

An analysis of Japanese Consumer Evaluation for Taiwan “Irwin” Mango –comparison with Mexican and Okinawa mango

台湾産マンゴーに対する消費者意識調査と評価

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1. Introduction

(1) Worldwide mango production and trade

Mango production occurs in over 90 countries. The Food and Agriculture Organization of the United Nations estimates worldwide production at nearly 38.7 million tons in 2010.

Although only a relatively small part of total mango production enters international trade (<4%), the trading volume has increased substantially since the late 1990s. From the 1990s, per capita consumption has increased noticeably in the USA, Japan and China, mainly due to higher income levels, improved advertising and lower mango prices (Litz, 2009).

Compare with other country, Japan and Taiwan are very particular for “Irwin” mango production and consumption. Due to the red peel, full smell and good taste, this variety get high consumer acceptance on Japan and Taiwan. However, the characteristic of “short shelf life” and “not so easy for long distance transport” lead to this variety is not so common to cultivar in other areas. Japan and Taiwan are two major production areas for “Irwin” mango in the worldwide. Most of Japan’s “Irwin” mango grows under greenhouse and Taiwan mango just crops in open field cultivation.

(2) Japanese mango production and import demand

In recent years, Japan’s mango production increased. The main production regions are Okinawa, Miyazaki and Kagoshima. The growing area was 403 ha and its production was 3,003 tons in 2008. As a result of the high greenhouse production cost, Japan’s domestic mango yield and are not enough to meet market demand. It still needs to import from other country. Import mango quantity is 10-12 thousand tons approximately from 2006 to 2011. The import value is about 3.7 to 5.7 billion Japanese Yen per year. Major importing countries are Mexico, Philippines, Thailand, Taiwan and Brazil. Among all of these, “Irwin” mango import from Taiwan increase gradually. Mango importing quantity from Taiwan is 1,154.8 tons (11.5%) and the value is 0.74 billion Japanese yen (19.8%) in 2011, which is ranked the third and followed with Mexico, Thailand (Japan government trade statistics

report). It seems that Japanese consumer like red peel and good smell “Irwin” mango more than others varieties.

(3) Taiwan mango production and consumption status

Mango is one of the main evergreen fruit trees in Taiwan. Total growing area was 16.6 thousand ha; the production amount was 140.3 thousand tons in 2010. It estimated “Irwin” mango production yield about 60-70 thousand tons on Taiwan. Generally speaking, over 95% of Taiwan mango production is consumed in domestic market and the remaining 3-5% also exports to other country. The major export countries are Japan, Hong Kong, Mainland China, Korea, and Singapore. Export quantity is 4,382 tons and value is 14.7 million US\$ in 2011. Taiwan mango exporting quantity to Japan was 1,161.1 ton and value was 8.3 million US\$. On the other way, the unit price was 7.18 US\$/kg (Taiwan government trade statistics report). Both export value and unit price to Japan are the higher than export to other countries. Japan is the key export market for Taiwan mango production.

The aim of the current study was to provide input to Taiwan mango industry relevant for strengthening its effort and supply good quality fruit for Japan market demand. This is the first research for Taiwan mango export to Japan market and will offer consumer evaluation for Japan import fresh fruit market.

2. Literature review

(1) Japan market survey for mango

A study of Okinawa mango consumption among the residents of Ginza (Tokyo), Osaka and Sapporo found that Ginza’s residents have the greatest buying potential. However, the study described that men are more concerned about quality than women, and women are more concerned about price(Nakamura et al., 2008).The research of consumer evaluation for Okinawa mango, shows that fruit color, taste, sweetness and after feeling of eating are vital characteristics for sensory evaluation (Kikuchi and Taira, 2009).

Research of Japanese consumer evaluation for Australian mango, illustrates that mango export managers should target the following

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markets, including young people, housewives, those who have never tasted mangos, those who seek nutrition from fruit, those who have positive attitudes towards foreign fruit, gift use, food industry use and household use (Miyachi and Perry, 1999).

(2) Intrinsic vs. extrinsic cues of food product

Product quality cues are categorized as either intrinsic or extrinsic (Lee and Lou 1995/1996). Intrinsic cues are part of a physical product. It is easy to recognize the relevance of these types of cues for food, particularly fresh food. They include appearance, color, shape, size and structure. Extrinsic cues are related to the product, such as name, price and country-of-origin (Steenkamp et al., 1986; Oude Ophuis and Van Trijp, 1995; Sulé Alonso et al., 2002).

The research has concluded that intrinsic cues are generally important to consumers in judging quality because they had a higher predictive, evaluate than extrinsic cues (Zeithaml, 1988). The intrinsic attributes exert greater influence on perceived quality in fruit products than do extrinsic attributes (Sulé Alonso et al., 2002). Perceived quality is explained more robustly by the intrinsic than by the extrinsic attributes in a survey on peach (Mora et al., 2011).

3. Research method, data collection and analysis

(1) Research hypothesis

Until now, there has been no research report about Taiwan's mango exportation in the Japanese market. It should serve as an original survey in the marketplace. Our research assumes that Japanese consumer buying behavior for Taiwan's mango will be affected by two factors, inner and outer factor. Inner factors include general image, eating and buying experience, and fruit quality. Outer factor is price (Figure 1). Many reports, which focus on the mango's general image and fruit quality, have been published. Eating and buying experience have not yet been conducted. About price factor, we adopt PSM (Price sensitive measure) to survey consumer price perception. To the knowledge of the authors, this study is the first research to do so in an application relating on consumption experience and PSM analysis to fresh mango evaluation. These are three academic points of originality in this research.

(2) Brief introduction of Price sensitive measure (PSM)

The method of PSM which reveals price perceptions of consumer as they relate to quality perceptions (Lewis, 1997). The PSM model contains four questions, i) at what price on the scale do you consider the product or service to be cheap? ii) at what price on the scale do you consider the product or service to be expensive? iii) at what price on the scale do you consider the product or service to be too expensive, so expensive that you would not consider buying it? iv) at what price on the scale do you consider the product or service to be too cheap, so cheap that you would not consider buying it? With these four cumulative

distribution curves of consumer perceive, we can get resulting area

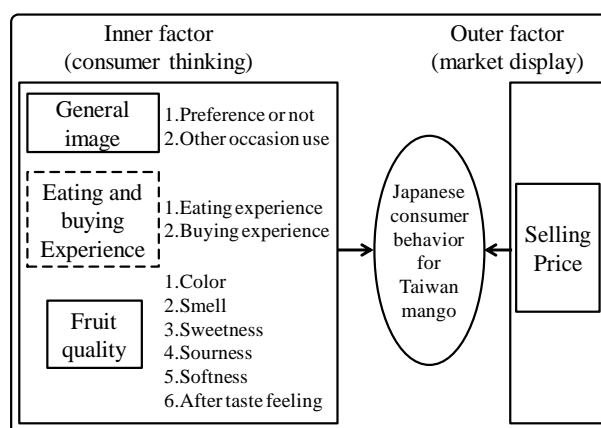


Figure 1 Research hypothesis of Japanese consumer buying behavior for Taiwan mango.

which indicates the range of acceptable price.

(3) Testing mango material preparation for sensory evaluation:

Because Okinawa is the biggest mango production area on Japan, Okinawan mango had been taken for standard reference of quality testing. Mexico mango also had been picked for its first one position on Japan import mango market. Each respondent was presented with 3 different production area mango, Okinawan, Taiwan and Mexico. Sample for testing were presented to consumer in clear plastic cups. The labels: A, B, C were used to represent the different production area. Filtered water was provided as palate cleansers between samples.

(4) Participants:

This survey was conducted with CLT (Central Location Test)¹. We hold a consumer study on July 30, 2011. The tasting took place at Museum of Tokyo University of Agriculture². Sixty-nine respondents for the study were recruited to meet specified criteria for gender, age, nationality, profession and household numbers (Table 1). Respondents spent about 30 minutes tasting mango and answering a questionnaire.

Table 1 Basic data of survey respondents.

Age	~19	11	Household numbers	living alone	9
	20~29	13		2 person	14
	30~39	14		3 person	22
	40~49	9		4 person	14
	50~59	11		5 person	5
	60~	10		No answer	5
Profession	No answer	1	Gender	Male	26
	Employed	36		Female	41
	Unemployed	2		No answer	2
	Housewife	9	Nationality	Japanese	65
	Student	19		Foreign	2
		No answer	3	No answer	2
Total number		69			

(5) Questionnaire procedure:

- a. Step1 (before mango tasting): data collect for mango consumption experience and image
 - i) Eating and buying experience:

This part is multiple options design for collecting consumer eating and buying experience information. We conducted to gather mango consumption experience, which mango produce from Japan, Taiwan, Mexico, Thailand and Philippine and so on.

ii) General image for mango product

To understand consumer occasion use of mango are important index for marketing segment. Multiple options include daily use, non-daily use, for gift, fresh fruit, processing food, seasonal food, healthy food and preference food for consumer general image.

b. Step 2: sensory evaluation of mango fruit quality

i) sensory evaluation item

We prepare different production are mango, Okinawa, Taiwan and Mexico for respondents, and request them to evaluate fruit quality including fruit color, smell, sweetness, sourness, softness and after tasting feeling.

ii)Hedonic ratings were obtained on a 5- point category scale with anchors: 5=“better more”, 4=“ better slightly”, 3=“similar”, 2=“ bad slightly”, 1=“bad more”. Okinawa mango was served for standard quality reference to evaluate Taiwan and Mexico mango.

c. Step3: PSM analysis of Taiwan mango

After respondents finished vision check and fruit sensory evaluation of these three different production areas mango, we offer four PSM questions for respondents as above illustrated. And we can get consumer price acceptability for Taiwan mango.

d. Step 4: final buying will for different production area

In the end of experimental study, participants are asked to make a choice about three different production areas mango. This short survey provided information on the relative important of price and production area for choice probability. Three different production areas mango price was presented which refer to supermarket selling price: Okinawan ¥2,500/piece; Taiwan ¥1,000/piece; and Mexico ¥500/piece.

4. Result

(1)General image

Many respondents think that mango is a seasonal fruit (42%), processed food (39.1%), non-daily use (37.7%), fresh fruit (36.2%), and preference food (34.8%). However, summer is mango eating season for Japanese consumer. And mango is not just for fresh use; processed mango will also be one option (Table 2).

(2)Eating and buying experience

The 88.4% respondents assumed that they had eaten mango. And most of them like mango (Table 2). Besides, 66.7% respondents had bought mango before. Even though mango is a tropical fruit, it is still not as popular in the Japanese market as is banana and pineapple. However, only 23.2 % people answered that they had eaten Taiwan’s mango before (Table 3). It seems Japanese consumers are not familiar with

Taiwan’s mango. And it is the main purpose for this study to survey Japanese consumer evaluation for Taiwan mango.

(3) Sensory evaluation and price acceptability

In comparison with Okinawan and Mexican mangos, Taiwan’s mango has a very good performance on color, smell, sweetness, sourness, softness and after tasting feeling. It seems that these characteristics make Japanese consumers impressed by Taiwan’s mango (Table 4).

(4)Significant test of inner factors

About general image, only “preference” is significant for consumer behavior. It shows “preference population” should be a potential characteristic for buying (Table 5). On the other hand, buying and eating experience, color, smell, sweetness, softness and after taste feeling are also very significant for consumer buying behavior.

Table 2 Respondent’s general image, eating and buying experience for mango.

		Respondents	Percentage(%)
Image	Daily use	4	5.8
	Non-Daily use	26	37.7
	As gift	16	23.2
	Fresh fruit	25	36.2
	Processed food	27	39.1
	Seasonal Fruit	29	42.0
	Healthy food	1	1.4
	Preference Food	24	34.8
Eating experience	Had eaten-like	60	87
	Had eaten- do’ntlike	1	1.4
	Has not eaten	7	10.1
	No answer	1	1
Buying experience	Had bought	46	66.7
	Has not bought	21	30.4
	No answer	2	2.9

Table 3 Respondents eating experience for different mango production areas.

Production areas	Respondents	Percentage(%)
Miyazaki(Japan)	29	42
Okinawa(Japan)	29	42
Others county of Japan	5	7.2
Taiwan	19	23.2
Mexico	19	23.2
Philippines	23	33.3
Others country	17	26.6
Can not make sure production area	23	33.3

Table 4 Fruit sensory evaluation of Taiwan's and Mexican mango, (Okinawan mango as standard check).

	Okinawa	Taiwan	Mexico
Colour	3	3.52	2.38
Smell	3	3.16	2.39
Sweetness	3	3.57	2.20
Sour	3	3.25	3.92
Softness	3	3.62	2.16
After taste feeling	3	3.64	2.66

Table 5 The significant test of the inner factor for Japanese consumers buying behavior about Taiwan's mango.

Inner factor		Pearson's chi-square probability	significant test
General Image	1.Daily use	0.18	
	2.Non-Daily use	0.69	
	3.Gift-giving	0.57	
	4.Fresh fruit	0.6	
	5.Processing	0.59	
	6.Season's Fruit	0.09	
	7.Healthy food	0.72	
	8.Preference Food	0.02	***
Eating and buying experience	1.Have been eaten Taiwan mango	0.01	**
	2.Have been bought mango	0.05	*
Fruit quality	1.color	0.02	*
	2.smell	0.01	**
	3.sweetness	0.02	*
	4.sourness	0.56	
	5.softness	0.0001	****
	6.after taste feeling	0.05	*

Note: *p<0.05; ** p<0.01; *** p<0.001; **** p<0.0001

(5) Price acceptability

For Taiwan's mango, 66.2% of respondents replied that they will buy on the price of ¥1,000/piece. It means that compared with Okinawan (¥2,500/piece) and Mexican (¥1,000/piece) mango, Taiwan's mango quality and price can meet consumer demand more (Figure 2).

The PSM (price sensitivity measure) method is implemented by presenting the subject with a product scenario that represents the total value of the product (Lewis and Shoemaker, 1997). Generally speaking, our research indicated that consumers' expected price for Taiwan's

mango is ¥475-625. Moreover, respondents of buying group have higher expected price of ¥500-800. It signified that the buying group is the main target population, helping to increase the sales amount and the price (Figure 3).

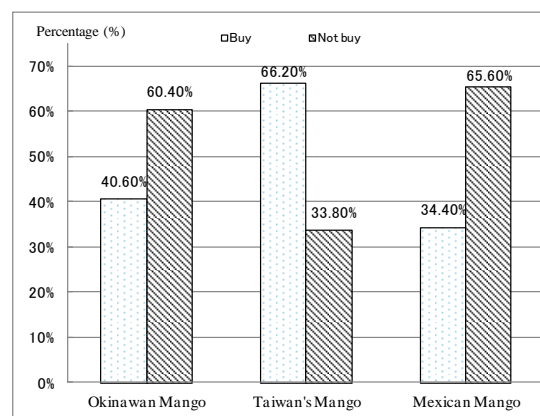


Figure 2 Buying will of Okinawan, Taiwan's and Mexican mango.

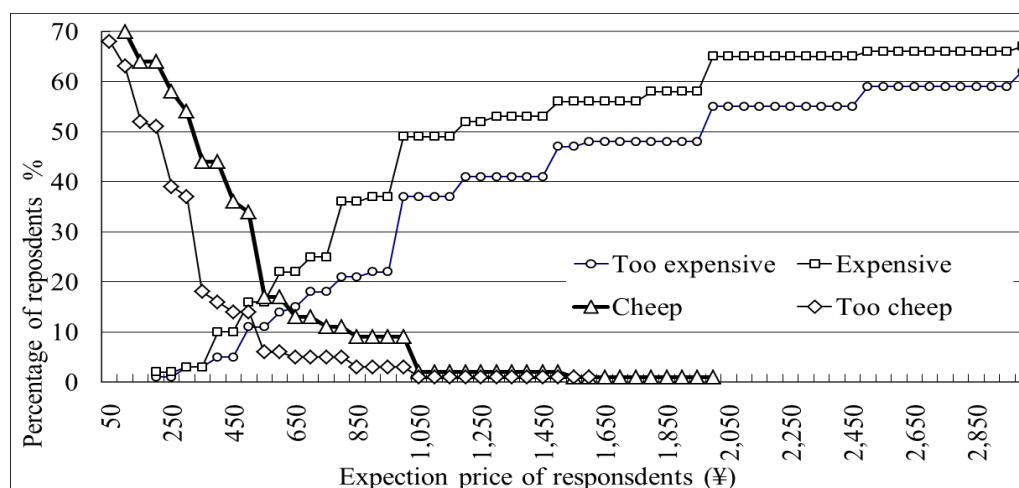


Figure 3 Price sensitivity measurement of Taiwan's mango.

5. Comment and discussion

(1) Inner factor:

a) General image:

37.7% respondents deemed that mango were for 'Non-daily use', and only 5.8% of respondents thought of mango for 'daily use'. It seems Japanese consumers are not as familiar with mango as with other tropical fruit. This outcome is similar with Japanese consumer research about Australian mango. One of the reasons for not having tasted mango is 'unfamiliarity with tropical fruit' (Miyachi and Perry, 1999). Next, JETRO'S report (1985) indicated fresh mangoes would be preferred to processed ones. Our study also pointed out that Japanese consumers consider mango for processed food (39.1%).

In our research about general image, only 'preference' is a significant factor for consumer behavior. In fact, Sidel and Stone (1993) previously recommended segmentation based on quality preference rather than by demographic background. Our study also shows that 'preference' is a central characteristic for mango's potential buying population.

b) Eating and buying experience:

Consumer assessment of quality is likely to be strongly influenced by their capacity to remember past experiences (Harker et al., 2002). According to a survey in Tokyo, the role of familiarity and experience with the product allows consumers to better identify their most preferred kiwifruit (Harker et al., 2009). Our research illustrates 'eating and buying experience' are both significant factors for mango buying behavior. This result corresponds with those other reports above, and also is the first paper to discuss about the experience for fresh mango consumption.

c) Sensory evaluation of fruit quality

For fruit products, consumer satisfaction and acceptance are key indicators of success (Brug et al., 1995). The taste of a fruit is generally evaluated by its sweetness and acidity in Japan (JETRO, 1985; Musa et al., 2010). For Japan's mango production in Miyazaki, premium quality Irwin mangos are cultivated in green houses, harvested with over 15 °Brix (Yamashita, 2000). 'Sweetness' has been reported as an important

mango fruit characteristic for the United States and Japanese consumers (Delwiche, 2008; Kikuchi and Taira, 2009). Characteristic of mango 'flavor' determines the quality, consumer acceptability and the price in India (Gholap et al., 1986) and Japan (Kikuchi and Taira, 2009).

Quality has been recognized by leading marketing strategy authors as a core concept in building consumer value and satisfaction (Oude Ophuis and Van Trijp, 1995). Dry matter also has been suggested as a quality prediction tool in mango fruit. All domestic markets require mango fruit to have a minimum of 14% dry matter for Australia (Bally et al., 2000). Our research expressed that mango colors, smell, sweetness, softness and after tasting feeling are obvious sensory characteristics for Japanese consumers. This same trend has been published in other reports.

(2) Outer factor: price

Even the price of Taiwan's mango (¥1,000/piece) we served for respondents is much higher than consumer expected price (¥475-625/piece), it still has 66.2% respondents reply that they will buy. It seems that price is not so major factor, if fruit quality is good enough. Therefore, Japan Miyazaki and Okinawa's mango has a high price in the market (>¥1,500/piece). It makes a premium and high quality image for Japanese consumers. Taiwan "Irwin" mango is the same variety as Japan's, with similar taste and is not so expensive. It also lets consumers feel it is worth paying ¥1,000/piece for this product.

6. Conclusion and further research

This study provides Japanese evaluation for mango consumption, and offer meaningful information for Taiwan "Irwin" mango development direction of export to Japan. Many respondents thought that mango is seasonal fruit (42%), processed food (39.1%), non-daily use (37.7%), fresh fruit (36.2%), and preference food (34.8%). For Japanese consumers, mango is not just for fresh use, processed mango will also be one option. Among those images, only 'preference' is a significant factor for consumer behavior. It means 'preference' is a considerable character

for mango potential buying population. Buying and eating experience are also key factors for consumption. Besides, fruit color, flavor, sweetness, softness and after tasting feeling are also very significant for consumer buying behavior. Japan's market emphasizes quality. Good quality is worth the higher price and low quality is just a cheap price. Improvement of mango fruit quality is a reliable method to meet Japanese consumer demand. Nowadays, Japanese consumers view Taiwan's mango with not-expensive price. It seems to focus on occasion for 'daily-fresh use' and reasonable price is suitable with market segment.

In addition, most of Taiwan mango export to Japan and distribute in Tokyo areas more. Other areas of Japan could be similarly researched testing this assumption and providing more market information in previously.

Note

1. We conduct this survey with CLT (Central Location Test). Owing to get neutral data, this study presented mango material for respondents at same time and on same place. Due to the limit for service space, questionnaire explanation and testing material preparation, this study hold at Museum of Tokyo University of Agriculture to do this research. More than 600 people visited the Museum on July 30 2011. Our survey began from 11:00 to 14:00. We request about 300 visitors to joint and near one-fourth agreed to participate in this study.
2. We conducted our survey on Museum of Tokyo University of Agriculture on July 30 2011 and the sampling percentage of younger student is higher than Tokyo city statistical data. Due to poor student's economic capacity, the frequency of student's buying experience for mango maybe less than other population. This may lead data bias for our survey. However, after we examine our data again, it shows clearly that buying and eaten experiences are very significance factors for Taiwan mango buying behavior even sampling percentage of student is higher. It seems that our result is not affected by sampling bias of higher student percentage.

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