

ศักยภาพการตลาดและการผลิตผักปลอดภัยจากสารพิษเพื่อ ตลาดนักท่องเที่ยวชาวต่างประเทศ จังหวัดสุราษฎร์ธานี

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บทคัดย่อ

งานวิจัยนี้มีวัตถุประสงค์เพื่อ 1) สำรวจลักษณะความต้องการและพฤติกรรมของนักท่องเที่ยวชาวต่างประเทเกี่ยวกับการบริโภคผักปลอดภัยจากสารพิษ และปัจจัยที่กำหนดพฤติกรรมดังกล่าว และ 2) ศึกษาชนิดของผักที่ต้องการ ตลอดจน 3) ความเป็นไปได้ในการผลิตในจังหวัดสุราษฎร์ธานี โดยรวบรวมข้อมูลจากการสัมภาษณ์นักท่องเที่ยวชาวต่างประเทศจำนวน 200 คน และข้อมูลทุติยภูมิด้านปัจจัยทางกายภาพของพื้นที่ โดยข้อมูลที่ได้จะถูกวิเคราะห์โดยใช้สถิติเชิงพรรณนาเพื่อหาชนิดผักที่นักท่องเที่ยวนิยมบริโภค ตลอดจนการวิเคราะห์ปัจจัยทางกายภาพเพื่อหาศักยภาพการผลิตผักเหล่านั้น ผลการวิจัยพบว่านักท่องเที่ยวชาวต่างประเทศที่ตอบแบบสอบถามมากกว่าร้อยละ 33 ให้การยอมรับผักปลอดภัยจากสารพิษ โดยระบุว่าจะซื้อผักปลอดภัยจากสารพิษอย่างแน่นอน โดยมีทัศนคติในระดับปานกลางค่อนข้างไปทางดี ส่วนลำดับชนิดผักที่ต้องการ ได้แก่ มะเขือเทศ,

หอมหัวใหญ่, บรอกโคลี, แดงกวา และข้าวโพดหวาน ตามลำดับ จากการวิเคราะห์ศักยภาพการผลิตโดยอาศัยปัจจัยทางกายภาพ พบว่า มะเขือเทศ บรอกโคลี แดงกวา และข้าวโพดหวาน เป็นผักที่มีศักยภาพการผลิตโดยปัจจัยที่มีผลต่อความต้องการบริโภคผักปลอดภัยจากสารพิษอย่างมีนัยสำคัญทางสถิติ คือ อายุและความกังวลด้านสารตกค้างในผัก

คำสำคัญ : จังหวัดสุราษฎร์ธานี, ชนิดผักที่ต้องการ, นักท่องเที่ยวชาวต่างประเทศ, ผักปลอดภัยจากสารพิษ, พฤติกรรมผู้บริโภค

The Potential of Marketing and Producing Pesticide – Safe Vegetables for Foreign Tourists in Surat Thani Province, Thailand

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Abstract

The research aimed to 1) investigate the intentions and behaviors of foreign tourists toward purchasing pesticide-safe vegetables and their influencing factors, and to 2) determine the preferred vegetables of these customers, as well as to 3) identify the production potential for growing such vegetables in Surat Thani province, southern Thailand. The method of data collection was personal interviews with 200 foreign tourists, with which data was collected on personal, attitudinal, behavioral and preference rankings of pesticide-safe vegetables. Secondary data was obtained through government and library sources, and using both sets of data, the production potential of preferred vegetables was descriptively analyzed to identify vegetable varieties which have potential to be grown in Suratthani. The results revealed that more than 33% of the respondents replied they would definitely purchase pesticide-safe vegetables, with a medium to good attitude on consuming pesticide-safe vegetables. The preference ranking showed the top five most popular vegetables to be tomatoes, onion, broccoli, cucumber and sweet corn, accordingly. After production potential screening, it was suggested that tomatoes, broccoli, cucumber and sweet corn would offer the best chance of successful production. Chi-square tests indicated that age and consumer concern about the risk of pesticide residues in vegetables significantly influenced the intention to buy pesticide-safe vegetables.

Keywords : foreign tourists, consumer behaviors, pesticide-safe vegetables,
Surat Thani province, preferred vegetables

INTRODUCTION

Surat Thani, the largest province in southern Thailand and a well-known tourist destination, is one of the major vegetable production areas in the South due to its abundant natural resources. In recent years, as more consumers have become concerned with food safety, the Department of Agricultural Extension has launched a pesticide-reduction program, and in 2001 this program was initiated in Surat Thani. Pesticide-safe vegetables are defined as vegetables which are free from pesticide residues or have pesticide residue of not more than the Maximum Residue Limit (MRL) as specified by the FAO/WHO. The program aims mainly to reduce pesticide use by educating the farmers on the proper use of pesticides and integrating many pest management techniques such as mechanical control, physical control, biological control, plant extracts and chemical control to manage pests and diseases from causing economic damage. Using participatory approaches, four vegetable farmer schools have been established in Surat Thani, allowing 25–30 farmers per school to learn by practicing the techniques of Integrated Pest Management (IPM) on their own farms, exchanging their experiences, and finding solutions together, all of which help to develop the production of pesticide-safe vegetables in Surat Thani (Choengthong 2004).

However, a previous study showed that farmers were dissatisfied with the program, mainly because they received the same low selling price for their pesticide-safe products as other farmers received for non-pesticide-safe vegetables. One reason for this is believed to be because the

government provides mainly technical guidance and information on safe production methods, but leaves farmers on their own in terms of marketing their safe vegetables (Choengthong, 2004).

Without price incentives, farmers are not likely to expand significantly the production of pesticide-safe vegetables, which will lead to the failure of the government effort. One way to obtain a better selling price is to produce vegetables which are in demand by a potential market. One such potential market is the foreign tourists market, which has more purchasing power than local customers and also has good potential for growth. For example, in 2003, there were about 0.9 million foreign tourists who visited Surat Thani, which increased to more than 1.0 million in the following year. The average length of stay of foreign tourists in Surat Thani is about 4.5 days (Tourism Authority of Thailand. 2002). The study of Krasin and Jaisai (1995) also found rapid growth in the tourism industry in Surat Thani. All of these factors indicate that there is a large existing and growing potential customer base for food in Surat Thani, including pesticide-safe produce.

When considering what vegetables to grow, the farmer must consider various things. For instance, the preferred vegetables of Thais and foreigners may differ due to cultural differences. Moreover, not all vegetable varieties can be produced in the south due to environmental constraints. Therefore, to assist good decision making for farmers and others considering entering the pesticide-safe vegetable market in Surat Thani, it is worthy to study the behavior of foreign

tourists concerning purchasing and consuming vegetables, and their attitude toward pesticide-safe vegetables, to obtain ideas concerning what vegetables should be produced and how to market pesticide-safe vegetables for foreign tourists to satisfy the customer needs in food service. Secondly, the production potential of the most popular vegetables should be determined, to obtain the most appropriate vegetable varieties for commercial production. Specific objectives of the study are to 1) explore the intentions and behaviors of foreign tourists considering purchasing pesticide-safe vegetables, 2) identify factors associated with the buying intentions of foreign tourists and 3) identify the potential vegetables that should be grown for foreign tourists and marketed in Surat Thani.

METHODOLOGY

Data Collection

Personal interviews with a structured questionnaire, accompanied with colored vegetable pictures, were used to collect information from foreign tourists, including personal data, attitudinal data and preference ranking data. The questionnaire was pre-tested using exchange staff at Prince of Songkla University, Surat Thani Campus, Thailand to ensure that the respondents understood the questionnaire.

The survey was conducted in three major districts of Surat Thani where there are usually many tourists, Samui Island, Pha-Ngan Island and Surat Thani City. A total of 200 foreign tourists were selected using a convenience sampling approach,

distributed among the three districts based on the 1999 foreign tourist statistics, leading to 4, 150 and 46 samples Surat Thani City, Samui Island, and Pha-Ngan Island, respectively. Incomplete questionnaires were eliminated and more interviews were conducted to obtain the target number of respondents. The interviews were conducted during April-May 2003 and January-March 2004.

The study also utilized secondary data from government and library sources including climate, soil types and geographical data to analyze the production potential of growing the selected vegetable varieties identified as preferred by foreign tourists in the surveys.

Data Analysis

Data analyses included descriptive analyses and chi-square tests. The percentage of responses of personal, behavioral and attitudinal data were calculated. A five-point Likert scale was used to measure the opinions and attitudes toward pesticide-safe vegetables as well as the food service perceptions. Chi-square tests were carried out to determine if gender, age, education, vegetarian lifestyle or concern about the risk of pesticide residues in vegetables significantly influenced the intention to buy pesticide-safe vegetables.

To obtain answers regarding the most preferred vegetables, a preference ranking was used. From the list of vegetables used with the questionnaire, the foreign tourists were asked to rank their five-most liked types of vegetables in order of preference with 1 being the highest and 5 being the least preferred. The rank orders were

transformed into scores where 1 = 5 points, 2 = 4 points, 3 = 3 points, 4 = 2 points and 5 = 1 point. Then the sums of preference ranking for each vegetable were calculated.

Next, the five most preferred vegetables as obtained from the questionnaires were analyzed in conjunction with environmental factors that indicate suitability for growth of particular species, i.e., rainfall, temperature, and humidity, to identify the production potential of growing selected vegetable varieties in Surat Thani. Finally a recommendation was made for vegetables which have both marketing potential and production potential to be commercially grown in Suratthani.

RESULTS AND DISCUSSION

A. Results of the Marketing Survey

Characteristics of foreign tourists respondents

The tourists respondents sampled were mainly from Europe (79%), followed by Asia (8%), North America (7.5%), and Australia (5.5%). The main countries represented were England (33.5%), Germany (18%), and Sweden (10%). The demographic profile of the respondents indicates that more than half (53%) were male with an average age of 28 years. The age ranged from 18-67 years with more than 81% in the 21-40 year age bracket. About three-fourth of the respondents had a college or higher education.

Most of the respondents (97.5%) were in Thailand for vacation and travelling. Nearly 80% had arranged the trip on their own. The length of the stay in Suratthani was about 8-9 days, with

the most favorite visiting places Samui and Phangan Islands. The average daily food expenditure ranged from 114-4,000 baht, with an average of 453 baht per day (1 US\$ = ~ 40 baht). More than two-thirds stayed overnight in lodging priced less than 480 baht per night (this is a rather low figure for tourist accommodation, but most visitors to the Island also indicated they came by ferry, so perhaps were more economical and adventurous than tourists who arrived by air).

General information of the respondents on vegetables consumption behavior

Information obtained concerning the vegetable consumption behavior of the respondents indicated that although only 15% of the respondents were vegetarian, almost all (84.5%) usually ordered vegetable dishes with a meal. The major reasons for choosing certain vegetables were health and nutrition concerns, followed by taste. The rest (15.5%) did not consume vegetables regularly because they had neither preference nor trust in the quality, or they thought the vegetables were too expensive.

The top five most preferred vegetables of foreign tourists

The respondents were asked to rank their top five most preferred vegetables in order of preference from the given list of vegetables. Thirty-eight percents of respondents placed tomato in the first rank. Onion was the second rank at 25%. The results of the preference rankings for each vegetable were transformed into scores and shown in Table 1. Tomato was the most preferred

Table 1 Preference ranking of the preferred vegetables

Vegetable varieties	Rank orders ^{1/} (%)					Number (n= 169)	Scores of preference ^{2/}
	1	2	3	4	5		
Tomato	38.7	20.7	20.0	13.3	7.3	150	555
Onion	23.0	25.4	15.9	18.3	17.5	126	401
Broccoli	25.2	19.1	22.6	15.7	17.4	115	367
Cucumber	14.9	25.7	21.8	19.8	17.8	101	303
Sweet corn	18.1	16.9	26.5	22.9	15.7	83	248

Note :

^{1/} Rank 5 orders (choose 5 from 23 vegetables; where 1 = most preferred and 5= least preferred)

^{2/} Number of respondents who cited on 1st rank X 5 points + Number of respondents who cited on 2nd rank X 4 points + ...+ Number of respondents who cited on 5th rank X 1 point

vegetable due to its highest points (555), followed by onion (401), broccoli (367), cucumber (303), and sweet corn (248). However, when asked about the frequency of eating these preferred vegetables, the results showed that tomatoes, onion, and cucumber were most frequently eaten (every day), followed by broccoli and sweet corn (2-3 times per week).

These findings for preferred vegetables were quite different from a similar survey of Thais. Hutapatch (1999) reported that the top twelve most popular vegetables for Thais were Chinese kale, water convolvulus, yard long bean, cabbage, cucumber, Chinese cabbage, mustard leaves, bean sprout, carrot, Chinese radish, baby corn, parsley, celery and ivy gourd.

Consumer opinions, attitudes and behaviors concerning pesticide-safe vegetables

1) The intention and willingness to buy pesticide-safe vegetables

Once the 200 respondents were asked for their concerns about the risk of pesticides residues

in vegetables, approximately 71% of the respondents stated that they were concerned for the risk (Table 2). Furthermore, the respondents were asked for their intention to buy pesticide-safe vegetables if available in a restaurant, about 34.5% of respondents indicated that they would definitely buy and 63% probably buy pesticide-safe vegetables. The rest (2.5%) indicated that they would not buy (Table 2). The reasons for not buying by the remainder were 'no interest' and 'too expensive'.

Excluding the 5 respondents who would not buy, the rest of the respondents were asked for their willingness to pay a premium price to consume pesticide-safe vegetables (Table 2). Seventy-three percent of the 195 respondents said they would be willing to pay such an additional price for consuming pesticide-safe vegetables, ranging from 2-100% with an average of 18.6%. This intention to buy and willingness to pay an additional price indicates there may be a good potential market for pesticide-safe vegetables.

Table 2 The intention to buy and willingness to pay a premium for pesticide-safe vegetables

	Numbers (n=200)	Response %
Concerned about risk of pesticide residues		
Yes	142	71.0
No	58	29.0
Intention to buy pesticide-safe vegetables		
Definitely buy	69	34.5
Probably buy	126	63.0
Definitely not buy	5	2.5
Willingness to buy pesticide-safe vegetables at a price higher than ordinary vegetables (n =195)		
Yes	143	73.0
No, only at the same price	52	27.0

Table 3 Important characteristics of pesticide-safe vegetables to attract respondents

Features	Level of importance in percentage (n=195)					\bar{X}	S.D.	Level of important
	Not at all important	Not so important	Neutral	Fairly important	Very important			
Price	6.2	16.9	20.0	36.4	20.5	3.48	1.17	Neutral
Safety	1.5	1.5	11.8	30.8	54.4	4.35	0.86	Fairly
Health and nutrition	1.0	2.1	6.7	29.2	61.0	4.47	0.79	Fairly
Freshness	1.0	0.5	3.1	23.6	71.8	4.65	0.67	Very
Taste	1.0	1.5	4.6	21.0	71.8	4.61	0.74	Very
Familiarity	7.7	13.8	40.5	22.1	15.9	3.25	1.12	Neutral
Appearance	4.1	12.8	29.2	34.9	19.0	3.52	1.07	Fairly
Unique Thai veg.	6.2	15.9	51.3	16.9	9.7	3.08	0.98	Neutral
Type of veg.	3.6	13.3	34.4	32.3	16.4	3.45	1.03	Neutral
Available at every restaurant	11.8	20.0	41.5	16.9	9.7	2.93	1.10	Not so important

2) Purchasing behavior and criteria

The respondents were asked to rate the importance of various characteristics of vegetables when considering whether or not to purchase. A 5-point scale was used, with 1 point = not at all important to 5 points = very important. Almost all

(95.4%) of the total respondents evaluated that freshness was somewhat to highly important characteristic of pesticide-safe vegetables to attract the respondents, followed by taste at 92.8%. In addition, the sums of rating scores for each characteristic were calculated and the

characteristics that would attract the respondents and the scores are summarized in Table 3. The results showed that the respondents placed the highest importance on freshness at 4.65 points, followed by taste at 4.61 points, health considerations and nutrition at 4.47 points, and safety at 4.35 points. These findings should also be useful in positioning selected vegetables grown in Suratthani as fresh vegetables in the market.

3) Certification of vegetables

When asked for the factors that would help the respondents to trust that the vegetables were safe, 67% of the total respondents said that an official safety certificate from a government institute would give them confidence, followed by a safety certificate from producers/farmers (59%), reputation of the store (55%), waiter/waitress's confirmation (11%), and other factors such as some type of international certificate (3%). This data indicates that government agencies should take action to certify the quality of pesticide-safe vegetables to give the foreign tourists confidence.

4) Attitudes toward pesticide-safe vegetables

The attitudes of respondents toward pesticide-safe vegetables as measured by their response to 10 statements were evaluated on a 5 point scale (1 point = strongly disagree, and 5 points = strongly agree). Then the attitude scores for each statement were summed and divided by the number of statements to obtain the average value. The statements and reactions are summarized in Table 4.

As shown, the average value of 3.41 indicated that the respondents have a medium to good attitude on consuming pesticide-safe vegetables.

The majority believed in the benefit of having pesticide-safe vegetables. For example, most respondents (80.5%) somewhat to strongly agreed that 'Eating pesticide-safe vegetables is safer than eating ordinary vegetables.' with the maximum attitude value of 4.17. About 75.5% of the respondents also somewhat to highly agreed that 'pesticide residues in vegetable can be harmful to health' with the attitude value of 4.06.

Factors influencing the intention to buy pesticide-safe vegetables of foreign tourists

Chi-square tests were performed to determine which attributes of the respondents such as age, gender, education, being vegetarian, and risk significantly influenced the buyer's intentions (Table 5). The tests indicated that older age and concern about the risk of pesticide residues in vegetables were significantly associated with an intention to purchase pesticide-safe vegetables, while gender, education, and being vegetarian were not so associated.

As shown, about 43% percents of respondents who concerned about risk of residues would definitely buy pesticide-safe vegetables. The respondents who had no concerned about risk, on the other hand, cited that they would definitely buy at 14%. The results also showed that the older respondents (40 years up) were more concerned about food safety, therefore, they would definitely buy pesticide-safe vegetables at 62.5%. However, only 47% of the respondents who were under 40 years perceived that it was important to consume pesticide-safe vegetables and they would definitely buy.

Table 4 Attitudes of the respondents toward pesticide-safe vegetables

Statements	Percent of respondents (n=200)					\bar{x}	S.D.	Level of opinion
	Strongly Disagree (SD)	Somewhat Disagree (SWD)	Neither Agree nor Disagree (NAND)	Somewhat Agree (SWA)	Strongly Agree (SA)			
1. I always look for eating places where pesticide-safe veg. are available.	20.0	19.0	43.0	14.5	3.5	2.63	1.07	NAND
2. The physical appearance ordinary veg. looks more attractive than pesticide-safe veg.	10.5	13.5	48.5	23.0	4.5	3.03	0.98	NAND
3. Eating pesticide-safe veg. is safer than eating ordinary veg.	2.5	5.5	11.5	34.0	46.5	4.17	1.01	SWA
4. It is my habit to eat pesticide-safe veg.	11.0	20.0	38.0	19.0	12.0	3.01	1.15	NAND
5. The taste of pesticide-free veg. and ordinary veg. is the same.	20.5	24.5	39.0	12.5	3.5	3.46	1.06	NAND
6. The availability of safety certificates for safe veg. is the only way to confirm their compliance with the regulations	2.0	5.0	33.0	33.0	27.0	3.78	0.97	SWA
7. Eating pesticide-safe veg. makes me healthier.	3.5	3.5	22.5	35.5	35.0	3.95	1.01	SWA
8. Pesticide residues in veg can be harmful to health.	4.0	4.5	16.0	33.0	42.5	4.06	1.07	SWA
9. It is unnecessary to pay more to get pesticide-safe vegetables.	8.0	27.0	24.5	28.5	12.0	2.91	1.16	NAND
10. The quality of pesticide-safe veg. bought from most restaurants is reliable.	2.0	10.0	61.5	22.5	4.0	3.17	0.74	NAND
Average						3.41	10.22	Medium

These findings generally agree with Sirinatum (1996), who reported that factors affecting the decision to consume pesticide-safe vegetables of housewives in Bangkok, Thailand were age and concern over pesticide residue in vegetables.

General information from the respondents on food buying

1) Experience with general food service in Surat Thani

The experiences of the respondents concerning food service in Suratthani is one of interest. Outdoor Thai restaurants were the most preferred place for foreign tourists to eat, followed

Table 5 Factors affecting the intention to buy pesticide-safe vegetables

Attribute	Intention to buy (Percentage of respondents)			Number	Pearson chi. sq.(Sig)
	Definitely not buy	Probably buy	Definitely buy		
Gender					
Male	2.8	63.2	34.0	106	0.119
Female	2.1	62.8	35.1	94	(0.942)
Total (No.)	5	126	69	200	
Age					
Less than 20	0	87.0	13.0	23	11.68
21-40 years	3.1	62.1	34.8	161	(0.020)***
More than 40	0	37.5	62.5	16	
Total (No.)	5	126	69	200	
Education					
High school or less	1.9	64.2	34.0	53	0.130
College or higher	2.7	62.6	34.7	147	(0.937)
Total (No.)	5	126	69	200	
Concern about risk of pesticide residues					
Yes	0.7	56.3	43.0	142	19.918
No	6.9	79.3	13.8	58	(0.000)***
Total (No.)	5	126	69	200	
Vegetarian					
Yes	0	58.6	41.4	29	1.416
No	2.9	63.7	33.3	171	(0.493)
Total (No.)	5	126	69	200	

Note *** indicates statistically significant at 5% level

by general restaurants and domestic food restaurants. The majority, 94%, found eating places by just walking around, while 42% took suggestions from friends/acquaintance. When asked about the overall satisfaction with the Thai food service industry, about 78% said that they were satisfied to very satisfied because of good taste, inexpensive, sanitation, and variety of food available. Only 3% said that they were dissatisfied because they experienced unsavory food (not fresh) and/or unsanitary toilets.

2) Criteria for choosing an eating place

For choosing an eating place, over 61% of the respondents cited that the cleanliness was the most important factors. They placed the highest importance on the cleanliness of the restaurant with a mean score of 4.57, followed by food variety at 3.94 mean score and service at 3.79 mean score (Table 6). Other factors were cleanliness of the toilet, good atmosphere, good taste, and domestic products available. It should be noted that cleanliness was not only the most important factor, but also the factor that showed the least

Table 6 Important factors in choosing an eating place

Quality	Level of importance in percentage (n=200)					\bar{X}	S.D.	Level of importance
	Not at all important	Not so important	Neutral	Fairly important	Very important			
Cleanliness	0	1.00	2.5	35.0	61.5	4.57	0.60	Very
Convenience	1.0	6.0	25.5	51.5	16.0	3.76	0.83	Fairly
Service	0	6.0	28.0	47.0	19.0	3.79	0.82	Fairly
Low price	2.0	12.0	29.5	44.5	12.0	3.53	0.92	Fairly
Food safety sign	6.0	15.0	37.0	28.0	14.0	3.29	1.07	Neutral
Food variety	0	3.5	23.5	49.0	24.0	3.94	0.78	Fairly
Language skills of waiter/waitress	12.5	28.0	35.5	19.5	4.5	2.76	1.05	Neutral
Attractiveness	3.0	20.0	29.5	36.0	11.5	3.33	1.02	Neutral
Reputation	5.0	10.5	38.5	29.5	16.5	3.42	1.04	Neutral

variation among respondents (S.D.= 0.60), indicating that this factor had a broad consensus.

3) Factors influencing the dish(es) ordered in the chosen eating place

Most respondents indicated that menu description was the main influence on what dishes were purchased in a restaurant, followed by the people they were with and specials of the day. Availability of vegetarian dishes and freshness of food were other influences.

B. Results of the Vegetable Production Potential Analysis

Production potential means the ability to produce the selected vegetables in marketable quality and quantity as well as at the appropriate time. In this study, the production potential analysis was performed on selected vegetables using the basic environmental criteria of cultivated area, rainfall, soil type, day length and humidity.

According to the Surat Thani Agricultural Office, in 2004 Surat Thani had a vegetable harvesting area of 36 thousand rai (1 hectare = ~6.25 rai), yielding a total of 65 thousand tons of vegetables (both pesticide-safe and ordinary vegetables). More than 62% of the harvest areas are found in two districts, Donsak and Kanjanadit. This is one sign of good potential, since these two districts are close to the most visited places in Surat Thani, Samui and Pha-Ngan Islands. Vegetables grown in this area would have a market advantage related to lower transportation costs and fresher attributes for serving the tourist market. The ordinary vegetables commonly grown are watermelon, sweet corn, pumpkin, cucumber, yard long bean, luffa, wax gourd, water convolvulus, mustard leaves, Chinese kale, Chinese cabbage, cauliflower, and cabbage (Surat Thani Agricultural Office. 2004). Although the safe-vegetable planting areas in Surat Thani are

undefined, the varieties of safe vegetables grown are similar to those of ordinary vegetables. The study of Choengthong (2004) indicated that there were about 13 varieties of safe vegetables commonly grown in the area, with the most common being cucumber, yard long bean, luffa, mustard leaves, Chinese kale and Chinese cabbage.

The top five preferred vegetables obtained from the consumer survey were tomato, onion, sweet corn, broccoli and cucumber. However, as cucumber and sweet corn are commercially grown in Surat Thani, the production potential analysis, therefore, concentrated on the remaining vegetables which local farmers do not produce or do not produce in sufficient quantities, tomato, onion, and broccoli. Based on information from the agroclimatic zones of the upper south of Thailand (Agricultural Research and Development Office Region 7. no year specified), each preferred vegetable would be justified for their production potential, briefly described as following:

General information of the upper south region

The upper south of Thailand includes seven provinces: Chumphorn, Surat Thani, Nakhonsi Thammarat, Ranong, Phang-nga, Krabi, and Phuket. The average temperature ranges between 26.5-28.1 degrees Celsius (C). Of the seven provinces, Surat Thani has the lowest average temperature of 26.5 C in January. Based on a 30-year average (1967-1996), the daytime temperature ranges from about 29.5-34.5 C whereas the night temperature varies between 20-25 C. Relative humidity of this region a

verages from a high between 84-96% and low between 50-70%. Surat Thani has the highest relative humidity between 94-95% and the lowest, between 50-65% (Agricultural Research and Development Region 7. no year specified).

Tomatoes

Temperatures of the upper south are within the suitable range for growing tomatoes, particularly the high-temperature tolerant varieties. Tomatoes require well-drained, fertile loamy soil. In the upper south of Thailand, there is soil from Fluvial origin found in narrow strips along important rivers in the region such as the Tapi, Pak Pha-nung, Phum Duang, Lung Suan and Kraburi rivers, and the Chumporn canal. These areas have loam or sandy-loamy soils with high fertility, making them suitable for growing vegetable and fruit crops, including tomatoes.

Although tomatoes are the most preferred vegetable for foreign tourists, local farmers in Surat Thani have not produced them much. Tomatoes require a warm climate for good growth, with optimum daytime temperatures between 25-30 C, although they can be grown in temperatures as low as 15.5-20C. If the daytime temperature is above 32C or the nighttime temperature above 21 C during anthesis, the fruit set may be reduced (Swiader and Ware. 2002). However, some tomato varieties have been bred to set fruit under high nighttime temperatures, up to 26 C. For the best quality yield, pH should be 5.5-7.5.

Tomato production in the south faces problems of high temperature and high humidity. Although tomatoes are normally grown in more

temperate climates, the Asian Vegetables Research Development Center (Thailand) has bred some tomato varieties to tolerate high temperature such as Sidathip 1, Sidathip 2, S111, S112, B200Nd and PT3027. Experiments were performed to test these species in high temperatures at Hat Yai in southern Thailand, and it was found that all of them had good growth. Two varieties, B200 and S211, provided higher yields than the national average yield (Santipracha. 1994).

Onions

Onions are not suitable to be grown in the upper-south of Thailand because they require a cool climate with optimum temperature between 13 to 15C. Onions need cool and moist air during early growth and development as well as the higher temperature and lower moisture for bulbing. Moreover, onions are sensitive to photoperiod with critical daylength between 12–15 hours. Onions have both short-day varieties and long-day varieties (McMahon et al., 2002), however, only short-day varieties can be grown in Thailand. The upper-south of Thailand has a longest daylength of 12.23 hours and shortest daylength of 11.23 hours with an average temperature of 26.5 to 28.1 C. This leads to the conclusion that this area is not suitable for growing onions since they require both low temperature and optimum daylength for growth and bulbing.

Broccoli

Broccoli varieties have been bred to tolerate to high temperatures, and can therefore be grown in every part of Thailand. According to the

Department of Plant Science, Faculty of Natural Resources, Prince of Songkla University, tests for early broccoli varieties were performed in Songkla province, one of the provinces in the south of Thailand. It was found that some hybrid broccoli varieties could be commercially grown in the South of Thailand, but specific varieties and planting time must be chosen (Santipracha. 1992). It was also found that broccoli varieties such as Toro, Three-season and Topgreen could be grown with high yields when planted in January, February and June. This is because these three months have a low temperature and not too much rain.

An earlier study by Chootummatouch et al. (2000), also indicated that the inside nested production of broccoli varieties Topgreen and KY can provide a 34% higher yield than planting outside a nested greenhouse in the rainy season, indicating a potential for growing broccoli year-round in the upper-south area. As broccoli is a well-known vegetable for foreign tourists, it is of great interest to have broccoli being produced in Surat Thani.

The criterion of production potential screening explained above are summarized in Table 7. Based on these findings, it is recommended that tomatoes and broccoli should be grown in Surat Thani.

CONCLUSIONS AND SUGGESTIONS

The study revealed that there is a potential for growing pesticide safe produce for the foreign tourist market in Surat Thani Province. As the tourists numbers increase, so does the demand for food of all types. The survey showed that most respondents (84.5%) liked to have vegetables due

Table 7 Criterion of production potential screening for the selected vegetables

Criteria	Tomato	Onion	Broccoli
Soil type	**	**	**
Temperature	*	X	*
Rainfall	X	X	*
Daylength	*	X	*
Relative humidity	*	X	*
Conclusion	Recommended	Not recommended	Recommended

Note : X means the conditions are not suitable
* means the conditions are somewhat suitable
** means the conditions are very suitable

to health and nutrition reasons, and they (71%) were also concerned about the risk of pesticide residues in vegetables they consume. There was a medium to good attitude concerning pesticide safe vegetables among foreign tourists interviewed. The majority (80.5%) somewhat to highly agreed that ‘Eating pesticide safe vegetables is safer than eating ordinary vegetables’. More than 33% of the respondents indicated an intention to definitely buy pesticide-safe vegetables if they were available in restaurants, with a willingness to pay an additional price ranging from 2% up to 100%. Age and consumers’ risk concerns on pesticide residues significantly affected the buyer’s intentions. Freshness and an official safety certificate from the government about the vegetables, the cleanliness of the eating place and menu description were the key important factors for the respondents.

As for the top five most preferred vegetables, respondents also cited tomato as their top-of-mind at 38.7%, followed by onion, broccoli, cucumber, and sweet corn. However, after the production potential screening, the suggestion was made to promote the production of tomato,

broccoli, cucumber, and sweet corn in Surat Thani. Onion was not recommended because it was not suitable to be grown locally.

Based on this study, the following suggestions are made concerning the development of marketing and producing pesticide-safe vegetables for foreign tourists in Surat Thani:

1. Pesticide safe vegetables require a safety certificate to ensure the customer’s confidence. Most respondents (67%) said that an official safety certificate would give them confidence that the vegetables being safe. It is thus recommended that a safety certificate, especially from a government agency, should be prominently posted at places where pesticide-safe vegetables are available, such as restaurants or dining rooms to confirm the compliance of the establishment with safe vegetable regulations.

2. As shown in table 3, about 95.4% of the total respondents cited that freshness was somewhat to highly important characteristic of pesticide-safe vegetables to attract them. Therefore, the pesticide-safe vegetables produced in Suratthani, should be positioned as fresh produce, which is one of the

most important attributes that foreign tourists demand.

3. As the respondents who intended to buy pesticide-safe vegetables expressed a willingness to buy them at a price 18.6% on average higher than ordinary vegetables, producers or sellers should establish the safe-vegetables prices at or above this amount to maintain customer confidence, as customers usually believe that high prices represent a higher quality product.

4. As the survey results showed, most respondents (71%) were concerned about the risk of pesticide residues in vegetables, and they (80.5%) agreed that eating pesticide-safe vegetables is safer than eating ordinary vegetables, therefore, there is no need to educate the consumers about the health effects of pesticide residues. The marketing efforts, instead, should focus on how to create customer knowledge about the availability of pesticide-safe vegetables, and to inform them where to obtain the products conveniently. For example, the availability of the safe vegetables should be advertised prominently at the restaurants, and also featured prominently in the menu descriptions to get the customer's attention. Also, as older people are more concerned about food safety, special attention should be paid in marketing programs to these consumers.

5. The suggestion is also offered that pesticide-safe vegetables should be marketed through reputable restaurants, including Thai restaurants, general restaurants, and hotel restaurants located in well-travelling places such as Samui, Phyan and Tao Islands. This is because 55% of respondents cited that the reputation of the

store would help them to trust that the vegetables were safe. Meanwhile, all such restaurants should be careful to note that for the foreign tourists, the most important factor in choosing an eating place is cleanliness.

6. Some vegetable producers should be persuaded to serve the market for vegetables for foreign tourists, along with government efforts to expand the planting areas of safe vegetables.

7. More research is needed to develop production technology for the recommended vegetables, especially tomatoes and broccoli. This research includes variety testing and constructing appropriate greenhouses to ensure the success of commercial production.

Although the results of this survey were useful and some interesting conclusions resulted, it must also be noted that our sample size was relatively small, the nationalities, ages and lodging expenditures not well-distributed due to the budget constraints. Therefore, surveys of larger and more representative samples are called for. In addition, the suggested vegetables were production screened using only secondary data. Field experiments should be conducted on production of vegetables that have never been commercially produced in the South and farmer acceptance of the new crops promoted to ensure the success of such marketing as we suggest.

REFERENCES

- Agriculture Research and Development Office Region
7. **Agro-ecological zones in the upper southern region 7 of Thailand.** Department of Agriculture. Ministry of Agriculture and Cooperatives.

- Choengthong, S. (2004). **The economics of producing and marketing pesticide safe vegetables in Surat Thani province.** Research Report. Thai Research Fund, Bangkok.
- Chootummatouch, W., P. Maneenit, C. Chaikwang and W. Kunchara Na Ayutthaya. (2000). Yield trials of broccoli and cabbage grown as hygenic fresh vegetables during rainy season in Songkhla. (in Thai). **Thai Agricultural Research Journal.** 18(1) January-April, 31-44.
- Hutapatch, K. (1999). 12 preferred vegetables of consumers (in Thai). **Natural Agriculture,** 10(November), 12-15.
- Krasin, V. and N. Jaisai. (1995). **Potential and trend of tourism industry expansion in Surat Thani province.** Research report. Prince of Songkla University, Surat Thani.
- McMahon, M.J., A.M. Kofranek and V.E. Rubatzky. (2002). *Hartmann's Plant Science: Growth, Development, and Utilization of Cultivated Plants.* Pearson Education. Upper Saddle River. New Jersey: Prentice Hall.
- Santipracha, Q. and S. Sdoodee. (1992). Yield Trial of 11 Early Varieties of Cabbage in Songkhla. **Songklanakarin Journal of Science and Technology,** 14, 379-385.
- Santipracha, Q. (1994). Yield Trial of Heat-tolerant Table Tomato in Summer in Songkhla. **Khon Kaen Agric,** 22(2), 60-65.
- Sirinatum, S. (1996). **Factor affecting the consumers' decisions on pesticide-safe vegetables, a survey of housewives in Bangkok.** Master thesis, Mahidol University.
- Suratthani Agricultural Office. (2004). **Planting and Harvesting Areas of Vegetables in Surat Thani.** (unpublished document).
- Swiader J.J. and G.W. Ware. (2002). **Producing Vegetable Crops. (5th edition).** Danville, Illinois: Interstate Publishers.
- Tourism Authority of Thailand. (2002). **Tourist statistics in Tourism Authority Region 5 of the South.** Tourism Authority of Thailand. Region 5 of the South. Surat Thani.

