



## Ethnobotany of *Syzygium polyanthum* (Wight) Walp In Terengganu, Peninsular Malaysia

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### **ABSTRACT**

Plant with medicinal potentials has contributed significantly to the evolution of the modern health care system. Medicinal plants remain the only way forward as they are gaining more acceptability and recognition all over the world. The emergence of new diseases all over the world has necessitates the need for the exploration of plant parts for the invention of promising drugs. To achieve this, prior knowledge of the medicinal plants is needed from the traditional medicinal practitioners and any other person utilising plants for medicinal purposes. This study aims at documenting traditional knowledge of *Syzygium polyanthum* cultivars (*Serai Kayu* and *Serai Kayu Hutan*) in Terengganu. Three hundred and eighty four respondents were interviewed with the aid of semi structured questionnaire. The study reported *Serai Kayu* and *Serai Kayu Hutan* to be used as *ulam*, spices and medicinal respectively. Leaves were found to be the most utilized part and Decoction is the most prepared method. However, the study recommends immediate conservation of the plant and adoption of Malays traditional culture utilisation of the species; due to its medicinal potentials.

**Keywords:** Traditional, medicinal, ethnobotany, *Syzygium polyanthum*

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### **INTRODUCTION**

Ethnobotany is the scientific way of studying plants and the way man is utilizing it for its own benefit (Abdulrahman et al., 2018b). It also looks at the dynamic relationships between people, biota, and environment, from the distant past to the immediate present. It is the interdisciplinary studies of how human culture interacts and uses their native plants. Therefore, it can simply be defined as the scientific and humanistic study of the complex set of relationships of the biota, to the present and the past human societies. Ethnobotany studies are very important in keeping, analyzing and passing knowledgeable information, the relationship among the plant world, and individual within their environment (Kankara et al., 2015). It gives emphasis to how diversity has been utilized in nature and subjective to human activities, how they can be classified, manage and use plants

that are available around them. Ethnobotany studies are often important in revealing locally important plant species particularly for finding crude drugs (Kankara et al., 2015).

Medicinal and Aromatic Plants (MAP) have played a key role as therapeutic agents for a long time and thus hold great economic value (Ong et al., 2011). Living things depend relatively on the plant, so as to meet their basic need for survival. Medicinal plants are the major sources of medication of about 70-80% of people all over the world (Mahmoud et al., 2020). Medicinal plants play a significant role in the upliftment of cultural diversity around the globe (Wahid et al., 2014; Yaoitcha et al., 2015). The use of medicinal plants and herbal medicine around the world serve as the basis for having cheap and good medical care system (Muhamad & Nashriyah, 2012).

Traditional medication is the most ancient and the most accepted form of medication today because it has been accepted by all cultures and tribes of the different faith (Abdulrahman et al., 2018a). The healing value of herbal plants has since been exploited for the treatments of various diseases and conditions in traditional practice (Abdulrahman et al., 2018b). In Asia medicinal plants have contributed significantly in the traditional medicinal system (Mahmoud et al., 2020).

Malaysia is a tropical country with diverse flora and fauna as a result of almost rain, high humidity and hot temperature throughout the year (Abdulrahman et al., 2018b). The condition makes it favourable for many tropical medicinal plants to be grown in the country.

Myrtaceae is a pan tropical family of trees and shrubs with nearly about 55000 species, classified into two sub-family, 17 tribes and 142 genera (Soh et al., 2011; Abdulrahman et al., 2018a). They are mainly found in large amount of number in Central America, South America, Australia and southern hemisphere. The largest genus in the Myrtaceae is *Syzygium*, with more than 1000 species that are predominantly trees, found in a tropical region with high diversity in South East Asia; but little information is known about them (Brambach et al., 2017). *Syzygium* consists of more than 190 species in Peninsular Malaysia which are mostly trees and few species of shrubs (Hussain et al., 1992). Being among the largest genus, it also plays a significant role in the rainforest ecosystem (Cardoso et al., 2009).

*Syzygium polyanthum* is a tree ranging between 22m tall with glabrous or greenish brown bark. Opposite leaves with elliptic apex angle and cuneate base shape. *Syzygium polyanthum* grow low land areas, widely distributed in tropical, subtropical region of the world (Soh et al., 2011). The plants have several local names it depends on the location of the plant species. In Malaysia the species has two cultivars known as *Serai Kayu* and *Serai Kayu Hutan* (Abdulrahman et al., 2018a). There is no comprehensive information with respect to the utilisation of *S. polyanthum* cultivars (*Serai Kayu* and *Serai Kayu Hutan*) by the Malay ethnic group in Terengganu state Peninsular Malaysia for treating of various ailments and improvements of health status. The present study will provide comprehensive information with regard to utilization of the consumed plant parts in Terengganu State, Peninsular Malaysia, Malaysia.

## **MATERIALS AND METHODS**

### Study area

The study was carried out in eight districts of Terengganu state, Peninsular Malaysia from February 2017 to February 2018 (Fig 1). Terengganu state is located between the longitude 102.25° to 103.50° and to 5.5° latitude (Nashriyah et al., 2012). The state is bordered with Kelantan in the northern and western part while bordered with Pahang from the south and western part of the state (Fig. 1).

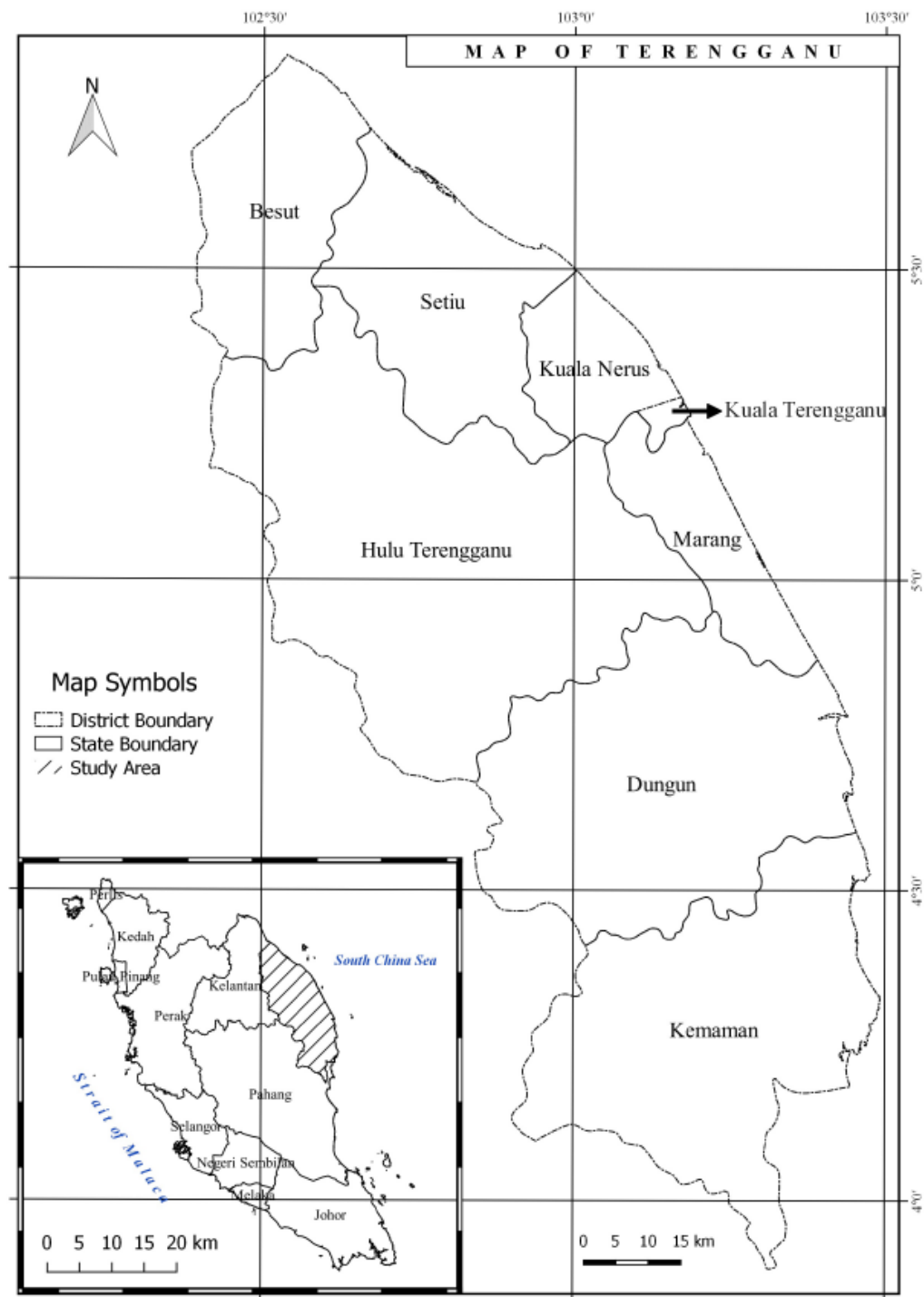


Fig. 1 Peninsular Malaysia map showing the eight districts of studied in Terengganu state

### Sampling size

In ethnobotanical study determination of the sample size is a paramount stage in other to come up with population opinion. The sample size was determined according to Krejcie and Morgan Table (1967) that for any population of 1,000 000 and above, 384 respondent or informants must be interviewed. Terengganu state has a total population of 1011,363 which make the sample size to be 384 (Table 1) (Nashriyah et al., 2012).

**Table 1** Krejcie and Morgan Table adapted from Nashriyah et al. (2012)

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	337
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	241
25	24	130	97	320	175	950	274	4000	246
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	184	110	285	5000	351
40	36	160	113	380	187	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	32	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	2740	159	750	256	2600	335	1000000	384

**Note:** N= Population S= Sample Size

## Data collections

Ethnobotanical survey was carried out in all the eight districts of Terengganu state. The following informants were interviewed in each districts Besut 52, Dungun 57, Hulu Terengganu 27, Kemaman 63, Kuala Terengganu 76, Marang 36, Setiu 21 and Kuala Nerus 52. Data was collected from traditional medical practitioners, birth attendants, herbalist and rural dwellers) using semi structured questionnaire (Table 2). The questionnaire was validated by three certified botanist and pre-tested before employed in the study. Informants were chosen without any bias to gender. Only informants who attend the age of 30 and above where interviewed. Prior to the visits no appointment has been made. Ethnobotanical and other relevant information pertaining to *Serai Kayu* and *Serai Kayu Hutan* were investigated.

## Harvesting risk (Hr)

The risk of harvesting medicinal plants was calculated based on the risk of harvesting plant parts and its usage at the community (Table 3). This will give an idea or conservation status of the utilized medicinal plants. The risk associated with the harvesting plants parts ( $H_i$ ) was scored according to the IUCN standard (Table .2) adapted from Yaoitcha et al. (2015). It was calculated using the following equation.  $HR = \sum N_{ui} \times \log (H_i)$ . Where  $N_{ui}$ = number of medicinal usages credited to the plants part and  $H_i$ = harvesting risk score of plants part. The economic importance index was determined according to Alain et al. (2015) using the equation below :  $MV/OU$  where  $MV$ = medicinal value of the plants part sold (Table 3) and  $OU$ = other uses: (a) Craft, fuel and charcoal (1), (b) Fodder (2), (c) Food (3) Construction (4) and (d) Innovations (5) adapted from Alain et al. (2015). The Risk Status (RS) was interpreted in two categories of the IUCN Benin red list status

- (1) Endangered species (10), (2) Vulnerable (5)

**Table 2:** Some questions employed during the interview at Terengganu, Malaysia

Questionnaire
Gender
Age
Education
Occupation
If traditional herbalist for how long?
Did you know <i>Serai Kayu</i> ?
Did you know <i>Serai Kayu Hutan</i> ?
Importance of the plant
Diseases cured with the plant part
Other uses of the plant
Is the plant wild or cultivated?
What part of the plant use?
Method of preparation
Method of administration
Is any part of the plant toxic?
How did you distinguished the two cultivars?
What type of medication you prepared?
Do you think traditional knowledge should be in cooperated to hospital?

**Table 3** Index of harvesting risk and economic importance credited to plant part with respect to collection

S/N	Description	Score ( $H_i$ )
1	Fruits/ Seeds: fruits and seeds reaping have minimal effect on leaves production	1
2	Leave: Leaves harvesting reduce the chance of regenerating of the plant	2
3	Bark: Taking of plants bark have effect on serf transmission	3
4	Stem: Steam harvesting lead to destruction of the whole plants	4
5	Roots: Root chop damage and destruct the whole plant	5

**Note:** S/N=Serial number, ( $H_i$ )= score harvesting risk

### ***Herbarium deposition and taxonomic identification***

Herbarium specimens were prepared for the collected sample of *Serai Kayu* and *Serai Kayu Hutan* from home gardens and its natural habitat. The collected plants were identified in the field by a Botanist in the Universiti Sultan Zainal Abidin (UniSZA), after which the identified herbarium specimen was further taken to the University of Malaya (UM), Universiti Kebangsaan Malaysia (UKM), further identification, and finally deposited at the respective Herbarium.

### Data analysis

A simple descriptive analysis was employed for the obtained ethnobotanical data to determine the percentage and frequencies and tabulated based on the following information:

- I. Socio demographic information of the informants
- II. Taxonomic information, mode of preparation, mode of administration, parts of the plant utilised and growth form.

III. Quantitative parameters was determined based on harvesting risk index (Hr).

## RESULTS AND DISCUSSION

Malay ethnic group are dominated in Terengganu State (Abdulrahman et al., 2018b). Their knowledge of utilisation of *Serai Kayu* and *Serai Kayu Hutan* was accessed with regard to medicinal, food usage (*Ulam* and spices) and other uses (ornamental and cosmetics). The present study found dominance of women among the interviewed respondent with (70%) while men (30%). The highest age range percentage of the interviewed informants was 37.8% (51-60), 22.9% (41-50), 18.8% (61-70), 15.1% (30-40) and 5.51% (71-above). The study found all the respond have the minimum basic education. But most of the valuable information of about the medicinal usage of *Serai Kayu* and *Serai Kayu Hutan* was obtained from the age range of 50 to above. Among all the respondent interviewed none below the age of 50 was found to have prior knowledge of *Serai Kayu Hutan*. Younger generation only new about *Serai Kayu*. The findings are in agreement with Kankara et al. (2015) where he observed 60% predominance of women in medicinal traditional knowledge. The study found old aged people are the bank of information with regard to the traditional medicinal knowledge of the Malay ethnic group. The study is in conformity with Nashriyah et al. (2012) where reported documentation of ethnobotanical knowledge of *Dioscorea hispida* in Terengganu Peninsular Malaysia from old aged Malay people. Therefore, traditional medicinal knowledge is facing a serious challenge because it might eventually lost subsequently, due to the demise of the older generation. Knowledge of the informants was accessed with regard to the complete utilisation of *Serai Kayu* and *Serai Kayu Hutan* (Fig. 2 and 3). The respondents reported *Serai Kayu* and *Serai Kayu Hutan* to be used as *Ulam* 29.2, 6.8, spices 13.8, 0, medicinal 36.7, 26.6, other uses 7.6, 0 and no idea 12.8, 66.7 % respectively.

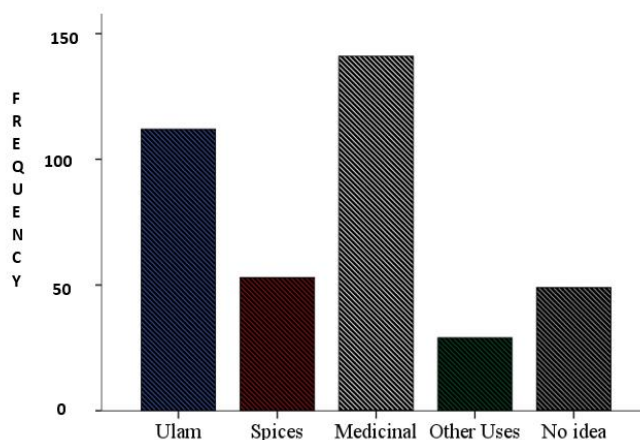


Fig. 2 Respondents Knowledge on the Ethnobotanical Usage of *Serai Kayu* in Terengganu State

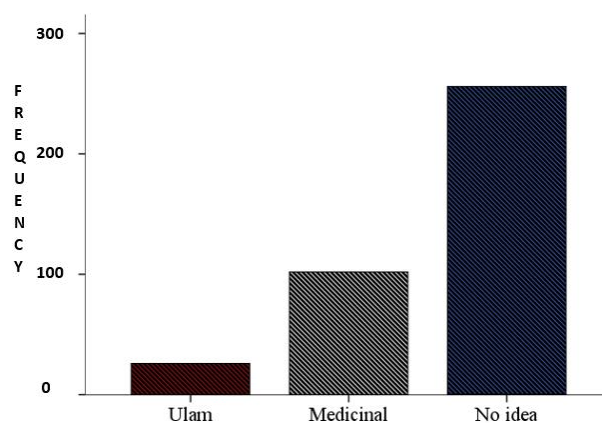
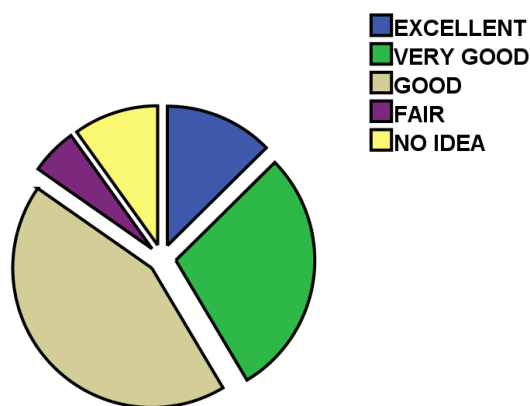


Fig. 3 Respondents Knowledge on the Ethnobotanical Usage of *Serai Kayu Hutan* in Terengganu State

**Table 4** Mode of Preparation of *Serai Kayu* and *Serai Kayu Hutan*

Mode	No of Respondents	Frequency %
Decoction	132	34.4
Infusion	92	24.0
Direct	59	15.4
Powder	33	8.6
Maceration	68	17.6

*Serai Kayu* was reported by the informants to be used for treatment of the following ailments and health improvement; cancer, diabetes, hypertension, diarrhea, fever, ulcer, skin diseases and postpartum while *Serai Kayu Hutan* was used in treating asthma, cancer, diabetes, endometriosis, hypertension, postpartum, ulcer, fever and skin diseases. The study has found all parts of the plant are utilised either for medicinal, food or other application (Fig. 4). The frequent usage of the leaves was documented in this study, probably due to the fact that secondary metabolites are primarily produced in the leaves where the photosynthesis takes place and later transported to the other parts of the plants and may also as a result of the easy collection of the leaves when compared to other parts of the plant like root, bark and whole plant. Even though the frequent utilisation of the plants leaf is a serious threat to biodiversity conservation and can also contribute to the global warming effect through reduction in the production of oxygen and carbon dioxide uptake, the utilisation of the leaves is in agreement with many botanical studies carried out in Peninsular Malaysia, Asian countries and worldwide (Nashriyah et al., 2012; Abdulrahman et al., 2018b; Mahmoud et al., 2020). Decoction is the most prepared method, followed by infusion, maceration, direct and powdered form (Table 4); dilutions were mostly prepared with water. The finding is as a result of the hot water extraction extracts more compounds from the plant parts which are the constituents responsible for the medicinal value. Similarly, Mohammed et al. (2012) and Kankara et al. (2015) reported decoction (69.2%) and (32%) respectively as the most frequent form of herbal medicine preparation. It has also been documented that most of the traditional herbal medicine were utilized dried and fresh this is due to most of the medicinal plants were wild, thus the plants have to be collected in excess to avoid any risk. This is in agreement with Nashriyah et al. (2012) and Kankara et al. (2015). Respondents have also revealed the usage of *Serai Kayu* and *Serai Kayu Hutan* for the improvement of health status as traditional medicinal plant on the scale of excellent 13.80, very good 32.6, good 46.6, fair 5.7 and no idea 1.3% respectively (fig. 4). Findings might be due to the belief of their forefathers of modern medicine has negative consequences on human health. The study agrees with Nashriyah et al. (2011).



**Fig. 4** Respondent Perspective on the Medicinal Usage of *Serai Kayu* and *Serai Kayu Hutan*

The harvesting risk and economic importance index of both the two cultivars were found to be 8 and 9 for *Serai Kayu* and *Serai Kayu Hutan* respectively (Table 2). Index of harvesting risk and economic importance of *S.*

*polyanthum* (*Serai Kayu* and *Serai Kayu Hutan*) was computed according to the International Union for Conservation of Nature (IUCN) Benin red list status and they were found to have the following conservation status (5) vulnerable, both the *Serai Kayu* and *Serai Kayu Hutan*, meaning they can be at any given time be an endangered species. The following parameter was previously used by Yaoitcha et al. (2015) in their study of medicinal knowledge with respect to usefulness of medicinal plants for conservation.

## CONCLUSION

The study reported comprehensive traditional knowledge of *Serai Kayu* and *Serai Kayu Hutan* for the first time ever in Malaysia. However, the study recommended immediate conservation of the plant and adoption of Malays traditional culture utilisation of the species; due to its medicinal potentials. The study recommends exploring of the plant parts of *Serai Kayu* and *Serai Kayu Hutan* for the development of herbal product to avoid extinction and over sampling of the cultivars; as cultivars were found to be vulnerable species.

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