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A Survey on Edible Aroids Consumed by Locals in Kelantan, Peninsular Malaysia

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Abstract. A total of seven variations of edible Araceae species were identically consumed by locals in the Districts of Kota Bharu and Machang, Kelantan, Peninsular Malaysia. These species are Keladi Pinang, Keladi Batang Putih, Keladi Tapak Badak, Keladi Birah, Keladi Batang Hitam, Keladi Candek and Keladi Tetawi. However, through a taxonomic identification were recognised only four species, these are *Colocasia esculenta* (L.) Schott, *Alocasia macrorrhizos* (L.) G. Don, *Alocasia longiloba* Miq. and *Xantosoma sagitifolia* (L.) Schott. The results revealed that *Colocasia esculenta* (L.) Schott *Alocasia macrorrhizos* (L.) G. Don. have three and two variations of species, respectively. The study also shows that Araceae is not only as sources of medicinal and ornamental but also commonly used by locals as foods which can be potentially explored and commercialized as a new bio-economy product.

1. Introduction

Aroid is locally called as *keladi* and scientifically known as Araceae. This family is the fourth largest family of monocotyledons after orchids, grasses and sedges [1]. Generally, it is a family of perennial evergreen to seasonally dormant monocotyledonous herbs defined at the macromorphological level by a unique inflorescence consisting of a spike of small bractless flowers on a fleshy unbranched spadix which is subtended by a modified leaf known as a spathe [2]. Most significantly, members of this family are easily recognizable due to their mesmerizing inflorescences, outstanding foliage and strong odours. Recent record highlights that there are approximately 118 genera and 3 500 published species of Araceae worldwide [3]. However, [4] estimated about 5 435 species of 132 genera that thrive well in different habitats of the world. In Peninsular Malaysia, 145 species from 28 genera are recorded which 28 species are endemic [5]; [1]; [6]; [7].

Malaysia is one of the countries where edible Araceae or also known as taro is said to have originated. Numerous wild relatives of taro occur, especially in Peninsular Malaysia. The long-term association notwithstanding, taro is today a minor crop in Malaysia, becoming significant only if and when the rice crop fails. The main consumers of taro in Malaysia are the Chinese. Numerous cultivars species are in cultivation. In Peninsular Malaysia, as a minor crop, numerous wild Araceae are cultivated. *Colocasia esculenta* (L.) Schott was cultivated as a short-term season (four-six months), meanwhile, *Xantosoma sagitifolia* (L.) Schott for a longer season (9-12 months). There are even cultivars that do not produce



corms but they are grown mainly for edible leaves and petioles. Kelantan is one of the state that majority occupied by Malay population. In the past, the consumption of Araceae is quite popular among the locals and became the popular food after rice and cassava. However, times passes and the use of Araceae as food becomes less and less popular. This study was conducted in order to identify and document the uses of Araceae among locals in Kelantan. The aim of the study is to examine the edible Araceae in the State of Kelantan, Peninsular Malaysia. In line with this, the specific objectives are to scientifically identify the edible Araceae species, examine their traditional uses and current status.

Araceae is widely used and cultivated for a number of purposes due to its high economical and scientific values [8]; [9]; [10]; [11]; [12]; [13]. However, the use of Araceae as food and medicine is particularly interesting because these plants are invariably toxic and require careful preparation for safe consumption. In the tropics, various species of Araceae are cultivated for food such as *C. esculenta* (L.) Schott, *X. sagittifolium* (L.) Schott and *A. macrorrhizos* (L.) G.Don [14]. Even though, they have less economical value compared to other major crops, edible Araceae are still considered as an important food material in the diet of many regions in developing countries [15]. They produce edible starchy storage corms and cormels which supply carbohydrate content of the diet in some parts of the tropics and sub-tropics.

Besides, edible Araceae have a higher content of protein, vitamins, minerals and amino acids than many other tropical root crops [16]; [17]. Moreover, Araceae also has a considerable potential as animal feed, renewable energy source and industrial raw material. However, the development of agro-industries that utilizes Araceae as major inputs remains a theoretical concept despite several positive indicators from research and development. Apart from this, short storage life and poor harvesting technologies often hinder the commercialization of Araceae as edible crops. Araceae have a major potential for food development in the future and have been accepted in many parts of the world as subsistence and emergency food sources. In countries such as Malaysia, Araceae may have an increasing role to play in the supply food for future generations.

2. Methodology

2.1 Study Area

The survey was conducted in the districts of Kota Bharu and Machang in the State Kelantan, Peninsular Malaysia. A total of eight villages were selected as study sites. In Kota Bharu, the four study sites are Kg. Belimbing, Kg. Lating, Kg. Keling and Kg. Kubang Itik. Meanwhile, in Machang, the sites are Kg. Pek, Kg. Bukit Tiu, Kg. Bunut and Kg. Bukit Baka.

2.2 Methods

In this study, the random sampling survey was conducted surroundings the selected villages in order to identified the edible Araceae. Then, the questionnaire and interview survey was done among the villagers to obtain the list of edible Araceae consumed by locals. The information such as local name of species, scientific name, uses and food preparation recipes were noted. The photograph of each species were also taken. The survey also evaluated the awareness of locals on edible Araceae species. The data was analysed using SPSS version 17. SPSS (Statistical Package for the Social Scientists). In this study, cross tabulation method was applied.

3. Results and Discussion

A total of 283 respondents were interviewed as shown in Table 1. Most of them are works as farmers and several are running a small-scale business in their villages. There are also a few works in private and government agencies.

The results show that a total of seven variations of species were noted in the Districts of Kota Bharu and Machang as tabulated in Table 2. These species as known by locals as Keladi Pinang, Keladi Batang Putih, Keladi Tapak Badak, Keladi Birah, Keladi Batang Hitam, Keladi Candek and Keladi Tetawi (Plate 1). However, scientific identification only recognised four species from the study area, these are

C. esculenta (L.) Schott, *Alocasia macrorrhizos* (L.) G.Don, *A. longiloba* Miq. and *X. sagitifolia* (L.) Schott. There are three variations, Keladi Pinang, Keladi Batang Putih and Keladi Tapak Badak from the same species of *C. esculenta* (L.) Schott. Meanwhile, the other two variations, Keladi Birah and Keladi Batang Hitam from the species of *A. macrorrhizos* (L.) G.Don. According to [18], the variation of species in *C. esculenta* (L.) Schott is due to habitat differences which also indicate the presence of variation in genotypic origin. Petiole, leaf, stolon and corm lengths expressed high heritability with moderate to high genetic advance signalled heritable in nature.

Table 1. No. of respondent in each sampling site.

District	Sampling site	No. of respondent
Kota Bharu	K. Kg Belimbing	50
	Kg Lating	34
	Kg. Keling	35
	Kg Kubang Itik	27
Machang	Kg. Pek	52
	Kg. Bukit Tiu	30
	Kg. Bunut	31
	Kg. Bukit Bakar	24
Total no. of respondents		283

Table 2. List of edible Araceae species recorded from the study area.

No.	Local name (Species variation)	Scientific Name
1.	Keladi Pinang	<i>Colocasia esculenta</i> (L.) Schott
2.	Keladi Batang Putih	
3.	Keladi Tapak Badak	
4.	Keladi Birah	<i>Alocasia macrorrhizos</i> (L.) G.Don
5.	Keladi Batang Hitam	
6.	Keladi Candek	<i>Alocasia longiloba</i> Miq.
7.	Keladi Ketawi	<i>Xantosoma sagitifolia</i> (L.) Schott

Araceae have to be cooked to be eaten and the most common techniques are boiling, frying and baking or roasting. These species cannot be eaten in raw. It may cause irritation and infection to human body system. In traditional folks, stems of Araceae were cooked usually with coconut milk and eat with staple food (rice). Meanwhile, tubers were boiled and eat during a leisure time especially in a period of monsoon season.

The results also show that Keladi Pinang (*C. esculenta* (L.) Schott) is the most popular edible Araceae consumed by locals, followed by Keladi Ketawi (*X. sagitifolia* (L.) Schott) and Keladi Batang Putih (also *C. esculenta* (L.) Schott). Besides that, Keladi Candek (*A. longiloba* Miq.) is rarely been eaten, their fruits are usually eating by birds. This species was used by locals a medicinal purpose for wound healing and gout treatments. A study by [10] shows that, *A. longiloba* Miq. has a remarkable wound healing activity and great potential to be developed as an effective natural wound healing agent.

4. Conclusion

Edible Araceae has a potential to be commercialized as an alternative food. From the survey, a total of four species of edible Araceae were recorded, these are *C. esculenta* (L.) Schott, *A. longiloba* Miq., *A. macrorrhizos* (L.) G.Don, and *X. sagitifolia* (L.) Schott. The potential of edible Araceae is quite interesting to be learned, and it may become the second alternative food after rice. Further studies on other aspects of edible Araceae such as genetic variation, physiology, chemical compound toxicity is recommended.

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Appendix

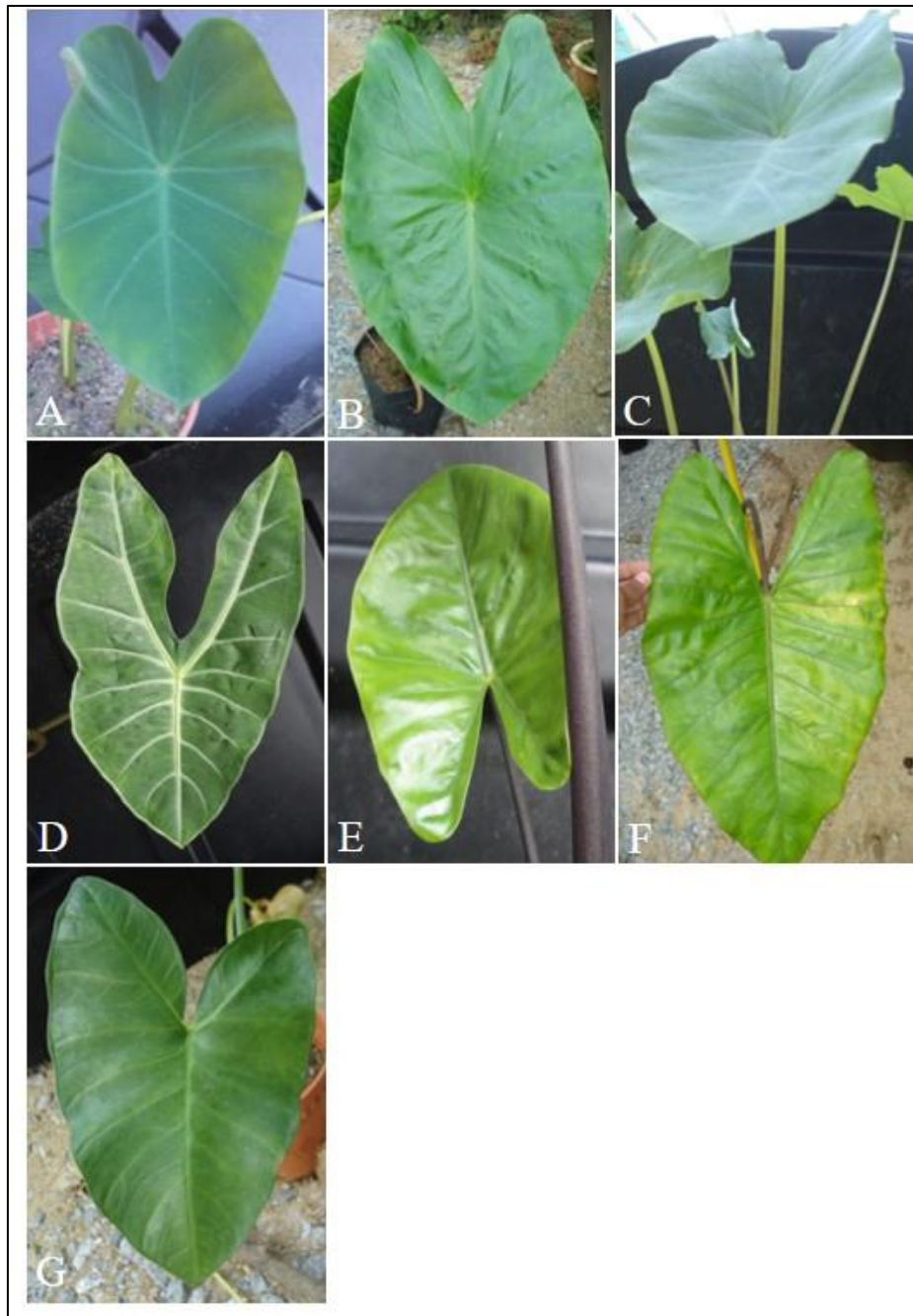


Plate A1. Keladi Pinang (*Colocasia esculenta*), **B** - Keladi Batang Putih (*Colocasia esculenta*), **C** - Keladi Tapak Badak (*Colocasia esculenta*), **D** - Keladi Candik (*Alocasia longiloba*), **E** - Keladi Birah (*Alocasia macrorrhizos*), **F** - Keladi batang Hitam (*Alocasia macrorrhizos*) and **G** - Keladi Ketawi (*Xanthosoma sagittifolium*).

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