

## Bamboo shoot utilization in peninsular Malaysia: a case study in Pahang

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**Abstract**—Bamboo had been noted as next to rattan in terms of economic importance, especially in Malaysia. The manufacturing of products such as blinds, chopsticks, mats and baskets, farming implements, scaffolding, houses and bridges are synonymous with the utilization of the resources by many Asian countries. In Malaysia, bamboo-based industries are more focusing on the production of skewers, chopsticks, toothpicks, furniture and craft [8] (Aminuddin and Abd. Latif, 1991). Besides the use of culms, another potential part, the use of which needs to be highlighted, is bamboo shoots. Bamboo shoots have been used widely in South East Asia as food, especially in Thailand. There are no accurate data stated on the establishment of industries related to bamboo shoots in Malaysia and it is assumed that this resource is consumed only by local communities in rural areas. However, on looking at the trade in bamboo (crude vegetable material) including shoots, the imports are always exceeding exports (1990–1998) in an increasing trend. Although the value is not large, the demand of bamboo shoots from local communities has been increasing for many years, but due to lack of information on the supply of the resources and with no encouragement to industries to invest in products related to shoots, imports of these items remain crucial to fulfill the demand. This study will determine the utilization status of bamboo shoots and its importance in terms of income generation to rural people, the supply scenario of the resources as well as its level of demand by consumers in the marketplace.

**Key words:** Bamboo shoots; utilization; supply; marketing; demand.

## INTRODUCTION

Bamboo shoots are considered to be one of the important daily foods for some local people [1], especially the Malays in rural areas. Shoots from bamboo species such as *Dendrocalamus asper*, *Gigantochloa thottii*, *Bambusa vulgaris*, *Bambusa blumeana*, *Gigantochloa latifolia* and *Gigantochloa ligulata* are much savoured as a delicacy

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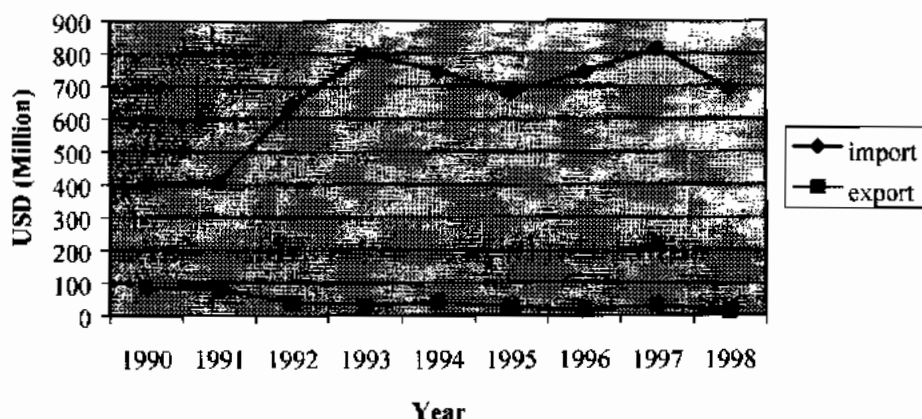


Figure 1. Trade of bamboo (crude vegetable materials) in Malaysia (1990–1998).

in local cuisine [2]. In terms of nutrient contents, bamboo shoots have low calories, high protein, calcium and magnesium compared to mushroom and asparagus [3]. Bamboo shoots sold in the local market were obtained from the natural forest. According to Abd. Razak and Aminuddin [4], about 11 species of commercial bamboo that produce edible shoots can be extracted yearly from May to September.

In Thailand, harvesting bamboo shoots is done from May to October (rainy season) where shoots can be collected daily, or twice a week [5]. For bamboo plantations, one- or two-year-old *Dendrocalamus asper* bamboo can give a yield of about five to six shoots per year. The shoots are normally harvested after 7 to 14 days with a height of 45 to 60 cm [6]. These can be sold as raw or preserved food in the local market. Abd. Razak and Aminuddin stated that most of the shoots for local consumption were found to have been imported from China, Taiwan and Thailand as canned product [4]. In Malaysia, the rural people relish the bamboo shoots as food. The utilization of this resource by industry is assumed to be rare, since there are no accurate data stated on the establishment of relevant industries. Figure 1 shows the trend of import and exports value of bamboos (in terms of crude vegetable materials) by Malaysia.

Statistics from 1990 to 1998 show that most of imports are from Vietnam, China and Thailand. Countries such as Singapore, Indonesia and Taiwan are found as the main buyers of bamboo (as crude vegetable material) from Malaysia. It is clear that imports always exceed exports for the eight years from 1990 to 1998. Therefore, it can be concluded that demand for bamboo as crude vegetable material in Malaysia is always high. The data showed that Malaysia still depends on the import of raw materials (crude vegetable materials) although the local resources are not well exploited. Proper management of the bamboo resources, especially if there were comprehensive information on the availability of such resources for sustainable supply to existing and potential industries, could overcome the over-dependence on import sources.

**Table 1.**

The distribution of bamboo shoots collectors in Pahang (1999)

District	No. of respondents	Percentage (%)
Temerloh	27	35.7
Kuantan	15	64.3
Total	42	100.0

## OBJECTIVES OF STUDY

The objective of the study is to determine the utilization status of bamboo shoot and its importance in terms of income generated to rural people in Malaysia. Other related information on the estimated availability of the resources, harvesting session and marketing of the products also will be highlighted.

## METHODOLOGY

A market survey was carried out at two highly populated districts of Pahang, namely, Temerloh and Kuantan from August 1999 to October 1999. Since Pahang is the biggest state in Peninsular Malaysia, it is estimated that the level of bamboo shoot utilization and its demand by users is high.

Since there are no documented data on bamboo shoot sellers in Malaysia, only 42 bamboo shoot collectors were identified (64% from Temerloh and 35% from Kuantan) and could be interviewed. The distribution of respondents interviewed in 1999 is as shown by Table 1.

## SOURCES OF BAMBOO SHOOTS

Rural people have collected and consumed bamboo shoots in Pahang for a long time. The respondents have about 0.5 to 30 years of experience, with an average of 9.4 years, in the collecting and selling of these resources. Most of them had been involved in the field for about 10 years. Basically, respondents utilized the resources as their part-time job (88.1% working in the village) besides planting other vegetables and fruits at their farm. Harvesting bamboo shoots is suitable for women in rural areas and they comprised 66.7% of respondents between the ages of 30 to 73 years old (average of 54 years old).

There are various sources of bamboo shoots obtained by respondents, as shown in Table 2.

The total area for collecting bamboo shoots by respondents was found to be 36.6 ha, with most respondents gaining their resources from their own planted area. The areal spread of bamboo shoot planting by category of sources is shown in Table 3.

Table 2.

The sources of bamboo shoots to respondents

Sources of bamboo shoots	No. of respondents	Percentages
Buy from other supplier	2	4.8
Natural forest <sup>a</sup>	3	7.1
Village's areas <sup>b</sup>	14	33.3
Planted areas <sup>c</sup>	15	35.7
State land areas <sup>d</sup>	1	2.4
Village's areas and planted areas	6	14.3
Planted areas and buy from supplier	1	2.4
Total	42	100

<sup>a</sup> Bamboo shoots harvested from natural forest located near to respondent's village.<sup>b</sup> Resources harvested at small forest area in the village.<sup>c</sup> Respondents gained the resources from their own plantation area.<sup>d</sup> Resources also gained from forest area located outside their village, which is not included as natural forest (e.g. small forest area located near Temerloh and Kuantan town).

Table 3.

Areal spread of bamboo shoot plantations

Sources of bamboo shoots	Areal spread of plantations (ha)	Total areas (ha)	Average areas (ha)
Buy from other supplier	N/A <sup>a</sup>	N/A	N/A
Natural forest	0.8	0.8	0.8
Village's areas	0.2–1.5	10.6	1.3
Planted areas	0.2–2.8	20.0	0.4
State land areas	N/A	4.8	
Village's areas and planted areas	0.4–1.5	0.4	
Planted areas and buy from supplier	0.4	0.4	0.4
Total	—	36.6	—

<sup>a</sup> N/A — not available.

## AVAILABILITY OF BAMBOO SHOOTS

The respondents were also asked to estimate the amount of bamboo clumps and culms available at the sites during the process of harvesting bamboo shoots (Tables 4 and 5).

Based on the 157 bamboo clumps available, it is estimated that about 8270 bamboo culms, on an average about 47.9 bamboo culms per clump, can be harvested from the total area of 36.6 ha (regardless of species) (Table 5). Those culms were found to be not fully utilized for market purposes, but more for traditional usage, such as making fencing for houses or farms, a raft during the rainy season, and for temporary construction poles. The commercial value of bamboo is still low since the bamboo-based industries in Pahang are scarce and not well developed. Difficulty in tracing potential suppliers of bamboo culms in Pahang by local industries also contributes to the problem.

**Table 4.**

Number of bamboo clumps available at collection sites

Sources of bamboo shoots	Range of bamboo clumps	Total clumps	Average bamboo clumps
Buy from other supplier	N/A <sup>a</sup>	N/A	N/A
Natural forest	2–4	10	3.3
Village's areas	1–12	54	3.9
Planted areas	1–9	63	4.2
State land areas	5	5	5
Village's areas and planted areas	2–6	24	4
Planted areas and buy from supplier	1	1	1
Total	—	157	—

<sup>a</sup> N/A — not available.**Table 5.**

Availability of bamboo culms at various collection sites of bamboo shoots

Sources of bamboo shoots	Range of bamboo clumps	Total bamboo clumps	Average bamboo clumps
Buy from other supplier <sup>a</sup>	900	900	900
Natural forest	120–180	460	153.3
Village's areas	30–540	2715	193.9
Planted areas	50–385	2870	191.3
State land areas	175	175	175
Village's areas and planted areas	60–275	1100	183.3
Planted areas and buy from supplier	50	50	50
Total	—	8270	—

<sup>a</sup> The amount of bamboo culms is based on supplier experiences and observations.

The estimated total amount of bamboo shoots available for each harvesting period (especially during rainy seasons) was determined by the amount of shoots harvested per clump. Respondents will select matured shoots during the harvesting session (see the later section on Characteristics of Bamboo Shoots Harvested). It was found that between three and 22 bamboo shoots, giving an average of 8.2 bamboo shoots per clump, were collected by respondents. Collection of bamboo shoots was done on a weekly basis for marketing. They harvested bamboo shoots between one to 12 times with an average of 3.5 times per month.

In Malaysia, species of commercial bamboo normally produced edible shoots from May to September yearly. Those months represented the rainy season, when bamboo could gain sufficient water to grow. The market survey was done from August 1999 to October 1999, which included during the rainy season. Detailed description of the amount of bamboo shoots harvested per month by respondents is given in Table 6.

**Table 6.**

Amount of bamboo shoots harvested by respondents as well as bought from other suppliers per month

Sources	No. of respondents	Range of bamboo shoots harvested/bought	Total bamboo shoots harvested/bought	Average bamboo shoots harvested/bought by respondents
Buy from supplier	6	20–120 <sup>c</sup>	268	44.7
Resources from natural forest, planted area and village's area	38 <sup>a</sup>	6–380	3796	99.9
Total	42 <sup>b</sup>	—	4064	—

<sup>a</sup> Two respondents collected bamboo shoots from other sources besides bought from supplier.<sup>b</sup> Total number of respondents interviewed.<sup>c</sup> Price of bamboo shoots bought from supplier ranged from RM0.30 (USD0.08) to RM1.00 (USD0.26) per shoot. Weight of every shoots cannot be estimated since respondents harvested various size of shoots.**Table 7.**

Species of bamboo focussed on for shoot production

Species of bamboo	No. of respondents	Percentages (%)
<i>Bambusa vulgaris</i>	29	69.0
<i>Dendrocalamus asper</i>	5	11.9
Both species	8	19.0
Total	42	100

Based on these data, it can estimated that about 4064 bamboo shoots (regardless of size) are available (harvested by respondents) at the collection sites per month (including resources bought from supplier).

### SPECIES OF BAMBOO HARVESTED FOR THE PURPOSE OF COLLECTING SHOOTS

Two bamboo species are focused on here for the production of shoots by respondents, namely, *Bambusa vulgaris* (buluh minyak) and *Dendrocalamus asper* (buluh betong). Most of the respondents harvested and planted shoots from *Bambusa vulgaris* (69%) since *Dendrocalamus asper* is rare in the natural forest and village areas; furthermore, the planting material is quite difficult to get (Table 7).

### CHARACTERISTICS OF BAMBOO SHOOTS HARVESTED BY RESPONDENTS

The diameter of bamboo shoots harvested ranged from 4 cm to 25.4 cm or about 11.1 cm on average. Most of the respondents (33.3%) collected bamboo shoots



Figure 2.



Figure 3.

with a diameter of 12.70 cm as mature shoots suitable for the market. The height of shoots harvested ranged between 15.24 cm to 91.44 cm. Figures 2 and 3 show the mature shoots harvested for products processing.

### PRODUCTS OF BAMBOO SHOOTS IN THE MARKET

Three types of products were sold by respondents in the market. Those were; (1) preserved shoots packed in a plastic bag (250 g to 300 g per bag, excluding the water); (2) unpacked preserved shoots and; (3) shoots that were sold in the raw state (without further processing). Most of respondents (88.1%) focused on the production of packed preserved shoots, 9.5% sold the unpacked preserved product



Table 6.  
Amount of bamboo shoots

Source	Amount
Buy from supplier	0
Resources from natural forest, planted area and village's area	20
Total	20



Figure 4. Preserved shoots in plastic bag.



Figure 5. Raw shoots after removing the sheath.

and only 2.4% sold bamboo shoots in raw state. Types of products sold in the market are as shown in Figs 4 to 6.

They also were asked to estimate the ratio of products that can be made from a unit of bamboo shoots. It is found that about 1–20 plastic bags (2.9 products on average), containing 250–300 g (275 g on average) of preserved shoots can be produced from a unit of raw shoots, regardless of size. Respondents stated that the amount of preserved shoots prepared by them normally ranged from 18–1300 products (an average product of 266.8 units) per month. By multiplying the average amount of estimated products with the number of respondents marketing the products, the estimated total production of shoot products per month could be determined.



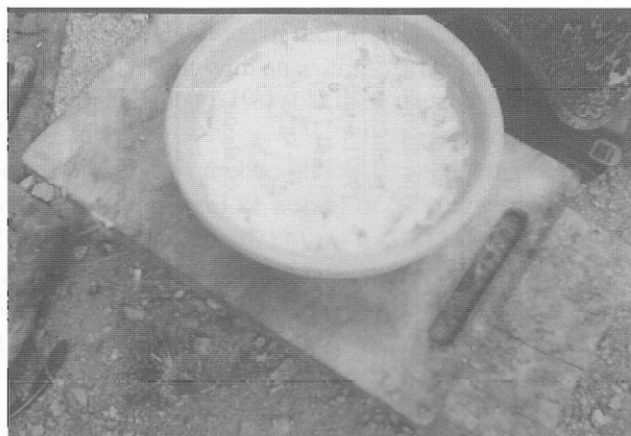


Figure 6. Unpacked preserved shoots.

As for unpacked preserved shoots, between 39 kg to 105 kg of sliced bamboo shoots (an average of 78.5 kg) could be prepared by the respondents per month. The difference between preserved shoots being packed and unpacked is that the unpacked products are sold by the kilogram and are not packed in plastic bags, although the process of producing the products is same.

Only one respondent sold raw bamboo shoots at the market place. About 60 shoots can be prepared if all the resources had been harvested per month. Table 8 described the estimated production of each product based on average production normally prepared by respondents on a monthly basis.

## MARKETING OF BAMBOO SHOOT PRODUCTS

Bamboo shoot products were sold in four types of market channel, namely, night market, one-day market, wholesale market, and shops. Most respondents (54.8%) sold their products only at one market channel. There are also respondents who sell through two-market channels (19.0%) as well as some through three locations (19.0%) per week.

The respondents sold their products by themselves (60%), with their husband/wife (30%), through a middleman (5%), and also with the help of another family member (5%). Most of the respondents (33%) used their own car, but some travelled by rented van (24%), their own van (18%), motorcycle (14%), bus (2%) and taxi (2%). Normally, they sold their products at various market places per week with a travel distance between 12 km to 150 km, or an average of 54 km per week. They travel between 48 km to 600 km per month (an average of 216 km) in order to market their products.

Packed preserved shoots were brought to the market at a volume of between 15 and 480 units, with an average of 125 units, per month. In total, respondents who were selling each month in the market bought an amount of 4609 units of packed

**Table 8.**  
Estimated total production of bamboo shoot products per month

Types of products	No. of respondents	Range of products that could be produced per month	Average estimated products could be produced per month	Estimated total production of products per month
Preserved bamboo shoots packed in plastic bag	37	18 units—1300 units (5.0 kg—357.5 kg) <sup>a</sup>	266.8 units (73.4 kg) <sup>a</sup>	9871.6 units (2714.7 kg) <sup>a</sup>
Unpacked preserved shoots (sold in kg)	4	39 kg—105 kg	78.5 kg	314 kg
Bamboo shoots sold as raw	1	60 shoots <sup>b</sup>	60 shoots	60 shoots
Total	42	—	—	—

<sup>a</sup> The amount of preserved bamboo shoots in kg (1 unit product contains about 275 gm (average) slices preserved shoots).

<sup>b</sup> The amount cannot be converted in terms of weight (kg) since respondent collected various sizes of raw bamboo shoots.

preserved bamboo shoots. The price of the product ranged from RM0.50 (USD0.13) to RM1.80 (USD0.47) per unit with an average price of RM0.90 (USD0.24). It was found that most of respondents (67%) sold their packed preserved shoots at the price of RM1.00 (USD0.26).

As for unpacked preserved bamboo shoots, respondents normally brought about 30–100 kg (69.5 kg on average) or a total of 278 kg per month. Those products prices from RM1.50/kg (USD0.40/kg) up to RM3.00/kg (USD0.79/kg) and the average price are about RM1.95 per kg (USD0.51/kg).

Only one respondent actively sold raw bamboo shoots in the market. It is estimated that that respondent brought about 60 shoots to the market per month and the price of the shoots was RM2.50 per unit (USD0.66/unit). Table 9 gives details of the marketing of bamboo shoot products.

## **MARKET RESPONSE TO BAMBOO SHOOT PRODUCTS**

Since the demand study of bamboo shoots by users is yet to be done, it is difficult to determine the status of its utilization by consumers. However, respondents have been asked to estimate the average products of bamboo shoots bought by users at the marketplace. This amount could be used as an indirect estimate of market response by users (consumers) to the bamboo shoot products. Details of the market response to various bamboo shoot products is shown in Table 10.

## **TOTAL REVENUE OF BAMBOO SHOOT PRODUCTS TO RESPONDENTS**

From the data in Table 10 and the average price stated for each product, the revenue of bamboo shoot products to respondents can be estimated. The estimated revenue of packed preserved shoot products ranged from RM12.00 (USD3) to RM420.00 (USD111) per month. It is also estimated that the average revenue is about RM95.70 (USD25) per month and the total revenue of the product to respondents is estimated at about RM3541.60 (USD932) per month at their market place in Temerloh and Kuantan (by taking only the 37 respondents available).

For the unpacked preserved shoots, the revenue gained by respondents ranged from RM48.00 (USD13) to RM180.00 (USD47) per month. The average value is RM119.10 (USD31) while the total revenue of the products to respondents (by referring to only four respondents) is about RM476.40 (USD125) per month.

In this study, it has been stated that only one respondent interviewed sold the raw bamboo shoots in the market. The amount successfully sold is 32 shoots per month. By taking the price of RM2.50 (USD0.66) per shoot, it is estimated that the total revenue of the products is about RM80.00 (USD21) per month.

To determine the proportion of income that came from the sales of bamboo shoots, the revenue of the sales has been compared with the monthly household income (respondent's income) (Table 11).

**Table 9.**  
Availability of bamboo shoot products in the marketplace

Types of products	Estimated production of products per month <sup>a</sup>			No. of products brought to the market per month			Percent of bamboo shoots utilized for market purposes per month		
	Range of production	Average production	Total estimated production	Range unit of products	Average unit of products	Total products for market purposes	Range of percentage	Average percentage <sup>b</sup>	
Packed preserved shoots	18–1300 units (5.0 kg–357.5 kg)	266.8 units (73.4 kg)	9871.6 units (2714.7 kg)	15–480 units (4.1 kg–132.0 kg)	125 units (34.4 kg)	4609 units (1267.5 kg)	36.9%–83.3%	60.1%	
Unpacked preserved shoots	39–105 kg	78.5 kg	314 kg	30–100 kg	69.5 kg	278 kg	76.9%–95.2%	86.1%	
Bamboo shoots sold in raw	60 shoots	60 shoots	60 shoots	60 shoots	60 shoots	60 shoots	100%	100%	

<sup>a</sup> The estimated production of product is based on respondent's amount of products normally produced per month.

<sup>b</sup> The average proportion of products available in the market to the total production per month ranged from 60.1% to 100%. It is found that respondents retain a certain percentage of production (39.9%) as reserve for the next cycle of marketing (e.g. for next marketing session or next market channel).

**Table 10.**  
Market response to various bamboo shoot products per month

Bamboo shoot product	Amount of product available in the market	Amount of products sold	Percentage of products sold	Average amount of products available in the market	Average amount of product sold	Percentage of average products sold
Packed preserved shoots	15–480 units	12–420 units	80.0%–87.5%	125 units	101 units	80.8%
Unpacked preserved shoots	30 kg–100 kg	30 kg–88 kg	88%–100%	70 kg	60 kg	90%
Bamboo shoots sold in raw state	60 shoots	32 shoots	53%	60 shoots	32 shoots	53%

**Table 11.**  
Proportion of income from the sales of bamboo shoot products to monthly household income<sup>a</sup>

Current occupation	No. of respondents	Range of income	Range of revenue gained from bamboo shoot sales per month	Range of sales as proportion of respondent income (%)
Local workers (e.g. farmers, rubber tapper, fishermen etc.)	37	RM230 (USD61)– RM500 (USD132) (RM344@USD91) <sup>b</sup>	RM12 (USD3)– RM280 (USD74) (RM88.40@USD23) <sup>b</sup>	4.2%–85.5% (26.3%) <sup>b</sup>
Market sellers	3	RM800 (USD211)– RM950 (USD250) (RM900@USD237) <sup>b</sup>	RM66 (USD17)– RM420 (USD111) (RM186@USD49) <sup>b</sup>	7.6%–44.2% (20.0%) <sup>b</sup>
Government servant	1	RM800 (USD211)	RM64 (USD17)	8.0%
Working in private company	1	RM900 (USD237)	RM204 (USD54)	22.7%
Total	42	—	—	25.3%

<sup>a</sup> The proportion of bamboo shoot sales to monthly income is categorized by occupation.

<sup>b</sup> The number in bracket is the average figure for related amount.

## PROBLEMS RELATED TO BAMBOO SHOOT UTILIZATION

There are some problems faced by respondents during collection and production of bamboo shoots and its products. Most respondents (21%) are willing to plant bamboo for shoot production if they have land for planting. They stated that since the demand for their shoots products is quite high (an average percentage of 53% to 90% of the whole products successfully sold), the supply of raw materials (shoots)

needs to be consistent. Although the study found that most respondents (36%) get their sources from the planted area, the area for shoot collection is still small, ranging from 0.2 ha to 2.8 ha (an average of 1.3 ha).

The inconsistent supply of shoots was encountered by 19% of the respondents. This is due to the problem of animal attack, such as from wild boar, buffalo or bamboo rat, which is known as *dekan* (*Rhizomys sumatransis*) (7% of respondents), and also great competition between villagers (2%). Although the average range of shoot products successfully sold in the market was 53% to 90%, 17% of the respondents complained that the demand from consumers was also inconsistent and seasonal. This is because consumers sometimes bought other vegetables as alternatives to the bamboo shoot products. Only a small percentage of respondents (2%) stated that they faced transportation problems. This will affect the frequency of the respondent's trip to their marketplace. Some respondents (24%) rented a van to transport to the market and sometimes shared with others; others used a bus (2%) or taxi (2%).

## DISCUSSION AND CONCLUSION

In Malaysia, the rural and indigenous people have utilized bamboo for a very long time. Besides being associated with the traditional lifestyle in rural areas, it was utilized by cottage industries in making products such as incense sticks, vegetable baskets, poultry cages, chopsticks, barbecue skewers and shade blinds. Nowadays, it had gained recognition by the Government as the third most important non-timber product in developing the economy of rural people [7].

The most frequently used bamboo parts in industry are bamboo culms. Another part that is of great significance is bamboo shoots. Although it was found that bamboo shoots are consumed by rural people, the contribution of this product to the income of shoot sellers (who are also rural people) is important to the economy of the country as a whole. According to the study, there are three products that can be made and sold from bamboo shoots, namely, packed preserved shoots, unpacked preserved shoots, and shoots sold in raw (without any additional processing). The sellers (also mostly bamboo shoot collectors) are estimated to gain on average RM95.70 (USD25) per month from selling packed preserved shoots and it is estimated that about RM3541.60 (USD932) of total revenue is taken per month by the 37 sellers available in Temerloh and Kuantan.

For the unpacked preserved shoots, the average revenue gained by respondents (sellers) was RM119.10 (USD31) per month while the total revenue, by taking only the four respondents involved, was estimated to be RM476.40 (USD125) per month. As for shoots sold in raw state, only one respondent was involved and the revenue of the products gained was estimated to be RM80.00 (USD21) per month.

By looking at income generated through the selling of bamboo shoot products, it was found that on average about 25.3% of the respondent's monthly income came from the activities. The market response to the shoot products by consumers



was also very favourable for sellers. The respondents successfully sold between 53% and 90% of the amount available in the market. Therefore, in conclusion, bamboo shoots can be a potential additional income earner alongside bamboo culms if the demand for the products is consistent and if they are marketed commercially (exported and sold in canned forms). However, the demand for bamboo shoots (according to the sellers) is inconsistent and seasonal, although only 17% of the respondents were affected by the situation.

By highlighting the nutritive values for various bamboo products, such as pickled shoots, and developing robust promotion of them, demand or sales of these products can be increased tremendously in Malaysia. With consistent supply of bamboo shoots and availability of well-managed plantations as well as good link-up in marketing between investors (industries) and sellers/collectors, bamboo shoot product industries, especially canned products, have great potential to be commercially established.

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