Plant fruits used as food by the Dayak community of Tamambaloh in Labian Ira’ang Village, Kapuas Hulu District, Indonesia

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Abstract. Supiandi MI, Leliavia, Syafruddin D, Utami YE, Sekunda R. 2019. Plant fruits used as food by the Dayak community of Tamambaloh in Labian Ira’ang Village, Kapuas Hulu District, Indonesia. Biodiversitas 20: 1827-1832. The Dayak Tamambaloh community has a long tradition of using plants as source of food. However, this knowledge of using the plants as food has not been scientifically documented. The objectives of this study were to identify the species of plants, especially fruit yielding plants, that which were used as food, and to document the methods of their processing practiced by Dayak Tamambaloh community. This study was conducted through the literature survey, interviews and field surveys in Labian Ira’ang Village, Kapuas Hulu District, Indonesia. The results of this study showed that Dayak Tamambaloh community in Labian Ira’ang Village use fruits of as many as 60 species of plants for edible purposes. They belonged to 29 plant families. The families with the highest percentage of fruit yielding plants were Moraceae (10%) and Cucurbitaceae (10%). The food plants were mainly obtained from forests (58.33%), gardens (16.67%), house yards (15%), river banks (5%) and hills (5%).

Keywords: Dayak, ethnobotany, food plants, Tamambaloh, traditional

INTRODUCTION

Dayak Tamambaloh is a community belonging to Dayak tribe, living in the regions bordering Indonesia and Malaysia. Administratively, Dayak Tamambaloh community belong to Labian Ira’ang Village, Batang Lepar Sub-district, Kapuas Hulu District, West Kalimantan Province, Indonesia. This village is around 2.370 hectares in area, with rich biodiversity. Plants, especially those which are used traditionally as sources of food by local communities, form a major component of the biodiversity heritage of this village. According to Nopandry (2009), the traditional communities have local wisdom which has the potential and strength for managing forest areas. The co-existence of local communities along with forests for hundreds of years is a proof for forest conservation by traditional civilizations.

According to Keraf (2002), local wisdom is all forms of knowledge, belief, understanding, or insight as well as customs or ethics that guide human behavior throughout their life within the ecological community. Tamalene (2016) says that local wisdom is a part of local culture that is formed through a learning process by observing, testing, practicing and spreading to others. Such local wisdom is reflected in the habit of Dayak Tamambaloh community in utilizing local plants to fulfill their daily food needs. Insight into the use of local plants is obtained by the community through inheritance from parents, and also from relatives and others. According to Tamin and Arbain (1995), knowledge in traditional society has been hereditary. However, this valuable local wisdom is threatened and gradually disappearing mainly because of activities that reduce the availability of food plants in local forests. Hulyati et al. (2014) stated the advancement of science and technology will make the youth to forget their own traditional ways of life and encourage them to adopt outside cultural regimen.

Ethnobotany can be understood as the relationship between plants and a specific ethnicity (community groups) in various parts of the world and society in general as well as emphasis on a particular culture and its traditions (Martin 1995; Tamin and Arbain 1995; Balick and Cox 1996; Cotton 1996; Munawaroh 2000; Pie and Xiu 2002; Choudhary et al. 2008; Tesfaye et al. 2009; Mesfin et al. 2013). Ethnobotany finds out how society considers botany on the cultural system (Tamin and Arbain, 1995). It is used to discover how precious plants are for certain tribes (Tjitrosoepomo 2005). Ethnobotanical research is very important for the purpose of biodiversity conservation (Martin 1995; Cunningham 2001; Alexiades 2003; Aryan 2009; Diance 2010; Reta 2010; Pironi et al. 2014; Supiandi et al. 2019).

The use of food plants by Dayak Tamambaloh community is facing various threats, such as (i) majority of people who of use these plants are not putting any effort to preserve them (Sutedjo 2004), (ii) clearing of forests due to forest fires and, palm and rubber plantations; (iii) the spraying of chemicals and the conversion of plantation land (Due 2013), and (iv) construction of roads, offices, ports, airports, large estates, community agriculture, mining, dams, industrial estates, urban settlements, irrigation networks, electricity networks and transmigration.
These activities may eliminate the biodiversity existing in natural ecosystems. Therefore, steps are needed to ensure that local forests remain conserved and the local cultural values centered around them are also preserved in the community.

To prevent the loss of biodiversity in general and to support the efforts of preserving food plants used by Tamambaloh Dayak community, in particular, it was necessary to conduct a detailed ethnobotanical research about food plants in this community. The results of such an ethnobotanical study regarding edible fruit yielding plants are presented in this paper.

**MATERIALS AND METHODS**

**Research site and time**

This research was carried out in Dayak Tamambaloh community in Labian Ira’ang Village, Batang Lupar Sub-district, Kapuas Hulu District, West Kalimantan Province, Indonesia. It was conducted during August and September 2018. Labian Ira’ang village is administratively included in Batang Lupar Sub-district, Kapuas Hulu District, West Kalimantan Province. The Labian Ira’ang village is bordered by Mensiau Village in the north, Setulang Village in the east, Abau River Village in the south; Labian Village in the west. Labian Ira’ang Village, Batang Lupar Sub-district, Kapuas Hulu District, West Kalimantan has an area about 2.370 Ha. The population of Labian Ira’ang village is about 455 people with the 126 of heads of household. There are 242 males and 213 females. This includes Bakul hamlet with 219 people (62 heads of household), Kereng Lunsah hamlet with 195 people (51 heads of household), and Sembawang hamlet with 43 people (13s head of household). Most of the lowlands of the study area are used for fields, vegetable plantations, settlements, and housing. The rest of the land is forest and set-aside land. The upland is used for natural rubber and fruit plantations. The map of the research area is presented in Figure 1.

**Data collection**

Data presented in this study consist of both primary data and secondary data (table 1). Primary data was about the diversity and use of fruit plants, such as their local names, scientific names, families, habitat, parts being used, and method of processing and uses. Meanwhile, secondary data consist of general conditions of the research location including demographic and socio-economic conditions.

Interview is a data collection technique used to obtain verbal information through conversations with people or respondents about research topics (Salerno et al. 2005). Interview employed in this study was semi-structured type. The respondents being interviewed were selected based on snowball sampling technique. Snowball sampling is a technique whose application starts from key informants (adat leaders) who can then provide further information needed in research. The respondent on the research is 20 people. Further, field observations were conducted for verifying information on food plant species obtained from interviews with traditional leaders, village heads, traditional healers/physicians and other people of the communities who had an understanding of food plants.

![Figure 1. Labian Ira’ang Village Administrative Area, Batang Lupar Sub-district, Kapuas Hulu District, West Kalimantan Province, Indonesia](source: Google Earth, 2019)
Table 1. Data collected

| Data collected                       | Description                                      | Methods                      |
|--------------------------------------|--------------------------------------------------|------------------------------|
| General conditions of the research location | (Secondary) Location and area Demographics Socio-economic conditions | Literature study |
| The diversity of food plants         | (Primary) Local names Scientific names Families Habitat Parts used Method of processing and uses | Field observation, interview, and literature study |

Data analysis

Identification of plant species was done to determine the scientific name of the species. Identification was done by (i) using reference books about plants, (ii) through photos from the internet (sites: www.theplantlist.org; www.catalogueoflife.org; wesp.science.kew.org; epic.kew.org; biodiversitylibrary.org; www.google.co.uk), and (iii) discussions with botanists and other plant experts.

Food plants that are used by the Dayak Tamambaloh community are grouped by family and family percentage was calculated using the following formula (Desuciani 2012):

$$ \text{Percentage of a family} = \frac{\sum \text{species from certain family}}{\sum \text{total species}} \times 100\% $$

The percentage of food plants based on their habitat types was calculated based on the number of species used from various habitat types such as forests, gardens, fields, yards, and others. The percentage of species of habitat types was calculated by the formula (Farneubun 2014) as follows:

$$ \text{Percentage of species from a habitat type} = \frac{\sum \text{species from certain habitat}}{\sum \text{species from all habitat}} \times 100\% $$

RESULTS AND DISCUSSION

Diversity of fruit plants used as food

Interviews and field observations with Dayak Tamambaloh community indicated that they are using a total of 60 species of edible fruit yielding plants. The detailed list of these plants is presented in Table 2.

The 60 species of fruit plants belonged to 29 families. They were found in various kinds of habitats, such as forests, gardens, yards, river banks, and hills. The processing methods included boiling, sautéing, frying, burning, pounding, and many are eaten directly. Dayak Tamambaloh community was still using the traditional methods to process fruits.

Familywise distribution of fruit yielding plants

The number of fruit yielding plants belonging to each of the 29 plant families and their percentage is shown in Table 3.

The families with the highest percentage are Moraceae (10%) and Cucurbitaceae (10%). The Moraceae family includes the kakatup (Broussontia papyrifera (L.) Vent.), karam (Ficus variegata Blume.), timadak (Artocarpus integer Merr.), kundur (Artocarpus camansi (Parkinson) Fosberg), takalong (Artocarpus sericocarpus Jarrett), and sukun (Artocarpus altilis (Parkinson) Fosberg). The fruits of Moraceae family are widely used as food because they have high nutritional values (Pitojo 2005). Kakatup (Broussontia papyrifera) has been reported to be useful in many ways. For example, (i) fruit and leaf are edible, (ii) leaves used as traditional medicine, and (iii) stem used for making paper and furniture. Ficus is the largest genus in the family Moraceae (Zheng et al. 2006). Lushaini et al. (2015) reported that leaf of karam plant (Ficus variegata Blume.) was used by the community as a vegetable. Lempang and Suhartati (2013) have also reported that young fruits of Artocarpus integer can be used as vegetables while ripe fruit can be eaten fresh or processed. Phytochemical studies on this fruit found the presence of protein, fat, carbohydrate, calcium, phosphorus, iron, vitamin A, vitamin C and water, and the total energy value was 116 kcal (Astawan 2009). Sukun plants have high economic value because they produce fruits with high nutrient content (Adinugraha et al. 2014). Fruits of sukun are one type of staple food for the Dayak Tamambaloh tribe, which is processed into a variety of dishes and snacks (Widowati 2003; Department of Agriculture 2003; Adinugraha et al. 2014).

The Cucurbitaceae family consists of antimun balao (Gymnopetalum cochinichinense (Lour) Kurz), kapari (Momordica charantia L.), pusut (Luffa acutangula L.), antimun uma (Cucumis sativus L.), lao baute ‘ (Lagenaria siceraria (Mol.) Standal), and paranggi (Cucurbita moschata Dutsch). The Cucurbitaceae family is widely used as source of fruits by the Tamambaloh Dayak tribe because: (i) it is easily cultivated, (ii) easy to process, (iii) has high nutritional value, and (iv) almost all parts of the plant can be used as vegetables.
| Local name      | Scientific name                                      | Family name          | Habitat       | Method of processing |
|-----------------|------------------------------------------------------|----------------------|---------------|----------------------|
| Antimun balao   | Gymnopetalum cochinchenense (Lour.) Kurz.            | Cucurbitaceae        | Forest        | Boiled, sauteed      |
| Antimun uma     | Cucumis sativus L.                                   | Cucurbitaceae        | Forest        | Boiled, sauteed      |
| Aratak          | Vigna sinensis (L.) Savi ex Hausskn.                 | Leguminosae          | Garden        | Boiled, raw eat      |
| Aratak binuang  | Abelmoschus esculentus (L.) Moench.                 | Malvaceae            | Garden        | Boiled, sauteed      |
| Barangan        | Castanea sativa Mill.                                | Fagaceae             | Forest        | Boiled              |
| Buangar         | Capsicum annuum L.                                   | Solanaceae           | Yard          | Pounded, sauteed     |
| Bunongkang      | Syzygium polyanthus (Wight) Walp.                    | Myrtaceae            | Forest        | Eaten directly       |
| Durian          | Durio zibethinus L.                                  | Malvaceae            | Forest        | Eaten directly, sauteed, boiled |
| Durian balanda  | Annona muricata L.                                   | Annonaceae           | Forest        | Sauteed (young fruits) |
| Embang-embang   | Curculigo orchioides Guertn.                         | Liliaceae            | Forest        | Eaten directly       |
| Inyak           | Cocos nucifera L.                                    | Areaceae             | Yard          | Eaten directly       |
| Jagong          | Zea mays L.                                          | Poaceae              | Garden        | Boiled, sauteed, grilled |
| Jambu air       | Syzygium aquum (Burm.f.) Alston.                    | Myrtaceae            | House yard    | Eaten directly       |
| Jambu karak     | Belucia asinantha Triana.                            | Malastomataceae      | Forest        | Eaten directly       |
| Jangkol         | Hornstedtia lancea (F.Muell.) K.Schum.               | Zingiberaceae        | Hills         | Eaten directly       |
| Jengkol         | Archidendron pavicorum (Benth.) I.C.Nielsen.         | Fabaceae             | Forest        | Boiled, sauteed      |
| Kakabu          | Ceiba pentandra (L.) Guertn.                         | Malvaceae            | Forest        | Eaten directly       |
| Kakatup         | Broussonieta papyrifera (L.) L'Her. ex Vent.        | Moraceae             | Hills         | Eaten directly       |
| Kakawang        | Shorea macrophylia (de Vries) P.S.Aston.             | Dipterocarpaceae     | Forest        | Burned               |
| Kalantamik      | Nepellium lappaceum L.                               | Sapindaceae          | House yard    | Eaten directly       |
| Kalamunting     | Melastoma affine D. Don.                             | Melastomataceae      | Forest        | Eaten directly       |
| Kalasi          | Passiflora foetida L.                                | Passifloraceae       | Riverbank     | Eaten directly       |
| Kambunga        | Syzygium malaccense (L.) Merr. & L.M.Perry.          | Myrtaceae            | Forest        | Eaten directly       |
| Kandis          | Garcinia celebica L.                                 | Clusiaceae           | Forest        | Eaten directly       |
| Kapari          | Momordica charantia L.                               | Cucurbitaceae        | Garden        | Sauteed              |
| Karam           | Ficus variegata Blume                                 | Moraceae             | Riverbank     | Eaten directly       |
| Kemantung       | Mangifera foetida Lour.                              | Anacardiaceae        | Forest        | Eaten directly       |
| Koko            | Theobroma cacao L.                                   | Malvaceae            | Forest        | Eaten directly       |
| Kuai            | Allium schoenoprasum L.                              | Liliaceae            | Garden        | Boiled, engulfed, sauteed |
| Kundur          | Artocarpus camansi Blanco.                           | Moraceae             | Forest        | Boiled, sauteed      |
| Kurandik        | Dialium indum L.                                     | Leguminosae          | Forest        | Eaten directly       |
| Lao baute'      | Lagenaria siceraria (Molina) Standl.                 | Cucurbitaceae        | Garden        | Boiled, engulfed, sauteed |
| Lasikan         | Myristica fragrans Houtt.                            | Myristicaceae        | Forest        | Eaten directly       |
| Lenset          | Lansium domesticum Correira.                        | Malvaceae            | Forest        | Eaten directly       |
| Limau bali      | Citrus grandis (L.) Osbeck.                          | Rutaceae             | Forest        | Eaten directly       |
| Limudan         | Eugenionna utilis Becc.                              | Anacardiaceae        | Forest        | Eaten directly       |
| Mangga          | Mangifera indica L.                                  | Anacardiaceae        | Forest        | Eaten directly       |
| Maraga          | Eleiodoxa conferta (Griff.) Burret.                  | Areaceae             | Forest        | Eaten directly       |
| Papakan         | Durio katejensis (Hassk.) Becc.                      | Malvaceae            | Forest        | Eaten directly, boiled, sauteed |
| Paranggi        | Cucurbita moschat Duchesne.                          | Cucurbitaceae        | Garden        | Boiled, engulfed, sauteed |
| Pusut           | Laffa acutangula (L.) Roxb.                         | Cucurbitaceae        | Garden        | Boiled, sauteed      |
| Rambean         | Baccaurea mollelyana (Müll.Arg.) Müll.Arg.          | Phyllanthaceae       | Forest        | Eaten directly       |
| Sampolam        | Mangifera indica L.                                  | Anacardiaceae        | Forest        | Eaten directly       |
| Sialam          | Garcinia x mangostana L.                             | Clusiaceae           | Forest        | Eaten directly       |
| Singkara        | Areca catechu L.                                     | Areaceae             | House yard    | Eaten directly       |
| Sukun           | Artocarpus altlis (Parkinson ex F.A.Zorn) Fosberg.   | Moraceae             | House yard    | Sauteed, fried       |
| Takalong        | Artocarpus sericarpus F.M.Jarrett.                  | Moraceae             | Forest        | Boiled, sauteed      |
| Tamparengget    | Aquilegia vulgaris L.                                 | Ranunculaceae        | Hills         | Eaten directly       |
| Tambuk panang   | Nepellium lappaceum L.                               | Sapindaceae          | Forest        | Eaten directly       |
| Tanggalak       | Litsea angulata Blume                                | Lauraceae            | Forest        | Eaten directly       |
| Tapis           | Hornstedtia scypheria (J.Koenig) Steud.              | Zingiberaceae        | Forest        | Eaten directly       |
| Tarung masam    | Solanum ferox L.                                     | Solanaceae           | Forest        | Sauteed, boiled      |
| Tarung pipit    | Solanum torum Sw.                                    | Solanaceae           | Riverbank     | Boiled, raw eat, sauteed |
| Tarung sina     | Solanum melongena L.                                 | Solanaceae           | Garden        | Engulfed, sauteed, boiled |
| Timadak         | Artocarpus integer (Thunb.) Merr.                    | Moraceae             | Forest        | Eaten directly       |
| Tomat           | Solanum lycopersicum Lam.                            | Solanaceae           | Garden        | Eaten directly, sauteed |
| Totokol         | Garicia forbesi King.                                | Guttiferae           | Forest        | Eaten directly       |
| Umbring         | Averrhoa carambola L.                                 | Oxalidaceae          | House yard    | Eaten directly       |
| Unti babari     | Ananas comosus (L.) Merr.                            | Bromeliaceae         | Yard          | Immediately eaten, sauteed |
| Unti kaya       | Carica papaya L.                                     | Caricaceae           | Yard          | Eaten directly       |
the lives of local communities. Forest, as an environmental unit, is the foundation of life for the community around (Nugraha and Murtijo 2005). Forests are an ecosystem that not only stores natural resources in the form of wood but also biological resources that have social and economic benefits for the environment. Forests, as a repository of biodiversity (flora and fauna), provide many benefits, one of which is to meet food needs (Puspitojati et al. 2014).

The habitat with second higher percentage of species (16.67%) was garden. According to (Hakim 2014), garden is a piece of landscape with planted species. In Tamanambah Dayak society, gardens are divided into vegetable and fruit gardens. In the vegetable plantation, they cultivated seasonal plants and horticultural plants. Whitten et al. (1996) stated that the gardens have great advantages for local communities being source of (i) daily necessities like firewood, vegetables and drugs, (ii) forage, (iii) building materials, (iv) income from selling the harvests, (v) products for religious ceremonies, and (vi) aesthetics value. Moreover, as Hakim (2014) explained, gardens also play important role in preserving biological diversity.

The third important habitat of food plants with 15% species was the yards. The yard is one of the agroforestry complex having a structure and variety of composition (Junaidah et al. 2015). Hakim (2014) explained that yard is a kind of open area near houses to facilitate planting of edible species. According to Sajogyo (1994), yard could play an important role as lumbung hidup (living barn) and warung hidup (living store). Suryanto et al. (2012) mentioned that yards as land used for cultivation and production, play an important role as the ecosystem warriors. Watson and Eyzaguirre (2002) listed the following benefits from management of the yards: (i) source of family nutrition, (ii) saving of money, (iii) source of additional family income, and (iv) biodiversity conservation.

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**Table 3. Percentage of fruit plants based on family**

| Family        | Number of plant species | Percentage |
|---------------|-------------------------|------------|
| Moraceae      | 6                       | 10         |
| Cucurbitaceae | 6                       | 10         |
| Solanaceae    | 5                       | 8.33       |
| Malvaceae     | 5                       | 8.33       |
| Areceae       | 4                       | 6.67       |
| Anacardiaceae | 4                       | 6.67       |
| Myrtaceae     | 3                       | 5          |
| Sapindaceae   | 2                       | 3.33       |
| Zingiberaceae | 2                       | 3.33       |
| Clusiaceae    | 2                       | 3.33       |
| Liliaceae     | 2                       | 3.33       |
| Leguminosae   | 2                       | 3.33       |
| Melastomataceae| 2                     | 3.33       |
| Passifloraceae| 1                       | 1.67       |
| Ranunculaceae | 1                       | 1.67       |
| Fagaceae      | 1                       | 1.67       |
| Phyllanthaceae| 1                       | 1.67       |
| Oxalidaceae   | 1                       | 1.67       |
| Poaceae       | 1                       | 1.67       |
| Fabaceae      | 1                       | 1.67       |
| Meliaceae     | 1                       | 1.67       |
| Annonaceae    | 1                       | 1.67       |
| Caricaceae    | 1                       | 1.67       |
| Dipterocarpaceae| 1                    | 1.67       |
| Bromeliaceae  | 1                       | 1.67       |
| Myristiceae   | 1                       | 1.67       |
| Rutaceae      | 1                       | 1.67       |
| Lauraceae     | 1                       | 1.67       |
| Guttiferae    | 1                       | 1.67       |

**Table 4. Habitat-wise distribution of food plants**

| Habitat     | Number of plant species | Percentage |
|-------------|-------------------------|------------|
| Forest      | 35                      | 58.33      |
| Garden      | 10                      | 16.67      |
| Yard        | 9                       | 15         |
| River Bank  | 3                       | 5          |
| Hills       | 3                       | 5          |
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