College of Tropical Agriculture
and Human Resources
University of Hawai'i at Mānoa

Economic Issues
June 2010
EI-19

Competitiveness of Hawai'i's Agricultural Products in Japan

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This publication extends and updates a recent CTAHR publication that assessed Hawai'i's comparative advantage (CA) in selected agricultural products in the U.S. mainland market.[1] While the previous publication assessed the CA patterns of Hawai'i's agricultural exports to the U.S. mainland market over the period 1995 to 2005, this publication examines the CA patterns of Hawai'i's agricultural exports to the Japan market over the period 1995 to 2008.

For the analysis, the agricultural products investigated were classified as either unprocessed/semi-processed or processed products. Unprocessed/semi-processed includes raw or fresh products and semi-processed products with minimal chemical transformation. Eleven were included in this classification: abalone (live or fresh), coffee (unroasted), cut flowers/buds, fruits and nuts (except for papayas, pineapples, and macadamia nuts), fixed vegetable fats and oils, macadamia nuts (fresh or dried), ornamental fish (live), papayas (fresh), pineapples (fresh or dried), seaweeds (fresh or dried, whether or not ground), and tuna (fresh or chilled, no fillets or other meat). Processed agricultural products included preserved products and products that were mixed with other substances. Nine were included in this classification: cocoa (processed), coffee (roasted), food preparations, fruit or vegetable juice, grape wine, macadamia nuts (processed), pineapples (processed), sugar confectionery, and water (bottled).

Table 1 lists each product's average value and average share in Hawai'i's total agricultural exports to Japan during the periods 1995–1999, 2000–2004, and 2005–2008. These 20 products comprised about 84 percent of Hawai'i's total agricultural exports to Japan in the period 1995–1999, about 77 percent in 2000–2004, and about 90 percent in the period 2005–2008.

Among the products investigated, cut flowers/buds, fresh/dried macadamia nuts, fresh papayas, and processed pineapples experienced declining shares in Hawai'i's total agricultural exports. Unroasted coffee and fixed vegetable fats and oils had relatively constant market shares. Roasted coffee, food preparations, grape wine, and water had increasing market shares. The

[1] Yu, R., J. Cai, PS. Leung, and M. Loke. 2008. Comparative advantage trends of selected agricultural products in Hawai'i in the U.S. mainland market. College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, Economic Issues no. 14, http://www.ctahr.hawaii.edu/oc/freepubs/pdf/EI-14.pdf.

Published by the College of Tropical Agriculture and Human Resources (CTAHR) and issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Andrew G. Hashimoto, Director/Dean, Cooperative Extension Service/CTAHR, University of Hawai'i at Mānoa, Honolulu, Hawai'i 96822.

Table 1. Top agricultural exports from Hawai'i to Japan, by value and share, 1995–2008

Product	Average Value (US$M)			Share to Total Agricultural Exports to Japan (%)		
	1995-1999	2000-2004	2005-2008	1995-1999	2000-2004	2005-2008
Unprocessed/Semi-Processed						
Abalone	0	1.23	1.39	0.00	3.56	2.36
Coffee, Unroasted	2.22	2.04	3.13	5.92	5.88	5.33
Cut Flowers/Buds	2.63	1.60	0.67	7.00	4.62	1.14
Fruits and Nuts	0.18	0.22	0.15	0.47	0.62	0.26
Fixed Vegetable Fats/Oils	0.04	0.06	0.09	0.11	0.18	0.15
Macadamia Nuts, Fresh or Dried	0.27	0.03	0.02	0.73	0.08	0.03
Ornamental Fish	0.31	0.02	0.09	0.83	0.04	0.15
Papayas	12.14	6.47	3.50	32.33	18.68	5.95
Pineapples, Fresh or Dried	0.00	0.68	0.45	0.01	1.95	0.76
Seaweeds	0.31	1.20	0.76	0.84	3.45	1.29
Tuna	1.69	0.34	0.65	4.50	0.98	1.11
Processed						
Cocoa, Processed	6.57	6.64	8.07	17.50	19.18	13.72
Coffee, Roasted	0.51	1.08	2.04	1.36	3.11	3.46
Food Preparations	0.07	0.10	1.53	0.19	0.29	2.61
Fruit or Vegetable Juice	0.37	0.64	0.80	0.99	1.85	1.36
Grape Wine	0.04	0.12	0.29	0.10	0.36	0.49
Macadamia Nuts, Processed	1.80	1.80	1.01	4.80	5.21	1.72
Pineapples, Processed	1.98	0.92	0.53	5.28	2.65	0.90
Sugar Confectionery	0.19	0.21	0.11	0.52	0.59	0.18
Water	0.11	1.15	27.51	0.29	3.33	46.78
Total of Twenty Agricultural Products	31.46	26.53	52.80	83.76	76.64	89.76
Other Agricultural Products	6.10	8.09	6.02	16.24	23.36	10.24
Total Agricultural Products	37.56	34.62	58.82	100.00	100.00	100.00

Sources: World Trade Atlas, UN Commodity Trade Statistics, Trade Statistics of Japan
Notes: The detailed HS codes and description of each product are shown in the Appendix.

remainder exhibited irregular changes in market share during 1995–2008.

Japan is the most important market of Hawai'i's agricultural exports next to the U.S. mainland.[2] For the period 1995–2008, Hawai'i exported about 72 percent (in terms of value), on average, of its agricultural products destined for the foreign market to Japan. Among all the products being produced and exported by Hawai'i to Japan, only the share of *agricultural* products experienced a steady increase over the period 1995–2008.[3] The export value of agricultural products was about 24 percent of Hawai'i's total export to Japan in the period 1995–1999. It increased by 13 percentage points to 37 percent in the period 2000–2005, and it increased by another 18 percentage points to 55 percent in the period 2005–2008. Export shares of other product groups, on the other hand, either declined or remained constant.[4] Given the importance of the Japan market to Hawai'i, an analysis of the comparative and competitive advantage of Hawai'i's agricultural products exported to Japan can provide valuable information about the direct or indirect competition faced by Hawai'i's agricultural exports in

[2] Agricultural Products were defined as those falling under HS (Harmonized Tariff Schedule of the United States) Chapters 01–24.

[3] Excluding mineral products (HS Codes 25-27) and vehicles, aircraft, vessels, and associated transportation equipment (HS Codes 86–89).

[4] World Trade Atlas, 2009.

Table 2. Comparative advantage of Hawai'i's agricultural exports to Japan, 1995 and 2008

PRODUCT	1995	2008	1995-2008
Unprocessed/Semi-Processed			
Abalone	0.00	0.17	0.17
Coffee (Unroasted)	0.09	0.18	0.09
Cut Flowers/Buds	0.59	0.03	-0.56
Fixed Vegetabel Fats and Oils	0.00	0.00	0.00
Fruits and Nuts	0.02	0.00	-0.02
Macadamia Nuts (Fresh or Dried)	0.00	0.00	0.00
Ornamental Fish	0.06	0.01	-0.05
Papayas	2.51	0.29	-2.22
Pineapples (Fresh or Dried)	-0.01	-0.01	0.00
Seaweeds	0.01	0.04	0.03
Tuna	0.67	0.02	-0.65
Processed			
Cocoa (Processed)	1.27	1.20	-0.07
Coffee (Roasted)	0.03	0.40	0.37
Food Preparations	-0.03	-0.09	-0.06
Fruit and Vegetable Juice	0.01	0.12	0.11
Grape Wine	-0.05	-0.03	0.02
Macadamia Nuts (Processed)	0.38	0.10	-0.28
Pineapples (Processed)	0.26	-0.01	-0.27
Sugar Confectionery	0.00	0.00	0.00
Water	0.03	5.08	5.05
Others	-5.84	-7.50	-1.66

Japan, which will be useful for recognizing and building on the competitiveness of Hawai'i's agricultural products.

Measurement of comparative advantage

Following the study on the comparative advantage of Hawai'i's agricultural exports to the U.S. mainland market, the normalized revealed comparative advantage (NRCA) index (Yu et al. 2009)[5] is used to measure the comparative advantage (CA) of Hawai'i's agricultural products to Japan. The NRCA of Hawai'i's agricultural product i in the Japanese market is given by:

$$NRCA_i^h = \frac{E_i^h}{E} - \frac{E_i}{E}\frac{E^h}{E} \quad (1)$$

where E_i^h denotes the supply of agricultural product i to Japan from Hawai'i, E_i denotes the supply of agricultural product i to Japan from Hawai'i and the rest of the world, E^h denotes the total supply of all agricultural products to Japan from Hawai'i, and E denotes the total supply of all agricultural products to Japan from Hawai'i and the rest of the world. The NRCA score signifies the extent of comparative advantage (or disadvantage) that Hawai'i possesses in a certain product. $NRCA_i > 0$ implies that Hawai'i has comparative advantage in product i, $NRCA_i < 0$ implies that Hawai'i has comparative disadvantage in product i, and $NRCA_i = 0$ implies that Hawai'i has neither comparative advantage nor disadvantage in product i.

Analysis of comparative advantage

Table 2 presents the NRCA scores of the products under investigation for 1995 and 2008.[6] Column 1 shows that in 1995, among the products investigated, Hawai'i had comparative disadvantage in only one unprocessed/semi-processed product (fresh or dried pineapples) and two processed agricultural products (food preparations and grape wine). Column 2 shows that in 2008 Hawai'i had comparative disadvantage in only one unprocessed/semi-processed product (fresh or dried pineapples) and three processed products (food preparations, grape wine, and processed pineapples).

The difference in NRCA scores between 1995 and 2008, shown in column 3, reveals that of the unprocessed/semi-processed agricultural products investigated, three gained CA from 1995 to 2008 (abalone, unroasted coffee, and seaweeds), and five lost CA (cut flowers/buds, fruits and nuts, ornamental fish, papayas, and tuna). Of the processed agricultural products, four gained CA from 1995 to 2008 (roasted coffee, fruit or vegetable juice, grape wine, and water), and four lost CA (processed cocoa, food preparations, processed macadamia nuts, and processed pineapples). Thus, of the 20 products investigated, nine lost CA, seven gained CA, and four (fixed vegetable fats and oils, fresh or dried macadamia nuts, fresh or dried pineapples, and sugar confectionery) maintained CA. The changes in CA in the Japan market echoes the CA pattern for some exports of Hawai'i to the U.S. mainland market. For example, coffee gained CA both in the U.S. mainland market and in Japan, while processed pineapples and papayas lost CA in both markets.

[5] Yu, R., J. Cai, and PS. Leung. 2009. The revealed normalized comparative advantage index. Annals of Regional Science 43:267–282.

[6] To facilitate the presentation, the NRCA score has been rescaled by a constant of 10,000.

Following the Yu et al. 2009 study on the comparative advantage of Hawai'i's agricultural exports to the U.S. mainland market, a simple time-trend model is likewise employed to detect the trends of change in CA,[7] that is, if CA has exhibited a tendency to decline or increase, hence revealing a more robust picture of the competitiveness of Hawai'i's products. Table 3 presents the comparative advantage trends for the products under investigation. The comparative advantage trend examines the annual changes in NRCA scores from 1995 to 2008.

Among the unprocessed agricultural products, Hawai'i had a positive and statistically significant[8] CA trend for only one product, abalone. For processed agricultural products, there is evidence of positive and significant CA trends in two products: roasted coffee and water. Meanwhile, during the same period of 1995 to 2008, Hawai'i kept losing CA in four unprocessed agricultural products (cut flowers/buds, ornamental fish, papayas, and tuna) and in two processed agricultural products (processed macadamia nuts and processed pineapples). The CA trends are consistent with the change in CA for these products identified in Table 2. Eleven agricultural products investigated revealed no significant trend in gaining or losing CA from 1995 to 2008. Other agricultural products (*Others*), meanwhile, are significantly losing CA. In addition, trends of CA in the Japan market echoes the CA trends for some exports of Hawai'i to the U.S. mainland market. For instance, coffee (both roasted and unroasted) had positive CA trends both in the U.S. mainland market and in Japan, while processed pineapples had declining CA trends in both markets.

Table 3. Comparative advantage trends of Hawai'i's agricultural exports to Japan, 1995–2008

PRODUCT	β (trend)	p-value
Unprocessed/Semi-Processed		
Abalone	0.029	0.010
Coffee (Unroasted)	0.011	0.358
Cut Flowers/Buds	-0.042	0.000
Fixed Vegetabel Fats and Oils	0.000	0.715
Fruits and Nuts	-0.001	0.612
Macadamia Nuts (Fresh or Dried)	-0.005	0.101
Ornamental Fish	-0.005	0.002
Papayas	-0.184	0.000
Pineapples (Fresh or Dried)	0.008	0.228
Seaweeds	0.009	0.146
Tuna	-0.027	0.013
Processed		
Cocoa (Processed)	0.002	0.878
Coffee (Roasted)	0.026	0.000
Food Preparations	0.011	0.348
Fruit or Vegetable Juice	0.005	0.117
Grape Wine	-0.002	0.522
Macadamia Nuts (Processed)	-0.019	0.010
Pineapples (Processed)	-0.028	0.004
Sugar Confectionery	-0.003	0.084
Water	0.428	0.000
Others	-0.212	0.034

Note: p-value <0.05 indicates statistical significance.

Table 4 displays the major competitors with Hawai'i in the Japan market for products for which Hawai'i had a significant CA trend, i.e., cut flowers/buds, ornamental fish, papayas, processed macadamia nuts, processed pineapples, tuna, abalone, roasted coffee, and water. Shown are the values of Japan's imports from the world and top-country suppliers, the percentage share of each country's supply in Japan's market, and Hawai'i's share in the U.S. supply to Japan for the years 1995, 2000, 2005, and 2008.

Cut flowers/buds

The USA is not a major supplier of cut flowers/buds to Japan, but Hawai'i produces about one- to two-thirds of this total supply (depending on the year cited). The major exporters of cut flowers/buds to Japan in 1995 were the Netherlands, Thailand, and New Zealand. However, by 2005, the shares of these three countries, together with the USA, in the Japan market dramatically went down.

[7] To examine the trend of a particular product's CA over time, the following model is used:

$NRCA^{h}_{i,t} = \alpha^{h}_{i} + \beta^{h}_{i} t + \varepsilon^{h}_{i,t}$, where α^{h}_{i} is the intercept, β^{h}_{i} is the slope coefficient, t is the time index, and $\varepsilon^{h}_{i,t}$ is a random error term. If β^{h}_{i} is not statistically different from zero, this implies that Hawai'i's CA in agricultural product i is stable; otherwise, it is unstable. In particular, $\beta^{h}_{i} > 0$ suggests that Hawai'i is gaining CA in agricultural product i and $\beta^{h}_{i} < 0$ suggests otherwise.

[8] p-value <0.05.

This is despite of the increasing total imports by Japan of cut flowers/buds, in terms of quantity (See Appendix Figure 1). Malaysia, Republic of Korea, China, other Asian countries, and Colombia started to gain market shares. Colombia's main advantage over Hawai'i is its lower labor cost. Malaysia, South Korea, and China, meanwhile, have an advantage because of their proximity to Japan, which minimizes shipping and postharvest storage costs. In addition, Malaysia and China, aside from having competitive wages, have governments that are promoting their cut flower industry by providing several support programs to investors.[9] Along with the declined share of the U.S. supplies in the Japan market, the share of Hawai'i in the U.S. supply declined as well. Hawai'i's share in the U.S. supply went down from 76 percent in 2000 to 31 percent in 2008. This is in light of the declining island lands dedicated to flower-growing and shifting to more lucrative use of land.[10] In a report published by the U.S. Department of Agriculture in 2008, the number of farms dedicated to cut flowers fell from 50 in 2003 to 37 in 2007. Likewise, production area fell from 3,005,000 ft^2 in 2003 to 2,350,000 ft^2 in 2007.[11] Along with these, Hawai'i had a continuous decline in CA in cut flowers/buds from 1995 to 2008, with the NRCA score falling from 0.63 in 1995 to 0.03 in 2008. Based on this decreasing trend, the CA of Hawai'i's cut flowers/buds is expected to continue declining in the Japan market in the near future. This observation is consistent with the findings on Hawai'i's exports of cut flowers to the U.S. mainland market. The CA of Hawai'i's exports of fresh cut anthuriums, potted orchids, and fresh foliages to the U.S. mainland also declined steadily over the period 1995–2005.

Ornamental fish (live)

In 1995, the United States was the second top supplier of ornamental fish to Japan, next to Singapore, which is the largest exporter of ornamental fish in the world.[12] The USA supplied about 14 percent of the total imports of Japan. Hawai'i's share of this supply is only 4 percent, and the majority came from Florida. The major exporters of ornamental fish to Japan are Singapore, Indonesia, Malaysia, Hong Kong, and Thailand, which are considered main production centers of ornamental fish.[13] From 1995 to 2008, Hawai'i's share in the U.S. supply and of the total imports by Japan did not exhibit any dramatic changes, but the share of the USA in the Japan market significantly declined, to 5 percent. Both Brazil and Colombia have captured larger shares of the Japan ornamental fish market, 15 and 9 percent, respectively, in 2008.

In spite of Hawai'i's initial efforts to stimulate its ornamental fish industry,[14] it has not been very successful in penetrating the international market. One primary reason is that wholesale buyers of ornamental fish prefer to buy from suppliers with large volumes and varieties. Florida still controls over 95 percent of the U.S. supply, mainly because it can provide these requirements to buyers.[15] Hawai'i's capacity in these aspects is still limited, as its ornamental fish industry is still in a development stage.[16] Although Hawai'i did not exhibit comparative disadvantage in ornamental fish, a significant decreasing trend was detected over the period 1995–2008. As a result, its NRCA score declined from 0.06 in 1995 to 0.01 in 2008. It is expected that this CA will continue to decline in the near future.

Papayas (fresh)

In 1995, the USA captured almost the entire papaya import market in Japan, with all of the U.S. supply coming from Hawai'i. By 2005, the U.S. share (i.e., Hawai'i) in

[9] For instance, the Chinese government offers interest-free loans for greenhouse construction, provides study tours to the Netherlands and Israel (two major players in the international cut-flower industry), and funds research to develop better growing, distribution, and marketing techniques (Clements-Hunt, A. 2004. Cut flowers: A multi-million dollar industry blooms in rural China. International Trade Center, International Trade Forum; Stewart, A. 2006. Flower confidential: The good, the bad, and the beautiful in the business of flowers. North Carolina: Algonquin Books of Chapel Hill). Similarly, the Malaysian government initiated a variety of policies for the industry: tax incentives, financing of growers' participation in international trade shows and exhibitions, and sponsorship of foreign consultants with production and marketing expertise (http://www.green-seeds.com/land_flor4.html).

[10] Stewart, A., 2006; http://www.humanflowerproject.com/index.php/weblog/comments/todays_Hawaiian_lei_kiss_not_included.

[11] National Agricultural Statistics Service. 2008. Hawaii flowers and nursery products annual survey.

[12] http://www.agribdc.gov.my/html/themes/bdc/pdf/ornamental.pdf.

[13] Watson and Shireman, 2002. Production of ornamental aquarium fish; http://edis.ifas.ufl.edu/pdffiles/FA/FA03900.pdf.

[14] CTSA, 2004. Accomplishment report, Center for Tropical and Subtropical Aquaculture, The Oceanic Institute and University of Hawai'i.

[15] Watson and Shireman, 2002.

[16] CTSA, 2004.

Table 4. Major suppliers of selected agricultural products to Japan, selected years

Products	1995			2000			2005			2008		
	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply
Cut Flowers/Buds												
World	214.64			162.02			229.71			277.11		
Netherlands	73.99	34%		33.73	21%		11.73	5%		8.51	3%	
Thailand	40.13	19%		27.57	17%		28.07	12%		33.01	12%	
New Zealand	29.92	14%		18.88	12%		14.76	6%		12.64	5%	
Malaysia	2.90	1%		6.23	4%		41.15	18%		59.69	22%	
Colombia	7.34	3%		11.98	7%		34.01	15%		52.31	19%	
Republic of Korea	2.78	1%		18.49	11%		20.68	9%		13.77	5%	
China	1.01	0.47%		1.07	1%		15.45	7%		30.27	11%	
Other Asia	7.49	3%		9.94	6%		18.43	8%		20.78	7%	
USA	5.66	3%		3.32	2%		1.78	1%		0.80	0.30%	
Hawaii	3.47	2%	61%	2.51	2%	76%	0.85	0.37%	48%	0.25	0.10%	31%
Ornamental Fish												
World	77.97			32.14			28.80			26.19		
Singapore	15.98	20%		5.52	17%		4.34	15%		4.68	18%	
Hong Kong	9.92	13%		2.34	7%		1.16	4%		0.81	3%	
Indonesia	9.04	12%		4.42	14%		4.03	14%		3.97	15%	
Malaysia	6.13	8%		4.15	13%		2.72	9%		1.33	5%	
Brazil	4.96	6%		4.46	14%		4.23	15%		3.89	15%	
Thailand	3.32	4%		1.00	3%		2.57	9%		0.80	3%	
Colombia	1.03	1%		1.07	3%		1.34	5%		2.37	9%	
USA	10.72	14%		2.90	9%		1.23	4%		1.38	5%	
Hawaii	0.41	0.53%	4%	0.07	0.22%	2%	0.06	0.21%	5%	0.08	0.31%	6%
Papaya												
World	14.27			12.53			9.25			7.77		
Philippines	0.25	2%		4.54	36%		4.45	48%		5.63	72%	
USA	14.02	98%		7.82	62%		4.67	51%		2.08	27%	
Hawaii	14.02	98%	100%	7.21	58%	92%	4.67	51%	100%	1.97	25%	94%
Macadamia Nuts, Processed												
World	10.79			6.79			6.53			5.80		
Australia	1.51	14%		1.37	20%		3.80	58%		3.14	54%	
USA	9.03	84%		5.34	79%		2.69	41%		2.64	45%	
Hawaii	2.14	20%	24%	1.89	28%	35%	0.93	14%	34%	0.70	12%	26%
Pineapples, Processed												
World	66.55			45.70			60.50			59.52		
Thailand	31.12	47%		22.12	48%		33.11	55%		31.65	53%	
Philippines	16.16	24%		11.82	26%		12.11	20%		11.77	20%	
Indonesia	7.79	12%		6.73	15%		8.39	14%		7.59	13%	
Costa Rica	0.00			0.00			1.21	2%		5.27	9%	
USA	3.82	6%		1.60	3%		1.45	2%		0.04	0.10%	
Hawaii	1.54	2%	40%	0.80	2%	50%	1.09	2%	75%	0.00	-	-
Tuna												
World	319.79			258.86			288.80			257.85		
Taiwan	94.05	29%		28.78	11%		15.86	5%		11.40	4%	
Indonesia	86.62	27%		82.21	32%		101.67	35%		117.35	46%	
FS Micronesia	33.70	11%		7.34	3%		1.17	0.41%		3.05	1%	
Australia	6.88	2%		11.03	4%		11.07	4%		15.54	6%	
Palau	6.33	2%		5.67	2%		29.23	10%		25.11	10%	
Thailand	2.66	1%		6.98	3%		16.39	6%		19.36	8%	
Sri Lanka	2.89	1%		10.15	4%		25.21	9%		12.09	5%	
USA	38.64	12%		18.00	7%		7.56	3%		34.91	14%	
Hawaii	4.00	1%	10%	0.30	0.12%	2%	1.28	0.44%	17%	0.36	0.14%	1%

Source: Computed from UN COMTRADE, World Trade Atlas, and Trade Statistics of Japan

Note: Japan's top suppliers of other agricultural products investigated in the current study are contained in the Appendix.

Table 4. Major suppliers of selected agricultural products to Japan, selected years (continued)

Products	1995			2000			2005			2008		
	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply
Abalone												
World	21.37			16.33			32.17			33.92		
Australia	12.03	56%		10.11	62%		10.62	33%		6.70	20%	
China	5.97	28%		0.29	2%		3.01	9%		0.53	2%	
South Korea	0.02	0.12%		0.00	0.01%		9.45	29%		21.19	62%	
USA	1.61	8%		2.40	15%		4.18	13%		2.65	8%	
Hawaii	-	-	-	0.003	0.02%	0.16%	1.48	5%	35%	1.16	3%	44%
Coffee, Roasted												
World	22.69			25.86			40.82			85.96		
United Kingdom	2.94	13%		4.95	19%		4.03	10%		12.52	10%	
Switzerland	-	-		0.64	2%		1.60	4%		16.63	19%	
Brazil	0.98	4%		0.74	3%		2.55	6%		6.94	8%	
Colombia	0.06	0.27%		0.68	3%		1.32	3%		7.57	9%	
USA	12.42	55%		12.38	48%		18.37	45%		25.39	30%	
Hawaii	0.21	1%	2%	0.89	3%	7%	1.18	3%	6%	2.74	3%	11%
Water												
World	120.04			115.47			279.17			369.95		
France	84.21	70%		98.61	85%		178.14	64%		235.02	64%	
USA	14.52	12%		10.56	9%		80.90	29%		109.20	30%	
Hawaii	0.25	0.21%	2%	0.42	0.37%	4%	16.70	6%	21%	34.40	9%	32%

Source: Computed from UN COMTRADE, World Trade Atlas, and Trade Statistics of Japan

Note: Japan's top suppliers of other agricultural products investigated in the current study are contained in the Appendix.

Japan was cut by half with growth in the Philippines' market share. By 2008, the Philippines overtook Hawai'i as the largest supplier of papayas to Japan, capturing 72 percent of the market. With the world price of papaya declining in the period 1995–2008 (see Appendix Figure 2), an explanation of Hawai'i's loss to the Philippines is production cost, particularly labor cost, in which Hawai'i is unable to compete. Another reason believed to have significantly contributed to Hawai'i's loss is the rejection by Japan of genetically engineered Hawai'i papayas.[17] Among the products identified as having significant comparative disadvantage trends, Hawai'i has the greatest comparative disadvantage trend in papaya (–0.198). Papaya likewise exhibited the largest decline in CA from 1995 (2.71) to 2008 (0.32), with the NRCA score falling by 88 percent (–2.39). This finding of a decline in Hawai'i's CA in papaya is consistent with the findings of many other studies.[18]

Macadamia nuts (processed)

A comparable picture can be seen in the case of Hawai'i's processed macadamia nuts. In 1995, the United States held 84 percent of the processed macadamia nuts market in Japan, with Hawai'i holding 24 percent of this total and California providing the remainder. Australia, the only other major exporter of processed macadamia nuts to Japan, held about 14 percent of the market share. Along with the decline in Japan's total quantity imported of processed macadamia nuts (See Appendix Figure 1), the U.S. market share declined to 45 percent in 2008, but the Australia market share went up to 54 percent. Although the Hawai'i share of the U.S. supply increased from 24 percent in 1995 to 35 percent in 2000, its share declined to 26 percent in 2008. Parallel to this observation, Hawai'i's CA in processed macadamia nuts in the Japan market has fallen, with the NRCA score dropping by about 73 percent, from 0.41 in 1995 to 0.11 in 2008.

Australia's macadamia nut industry has experienced progressive growth through the years largely because of the efforts of the Australian Macadamia Society (AMS). Although the greater focus of AMS is to help the growers of macadamia nuts, it has proven to be helpful as well to processors of macadamia nuts. AMS supports efforts in improving processing efficiencies and marketing of processed macadamia nuts. For instance, AMS provides publicity and information by distributing brochures about processed Australian macadamia nuts at events, offering samples of processed nuts and helping improve perception of the health effects of macadamia nuts.[19] Hawai'i has a similar industry body, the Hawaii Macadamia Nut Association (HMNA). While AMS is a well-funded organization, which allows for various research efforts and projects that help improve the efficiency of both macadamia nut growers and processors, HMNA is plagued by financial difficulties and has been unable to meet its responsibilities to the Hawai'i macadamia nut growers.[20] Assistance from HMNA to macadamia nut processors is not expected. Based on the historical trend, Hawai'i's CA in processed macadamia nuts in the Japan market is expected to continue to decline in the near future. Furthermore, two of the leading processors are owned by off-shore multinational corporations and conduct independent marketing. Lower market prices for macadamia nuts and new buying contracts between the processors and local growers have also caused much dissention in the ranks. HMNA was unable to mitigate many of the challenges between growers and processors.

Pineapples (processed)

Hawai'i is the largest supplier of U.S. exports of processed pineapples, but the major exporters of processed pineapples to Japan are its neighbors: Thailand, the Philippines, and Indonesia. Similar to the situation of cut flowers/buds, the USA is not a significant supplier of processed pineapples to Japan. An increasing trend in Hawai'i's share in the U.S. export of processed pineapples to Japan can be observed from 1995 to 2005 (Table 4). In 2005, Hawai'i supplied 75 percent of the U.S. exports to Japan. However, with the closures of the Del Monte

[17] Greenpeace International (2006). The failure of GE papaya in Hawaii. Netherlands: Greenpeace International.

[18] See for instance, Yu, R., J. Cai, M.K. Loke, and PS. Leung, 2009, Assessing the comparative advantage of Hawaii's agricultural exports to the U.S. mainland market. Annals of Regional Science, DOI 10.1007/s00168-009-0312-9; and Cai, J., PS. Leung, and M. Loke, 2007, Comparative advantage of selected agricultural products in Hawai'i: A revealed comparative advantage assessment. College of Tropical Agriculture and Human Resources, University of Hawai'i at Mānoa, Economic Issues no. 11, http://www.ctahr.hawaii.edu/oc/freepubs/pdf/EI-11.pdf.

19 http://www.macnuts.com.au/industry.htm.

20 HMNA does not even have a full-time staff member to oversee any projects. Its failure to raise money from its members has kept it from meeting its service goals and holding educational meetings (http://www.ctahr.hawaii.edu/fb/macadami/macadami.htm#top).

Plantation cannery in Central O'ahu in 2006 and the Maui Land and Pineapple Company's cannery in 2007, Hawai'i's share of the U.S. export dropped to zero, and the U.S. share in the Japan market fell from 2 to merely 0.1 percent. The Del Monte operations were transferred to a low-labor-cost country, Costa Rica, where in 2008 it held 9 percent of the Japan market, up from only 2 percent in 2005. From 1995 to 2008, Hawai'i experienced a position of comparative advantage to comparative disadvantage, with its NRCA score falling to –0.01 in 2008 from 0.29 in 1995. According to the CA trend, Hawai'i's processed pineapples will likely continue to lose comparative advantage in the Japan market in the near future.

Tuna (fresh or chilled)

In 1995, the USA was the third top supplier of tuna to Japan, next to Taiwan and Indonesia. The USA supplied about 12 percent of the total imports of Japan, with Hawai'i providing about 10 percent of this supply. In the late 1990s, there was a heightened concern that longline fishing gear posed a threat to protected sea turtles. As a result, in November 1999 the Federal Court in Honolulu ordered a temporary seasonal closure of certain waters to Hawai'i-based longline vessels.[21] This directly and indirectly reduced Hawai'i's share in the Japan tuna market to 0.12 percent in 2000. By 2008, although the final regulations only affected the swordfish fishery, and total tuna catch in Hawai'i has actually been increasing, Hawai'i's shares in the U.S. supply and of the total imports of Japan were only 0.14 percent and 1 percent, respectively. Indonesia, Palau, and Thailand captured larger shares of the Japan tuna market. From 1995 to 2008, Hawai'i showed a decline in its comparative advantage in tuna, with its NRCA score falling by almost 97 percent, from 0.67 in 1995 to 0.02 in 2008.

Despite Hawai'i's losing CA in the aforementioned products in the Japan market, it is gaining CA in three products (roasted coffee, abalone, and water), revealing a shift of CA among these products.

Roasted coffee

From 1995 to 2008, Hawai'i had a positive CA trend in roasted coffee. In 1995, its NRCA score for roasted coffee was only 0.04, but in 2008 it increased to 0.44, representing an increase of 1,100 percent. Hawai'i is the only coffee-growing state in the USA. Other cities that process or roast coffee, such as Seattle, Los Angeles, and San Francisco, have to first import coffee beans from coffee-growing regions such as South and Central America and Africa and countries such as Indonesia. While Seattle remains the top exporter of roasted coffee in the USA, Hawai'i has been taking over some of the market share from Seattle and California. In 2008, Hawai'i supplied 11 percent of the U.S. export to Japan, up from only 2 percent in 1995. Based on the historical trend, Hawai'i's CA in roasted coffee is expected to continue to increase in the near future. With the total quantity of roasted coffee imported by Japan showing an upward trend (see Appendix Figure 1), the roasted coffee industry in Hawai'i has a promising future.

Abalone (live or fresh)

Abalone is a popular luxury seafood delicacy in Japan. Australia and China were the top suppliers of abalone to Japan in 1995. The USA was supplying 8 percent of Japan's imports at that time, with the supply coming mainly from California. In 1997, due to depletion of wild abalone populations in California, commercial abalone fishing was closed there, raising the demand for farm-raised abalone. With the establishment of the Big Island Abalone Corporation (BIAC) in 2000, Hawai'i started supplying abalone to Japan in 2001. BIAC operates the sole abalone farm in Hawai'i, which is currently the largest in the nation.[22] By 2005, South Korea and the USA had already captured larger shares of the abalone market in Japan. In 2008, Hawai'i was supplying almost half of the U.S. exports to Japan. However, it is notable that the U.S. supply declined and South Korea captured a larger share of the market, which is a growing threat to Hawai'i's abalone producer. With Hawai'i being able to respond to the increasing demand by Japan for farm-raised abalone (see Appendix Figure 1), Hawai'i has gained CA in this product. In 1995, the NRCA score for abalone was zero, but by 2008 it had increased to 0.19.

Water (bottled)

Another popular Hawai'i product being exported to Japan is mineral water. In fact, among the three products identified as having significant CA trends, Hawai'i has the greatest CA in mineral water (0.472). Mineral water

[21] Allen and Gough, 2007; http://www.pifsc.noaa.gov/tech/NOAA_Tech_Memo_PIFSC_8.pdf

[22] http://www.highbeam.com/doc/1G1-95121706.html

likewise had the greatest increase in NRCA score from 1995 to 2008, from 0.03 in 1995 to 5.59 in 2008, representing a 556 percent increase in the NRCA score. In 1995, France dominated the Japan mineral water import market, supplying 70 percent of Japan's imports. The USA held 12 percent of the market, with Hawai'i supplying only 2 percent, and Los Angeles, San Francisco, and Seattle providing the majority of the U.S. supply. In 2002, Hawai'i started exporting desalinated deep-sea water to Japan with the establishment of Koyo USA Corporation.[23] Since then, several other companies have invested in the desalinated deep-sea water industry in Hawai'i. With this, Hawai'i's share in Japan's market dramatically increased, from less than 1 percent in 1995–2000 to 6 percent in 2005. Likewise, the share of Hawai'i in the U.S. supply to Japan increased by 17 percentage points from 4 percent in 2000 to 21 percent in 2005. By 2008, Hawai'i's share of Japan's market further increased to 9 percent, with its share in the U.S. supply increasing further to 32 percent. Similar to roasted coffee, with the total quantity imported of mineral water by Japan showing an upward trend (See Appendix Figure 1), the desalinated deep-sea water industry in Hawai'i holds great potential.

The exportation of both abalone and desalinated deep-sea water are products of research projects supported by the Natural Energy Laboratory of Hawai'i Authority (NELHA). NELHA is a state agency set up to research ocean thermal energy conversion processes and related technologies.[24] Currently, NELHA supports over 30 thriving enterprises utilizing the natural riches of the ocean depths. The success of abalone and desalinated deep-sea water exportation emphasizes the importance of continuous government support for research that eventually could enhance the competitiveness of U.S. and Hawai'i products. Similarly, government support for organizations such as the Hawaii Coffee Association, which promotes Hawai'i as a coffee origin, would be beneficial to ensure that the roasted coffee industry continues to blossom.

Figure 1 shows a competitiveness matrix relating the NRCA score of each product with Japan's total imports of the product over time. The classification of products—rising stars, missed opportunities, declining stars, and retreat—is based on the competitiveness matrix developed by the World Bank and the United Nations Organization.[25] Rising stars are products where Hawai'i has a positive and statistically significant NRCA trend and where Japan is increasing its total imports. Missed opportunities take place in products in which Hawai'i has a negative and statistically significant NRCA trend or a statistically insignificant NRCA trend and in which Japan is increasing its total imports. Declining stars are products in which Hawai'i has a positive and statistically significant NRCA trend but in which Japan is decreasing its total imports. Finally, the situation of a product is considered a retreat when Hawai'i has negative and statistically significant NRCA trend or statistically insignificant NRCA and the total imports by Japan of the product is decreasing.

Abalone, roasted coffee, and bottled water are Hawai'i's rising stars. Both roasted coffee and bottled water have had a positive and statistically significant CA, along with expanding imports in the Japan market (See Appendix Figure 1). While abalone has shown a positive CA trend, its market share declined from 2005 to 2008. With the Japan abalone import market showing an upward trend (See Appendix Figure 1), Hawai'i's agriculture policy-makers and abalone growers should take action to prevent the further slide of Hawai'i's market share in the Japan abalone market; otherwise, abalone may become a missed opportunity. Cut flowers/buds are classified under missed opportunity, as Hawai'i has failed to keep up with the growing demand for cut flowers/buds in Japan (See Appendix Figure 1). Papayas, processed macadamia nuts, processed pineapples, ornamental fish, and tuna, meanwhile, are classified under retreats. As Japan has decreased its imports of these products (See Appendix Figure 1), Hawai'i has had a declining CA in them.

Notable is that all unprocessed/semi-processed agricultural products (except for abalone) are classified as missed opportunity or retreat. Products that are classified as rising stars, meanwhile, are processed agricultural products (roasted coffee and bottled water). While abalone is an exception, its production requires a different

[23] Though bottled sea water has been around in Japan since mid-1990s, deep-sea water coming from Hawai'i is touted as having the highest quality, because nothing can match the depth, quality, and purity of water drawn from the middle of the Pacific Ocean (http://www.uswaternews.com/archives/arcglobal/4japathir10.html).

[24] http://www.dswihawaii.com/nelha.html.

[25] See Mandeng, O. 1991. World competitiveness and international specialization. Eclac Review 45.

Figure 1. Competitiveness matrix of Hawai'i's Agricultural exports to Japan, 1995–2008

NRCA trend		
	Declining Stars	**Rising Stars** **Abalone*** **Coffee (Roasted)** **Water (Bottled)**
	Retreats **Papaya** **Macadamia Nuts (Processed)** **Pineapples (Processed)** **Ornamental Fish** **Tuna** Macadamia Nuts (Fresh/Dried) Seaweeds	**Missed Opportunities** **Cut Flowers/Buds** Cocoa (Processed) Coffee (Unroasted) Fixed Vegetable Fats and Oils Food Preparations Fruit or Vegetable Juice Fruits and Nuts Grape Wine Pineapples (Fresh/Dried) Sugar Confectionery
	Japan's Total Imports	

***Exhibited declining market share from 2005 to 2008**

kind of technology. This suggests that better production techniques have an important role in increasing the international competitiveness of Hawai'i's products.

Conclusion

While Hawai'i had comparative advantage in fresh papayas, pineapples (processed), cut flowers/buds, macadamia nuts (processed), ornamental fish, and tuna in 1995, it has lost its comparative advantage considerably in these products over the years. The emergence of abalone and desalinated deep-sea water as top export products to Japan shows that Hawai'i has capitalized on its under-tapped but abundant natural resource—sea water.[26] However, it must be emphasized that better production techniques have greatly contributed to the increase in competitiveness of Hawai'i in these two sea water products. Moreover, Hawai'i has taken advantage of the brand recognition by Japanese consumers of Hawai'i products, in particular desalinated deep-sea water and roasted coffee, for having high quality.[27]

The findings of this study are relevant for policy makers, as they suggest that Hawai'i may be losing competitiveness in some of its products in the Japan market due to lower labor costs and more efficient production techniques in some of its competitors. Whether these are the exact reasons for Hawai'i's loss of competitiveness is a rich subject requiring future research. If Hawai'i is not able to compete in these aspects, then other ways must be found to improve competitiveness in the products experiencing competitive disadvantage. Otherwise, it may be necessary to abandon promotion of these products and focus attention and limited resources on promotion of products with the brightest prospects, such as desalinated deep-sea water, roasted coffee, and abalone, as this study suggests. In addition, findings of this study suggest that the role of research and technology is important in harnessing the productive capacities of natural resources.

[26] Mark Anderson, formerly of the state's Foreign-Trade Zone Division, noted that Hawai'i always had difficulty creating new export industries because Asia and the West Coast have more resources and cheaper labor, but Hawai'i may have discovered an inexhaustible gold mine in water. (http://archives.starbulletin.com/2004/10/11/business/story2.html).

[27] Japanese visitors have been flocking the famers' markets seeking both a local experience and local products, often for omiyage (gifts).

Acknowledgments

This publication benefited greatly from the constructive comments and suggestions of Dr. Donna Lee of the University of Hawai'i Economic Research Organization and Dr. Christopher Edmonds of the University of Hawai'i Center on the Family. Responsibility for the final content rests with the authors.

The authors gratefully acknowledge financial support from the United States Department of Agriculture, Agricultural Research Service, under the Specific Cooperative Agreement "Agricultural Post-Harvest, Value Added Products and Processing Program" (Award no. 58-5320-7-664), and the United States Department of Agriculture, Agricultural Marketing Service under the Federal-State Marketing Improvement Program (FSMIP Award no. 12-25-G-0885).

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Appendix

Appendix Table 1. Product description and HS codes

Product	HS Code	Description
Unprocessed/Semi-Processed		
Abalone	1605906020	Abalone, Live or Fresh
Coffee (Unroasted)	0901110000	Coffee, Not Roasted/Not Decaffeneited
	0901120000	Coffee, Not Roasted/Decaffeneited
Cut Flowers/Buds	0603100000	Cut Flowers/Buds, Fresh
	0603190000	Cut Flowers/Buds, Fresh
	0603900000	Cut Flowers/Buds, Dried, Dyed, Bleached
Fixed Vegetabel Fats and Oils	1515900000	Other Fixed Vegetable Fats and Oil
	1515908000	Fixed Vegetable Fats/Oil, Not Chemically Modified
	1515908002	Fixed Vegetable Fats/Oil, Not Chemically Modified, NESOI
Fruits and Nuts	0802909500	Nuts, Shelled, Fresh or Dried, NESOI
	0811909000	Fruits and Nuts, Uncooked/Cooked by Water, Frozen, NESOI
	0812908800	Fruits and Nuts, Provisionally Preserved, Inedible, NESOI
	0813408500	Other Fruits and Nuts
Macadamia Nuts (Fresh or Dried)	0802608000	Macadamia Nuts Shelled, Fresh or Dried
Ornamental Fish	0301100000	Ornamental Fish, Live
Papayas	0807200000	Papayas, Fresh
Pineapples (Fresh or Dried)	0804300000	Pineapples, Fresh or Dried
Seaweeds	1212200000	Seaweeds
Tuna	0302320000	Yellowfin Tunas
	0302330000	Skipjack Tunas
	0302340000	Bigeye Tunas
Processed		
Cocoa (Processed)	1806100000	Cocoa Powder, Containing Added Sugar or Other Sweetening
	1806206000	Confectioners Coatings/Products Containing Not Less 6.8% Cocoa Solid Block
	1806209000	Cocoa Preparations in Bulk Form, NESOI
	1806310040	Chocolate and Other Food Preparations Containing Cocoa, Confectionery, in Block, Slabs or Bars Weighing 2 Kgs or Less, Filled
	1806310080	Chocolate or Cocoa Preparations, Non-Confectionery, in Blocks/Bars Not Over 2 Kg, Filled
	1806321000	Chocolate or Cocoa Preparations, Confectionery, in Blocks/Bars Not Over 2 Kg
	1806323550	Chocolate and Other Food Preparations Containing Cocoa, in Block, Slabs or Bars Weighing 2 Kgs or Less, Not Filled, Except Confectionery
	1806900063	Chocolate Retail - Confectionery
	1806900073	Cocoa Preparations Except Confectionery, NESOI, For Retail
	1806900083	Confectionery, Cocoa Food Preparations, NESOI, Not Retail
	1806900093	Cocoa Preparations, NESOI, Not Put Up for Retail Sale, Except Confectionery

Appendix Table 1 (continued). Product description and HS codes

Product	HS Code	Description
Coffee (Roasted)	0901210000	Coffee, Roasted/Not Decaffeneited
	0901220000	Coffee, Roasted/Decaffeneited
Food Preparations	2106901800	Preparations for Alcoholic Beverages, GT 0.5% by Volume GT 50% by Weight
	2106905800	Food Preparations of Geletin, NESOI
	2106906573	Preparations for Manufacture of Bevereages, NESOI
	2106906587	Herbal Teas, Etc.
	2106906592	Food Preparations, NESOI, Canned
	2106906595	Food Preparations, NESOI, Frozen
	2106907090	Edible Preparations, Not Canned/Frozen, Not Containing Sugar, NESOI
Fruit or Vegetable Juice	2009308000	Fruit Juices, Unmixed, Unfermented, Concentrated
	2009315050	Citrus Juice (Single Fruit), NESOI, Brix Value < 20
	2009600040	Fruit Juices, Unfermented, Concentrated, Frozen
	2009800000	Juice of Any Other Single Fruit or Vegetable
	2009809000	Juice of Any Single Fruit or Vegetable, NESOI
	2009904000	Fruti Juice, Unfermented
	2202903600	Juice of Any Single Fruit or Vegetable, (Except Orange Juice), Fortified with Vitamins/Minerals, Non-Concentrated Form
Grape Wine	2204212000	Effervescent Wine of Fresh Grape in Containers 2 Liters or Less
	2204214000	Grape Wine, NESOI, Not Over 14% Alcohol, Containers 2 Liters or Less
	2204217000	Grape Wine, NESOI, Over 14% Alcohol, Containers 2 Liters or Less
Macadamia Nuts (Processed)	2008199010	Macadamia Nuts, Prepared or Preserved
Pineapples (Processed)	2008200000	Pineapples, Prepared or Preserved, NESOI
	2009402000	Pineapple Juice, No Spirit, Unfermented, Concentration Not More Than 3.5 Degrees
	2009404000	Pineapples Juice, Unfermented, Frozen
	2009412000	Pineapple Juice, Brix Value < 20, Concentration Not More Than 3.5 Degrees
	2009414000	Pineapple Juice, Brix Value < 20, NESOI, Unfermented
	2009492000	Pineapple Juice, NESOI, Not Concentrated or Concentration Not More Than 3.5 Degrees
	2009494000	Pineapple Juice, NESOI, No Vitamins, Unfermented
Sugar Confectionery	1704903000	Confections or Sweetmeats Ready for Consumption, No Cocoa
	1704907000	Sugar Confectionery, Without Cocoa, NESOI
Water	2201100000	Mineral Waters and Aerated Waters, Natural or Artificial, Not Sweetened
	2201900000	Waters Not Sweetened or Flavored, NESOI

Source: World Trade Atlas

Appendix Table 2. Major suppliers of selected agricultural products to Japan in selected years

Products	1995			2000			2005			2008		
	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply
Cocoa (Processed)												
World	317.13			310.54			380.48			501.40		
Singapore	49.12	15%		52.98	17%		85.62	23%		188.86	38%	
Australia	37.24	12%		36.18	12%		41.90	11%		38.36	8%	
Belgium	24.74	8%		23.84	8%		48.95	13%		54.26	11%	
France	18.04	6%		15.07	5%		35.57	9%		42.33	8%	
New Zealand	27.51	9%		22.64	7%		20.71	5%		21.80	4%	
Rep. of Korea	18.37	6%		18.34	6%		22.15	6%		20.58	4%	
USA	50.60	16%		45.05	15%		34.56	9%		35.59	7%	
Hawaii	7.35	2%	15%	7.69	2%	17%	6.17	2%	18%	8.46	2%	24%
Fixed Vegetable Fats and Oils												
World	20.86			30.43			45.02			74.56		
Thailand	1.01	5%		3.28	11%		16.02	36%		18.01	24%	
India	1.75	8%		8.10	27%		4.16	9%		9.34	13%	
Sweden	3.93	19%		2.38	8%		1.58	4%		2.31	3%	
China	1.02	5%		1.46	5%		3.06	7%		9.83	13%	
Italy	0.01	0.04%		1.26	4%		2.62	6%		4.90	7%	
Viet Nam	0.00	-		0.00	-		2.05	5%		14.44	19%	
USA	5.74	27%		3.88	13%		5.21	12%		4.16	6%	
Hawaii	0.03	0.14%	1%	0.05	0.16%	1%	0.08	0.18%	2%	0.04	0.05%	1%
Food Preparations												
World	403.36			505.42			926.92			878.46		
China	15.36	4%		31.71	6%		144.43	16%		110.00	13%	
Rep. of Korea	55.87	14%		49.42	10%		72.26	8%		97.18	11%	
Singapore	37.19	9%		33.57	7%		44.71	5%		95.68	11%	
New Zealand	35.84	9%		47.35	9%		52.24	6%		58.02	7%	
Thailand	29.53	7%		30.73	6%		43.53	5%		100.82	11%	
Belgium	33.11	8%		27.99	6%		50.87	5%		27.98	3%	
Netherlands	12.75	3%		7.25	1%		15.92	2%		65.16	7%	
USA	130.57	32%		192.54	38%		364.27	39%		190.74	22%	
Hawaii	0.18	0.04%	0.14%	0.12	0.02%	0.06%	3.83	0.41%	1%	0.12	0.01%	0.06%
Fruits and Nuts												
World	32.77			32.57			70.63			50.04		
France	16.29	50%		15.85	49%		19.79	28%		18.71	37%	
China	6.49	20%		7.34	23%		22.00	31%		13.80	28%	
Thailand	2.64	8%		3.19	10%		5.33	8%		7.00	14%	
United Kingdom	3.24	10%		4.33	13%		3.91	6%		3.52	7%	
Egypt	2.39	7%		2.31	7%		3.37	5%		3.12	6%	
Rep. of Korea	0.07	0.22%		0.42	1%		6.28	9%		5.61	11%	
USA	4.75	14%		3.39	10%		1.87	3%		1.15	2%	
Hawaii	0.42	1%	9%	0.38	1%	11%	0.31	0.44%	17%	0.00	-	-
Fruit or Vegetable Juice												
World	193.16			183.28			175.30			234.06		
Australia	40.45	21%		20.48	11%		33.60	19%		40.88	17%	
China	2.48	1%		3.94	2%		24.03	14%		11.66	5%	
Netherlands	3.66	2%		5.78	3%		11.16	6%		10.26	4%	
Italy	7.13	4%		8.73	5%		6.37	4%		8.10	3%	
Chile	2.80	1%		5.76	3%		13.18	8%		13.25	6%	
Other Asia	3.33	2%		3.28	2%		7.73	4%		6.02	3%	
USA	91.70	47%		76.44	42%		53.31	30%		75.63	32%	
Hawaii	0.25	0.13%	0.27%	0.78	0.43%	1%	0.80	0.46%	2%	0.99	0.42%	1%

Sources: Computed from UN COMTRADE, World Trade Atlas, and Trade Statistics of Japan

Appendix Table 2 (continued). Major suppliers of selected agricultural products to Japan in selected years

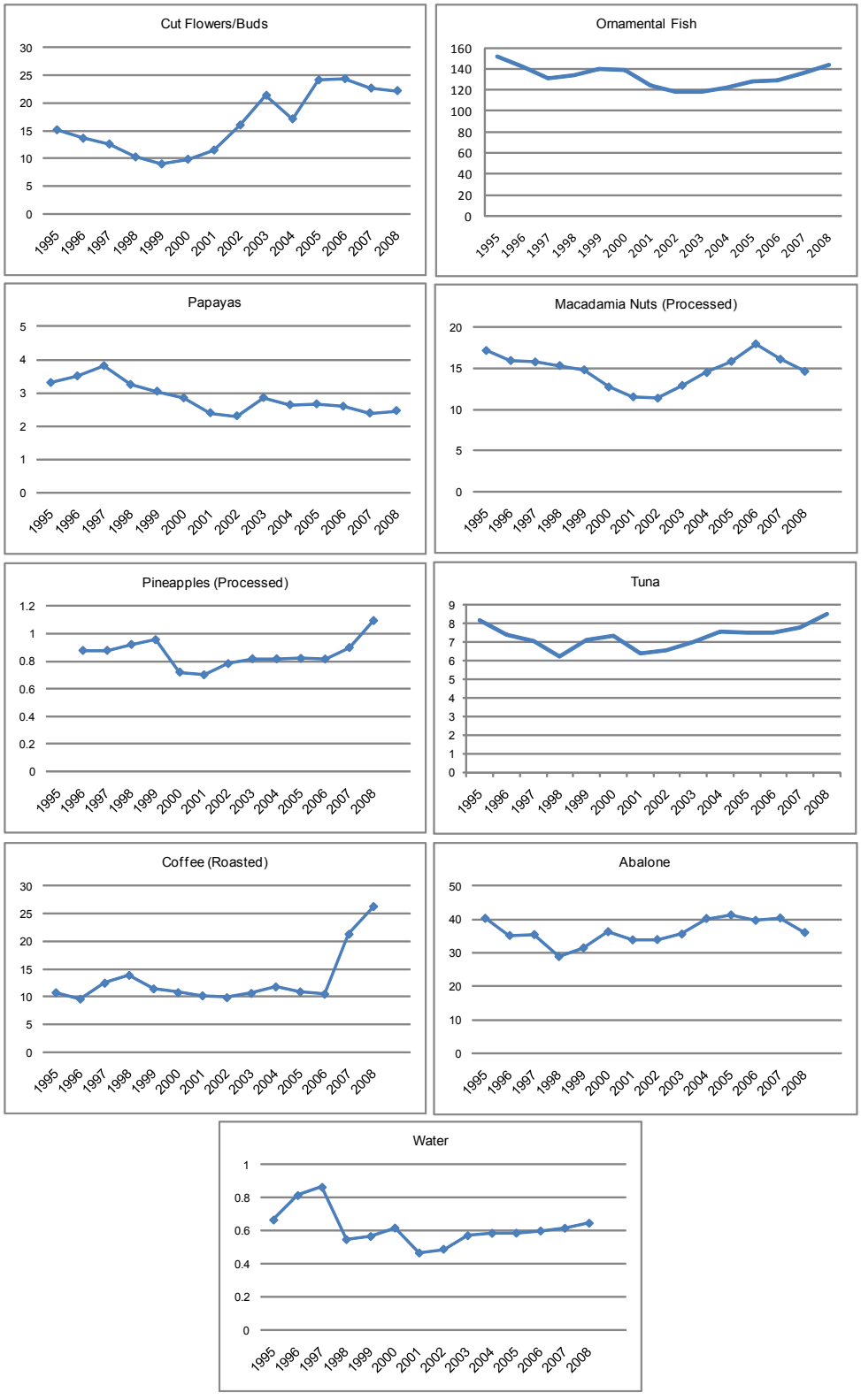
Products	1995			2000			2005			2008		
	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply	Value (US$ millions)	Share in Japan Market	Share in US Supply
Grape Wine												
World	339.23			604.70				752.21		870.38		
France	199.57	59%		350.29	58%		462.46	61%		507.24	58%	
Italy	34.35	10%		81.56	13%		103.40	14%		131.30	15%	
Germany	57.05	17%		35.27	6%		26.22	3%		21.19	2%	
Chile	1.22	0.36%		27.93	5%		25.83	3%		45.28	5%	
USA	20.54	6%		53.00	9%		48.04	6%		59.98	7%	
Hawaii	0.03	0.01%	0.15%	0.08	0.01%	0.15%	0.16	0.02%	0.33%	0.56	0.06%	1%
Macadamia Nuts (Fresh or Dried)												
World	11.50			11.53			36.55			16.99		
Australia	6.84	59%		6.17	54%		23.38	64%		10.80	64%	
Kenya	3.91	34%		3.50	30%		3.34	9%		0.00	-	
Malawi	-	-		0.82	7%		4.88	13%		2.57	15%	
South Africa	0.24	2%		0.00	-		4.62	13%		2.82	17%	
USA	0.27	2%		0.72	6%		0.00	-		0.00	-	
Hawaii	0	-	-	0.00	-	-	0.00	-	-	0.00	-	-
Pineapples (Fresh or Dried)												
World	52.50			48.60			89.65			84.85		
Philippines	51.77	99%		46.97	97%		86.95	97%		84.14	99%	
Taiwan	0.72	1%		0.83	2%		0.85	1%		0.64	1%	
USA	0.01	0.01%		0.01	0.02%		1.57	2%		0.01	0%	
Hawaii	-	-	-	0.00	-	-	1.41	2%	90%	0.00	-	-
Seaweeds												
World	174.88			150.22			179.31			172.49		
Rep. of Korea	113.95	65%		68.18	45%		69.05	39%		64.10	37%	
China	33.70	19%		60.49	40%		87.06	49%		82.18	48%	
Chile	9.01	5%		8.99	6%		7.84	4%		12.21	7%	
Canada	0.70	0.40%		1.52	1%		5.14	3%		7.04	4%	
USA	1.99	1%		0.82	1%		0.99	0.08%		0.45	0.09%	
Hawaii	0.23	0.13%	12%	0.67	0.45%	82%	0.99	0.55%	100%	0.45	0.26%	100%
Sugar Confectionery												
World	60.70			60.92			83.40			78.49		
Netherlands	14.94	25%		13.58	22%		12.58	15%		9.35	12%	
Spain	7.78	13%		11.09	18%		12.89	15%		13.66	17%	
Germany	3.47	6%		2.58	4%		13.59	16%		12.81	16%	
China	0.76	1%		14.90	24%		10.60	13%		6.22	8%	
Thailand	0.07	0.11%		0.94	2%		5.54	7%		6.39	8%	
USA	2.77	5%		4.00	7%		4.23	5%		4.58	6%	
Hawaii	0.06	0.10%	2%	0.46	0.76%	12%	0.17	0.20%	4%	0.11	0.14%	2%
Coffee (Unroasted)												
World	1096.11			768.05			877.65			1104.97		
Brazil	256.56	23%		178.16	23%		246.17	27%		279.50	24%	
Colombia	222.76	20%		178.68	23%		237.72	26%		282.89	24%	
Indonesia	152.58	14%		84.89	11%		74.47	8%		130.82	11%	
Guatemala	70.41	6%		69.41	9%		90.82	10%		125.48	11%	
Ethiopia	54.25	5%		56.66	7%		70.86	8%		26.63	2%	
Viet Nam	48.87	4%		22.52	3%		25.99	3%		125.05	11%	
Honduras	46.26	4%		38.56	5%		14.31	2%		23.61	2%	
Jamaica	26.05	2%		28.41	4%		18.29	2%		25.44	2%	
United Rep. of Tanzania	36.63	3%		21.03	3%		24.90	3%		26.56	2%	
Mexico	25.77	2%		26.52	3%		16.71	2%		12.39	1%	
USA	3.77	0.35%		4.14	0.53%		3.42	0.37%		3.87	0.33%	
Hawaii	1.44	0.13%	38%	1.54	0.20%	37%	2.76	0.30%	81%	2.15	0.18%	56%

Sources: Computed from UN COMTRADE, World Trade Atlas, and Trade Statistics of Japan

Appendix Figure 1. Total quantity of selected agricultural products imported by Japan, 1995–2008; units in kg except water, in liters

Source: UN Comtrade

Appendix Figure 2. Average price of selected agricultural products, 1995–2008; units in $/kg except water, in $/liter



Source: UN Comtrade