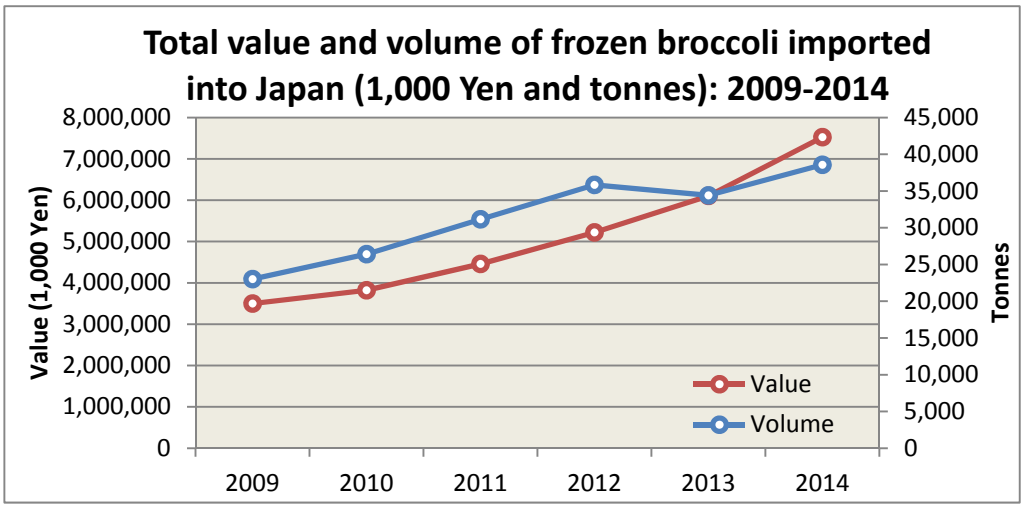


Figure 15: Total value and volume of imports of frozen broccoli into Japan (1,000 Yen and tonnes) from 2009 to 2014.
Source: Trade Statistics Japan, 2014

Market share

As indicated by Figures 16 and 17, the import market for frozen broccoli in Japan is dominated by China and Ecuador with Mexico and Guatemala as relatively small players in the market. As at 2014, China held 56 percent (21,772 tonnes) market share, followed by Ecuador with 37 percent (14,267 tonnes).

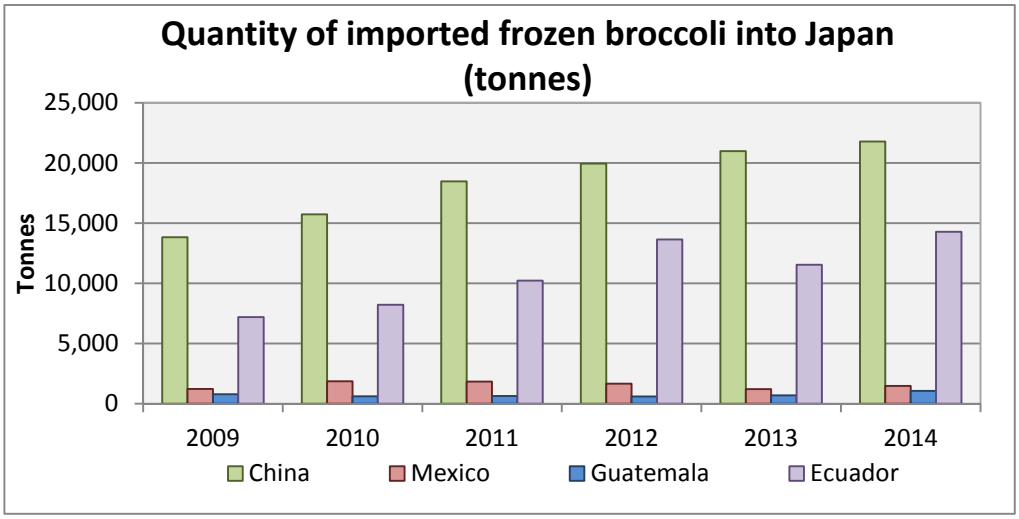


Figure 16: Quantity of frozen broccoli imported into Japan by country
Source: Trade Statistics Japan, 2014)

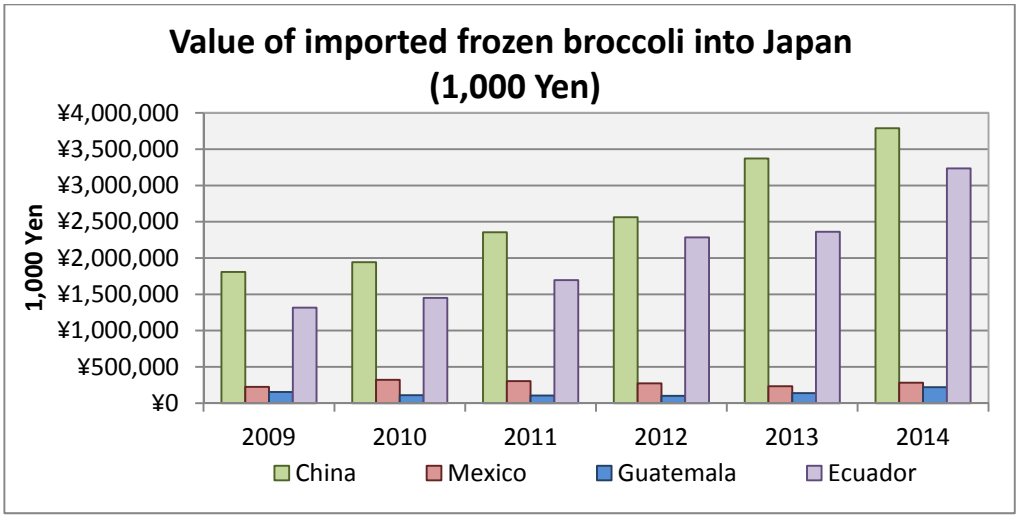


Figure 17: Value of frozen broccoli imported into Japan by country
Source: Trade Statistics Japan, 2014

Seasonality

Figure 18 shows the monthly data from 2009 to 2014 for the four supplying countries of frozen broccoli to Japan namely China, Mexico, Ecuador and Guatemala. The data indicates that all four countries supply frozen broccoli throughout the year.

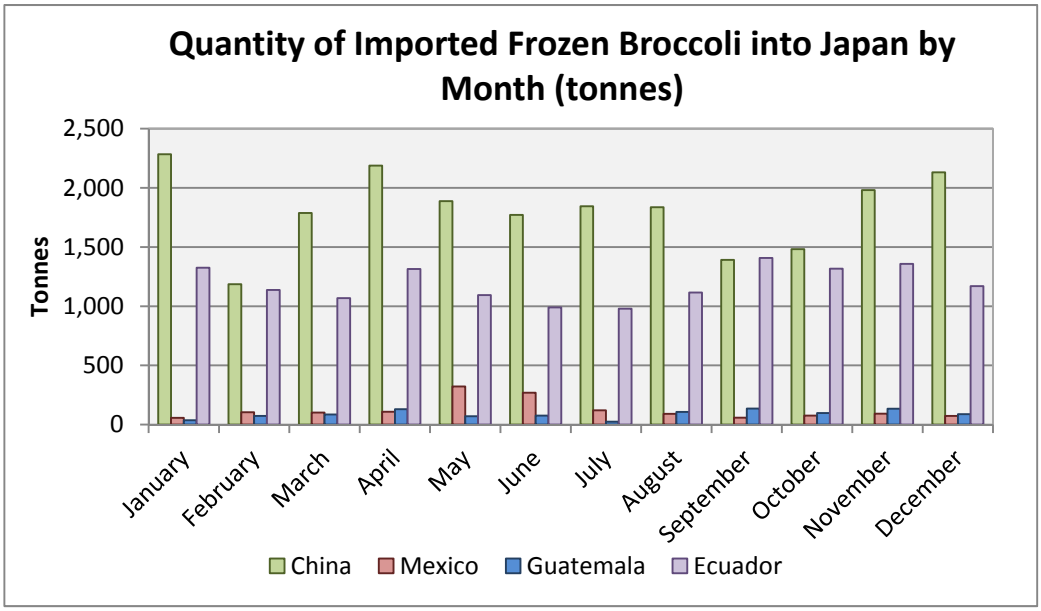


Figure 18: Monthly imports of frozen broccoli to Japan by country
Source: Trade Statistics Japan, 2014

Pricing

As presented in Figure 19, most frozen broccoli is imported at a CIF price of A$2.00 to A$2.40 per kilogram. Frozen broccoli from China is the cheapest, selling at an average CIF price of A$1.83 per kilogram.

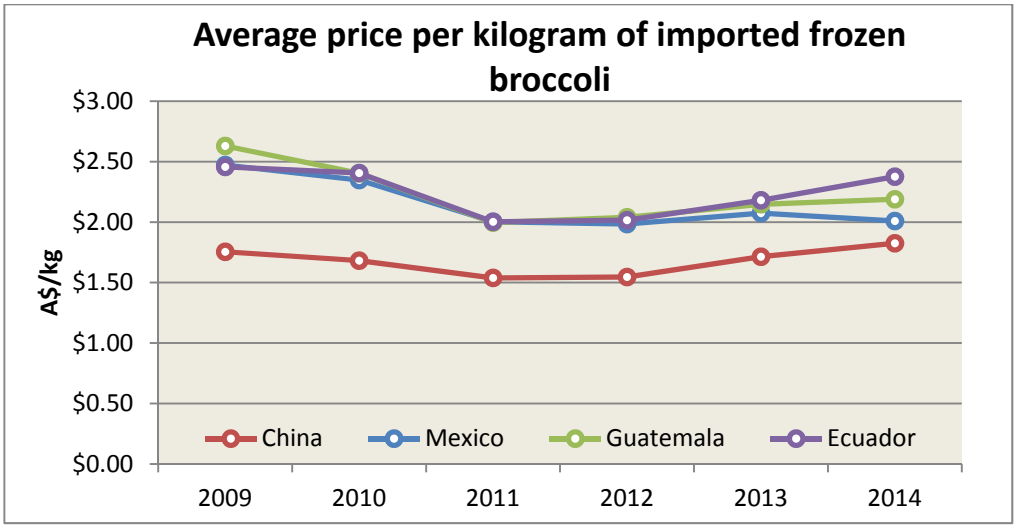


Figure 19: Estimates of A$ per kilogram of frozen broccoli imported into Japan (CIF)
*Figures derived imports statistics value by volume
Source: Trade Statistics Japan, 2014

5.3 Market segments

5.3.1 Importers/distributors

There are 13 importers who handle 90 percent of the fresh imports of broccoli from the United States. Union Corporation dominates the market for imported broccoli. Other leading importers include IPM Nishimoto, Itochu Corporation and MVM Shoji Co.

Presented in Table 7 are the volumes, product specifications and pricing for 12 key importers interviewed during the in-market visit and additional information on one other importer (Kibun Foods) who approached the project team seeking broccoli suppliers.

Procurement and distribution

Importers reported that most of the broccoli from the United Sates is sold to the retail sector with some also sold to the food service sector. Broccoli from Mexico is also sold to these sectors however Chinese product is mainly sold to the food processing and food service sector. Importers handle both local and imported broccoli.

Supply from Mexico and China is used to compensate reduced supply from the United States, or when United States product is of lower quality. December to March (Japanese winter) was flagged as a key period where volumes from the United States decrease and quality also drops. In particular, the months of January and February are the peak periods when United States supply is low. At present, broccoli from Mexico is mainly supplied during these months. There are frequent peaks in demand for imported broccoli in September and April due to the impact of extreme weather conditions on domestic supply.

Japan's winter (Australia's summer) was identified as the main window of opportunity for Australian broccoli. The December to March window is a period where quality and supply availability from Japan and United States is significantly lower and alternative supply options

are sought by importers. Inconsistency in supply, quality and pricing of United States broccoli provide an opportunity for Australian broccoli, particularly with supermarket chains.

Certain importers and wholesalers target particular centres. Leading importers such as Union Corporation and IPM Nishimoto dominate the Kanto (Tokyo, Yokohama, Saitama, Chiba) and Keihanshin (Kyoto, Osaka, Kobe) areas. Japan's wholesale markets in Tokyo and Osaka are also major trading hubs for broccoli. In Tokyo, this is Ota market. Seika Trading Co. is the leading broccoli importer and wholesaler at the Ota market.

Product specifications

The current general product specification requirement of Japanese importers, retailers and food service businesses alike is a 38 head count, 10 kg waxed carton, packed with flaked ice. Firm, round, dome shaped crowns that are deep green in colour (not purpling), with minimal damage, are the key quality requirements (Appendix 6 & 7). There is no clear preference for variety or country of origin. There is reticence to buy Chinese broccoli due to well publicised food safety issues across a range of food categories.

Notably, importers have systems in place to handle and distribute this specification of broccoli to their customers, particularly systems for import inspections, fumigation and repacking of broccoli. Importers advised that any variation to the current specification would require consultation with retail and food service customers.

Table 7: List of importers trading in broccoli and other vegetables, 2014

	Union Corp	Royal	Watari	Tokyo Seika	Itochu Corp	Funasho Shoji	Kitbun Food
Established	1974	1964	*	1947	1858	1974	1938
Procurement contact	Tomohisa Nishikawa Vegetable Department Manager	Hiroshi Sakurai Vegetable Group	Kazumasa Baba, Executive Officer	Bungo Imagawa General Manager	Norihiko Hatanaka Fresh Produce Leader	Yusuke Kurata Sales Manager	Ayumi Kojima
Main vegetable products traded	Broccoli, asparagus, onion, leek, corn, pumpkins	Broccoli, onions, pumpkins, celery, kale	Asparagus, (broccoli in past but not currently)	Broccoli, asparagus capsicums, onions, lettuce, pumpkins	Broccoli, capsicums	Broccoli, capsicums, asparagus, corn	Broccoli, Pumpkin, Onion, Sweet Potato, Various Domestic Frozen Vegetables, (Spinach, Grated Yam), radish, Direction Onion, Cut Cabbage, Carrot Burdock, Spring Onion, Peeled Garlic
Main market channels serviced	Supermarkets Food service	Food service	Wholesale Retail	Supermarkets Food service	Wholesale Retail	Supermarkets Food service	Importers
Broccoli Suppliers	US, China, Domestic	US	Not currently trading broccoli	US, Domestic	US (Dole) , Domestic	US	US
Imported broccoli specification	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	*	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed carton with ice, 38 hds
Volume purchased	25-30 x 40ft containers / week	2 x 40ft containers / week	*	2 x 40ft containers / week	10 x 40ft containers / week	1 x 40ft container / fortnight	10-15 40ft containers /week
Broccoli purchase price / carton	Average US$17-20 CFR September 2014 US $25-27 CFR	*	*	At lowest US$17-18 CFR At highest US$38 CFR September 2014 US $30 CFR	US$13-16 FOB		US$18; <US$20 CFR

	Smile	IPM Nishimoto	Sun Globe	Ishihara Corp	H&F International	CGC
Established	1977	1912	1978	*	1993	*
Procurement contact	Koji Kashimata Food Marketing Section	Yoshimitsu Chiba General Manager	Isamu Yuki Director Sales	Keiji Ishihara Director	Yoon Youngjun Sales Leader	Tomoyuki Higuchi Fresh Food Div Leader
Main vegetable products traded	Broccoli, asparagus, onion, pumpkin	Broccoli, onion, asparagus, capsicum	Broccoli, broccolini, asparagus, lettuce, tomato, onion	*		Full range of vegetables
Main market channels serviced	Retail – supermarket (Seiyu, Walmart), department stores and convenience stores	Supermarkets – Ito Yokado Processors	Supermarkets Food service (McDonalds)	*		Supermarkets
Broccoli Suppliers	US	US (program supply), China, Domestic	US (M&M Produce)	US, Domestic		US
Imported broccoli specification	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds	US spec – 10kg waxed cartons with ice, 38 hds
Volume purchased	3-5 x 40ft containers / week	10+ 40ft containers / week	1 x 40ft container / week	*	3 x 40ft containers / week	2-3 x 40ft containers / week
Broccoli purchase price /carton	Contract arrangement for 2 containers at US US$19.50 CFR , additional orders are at US$30 CFR	US$11-16 FOB	At lowest US$13-14 CFR September 2014 US$28 CFR	*	US$25 CFR	At lowest US$18 CFR September 2014 US$32 CFR

Source: Importer interviews, 2014 and 2015

Packaging specifications

Currently all broccoli from the United States is imported in cardboard wax cartons and then re-iced in Japan and inserted into Styrofoam crates which are specifically designed to fit the wax cartons inside (Figure 20).

Figure 20: US wax cartons slot into custom made Styrofoam crates (September, 2014)

Figure 21: Iceless broccoli (FreshPlaza, 2014b)

Figure 22: A bulk shipping carton (Ekman, 2014)

Innovations in packaging which could potentially remove the requirement for ice, through the use of liners, modified or controlled atmosphere and ethylene blockers (Figure 21), did not appeal to most businesses interviewed. Most importers and retailers had a strong preference for traditional packaging in waxed cartons with ice. While some importers were frustrated with water leakage and costs of Styrofoam crates used to prevent water leakage, importers and retailers indicated they did not feel confident in using alternative methods of packaging for a number of key reasons:

- Importers hold broccoli in storage for a number of weeks and on some occasions product can be held for up to a month in storage.
- The cool chain in Japan was considered not sufficiently sophisticated at this stage to handle iceless broccoli.
- Modified Atmosphere Packaging had been trialed in the past and was not successful with the quality of broccoli being adversely impacted (head rots developing and softening of florets). All importers agreed that quality and shelf life is maintained more efficiently using ice.
- Packaging alternatives that could reduce costs such as bulk packaging into bins were not overly appealing (Figure 22). While the elimination of cartons would reduce costs and still allow for fumigation, if required, importers raised concerns over the ease of handling following delivery and the potential impact on quality (due to significant increase in weight of broccoli layered on top of each other).

Pricing

According to importers, price is the key determining factor when purchasing imported broccoli. Traditionally the price of imported broccoli from the United States has been consistent with little variation throughout a typical season. However, in recent seasons importers have paid significantly higher prices for broccoli as a result of shortages in supply from the United States.

Interest in sourcing product from Australia will depend on the supply situation from the United States. Importers indicated that if the price of United States product remains high (above US$20/10kg carton), there would be strong interest in using Australia as an alternative source of supply. To remain competitive, importers stated that Australian suppliers need to aim for US$17-20/10kg carton. A US$1-2 difference in carton price between Australian broccoli and United States broccoli was considered acceptable by one importer but quality would need to be comparable. Importers aim to achieve a sales profit margin of between 2-5 percent.

Table 8: Prices of imported broccoli by country of origin (CFR)

Type of importer	United States broccoli	China broccoli	Mexico broccoli
Imports 10 or more containers a week	US$15-17/10kg carton (typical price). US$25-27/10kg carton (September 2014) US$22/10kg carton (January 2015)	US$9-13 /10kg carton	US$17.50 per 10kg carton (January 2015)
Imports 1-5 containers a week	US$18-22/10kg carton (typical) US$28-32 '/10kg carton (September 2014)		

Source: Importer interviews, 2014 & 2015

Import costs

Exporters of broccoli to Japan are paid on the basis of CIF or CFR. However once the product arrives in Japan the importer is responsible for a range of other costs as outlined in Table 9. Since ratification of the JAEPA Australia no longer pays the 3 percent tariff previously applied to fresh broccoli. Repacking of wax cartons into Styrofoam crates is also an added cost in the chain.

Instances of fumigation of consignments from United States and China are relatively low, with less than 10 percent of consignments requiring treatment. However, should fumigation be required, these costs are paid by importers unless it becomes an ongoing issue. Should fumigation occur regularly, then a cost sharing arrangement may be required between the exporter and importer.

Table 9: Costs associated with importing broccoli

Type of cost	Yen / unit	Who pays each cost
Transport from sea port to warehousing facility	US$600 /container	importer
Chemical residue test	US$50-100	importer (only if violated)
Fumigation	US$1000 /container	importer (if occur irregularly)
Customs inspection	No charge	
Customs clearance/storage	US$2,000 /container	importer
Repacking	¥300-400/carton	importer
Taxes/duties	3-5 percent tariff on CIF/CFR price depending on country of origin	importer

Source: MAFF Plant Protection Station, 2014, Importer interviews, 2014 & 2015

Logistics and handling

Leading importers and retailers such as Union Corporation and Aeon have their own distribution facilities. Smaller importers, as well as leading importers, also rent warehousing facilities located close to the port of entry. These facilities are usually shared by a number of importers and have capacity to store large volumes of broccoli. These facilities are operated by service providers who manage the customs clearance, storage and re-packing of broccoli consignments.

Importers often stockpile broccoli consignments. As a result, product can be stored for up to four weeks before reaching customers however it is most common for product to be distributed within two weeks of receipt. Prior to distribution, broccoli cartons are re-packed with ice.

Transportation and delivery of broccoli to customers throughout Japan is handled by road and rail. Broccoli orders are predominantly distributed to these customers in consolidated fresh produce loads. Importers typically distribute orders using a fleet of trucks, many of which are refrigerated to ensure the cool chain is not disrupted.

Market development

Importers and retailers were supportive of undertaking market development activities targeted at promoting Australian broccoli. Some suggestions are listed below:

- In-store promotions and tastings; promoting broccoli along with other Australian products which are more accepted/recognised by retailers and likely to have a greater impact.
- Using media and developing posters/tags for retail stores as a means of promoting brands and country of origin.
- A key message to highlight may be that the Australian industry uses Japanese seeds.

Aeon runs an Australia Fair during May and September. Aeon was willing to include broccoli in their next Australia fair to gauge its acceptance and assess sales performance.

Some importers receive informational guides on harvesting periods from the United States (for a range of crops) which is helpful in planning procurement and marketing activities

Point of sale materials that emphasise Australia's clean, green, safe image as well as the nutritional value of broccoli were seen as effective way to educate consumers.

Figure 23: Stem tag identifying broccoli origin. US broccoli in Ito Yokado supermarket (September, 2014)

5.3.2 Retail – supermarket

Most imported broccoli is sold through Japan's supermarket sector, where opportunities were identified for Australian broccoli. Broccoli is also sold through department stores, independent grocers and some convenience stores. The focus of this section is on the potential for Australian broccoli in supermarkets.

Listed in Table 10 are the top 14 supermarket chains in Japan. AEON and Ito Yokado account for 40 percent of all supermarket sales, while Uny, Daiei, and Life Corp hold 20 percent market share.

Table 10: Leading supermarket chains in Japan

Rank	Company name	Total food sales (Million Yen)	Number of outlets	Location / Regional presence in Japan
1	Aeon	1,085,300	491	Nationwide
2	Ito-Yokado	623,571	174	Nationwide
3	Uny	488,149	227	Nationwide
4	Daiei	388,198	205	Nationwide
5	Life Corp.	416,247	231	Nationwide
6	Izumi	160,144	92	Hiroshima
7	Arcs	386,091	291	Hokkaido (HQ is in Sapporo)
8	York Benemaru	269,794	184	Fukushima, Tohoku (HQ in Fukushima)
9	Heiwado	211,731	134	Shiga
10	Maruetsu	216,494	271	Tokyo
11	Fuji	123,451	96	Ehime
12	Izumiya	172,179	89	Osaka
13	Okuwa	216,494	173	Wakayama
14	MV West	236,981	171	Fukuoka

Source: USDA Foreign Agriculture Service, 2013b

Currently there is considerable consolidation of supermarket chains. Regional supermarkets such as Arcs in Hokkaido and Universe in Northern Japan have merged to compete against leading national chains. Daiei and Aeon have also recently entered into merger negotiations (Freshplaza, 2014a).

Additionally, there is a growing number of specialty supermarkets stores with a strong focus on imported food products. These stores attract premium prices and include Kinokuniya, Meidi-ya, Seijo Ishii, Dean and Deluca, Queens Isetan, Kaldi Coffee and National.

Costco, the American retail chain, has also established a presence with 20 stores in regional Japan and a further 30 stores planned to open by 2020 (Baud, 2014, pers. comm., September). Although not listed in Table 10 Seiyu/Walmart has around 350 stores in Japan and have a focus on low prices.

Other trends impacting the development of the retail sector include an increase in online shopping, target marketing at the aging socio-economic demographic and an increase in the sales of cut and prepared vegetables (Onishi, 2014, pers. comm., September).

In-store observations of broccoli

Broccoli is a staple fresh produce category in Japan and was found available in all fresh produce retail outlets in Japan that were visited. Aeon and Ito-Yokado are the leading retailers of fresh and frozen broccoli products in Japan. In the fresh category, these stores offer consumers a choice of both domestic and imported fresh broccoli.

Broccoli is predominantly sold loose by the crown, with some upper tier supermarkets selling pre-wrapped broccoli (which is done at store level). In some instances, stem tags are attached to United States broccoli stems (Figure 23) to

identify the country of origin. Broccoli is either displayed in aisle shelves or in refrigerated cabinets and country of origin labelling is prominent. Domestic broccoli is further differentiated from imported broccoli as the petioles and leaves are left attached. Whereas (similar to Australian broccoli) United States broccoli petioles are trimmed.

Domestic broccoli attracts premium prices ranging from ¥239 to ¥398 per piece. United States broccoli sells for a lower price than domestic broccoli with prices ranging from ¥110 to ¥199 per piece. It was reported by retailers (Higuchi, 2014, pers. comm.) that mid to upper socio-economic consumers buy domestic broccoli while lower socio-economic consumers prefer cheaper United States broccoli. One importer advised that ¥100 per piece for United States broccoli was common in the past but, with increasing packing costs, this pricing was mainly only for promotional sales (Higuchi, September 2014, pers. comm.).

5.3.3 Food service

Preliminary investigations of the food service sector in Japan were made. Research identified restaurants and hotels as the main buyers and users of broccoli. The United States, China and Mexico are the key suppliers of broccoli into this segment. The United States is targeting the upper tier segment and this is where there may be opportunities for Australia to supply fresh broccoli.

Broccoli was not found to be readily available in restaurants and is more commonly consumed in households. Food service businesses incorporate broccoli in a range of food styles, including fresh salads and cooked meals, such as soups and vegetable stir-fry dishes.

Figure 24 is an overview of the food service segment. Upper tier restaurants and hotels are the likely target segment for Australian broccoli and the focus of the research is on these segments.

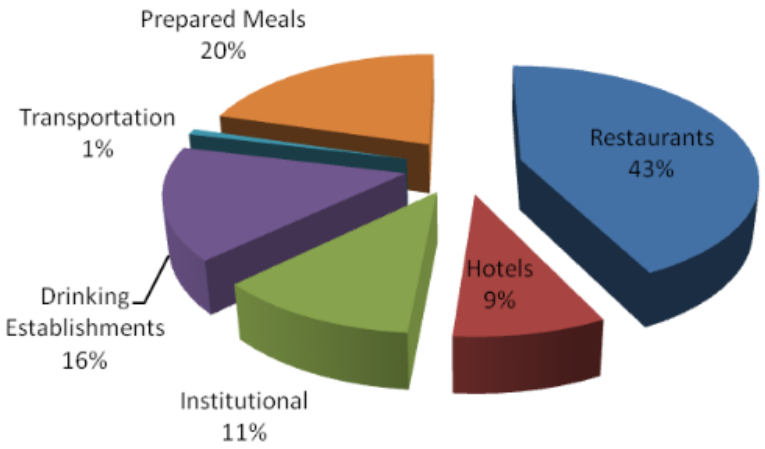


Figure 24: Food service sector by segment
Source: USDA Foreign Agriculture Service, 2013b

The restaurant sector in Japan includes a wide variety of operators including western, ethnic, Chinese and Japanese chains plus family owned single outlet restaurants. Broccoli use in this sector is focused towards restaurants driven by western, Japanese and ethnic fusion cuisines.

Table 11: Number of restaurant outlets by type of general restaurant

Restaurant category	Number of outlets
Non- Specialised	63,427
Specialised: Western, Other Ethnic Cuisine & Meat	61,913
Chinese	56,541
Japanese	50,763
Total	**232,644**

Source: USDA Foreign Agriculture Service, 2013a

Table 12: Restaurant profile applicable to broccoli

Rank	Company	Outlet name, type, no. of outlets	Outlets	Location
2	Zensho	Sukiya / Coco's, QSR beef bowl and various	4667	Nationwide
3	Skylark	Skylark / Gusto / Yumean / Barmiyan, FSR	2636	Nationwide
4	Nisshin Health	Office, hospital meals, institutional	4925	Nationwide
5	Plenus	Hotto motto, take-out meals	2881	Western Japan
10	Reins International	Gyukaku, casual steak house	1217	Nationwide
11	AIM Service	Institutional	1367	Eastern Japan
12	Saizeriya	Saizeriya, Italian FSR	929	Nationwide
16	Honke Kamadoya	Kamadoya, take-out meals	1810	Nationwide
17	Yoshinoya Holdings	Yoshino-ya, Hanamaru udon	1193	Nationwide
18	Green House	Institutional, home meal replacement	1775	Nationwide
20	Matsuya Foods	Matsu-ya, QSR beef bowl	1043	Nationwide
22	Daisho	Shoya, pub dining	868	Eastern Japan
23	Seiyo Food Compass	Han / CASA / Itoguruma / pub dining, institutional	800	Eastern Japan
24	Seven & I Food Service	Denny's / Famil / Popo / FSR, QSR	844	Nationwide
25	Watami Food Service	Watami, pub dining	639	Nationwide
26	Toridoll	Marukame Seimen, QSR noodle	762	Nationwide
27	Ichiban-ya	Ichiban-ya, QSR curry shop	1237	Nationwide
28	Fujisangyo	Institutional	1989	Eastern Japan
30	Joyful	Joyful, FSR	710	Western Japan
31	Uokuni Sohonsha	Office cafeteria – Institutional	2585	Western Japan
32	Colowide East Japan	Amata-ro, WPJ, pub dining	519	Eastern Japan
33	Chimney	Hananomai / Sakanayadojo / pub dining	687	Eastern Japan
34	LEOC	Institutional		Eastern Japan
35	Aleph	Bikkuri Donkey, FSR	327	Eastern Japan
36	Nippon Restaurant Enterprise	American Diner B&G / Ajisai-tei, multi FS, restaurants, bento	460	Eastern Japan
37	Rock Field	RF1, take-out meals	329	Central Japan
38	Mefos	Institutional	263	Eastern Japan
39	Hokka Hokka tei	Take away lunch carton	1232	Eastern Japan
40	Origin Toshu	Origin bento, take-out meals	602	Eastern Japan
41	Fujio Food Systems	Maido Okini, Japanese style restaurant	651	Western Japan
42	Kisoji	Kisoji, Japanese style restaurant	175	Nationwide
44	Atom	Steak Miya, FSR / QSR	391	Eastern Japan
45	Watami Takushoku	Home delivery, Catering	431	Eastern Japan
46	Koraku-en	Korakuen, noodle shop	509	Eastern Japan
47	Royal Host	Royal Host / Cowboy Family / Shakey's, FSR	753	Nationwide
48	Green House Foods	Saboten / Shahoden, HMR / Restaurant	582	Nationwide
49	Dynac	Hibiki / Toridori, pub dining / restaurant	241	Eastern Japan

Source: USDA Foreign Agriculture Service, 2013a
QSR – Quick Service Restaurant, FSR – Family Style Restaurant

First class hotels have a large variety of on-site restaurants including those serving Western, Chinese and Japanese cuisine. Hotels are major users of almost all types of fresh foods including imported broccoli. The hotels listed below are the leading major hotel chains in Japan.

Table 13: Leading Hotel Chains

Rank	Hotel	Location
1	Palace Hotel	Tokyo
2	Shangri La Hotel	Tokyo
3	The Peninsula	Tokyo
4	Mandarin Oriental	Tokyo
5	The Ritz Carlton	Osaka
6	The St Regis Hotel	Osaka
7	Park Hyatt Tokyo	Tokyo
8	The Capital Hotel	Tokyo
9	Conrad	Tokyo
10	The Terrace Club	Okinawa

Source: USDA Foreign Agriculture Service, 2013a

Figure 25: Fresh broccoli salad (Basement level department store) (September, 2014)

Figure 26: Broccoli and salmon in mayonnaise sauce (Independent restaurant – Ebisu Night Market) (September, 2014)

Figure 27: Broccoli on Pizza – Italian Restaurant (September, 2014)

Figure 28: Steamed broccoli with chicken and udon noodles, Japanese Noodle Restaurant (September, 2014)

Figure 29: Broccoli cream soup (September, 2014)

5.3.4 Food processing

Preliminary investigations were undertaken in the food processing sector. The frozen broccoli market in Japan is price sensitive; the purchasing decisions of buyers is based primarily on 'price' rather than 'product quality, taste or appearance' (Nakamura September 2014, pers. comm.). For this reason, China and Ecuador are leading suppliers of broccoli for processing and dominate this segment of the market.

In 2012 the value of frozen vegetable imports increased by 10.8 percent to reach ¥133 billion. Growth in frozen food consumption was largely driven by an increase in consumers eating in and consumers valuing products with longer shelf-lives which can be stored. The range of home meal replacement frozen foods available at retail outlets continues to grow (USDA Foreign Agriculture Service, 2012).

The in-market research visit engaged only one import business currently involved in broccoli processing – KI Fresh Access Inc, a subsidiary of Sumitomo Corporation. KI Fresh is currently sourcing fresh broccoli direct from exporters in China for processing into frozen broccoli for retail supermarkets. Chinese broccoli can be sourced for as low as US$9-10 /10 kg carton.

The Japanese food processing industry is dominated by 15 companies, making up almost 50 percent of the market sales in 2010 with the largest company, Kirin Holdings Co., Ltd., claiming a 10 percent market share. As outlined in Table 14 only Meiji Holdings and Nichirei Corporation are involved in frozen food production.

Table 14: Japanese food processing companies

	Company	Main products	Net Sales (2010)	End user	Procurement channels
3	Meiji Holdings	Beverages, frozen foods, processed foods, baby food	$12.66 billion	Retail	Importer-direct
11	Nichirei Corp	Frozen and retort processed foods, chicken, pork, beef, fish	$4.98 billion	Retail	Importer-direct

Source: USDA Foreign Agriculture Service, 2012

In terms of fresh florets, some of the damaged domestically produced broccoli is processed into packaged florets. According to Mr Nishikawa, General Manager Department of Vegetables at Union Corporation, opportunities exist for prepacked florets and other vegetables however the quality and shelf life of imported products to date have been limiting factors (Nishikawa, 2015 pers.com. March).

Figure 30: 250g frozen broccoli packs (broccoli florets) retailing at JPY 348. Broccoli was supplied from Ecuador (September, 2014)

Figure 31: Frozen broccoli (broccoli florets and carrot combined) produced by Taylor Farms (US manufacturer) in 255g retail packs, retailing at JPY 100 (September, 2014)

6 Competitor analysis

6.1 Japan

6.1.1 Production

In 1994 Japan produced 71,500[3] tonnes of broccoli. By 2013, this had risen to 122,400 tonnes. Figure 32 shows that the real change in Japan's production (shipped) from 1994 to the 2013 was 71 percent, with a compound annual growth rate of 2.72 percent (CAGR). For the last six years (2008-2013) the quantity of Japanese broccoli production has been around 120,000 tonnes.

The increase in production has been achieved through increased plantings of new varieties which are more resistant to weather variations thereby allowing for all year round supply.

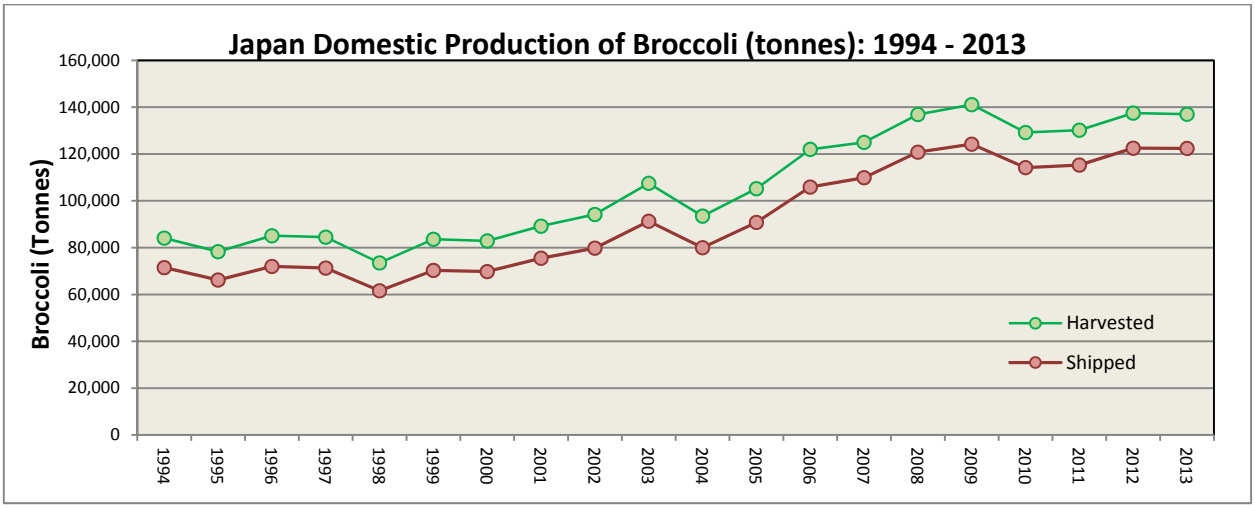


Figure 32: Japanese domestic production of broccoli
Source: MAFF, 2013

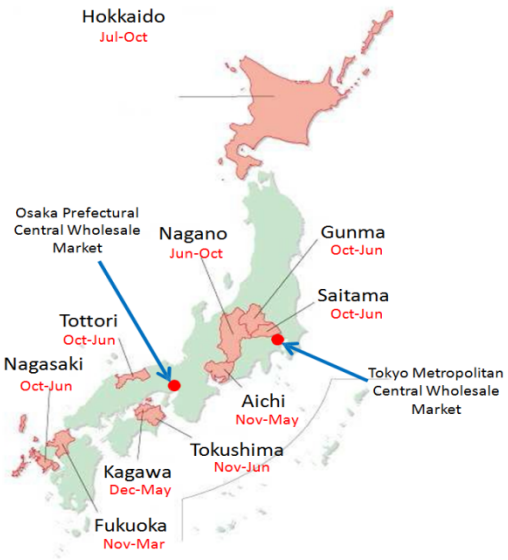


Figure 33: Broccoli and cauliflower growing regions in Japan

[3] Shipped

It is projected that Japan's production will continue to increase steadily in the short to medium term.

Historically, cauliflower was the dominant brassica grown in Japan until the early 1980s. However, since that time, Japanese people became more health conscious. As a result, the nutritional value of deeply coloured vegetables, such as broccoli, became more valued and consumption increased, growing three times as much as cauliflower (Vegetable Total and Aggregate Information network, 2012a).

Broccoli production in Japan spans a number of prominent growing regions. According to 2012 figures, the cultivation area is approximately 13,600 hectares (Vegetable Total and Aggregate Information Network, 2012b).

As outlined in Figure 34, the main production areas in Japan are Hokkaido, producing 17 percent, Aichi 12 percent, and Saitama 11 percent. In a typical season, production moves from north to south and vice versa in line with seasonal conditions and favourable weather conditions (Vegetable Total and Aggregate Information Network, 2012b).

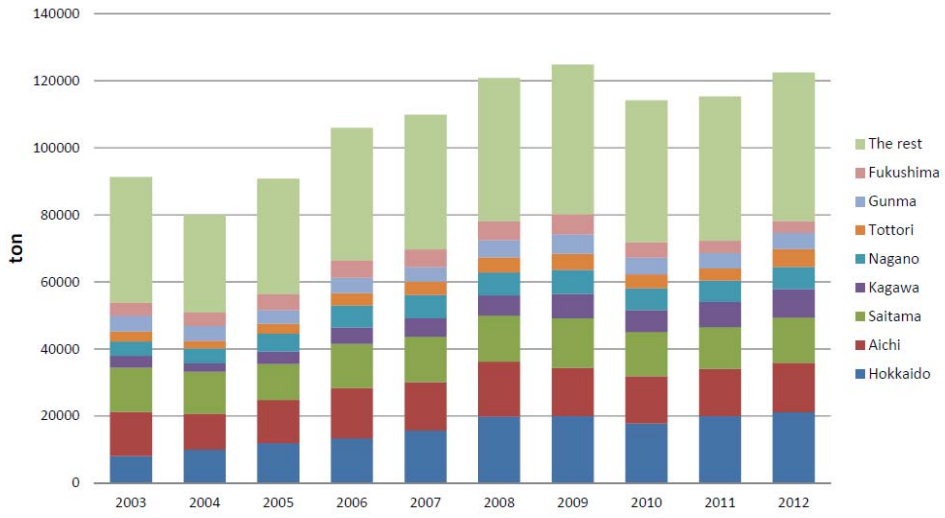


Figure 34: Total quantity of broccoli produced and share of major production prefectures (2003-2012)
Source: Matsushita et al, 2014

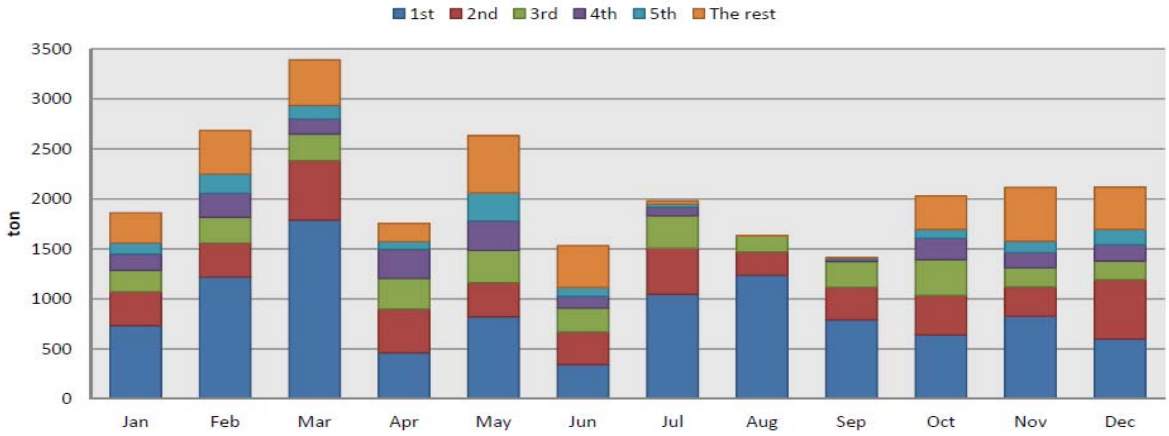
As outlined in Figure 34, the spread of production areas enables year round domestic production, which peaks during the winter months of October to March.
The three distinct growing seasons include:

- Spring –March to June in Saitama, Aichi, Kagawa prefecture
- Summer –July to September in Hokkaido, Nagano prefecture
- Winter –October to February in Saitama, Aichi, Nagasaki prefecture

The key factors impacting production costs are transport and packaging. Japanese broccoli farmers in Hokkaido do not require irrigation but rely on rainfall. The Japanese production volume can fluctuate across seasons, which in turn impacts on the level of imports. Interviews with farmers in Hokkaido revealed that the main factor impacting quality and production volumes was the variability of temperatures after rain, which can lead to disease such as head rot and hollow stem.

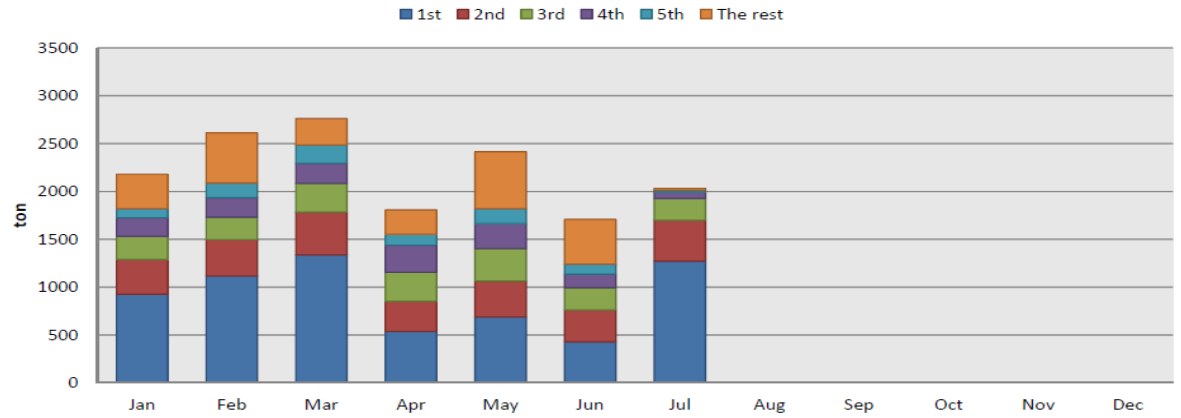
6.1.2 Seasonality

As Figures 35 and 36 indicate, Japan produces broccoli across all months with supply peaking during February, March and May.



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	Aichi 39.4%	Aichi 45.4%	Aichi 52.7%	Saitama 26.3%	Saitama 31.2%	Nagano 22.4%	Hokkaido 52.8%	Hokkaido 75.9%	Hokkaido 55.9%	Hokkaido 31.5%	Saitama 39.1%	Aichi 28.2%
2nd	Saitama 18.1%	Saitama 12.7%	Kagawa 17.6%	Aichi 24.9%	Aichi 13%	USA 21.4%	Nagano 23.4%	USA 14.2%	Nagano 23%	Saitama 19.5%	Aichi 13.8%	Saitama 28%
3rd	China 11.5%	Kagawa 9.5%	Saitama 7.8%	USA 17.5%	USA 12.3%	Fukushima 15.5%	USA 16.2%	Nagano 9.7%	USA 18.1%	Nagano 17.7%	Gunma 9.1%	Gunma 8.8%
4th	USA 8.7%	China 9%	Nagasaki 4.4%	Kagawa 16.6%	Kagawa 11.1%	Hokkaido 7.7%	Aomori 4.2%	Aomori 0.1%	Aomori 2%	USA 10.5%	USA 7.2%	Kagawa 7.7%
5th	Kagawa 6%	Nagasaki 7.2%	USA 4.1%	Hyogo 4.4%	Fukushima 10.7%	Niigata 5.8%	Iwate 1.6%	Saitama 0%	Iwate 0.7%	Fukushima 4.4%	Tochigi 5.4%	USA 7.3%
The rest	16.2%	16.2%	13.4%	10.4%	21.7%	27.3%	1.7%	0%	0.3%	16.5%	25.5%	20%

Figure 35: Monthly receipts of broccoli at Tokyo Wholesale Market and top five origins (percent) in 2013
Source: Matsushita et al, 2014



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1st	Aichi 42.5%	Aichi 42.8%	Aichi 48.4%	Aichi 29.7%	Saitama 28.5%	Nagano 25.1%	Hokkaido 62.6%					
2nd	Saitama 16.6%	Kagawa 14.5%	Kagawa 16.1%	Saitama 17.5%	Aichi 15.5%	Fukushima 19.4%	Nagano 21%					
3rd	Kagawa 11.2%	Nagasaki 9%	Nagasaki 10.9%	USA 16.8%	Kagawa 14%	USA 13.7%	USA 11.3%					
4th	USA 8.8%	Saitama 7.8%	USA 7.6%	Kagawa 15.6%	USA 10.8%	Aomori 8.1%	Aomori 3.2%					
5th	Gunma 4.4%	USA 5.9%	Saitama 6.9%	Nagasaki 6.4%	Fukushima 6.5%	Niigata 6.3%	Iwate 0.9%					
The rest	16.5%	20%	10%	14%	24.6%	27.4%	1%					

Figure 36: Monthly receipts of broccoli at Tokyo Wholesale Market and top five origins (percent) in 2014
Source: Matsushita et al, 2014

6.1.3 Pricing

According to data collected from the Tokyo wholesale market the market price for broccoli in Japan tends to fluctuate throughout a given year. As can be seen in Figure 37 below, the highest market price for broccoli in Tokyo between 2000 and 2012 was approximately 499 yen/kg in April 2010. The lowest market price in the same 12 year period was approximately 181 yen/kg in January 2009. Overall, there was a steady price increase over the period.

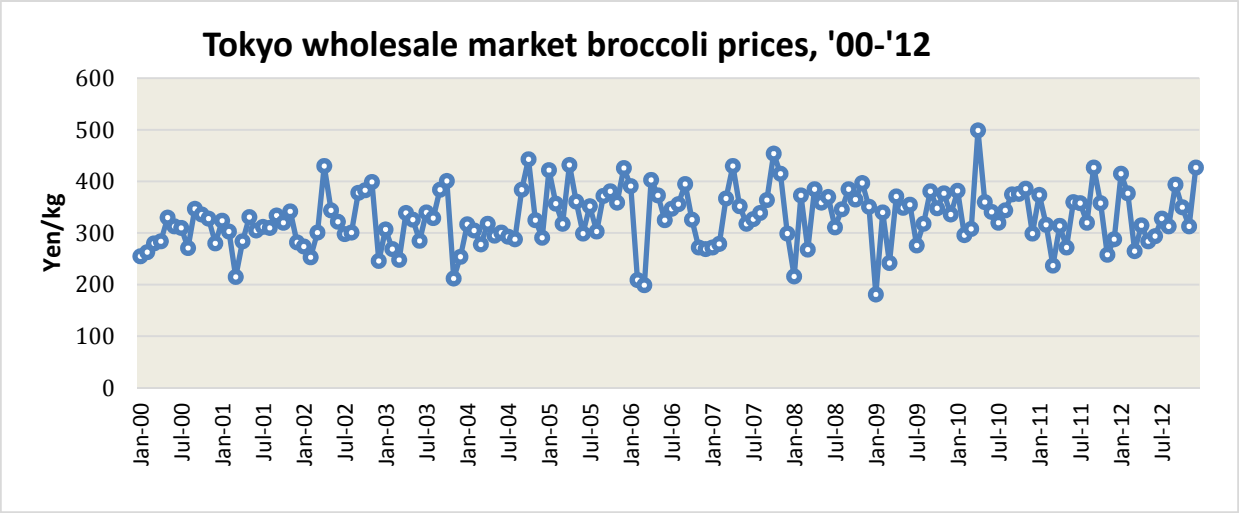


Figure 37: Tokyo wholesale market broccoli prices, 2000-2012
Source: Vegetable Total and Aggregate Information Network, 2015

6.1.4 Product specifications

The following specifications were observed at a Dole Farm in Hokkaido and during in-store visits. Petioles were left attached to distinguish the domestic product from imported broccoli and were sold in-store in this form. Importers reported this practice protected the broccoli from transport and handling damage, and enhanced the broccoli's appearance. The petioles are then trimmed in store to enhance the fresh appearance of the broccoli.

Table 15: Japanese broccoli product specifications

Product attributes	Product specifications
Size	Between 120mm to 150mm head diameter, stalk length 120 - 150mm, stems untrimmed.
Varieties	Sakata - Ohio, Pixel
Shape	Round, dome shaped crowns,
Colour	Dark green
Appearance	crown cut type, small beads, petioles attached
Carton	Styrofoam, drain plug
Count	20-24 heads
Quality	Free from scars/pest damage, pin rot, water spot, hollow core and any discolouration
Quality Assurance, Food Safety	Presently no formal system in place. However, growers are moving to implementing Global Gap 4.0 at the request of retailers.

Source: Appendix 6 and 7, Importer interviews 2014, Dole Farm visit, 2014

6.1.4 Relationships

Dole owns 5 broccoli farms and Aeon also owns 12 farms which grow and supply them with broccoli. All farms owned by Aeon are Global Gap 4.0 accredited. Aeon mandates that all farms which currently supply them must be Global Gap accredited by the end of 2015.

6.1.5 Supply chain

The following supply chain is based on a visit to a Dole Farm in Hokkaido and visits to the wholesale markets and retailers in September 2014.

Production/Harvest

Broccoli is produced all year round in Japan. Farm systems, including plant density, are very similar to Australia, with average plant stands between 44,000 – 50,000 plants/ha. Seedlings are the main source of plant establishment in Japan. Broccoli is hand harvested by knives into bins before being transported to the packing shed within two hours of harvest. Knives with different blade lengths are used so the harvesting staff can determine if field broccoli is in the desired specification i.e. 150mm knives are used for broccoli.

Packing

After harvest, broccoli is hydro cooled to reduce field heat. Broccoli is tipped from the bins into a hydro cooler for a period of 20 minutes with water at 2°C. Broccoli is then placed into stackable plastic crates for overnight storage in cold room at 0°C – 1°C. After cold storage, the broccoli is trimmed before packing into Styrofoam cartons in counts of 15, 20 or 24 crowns. Broccoli that is damaged or not suitable for fresh retail markets is packed into plastic crates for processing into florets. After packing broccoli is flake iced and lidded. Iced broccoli is stacked onto pallets of 48 cartons for road transport or stacked onto rail transport containers. For a grower to breakeven they would need a price of ¥1,800/carton (A$18.80 at Sept 2014)

Transport

Rail and refrigerated road transport are used in Japan for transport to wholesale markets, storage warehouses and retail distribution centres. Rail transport is not refrigerated and dry ice may be shovelled onto the top of the cartons to aid in temperature maintenance. Refrigerated road transport is set at 0-2°C.

Wholesale markets
Japanese broccoli is shipped directly to supermarket distribution centres or wholesale warehouses where cold storage is available. Wholesale markets and distribution centres are located in various locations throughout Japan. Tokyo wholesale markets are closed on Wednesdays. Some Japanese broccoli is packed into Styrofoam cartons which have a drain plug fitted. This allows easy draining of water from melted ice and allows re–icing for extended storage if necessary. In September 2014, Japanese broccoli was being sold at the wholesale markets in Tokyo for ¥2,000 to ¥2,800 carton which was approximately ¥100 per broccoli crown.

Retail
Japanese broccoli was always presented well in retail outlets. Japanese broccoli, distinguished by the untrimmed stems, was sold at a premium to imported product when both lines were supplied. An 8% VAT is applied at retail sales in Japan for all food, including imported produce. Some Japanese broccoli was sold pre-packaged in store. Japanese produce, prefecture where grown and sustainable agriculture practices of Japanese production was often promoted in stores.

6.2 United States

6.2.1 Production

The San Joaquin Valley produces one-third of California's vegetables which, in 2012, amounted to a district total of US$2.65 billion in gross farm value (County Agricultural Commissioners' Reports, 2012). It is the second-largest vegetable-producing district in California, next to the Central Coast Valley, which generated US$3.36 billion in gross farm value in the same year. The San Joaquin Valley and Central Coast districts have been experiencing exceptional drought conditions (USDA, Economic Research Service, 2014b).

As outlined in Figure 38 and 39 in 2014, United States production of broccoli covered approximately 52,000 hectares producing around 950,000 tonnes (USDA, Economic Research Service, 2014a). The two prominent growing regions are California and Arizona.

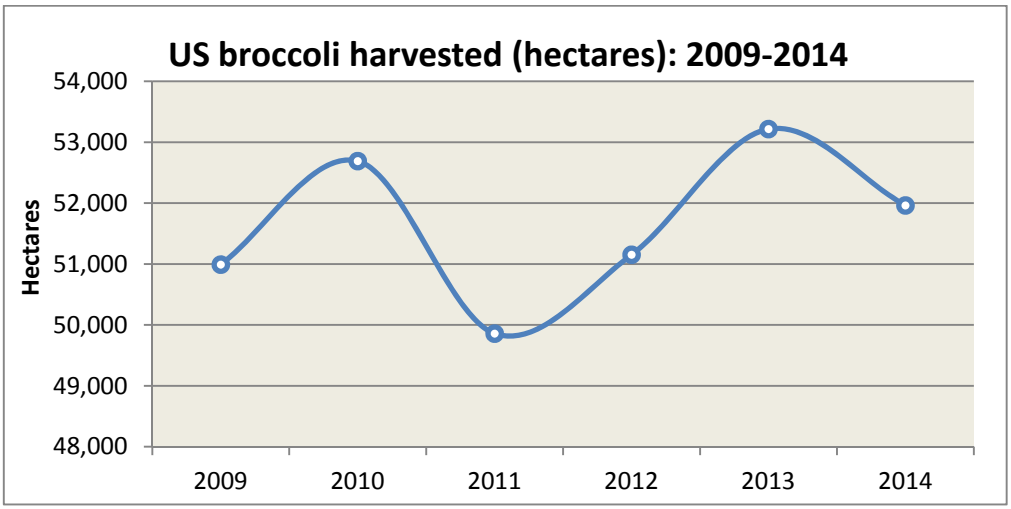


Figure 38: Total broccoli harvested (hectares) in the US from 2008 to 2014
Source: USDA, Economic Research Service, 2014a

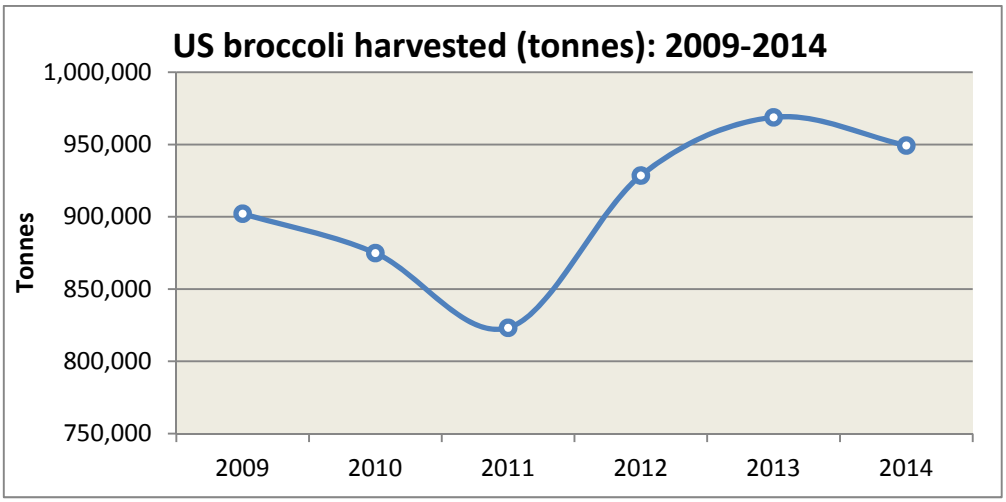


Figure 39: Total broccoli harvested (tonnes) in the US from 2008 to 2014
Source: USDA, Economic Research Service, 2014a

As highlighted in Figure 40 and Table 16 California alone harvested 48,968 hectares (or 913,081 tonnes) of broccoli in 2014, around 94 percent of total United States production. In contrast, Arizona harvested 2,590 hectares (36,287 tonnes) of fresh broccoli in 2014 (USDA, Economic Research Service, 2012a and 2012b). From 2013 to 2014 United States broccoli production fell by around 19,000 tonnes. There would not appear to be a dramatic fall in United States broccoli production as has been inferred through in-market research. There maybe a range of factors impacting on export volumes to Japan such as quality and redirecting supply to the domestic or other markets.

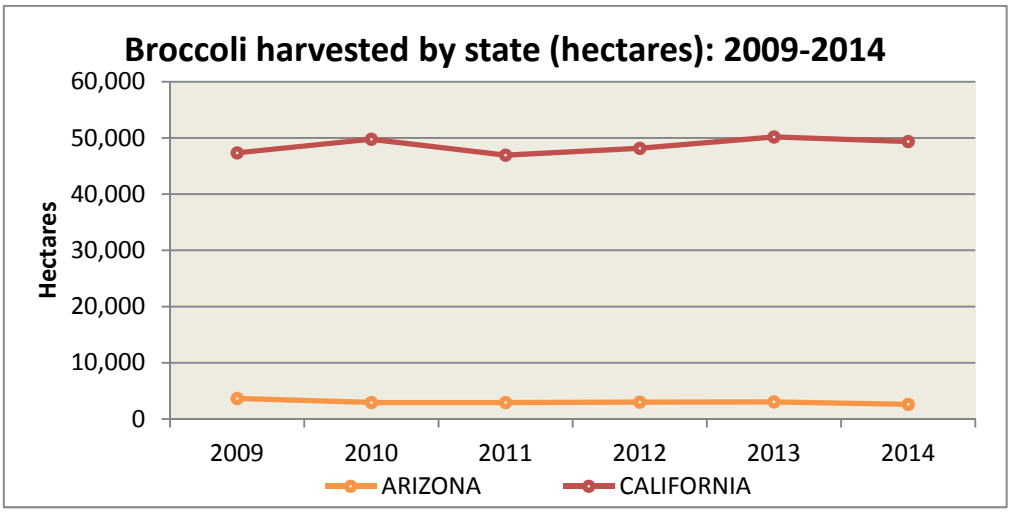


Figure 40: Total broccoli harvested by key US State from 2008 to 2014
Source: USDA, Economic Research Service, 2014a

As outlined in Table 16 and 17 California yields around 18,494 kg/ha and Arizona 14,010 kg/ha. In 2014, the broccoli industry was valued at US$806M in California and US$29M in Arizona. In contrast Australia's industry in 2008/09 was valued at A$101M, yielding 6,500kg/ha and producing 48,500 tonnes in 2011/12.

Table 16: Production statistics and values for California, 2014

California	Hectares Planted	Hectares Harvested	Yield (Kg/Ha)	Production (Tonnes)	Price per Kg (US$)	Value of Production in Dollars (US$)
Broccoli - Total	49,777	48,968	18,646	913,081	$0.88	$803,511,000
Broccoli - fresh				881,783	$0.89	$791,208,000
Broccoli - processing				N/A	N/A	$15,353,000

Source: USDA, Economic Research Service, 2014

Table 17: Production statistics and values for Arizona, 2014

Arizona	Hectares Planted	Hectares Harvested	Yield (Kg/Ha)	Production (Tonnes)	Price per Kg (US$)	Value of Production in Dollars (US$)
Broccoli	2,590	2,590	14,010	36,287	$0.82	$29,290,000

Source: USDA, Economic Research Service, 2014

According to importers of United States product during the 2014 season, quality from United States suppliers had been below usual standards. In particular, importers reported a number of issues including inconsistent head sizes, more damage on broccoli heads, and mould development on heads.

6.2.2 Import to Japan - fresh

In 2014 Japan imported 29,112 tonnes of United States broccoli valued at ¥6.2 billion. The United States has remained the leading exporter of broccoli to Japan for over two decades and, although prices and volumes have declined over that period, the United States has maintained its dominance of the market.

As highlighted in Figure 41 there is a long term declining trend for fresh broccoli imports. Imports from the United States were 6,000 tonnes per month (average) in the mid to late 90s and that has dropped to approximately 3,000 tonnes per month (average) in recent years.

Figure 41 indicates that the decline in the imports of broccoli from the United States is paralleled by an associated increase in the domestic production of broccoli. Additionally, while imports from the United States exports of broccoli have declined by approximately 40,000 tonnes over the observed period, domestic production has increased by over 50,000 tonnes.

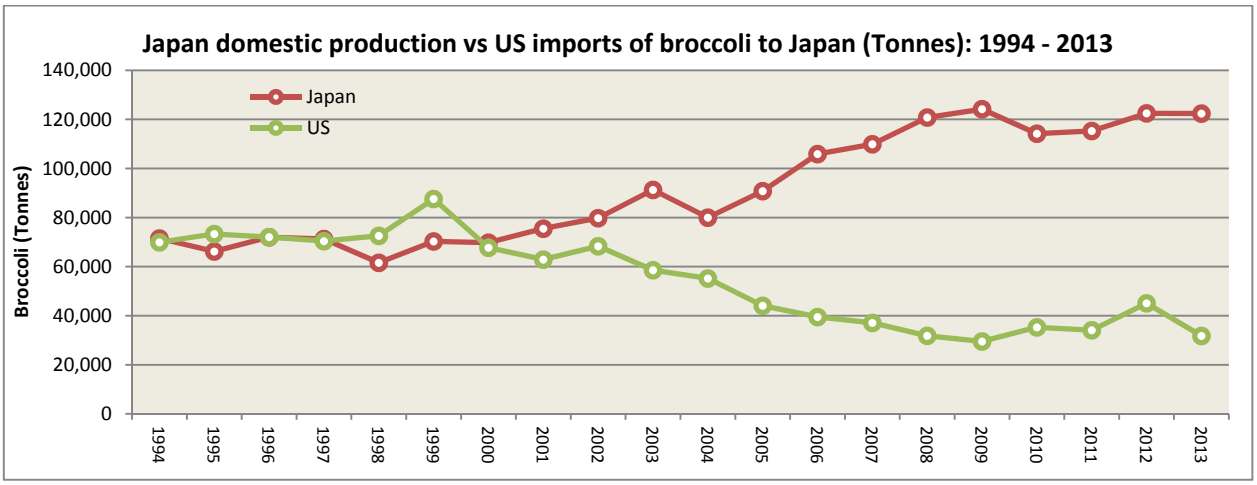


Figure 41: Comparing Japanese annual domestic production with annual US imports of fresh broccoli from 1994 to 2013
Source: MAFF, 2014, Trade Statistics Japan, 2014

6.2.3 Seasonality

In Table 18, United States exports of broccoli to Japan have been analysed using monthly data (1994 to 2014). Table 18 illustrates the seasonal factor in the fluctuations above and below 1.0 which represent the movements above and below the average monthly imports of broccoli into Japan.

Table 18: Seasonality factors of United States imports of broccoli in to Japan

1994-2014	Seasonal Factor
January	0.50
February	0.69
March	0.73
April	1.12
May	1.37
June	1.21
July	1.25
August	1.20
September	1.31
October	1.24
November	0.74
December	0.62

Source: Trade Statistics Japan, 2014 (baseline data)

As an example, the data indicates that in May (1994 to 2014) the United States exported 37 percent (1.37) more fresh broccoli above its average monthly figure for exports to Japan for the observed period. The data over the last 20 years confirms that the United States supply window is April through October. This coincides with Australia's peak production period.

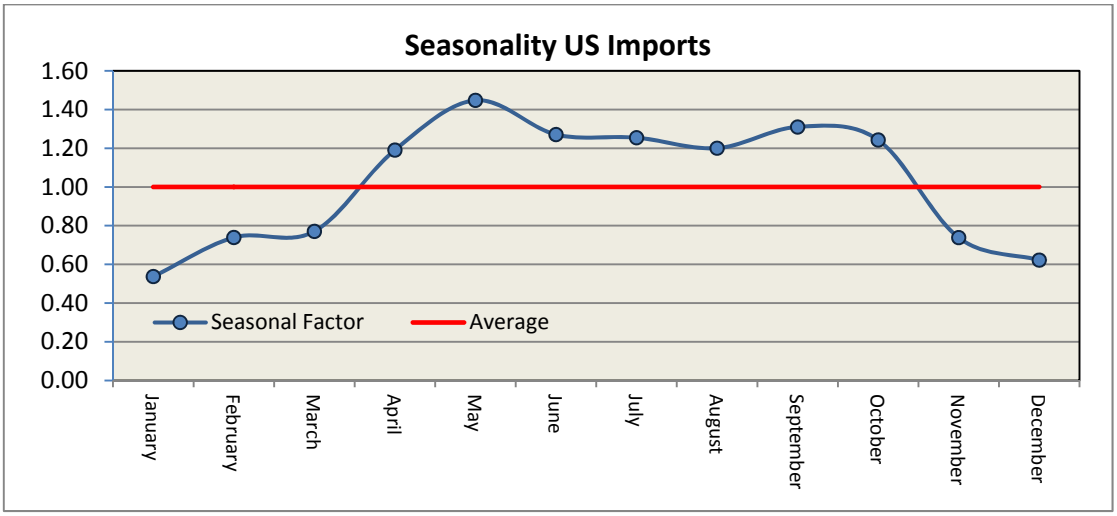


Figure 42: Graphical representation of the seasonality of US imports of fresh broccoli in to Japan
Source: Trade Statistics Japan, 2014 (baseline data)

6.2.4 US exporters and brands

M&M Produce, Beach Side Produce, Freitas Bros Farms, Pacific Coast Produce, Bonipack and Amaral Ranches are the leading exporters identified during the in-market research, all of which are based in California. Other leading exporters are Cal-Ex, with production based predominantly out of Santa Maria, and I.P.G, which sources product mainly from Sirenis but also deals with Mexican broccoli producers. Listed below were key companies and brands identified in Japan in September 2014:

Brand	Company	Location
Amaral Ranches	Amaral Ranches Inc	California
Highway One	Beachside Produce	California
Song Hee	Beachside Produce	California
Starboard	Beachside Produce	California
Surf	Beachside Produce	California
Dole	Dole Food Company	California
Joe Jr	Freitas Brothers Farms	California
Warriors	Freitas Brothers Farms	California
Golden Freen	M&M West Coast Produce Inc	California
The Good Box	M&M West Coast Produce Inc	California
Pacific Coast	Pacific Coast Produce	California

Figure 43: Dole, California, US (September, 2014)

Figure 44: Beachside, California, US (September, 2014)

6.2.5 Product specifications

The specifications listed in Table 19 are derived from market observations and importer and retailer interviews and the product specifications in Appendix 6 and 7. The varieties listed below have similar characteristics to those planted in Japan and Australia, and it is likely that varietal crossover exists between countries.

Table 19: United States broccoli product specifications

Product attributes	Product specifications
Size	Between 120mm to 130mm head diameter, stalk length 120 - 150mm, stems untrimmed.
Varieties	Sakata - marathon, patriot, castle domo, imperial and heritage
Shape	Round, dome shaped crowns,
Colour	Dark green (no purpling)
Appearance	crown cut type, large beads
Carton	10 kg wax carton
Count	38 heads
Quality	Free from scars/pest damage, pin rot, water spot, hollow core and any discolouration. No yellow/brown beads
Food safety/ Quality Assurance	USDA Good Agricultural Practices (GAP) Program and PRIMUS GFS Certification Growers/exporters control pesticide residues in accordance with Japan's Positive List

Source: Appendix 6 and 7, and Importer interviews, 2014

6.2.6 Supply chain costs

Supply chain costs for United States broccoli, including freight, customs and packing requirements, are listed in Table 20.

Table 20: Indicative export costs for the US export supply chain– 40 foot Reefer

Item	Cost (US$)
Sea freight	$3,000 or $3.13 per carton
Customs clearance & delivery to warehouse	$600 or $0.63 per carton
Unloading and warehousing of broccoli	$2,000 or $2.08 per carton
Re-ice and pack into Styrofoam crate (includes carton)	$3.65 per carton
Fumigation (if required)	$1,000 to $2,000

Source: Dara et al 2012 & Importer interviews, 2014

6.2.7 Production Economics

In 2013, Cornell University (Atallah et al, 2013) published a report which investigated the costs of production for broccoli in the States of New York, Virginia, North and South Carolina and California. A summary of the findings is detailed below in Table 21.

Table 21: Eastern US broccoli crop budgets (US$), 2013

	South Carolina	North Carolina	New York	Virginia	California	Average
Carton per Acre	400	440	450	570	800	532
Pre-Harvest (per Carton)	$4.19	$4.52	$4.86	$3.30	$2.78	$3.93
Harvest (per Carton)	$3.60	$3.83	$3.10	$3.05	$4.53	$3.62
Post-Harvest (per Carton)	$1.24	$1.33	$0.50	$3.40	$2.19	$1.73
Fixed and Capital (per Carton)	$2.38	$2.72	$1.95	$1.84	$2.24	$2.23
Total (US$) per Wax Carton	**$11.41**	**$12.40**	**$10.41**	**$11.59**	**$11.74**	**$11.51**

Note: California is the dominant growing region in the US

With a focus on the predominant growing area of California (major export point), the report indicates that it costs around US$11.74 to produce a 10kg wax carton of fresh broccoli. This equates to a cost of US$1.17/kg. Using an exchange rate of 1USD:80AUD this equates to A$1.46/kg or A$11.68/12kg Styrofoam carton containing 8kg of product. These figures incorporate all costs (variable, fixed and capital).

6.2.8 Supply chain

This supply chain is based on secondary research and in-market interviews conducted in September 2014 with importers and retailers and market observations.

Production and harvesting

The United States produces broccoli all year round. Broccoli is produced in California and Arizona during the following times:

March to December – California (mostly Sirenis and Santa Maria)

December to March – Arizona (Yuma and Coachella)

Broccoli fields in California can be direct seeded or transplanted (Strange et al., 2012), although the majority are direct seeded with an average plant population of 106,000 plants/ha (Strange et al., 2010). Yields in 2012 were 19.7 tonnes/ha (Atallah et al, 2013).

Harvesting is performed by hand using a knife using contract labour. Broccoli is packed in the field (Dara et al., 2012).

Each 10kg wax carton contains between 34 and 38 heads with a minimum weight of 9kg (Strange et al., 2010). Packed cartons are bought back to a central cooling facility.

Post harvest/transport

Transportation costs vary depending on the distance to the cooler, with most farms located within 40km of a cooler (Dara et al., 2012).

Broccoli is transported to the cooler as soon as possible after packing (Dara et al., 2012).

Ice injection or liquid ice is the standard cooling method for US broccoli (Dara et al., 2012 & Strange et al., 2010). Forced air or hydro cooling can be used but temperature management during shipping and storage is more critical than iced broccoli (Dara et al., 2012).

Broccoli cartons are column stacked (48 per pallet) and are stored in cold storage until loading into containers (Dara et al., 2012).

A 40ft reefer is the standard container used for sea freight to Japan. Palletised broccoli is loaded into the container using a forklift - 960 cartons fit in the container.

Three weeks lead time is specified for broccoli delivery by Japanese importers.

Shipping to Japan

Sea freighted containers from the US can take between 10-17 days to arrive in Japan depending on the speed of the vessel. On average, most orders arrive within 12 days.

Customs clearance, transport to warehouse Japan

Upon arrival in Japan by sea freight, US broccoli is unloaded in a secure area for inspection for quarantine pests and sampling for chemical residues by Japanese officials.

Consignments undergo MAFF / MLHW inspections and are processed by customs before being transported to the warehousing facilities of importers.

Containers are generally cleared by customs with 24 hours, provided there are no issues with pesticides or chemical residues. If MRLs are exceeded or pests detected, custom clearance can be delayed by up to three days.

Refrigerated containers remain plugged into a power source while the ship is docked.

Retail

US broccoli is clearly marked with country of origin in retail outlets in Japan. US broccoli is sold at a discount compared with local Japanese product in most stores and is clearly distinguished from Japanese product by its cleanly trimmed stems.

Stem tags may also be used to identify US broccoli. Supermarkets mainly sell US broccoli loose, however some premium stores wrap the broccoli heads in store for retail sale.

There was no evidence of in store promotion for US broccoli and no supply chain interviews mentioned marketing or training.

Warehousing

Either the importer or a third party agent will store and process the broccoli on importation from the US. Broccoli is stored at o°C until distributed to the retailer. Broccoli may be stored for up to four weeks in the warehouse.

US wax cartons of broccoli are re-iced and placed inside a styrofoam crate and stacked onto pallets of 24 prior to shipment to the retailer.

Warehouse operators may offer other services, including repacking, re-icing and logistics.

US broccoli can also be repacked.

6.3 China

6.3.1 Production

China is the world's leading producer of brassicas (including broccoli and cauliflower) with an estimated 45 percent of global production (FAOSTAT, 2012). As presented in Figure 45, production in China has been steadily increasing in recent years with over 9.5 million tonnes produced in 2012, an increase of over 1 million tonnes since 2008. Notably, cauliflower production is considered a more significant industry in China (FAOSTAT, 2012).

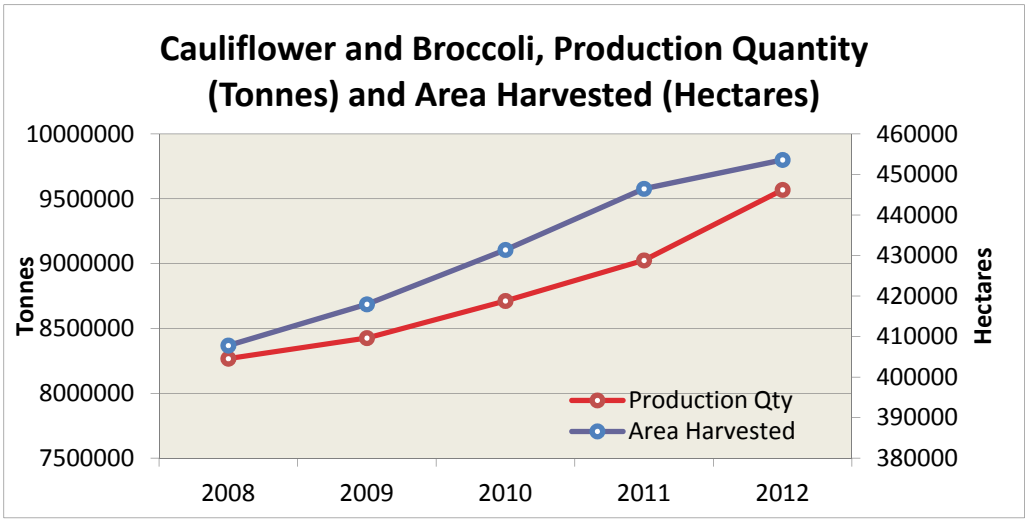


Figure 45: China's production of cauliflower and broccoli, 2008 to 2012
Source: FAOSTAT, 2012

6.3.2 Import to Japan - fresh

Between 2000 and 2007 Japan's imports of broccoli from China averaged approximately 12,000 tonnes per year (as shown in Figure 46). Imports from China ceased in 2008 and then resumed in 2010. More recent data shows that China steadily increased its exports in the years 2011 to 2013, averaging around 3,600 tonnes per annum.

However 2014 data indicates that imports from China of fresh broccoli fell to 1,002 tonnes per annum valued at ¥172 million. This trend reflects the in-market research which found importers reluctant to buy fresh Chinese broccoli due to food safety issues that have arisen with other Chinese food products. Some importers and their customers have policies against procuring produce from China (Importer interviews 2014).

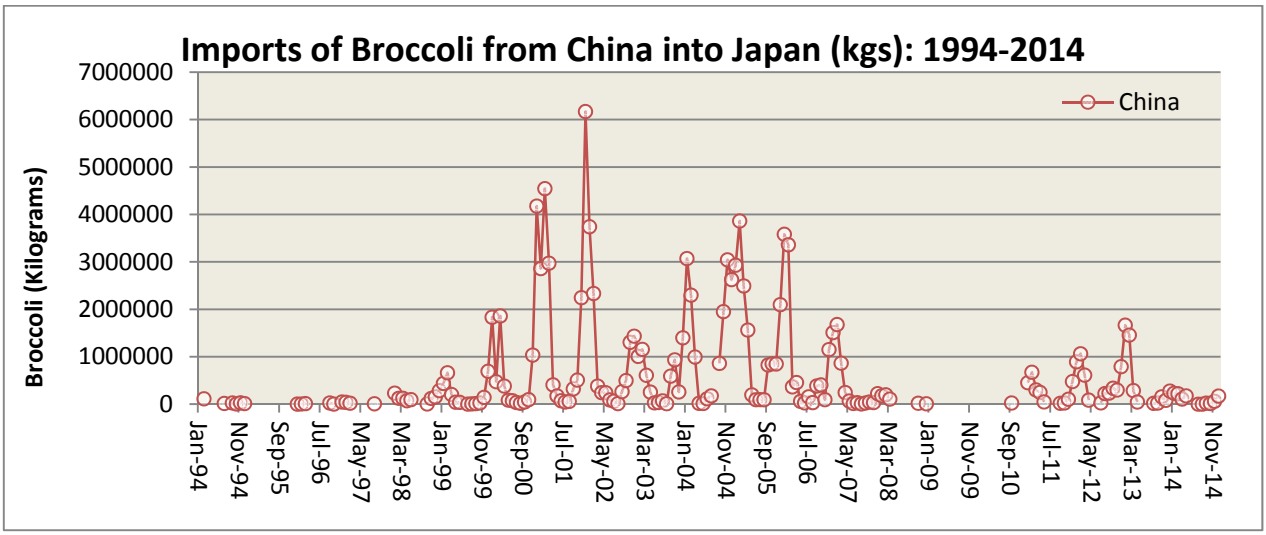


Figure 46: Total Volume of Imports of Broccoli from China into Japan from 1994-2014
Source: Trade Statistics Japan, 2014

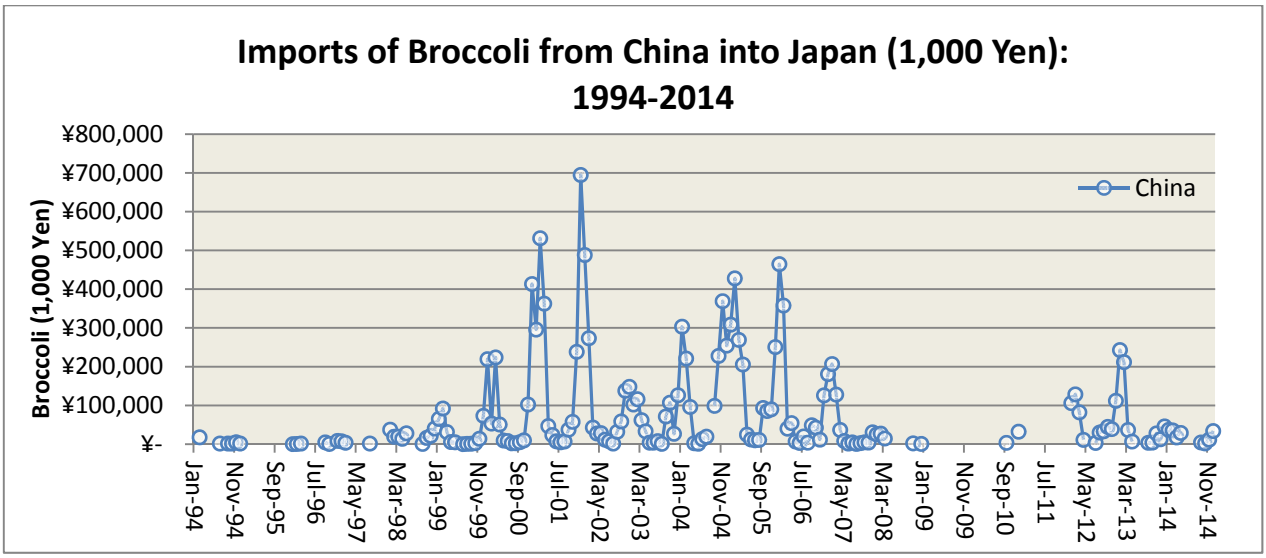


Figure 47: Total Value of Imports of Broccoli from China into Japan from 1994-2014
Source: Trade Statistics Japan, 2014

Chinese broccoli remains a secondary supply option to United States broccoli and is typically supplied to wholesale, food processing and food service segments of the market during periods where local and United States broccoli supply is limited (December to April period).

6.3.3 Imports to Japan - frozen

In 2014, frozen imports from China were 21,772 tonnes and were valued at approximately ¥3.8 billion (as shown in Figure 48). Between 2009 and 2014, frozen imports from China averaged approximately 18,450 tonnes per year (or 1,500 tonnes per month). On average, imports of frozen broccoli from China have grown by approximately 8 percent per year (CAGR of tonnes).

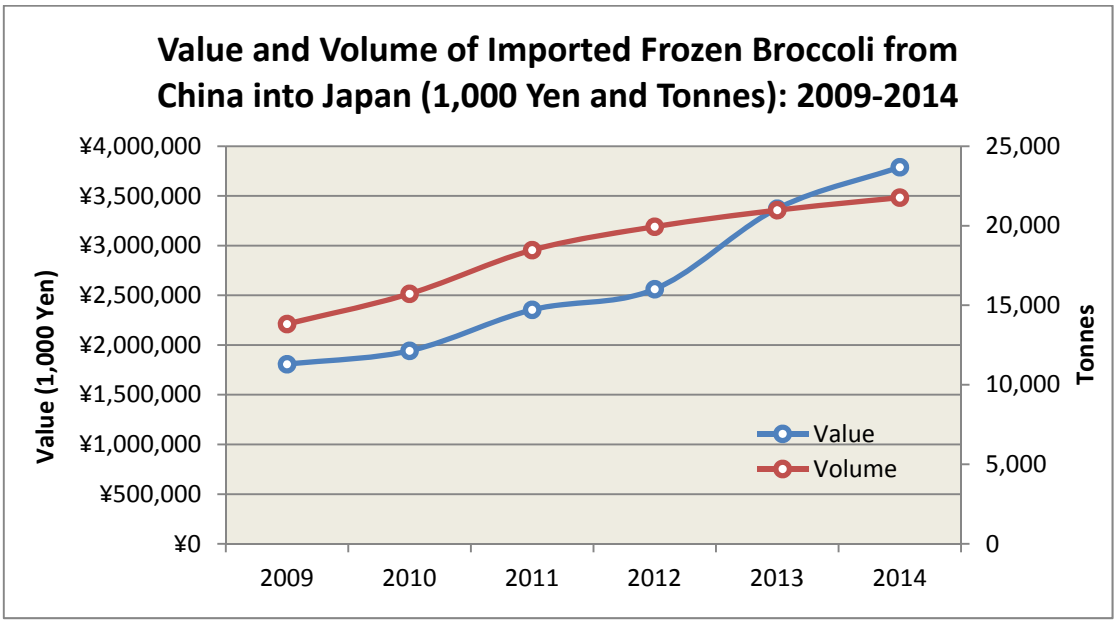


Figure 48: Imports of frozen broccoli from China
Source: Trade Statistics Japan, 2014

6.3.4 Seasonality

In Table 22 Chinese exports of broccoli to Japan have been analysed using monthly data (1994 to 2014). The seasonal factor in Table 22 shows the fluctuations above and below 1.0 which represents the movements above and below the average monthly imports of broccoli into Japan.

Table 22: Seasonality factors of Chinese imports of broccoli in to Japan

1998-2014	Seasonal Factor
January	2.57
February	2.61
March	1.32
April	0.40
May	0.09
June	0.04
July	0.12
August	0.12
September	0.38
October	1.17
November	0.76
December	2.19

Source: Trade Statistics Japan, 2014 at (Baseline Data)

As an example, the data indicates that, in March (1998 to 2014), China exported 32 (1.32) more fresh broccoli above its average monthly figure for exports to Japan for the observed period. As Figure 49 indicates, Chinese broccoli supply window is from December to March.

Given some Australian states are moving to year round supply and Victoria is able to supply over Australia's summer, there may be a window of opportunity during this period to replace Chinese imports.

Figure 49: Graphical representation of the seasonality of Chinese imports of fresh broccoli in to Japan
Source: Trade Statistics Japan, 2014 (Baseline Data)

6.3.5 Product specifications

Generally, imported broccoli is in line with United States product specification. Table 23 outlines some variations for Chinese broccoli.

Table 23: Chinese Broccoli Product Specifications

Product attributes	Product specifications
Size	Between 100mm to 200mm head diameter, thick stalks (40-50mm in length)
Varieties	Calabrese (Italian varietal name), Youxiu (local varietal name)
Shape	Round, dome shaped crowns,
Colour	Dark green
Appearance	Crown cut type, small beads
Carton	Both waxed cardboard carton and Styrofoam carton options
Count	18-20 head (8kg), 38 head (10kg) options
Quality	Free from scars/pest damage, pin rot, water spot, hollow core and any discolouration
Quality Assurance, Food Safety	Global Gap 4.0 certification, Food Safety Management System Certificate (HACCP equivalent)

Source: Appendix 6 & 7, Importer interviews, 2014 & 2015

Figure 50: Chinese broccoli packed into Styrofoam cartons for export
Source: Great-Sun Pty Ltd, 2014

6.3.6 Import prices

Importers indicated that 40 foot containers of Chinese broccoli can be sourced for as low as US$9-12 per 10 kg carton CIF/CFR throughout a typical season. Importers indicated in January 2015 that the average CIF/CFR price of Chinese broccoli was US$15.50 per 10 kg carton.

6.4 Mexico

6.4.1 Production

As outlined in Figure 51, Mexico produced 416,000 tons of broccoli in 2013 from a harvest area of 28,648 hectares. The volume of Mexico's broccoli production has grown by 34 percent since 2008. Avenger is the main variety for export to Japan.

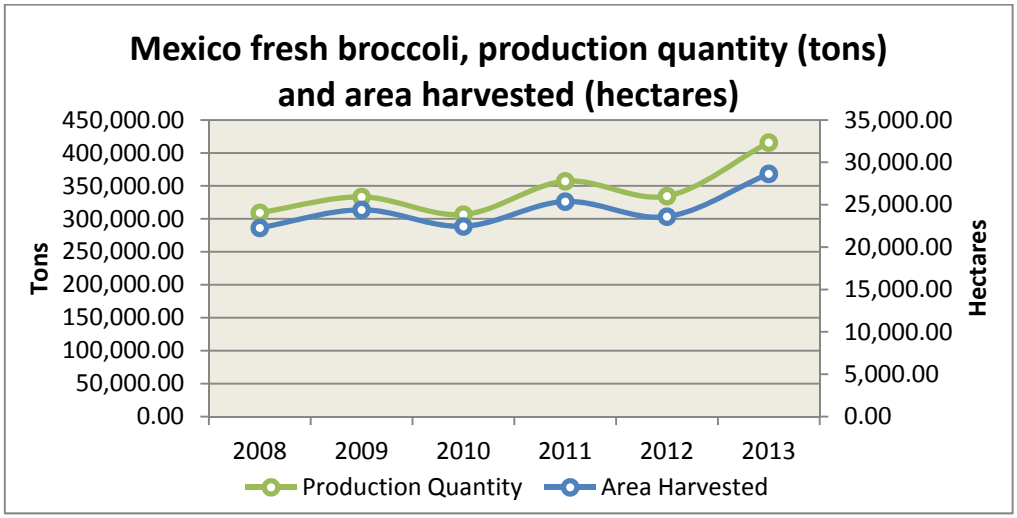


Figure 51: Mexico's production of broccoli (Tons[4] and Hectares), 2008 to 2013
Source: Secretaria De Agricultura, Ganaderia, 2015

[4] Imperial measurement: one imperial ton equals 0.907185 metric tonnes.

6.4.2 Import to Japan - fresh

Mexico is an emerging competitor in the Japanese market. Japan presently imports both fresh and frozen broccoli from Mexico. As outlined in Figure 52, in 2014 Japan imported 270 tonnes of fresh broccoli valued at ¥60 million. Currently Mexico is a minor player with only one percent of the fresh import market.

There were no imports of fresh broccoli from Mexico in 2009 however, since 2010 the volume and value of imports has increased by 184 percent and 188 percent respectively.

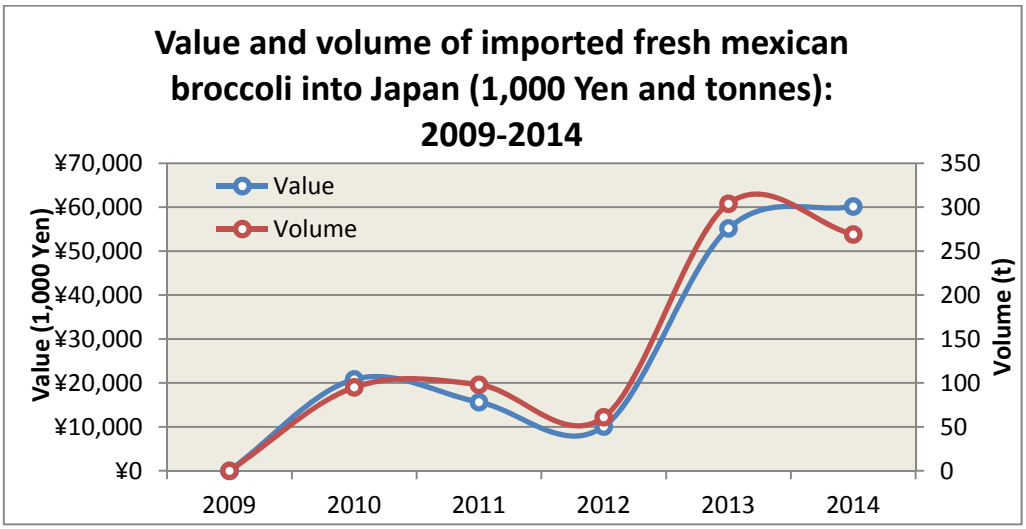


Figure 52: Japan's total value and volume of imports of fresh broccoli from Mexico 2009 to 2014 (1,000 Yen and Tonnes).
Source: Trade Statistics Japan, 2014

It was reported that United States companies exporting broccoli to Japan are also sourcing product from Mexico (Importer interviews, 2014).

6.4.3 Import to Japan – frozen

In 2014, Japan imported 1,470 tonnes of frozen broccoli from Mexico valued at ¥281 million (shown in Figure 53). Mexico currently has a market share of approximately 4 percent in the frozen broccoli market. There was a decline in frozen broccoli from Mexico in 2012-2013, however, the compound annual growth rate of imported tonnes over the period from 2009-2014 was 3 percent (CAGR).

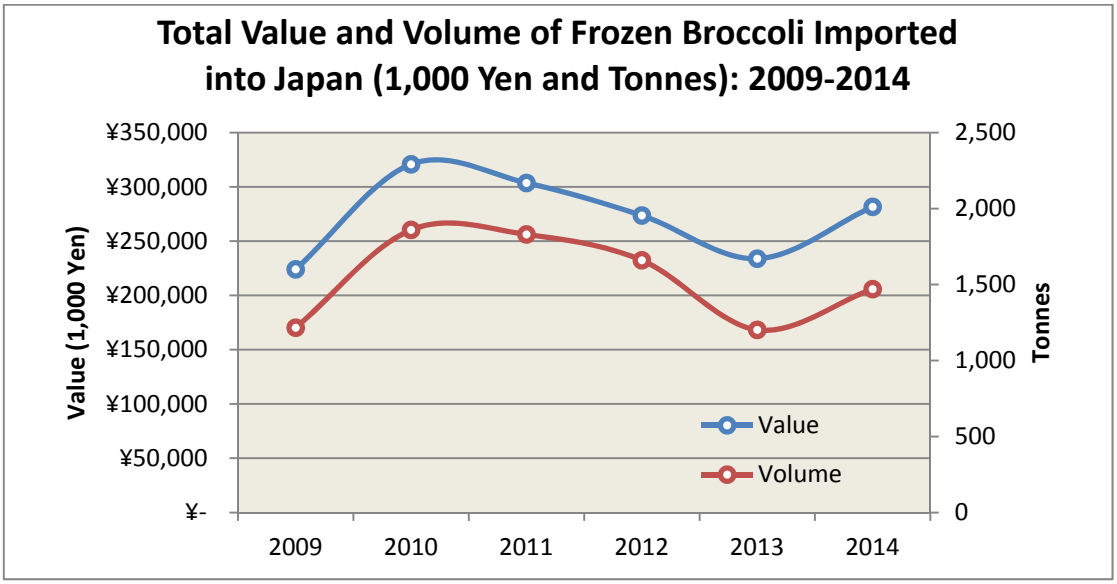


Figure 53: Japan's total value and volume of imports of frozen broccoli from Mexico 2009 to 2014 (1,000 Yen and Tonnes).
Source: Trade Statistics Japan, 2014

6.4.4 Seasonality

Japan is importing frozen broccoli from Mexico all year round however, fresh broccoli exports are concentrated from December through to April (shown in Figure 54). This period is reported to be the low supply period for both the United States and domestic sourced broccoli. Fresh broccoli from Mexico is being sold to the supermarket segment (Importer interviews, 2015).

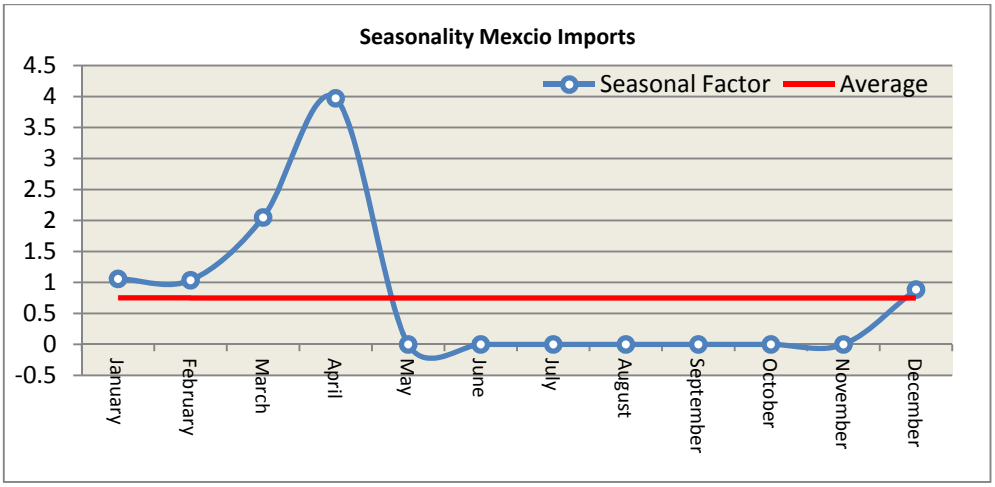


Figure 54: Graphical representation of the seasonality of Mexican imports of fresh broccoli to Japan
Source: Trade Statistics Japan, 2014 (baseline data)

6.4.5 Import prices

Import price for Mexican broccoli was CIF US$17.50/10 kg carton (Importer interviews, 2015). This pricing places Mexico at the lower end of the price range when compared with product supplied by the United States but is higher than China.

7 Japanese consumer profile

7.1 Desktop review

7.1.1 Socio-demographic and geographic trends

Some key drivers in the socio-economic and geographic landscape in Japan include an ageing population, growth in one-person households, long life expectancy, growth in urbanisation and growth in the number of females in the workforce.

The three metropolitan areas of Tokyo (Kanto), Osaka (Keihanshin) and Nagoya (Chubu) have 51 percent of the total population. It is projected that the populations in these centres will continue to rise.

Japan has an ageing population, with 24.1 percent of citizens aged over 65 years in 2012. Japan is notably the most aged society in the world today. As shown in Figure 55, the proportion of senior citizens (over 65 years) within the total population is projected to further increase to over 40 percent in the next 40 years.

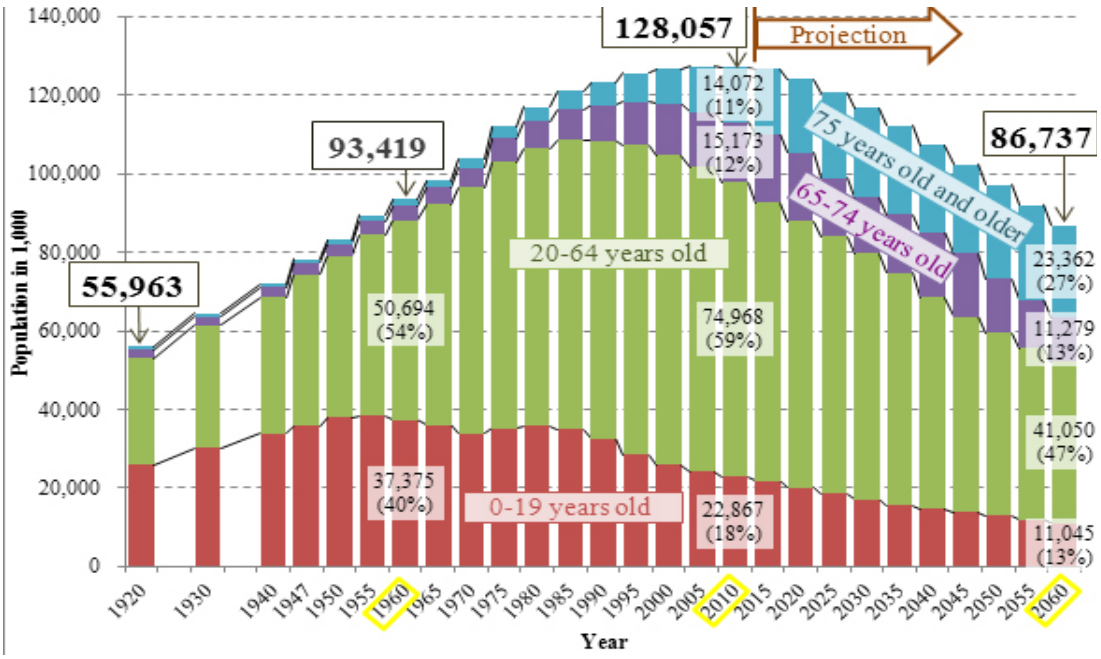


Figure 55: Japanese population trend and projections 1920 to 2060
Source: Japan Statistical Bureau 2014

Population decline has become a reality (refer Figure 55). A change in household structures is contributing to this phenomenon. One-person households (HH) and those with only a married couple are on the rise, while homes with married couples with children are on the decline. An associated trend is the growing number of females aged over 25 years participating in the workforce.

Japanese citizens also boast one of the world's longest life expectancies with 79.9 years for males and 86.4 years for females (Euromonitor 2013b).

These trends are extending to the agriculture sector. Historically, the average age of farmers has changed from 61.1 years in 2000 to a projected age of 70 years by 2015.

This has implications for vegetable self-sufficiency rates in the future, as younger generations are less likely to take up agricultural occupations.

7.1.2 Japanese food values

Vegetables are a fundamental element of the Japanese diet and their meal preparations. Key factors that drive their food and vegetable choices are healthy living, fresh and local, organic, green and functional food.

Japanese consumers have a strong interest and long tradition of consuming healthy, natural and safe foods. In Japanese cuisine, 4 to 5 different vegetables are often served in a single meal occasion (Kim 2008). Japanese consumers also seek out fresh food sourced from areas close to where it is consumed. Buying local is a primary purchase motivator for most people. They have concerns around fresh imported vegetables and are highly conscious of only purchasing food from safe sources with low or no chemical treatments (Moreno-Penarando 2011). Importantly, Japanese consumers view Australia as a trusted source of safe, dependable and high quality products grown in an environment with low use of chemicals (Australian Trade Commission 2013a).

Two other major trends in Japan are the growth in organic food and the consumption of food for medicinal benefits. Japan accounts for the bulk of organic sales in Asia. The estimated value of this market in 2010 was A$1.4 billion (FASUSDA 2013). The Japanese support a disease mitigation approach to diet and have a strong belief that food can be used as medicine (Johnson 2011). Consumers continue to favour products that promise to improve health and beauty (in particular anti-aging properties) and to boost immunity, as well as those that are for specific health use.

There is an increasing demand for functional vegetables and for the information that supports the key health property or benefit of vegetable (Australian Trade Commission 2013b; Euromonitor 2013a). Japanese consumers continue to show signs of following global health trends, including calorie control and juicing (Onishi 2014).

7.1.3 Vegetable and broccoli consumption

Japan has one of the highest consumption levels of vegetables in the world. However as highlighted in Figure 56, Japan's vegetable consumption has been falling over the past 20 years and is forecast to fall a further one percent by 2017 (Honma 2014).

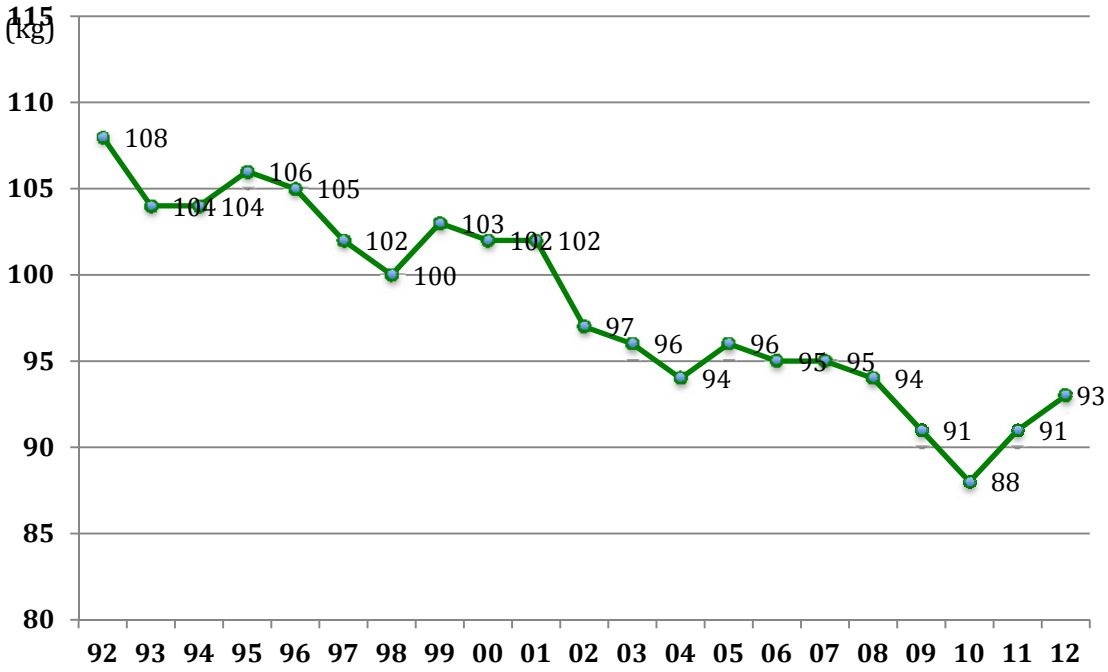


Figure 56: Trend of vegetable consumption per capita 1992 to 2012
Source: MAFF 2012

Vegetable and broccoli consumption are impacted by socio-economic, food safety and global market influences on the types of foods consumed. The declining population will result in a declining market size for vegetables however; this is offset to some extent by the aging population which tend to eat more vegetables. Growth in smaller households and a rising number of working women relates to increased out of home consumption, reduced meal preparation and cooking time in the home. There tends to be a lower prevalence of vegetables in meals consumed outside the home.

Japan has concerns regarding the long-term implications of soil contamination following the 2011 Fukushima radiation incident and the resulting impact on the safety of vegetables grown in affected or near affected regions (Euromonitor 2013a). Globally, there is a trend to substitute fresh food with processed foods and drinks- the culture of cooking traditional cuisine in Japan is declining due to the influence of western palates.

To counter these trends, the government has implemented a range of programs to boost vegetable consumption. Some of these include Health Japan 21, healthy lunch programs in schools and companies providing meals which include five serves of vegetables.

Despite the relatively negative outlook for total vegetable consumption, broccoli experienced growth between 2010 and 2012. Broccoli recorded the highest volume growth due to its perceived health benefits and partly in response to the popularity of salad bars (Euromonitor 2013c). Figure 57 indicates, broccoli is mainly consumed during Japan's winter/autumn period.

Continuing the positive consumption trends from 2010 to 2012, as outlined in Figure 58, broccoli consumption rose to 1,371 grams per person in 2014.

Broccoli is recognised by Japanese consumers as a 'super' vegetable, known to contain the most potent anti-oxidative properties and positive health benefits. Japanese people consume approximately five times the amount of cruciferous vegetables that is eaten by United States consumers (Takebayashi et al. 2013).

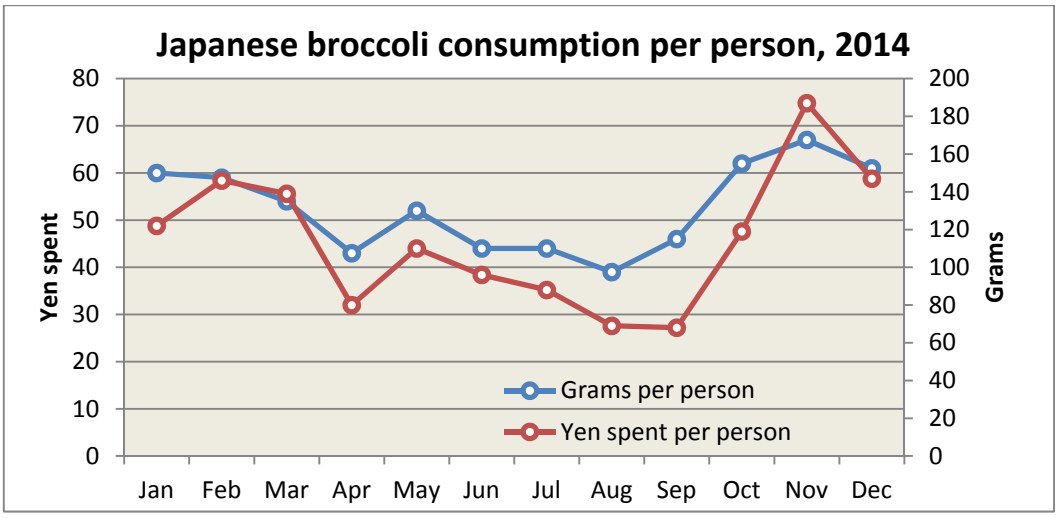


Figure 57: Japanese monthly broccoli consumption per person 2014.
Source: MAFF, 2014

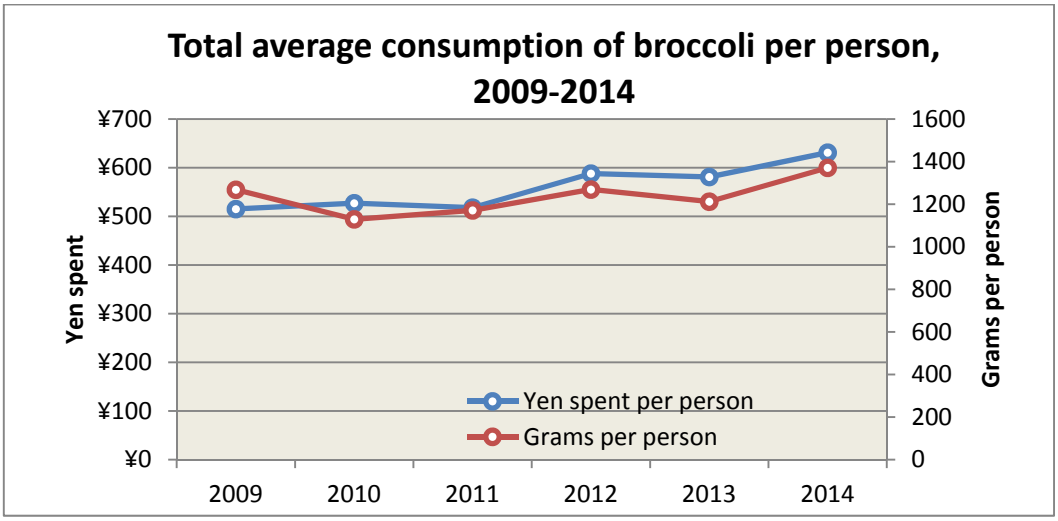


Figure 58: Japanese broccoli consumption per person/Yen spent 2009 to 2014
Source: MAFF, 2014

7.2 In-market research

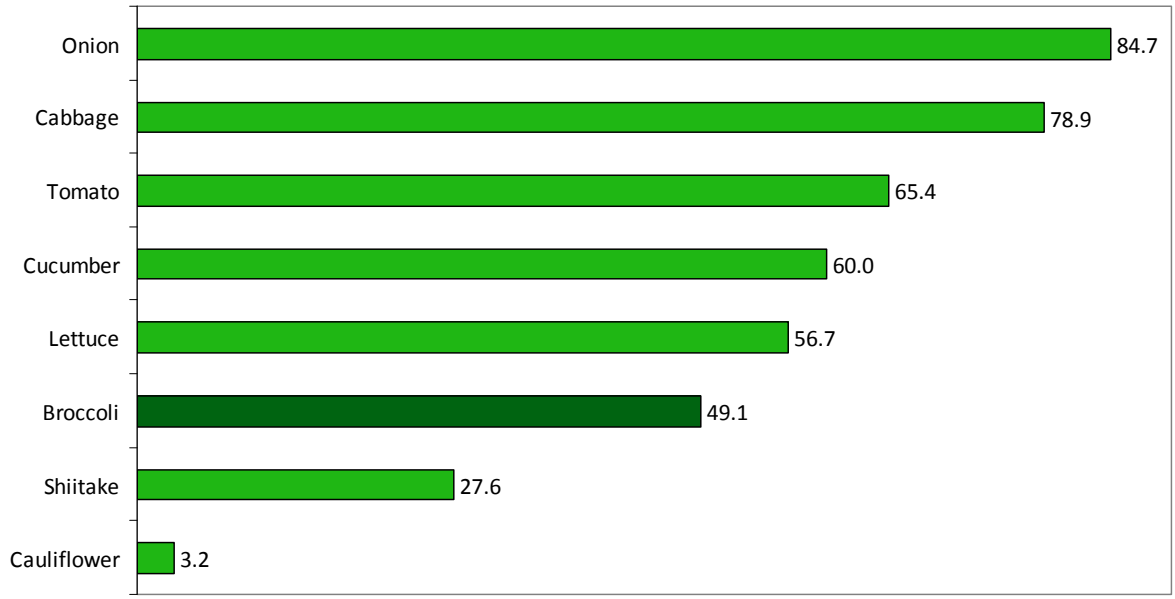
7.2.1 Vegetable consumption

Fresh green vegetables are a prevailing element in the Japanese diet. More than half of all meals contain green vegetables, with 77.8 percent of consumers being regular buyers.

Type of vegetables consumed weekly

The question asked respondents about their weekly vegetable consumption. This was a prompted question and included a list of vegetables namely: cucumber; tomato; lettuce; cabbage; cauliflower; broccoli; shiitake mushroom; and onion.

When respondents were prompted about which vegetables they consumed weekly, broccoli ranked sixth behind onions, cabbage, tomato, cucumber and lettuce and this is illustrated in Figure 59. This is consistent with the previous responses regarding the most widely eaten vegetables. Broccoli was consumed by almost 50 percent of respondents.



Note: Sample (n) = 1,010

Figure 59: Type of vegetables consumed weekly
Source: Results from author's analysis

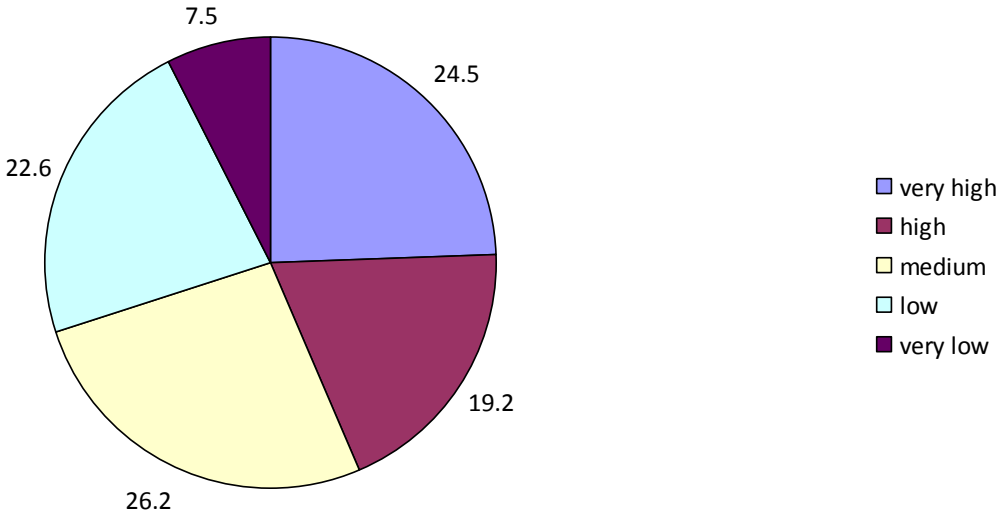
Examining broccoli consumption by age socio-demographic does not show significant differences across any specific age group. When considering vegetable consumption by income level, including broccoli, there is a direct correlation between a higher level of consumption and a higher annual income level.

Prevalence and frequency of fresh green vegetable consumption

Two questions were asked of respondents to understand green vegetable consumption and purchase frequency. Respondents were asked:

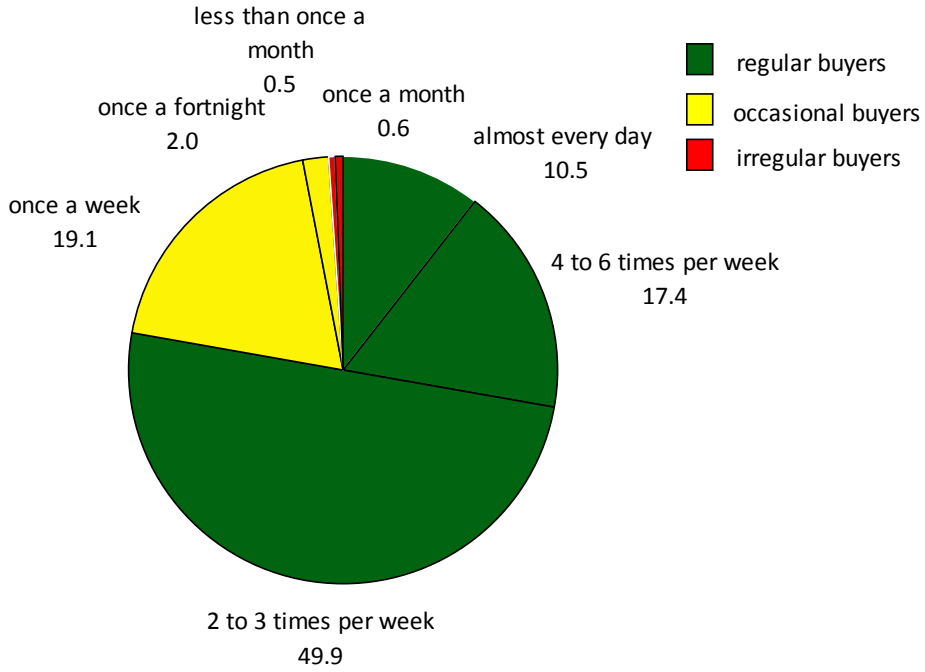
- What proportion of all weekly meals consumed feature one or more green vegetables?
- On average, how often do you purchase fresh green vegetables?

Green vegetables feature significantly in weekly meal occasions; just under half (43.7 percent) of the respondents reported high or very high consumption levels of green vegetables in their weekly meals (refer Figure 60). Of all weekly meals consumed, 53.6 percent featured green vegetables.



Note: Sample (n) = 1,010
Figure 60: Proportion of weekly meals that feature one or more green vegetables
Source: Results from author's analysis

Just over 10 percent of buyers purchased their fresh green vegetables almost every day (refer Figure 61). Further analysis of purchase frequency revealed that almost half of respondents shopped for their green vegetables two to three times per week.



Note: Sample (n) = 1,010

Figure 61: Proportion of weekly meals that feature green vegetables
Source: Results from author's analysis

Based on the responses regarding purchase frequency, three fresh green vegetable buyer types were identified: *regular buyers* (two to three times per week ~; four to six times per week; almost every day); *occasional buyers* (once a week and once a fortnight) and *irregular buyers* (once a month and less than once a month) (refer Figure 62).

77.8 percent
Regular Buyers

purchase two to three times or more per week

21.1 percent
Occasional Buyers

purchase every one to two weeks

1.1 percent
Irregular Buyers

purchase once a month or less

Note: Sample (n) = 1,010

Figure 62: Buyer categories for purchase frequency of fresh green vegetables
Source: Results from author's analysis

Respondents aged 35 or over (81.2 percent) are more likely to be *regular buyers* than younger respondents (70.8 percent). There are no further obvious trends across socio-demographic attributes. Overall, Japanese buyers of fresh green vegetables purchase and consume regularly.

7.2.2 Propensity to consume and purchase broccoli

Broccoli ranks sixth in terms of vegetables consumed weekly. Of those consumers who purchase broccoli, one-third are buying weekly and a further one-third are buying every two to three weeks.

Broccoli has perceived suitability across a broad spectrum of meal preparations with a particularly strong association with salad.

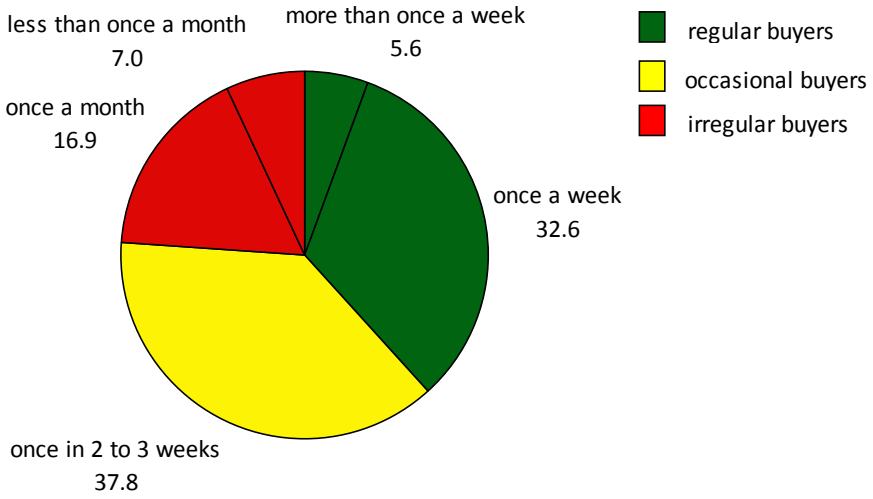
The main place of purchase for in-home consumption is the supermarket (both large and local). Females, particularly those aged 35 years and over, have a very broad range of places in which they purchase broccoli, including supermarkets, market stalls and cooperatives. This means the breadth of distribution channels is important.

There is a preference for consumption of broccoli from restaurants and dine-in cafes over fast food and takeaway outlets.

Loose – whole head format for broccoli is mainstream and preferred. Ideal colour and size of produce are key drivers of purchase.

Frequency of broccoli purchase

Respondents were asked for an indication of average frequency with which they purchased broccoli. Based on responses, three broccoli buyer types were identified with different purchase frequencies: *regular buyers* (more than once a week and once a week); *occasional buyers* (once in two to three weeks) and *irregular buyers* (once a month and less than once a month) (refer Figure 63).



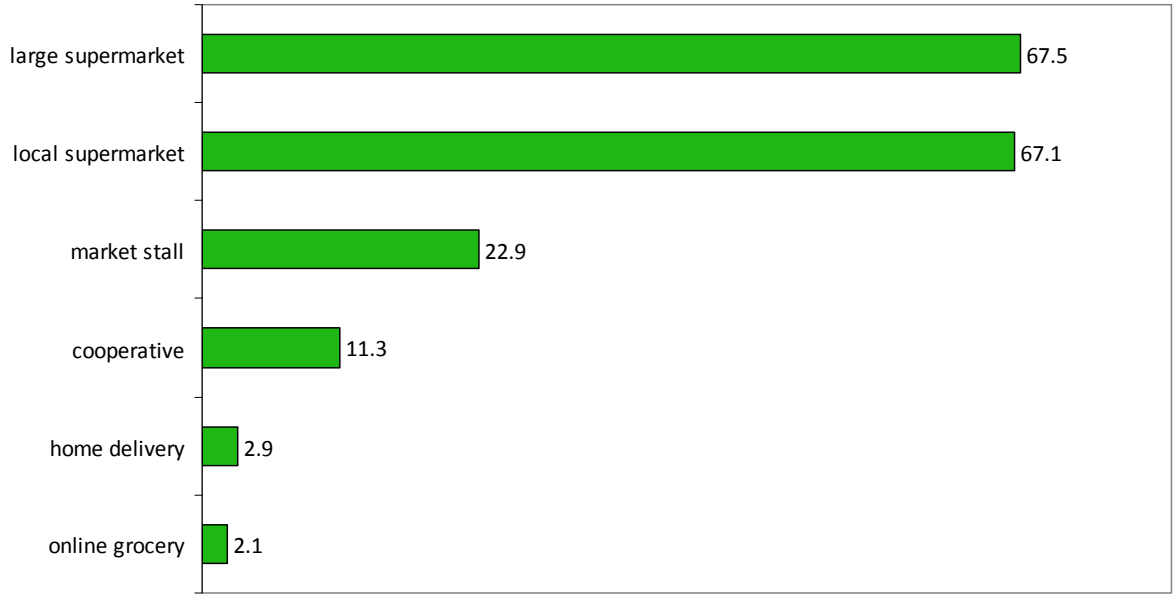
Note: Sample (n) = 1,010

Figure 63: Frequency of broccoli purchase
Source: Results from author's analysis

Figure 63 shows the distribution of broccoli buyers among the three purchase categories. As can be seen, among 1,010 consumers surveyed, most respondents (5.6 percent + 32.6 percent = 38.2 percent) were *regular buyers* of broccoli who purchased product once a week or more than once a week. Over one-third of the respondents were *occasional buyers* who shopped for broccoli every two to three weeks. About one-quarter of the respondents were *irregular buyers* who bought broccoli once a month or less often. High-income respondents (45.9 percent) were more likely to be *regular buyers* of broccoli. Low-income respondents were more likely to be *irregular buyers* of broccoli. Older respondents purchased broccoli more frequently than younger respondents. When considering gender, males (42.3 percent) were more likely to be *regular buyers* of broccoli. Overall, a significant majority of the respondents (76 percent) therefore purchased broccoli either regularly or occasionally.

Preferred place of purchase for broccoli for home

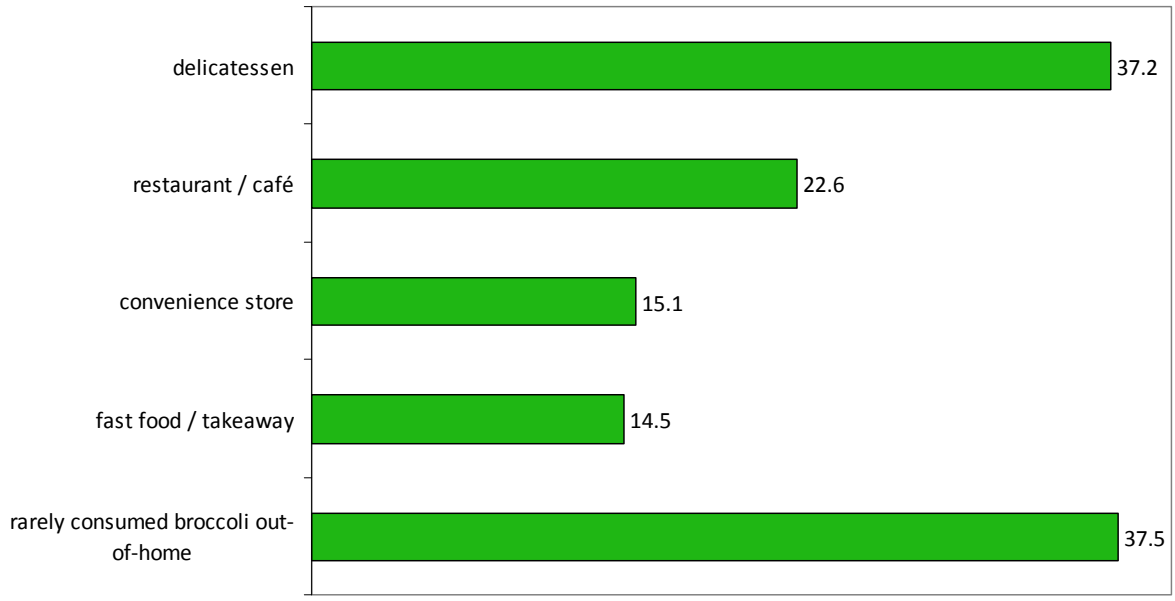
Large supermarkets and local supermarkets were the preferred places to purchase broccoli amongst the survey group (refer Figure 64). Market stalls and cooperatives did not appear to be a first place of choice to purchase broccoli. The results revealed that males identified large supermarkets as their preferred place of choice to purchase broccoli. In contrast, females indicated local supermarkets in preference to large supermarkets when purchasing their broccoli. Regarding traditional channels, women show a stronger preference to purchase broccoli from market stalls and cooperative arrangements. While the levels are currently very low, males are more likely to engage vegetable delivery services and on-line vendors than females.



Note: Sample (n) = 1,010
Figure 64: Preferred place of purchase for broccoli for home
Source: Results from author's analysis

Out-of-home consumption of prepared and cooked broccoli

For respondents who consumed broccoli out-of-home, the most popular place of purchase is the delicatessen (37.2 percent), followed by restaurants (22.6 percent) (refer Figure 65). Notably there were a significant number of respondents (37.5 percent) who would not consume broccoli outside of their home.

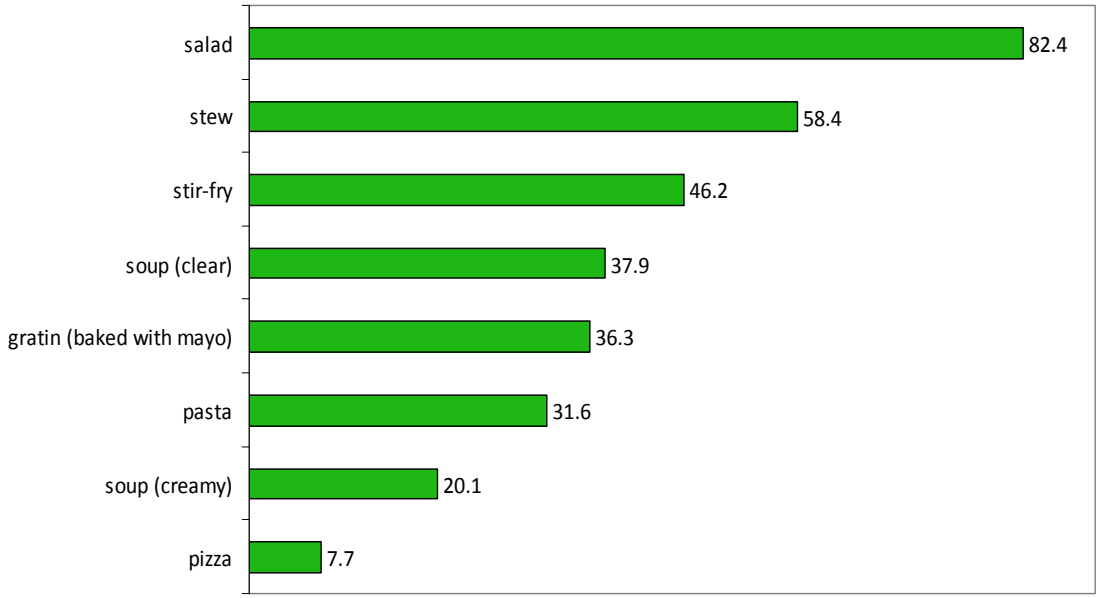


Note: Sample (n) = 1,010
Figure 65: Out-of-home consumption (prepared and cooked broccoli)
Source: Results from author's analysis

There are strong skews to particular socio-demographics in relation to out-of-home consumption of broccoli. Respondents from Tokyo (Kanto) were more likely to consume broccoli away from the home than consumers from the Keihanshin area. Males have a higher rate of consumption across the spectrum of out-of-home purchase outlets than females. Households with high-incomes consume a greater proportion of broccoli in restaurants and cafes while consumption at fast food and take away outlets is more prevalent among low-income households. Out-of-home consumption is higher amongst those with a university education.

Intended use and meal consideration

Salads (82.4 percent) were considered the primary choice of meal in which to use broccoli as an ingredient (refer Figure 66). Over half of the respondents also identified a stew (58.4 percent) as a meal in which that they would include broccoli. To a lesser extent stir-fries and clear soups were also favoured to include broccoli.



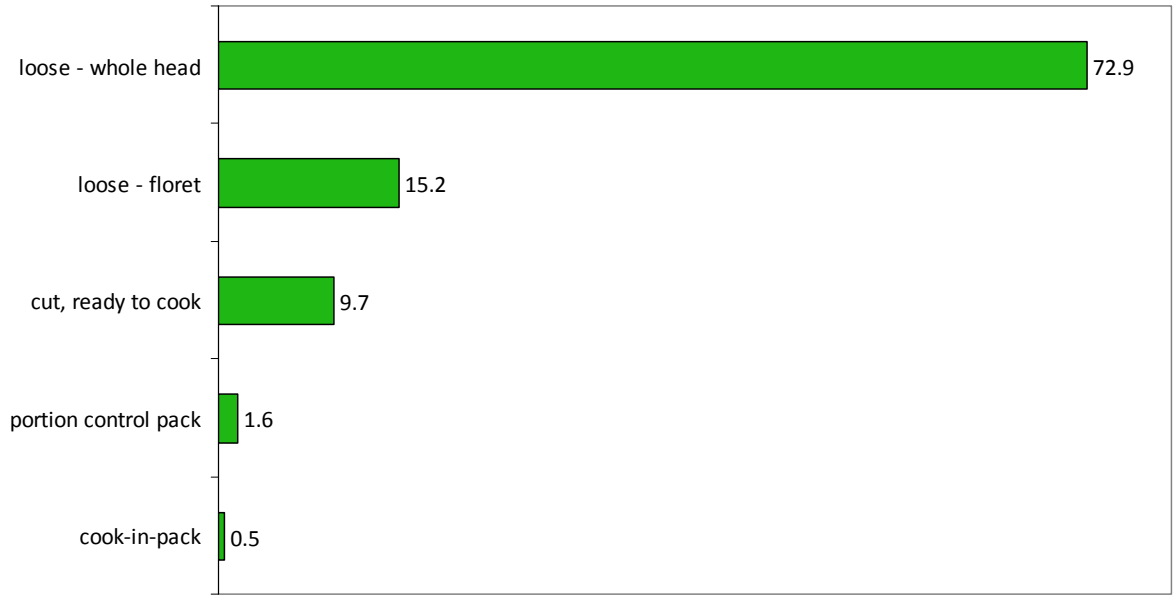
Note: Sample (n) = 1,010
Figure 66: Preferred use of broccoli as an ingredient in a meal
Source: Results from author's analysis

Broccoli was seen by respondents as a versatile vegetable with many uses across a broad spectrum of meal formats. Broccoli was synonymous with use in salads, particularly among females and those aged over 35 years. There was distinct support for broccoli served in both cold and hot formats including salads, stews and stir-fries. Males had a much stronger preference for broccoli as an ingredient in soups, both in clear (consome) and creamy (potage) formats.

Form, packaging and attribute preferences

Loose whole head is the overwhelming preferred choice for fresh broccoli form, with 72.9 percent of respondents indicating this preference (refer Figure 67). To a lesser extent, loose floret (15.2 percent) and cut, ready to cook (9.7 percent) were also acknowledged as a preference for purchasing broccoli. Of significance is the preference for females to favour loose, whole head broccoli (84.2 percent) when

compared with males (54.6 percent). Broccoli presented in loose floret pieces or cut, ready to cook (unwashed) is primarily favoured by males or younger adults.



Note: Sample (n) = 1,010

Figure 67: Preferred choice for broccoli form
Source: Results from author's analysis

Product attributes

Locally grown was identified by respondents as primarily a very important attribute linked to the purchase of their broccoli (see Table 24). Colour, product size and country of origin were considered important when purchasing broccoli. Interestingly, respondents were ambivalent when considering the smell of broccoli, the brand and the protective packaging of the product (see Table 24).

Table 24: Product attributes

	Very unimportant	Unimportant	Can't say either way	Important	Very important
Colour	0.2	0.5	5.8	55.3	38.1
Size	0.2	2.2	15.3	59.0	23.3
Locally grown	0.9	5.3	22.3	34.7	36.8
Country of origin	1.2	4.4	23.9	37.3	33.3
Smell	2.4	10.1	45.0	34.4	8.2
Brand	3.3	13.4	42.9	28.9	11.6
Protective packaging	16.3	27.9	39.6	14.2	2.0

Note: Sample (n) = 1,010
Source: Results from author's analysis

The order of priority of broccoli attributes is largely consistent across all socio-demographic profiles. Females tended to value the form factors of colour and size more than other attributes. Higher income earners and older respondents placed greater importance on a locally grown product and country of origin attributes.

Younger respondents and males placed a greater importance on protective packaging of their broccoli.

7.2.3 Attitudes towards imported vegetables

The characteristics of locally grown and country of origin, while ranked third and fourth most valued attributes for broccoli behind colour and size, still register high levels of importance. In general there is no strong image around Australian vegetables, their quality and safety levels. There is however less negativity around Australian produce versus the general label of 'imported' vegetables.

As outlined in Table 25, the majority of respondents do not have a clear opinion around the image or safety standards of Australian vegetables. For those who expressed a point of view, it is significantly more positive than negative. In contrast, fewer respondents were ambivalent in regard to their view of imported vegetables. Although just under half the respondents did not have a position about their preference for imported or locally grown product, around one-quarter expressed disagreement with the statement that imported vegetables could be just as good as locally grown produce.

Table 25: Statements about Australian vegetables, imported vegetables and food safety

	Strongly disagree	Disagree	Can't say either way	Agree	Strongly agree
Australian vegetables are clean and green	2.1	7.3	62.3	24.9	3.5
Imported vegetables can be just as good as locally grown produce	5.3	19.5	48.3	23.2	3.7
Australian vegetables are the safest imported vegetables to consume	2.6	9.7	62.0	22.5	3.3

Note: Sample (n) = 1,010

Source: Results from author's analysis

7.2.4 Socio-demographics

The core socio-demographic group for broccoli consumers is aged over 35 years, with a high (>¥9 million) annual household income.
There is a distinct correlation between high income earning households and higher vegetable consumption rates.

People in this group are more likely to be married and the married status is strongly associated with middle and higher-level household incomes.

Broccoli recall, as a vegetable of familiarity, is more prevalent among the older generation.

The older group is less influenced by modern trends and tends to eat a greater proportion of meals at home where vegetables feature more prominently.

7.2.5 The broccoli consumer profile

The Japanese broccoli consumer to be defined in three groups: the *regular buyers*, the *occasional buyers* and the *irregular buyers* (refer Figure 103).

Regular Buyers	Occasional Buyers	Irregular Buyers
purchase once or more than once a week	purchase every two to three weeks	purchase once per month or less often
38.2 percent	37.8 percent	23.9 percent
male skew	female skew	males and females
married status	married status	single status
aged 35 years +	aged 35 years +	aged < 35 years
university educated	no education skew	high school educated
high income household	mid income household	low income household

Note: Sample (n) = 1,010

Figure 68: Japanese broccoli buyer profile
Source: Results from author's analysis

8 Economic analysis

The economic assessment focused on the supply chain from the farm gate to the export destination (Japan). Both air freight and sea freight options were considered.

Apart from undertaking an economic analysis of the supply chain from the farm gate to the destination port, it is important to understand the economics of domestic broccoli production to ensure the underlying viability of the proposed venture.

One of the key drivers for the success of this project will be to demonstrate to industry participants that there will be an opportunity to draw a profit from the activity. As such, a gross margin analysis of fresh broccoli production is provided as a building block for an assessment of potential profitability. However, industry participants must assess the risks independently and should not rely exclusively on the gross margin analysis.

As part of the economic analysis, risk will be considered. Risk and uncertainty are features of most business and government activities and need to be understood to ensure rational investment decisions. As such, a risk assessment will form part of the overall analysis including monitoring of changes in exchange rates and prices received in Japan. This will deliver a broader understanding of the economic risks involved in exporting fresh broccoli to Japan.

The prices used in this analysis were based on Table 9 which outlines that large importers (>10 containers per week) were prepared to pay between US$1.50 and US$1.70 per kilogram of fresh broccoli, while smaller importers (one to five containers per week) were prepared to pay between US$1.80 and US$2.20 per kilogram of fresh broccoli.

Given an exchange rate of approximately USD1:AUD0.80 (currently indicating further decline) the equivalent price range is A$1.88 to A$2.13/kg of fresh broccoli for large importers, and A$2.25 to A$2.75/kg of fresh broccoli for small importers. For the purpose of this study we applied the extremes of the two ranges, A$1.88 to A$2.75/kg. The average equates to A$2.31 per kilogram of fresh broccoli, or A$18.48 per 12 kilogram Styrofoam carton (8kg of fresh broccoli). A CIF/CFR price range of A$19-22/ 12kg carton was presented at the Industry Seminar held in March 2015 to reflect the declining exchange rate and potential to command a price premium for high quality Australian broccoli.

The economic analysis of both sea and air freight is outlined in Appendix 9.

9 Communication and extension activities

9.1 Project objective

Develop and implement an extension and communication plan throughout the project and collaborate with existing HIA projects (i.e. National Export Opportunity Symposium) and AUSVEG communications.

9.1.1 Goal

The goal of this strategy is to ensure research findings and outcomes generated by this project are effectively and efficiently communicated to key stakeholders in the broccoli industry (listed in Table 26).

9.1.2 Communication plan

Communication objectives are:

- growers and exporters involved in or capable of exporting broccoli receive information on the project findings and outcomes
- industry representatives participate in the in-market activities of the project
- the project steering committee members are advocates of the project and use their networks to communicate findings to other industry participants
- key stakeholders including AUSVEG, HIA are informed of key findings from the research

Table 26: Target Audience for activities

Target Audience
Project Steering Committee
Broccoli growers interested in exporting
Exporters who have or are exporting broccoli
AHEA
AUSVEG
Seedling companies
Freight forwarders
Department of Agriculture
Potential Japanese customers – importers and retailers
Horticulture Innovation Australian (HIA)

9.2 Strategies

Use a range of media to disseminate the key findings from each major component of the project.

9.3 Activities

A list of key communication activities and outcomes is displayed in Table 27 (below).

Table 27: Key communication activities

Activity	Outcomes
Profiles (short summaries): - desktop research; - industry consultation; - market segments and; competitors; - supply chains - consumer research.	**Profiles** Desktop research and industry consultation profile disseminated to the following: - Vegetables Victoria – dissemination of profiles to 100 members - vegetablesWA – disseminated via article in e-newsletter, - Dissemination to broccoli industry list (Appendix 1) - Article on desktop profile and link to profiles on TIQ website. Other profiles to be placed on TIQ's website and emailed to broccoli industry list (Appendix 1), AUSVEG, vegetablesWA and Vegetables Victoria
Project Steering Committee - Hold up to six committee meetings - Disseminate draft research and reports to committee for comment and endorsement - Organise teleconferences for updates - Maintain regular dialogue for input and advice	**Project Steering Committee** - Committee meeting held on 20 August 2014 – consultation on research methodology and findings to date - Committee meeting held on 3 December 2014 – presented research findings, sought feedback on draft report and three year market/investment plan - Surveys, capability profile, project overview and consumer research methodology disseminated - 19 September 2014 debrief of in-market visit by project team and Kees Versteeg (Qualipac). Teleconference taped and emailed to all committee members. - Consultation regarding potential variation to project to include inbound mission by importers/retailer - 8 committee members or their representative attended the broccoli seminar held in Brisbane on 25 March 2015 to release the key findings from the project to industry
Media	Daiji Takashima interviewed by Nokei Shimbun, trade paper targeting wholesalers, distributors and importers of vegetables and fruits
Electronic Newsletters/ Websites	- vegetablesWA e-newsletter – article on Grower Survey (17 April 2014) - AUSVEG weekly update (22 April 2014) - AUSVEG Trade Talk – Desktop profile (2

Activity	Outcomes
	November 2014) - DAFF Food Chains e-newsletter November 2014 (update on in-market visit) - Articles on TIQ's website on broccoli seminar, project steering committee, desktop profile
Seminars, Workshops, Conferences	- Broccoli seminar held 17 June 2014 (27 attendees) - Clinton McGrath attended AUSVEG conference in Cairns in June 2014 - Clinton McGrath and Adriano Brescia attended AsiaFruit Logistica 2014 - Bronwyn Warfield attended 2015 Malaysia and UAE Export Symposium - Broccoli Seminar held 25 March 2015 to coincide with visit by Union Corporation Pty Ltd
Multi-media – videos, webinars	Videos of presentations delivered at broccoli seminar held June 2014 posted on TIQ website: - Gavin Foord, Case Study WA Carrot Exports - Jenny Ekman, Better broccoli maximising storage life and quality - Mike Titley, Broccoli exports to South East Asia and Japan - Project Team – project methodology Videos of presentations and interviews delivered at broccoli seminar held March 2015 posted on TIQ's website: - Project Team – project methodology - James Terry, Momack Produce, Case Study Asparagus Exports to Japan - Interview panel – project team, James Terry and Mr Nishikawa from Union Corporation Pty Ltd - Interviews with Mr Nishikawa and Project Steering Committee – opportunities for broccoli and vegetables to Japan, impediments/ challenges and future activities
HIA reporting	- Vegetable Industry Advisory Committee Annual Report 2013/14 - Presentation delivered to the Vegetable Market and Value Chain Development Advisory Panel meeting held in Werribee on 22 April 2015
Other	- Annual Report Governing for Growth – Case Study (Queensland Government) - Co-ordinated inbound visit by Smile Corporation (Japanese importer) to Melbourne and Lockyer Valley. - Co-ordinated inbound visit by Union Corporation (Japanese importer) to Queensland.

10 SWOT

Presented in Table 28 is an analysis of Australia's competitive opportunities to export broccoli to Japan.

Table 28: SWOT analysis

Strengths	Weaknesses
- Australian industry has potential to increase production to supply the Japanese market. - Industry is funding research into broccoli packaging options, maintaining quality through the supply chain and harvesting efficiencies. - The Australian vegetable industry is supporting vegetable exports. - Australia's broccoli exports to Asia have been increasing in recent years and an export culture is developing. - Broccoli growers are interested in working collaboratively to supply the Japanese market all year round. - In-market government representation in Japan to assist with export development. - Growers have expertise in supplying direct to leading supermarket chains in Australia.	- Australia has lost its foothold in the market having had no regular exports to Japan since 2006. - Australian industry lacks the size and scale to be a dominate supplier of broccoli to Japan. - Exporting to Japan will require implementation of completely new supply chain processes (airfreight to sea freight) and new packaging. - Growers may need to seek cost efficiencies in their supply chain to improve profitability in servicing the Japanese market. - Australia has lower yields and higher production costs compared to the United States and other competitors. - Some growers may require additional accreditation (Global Gap V4.0). - Australia's industry is geared to supply the domestic market in which broccoli is sold by the kilogram whilst in Japan it is sold by the piece. This has implication in terms of varieties and production systems.

Opportunities	Threats
- Interest expressed in Australian broccoli by leading importers and retailers of broccoli. - Potential to differentiate from the United States on consistent quality, supply and pricing. Ability to differentiate from China on food safety. Further research with consumers may identify other points for differentiation. - Potential to profile Australian broccoli to consumers and the trade through branding and packaging (stem tags, shrink wrap, POS). Support for in-market development programs by retailers and importers. - Large import market for fresh broccoli currently between 30,000-40,000 tonnes per year. - Some importers and retailers have indicated a willingness to pay slightly more for Australian broccoli than United States broccoli. Historically Japan has paid a higher price for Australian broccoli than for product from the United States. - JAEPA which entered into force in January 2015 has eliminated the 3 percent tariff on fresh broccoli. The United States will continue to pay the tariff. - Australia is recognised globally as a supplier of safe, clean and green food. - Australia has a potential advantage being a southern hemisphere producer whereas Japan and US, the main competitors in the fresh broccoli sector, are northern hemisphere producers and are impacted by similar climate patterns/seasons. - Opportunity to supply October to March as United States exports fall and China/Mexico supply increases. Japan's broccoli consumption peaks Oct-Dec and Feb-Mar. - Low level of confidence in the safety of Chinese food imports and declining broccoli imports from China. - Falling value of the AUD against the USD and JPY. - US production is impacted by drought conditions which is affecting supply volumes and quality leading to higher prices. - Profile of main consumer and principal uses of broccoli identified to use for targeted market development activities.	- The United States has been the leading supplier of fresh broccoli to Japan for over 20 years with strong supply chain relationships. - United States is a reliable low cost producer and exporter to Japan and can supply broccoli in all seasons. In the last 10years, United States received an average CIF price of A$2.30/kg. - Australia currently cannot differentiate from the United States on the basis of food safety. - Stringent inspections for quarantine pests and testing for chemicals. Current imports of broccoli have low fumigation levels and no reported problems with chemical residues. - Japan's domestic production has been increasing since the early 2000s and imports are declining. Japan's production increased (71 percent) over the last 20 years and can now supply all year round. - Mexico and China are supplying during the low supply period (Japan's autumn, winter) for the US. The quality of Chinese product is comparable to other imported broccoli. - Frozen broccoli imports are growing and are supplied by low cost producers such as China, Ecuador and Mexico. - Japanese prefer domestic broccoli and pay a premium for it over imported product.

11 Preliminary Strategies

Australia's broccoli exports to Japan ceased in 2006, since that period there have only been a few sporadic shipments. Research indicates potential to re-open Australia's exports of broccoli to Japan by working in partnership with key importers, retailers and high-end food service operators in Japan. A long-term strategic approach is required to build sustainable exports and regain the confidence of Japanese supply chain partners.

Outlined below are seven key areas for strategic development of Australia's exports to Japan. They include relationships, supply chains and product quality, production, differentiation, product opportunities, market development and competitors.

11.1 Relationships

- Cultivate relationships with key importers, retailers and high-end food service operators in Japan to profile Australia's product quality and export capability.

Rationale

The research identified potential to re-establish Australia's exports into the retail and high-end foodservice sector. Importers will be a key partner in assisting to re-open Australia's exports to Japan. Building strong relationships and friendships with customers is a key characteristic of Japanese business culture.

11.2 Supply Chains and Product Quality

- Undertake an audit of the current supply chain processes in Australia and the United States.
- Investigate and trial options using the United States as a benchmark to reduce costs in the supply chain for Australian broccoli exports to Japan.
- Investigate and trial new packaging, technologies and systems to reduce costs and enhance product quality along the supply chain.
- Document and monitor the cool chain (from farm to consumer) to identify breaks in the chain and identify and implement practices to enhance product quality.
- Prepare an export manual documenting best practice supply chain processes to service the Japanese broccoli market.
- Facilitate an integrated national approach to exporting broccoli to Japan to provide year round supply and to enable supply of the volumes and specifications required by customers and consumers in Japan.

Rationale

Australia presently airfreights most broccoli overseas in 12 kg Styrofoam cartons (8 kg broccoli/4 kg ice). There is currently limited expertise in sea freighting broccoli. The economic analysis indicates that sea freight is the most viable option for re-establishing exports to Japan.

The United States has sea freighted broccoli to Japan for over 20 years. United States exporters have developed efficient production and supply chain processes, and export between 57-76, 40 foot containers per week of fresh broccoli to Japan. The United States' costs of producing broccoli are 56 percent lower than Australia. United States exporters field pack broccoli and then inject liquid ice into wax cartons. Given Australia's limited expertise in sea freighting broccoli and the production efficiencies of the United States, scope exists to gain a better understanding of these processes, some of which maybe applicable to Australian growers.

Additionally given Australia's higher production and supply chain costs when compared with other import competitors, investigations into new technologies and systems to reduce costs and maximise the quality of broccoli should be explored. Such systems may include mechanical harvesting, electronic grading and alternative cooling, icing and packaging systems.

Maintaining a temperature of 0-2°C is critical to maximise the shelf-life of broccoli. Higher temperatures will reduce shelf life, in particular temperatures above 5°C. (Ekman 2015, pers. comm. February). Sea-freight takes between 10-12 days from Australia which means the broccoli will be around 15 days old by the time it arrives in Japan. Furthermore, importers reportedly store broccoli for up-to four weeks, therefore maximising shelf-life is essential.

Presently, Australia includes between 3 to 4 kg of ice in each 8kg Styrofoam carton of broccoli. The United States also injects ice into wax cartons. Icing broccoli causes rots, splits and potential food safety issues (Ekman, 2014) and also increases costs. Importers reported frustration with melting ice and costs with re-icing and repacking; however, trials using MAP reportedly had failed to maintain product quality, and temperature control in the supply chain was reportedly inadequate for iceless broccoli. A better understanding of the temperature along the supply chain from the farm to the retailers will enable exporters to maximise the shelf-life of Australian broccoli and identify the viability of using alternative packaging options.

The research indicated that certain importers are seeking supply across all seasons, with the peak window of opportunity from October through to March. Japan's total imports of fresh broccoli represent around 60-80 percent of Australia's national production Given that during Australia's peak exports to Japan in the 1990s only equated to 100 to 300 tonnes a month compared with the current United States exports of 3,000 tonnes a month, Australia is a small scale supplier. In light of these factors of year round and limited supply, a coordinated national approach to exporting to Japan is recommended.

11.3 Production

- Work in partnership with Japanese customers to implement production, supply chain, accreditation schemes and procedures and training to meet their customers' quality requirements.

Rationale

Broccoli in Japan is sold by the unit rather than weight. To improve production efficiencies and better meet the needs of the final consumer different varieties which have thinner stalks and potentially a smaller crown should be identified and samples sent to Japan for assessment. Additionally production efficiencies should be explored such as increasing planting density and mechanical harvesting. According to Mike Titley the ideal weight to aim for the Japanese market is between 250 to 280 grams (Titley, 2014). Some importers have also suggested changes to Australia's post-harvest processes. They have recommended that some petioles remain attached to protect the crown during transit, and also reduce the problem of the stem turning black where the petioles have been removed on-farm. Retailers trim the petioles in-store to enhance the fresh appearance of the broccoli. Japanese domestically grown broccoli is sold to consumers with the petioles attached.

Depending on the outlet for Australian broccoli, exporters may also need to look at obtaining GlobalGap V4.0 accreditation. Aeon is requiring all suppliers to have this accreditation. Although the general United States specification is required by most importers, there may be variations from buyer to buyer.

11.4 Differentiation

- Undertake consumer research with the potential target market of Australian broccoli to identify points of differentiation from competitors and identify purchase drivers. Some of the key drivers to explore include the importance of various attributes (colour, size, shape, packaging and taste), environmental and social responsibility practices, image of Australia and Australian vegetables versus the United States and other key competitors.
- Incorporate the findings from this research into the production of branding and promotional material.
- Work in partnership with Japanese customers to implement strategies to promote and differentiate Australian broccoli from its competitors.
- Consult with (and use the learnings from) successful Australian products in Japan, such as MLA's strategies for beef to build exports, and differentiate from the United States. Also identify any synergies to work collaboratively with MLA in Japan.

Rationale

Vegetable and broccoli consumption in Japan has fallen in recent years although broccoli is projected to have positive growth due to its health benefits, aging population and the government's program to stimulate vegetable consumption. Broccoli ranks sixth in terms of vegetables eaten weekly. One third of consumers buy it weekly and a further one-third buy it every two to three weeks. It is used in a wide range of dishes but is strongly associated with salads. Preliminary research indicates that colour, product size and country of origin are important factors when purchasing broccoli. Consumers also do not have a clear image of the safety or 'clean, green' image of Australian vegetables. The profile of the regular buyer of broccoli is male, 35 years and over, university educated and high income. Further research into consumers' perception of Australian broccoli versus other imported broccoli and what

particular colour, size, shape, packaging and format is preferred will assist in differentiating Australian broccoli and better met consumers' expectations.

Currently United States broccoli is identified in store through stem tags and domestic broccoli is sold with the petioles attached. Some importers and retailers have expressed interest in working with the industry to differentiate Australian broccoli through packaging and branding and in undertaking POS promotional activities.

11.5 Product opportunities

- Continue to explore product opportunities which create value and differentiate Australian broccoli and examine opportunities for other vegetables.

Rationale

Consumer trends in Japan indicate an aging population, smaller households, growing number of women working and demand for functional vegetables. The visit by Mr Nishikawa General Manager, Department of Vegetables, Union Corporation and interviews with other importers, has highlight opportunities for other vegetables. Therefore an opportunity exist to continue to explore with customers and consumers opportunities for value added broccoli and other vegetable lines.

11.6 Market development

- Work collaboratively to develop and implement export development activities with commercial partners and government representatives in Japan.
- Implement a range of activities (in-store promotions, POS, cooking demonstrations, media, labelling) to boost trial and consumption by consumers of Australian broccoli and support trade partners to profile and sell Australian broccoli.
- Build relationships and profile Australian broccoli to importers, retailers and the foodservice through a range of activities (trade shows, training, product information, missions).

Rationale

To ensure the export development plans are commercially focused it is recommended that commercial partners endorse and have input into the export activities planned for broccoli exports to Japan. Queensland and Victoria have trade and investment experts based in Tokyo as does Austrade. Given the intricacies of the Japanese market (language and culture) working in partnership with these agencies will be vital for ongoing success. Given Australia's limited production capacity and the size of the Japan's broccoli import market, continued collaboration across key broccoli producing states is recommended.

To re-open the Japanese market for Australian broccoli in-market support to importers, retailers and high-end food service operators is required to rebuild Australia's market share. Boosting awareness and sales of Australian broccoli direct to the final consumer will act as a pull strategy to build a preference for Australian

broccoli over other imports. Supporting the trade through training related to maintaining product quality through the chain, coupled with POS activities targeting the consumer has been a successful strategy used by Queensland in the promotion of mango, avocado and mandarin industries. Similarly Victoria has been successful in implementing POS activities for table grapes in a range of overseas markets.

11.7 Competitors

- Monitor competitors' activities in terms of in-market activities, production and supply chain issues and innovations.
- Undertake further analysis of Mexico's export industry in particular its production processes and export supply chains.

Rationale

The key competitors to Australia's exports of broccoli are the United States and the emergence of China and Mexico. The United States, with 96 percent market share for the fresh broccoli import market, is the main competitor and has significant production and supply chain efficiencies which warrants an in-depth analysis. China only has 3 percent share of the market and Mexico one percent. However since 2010 Japan's imports in terms of volume from Mexico increased by 184 percent. As for imports from China they have been erratic and in 2014 fell which is attributed to the impact of food safety concerns. Trade interviews indicated that importers were reticence to source broccoli from China and most Chinese broccoli was sold into the food service and processing sectors rather than to retail outlets. Perceptions of Chinese product should be further explored with consumers. It is therefore recommended that increased focus be placed on Mexico as a more significant emerging competitor. However, all current and emerging competitors should be monitored and further analysis of consumers' perceptions of different countries of origins and its relevance to their purchasing decisions be explored.

Appendix 1 – Seminar Invitation list and attendees

Name	Company	Type of Business
Queensland		
Steven Moffatt	Moffatt Produce	Grower
Chris Warr	Tony Warr Shipping	Freight Forwarder
Shaun Wood	CT Freight	Freight Forwarder
Linton Brimblecombe	Moira Farming	Grower
Kees Versteeg, Brad Qualischefski	Qualipac	Grower/Exporter
Matt Hood, Amir Shoshani	Rugby Farms	Grower/Exporter
Fabian Carniel	Mulgowie	Grower
Paul and Sharon Windolf, Cameron Sippel	Windolf Farms	Grower
Darren Wood	Withcott Seedlings	Seedlings
Ross Edser	South Pacific Seeds	Seeds
Anthony Staatz	Koala Farm	Grower
Nick Miall	Bauers Farm	Grower
Clem Hodgman	Barden Produce	Grower
Justin Heaven	Department of Agriculture Forestry and Fisheries	State Government
Scott Bretherton	Department of Agriculture	Federal Government
Tasmania		
Peter Mitchell	Forest Organics Tasmania Farm	Grower
Michael and Jim Ertler	Premium Fresh	Grower
Simon Drum, David Hooper	Harvest Moon	Grower/Exporter
Victoria		
James Terry	Momack Produce	Grower/Exporter
Joe Vizzarri	Vizzarri Farms	Industry Representative
Robert Nave	Fragapane Farms	Grower
Paul Gazzola	Gazzola Farms	Grower
John Said	Fresh Select	Grower/Marketer
Peter Covino	Covino	Grower
Ross Ingram	Bonaccord	Grower
Tony Ford	Boomaroo Nursery	Seedlings
Tina Lamattina	Lamattina Group	Growers
Andrew Bulmer	Bulmer Farms	Grower
Tony Imeson, Helena Whitman	Vegetables Victoria	Grower Organisation
Western Australia		
Brad Ipsen	Twin Lakes	Grower
Gavin Foord, Sarah Houston	vegetablesWA	Grower Organisation
Jim Mustica	Monte and Sons	Grower
Rachel Lancaster and Alan McKay	Department of Agriculture and Food, Western Australia	State Government
South Australia		
Don Ruggiero	SwanPort Harvest	Grower
New South Wales		
Michelle Christoe	AHEA	Industry Representative
Dr Jenny Ekman	Applied Horticulture Research	Consultant
Mike Titley Consultant	MHT Consulting	Consultant
Hayden Moore/ Michael Coote	AUSVEG	Export Manager
Jeff McSpedden		Industry Representative
Allan Cox	Cox A F & H S & Son	Grower
Ed Fagan	Mulyan Farms	Grower

Appendix 2 – Project Steering Committee Terms of Reference

ブロッコリー

Terms of Reference

Project Steering Committee

Market Analysis and Strategy | Broccoli to Japan

Project Objective

1. Work in a collaborative partnership with vegetable levy payers and exporters to direct and oversight the project activities and actively participate in in-market activities.

Committee Objectives

1. Provide input and direction to the project team on research and communication activities.
2. Provide information to the project team to assist them meet the project objectives.
3. Assist with communication and dissemination activities for the project.
4. Identify any key impediments and issues that the project team should investigate as part of the project activities.
5. Participate in the in-market activities if possible.

Activities

1. Attend (in person or via teleconference, videoconference) project steering committee meetings. Six meetings in total running for three hours.
2. Provide information or contacts to the project team that contributes to project activities.
3. Identifies any relevant issues or impediment that may impact on the project or that requires the project team to investigate.
4. Participate in communication activities such as workshops/seminars and in-market visit.

Schedule of project meetings

Month	Activities
July	Timing and itinerary for in-market visit, surveys reviewed
September	In-market visit (committee members welcome to participate)
October	Post in-market review - consumer research, competitor analysis, supply chain mapping
November	Economic analysis, update on research
January	Update on final report and communication activities, and three year market development plan
February	Communication and extension - workshop/seminar

Funding

All travel costs for project steering committee members to attend meetings will be covered by the project.

Contact

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Trade & Investment Queensland

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TIQ Trade & Investment Queensland AUSTRALIA

HAL Horticulture Australia

Griffith UNIVERSITY Queensland, Australia

Queensland Government Australia

Great state. Great opportunity.

Appendix 3 – Quarantine pest list

1. Injurious Animals

Phylum / Group	Scientific or common name of pest
1. Arthropods	Acalolepta australis, Acalymma vittatum, Acanthocinus aedilis, Acizzia acaciaebaileyanae, Acizzia uncatoides, Acrolepiopsis assectella, Acrosternum hilare, Acutaspis albopicta, Adoretus versutus, Adrama determinata, Aegopsis bolboceridus [SYN: Aegopsis bolbocerida], Aleurocanthus citriperdus, Aleurocanthus woglumi, Aleuroclava gordoniae, Aleuroclava guyavae, Aleuroclava neolitseae, Aleurodicus cocois, Aleurodicus dispersus, Aleurotuba jelinekii, Aleyrodes proletella, Amblypelta cocophaga, Amblypelta lutescens, Amphorophora agathonica, Amsacta moorei, Anarsia lineatella, Anastrepha fraterculus, Anastrepha ludens, Anastrepha obliqua, Anastrepha serpentina, Anastrepha suspensa, Anstenoptilia marmarodactyla, Anthonomus eugenii, Anticarsia gemmatalis, Aonidomytilus albus, Aphis intybi, Aphis newtoni, Aphis pomi, Apterothrips apteris, Archips argyrospilus, Archips machlopis, Archips micaceana, Argyrotaenia citrana, Argyrotaenia velutinana, Arhopalus ferus, Arixyleborus canaliculatus, Arixyleborus granifer, Arixyleborus granulifer, Arixyleborus hirsutulus, Arixyleborus imitator, Arixyleborus mediosectus, Arixyleborus rugosipes, Arorathrips spiniceps, Asiacornococcus kaki, Asiraca clavicornis, Aspidiella hartii, Aspidiotus coryphae, Australothrips bicolor, Autographa californica, Bactericera cockerelli, Bactrocera albistrigata, Bactrocera correcta, Bactrocera cucurbitae, Bactrocera dorsalis species complex, Bactrocera frauenfeldi, Bactrocera latifrons, Bactrocera luzonae, Bactrocera mcgregori, Bactrocera neohumeralis, Bactrocera nigrotibialis, Bactrocera ochrosiae, Bactrocera oleae, Bactrocera passiflorae, Bactrocera tau, Bactrocera tryoni, Bactrocera ubiquita, Bactrocera umbrosa, Bactrocera xanthodes, Bactrocera zonata, Baileyothrips arizonensis, Blissus leucopterus, Boisea trivittata, Brachycaudus schwartzi, Brevipalpus chilensis, Brevipalpus essigi, Bruchophagus roddi, Bruchus lentis, Cacoecimorpha pronubana, Caliothrips fasciatus, Caliothrips indicus, Caliothrips phaseoli, Callosobruchus analis, Callosobruchus rhodesianus, Capitophorus horni, Carpomya pardalina Carpophilus obsoletus, Caryedon serratus, Caulophilus oryzae, Cerataphis brasiliensis, Cerataphis orchidearum, Ceratitis capitata, Ceratitis cosyra, Ceratitis malgassa, Ceratitis punctata, Ceratitis rosa, Ceroplastes destructor, Ceroplastes rusci, Chaetanaphothrips signipennis, Chaetocnema pulicaria, Cheirolasia burkei, Chilo auricilius, Chiloloba acuta, Chloridolum alcmene, Chlorocala africana, Chlorochroa ligata, Choristoneura evanidana, Choristoneura rosaceana, Chromatomyia syngenesiae, Chrysobothris femorata, Chrysodeixis chalcites, Chrysodeixis includens, Cinara confinis, Cinara occidentalis, Circulifer tenellus, Clavigralla tomentosicollis, Clepsis peritana, Clepsis spectrana, Coccotrypes subcribrosus, Cochlochila bullita, Conotrachelus nenuphar, Copitarsia turbata, Cordylomera torrida, Corizus hyoscyami, Costelytra zealandica, Craspedothrips minor, Crenidorsum aroidephagus, Cricula trifenestrata, Crioceris asparagi, Crioceris duodecimpunctata, Crossotarsus squamulatus, Cryphalus latus, Cryptolestes capensis, Cryptoxyleborus subnaevus, Crypturgus cinereus, Ctenarytaina eucalypti, Ctenopseustis obliquana, Cyclorhipidion agnatum, Cyclorhipidion sexspinatum, Cyclorhipidion subagnatum, Cydia pomonella, Cylas formicarius, Dacus ciliatus, Delia radicum, Dendroctonus brevicomis, Dendroctonus ponderosae, Dendroctonus pseudotsugae, Dendroctonus rufipennis, Dendroctonus valens, Desmothrips tenuicornis, Diabrotica balteata, Diabrotica undecimpunctata, Dialeges pauper, Dialeuropora decempuncta, Diaphania hyalinata, Diaphania nitidalis, Diaphorina citri, Diaprepes abbreviatus, Diaprepes splengleri, Diapus minutissimus, Diapus pusillimus, Diapus quinquespinatus, Diaspidiotus ancylus, Dichromothrips corbetti, Dictyotus caenosus, Diloboderus abderus, Dinoplatypus agnatus, Dinoplatypus biuncus,

Phylum / Group	Scientific or common name of pest
	Dinoplatypus cavus, Dinoplatypus chevrolati, Dinoplatypus cupulatulus, Dinoplatypus cupulatus, Dinoplatypus forficula, Dinoplatypus luniger, Dinoplatypus pallidus, Dinoplatypus pseudocupulatus, Dinoplatypus uncatus, Ditula angustiorana, Dolurgus pumilus, Dryocoetes affaber, Dumbletoniella eucalypti, Duponchelia fovealis, Dysaphis apiifolia, Dysaphis cynarae, Dysmicoccus finitimus, Dysmicoccus grassii, Dysmicoccus lepelleyi, Dysmicoccus neobrevipes, Dysmicoccus texensis, Eccoptopterus gracilipes, Edessa meditabunda, Elasmopalpus lignosellus, Elophila responsalis, Empoasca decipiens, Empoasca fabae, Endrosis sarcitrella, Epichoristodes acerbella, Epidiaspis leperii, Epilachna borealis, Epiphyas postvittana, Ericaphis scammelli, Eriophyes sheldoni, Estigmene acrea, Eulecanium tiliae, Euplatypus hintzi, Euplatypus parallelus, Euproctis chrysorrhoea, Eurydema ornata, Eurygaster integriceps, Euryphagus lundi, Euscepes postfasciatus, Euschistus conspersus, Euwallacea destruens, Euxesta stigmatias, Ferrisia malvastra, Formicococcus njalensis, Frankliniella australis, Frankliniella brunnea, Frankliniella citripes, Frankliniella fallaciosa, Frankliniella gossypiana, Frankliniella panamensis, Frankliniella schultzei, Frankliniella williamsi, Furcaspis oceanica, Gatesclarkeana domestica, Genyocerus abdominalis, Genyocerus borneensis, Genyocerus pendleburyi, Genyocerus spinatus, Gnathotrichus retusus, Gnathotrichus sulcatus, Golofa eacus, Graphania ustistriga, Grapholita funebrana, Grapholita prunivora, Gryllotalpa gryllotalpa, Gymnoscelis rufifasciata, Halotydeus destructor, Haplothr anceps, Haplothrips clarisetis, Haplothrips froggatti, Haplothrips robustus, Haplothrips varius, Helicoverpa punctigera, Helicoverpa zea, Heliothis virescens, Hemiberlesia musae, Hemiberlesia ocellata, Hendecasis duplifascialis, Heterobostrychus aequalis, Hofmannophila pseudospretella, Hordeolicoccus nephelii, Hyadaphis coriandri, Hylesinus aculeatus, Hylesinus varius, Hylurgops rugipennis, Hypolycaena erylus, Hypothenemus hampei, Insignorthezia insignis, Ips calligraphus, Ips concinnus, Ips latidens, Ips montanus, Ips perturbatus, Ips pini, Ips sexdentatus, Ips tridens, Isotenes miserana, Lambdina fiscellaria, Leptinotarsa decemlineata, Leptoglossus clypealis, Leptoxyleborus punctatissimus, Limothrips angulicornis, Limothrips cerealium, Limothrips denticornis, Lindingaspis rossi, Liriomyza betae, Liriomyza langei, Liriomyza nietzkei, Listronotus oregonensis, Lygus elisus, Lygus hesperus, Lygus lineolaris, Macroplectra nararia, Malacosoma americanum, Malacosoma disstria, Malacosoma parallela, Mamestra configurata, Mayetiola destructor, Megalurothrips sjostedti, Megastigmus transvaalensis, Melolontha melolontha, Meyriccia latro, Microtheca ochroloma, Monacrostichus citricola, Monarthrum fasciatum, Monarthrum mali, Monochamus scutellatus, Murgantia histrionica, Mythimna unipuncta, Myzus cymbalariae, Naupactus leucoloma, Naupactus xanthographus, Neides muticus, Neoceratitis cyanescens, Nipaecoccus nipae, Nysius huttoni, Nysius raphanus, Oligonychus peruvianus, Omphisa anastomosalis, Oncastichus goughi, Opogona aurisquamosa, Opogona omoscopa, Orchamoplatus mammaeferus, Organothrips indicus, Orgyia antiqua, Orgyia leucostigma, Orseolia oryzae, Orthotomicus erosus, Oryctes agamemnon, Oryctes boas, Oryctes monoceros, Ostrinia nubilalis, Otiorhynchus armadillo, Otiorhynchus meridionalis, Otiorhynchus ovatus, Otiorhynchus rugosostriatus, Otiorhynchus salicicola, Otiorhynchus singularis, Oulema melanopus, Oxoplatypus quadridentatus, Oxycarenus hyalinipennis, Oxycarenus luctuosus, Pachnoda butana [SYN:Pachnodella butana], Pachnoda interrupta, Pagiocerus frontalis, Panchaetothrips indicus, Papuana uninodis, Papuana woodlarkiana, Paracoccus marginatus, Parapiesma quadratum, Parlatoria oleae, Parlatoria pittospori, Pentamerismus erythreus, Phenacoccus hakeae, Phenacoccus solenopsis, Phenacoccus stelli, Phloeosinus cupressi, Phloeosinus punctatus, Phloeotribus liminaris, Phloeotribus scarabaeoides, Phlogophora meticulosa, Phlyctinus callosus, Phrissogonus laticostata, Phyllophaga smithi, Pinnaspis musae, Placosternus difficilis, Planococcus ficus, Planococcus kenyae, Planococcus mali, Planococcus minor, Platynota stultana, Platyptilia carduidactyla, Platypus apicalis, Platypus curtus, Platypus excedens, Platypus geminatus, Platypus jansoni, Platypus

Phylum / Group	Scientific or common name of pest
	koryoensis, Platypus porcellus, Platypus pseudocurtus, Platypus shoreanus, Platypus subdepressus, Plicothrips apicalis, Podischnus agenor, Polychrosis viteana, Polygraphus occidentalis, Polygraphus rufipennis, Prionus californicus, Proeulia chrysopteris, Protaetia aeruginosa, Protaetia aurichalcea, Protaetia auripes, Protaetia bipunctata, Protaetia celebica, Protaetia cretica, Protaetia cuprea, Protaetia himalayana, Protaetia milani, Protaetia nox, Protaetia speciosa, Pseudanaphothrips achaetus, Pseudaulacaspis eugeniae, Pseudaulacaspis papayae, Pseudococcus calceolariae, Pseudococcus elisae, Pseudococcus epidendrus, Pseudococcus jackbeardsleyi, Pseudococcus maritimus, Pseudococcus saccharicola, Pseudococcus solenedyos, Pseudococcus viburni, Pseudohylesinus nebulosus, Pseudotheraptus wayi, Psila rosae, Ptinus tectus, Pyrrharctia isabella, Rastrococcus iceryoides, Retithrips syriacus, Rhagoletis cerasi, Rhagoletis cingulata, Rhagoletis completa, Rhagoletis fausta, Rhagoletis indifferens, Rhagoletis pomonella, Rhopalosiphoninus staphyleae, Rhopalus tigrinus, Saperda candida, Saturnia pavonia, Saturnia pyri, Scapanes australis [SYN: Oryctes australis], Schistocerca gregaria, Schizotetranychus malayanus, Sciopithes obscurus, Scirtothrips citri, Scirtothrips inermis, Scolypopa australis, Scolytus multistriatus, Scolytus rugulosus, Scolytus scolytus, Selenaspidus articulatus, Semanotus ligneus, Semanotus litigiosus, Sinicaepermenia sauropophaga, Sinoxylon anale, Sinoxylon conigerum, Sitobion fragariae, Sitobion luteum, Sitophilus granarius, Sitophilus linearis, Spissistilus festinus, Spodoptera albula, Spodoptera frugiperda, Spodoptera latifascia, Spodoptera littoralis, Spodoptera ochrea, Spodoptera ornithogalli, Spodoptera praefica, Stenozygum coloratum, Strategus aloeus, Strategus anachoreta, Strategus barbigerus, Strategus jugurtha, Strategus simson, Strategus validus, Striglina scitaria, Strymon melinus, Systole coriandri, Tagosodes orizicolus, Taphrorychus bicolor, Tenothrips discolor, Tenuipalpus caudatus, Tetranychus desertorum, Tetranychus lambi, Tetranychus malaysiensis, Tetranychus marianae, Tetranychus mexicanus, Tetranychus pacificus, Tetranychus turkestani, Tetrapriocera longicornis, Thrips angusticeps, Thrips atratus, Thrips australis, Thrips florum, Thrips fuscipennis, Thrips imaginis, Thrips major, Thrips meridionalis, Thrips minutissimus, Thrips nelsoni, Thrips obscuratus, Thrips parvispinus, Thrips safrus, Thrips sumatrensis, Thrips vulgatissimus, Thyridopteryx ephemeraeformis, Trialeurodes ricini, Trioza vitreoradiata, Trogoderma granarium, Trogoxylon spinifrons, Trypodendron rufitarsis, Tuta absoluta, Unaspis citri, Uroleucon cichorii, Vinsonia stellifera, Vryburgia amaryllidis, Webbia pabo, Xyleborinus exiguus, Xyleborinus gracilis, Xyleborus abscissus, Xyleborus amplexicauda, Xyleborus bidentatus, Xyleborus cognatus, Xyleborus emarginatus, Xyleborus fallax, Xyleborus fastigatus, Xyleborus ferrugineus, Xyleborus latecornis, Xyleborus macropterus, Xyleborus pseudopilifer, Xyleborus pumilus, Xylechinus montanus, Xylocis tortilicornis, Xyloperthella crinitarsis, Xyloperthella picea, Xylosandrus morigerus, Xylothrips religiosus, Xylotrupes gideon, Xylotrupes pubescens, Zabrotes subfasciatus, Zonocerus elegans, Zonosemata electa
2. Nematodes	Ditylenchus angustus, Globodera pallida, Globodera rostochiensis, Heterodera goettingiana, Heterodera schachtii, Heterodera zeae, Meloidogyne chitwoodi, Meloidogyne fallax, Nacobbus aberrans, Radopholus citrophilus, Radopholus similis, Xiphinema index
3. Mollusks	Achatina fulica, Acusta ravida, Arion ater, Arion hortensis, Candidula intersecta, Cepaea nemoralis, Cernuella virgata, Cochlicella acuta, Cochlicella barbara, Deroceras reticulatum, Helix aperta, Helix aspersa, Mariaella dussumieri, Succinea erythrophana, Succinea putris, Theba pisana

Note: Plant Protection Station of Japan may take quarantine action on organisms without the list.

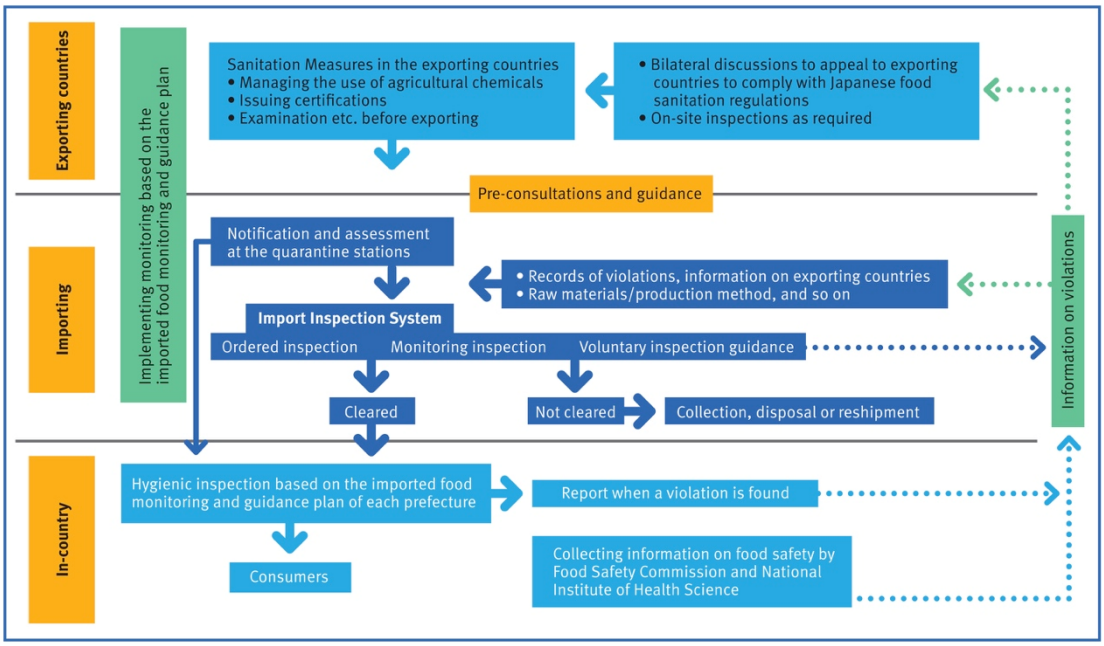
2. Injurious plants and Microorganisms

Phylum/Group	Scientific name of past
1. Fungi	Alternaria triticina, Apiosporina morbosa, Balansia oryzae-sativae, Ceratocystis fagacearum, Cercospora smilacis, Claviceps gigantea, Cochliobolus victoriae, Coleosporium ipomoeae, Deuterophoma tracheiphila, Drechslera iridis, Elsinoe australis, Eutypa lata, Fusarium oxysporum f. sp. betae, Fusarium oxysporum f. sp. pisi, Fusarium oxysporum f. sp. tuberosi, Guignardia citricarpa, Gymnosporangium clavipes, Gymnosporangium juniperi-virginianae, Hypoxylon mammatum, Hypoxylon mediterraneum, Monilinia vaccinii-corymbosi, Ophiostoma novo-ulmi, Ophiostoma ulmi, Peniophora sacrata, Peronosclerospora maydis, Peronosclerospora philippinensis, Peronosclerospora sacchari, Peronosclerospora sorghi, Peronospora tabacina, Phymatotrichopsis omnivora, Phytophthora kernoviae, Phytophthora phaseoli, Phytophthora ramorum, Puccinia aristidae, Puccinia pittieriana, Pucciniastrum americanum, Rosellinia bunodes, Rosellinia pepo, Septoria citri, Sphaeropsis tumefaciens, Stenocarpella macrospora, Stenocarpella maydis, Synchytrium endobioticum, Synchytrium psophocarpi, Tilletia indica, Uromyces betae
2. Bacteria	Alternaria triticina, Apiosporina morbosa, Balansia oryzae-sativae, Ceratocystis fagacearum, Cercospora smilacis, Claviceps gigantea, Cochliobolus victoriae, Coleosporium ipomoeae, Deuterophoma tracheiphila, Drechslera iridis, Elsinoe australis, Eutypa lata, Fusarium oxysporum f. sp. betae, Fusarium oxysporum f. sp. pisi, Fusarium oxysporum f. sp. tuberosi, Guignardia citricarpa, Gymnosporangium clavipes, Gymnosporangium juniperi-virginianae, Hypoxylon mammatum, Hypoxylon mediterraneum, Monilinia vaccinii-corymbosi, Ophiostoma novo-ulmi, Ophiostoma ulmi, Peniophora sacrata, Peronosclerospora maydis, Peronosclerospora philippinensis, Peronosclerospora sacchari, Peronosclerospora sorghi, Peronospora tabacina, Phymatotrichopsis omnivora, Phytophthora kernoviae, Phytophthora phaseoli, Phytophthora ramorum, Puccinia aristidae, Puccinia pittieriana, Pucciniastrum americanum, Rosellinia bunodes, Rosellinia pepo, Septoria citri, Sphaeropsis tumefaciens, Stenocarpella macrospora, Stenocarpella maydis, Synchytrium endobioticum, Synchytrium psophocarpi, Tilletia indica, Uromyces betae Acidovorax avenae subsp. citrulli, Apple rubbery wood phytoplasma, Aster yellows phytoplasma group, Candidatus Liberibacter africanus, Candidatus Liberibacter americanus, Candidatus Liberibacter asiaticus, Candidatus phytoplasma aurantifolia（Lime witches'-broom phytoplasma, Candidatus Phytoplasma australiense, Candidatus Phytoplasma mali, Candidatus Phytoplasma prunorum（Apricot chlorotic leafroll）, Candidatus Phytoplasma pyri, Clavibacter michiganensis subsp. nebraskensis, Curtobacterium flaccumfaciens pv. betae, Curtobacterium flaccumfaciens pv. flaccumfaciens, Erwinia amylovora, Erwinia tracheiphila, Grapevine flavescence doree phytoplasma, Grapevine yellows phytoplasma, Pantoea stewartii [SYN:Erwinia stewartii], Peach rosette phytoplasma, Peach X-disease phytoplasma, Peach yellows phytoplasma, Potato purple top wilt phytoplasma , Potato stolbur phytoplasma, Rubus stunt phytpolasma, Spiroplasma citri, Strawberry lethal decline phytoplasma, Sugarcane grassy shoot and white leaf phytoplasmas, Sugarcane yellows phytoplasma, Vaccinium Witches'-broom phytoplasma, Xanthomonas arboricola pv. Juglandis [SYN:Xanthomonas campestris pv. juglandis], Xanthomonas arboricola pv. populi [SYN:Xanthomonas campestris pv. populi], Xanthomonas campestris pv. vasculorum, Xanthomonas oryzae pv. oryzicola, Xylella fastidiosa
3. Viruses	Allium virus X, American plum line pattern virus, Andean potato latent virus, Andean potato mottle virus, Apricot deformation mosaic virus, Arracacha virus B, Artichoke Italian latent virus, Banana bract mosaic virus, Banana streak GF virus, Banana streak Mysore virus, Banana streak OL virus, Banana streak virus, Beet curly top virus, Black raspberry necrosis virus, Blackberry yellow vein- associated virus, Blackcurrant reversion virus, Blueberry leaf mottle virus, Blueberry mosaic virus, Blueberry scorch virus, Blueberry shock virus, Blueberry shoestring virus, Broad bean stain virus, Broad bean true mosaic virus, Carnation Italian ringspot virus, Carnation ringspot virus, Cherry hungarian rasp leaf virus, Cherry line pattern and leaf curl virus, Cherry mottle leaf virus, Cherry rasp leaf virus, Chestnut line pattern virus, Citrus leprosis virus C, Citrus sudden death-associated virus, Citrus variegation virus, Citrus yellow mosaic virus, Fiji disease virus, Fragaria chiloensis latent virus, Gooseberry vein banding

Phylum / Group	Scientific name of past
	associated virus, Grapevine Bulgarian latent virus, Grapevine chrome mosaic virus, Grapevine leafroll-associated virus 4, Grapevine leafroll-associated virus 5, Grapevine leafroll-associated virus 6, Grapevine leafroll-associated virus 7, Grapevine leafroll- associated virus 8, Grapevine line pattern virus, Grapevine yellow vein virus , Indian citrus ringspot virus, Iris fulva mosaic virus, Maize stripe virus, Myrobalan latent ringspot virus, Narcissus degeneration virus, Narcissus late season yellows virus, Narcissus tip necrosis virus, Onion mite- borne latent virus, Passion fruit ringspot virus, Passion fruit woodiness virus, Passion fruit yellow mosaic virus, Peach mosaic virus, Peach rosette mosaic virus, Peach yellow bud mosaic virus, Peanut clump virus, Pelargonium leaf curl virus, Pepino mosaic virus, Pineapple mealybug wilt- associated virus 1, Pineapple mealybug wilt-associated virus 2, Pineapple mealybug wilt-associated virus 3, Plum pox virus, Potato black ringspot virus, Potato deforming mosaic virus, Potato latent virus, Potato rough dwarf virus, Potato virus T, Potato virus U, Potato virus V, Potato yellow dwarf virus, Potato yellow mosaic virus, Potato yellow vein virus, Potato yellowing virus, Ranunculus white mottle virus, Raspberry bushy dwarf virus, Raspberry leaf curl virus, Raspberry leaf spot virus, Raspberry ringspot virus, Raspberry vein chlorosis virus, Rubus Chinese seed-borne virus, Rubus yellow net virus, Solanum apical leaf curl virus, Sowbane mosaic virus, Strawberry chlorotic fleck associated virus, Strawberry latent ringspot virus, Strawberry leafroll virus, Strawberry necrotic shock virus, Strawberry pallidosis-associated virus, Sugarcane mild mosaic virus, Sugarcane streak Egypt virus, Sugarcane streak virus, Sugarcane striate mosaic-associated virus, Sugarcane yellow leaf virus, Sweet potato caulimo-like virus, Sweet potato chlorotic stunt virus, Sweet potato feathery mottle virus, Sweet potato leaf curl Georgia virus, Sweet potato leaf speckling virus, Sweet potato mild mottle virus, Sweet potato mild speckling virus, Sweet potato vein mosaic virus, Sweet potato virus 2, Thimbleberry ringspot virus, Tomato yellow mosaic virus, Tulip halo necrosis virus, Vallota mosaic virus
4. Viroid	Potato spindle tuber viroid
5. Diseases (The causal agent is unknown.)	Amasya cherry disease, Apple ringspot, Apple star crack, Apricot moorpark mottle, Apricot pucker leaf, Apricot ring pox, Apricot stone pitting, Australian citrus dieback, Blackberry Calico, Blackcurrant yellows, Cherry black cancker, Cherry rough fruit, Cherry rusty mottle disease, Citrus bud union crease, Citrus chlorotic dwarf, Citrus cristacortis, Citrus gum pocket, Citrus gummy bark, Citrus impietratura, Elm zonate canker, Krikon stem necrosis, Peach purple mosaic, Peach seedling chlorosis, Peach stubby twig, Peach wart, Prune diamond canker

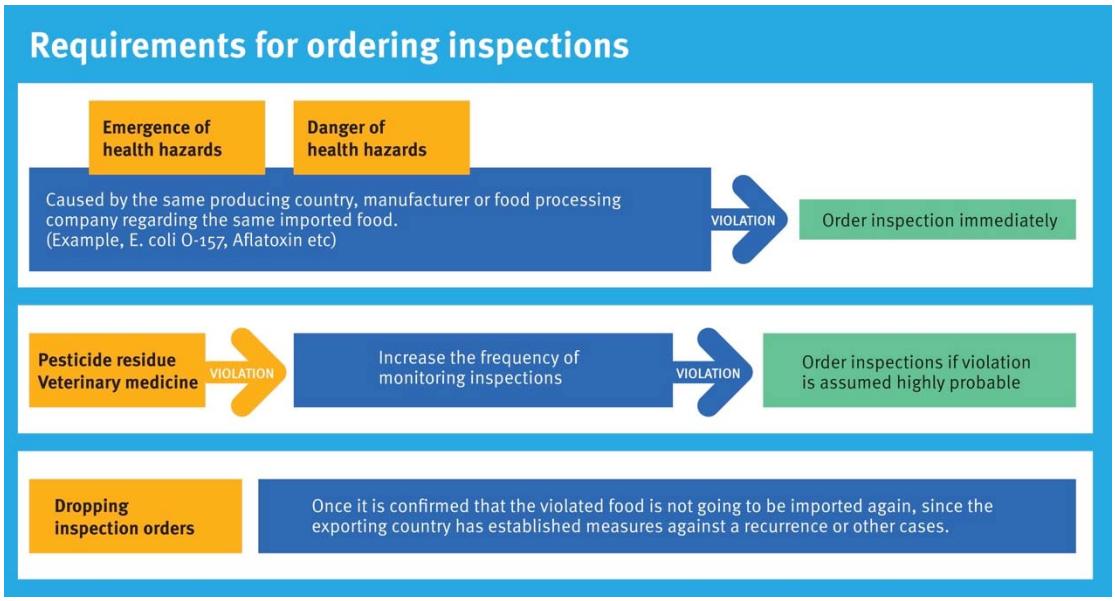
Note: Plant Protection Station of Japan may take quarantine action on organisms without the list.

Appendix 4 – Flowchart of Monitoring system for imported foods



Source: Office of Import Food Safety, Ministry of Health, Labour and Welfare, 2014

Appendix 5 – Flowchart of requirements for ordering inspections



Source: Office of Import Food Safety, Ministry of Health, Labour and Welfare, 2014

Appendix 6 – Consumer Grocery Council specification

CGC	Agreement Regarding Specifications of U.S. Broccoli			

Item /common item #	**CGC U.S. BROCCOLI**
Specification	**38 COUNT/CARTON**
Exporter	
Grower	

Growers	Join LGMA	Join LGMA"Leafy Green Marketing Agreement" authorized by FDA
	3rd party certificat	Acquire GFSI certified scheme
		Acquire Primus GFS
	Farm	Products shall be delivered by in-house or contract growers
Ingredients	Ingredients	California grown fresh broccoli
	Growing areas	Salinas, Imperial valley, California and Yuma, Arizona
	Varieties grown	Heritage, Marathon, Castle dome, Imperial and other varieties (depending on season and circumsta
Product specifications	Size	**Diameter: about 4.7 in. (12cm) to about 5.1 in. (13cm), Length: about 5.5 in. (14cm)**
	Count	**38 count/carton**
	Quality standard	1. Firm crowns
		2. Round, dome-shaped crowns
		3. No scars. No damage from pests
		4. No yellow beads
		5. No brown beads
		6. No hollow core (hollow or cracked stem)
		7. No pin rot (pin-shaped rotting on the crown)
		8. No water spots (absorbtion of water)
		9. No discoloration (purpling) of the crown
Harvest and storage process	Harvest	Manual (hand) cutting, harvest, and packing (field pack)
	Pack	38 count/carton
	Refrigeration	Placed in cooler within 4 to 6 hours of harvest
	Flash freezer/cool	Flash cooling with hydrovacuum (to be used in summer more than 70F or 21C)
	Cooling with ice	Each carton to be packed with ice (broccoli core temp.: 33F to 36F, or 0.6C to 2C)
	Cooler storage	Cooler temp. to be 33F to 37F (0.6C to 3C)
	Shipping	40ft reefer container with 960 cartons/container (container temp. to be 31F to 33F, or -0.6C to 0.6C)
Carton	1. Material	Corrugated cardboard (water-resistant)
	2. Size, spec	Dimensions: 18.9 in. X 11.0 in. X 11.8 in. (48cm X 28cm X 30cm)
	3. Design	Design to be provided by CGC
	4. Display	Same as above
	5. LOT #	Traceability code (harvest date, field number, date and time of cooler check-in)
	6. Manufacturer	Hayes Produce Marketing
	7. Handle	None
	8. Color	Depending on design
	9. Partition	None
Container quantity	20ft	–
***Reefer container**	40ft	About 960 cartons (depending on weight of cargo)
C&F Japan	20ft	–
	40ft	Price to be determined weekly and/or monthly
Minimum order quantity		960 cartons
Lead time		ETA to be 3 weeks following issue of purchase order
Other control documents to be included in the spec. sheet	*Grower shall control pesticide residue in accordance with Japan's Positive List.	
	*Pesticide residue levels shall not exceed Japan's tolerance limits when tested by a third party upon customs clearanc	
	If detected levels exceed these tolearance limits, this will be considered a breach of contract and the grower shall be responsible for costs related to recall of the cargo in question.	
	*Grower shall not ship product that is not grown in-house or by a contract grower.	

Appendix 7 – Broccoli - General market specifications

Market Produce Specifications

PRODUCE: BROCCOLI
TYPE: N/A
VARIETY: Various
CLASS: One

GENERAL APPEARANCE CRITERIA	
COLOUR	*With blue-green to purple-green florets; olive green leaves; light green stalks; white to cream cut flesh at base. Nil with brownish or reddish florets*
VISUAL APPEARANCE	*Fresh, compact heads; 3-6 narrow outer leaves retained; stalks with even, clean fresh cuts; no leaves growing through or above the head; no foreign matter.*
SENSORY	*With firm, crisp heads; pleasant flavour; no persistent 'off' odours or tastes*
SHAPE	*With compact, domed heads; tightly grouped branchlets, not loose or spreading; floret size relatively even over the head.*
SIZE	*Preferred Head diameter is 100 - 140mm (small/medium). All other sizes only by request; 80 - 100mm (small), 140 - 180mm (medium), 180 - 200mm (large).* *Stalk length: trimmed, per requirements, eg. With distance from cut base to dome top being approximately equal to dome width; or cut not >20mm below the join (lower side) of bottom lateral to main stalk.*
MATURITY	*Full firm stalks, no evidence of bud opening (overmature).*
MAJOR DEFECTS	
INSECTS DISEASES	*With evidence of live insects, eg. insect larvae, slugs, snails.*
	With fungal or bacterial rots in the head, stem or attached leaves.
PHYSICAL / PEST DAMAGE	*With broken or crushed branchlets, or with cuts or splits in the stems which break the skin.*
PHYSIOLOGICAL DISORDER	*With limp, soft leaves or florets (dehydrated).*
	With yellowish, purplish or brown toned florets, or with yellowed or brown jacket leaves.
	With yellowing florets (age, ethylene damage).
TEMPERATURE INJURY	*With bleached or discoloured appearance (sunburn)*
	With soft, discoloured water-soaked florets, leaf or stalk tissues (freezing injury).
MINOR DEFECTS	
PHYSICAL / PEST DAMAGE	*With minor (<2mm deep) abrasion, scuffing, pest chewing, hail or rub damage/blemish to florets or stalks, affecting >1sq cm.*
	With minor breaks to florets around the head perimeter exposing >6 sq cm of damaged florets (white-green appearance in side-on-view).
PHYSIOLOGICAL DISORDERS	*With hollow stalk, ie. Discoloured cracks/hollow areas affecting >1 sq cm of the cut base of the stalk.*
CONSIGNMENT CRITERIA	
TOLERANCE PER CONSIGNMENT	*Total minor defects (within allowance limit) to be < 2 defects per item Total minor defects (outside allowance limit) must not exceed 10% of consignment. Total major defects must not exceed 2 % of consignment. Combined Total not to exceed 10%.*
PACKAGING & LABELLING	*Packaging manufactured from new food grade materials or sanitised returnable crates. All labelling must meet the current legislative requirements. Labelling to identify grower's name/brand (plus growers name/code if via a packhouse), address, contents, class, size and minimum net weight. Produce to identify 'Packed On' date (eg. Pkd DD/MM/YY) and Country of Origin (eg. Produce of Australia) on outer container. Produce delivered in styrofoam*
SHELF LIFE	*Produce must provide not less than 14 days clear shelf life from date of receival.*
RECEIVAL CONDITIONS	*Compliance with Quarantine Treatments (if required) for Interstate Consignment. Stacked onto a stabilised pallet as pre-ordered. Refrigerated van with air bag suspension, unless otherwise approved. Pulp Temperature 0 - 5 °C.*
CHEMICAL & CONTAMINANT RESIDUES	*All chemicals used pre/postharvest must be registered and approved for use in accordance with the requirements of the APVMA regulatory system. Residues, Contaminants and Heavy Metals to comply with the FSANZ Food Standards Code MRL's and ML's.*
FOOD SAFETY REQUIREMENTS	*Produce is to be grown and packed under a HACCP based food safety program that is subject to an annual third-party audit. A copy of current certification to be forwarded to receiver. Produce that meets the above specifications but is not grown under a HACCP based food safety program must not be labelled Class 1.*
Specifications reviewable: eg. to account for specific regional effects or adverse seasonal impacts on quality or early or late seasonal variances as agreed and communicated formally in writing.	

Appendix 8 – Market Analysis and Strategy: Broccoli / Japan

Broccoli to Japan
Market Analysis and Strategy

Overview

A value chain approach has been adopted for this project. All businesses from seedling companies to consumers will be engaged to provide a thorough analysis of the market opportunities and viability of boosting Australia's exports of broccoli to Japan. A key strategy will be the active involvement of growers and exporters in directing project activities and participating in in-market activities.

The key strengths of this proposal include the project team, methodology and existing collaboration with broccoli growers and an exporter on a Global Markets Initiative (GMI) funded export project to Singapore. GMI is an export development program managed by TIQ and DAFF-Qld and has been highly successful in boosting exports of mangoes, avocados and mandarins.

TIQ's project team includes an experienced Business Development Manager based in Tokyo who has previously undertaken export development work on value added broccoli opportunities in Japan. The team also includes Clinton McGrath from DAFF-Qld who is an experienced horticulturalist and is part of the project team involved in the GMI funded broccoli export project to Singapore. DAFF-Qld and TIQ are combining their trade and industry experience to collaborate with the academic expertise of Griffith University Department of International Business & Asian Studies to ensure a robust and rigorous methodology. The experience of the project team coupled with the learnings from the GMI funded broccoli project to Singapore, will deliver a well researched market analysis and strategy for broccoli exports to Japan which will focus on export outcomes.

Objectives

Produce an in-depth analysis of the broccoli market in Japan, and pending Industry Advisory Committee endorsement, develop a three year export investment strategy to develop broccoli exports to Japan.

Stage 1

1) Work in a collaborative partnership with vegetable levy payers and exporters to direct and oversight the project activities and actively participate in in-market activities.
2) Conduct desktop research to determine market demand, competitors, market access, barriers to entry and foodservice, retail and consumer trends.
3) Map the supply chains from grower to the final consumer for imported broccoli to gain knowledge of market specifications, develop relationships and document costs.
4) Conduct consumer research in Japan to assess consumption habits, demographics, usage and attitudes to imported broccoli.
5) Undertake an economic analysis to evaluate the cost of exporting from farm gate to market including a return on investment.
6) Develop and implement an extension and communication plan throughout the project and collaborate with existing HAL projects (i.e. National Export Opportunity Symposium) and AUSVEG communications.

Stage 2 – Pending interim report

1) Develop a three year Market Development Investment Program for broccoli exports to Japan.
2) Prepare new project to implement the Market Development Investment Program.

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Methodology

Stage 1 (1) Work in collaborative partnerships

- Hold an industry symposium involving businesses along the supply chain from breeding and seedling suppliers through to exporters. This activity may be linked with the National Export Opportunity Symposium. From this symposium a project steering committee of an AUSVEG representative, broccoli growers and exporters from each of the key production states will oversight the project and participate in in-market activities. Steps have already been taken to form a committee.
- Survey key broccoli growers to identify information gaps and issues regarding the Japanese market and attitudes to export. Document the issues identified by growers exporting to Singapore as part of the GMI funded broccoli project.
- Engage with TIQ Tokyo to guide in-market activities.

Stage 1 (2) Conduct desktop research of the Japanese broccoli market

- Collect Japan's production and import statistics and trends from MAFF using our TIQ office in Tokyo.
- Review existing reports prepared on broccoli and vegetable market for Japan including VG06143, VG12042, VG05028, MT12045, MC07022, VG12093 and Australian vegetable industry strategic investment plan 2012-2017.
- Identify key in-market suppliers, product formats, branding, packaging of broccoli in the retail and foodservice sectors. Identify key retail and foodservice operators in the vegetable market. Identify market access and other trade barriers.

Stage 1 (3, 4, 5) Supply Chain mapping, Consumer Research, Competitor Analysis, Economic Analysis

- Conduct in-depth interviews with each of the supply chain businesses (importers, distributors, retailers, foodservice) to identify product specifications, supply periods, competitor's strengths and weaknesses, pricing and opportunities for differentiation. Undertake supply chain mapping and identify market segments, product pricing, distribution networks and cold chain infrastructure. Invite industry project committee members to participate in the market visit.
- Undertake quantitative research with Japanese consumers to build a consumer profile including demographics, attitudes, buying behaviours and trends relating to vegetables and broccoli.
- Undertake an analysis of the key competitors (USA, China) to determine their strengths and weaknesses to determine points of differentiation.
- Undertake an economic analysis to evaluate the cost of exporting from farm gate to market including a return on investment and benefit/cost analysis to assess the viability of exporting to Japan.

Stage 1 (6) Develop extension and communication activities

A wide range of stakeholders within the Australian vegetable industry will be engaged and informed of the project outcomes by the project team through the extension and communication activities as follows:

- Standard Reporting Requirements – HAL Final Report, Communication Summaries and Presentation to AUSVEG or design team.
- Consult with the successful service provides - for the other projects (1.5 DT MVCD, 1.6 DT MVCD, 1.7 DT MVCD) under the Market and Value Chain Development program to ensure a coordinated approach.
- Project Steering Committee – present with draft extension and communication plan at initial project meeting. Obtain their input and endorsement. This will be a two way engagement, so that these growers and businesses will have first opportunity to consider the information which will be used in ongoing communication activities with stakeholders in the Australian vegetable industry.
- Some key elements for the project which will be extended and communicated throughout the project will include grower survey, consumer profile and supply chain mapping. A range of tools will be used depending on the target audience including videos, webinars, print and AUSVEG's magazine and website. The Project Steering Committee's websites as well as TIQ, DAFF-Qld and Griffith University will also host links to project information. In addition to this industry meetings and presentations will be held and reporting through the National Export Opportunity Symposium.

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Stage 2 (1) Three Year Market Development Investment Program

- Present a SWOT analysis to the Steering Committee.
- Key elements of the program will involve strategies, objectives, activities, budget and timeline relating to product format, pricing, promotion/training and educational support, supply chains/market entry, positioning for each market segment identified as having market opportunities and providing a viable ROI. The market segments to target will be identified in Stage 1(3) and activities will use a value chain approach engaging all businesses in the supply chain.
- Following endorsement by IAC prepare a project proposal to implement the program.

Project Team

Bronwyn Warfield – Trade & Investment Queensland	Project Leader
Dr Robin Roberts – Griffith University	Consumer research
Daiji Takashima – Trade & Investment Queensland	In-market activities
Iori Forsyth – Trade & Investment Queensland	In-market activities
Adriano Brescia – Trade & Investment Queensland	Market research
Clinton McGrath – Department of Agriculture, Forestry and Fisheries	Supply chain mapping, competitor analysis
Bill Johnston – Department of Agriculture, Forestry and Fisheries	Economic and competitor analysis

Project Steering Committee

Hayden Moore, National Manager	Export Development AUSVEG
Gavin Foord, Export Development Manager	vegetablesWA
Kees Versteeg, Grower/Exporter	Qualipac (Qld)
Brad Ipsen, Grower/Exporter	Twin Lakes (WA)
Robert Nave, Grower/Exporter	Fragapane Farm (Vic)
Darren Wood, Chief Financial Officer	Withcott Group (Qld)
Chris Warr, General Manager	Tony Warr International (Qld)
Michelle Christoe, Executive Director	Australian Horticultural Exporters Association
Justin Heaven, Senior Industry Development Officer (Horticulture)	Department of Agriculture Forestry and Fisheries (Qld)
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Appendix 9 – Economic Analysis

Production Economics

In 2013, Cornell University (Atallah et al, 2013) published a report which investigated the costs of production for broccoli in the States of New York, Virginia, North and South Carolina and California. A summary of the findings are detailed below in Table 9.1.

Table 9.1: Eastern US broccoli crop budgets (US$), 2013.

	South Carolina	North Carolina	New York	Virginia	California	Average
Carton per Acre	400	440	450	570	800	532
Pre-Harvest (per Carton)	$4.19	$4.52	$4.86	$3.30	$2.78	$3.93
Harvest (per Carton)	$3.60	$3.83	$3.10	$3.05	$4.53	$3.62
Post-Harvest (per Carton)	$1.24	$1.33	$0.50	$3.40	$2.19	$1.73
Fixed and Capital (per Carton)	$2.38	$2.72	$1.95	$1.84	$2.24	$2.23
Total (US$) per Wax Carton	**$11.41**	**$12.40**	**$10.41**	**$11.59**	**$11.74**	**$11.51**

Note: California is the dominant growing region in the US

With a focus on the predominant growing area of California (major export point), the report indicates that it costs around US$11.74 to produce a 10kg wax carton of fresh broccoli. This equates to a per kilogram cost of US$1.17. Using an exchange rate of 1USD:AUD0.80, this equates to A$1.46 per kilogram or A$11.68 per 12kg Styrofoam carton with 8kg of product contained within it. These figures incorporate all costs (variable, fixed and capital).

Table 9.2: Costs per kilogram of broccoli in Australian Dollars

All Figures in A$ per Kg	United States (California)	Australia (Queensland)
Kilograms per Ha	19,770	8,128
Pre-Harvest	$0.35	$0.86
Harvest	$0.57	$0.61
Post-Harvest	$0.27	$0.45
Fixed and Capital	$0.28	$0.38
Total per Kg	**$1.47**	**$2.30**

Note: Harvest figure covers labour and carton cost.
Note: Fixed and capital cost at 20 percent

Table 9.2 shows that broccoli produced in Queensland Australia costs 56 percent more to produce than that of the major production region in the United States (California). If the state of California was exporting broccoli in 8kg net cartons the production cost would be A$11.76 per carton (US$9.41 per carton).

Research indicates that the sea freight shipping time from the United States is 10 to 17 days averaging 12 days, which is similar to the time taken from Australia. Using the United States cost of shipping fresh broccoli of US$3.13 (A$3.91) the United States could land 8kg of broccoli (12kg

carton) in Japan for a total cost of A$15.67, while the estimated costs for landing a similar carton of Queensland broccoli in Japan would be A$22.78 (production cost + shipping).

In summary, the United States (California) can produce a 10 kg wax carton of fresh broccoli for US$11.76 and export it to Japan for US$3.13, a total cost of US$15.67. Given the intelligence supplied in Table 9 the CIF price range of US$15.00 to US$22.00 (with prices reaching US$32.00) suggests a profitable export channel, although marginal at the lower price extremity.

Queensland Domestic Production Economics for Broccoli

To establish the viability of exporting fresh broccoli to Japan, it is important to understand production costs. The following section provides an estimate of the production cost per carton of fresh broccoli to the farm gate.

To establish true costs, it is important to capture all relevant variable, fixed and capital costs of the farming operation. Due to operational limitations, a detailed gross margin budget was developed and a proxy estimate for fixed and capital costs applied. The proxy estimate for fixed and capital costs is 20 percent and was drawn from a recent report from Cornell University on broccoli crop budgets in the eastern United States (Atallah et al, 2013). The figure represents the average fixed and capital costs across five growing regions in the Eastern United States.

Table 9.3: Base production parameter (A$) for southern Queensland broccoli producer

Production Parameters	Value
Plant density per Ha	50,000
Heads harvested per Ha	32,500
Cartons harvested per Ha	1,016
Heads per carton (average)	32
First grade cartons per Ha (export quality)	884 (87%)
Second grade cartons per Ha	132 (13%)
Industry levies	2.5%

Table 9.4: Variable production costs (A$) for broccoli production in southern Queensland

Production Parameters	A$ per Ha	A$ per Carton
Pre-Harvest Costs		
Machinery costs (fuel, oil, repairs and maintenance)	$1,350	$1.33
Planting (transplants and labour)	$4,500	$4.43
Fertiliser	$336	$0.33
Other chemicals (herbicide, insecticide & fungicide)	$596	$0.59
Irrigation (water charges, labour & electricity)	$165	$0.16
Crop monitoring	$30	$0.03
Harvest and Post-Harvest		
Harvesting and packing	$8,592	$8.46
Total Variable Costs	**$15,569**	**$15.33**

As shown in Table 9.4, the total variable costs of producing fresh broccoli in southern Queensland are A$15.33 per Styrofoam carton (8kg of broccoli) or A$1.92 per kilogram. The total production cost per Styrofoam carton (including both fixed and capital costs) is **A$18.40** or **A$2.30** per kilogram. Therefore, the CIF/CFR price received in Japan would need to return a farm gate price of A$18.40 or higher to be profitable.

It should be noted that the production cost above is based on the use of transplants rather than direct seeding.

Supply chain costs farm gate to Japan (seafreight)

One option for fresh broccoli exports to Japan is to utilise the sea freight channel, as used by exporters in the United States. The economics of the sea freight channel is based on shipping one, 40 foot reefer from the east coast of Australia to Yokohama.

While the project will examine various packaging and related transport options, this analysis assumes that the current practices for both domestic and export production remain the same. As such the packaging standard shown in Table 9.4 is applied:

Table 9.5: Packaging standards for export broccoli (fresh)

Parameter	Standard
Packaging Type	Styrofoam carton
Length	58 cm
Width	31 cm
Depth	29 cm
Weight of broccoli	8.0 kg
Weight of ice added	3.5 kg
Gross weight of carton	12.0 kg
Heads per carton*	32
Japanese Spec Head Size	120 – 140 mm

*Based on estimate supplied by Qualipac

The assessment of the sea freight channel looked at the export of one container with 1,036 cartons (C Warr, 2014, pers. comm. July) from the Lockyer Valley in Queensland via Brisbane (east coast) to Japan. The gross shipment weight (carton – ice – broccoli) is 12,432 kg, with a net weight of fresh broccoli of 8,288 kg. All costs are presented in Australian dollars.

Table 9.6: Sea freight costs for shipment of one 40 foot reefer of fresh broccoli

Export Cost Item	Cost per Defined Unit (A$)	A$/12kg styro Carton
Farm Gate to Port		
Transport to Port of Brisbane	$800 per container	$0.77
Quarantine / Biosecurity Assess	$100 per container	$0.10
Sea Shipment Costs		
Base shipping rate	$1,700 per container	$1.64
Bunker adjustment factor (BAF)	$1,150 per container	$1.11
Origin Terminal Handling Charge (OTHC	$397 per container	$0.38
Port Service Charge (PSC)	$188 per container	$0.18
LoLo (lift on – lift off)	$75 per container	$0.07
Terminal security (TSS)	$6 per container	$0.01
Carrier security (CSS) – converted US$	$7.50 per container	$0.01
Documentation fee	$80.00 per Bill of Lading	$0.08
Advanced manifest (AMS) – converted US$	$37.50 per Bill of Lading	$0.04
Total cost per export carton – landed in Japan		**$4.38**
Total cost of shipment by sea freight (ex-Brisbane)		**$4,538**

As demonstrated in Table 9.7, the combined on-farm production cost of A$18.40 and the sea freight cost of A$4.38 per Styrofoam carton would require a breakeven CIF/CFR price in Japan of **A$22.78**. Given the estimated CIF/CFR typical price range is between A$15.04 and A$22.00[5] per carton (A$1.88 to A$2.75/kg), the sea freight channel is considered unviable at the current price range. However, it should be noted that given prices of up to A$25.60 per carton (A$3.20/kg) are paid by small importers and A$21.60 per carton (A$2.70/kg) by large importers, the potential for drawing profits may be possible.

Table 9.7 represents the price a producer would need to breakeven on the cost of producing a carton of fresh broccoli under the current export environment.

Table 9.7: Summary sea freight breakeven points

	A$ Shipping Cost per Carton	A$ Typical CIF/CFR Price	A$ Breakeven Price per Carton
Production cost breakeven	$4.38	$18.48	$14.10
CIF price breakeven	$4.38	$18.48	$22.78

[5] Refer Table 8

Figure 9.1: Supply chain costs farm gate to Japan (seafreight)

Supply chain costs farm gate to Japan (air freight)

Another option for exporting broccoli to Japan is to utilise air freight as it may provide a competitive advantage over major competitors (United States) who only supply through sea freight.

The assessment of the air freight channel looks at the export of one pallet containing 236 cartons (CT Freight) from the Lockyer Valley in Queensland via Brisbane to Japan. The gross shipment weight (carton–ice–broccoli) is 2,832kg, with a net weight for fresh broccoli of 1,888kg. All costs are presented in Australian dollar terms.

Table 9.8: Air freight costs for shipment of one pallet of fresh broccoli

Export Cost Item	A$ Cost per Defined Unit	A$/12kg Styro Carton
Farm Gate to Airport		
Transport to Brisbane	-	$0.85
Air Shipment Costs		
Airline charge (CT Freight Quote)	$1.46 per kg	$17.52
Freight forwarder commission	10.00%	$0.15
Pallet loading (PMC or LD7)	$60.00 per pallet	$0.25
Aircraft loading fee	$325.00 per pallet	$1.38
Documentation (AWB etc.)	$75.00 per shipment	$0.32
Quarantine Inspection	$140.00 per shipment	$0.59
Additional Inspection (FF)	$40.00 per shipment	$0.17
Fuel and security surcharge	$120.00 per pallet	$0.51
Total cost per export carton – landed in Japan		**$21.74**
Total cost of shipment by air freight (ex-Brisbane)		**$5,130**

Table 9.9: Summary air freight breakeven points

	A$ Shipping Cost per Carton	A$ Typical CIF/CFR Price	A$ Breakeven Price per Carton
Production cost breakeven	$21.74	$18.48	-$3.26
CIF price breakeven		$18.48	$40.14

Table 9.9 illustrates that the combined on-farm production cost of A$18.40 and the air freight cost of A$21.74 require a **breakeven** CIF price of **A$40.14**. Given that the typical CIF/CFR price in Japan is likely to be between A$15.04 and A$22.00[6] per carton (A$1.88 to A$2.75/kg) per Styrofoam carton, the air freight channel is considered unviable. Even though prices of up to A$25.60 per carton (A$3.20/kg) are paid by small importers and A$21.60 per carton (A$2.70/kg) by large importers, the potential for drawing profits does not appear likely. However, it should be noted that exporters from other states may have more competitive airfreight rate than were used in this analysis.

[6] Refer Table 8

Figure 9.2: Supply chain costs farm gate to Japan (seafreight)

Risk analysis of the sea freight channel

It is evident that sea freight provides the greatest opportunity as an export channel for broccoli producers. As such, it is worth investigating the broad range of expected price points under Japanese market conditions.

The risk analysis will utilise the Monte Carlo simulation technique over a five point distribution. The distribution is characterised by five parameters – minimum, poor, average, good and maximum. The sampling task is to generate estimates of profit per carton of broccoli given sampled inputs (i.e. price) across one or more input distributions.

The input distributions that the risk analysis will sample from are the CIF/CFR price in JPY per 8kg carton of fresh broccoli and the JPY-AUD exchange rate, as it impacts the potential return. Probabilities are allocated to parameters within the distribution and determine the sampling bias. That is, samples are more likely to be drawn from areas of the distribution which have higher probabilities of occurrence.

Tables 9.11 and 9.12 outline the two distributions to be sampled.

Table 9.10: Exchange rate distribution with cumulative probability estimates

	JPY:AUD	Probability	
Minimum ER	89.02	0%	
Low ER	91.60	20%	**20%** chance getting between **89.02** and **91.60**
Average ER	94.17	50%	**30%** chance getting between **91.60** and **94.17**
Good ER	95.15	80%	**30%** chance getting between **94.17** and **95.15**
Maximum ER	96.12	100%	**20%** chance getting between **95.15** and **96.12**

The expected mean of the exchange rate distribution is 93.45 JPY-AUD.

Table 9.11: CIF/CFR price distribution in JPY with cumulative probability estimates

	JPY CIF/CFR Price	Probability	
Minimum Price	¥1,495	0%	
Low Price	¥1,589	20%	**20%** chance getting between **¥1,495** and **¥1,589**
Average Price	¥1,682	50%	**30%** chance getting between **¥1,589** and **¥1,682**
Good Price	¥1,869	80%	**30%** chance getting between **¥1,682** and **¥1,869**
Maximum Price	¥2,336	100%	**20%** chance getting between **¥1,869** and **¥2,336**

The expected mean of the exchange rate distribution is ¥1,752.

Table 9.11 represents the conversion (to JPY) of a price distribution based on information provided by importer interviews. Table 9.12 shows the equivalent distribution displayed in A$ per 8kg carton of broccoli and the United States price received per 10 kg carton (basis of distribution). An exchange rate of 0.80 AUD:USD was applied to convert the distribution to AUD, followed by the application 93.45 JPY:AUD (expected mean of the distribution in Table 9.11) to establish the JPY CIF/CFT price distribution above.

Table 9.12: CIF/CFR Price equivalents for both Australian and US broccoli cartons

CIF/CFR Price Equivalents	A$ per 8kg Carton	US$ per 10kg Carton
Minimum Price	$15.00	$15.00
Low Price	$17.00	$17.00
Average Price	$18.50	$18.50
Good Price	$20.00	$20.00
Maximum Price	$27.00	$27.00

The above sample distributions (Table 9.11 and 9.12) provide a range of CIF price estimates. From this estimate the cost of sea freight (A$4.38 per carton) was deducted to provide a cumulative probability distribution of farm gate prices.

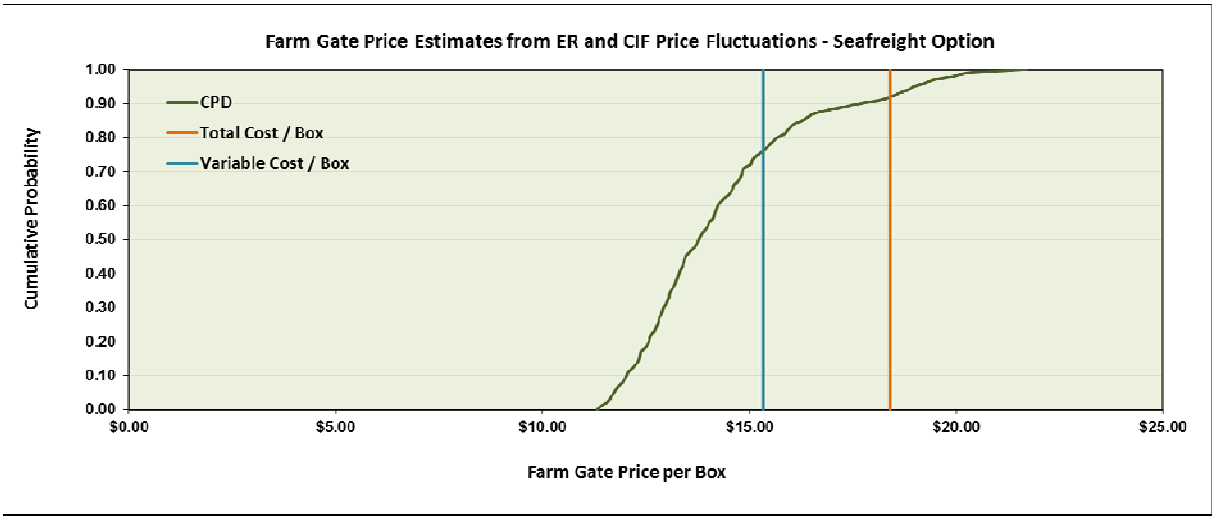

Figure 9.3: Cumulative probability distribution (CPD) of the farm gate price estimate (in A$) for the sea freight of broccoli to Japan

The results of the simulation show that the farm gate prices returned range from a low of A$10.41 per carton to a high of A$23.55 per carton. The average farm gate price returned was A$14.74 per carton. Also provided is a plot of the total variable costs and total costs (variable costs + fixed + capital) to give an indication of break-even at the gross margin level (A$15.33) and at full production cost (A$18.40).

The results of the risk analysis show that it is unlikely that the range of CIF/CFR prices will result in a profitable supply chain. A change in the current price distribution is required for the sea freight channel to be profitable. Alternatively, modification of the production system for broccoli to reduce costs would assist in creating a profitable supply chain. If there is to be a re- establishment of broccoli exports to Japan, the direction of any future research should be towards:

1. **Lowering production costs** behind the farm gate – mechanical harvesting, direct seeding or packing in the paddock.
2. **Alternative packaging methods** – type, capacity, product-ice ratio, alternative cooling methods.
3. **Seek higher prices** based on differentiation of product – quality, size, branding (clean green image of Australia).

Appendix 10 – Minimum residue level requirements

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
ACEPHATE	5	5	
ACETAMIPRID	2	-	
ACIBENZOLAR-S-METHYL	1	-	
ACRINATHRIN	2	-	
ALACHLOR	0.02	-	
ALANYCARB	0.1	-	
ALDRIN and DIELDRIN	N.D.	0.1	
AMETOCRADIN	9	-	
AMISULBROM	2	-	
ANILAZINE	-	-	10 (2015.05.16)
ASULAM	0.2	-	
ATRAZINE	0.02	-	
AZOXYSTROBIN	5	0.5	
BARBAN	-	-	0.05 (2015.05.16)
BENALAXYL	0.05	-	
BENFURACARB	1	-	
BENSULIDE	0.1	-	
BENTAZONE	0.05	-	
BENTHIAVALICARB-ISOPROPYL	1	-	
BENZYLADENINE	0.5	-	
BHC	0.2	-	
BIFENTHRIN	0.4	1	
BILANAFOS (BIALAPHOS)	0.004	-	
BIORESMETHRIN	0.1	-	
BITERTANOL	0.05	-	
BOSCALID	5	2	
BRODIFACOUM	0.001	-	
BROMIDE	110	-	
BROMOPHOS-ETHYL	-	-	0.05 (2015.05.16)
BROMOPROPYLATE	0.5	-	
BUTAMIFOS	0.02	-	
Sec-BUTYLAMINE	0.1	-	
CAPTAN	5	-	
CARBARYL	6	5	
CARBENDAZIM, THIOPHANATE, THIOPHANATE-METHYL and BENOMYL	3	-	
CARBOFURAN	0.5	-	
CARBOSULFAN	1	-	
CARFENTRAZONE-ETHYL	0.1		

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
CARTAP, THIOCYCLAM and BENSULTAP	3	-	
CHLORANTRANILIPROLE	4	0.5	
CHLORBUFAM	-	-	0.05 (2015.05.16)
CHLORDANE	0.02	0.02	
CHLORFENAPYR	3	0.5	
CHLORFENVINPHOS	0.05	0.05	
CHLORFLUAZURON	2	-	
CHLORIDAZON	0.1	-	
CHLORMEQUAT	0.05	-	
CHLOROBENZILATE	0.02	-	
CHLOROTHALONIL	5	7	
CHLOROXURON	-	-	0.05 (2015.05.16)
CHLORPYRIFOS	1	0.5	
CHLORPYRIFOS-METHYL	0.03	-	
CHLORTHAL-DIMETHYL	4	5	
CHLOZOLINATE	-	-	0.05 (2015.05.16)
CHROMAFENOZIDE	2	-	
CLETHODIM	2	-	
CLODINAFOP-PROPARGYL	0.02	-	
CLOFENTEZINE	0.02	-	
CLOMAZONE	0.02	-	
CLOPIDOL	0.2	-	
CLOPYRALID	2	-	
CLOTHIANIDIN	1	-	
COPPER NONYLPHENOLSULFONATE	10	-	
4-CPA	0.02	-	
CYANAZINE	0.05	-	
CYANOPHOS	0.05	-	
CYANTRANILIPROLE	2	-	
CYAZOFAMID	1	-	
CYCLOPROTHRIN	0.02	-	
CYCLOXYDIM	2	-	
CYFLUTHRIN	2	0.5	
CYHALOTHRIN	0.5	0.1	
CYMOXANIL	0.05	-	
CYPERMETHRIN	1	1	
CYPRODINIL	1	-	
CYROMAZINE	1	-	
2,4-D	0.08	-	
DAZOMET, METAM and METHYL	0.5	-	

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
ISOTHIOCYANATE			
DBEDC	0.5	-	
DCIP	1	-	
DDT	0.2	1	
DELTAMETHRIN and TRALOMETHRIN	0.5	0.05	
DEMETON-S-METHYL	0.4	0.5	
DIAFENTHIURON	0.02	-	
DI-ALLATE	-	-	0.05 (2015.05.16)
DIAZINON	0.1	0.7	
DICHLOFLUANID	5	-	
DICHLORPROP	0.05	-	
DICHLORVOS and NALED	0.1	0.5	
DICLOMEZINE	0.02	-	
DICOFOL	3	5	
DIELDRIN	-	0.1	
DIETHOFENCARB	5	-	
DIFENOCONAZOLE	2	-	
DIFENZOQUAT	0.05	-	
DIFLUBENZURON	1	-	
DIFLUFENZOPYR	0.05	-	
DIHYDROSTREPTOMYCIN and STREPTOMYCIN	0.05	-	
DIMETHIPIN	0.04	-	
DIMETHIRIMOL	-	-	0.2 (2015.05.16)
DIMETHOATE	1	0.3	
DIMETHOMORPH	6	2	
DINOSEB	0.05	-	
DINOTEFURAN	2	-	
DINOTERB	-	-	0.05 (2015.05.16)
DIOXATHION	-	-	0.05 (2015.05.16)
DIPHENYLAMINE	0.05	-	
DIQUAT	0.05	-	
DISULFOTON	0.5	0.5	
DITHIOCARBAMATES	0.2	-	
DIURON	0.05	-	
2,2-DPA	0.1	-	
EMAMECTIN BENZOATE	0.1	-	
ENDOSULFAN	0.5	1	
ENDRIN	N.D.	-	
EPN	0.1	-	
ESFENVALERATE	-	1	

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
EPTC	0.1	-	
ETHEPHON	0.05	-	
ETHION	0.3	-	
ETHYLENE DIBROMIDE (EDB)	0.01	-	
ETHYLENE DICHLORIDE	0.01	-	
ETOFENPROX	-	-	2 (2015.09.25)
ETRIDIAZOLE	0.1	-	
FAMOXADONE	0.1	-	
FENAMIDONE	5	-	
FENAMIPHOS	0.04	0.05	
FENARIMOL	0.5	-	
FENBUTATIN OXIDE	0.05	-	
FENITROTHION	0.5	0.1	
FENOBUCARB	0.3	-	
FENOXAPROP-ETHYL	0.1	-	
FENOXYCARB	0.05	0.05	
FENPROPATHRIN	3	-	
FENPROPIMORPH	0.05	-	
FENTIN	0.05	-	
FENVALERATE	2	1	
FIPRONIL	0.05	0.05	
FLAZASULFURON	0.02	-	
FLONICAMID	5	-	
FLUAZIFOP	1	-	
FLUAZINAM	0.1	-	
FLUBENDIAMIDE	5	5	
FLUCYTHRINATE	0.2	-	
FLUDIOXONIL	2	0.7	
FLUFENOXURON	5	-	
FLUOMETURON	0.02	-	
FLUOPICOLIDE	5	-	
FLUOROIMIDE	0.04	-	
FLUROXYPYR	0.05	-	
FLUSULFAMIDE	0.1	-	
FORMOTHION	-	-	0.02 (2015.05.16)
FOSETYL	60	-	
FOSTHIAZATE	0.1	-	
FURATHIOCARB	0.3	-	
GIBBERELLIN	0.2	-	
GLUFOSINATE	0.2	-	
GLYPHOSATE	0.2	-	

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
HEPTACHLOR	0.03	0.05	
HEXACHLOROBENZENE	0.01	-	
HEXACONAZOLE	0.02	-	
HEXYTHIAZOX	0.5	-	
HYDROGEN CYANIDE	5	-	
HYDROGEN PHOSPHIDE	0.01	-	
HYMEXAZOL	0.5	-	
IMAZALIL	0.02	-	
IMAZAQUIN	0.05	-	
IMAZETHAPYR AMMONIUM	0.05	-	
IMIDACLOPRID	5	0.5	
IMINOCTADINE	0.1	-	
INDOXACARB	0.2	2	
IOXYNIL	0.1	-	
IPRODIONE	25	0.05	
ISOFENPHOS	0.1	-	
ISOURON	0.02	-	
ISOXATHION	0.1	-	
KASUGAMYCIN	0.2	-	
LENACIL	0.3	-	
LEPIMECTIN	0.05	-	
LINDANE	2	2	
LINURON	0.2	0.05	
LUFENURON	2	-	
MALATHION	5	2	
MALEIC HYDRAZIDE	0.2	-	
MANDIPROPAMID	5	-	
MECARBAM	-	-	0.05 (2015.05.16)
METAFLUMIZONE	10	-	
METALAXYL and MEFENOXAM	0.5	0.1	
METHACRIFOS	-	-	0.05 (2015.05.16)
METHAMIDOPHOS	1	1	
METHIDATHION	0.1	0.1	
METHIOCARB	0.1	-	
METHOMYL	-	2	
METHOXYCHLOR	7	-	
METHOXYFENOZIDE	5	-	
METOLACHLOR	0.02	0.3	
MEVINPHOS	0.5	-	
MONOCROTOPHOS	0.05	-	
MONOLINURON	-	-	0.05 (2015.05.16)

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
NAPROPAMIDE	0.1	-	
NICOTINE	2	-	
NITENPYRAM	5	-	
NOVALURON	2	-	
OMETHOATE	2	2	
OXADIXYL	5	-	
OXINE-COPPER	1	-	
OXOLINIC ACID	0.2	-	
OXYDEMETON-METHYL	0.5	-	
OXYFLUORFEN	0.05	0.05	
OXYTETRACYCLINE	-	-	0.05 (2015.08.19)
PACLOBUTRAZOL	-	0.01	
PARAQUAT	0.05	-	
PARATHION	0.3	-	
PARATHION-METHYL	0.2	0.1	
PENCONAZOLE	0.05	-	
PENDIMETHALIN	0.05	0.05	
PENTHIOPYRAD	10	-	
PERMETHRIN	2	1	
PHENOTHRIN	0.02	-	
PHENTHOATE	0.05	-	
PHORATE	0.3	0.5	
PHOSALONE	0.5	-	
PHOSMET	1	-	
PHOSPHAMIDON	0.2	-	
PHOXIM	0.02	-	
PINDONE	0.001	-	
PIPERONYL BUTOXIDE	8	8	
PIRIMICARB	1	1	
PIRIMIPHOS-METHYL	1	-	
PROBENAZOLE	0.1	-	
PROCHLORAZ	0.05	-	
PROCYMIDONE	5	-	
PROFENOFOS	0.05	-	
PROHEXADIONE-CALCIUM	0.05	-	
PROMETRYN	0.05	-	
PROPACHLOR	0.6	0.6	
PROPAMOCARB	0.5	-	
PROPANIL	0.1	-	
PROPARGITE	-	3	3 (2015.05.16)
PROPAZINE	0.1	-	

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
PROPICONAZOLE	0.05	-	
PROPOXUR	2	-	
PROPYZAMIDE	0.05	-	0.1 (2015.08.19)
PROTHIOFOS	0.2	0.2	
PYMETROZINE	0.02	0.02	
PYRACLOFOS	0.05	-	
PYRACLOSTROBIN	5	-	
PYRAZOLYNATE	0.02	-	
PYRAZOPHOS	-	-	0.05 (2015.05.16)
PYRETHRINS	1	1	
PYRIDALYL	2	-	
PYRIDATE	10	-	
PYRIFLUQUINAZON	2	-	
PYRIMIDIFEN	-	-	0.05 (2015.05.16)
PYRIPROXYFEN	0.7	-	
QUINALPHOS	0.05	-	
QUINOCLAMINE	-	-	0.03 (2015.08.19)
QUINTOZENE	0.05	0.02	
QUIZALOFOP-ETHYL	0.3	-	
RESMETHRIN	0.1	-	
SETHOXYDIM	10	-	
SPINETORAM	2	0.2	
SPINOSAD	2	0.5	
SPIROMESIFEN	2	-	
SPIROTETRAMAT	1	7	
SULFENTRAZONE	0.05	-	
TEBUCONAZOLE	0.3	-	
TEBUFENOZIDE	0.5	-	
TEBUTHIURON	0.02	-	
TECNAZENE	0.05	-	
TEFLUBENZURON	1	-	
TEFLUTHRIN	0.5	-	
TEPRALOXYDIM	0.05	-	
TERBUFOS	0.05	-	
TETRACHLORVINPHOS	0.3	-	
TETRADIFON	1	5	
THIABENDAZOLE	2	-	
THIAMETHOXAM	5	3	
THIODICARB and METHOMYL	2	-	
THIOMETON	0.2	-	
TOLCLOFOS-METHYL	2	-	

Agricultural Chemical	MRLs JPN (ppm)	MRLs AUS (mg/kg)	Time limit for application (Japan)
TOLFENPYRAD	1	-	
TRIADIMEFON	0.1	-	
TRIADIMENOL	1	1	
TRICHLORFON	0.5	0.1	
TRICLOPYR	0.03	-	
TRICYCLAZOLE	0.02	-	
TRIDEMORPH	0.05	-	
TRIFLOXYSTROBIN	0.5	-	
TRIFLUMIZOLE	-	-	1.0 (2015.09.25)
TRIFLUMURON	0.02	-	
TRIFLURALIN	0.05	0.05	
TRIFORINE	2	-	
VALIDAMYCIN	0.05	-	
WARFARIN	0.001	-	

Source: Japan Food Research Chemical Foundation, 2015 and Biotech Laboratories, 2014

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