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**Adi Bejo Suwardi**  
Department of Biology  
Education, Faculty of Teacher  
Training and Education,  
Universitas Samudra, Langsa,  
Aceh, 24416, Indonesia

**Zidni Ilman Navia**  
Department of Biology, Faculty  
of Engineering, Universitas  
Samudra, Langsa, Aceh, 24416,  
Indonesia

**Tisna Harmawan**  
Department of Chemistry,  
Faculty of Engineering,  
Universitas Samudra, Langsa,  
Aceh, 24416, Indonesia

**Syamsuardi**  
Department of Biology, Faculty  
of Mathematics and Sciences,  
Universitas Andalas, Kampus  
Limau Manis Padang, 25163,  
West Sumatra, Indonesia

**Erizal Mukhtar**  
Department of Biology, Faculty  
of Mathematics and Sciences,  
Universitas Andalas, Kampus  
Limau Manis Padang, 25163,  
West Sumatra, Indonesia

**Correspondence**  
**Adi Bejo Suwardi**  
Department of Biology  
Education, Faculty of Teacher  
Training and Education,  
Universitas Samudra, Langsa,  
Aceh, 24416, Indonesia

## The diversity of wild edible fruit plants and traditional knowledge in West Aceh region, Indonesia

**Adi Bejo Suwardi, Zidni Ilman Navia, Tisna Harmawan, Syamsuardi and Erizal Mukhtar**

### Abstract

Rural communities in the West Aceh region continue to collect and consume many edible wild fruit plants as a food source. This study was an account of the traditional knowledge and use of wild edible fruit plants by local people in the West Aceh region. The study was conducted in Sungai Mas and Pante Ceureumen, West Aceh Regency, between April and June 2019. Plant specimens have been gathered from the forest, agroforestry and home garden. A total of 100 informants (50 informants at each site) were involved in the survey of Ethnobotanical data. The questionnaires used to investigate the local name of the species, the habitats, the location of the collection, the season of collection, the parts used, the categories of use and the manner of fruit consumption. A total of 44 species of edible fruit plants recorded in West Aceh region, Aceh Province, Indonesia. The Myrtaceae and Malvaceae were the most represented families. *Baccaurea motleyana*, *Durio zibethinus*, *Garcinia mangostana*, *Lansium domesticum*, *Mangifera odorata*, and *Mangifera foetida* were the top six most common wild edible fruits in this region. The local community uses wild edible fruit species for food (44 species), medicine (11 species), construction materials (9 species), furniture (9 species) and firewood. *D. zibethinus*, *M. foetida*, *M. odorata*, *M. quadrifida*, *B. motleyana*, *L. domesticum*, *G. xanthochymus*, and *G. mangostana* are also commonly traded in traditional markets.

**Keywords:** Ethnobotanical, medicine, edible fruit, West Aceh

### 1. Introduction

Many people in developing countries do not have enough food to satisfy their daily needs, and they are deficient in one or more micronutrients (Hussain *et al.*, 2011) [6]. Most rural people in developing countries rely on wild resources, including wild edible fruits as a source of food. The diversity of wild species provides a variety of family diets and leads to household food security. In particular, wild plants are reported to retain various uses (Johns *et al.* 1996; Ogle *et al.* 2003; Shrestha and Dhillon, 2006) [7, 18, 25]. Wild plant food has been an essential element of the human diet since ancient times and almost 75,000 plant species are known to be edible (Walters and Hamilton, 1993; King, 1994; Diamond, 2002; Leonti *et al.*, 2006) [29, 8, 3, 10]. About 200 plant species have been domesticated as food plants, of which only about 30% contribute 95% of the world's plant food consumption (Simpson and Ogorzaly, 1995; FAO, 2009) [27, 4].

Rural communities in the West Aceh region are still gathering and consuming many edible wild plants including wild edible fruits. They are still using them as a supplement of their essential need for food. Their significance is evidenced by free and easy accessibility and nutritional riches, especially vitamins and micronutrients. Local people have obtained knowledge of wild edible fruit plant based on field trials. Knowledge of wild edible fruit plants can be utilized to combat food insecurity and malnutrition challenges (Johns *et al.*, 1996) [7]. This knowledge is transferred from generation to generation (Pilgrim *et al.* 2008) and can only be found in particular as oral traditions. Traditional knowledge of local people about wild food is threatened with modernization. Modernization causing a decrease in traditional knowledge and use of biodiversity (Ong *et al.*, 2012; Wiryono *et al.*, 2017) [19, 31]. Many studies indicate that older generations in many parts of the world fail to disseminate traditional knowledge to the younger generation (Quinlan and Quinlan, 2007; Sousa *et al.* 2012; Saynez-Vaquest *et al.* 2016) [21, 28]. The consequences remain many young people can be alienated from their environment and ultimately lose their knowledge of nature. In addition, the presence of wild edible fruit plants in nature is threatened by the expansion of the agricultural sector.

This condition forces local people to face challenges in adapting to the expansion that leads to changes in the habitat and natural resources. Traditional knowledge and use of natural resources like medicinal plants, food sources, and many other biological resources are bound to alter with the evolving circumstances surrounding them. This study was an account of the traditional knowledge and usage of wild edible fruits plants by local people in West Aceh region.

## 2. Methodology

### 2.1 Study Site

The study was conducted in Sungai Mas and Pante

Ceureumen District of West Aceh Regency (Figure 1). The study site is a lowland area with altitude of 37-55 m above sea level. Most of the area is covered by lowland tropical forests. The climate is wet tropical, with average annual rainfall of 311.4 mm, average humidity is 89,9% and temperature of 22.4-33.5 °C with the lowest temperature 22.4 °C in February and the highest temperature 32.5 °C in June. The total population in Sungai Mas and Pante Ceureumen districts are 3,866 people and 11,703 people respectively. Most people from both districts settle on the edge of the forest or along the river and work as farmers.

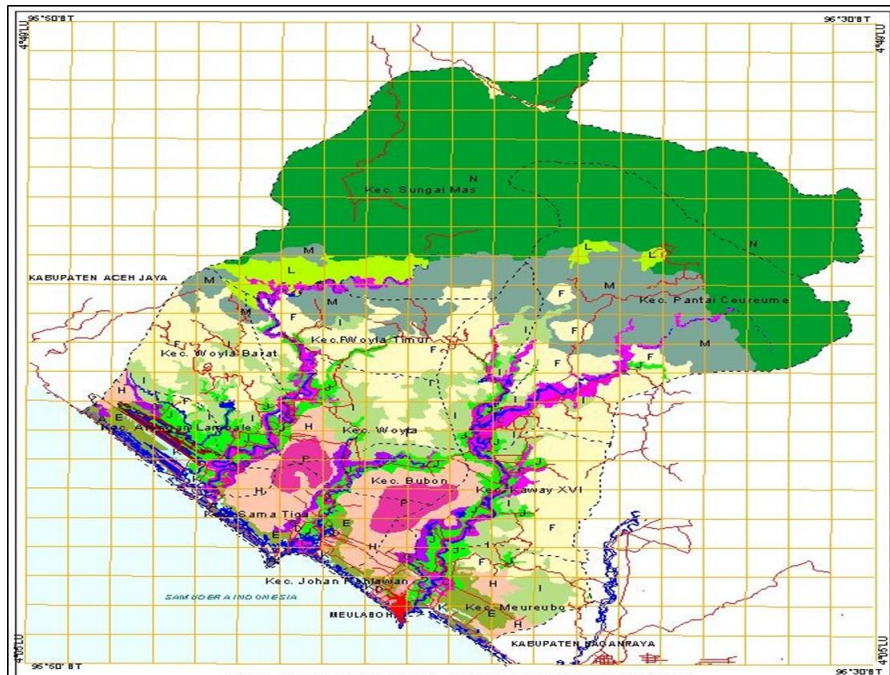


Fig 1: Map of the study site

### 2.2 Data collection

A field survey was conducted in various areas of Sungai Mas and Pante Ceureumen District, West Aceh Regency during April to June 2019 to collect information about the wild edible fruits. Plant specimens were collected from the forest, agroforestry, and home garden. Plants were mostly collected under flowering and fruiting circumstances and verified by local people to guarantee that adequate plants were collected. The specimens were collected for scientific identification sent to the ANDA Herbarium, University of Andalas.

Ethno botanical data collected through informed consent semi-structured interviews during April to June 2019 from Sungai Mas and Ceureumen District, West Aceh Regency. A total 100 informants (50 informants at each site) were surveyed between that age of 25-65 years with the accurate traditional knowledge of useful wild edible fruit plants,

mostly either native-born or living in the region for more than 20 years. The questionnaires concentrated on investigating the local name of the species, habitats, location of collection, season of collection, parts used, categories of use and manner of consumption of fruits.

## 3. Results and Discussion

### 3.1 Diversity of wild edible fruits species

A total of 44 species of edible fruit plants that are known and used by the local people in West Aceh region, Aceh Province, Indonesia (Table 1). The Myrtaceae and Malvaceae were the most represented families, consist of six and five species respectively. *Baccaurea motleyana*, *Durio zibethinus*, *Garcinia mangostana*, *Lansium domesticum*, *Mangifera odorata*, and *Mangifera foetida* were the top six most common wild edible fruits in west Aceh region.

Table 1: List of wild edible fruit plants in West Aceh, Indonesia

Scientific Name	Family	Local name
<i>Archidendron jiringa</i> (Jack) Neil.	Mimosaceae	Jreung
<i>Artocarpus altilis</i> (Parkinson) Forsberg	Moraceae	Nangka
<i>Artocarpus camansi</i> (Parkinson) Fosberg	Moraceae	Keluwih
<i>Artocarpus champeden</i> (Lour.) Stokes	Moraceae	Cempedak
<i>Artocarpus odoratissimus</i> Blanco	Moraceae	Terap
<i>Baccaurea motleyana</i> Müll.Arg.	Phyllantaceae	Rambe
<i>Baccaurea racemosa</i> (Reinw. ex Blume) Müll. Arg	Phyllantaceae	Tampoi
<i>Blumeodendron tokbrai</i> (Bl.) Kurz	Euphorbiaceae	Bantas
<i>Bouea macrophylla</i> Griffith	Anacardiaceae	Gandaria

<i>Cyathocalyx sumatranus</i> Scheff	Anonaceae	Mempisang
<i>Dialium indum</i> L., Mant.	Fabaceae	KerANJI
<i>Durio acutifolius</i> (Mast.) Kosterm	Malvaceae	Durian hutan
<i>Durio griffithii</i> (Mast.) Bakh.	Malvaceae	Durian burung
<i>Durio lowianus</i> Scort. ex-King	Malvaceae	Durian merah
<i>Durio oxleyanus</i> Griff.	Malvaceae	Durian daun
<i>Durio zibethinus</i> Murr.	Malvaceae	Durian
<i>Eleiodoxa conferta</i> Burret	Arecaceae	Asam paya
<i>Garcinia mangostana</i> L.	Clusiaceae	Manggeh
<i>Garcinia xanthochymus</i> Hook. f.	Clusiaceae	Asam gelugur
<i>Knema cinerea</i> var <i>sumatrana</i> Blume	Myristicaceae	Bedarah
<i>Lagerstroemia ovalifolia</i> Teijsm & Binn	Lythraceae	
<i>Lansium domesticum</i> Corr.	Meliaceae	Lansat
<i>Leuconotis eugenifolius</i> DC	Apocynaceae	
<i>Limonia acidissima</i> L.	Rutaceae	Boh batok
<i>Lithocarpus cf echinulatus</i> Soepadmo	Fagaceae	Geseng
<i>Lithocarpus wallichianus</i> (Lindl. ex Hance) Rehder	Fagaceae	Geseng tanduk
<i>Mallotus philippensis</i> (Lam.) Müll. Arg.	Euphorbiaceae	Angin-angin
<i>Mangifera caesia</i> Jack.	Anacardiaceae	Binjai
<i>Mangifera foetida</i> Lour.	Anacardiaceae	Bacang
<i>Mangifera odorata</i> Griff.	Anacardiaceae	Kuweni
<i>Mangifera quadrifida</i> Jack	Anacardiaceae	Kumbang
<i>Physalis minima</i> L	Solanaceae	Ciplukan
<i>Rubus moluccanus</i> var. <i>trilobus</i> A.R. Bean.	Rosaceae	Bluberi hutan
<i>Salacca affinis</i> Griff.	Arecaceae	Salak hutan
<i>Salacca wallichiana</i> Mart.	Arecaceae	Salak hutan
<i>Spondias cytherea</i> Sonn	Anacardiaceae	Kedondong hutan
<i>Syzygium jambos</i> (L) Alston	Myrtaceae	Jambu
<i>Syzygium malaccense</i> (L) Merr. & L.M. Perry	Myrtaceae	Jambe Meulaboh
<i>Syzygium cumini</i> (L.) Skeels	Myrtaceae	Jembe keling
<i>Syzygium polyanthum</i> (Wight) Walp	Myrtaceae	Salam
<i>Syzygium nitidulum</i> (Ridl.) I.M.Turner	Myrtaceae	Jambu air hutan
<i>Syzygium samarangense</i> (Blume) Merr & L.M. Perry	Myrtaceae	Jambu air

Edible fruit species in the west Aceh region are highest than the number of species reported in Langsa (Navia, 2017) [17] and Mandor Nature Reserve, West Kalimantan (Wardani, 2008) [30]. This shows that the West Aceh region supports a high diversity of edible fruit plants can be used as a source of nutrition for rural people. Wild fruit species carry out a significant role as essential sources of nutrition for rural poor (Mahapatra *et al.*, 2012) [11].

### 3.2 Utilization of wild edible fruit plants

The West Aceh region consists of a large mountain forest with rich floristic diversity. The forest offers all essential necessities like food, fuel wood, medicine, construction material, and furniture. The local community uses wild edible fruit species in the forest, such as food (44 species), followed by medicine (11 species), construction materials (9 species), furniture (9 species) and firewood (6 species) (Table 2).

**Table 2:** Utilization of wild edible fruit plants in West Aceh region

Scientific Name	Part use	Utilization	Other Uses
<i>Archidendron jiringa</i>	Fruits and young shoots	Fresh fruit eaten as raw vegetables or made "rendang," young shoots eaten as vegetables	FN, W, M
<i>Artocarpus altilis</i>	Fruit and seed	Fresh and ripened fruit are eaten raw or immature fruit as vegetables, seeds are eaten after boiling, baking, roasting or frying, immature seeded fruit is cooked as a vegetable with coconut milk	W, M
<i>Artocarpus camansi</i>	Fruit	Immature fruit as vegetables or eaten after boiling, roasting or frying	W
<i>Artocarpus champeden</i>	Fruit and seed	The ripened fruit is eaten raw, fresh fruit is consumed as vegetables, seed is eaten after boiling, baking, roasting or frying	FN, W
<i>Artocarpus odoratissimus</i>	Fruit and seed	Fresh and ripened fruit are eaten raw, seed are eaten after boiling, baking, roasting or frying	
<i>Baccaurea motleyana</i>	Fruit	Fruit are eaten raw or made into drinks or is sometimes pickled to be served with curries	FN
<i>Baccaurea racemosa</i>	Fruit	Fruit are eaten raw	FN
<i>Blumeodendron tokbraii</i>	Fruit	Fruit are eaten raw	FN, W
<i>Bouea macrophylla</i>	Fruit	Fresh and ripened fruit are eaten raw, young fruit serve as ingredient of a 'Sambal', the chili-based condiment, and in pickles ( <i>asinan</i> )	
<i>Cyathocalyx sumatranus</i>	Fruit	Fruits are not consumed but consume by animal	M
<i>Dialium indum</i>	Fruit	Fruit are eaten raw	C, M
<i>Durio acutifolius</i>	Fruit	Fruit are eaten raw	C
<i>Durio griffithii</i>	Fruit	Fruits are not consumed but consume by animal	C
<i>Durio lowianus</i>	Fruit	Fruit are eaten raw	C, FN

<i>Durio oxleyanus</i>	Fruit	Fruit are eaten raw	C, FN
<i>Durio zibethinus</i>	Fruit and seed	Fruit are eaten raw or made as “dodol durian”, seed are eaten after boiling, baking, roasting or frying	C, FN
<i>Eleiodoxa conferta</i>	Fruit	Fruit are eaten raw or made into candied fruit	C
<i>Garcinia mangostana</i>	Fruit	Fruit are eaten raw	M
<i>Garcinia xanthochymus</i>	Fruit	Fruit are eaten raw or cooked or as a flavouring in other foods	M
<i>Knema cinerea var sumatrana</i>	Fruit	Fruits are not consumed but consume by animal	FN
<i>Lagerstroemia ovalifolia</i>	Fruit	Fruits are not consumed but consume by animal	M
<i>Lansium domesticum</i>	Fruit	Fruit are eaten raw	
<i>Leuconotis eugenifolius</i>	Fruit	Fruit are eaten raw	M
<i>Limonia acidissima</i>	Fruit	Fruit are eaten raw or as a salad mixture -rujak Aceh-	
<i>Lithocarpus cf echinulatus</i>	Fruit	Seed is eaten after roasting or frying	C
<i>Lithocarpus wallichianus</i>	Fruit	Seed is eaten after roasting or frying	C
<i>Mallotus philippensis</i>	Fruit	Seed is eaten after roasting or frying	W
<i>Mangifera caesia</i>	Fruit	Fruit are eaten raw or made mango juice	
<i>Mangifera foetida</i>	Fruit	Fruit are eaten raw or made mango juice	
<i>Mangifera odorata</i>	Fruit	Fruit are eaten raw or made mango juice	
<i>Mangifera quadrifida</i>	Fruit	Fruit are eaten raw or made mango juice	
<i>Phisalis minima</i>	Fruit	Fruit are eaten raw	M
<i>Rubus moluccanus var. trilobus</i>	Fruit	Fruit are eaten raw	
<i>Salacca affinis</i>	Fruit	Fruit are eaten raw	
<i>Salacca wallichiana</i>	Fruit	Fruit are eaten raw	
<i>Spondias cytherea</i>	Fruit	Fruit are eaten raw	FN
<i>Syzygium jambos</i>	Fruit	Fruit are eaten raw	
<i>Syzygium malaccense</i>	Fruit	Fruit are eaten raw or made into pickles ( <i>asinan</i> )	
<i>Syzygium cumini</i>	Fruit	Fruit are eaten raw or made into candied or juice	M
<i>Syzygium polyanthum</i>	Fruit and Leaves	Fruit are eaten raw and the leaves are used as cooking spices	M
<i>Syzygium samarangense</i>	Fruit	Fruit are eaten raw	
<i>Syzygium nitidulum</i>	Fruit	Fruit are eaten raw	

Use of fruit that is mostly produced by local groups in the West Aceh region in the form of fruit that is directly eaten. The species frequently used are Myrtaceae (*Syzygium jambos*, *Syzygium malaccense*, *Syzygium cumini*, *Syzygium samarangense*, and *Syzygium nitidulum*), Malvaceae (*Durio acutifolius*, *Durio lowianus*, *Durio oxleyanus*, and *Durio zibethinus*), and Anacardiaceae (*Mangifera caesia*, *Mangifera foetida*, *Mangifera odorata*, and *Mangifera quadrifida*). This study did not evaluate the contribution of wild edible fruit plants to improving food security and household income. However, a great amount of wild edible fruit species recorded here, their preference and consumption, indicate the economic value of the forests in the West Aceh region and the potential role of food security and household income. Although the market for Indigenous Forest Foods is not well known, about 46% of respondents from the study site indicated that they had earned some revenue from sales of wild edible fruit plants, like *Durio zibethinus*, *Mangifera foetida*, *Mangifera odorata*, *Mangifera quadrifida*, *Baccaurea motleyana*, *Lansium*

*domesticum*, *Garcinia xanthochymus*, and *Garcinia mangostana* are also commonly traded in traditional markets. Wild edible fruit plants although most undomesticated play important role in people living in rural area of West Aceh region. Some indigenous fruits are known to improve food security for rural communities (Mojeremane and Tshwenyane, 2004) [14]. Indigenous wild plants include edible fruit plants for medicinal uses, forage, firewood, craft, and cash offerings and construction materials for rural communities (Motlhanka *et al.*, 2008) [15]. In addition, edible fruits are a precious source of vitamins and minerals are necessary for the maintenance of good health (Saka *et al.*, 1994) [22].

Local people in West Aceh, particularly those living close forest areas, still use wild plants as traditional medicines. Several species of fruit-producing plants are used as medicinal materials for the treatment of multiple kinds of illnesses suffered by local people (Table 3).

**Table 3:** Traditional medicinal use

Scientific Name	Part use	Utilization
<i>Archidendron jiringa</i>	Leave	Leaves are used to treat toothache
<i>Artocarpus altilis</i>	Leave	Leaves are used in fever
<i>Cyathocalyx sumatranus</i>	Leave	Leaves as an injury medicine
<i>Dialium indum</i>	Leave and bark	Leaves help in producing urine and are used to treat dysuria, bark is used for the treatment of toothache
<i>Garcinia mangostana</i>	Fruit and Bark	Fruit and bark used in diarrhea and dysentery. Fruit also believed to maintain digestive health
<i>Garcinia xanthochymus</i>	Fruit	Fruit extracts are used in treatment fever and stomach problems
<i>Lagerstroemia ovalifolia</i>	Bark	The bark is used treatment of diarrhea
<i>Leuconotis eugenifolius</i>	Root	Roots are used to treat flu
<i>Phisalis minima</i>	Fruit and leaves	The fruit is used as a medicine for bleeding gums, boils, and also for heartburn, leaves are used as a medicine for boils
<i>Syzygium cumini</i>	Fruit, leaves and bark	The fruit and leaves are used in the treatment of diarrhea, bark juice is used to treat wounds
<i>Syzygium polyanthum</i>	Leaves	Leaves are used as a stomachache medicine

Rural people use more than one species of plant to treat a disease. Traditionally, the use of traditional medicine is still commonly practiced in villages in the West Aceh region, especially in the treatment of a still relatively mild disease, like cough, stomach ache, dysentery, fever or digestive problems. Some studies have shown that a few species of fruit plants contain bioactive compounds that can be used as traditional medicines (Pedraza-Chaverri *et al*, 2008; Abbasi *et al.*, 2013; Bunawan, and Dusik, 2013; Silalahi *et al.*, 2015; Mohanty and Pradhan, 2015; Murmu *et al.*, 2016; Wiryono *et al.*, 2017; Handayani, 2018; Sanjayrao and Sanjay, 2019) [29, 1, 2, 26, 15, 16, 31, 5, 23].

#### 4. Conclusion

A total of 44 species of edible fruit plants recorded in West Aceh region, Aceh Province, Indonesia. The Myrtaceae and Malvaceae were the most represented families. *B. motleyana*, *D. zibethinus*, *G. mangostana*, *L. domesticum*, *M. odorata*, and *M. foetida* were the top six most common wild edible fruits in this region. The local community uses wild edible fruit species for food (44 species), medicine (11 species), construction materials (9 species), furniture (9 species) and firewood. *D. zibethinus*, *M. foetida*, *M. odorata*, *M. quadrifida*, *B. motleyana*, *L. domesticum*, *G. xanthochymus*, and *G. mangostana* are also commonly traded in traditional markets. Wild edible fruit plants although most undomesticated play important role in people living in rural area of West Aceh region.

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