

Ethnobotany of semi-arid medicinal plants used by Bunaq Tribe in Lamaknen, Belu District, Indonesia

YOSEF JEFRIANTO ADE MELA, EMILIA JULIYANTI BRIA*, ITE MORINA YOSTIANTI TNUNAY

Program of Biology, Faculty of Agriculture, Universitas Timor. Jl. Sasi Km. 9, Kefamenanu, North Central Timor, East Nusa Tenggara, Indonesia.
Tel.: +62-3882705800, *email: emilijuliyanti@gmail.com

Manuscript received: 1 October 2021. Revision accepted: 2 June 2022.

Abstract. Mela YJA, Bria EJ, Tnunay IMY. 2022. *Ethnobotany of semi-arid medicinal plants used by Bunaq Tribe in Lamaknen, Belu District, Indonesia. Intl J Trop Drylands 6: 16-25.* The diversity of traditional medicinal plants of the Bunaq Tribe in Lamaknen, Belu District, Indonesia is a basic study of the development of local potential in supporting plant conservation in the border areas of Indonesia. The purpose of this study was to determine the types of medicinal plants, the organs used, processing methods and ways of using plants as traditional medicines and species use values (SUV) by the Bunaq Tribe in Belu District, a semi-arid climatic area in Timor Island, Indonesia. This study uses a descriptive qualitative and quantitative approach. The research method used was semi-structured interviews with village shamans. The results showed that there were 26 families consisting of 63 species of plants used as medicine. Fabaceae had the highest number of species used as medicine. The most widely used growth form was tree and the most frequently used plant part was leaf: 30%. The most widely applied processing method was boiling. Turmeric (*Curcuma longa* L.) showed the highest use value, 0.57, compared to other species. In conclusion, the Bunaq Tribe still preserves traditional knowledge of medicinal plants through village shamans. This information can be used as the basis for developing the social and cultural values of the Bunaq Tribe in the border areas of Indonesia.

Keywords: Bunaq Tribe, Lamaknen, medicinal plants

INTRODUCTION

Lamaknen is a Sub-district in Belu District, East Nusa Tenggara, located at the border between Indonesia and East Timor. This sub-district consists of nine villages, namely Dirun, Duarato, Fullur, Kewar, Lamaksenu, Leowalu, Makir, Mauhitas and Maudemu (Belu District Profile 2020). The community is dominated by the Bunaq Tribe, who still use natural resources to meet their daily needs. They also use plants for hereditary spiritual interests (Atok et al. 2010). Traditional medicinal practices have developed from generation to generation based on natural medicines, spiritual therapies, manual techniques, and exercises to diagnose, treat, and prevent disease (Bussmann et al. 2010). Traditional medicine is quite popular in this area and is accepted by the wider community even though there are modern health facilities (Yuliani et al. 2019). Besides being used as a first aid system in the family, traditional medicine is considered cheaper and safer than modern drugs because of the low side risk (Rahayu and Andini 2019; Nugroho et al. 2022).

Belu District has an average temperature of 27.6°C with a temperature interval of 21.5-33.7°C; the lowest temperature (21.5°C) in August and the highest temperature (33.7°C) in November. According to the climate classification by Schmidt and Ferguson, the climate type in this district is D (semi-arid climate), with two seasons, namely dry and rainy seasons. The average rainfall for 5 years (2011-2015) is 209 mm/month with the number of rainy days is 8 days/month. The wind currents in June-September come from Australia with little water vapor,

while the wind currents in December-March contain a lot of water vapor from Asia and the Pacific Ocean. The district has four wet months (December-March) and eight dry months. Community life, including agricultural activities, adapts to this semi-arid climate condition (Belu District 2021)

One practice of traditional medicine is to use medicinal plants. The interaction of humans and plants is getting more intense with the times, resulting in the accumulation of human knowledge and expertise in herbal medicines (Yeung et al. 2020). However, knowledge about traditional medicine and medicinal plants is known only by certain people, and its oral delivery has become a tradition in a community group (Elfahmi et al. 2014; Silalahi and Nisyawati 2018). The ethnobotanical study can be done to inventory, identify and evaluate the most important plant species for a given culture (Zenderland et al. 2019). In addition, this study is useful for uncovering community knowledge systems about biodiversity, conservation and cultural resources (Albuquerque et al. 2006; Ledo and Seran 2019).

Several previous studies have revealed the distribution of medicinal plants in this area. Atok et al. (2010) found that the Bunaq Tribe in Dirun Village, Belu District used sixty-nine species of medicinal plants. Furthermore, Yuliani et al. (2019) also revealed that the Bunaq Tribe in Kewar Village used twenty-nine traditional medicinal plants. However, these studies are very limited in area and scope even though this information is needed to conserve biodiversity in this region.

This study aimed to analyze the potential of naturally distributed medicinal plants and their use by the Bunaq

Tribal community, especially by village shamans in Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia. This information can enrich the database of medicinal plants and their processing by the Bunaq Tribe and be used as the basis for the sustainable management of biological resources in border areas.

MATERIALS AND METHODS

Study area

This research was conducted in Lamaknen Sub-district of Belu District, East Nusa Tenggara Province, Indonesia, a tropical semi arid area; and the focus area were the villages of Furur, Makir, and Duarato (Figure 1). Lamaknen has an area of 105.90 km². This hilly to mountainous area has a semiarid climate with two seasons, namely the rainy season, from November to May, and the dry season, from June to October. Lamaknen has 9 villages with a population of 13,195 in 2020 (Belu District Profile 2020). Most of the people are of the Bunaq Tribe and speak the local Marae language.

Selection of participants

Key participants were selected purposively and systematically based on the recommendations of knowledgeable elders and development agents (Jima and Megersa 2018). The selection of key participants was also based on the cured diseases, personal experience in self-medication and quality of explanations that particular participants gave during an interview. As a results, there were seven key informants who were village shamans in the three research villages. They consisted of 3 men and 4 women who has traditional expertise of medicinal plants known and commonly used by the Bunaq Tribe and others.

Techniques employed for data collection were semi-structured interviews, guided field walks, and observations with participants. Interviews were undertaken using questionnaires on botanical names and local names, parts used, mode of preparation, The use reports, relative importance, and voucher number were tabulated for all reported plant species (Hussain et al. 2018).

Specimen collection and identification

Field observations were performed with the help of local guides to describe morphological features and

habitats of each medicinal plant species in the field. Identification was done with the results of field descriptions and cross checks using Flora of Java (Backer and Bakhuizen 1968) and integrated taxonomic information system-report (itis.gov), and the plantlist.org to confirm the correct nomenclature of plant species.

Data analysis

Descriptive analysis was applied by tabulating the information into a specific table. This consisted of a family name, scientific name, and local name of the plant, plant habitus, plant part used as medicine, the name of the disease or disorder that is cured, and the method of processing that part of the plant. Species use value (SUV) was calculated to see the important plant species for the treatment of certain types of diseases in the study area, using the following equation:

$$SUV = \frac{\sum UV_i}{ni}$$

Where: UV_i is use-value of particular species and ni is the total of a number of participants (Fathir et al. 2021).

RESULTS AND DISCUSSION

Medicinal plants used by the Bunaq Tribe

The Bunaq tribal community in Lamaknen Sub-district used 26 families of plants consisting of 63 species (Table 1). Medicinal plants used by the Bunaq people vary greatly in terms of species, locations, and organs used. The most widely used plant family was Fabaceae, consisting of 8 species, followed by Euphorbiaceae with 6 species, and Poaceae with 5 species, while others ranged from 1-4 species. The majority of Fabaceae in Lamaknen Sub-district is closely related to the location and environmental conditions. Atok et al. (2010) stated that Fabaceae is a family most widely used by the community in Dirun Village, Lamaknen Sub-district. Molares and Ladio (2012) also revealed that Fabaceae has an important role both as food ingredients and as medicinal ingredients in Argentine-Chilean Patagonia. Napagoda et al. (2018) also found that Fabaceae is the most widely cited as a medicinal plant by the community in Gampaha District, Western Province, Sri Lanka.

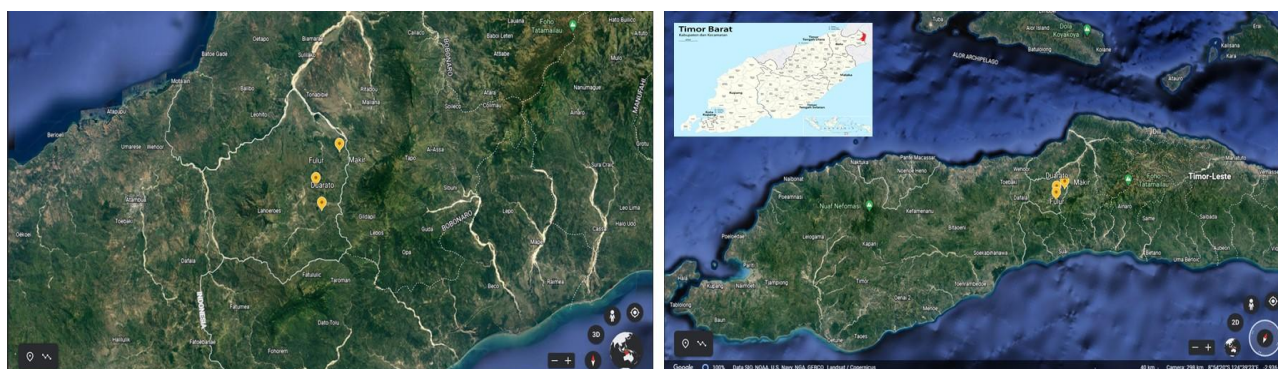


Figure 1. Map showing the study area in Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia

The presence of plants in each village also varies greatly among villages in Lamaknen Sub-district. Fulur, which has the most medicinal plants, is strongly influenced by environmental conditions, where this village has a mountainous topography and a large forest area. The informants said that the majority of plants used as medicine are wild plants taken from forests. This is because the condition of the forest around Lamaknen Sub-district is still relatively good and the community only uses it for traditional gardening and farming. This is also supported by Nagaïke (2012) which states that if the condition of the forest is still good, the species found are also very diverse.

The most widely used medicinal plant habitus was tree (41%) (Figure 2). This was followed by herb (36%), shrub (13%), liana (5%), grass (3%), and fern (2%). Tree was also the most widely used as a source of medicine by the Manobo tribe, Philippines (Dapar et al. 2020) and by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia (Nugroho et al. 2022).

The vegetative and generative organs of plants are used by the Bunaq Tribe as ingredients for traditional medicine. Root, bark, stem, leaf, fruit and tuber are used as medicine. The percentage of plant organs (Figure 3) shows that the most widely used plant organ in the utilization of medicinal plants was leaf (30%), followed by bark, root, rhizome, seed, fruit and tuber. All vegetative organs of several plants such as *Euphorbia heterophylla* L., *Euphorbia thymifolia* L., *Eleusine indica* (L.) Gaertn, and *Equisetum debile* Roxb. ex-Vaucher were used as medicines.

Leaf was also the most widely used plant part as medicine by people of Buwun Sejati Village, Narmada District, West Lombok District (Rahayu and Andini 2019), Batak Toba Tribe in Peadundung Village, North Sumatra, Indonesia (Silalahi et al. 2019), Tengger tribe in Ngadisari village, Indonesia (Jadid et al. 2020), Tengger tribe in Ranu Pani village, Indonesia (Bhagawan and Kusumawati, 2021), local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia (Nugroho et al. 2022) Ayta community, Philippines (Tantengco et al., 2018), indigenous communities in the Bandarban District of Bangladesh (Faruque et al. 2018) and rural communities of arid regions of Northern Punjab, Pakistan (Ashfaq et al. 2019).

Leaves are widely used because they are easy to obtain and to mix due to their high-water content. As a place for photosynthetic accumulation, leaves contain essential oils, phenols, potassium compounds, and chlorophyll, which can cure diseases (Nahdi and Kurniawan 2019). Alvionita et al. (2020) also revealed that the use of leaves does not damage other plant parts, because the leaves are easy to grow back and are almost always plentiful in wet tropical climate.

Preparation and use of traditional medicinal plants by the Bunaq Tribe

Preparation and consumption of plants as ingredients for traditional medicine by the Bunaq Tribal community in Lamaknen Sub-district, Belu District is very simple and varies based on the disease suffered by the patient. In this study, there were 34 prescription drugs, mostly a mixture

of several plants (Table 2). The traditional treatment of the Bunaq Tribe consists of several methods: the material was boiled and then drunk (BO-DR), boiled and then washed (BO-WA), chewed and then lubricated (CH-LU), chewed and paste (CH-PA), squeezed and drunk (SQ-DR), soaked with hot water and then drunk (SO-DR), and boiled and then eaten (BO-DA). Of the several methods, the most widely used is boiled and drunk (59%), and the lowest is squeezed and then drunk (3%) (Figure 4).

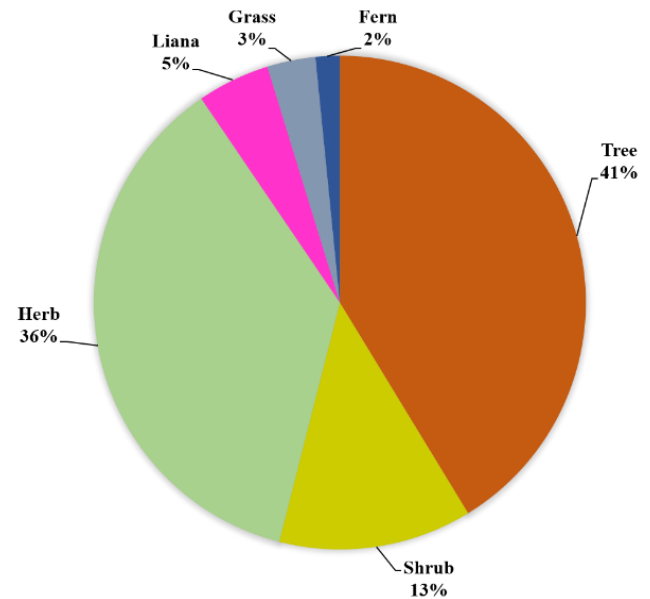


Figure 2. Percentage of medicinal plant habitus used by the Bunaq Tribe, Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia

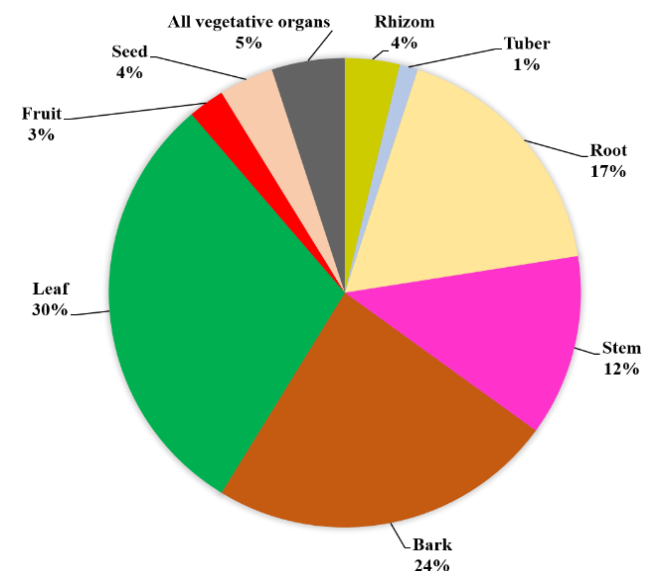


Figure 3. Percentage of plant parts/organs used as medicine by the Bunaq Tribe, Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia

Table 1. Medicinal plants record used by the Bunaq Tribe, Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia

| Family | Botanical name | Common name | Local name | Use | Part of Plant | Habitus | SUV | |
|--------------------------------------|---|---|-------------------|--|--|------------------|-------|------|
| Fabaceae | <i>Cassia fistula</i> L. | golden shower | Arus norbeka | Bone fracture | Bark | Tree | 0,14 | |
| | <i>Vachellia farnesiana</i> (L.) Wight & Arn | sweet acacia | Ailo'ok | HIV/AIDS | Root | Shrub | 0,14 | |
| | <i>Flemingia strobilifera</i> (L.) W.T. Aiton | Wildhops | Ii | Indigestion /stomach ache, fever, snake peck | Root, bark | Shrub | 0,29 | |
| | <i>Senna siamea</i> (Lam.) H.S. Irwin & Barneby | Siamese cassia | Tomol netel | HIV/AIDS | Root | Tree | 0,14 | |
| | <i>Albizia procera</i> (Roxb) Benth | tall albizia | Jul geti | HIV/AIDS, fever, snake bite | Bark | Tree | 0,29 | |
| | <i>Pterocarpus indicus</i> Willd. | Red sandalwood | Majo | Fluor albus/vaginal discharge | Bark | Tree | 0,14 | |
| | <i>Vigna radiata</i> (L.) R.Wilczek | mung bean | Ho gapa | Appendix | Seed | Herb | 0,14 | |
| | <i>Arachis hypogaea</i> L. | peanut | Ho'i | Breast cancer | Seed | Herb | 0,14 | |
| | Euphorbiaceae | <i>Euphorbia heterophylla</i> L. | Mexican fireplant | Uh suil | Appendix | Root, stem, leaf | Herb | 0,14 |
| | | <i>Euphorbia tirucalli</i> L. | Indiantree spurge | Lawar geruk | Stroke, headache, fever, food poisoning, spiritual magic | Stem | Tree | 0,14 |
| <i>Sauropus androgynus</i> (L.) Merr | | chekurmanis, sweet leaf, star-gooseberry, katuk | Katuk | Breast feeding production | Leaf | Shrub | 0,14 | |
| <i>Jatropha gossypifolia</i> L. | | bellyache bush | Alul geti | Fracture, swollen body | Bark | Shrub | 0,14 | |
| <i>Euphorbia hirta</i> L. | | pillpod sandmat | Mau meak | Indigestion, fracture, swollen body | Stem, root | Herb | 0,29 | |
| <i>Euphorbia thymifolia</i> L. | | gulf sandmat | Upe gol | Appendix | Root, stem, leaf | Herb | 0,14 | |
| Poaceae | | <i>Imperata cylindrica</i> (L.) Rausch. | satintail | Hut | Indigestion /stomach ache, stroke, headache, fever, food poisoning | Root, leaf | Grass | 0,29 |
| | <i>Bambusa</i> sp. | Bamboo | Mah olas | HIV/AIDS, stroke, headache, fever, food poisoning | Leaf | Tree | 0,29 | |
| | <i>Cymbopogon citratus</i> (DC.) Stapf | lemon grass | Anmami | Indigestion | Stem | Herb | 0,14 | |
| | <i>Cymbopogon nardus</i> (L.) Rendle | citronella grass | Anmami bule'en | Hepatitis | Stem | Herb | 0,14 | |
| | <i>Eleusine indica</i> (L.) Gaertn | crowsfoot grass/Indian goose grass | Uh rikit | Kidney disease | Root, stem, leaf | Herb | 0,14 | |
| Myrtaceae | <i>Psidium guajava</i> L. | Guava | Goiga riki | Diarrhea and vomiting | Leaf | Tree | 0,14 | |
| | <i>Syzygium aqueum</i> (Burm.f.) Alston | watery rose apple | Pilip pokoi | Stroke, headache, fever, food poisoning, spiritual magic | Bark | Tree | 0,14 | |
| | <i>Eucalyptus urophylla</i> S.T. Blake | Ampupu/Timor white gum | Tal geti | Stroke, headache, fever, food poisoning, spiritual magic | Bark | Tree | 0,14 | |
| | <i>Syzygium cumini</i> (L.) Skeels | Java plum | Sibal lebo | Stroke, headache, fever, food poisoning, | Bark | Tree | 0,14 | |

| | | | | | | | |
|---------------|--|---|-----------------|--|------------|-------|------|
| Malvaceae | <i>Sida rhombifolia</i> L. | Arrow leaf sida | Kibu | spiritual magic Inpartu, HIV/AIDS, stroke, headache, fever, food poisoning, Fracture, swollen body, kidney disease | Leaf | Herb | 0,43 |
| | <i>Sterculia foetida</i> L. | hazel sterculia | Bane | Orchitis/swollen testicles | Bark | Tree | 0,14 |
| | <i>Ceiba pentandra</i> (L.) Gaertn. | white silk- cotton tree/ kapok tree | Gela jhon | Malnutrition | Bark | Tree | 0,14 |
| Asteraceae | <i>Elephantopus scaber</i> L. | Elephant foot | Apa sakan | Waist pain | Root | Herb | 0,14 |
| | <i>Pluchea indica</i> (L.) Less. | Indian camphorweed/ Indian pluchea | Beluntas | Kidney disease | Leaf | Herb | 0,14 |
| | <i>Ageratum conyzoides</i> L. | tropical whiteweed | Uh sino | Wound | Leaf | Herb | 0,14 |
| | <i>Chromolaena odorata</i> (L.) R.M. King & H. Rob. | Jack in the bush/ Siamweed/ Kirinyuh | Siekelen | Gout | Leaf | Shrub | 0,14 |
| Zingiberaceae | <i>Curcuma longa</i> L. | Turmeric | Kirun | Indigestion, kidney disease, hypertension, hepatitis | Rhizome | Herb | 0,57 |
| | <i>Zingiber officinale</i> Linn. Var Rubrum | Red Ginger | Inma bule'en | Stroke, headache, fever, food poisoning, spiritual magic | Rhizome | Herb | 0,29 |
| | <i>Curcuma xanthorrhiza</i> Roxb. | Javanese turmeric/ temulawak | Kirun belis | Indigestion, hypertension | Rhizome | Herb | 0,29 |
| Apocynaceae | <i>Calotropis gigantea</i> (L.) Dryand. | giant milkweed | Hot gie oe | Stroke, headache, fever, food poisoning, spiritual magic, gout | Stem, leaf | Tree | 0,29 |
| | <i>Plumeria rubra</i> L. | frangipani, temple tree | Antoni | Appendix, indigestion | Bark | Tree | 0,14 |
| | <i>Alstonia scholaris</i> (L.) R. Br. | blackboard tree/ devil's tree | Joil | Appendix, indigestion | Bark | Tree | 0,14 |
| Lamiaceae | <i>Orthosiphon aristatus</i> (Blume) Miq | Cats' Whiskers, Java Tea | Kumis kucing | Hypertension | Leaf | Herb | 0,14 |
| | <i>Scutellaria galericulata</i> L. | hooded skullcap, marsh skullcap | Bulis gigo | Diarrhea and vomiting | Root | Herb | 0,14 |
| | <i>Plectranthus amboinicus</i> (Lour.) Spreng. | Mexican mint | Hol si | Asthma | Leaf | Herb | 0,14 |
| Rubiaceae | <i>Coffea</i> sp | Coffee | Kopi jhon | Stroke, headache, fever, food poisoning, spiritual magic | Stem | Tree | 0,14 |
| | <i>Timonius sericeus</i> (Desf.) K.Schum. | Timo | Miel riki | Breast cancer, HIV/AIDS, Stroke, headache, fever, food poisoning, spiritual magic | Leaf | Tree | 0,29 |
| Annonaceae | <i>Morinda citrifolia</i> L. | Indian mulberry | Mengkudu | Kidney disease | Bark | Tree | 0,14 |
| | <i>Annona muricata</i> L. | Soursop | Kulo | Diarrhea and vomiting, cholesterol, diabetes | Bark | Tree | 0,29 |
| | <i>Annona squamosa</i> L. | sweet sop/ sugar | Anonak | Stomach ache | Bark | Tree | 0,14 |

| apple | | | | | | | |
|----------------|--|---------------------------------|-----------------|--|-------------------------|-------|------|
| Apiaceae | <i>Apium graveolens</i> L. | wild celery | Sub | Hypertension | Leaf | Herb | 0,14 |
| | <i>Centella asiatica</i> (L.) Urb. | Spadeleaf | Pegagan | Hypertension | Leaf | Herb | 0,14 |
| Piperaceae | <i>Piper retrofractum</i> Vahl | Java chili | Patal muk | Hepatitis | Leaf | Liana | 0,14 |
| | <i>Piper betle</i> L. | betel pepper | Molo | Kidney disease | Leaf | Liana | 0,43 |
| Moraceae | <i>Ficus septica</i> Burm. F.. | Awar-awar | Kaboke | Inpartu, HIV/AIDS, stroke, headache, fever, food poisoning | Leaf | Tree | 0,43 |
| | <i>Ficus benjamina</i> L. | weeping fig | Pur geti | Fracture, swollen body | Bark | Tree | 0,14 |
| Acanthaceae | <i>Justicia gendarussa</i> Burm.f. | Gandarusa | Moruk belis | HIV/AIDS | Root | Shrub | 0,14 |
| | <i>Thunbergia grandiflora</i> (Rox b. ex Rottl.) Roxb. | Bengal trumpet | Bubuk belis | Fracture | Root | Liana | 0,14 |
| Simaroubaceae | <i>Brucea javanica</i> (L.) Merr. | Makasar fruit | Hotel mal | Malaria | Fruit | Shrub | 0,14 |
| Urticaceae | <i>Girardinia palmata</i> (Forssk.) Gaudich. | girardinia/ bedor | Mebu bule'en | Stroke, headache, fever, food poisoning, spiritual magic | Bark | Herb | 0,14 |
| Equisetaceae | <i>Equisetum debile</i> Roxb. ex Vaucher | Horsetail | Hura | Gout | Root, stem, leaf | Fern | 0,14 |
| Phyllanthaceae | <i>Phyllanthus niruri</i> L. | gale of the wind | Gololok | Hypertension | Leaf | Herb | 0,14 |
| Meliaceae | <i>Melia azedarach</i> L. | Chinaberry tree, chinaberry, | Kelu | HIV/AIDS | Bark | Tree | 0,14 |
| Cyperaceae | <i>Cyperus rotundus</i> L. | Nutgrass | Kebot apa | Waist pain | Root | Grass | 0,14 |
| Moringaceae | <i>Moringa oleifera</i> Lam. | Horseradish tree | Marungga | Gout | Leaf | Tree | 0,14 |
| Lythraceae | <i>Punica granatum</i> L. | Pomegranate | Rumau | Diarrhea and vomiting, breast cancer | Bark, young fruit | Shrub | 0,29 |
| Caricaceae | <i>Carica papaya</i> L. | Papaya | Dila | Postpartum | Leaf | Tree | 0,14 |
| Arecaceae | <i>Areca catechu</i> L. | betel palm | Pu | Stomach ache | Seed | Tree | 0,43 |
| Amaryllidaceae | <i>Allium sativum</i> L. | Garlic | In nuek | Appendix | Tuber | Herb | 0,29 |

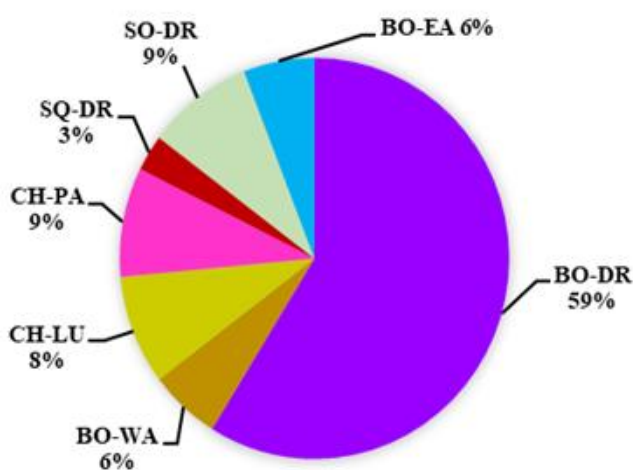


Figure 4. Percentage of processing and use of medicinal plants by the Bunaq Tribe, Lamaknen Sub-district, Belu District, East Nusa Tenggara, Indonesia

The way of processing and using traditional medicine by the Bunaq Tribe is based on the diseases. The boiling is the most used method by the Bunaq people because most of the diseases in the community to be cured are internal diseases. According to key informants, consuming boiled water will speed up the healing process. This is also expressed by Efremila et al. (2015) that people use drugs more by drinking because most species of plants are found and used to treat internal diseases. The process of concocting drugs is closely related to the disease suffered by the patient because it has different effects as well. The way people use medicinal plants is very diverse, including rubbing, eating, drinking, smearing, sprinkling, pasting and dripping for external diseases, while the general treatment method for internal diseases is boiling and brewing. During the boiling process the substances contained in plants will come out and dissolve into the water. This is considered very easy and effective by the community because it is directly processed in the body's metabolism after drinking the boiled water (Husain 2015). If the processing of plants is carried out through the boiling process, the compounds contained in the plant organs will come out and be mixed with water or dissolve in water. The longer the boiling process is carried out, the more compounds present in the plant organs will experience evaporation so that the quality of the ingredients from the plant organs will be more efficacious (Nomleni et al. 2019).

Table 2. The recipes and how to use traditional medicinal plants

| Diseases | Species | Organ | Preparation |
|--|---|---------------------|--|
| Vomiting | <i>Psidium guajava</i> L. | Leaf (bud) | All ingredients are boiled and drunk 3 times a day |
| | <i>Punica granatum</i> L. | Bark | |
| | <i>Annona muricata</i> L. | Bark | |
| | <i>Scutellaria galericulata</i> L. | Root | |
| Inpartu | <i>Ficus septica</i> Burm. F. | Leaf (bud) | All ingredients are chewed and affixed to the stomach of pregnant women. |
| | <i>Sida rhombifolia</i> L. | Leaf (bud) | |
| Breast cancer | <i>Timonius sericeus</i> (Desf.) K.Schum. | Leaf (bud) | The leaves were chewed and pasted to the breast affected by cancer. |
| Vomiting | <i>Flemingia strobilifera</i> (L.) W.T. Aiton | Root | Wild hops and satintail roots are boiled together with 7 areca nuts and the water is drunk 3 times a day. |
| | <i>Areca catechu</i> L. | Seed | |
| | <i>Imperata cylindrica</i> (L.) Raeusch. | Root | |
| HIV/AIDS | <i>Vachellia farnesiana</i> (L.) Wight & Arn | Root | All ingredients are boiled and drunk. |
| | <i>Justicia gendarussa</i> Burm.f. | Root | |
| | <i>Senna siamea</i> (Lam.) H.S. Irwin & Barneby | Root | |
| | <i>Albizia procera</i> (Roxb) Benth | Bark | |
| | <i>Melia azedarach</i> L. | Bark | |
| | <i>Ficus septica</i> Burm. F. | Leaf (bud) | |
| | <i>Bambusa</i> sp. | Leaf (bud) | |
| Orchitis/swollen testicles | <i>Timonius sericeus</i> (Desf.) K.Schum. | Leaf (bud) | Bark of sterculia is chewed and paste to the swollen part of body. |
| | <i>Sterculia foetida</i> L. | Bark | |
| Stroke, headache, fever, poisoning and exorcised by evil spirits | <i>Zingiber officinale</i> Linn. Var Rubrum | Rhizom | All ingredients are cut into small pieces and soaked with hot water. The soaking water is drunk twice a day. |
| | <i>Timonius sericeus</i> (Desf.) K.Schum. | Leaf (bud) | |
| | <i>Girardinia palmata</i> (Forssk.) Gaudich. | Bark | |
| | <i>Calotropis gigantea</i> (L.) Dryand. | Stem | |
| | <i>Syzygium cumini</i> (L.) Skeels | Bark | |
| | <i>Coffea</i> sp. | Stem | |
| | <i>Eucalyptus urophylla</i> S.T. Blake | Bark | |
| | <i>Syzygium aqueum</i> (Burm.f.) Alston | Bark | |
| Malnutrition | <i>Euphorbia tirucalli</i> L. | Stem | Bark of kapok tree was boiled and then used for washing/bathing. |
| | <i>Ceiba pentandra</i> (L.) Gaertn. | Bark | |
| | | | |
| Appendix, indigestion | <i>Plumeria rubra</i> L. | Bark | Both ingredients are boiled and drunk. |
| | <i>Aistonia scholaris</i> L. | Bark | |
| Appendix | <i>Euphorbia heterophylla</i> L. | Root, stem and leaf | Root, stem and leaves of Mexican fireplant are boiled with mung beans and 7 cloves garlic and boiled water is drunk. |
| | <i>Allium sativum</i> L. | Rhizom | |
| | <i>Vigna radiata</i> (L.) R. Wilczek | Seeds | |
| | <i>Cassia fistula</i> L. | Bark | |
| | <i>Thunbergia grandiflora</i> (Roxb. ex Rottl.) Roxb. | Root | |
| Bone fracture | <i>Piper betle</i> L. | Fruit | Golden shower bark and Bengal trumpet root are sliced and then chewed with betel and areca nut then lubricated on broken bones. |
| | <i>Areca catechu</i> L. | Seed | |
| | | | |
| Vaginal discharge | <i>Pterocarpus indicus</i> Willd. | Bark | Bark of red sandalwood was boiled and boiled water is drunk. |
| Gout | <i>Equisetum debile</i> Roxb. ex Vaucher | Root, stem and leaf | All ingredients were boiled and then boiled water is used for washing/bathing. |
| | <i>Calotropis gigantea</i> (L.) Dryand. | Leaf | |
| Waist pain | <i>Cyperus rotundus</i> L. | Root | Both ingredients are cut into small pieces and chewed, then lubricated on the sore waist. |
| | <i>Elephantopus scaber</i> L. | Root | |
| | <i>Imperata cylindrica</i> (L.) Raeusch. | Leaf (bud) | |
| Stroke, fever, foot poison, and headache | <i>Ficus septica</i> Burm. F.. | Leaf (bud) | All ingredients are boiled and eaten. |
| | <i>Bambusa</i> sp. | Leaf (bud) | |
| | <i>Euphorbia hirta</i> L. | Stem | |
| Vomiting | <i>Curcuma longa</i> L. | Rhizome | Rhizome of turmeric and temulawak, and lemongras stem are sliced and boiled. After boiling, pillpod sandmat stem is inserted. Boiled water is drunk 3 times a day. |
| | <i>Curcuma zanthorrhiza</i> Roxb | Rhizome | |
| | <i>Cymbopogon citratus</i> (DC.) Stapf | Stem | |
| | <i>Pluchea indica</i> (L.) Less. | Leaf | |
| | <i>Piper betle</i> L. | Leaf | |
| Kidney disease | <i>Curcuma longa</i> L. | Rhizome | Rhizome of turmeric are sliced and boiled and leaves of betel and pluchea are added. Boiled water is drunk in twice a day |
| | | | |
| | | | |
| Puerperium / post-partum recovery | <i>Carica papaya</i> L. | Leaf | Papaya leaves are cut and boiled with palm sugar and salt. Boiled water is drunk for two days after giving birth. |

| | | | |
|---------------------------------|--|--|--|
| Breast milk production | <i>Sauropus androgynus</i> (L.) Merr | Leaf | Katuk leaves are boiled then eaten |
| Headache | <i>Zingiber officinale</i> Linn. Var Rubrum | Rhizome | Rhizome of red ginger are burned and pounded then soaked with hot water. Soaked water is drunk |
| Hypertension | <i>Apium graveolens</i> L. <i>Centella asiatica</i> (L.) Urb. <i>Orthosiphon aristatus</i> (Blume) Miq <i>Phyllanthus niruri</i> L. <i>Curcuma xanthorrhiza</i> Roxb. <i>Curcuma longa</i> L. | Leaf Leaf Leaf Leaf Rhizome Rhizome | After boiling the sliced of ginger and turmeric, add the leaves of celery, spadeleaf, cat's whiskers, and gale of wind. Boiled water is drunk 2 two times a day. |
| Cholesterol and diabetes | <i>Annona muricata</i> L. | Leaf | Soursop leaves are boiled then the boiled water is drunk. |
| Hepatitis | <i>Piper retrofractum</i> Vahl <i>Cymbopogon nardus</i> (L.) Rendle <i>Curcuma longa</i> L. | Leaf Stem Rhizome | All ingredients are boiled and the boiled water is drunk. |
| Stomach ache | <i>Annona squamosa</i> L. | Bark | Bark of sugar apple is boiled and the boiled water is drunk. |
| Malaria | <i>Brucea javanica</i> (L.) Merr. | Fruit | Makasar fruit is soak with hot water and the hot water is drunk |
| Appendix | <i>Euphorbia thymifolia</i> L. | Root, stem and leaf | All ingredients are boiled with 7 cloves of garlic until the water remains 1 cup, then the water is drunk |
| Wound | <i>Ageratum conyzoides</i> L. | Leaf | Whiteweed leaves are chewed and pasted to the wound of body |
| Asthma | <i>Plectranthus amboinicus</i> (Lour.) Spreng. | Leaf | The Mexican mint leaves are squeezed and drunk |
| Bone fracture and swelling body | <i>Ficus benjamina</i> L. <i>Euphorbia hirta</i> L. <i>Sida rhombifolia</i> L. <i>Jatropha gossypifolia</i> L. <i>Piper betle</i> L. <i>Areca catechu</i> L. | Bark Root Root Bark Leaf Fruit | All ingredients are chewed and lubricated on broken bones or swollen body |
| Fever and green snake bite | <i>Albizia procera</i> (Roxb) Benth <i>Flemingia strobilifera</i> (L.) W.T. Aiton | Bark Bark | All ingredients are boiled and drink the boiled water |
| Urolithiasis | <i>Sida rhombifolia</i> L. | Root, stem and leaf | All ingredients are boiled and drink the boiled water |
| Gout | <i>Morinda citrifolia</i> L. <i>Chromolaena odorata</i> (L.) R.M. King & H. Rob. | Bark Leaf | All ingredients are boiled and drink the boiled water |
| Breast cancer | <i>Moringa oleifera</i> Lam. <i>Punica granatum</i> L. <i>Arachis hypogaea</i> L. | Leaf Fruit Seed | Seven unit of fruit (juvenile) of pomegranate are boiled with red peanuts (single) then the water is drunk. |
| Kidney disease | <i>Eleusine indica</i> (L.) Gaertn | Root, stem and leaf | All vegetative organs of the crowsfoot grass are boiled and then the boiled water is drunk |

Species use value (SUV)

The SUV ranged between 0.14 and 0.57, with an average of 0.20 (Table 1). *Curcuma longa* L. has the highest score (0.57), having 4 use reports, followed by *Sida rhombifolia* L., *Piper betle* L., *Ficus septica* Burm. F., and *Areca catechu* L., each of which has a value of 0.43 and has 3 use reports while other plants below it. High or low SUV may be due to extensive or minimum ethnobotanical uses of the reported species, respectively. The highest SUV represents the most exploited medicinal plants used to treat a specific ailment (Jadid et al. 2020). Previous research also revealed that turmeric has a fairly high UV value as a medicinal plant (Silalahi et al. 2019; Fathir et al. 2021). This study revealed that turmeric is a prescription ingredient in treating vomiting, kidney disease, hypertension, and hepatitis. Khotimah et al. (2018) revealed that turmeric is the most widely used plant species as traditional medicine by the Banyuwangi tribe. Another study also revealed that turmeric could treat diarrhea,

abdominal pain, cough, itch, and injury (Silalahi et al. 2019).

Ani et al. (2021) stated that turmeric has a pharmacological effect and can strengthen the efficacy of other drugs that are mixed. This plant contains compounds that have medicinal properties, called curcuminoids. Nasri et al. (2014) revealed that this plant has useful properties with antioxidant activities and is useful to treat inflammation, ulcer and cancer. It also has antifungal, antimicrobial renal and hepatoprotective activities. It's anti-inflammatory, anti-cancer and antioxidant roles may be clinically exploited to control rheumatism, carcinogenesis and oxidative stress-related pathogenesis. Therapeutic uses include: AIDS/HIV, anemia, cancer, diabetes, digestion, food poisoning, gall stones etc. (Rathaur et al. 2012).

In this study, *S. rhombifolia* was used as a prescription drug for childbirth, bone fracture and swelling of the body, and urolithiasis. Singh et al. (2018) revealed that this plant is also used to help childbirths in Assam, India. However,

the hot aqueous extract of entire plant of *S. rhombifolia* is used as an abortifacient when it is taken orally by pregnant women. This plant has bioactivity as anti-inflammatory, anti-inflammatory, kidney disorders, hepatoprotective, anti-diabetic mellitus, and also analgesic (Silalahi 2020). This plant is used to treat fractures, wounds and fever (Silalahi et al. 2015) and kidney dysfunction (Thounaojam et al. 2010). In addition, in India this plant as one of the ayurvedic medicines are used to cure pain and swelling caused by rheumatism, muscular weakness, urinary tract wounds and also to treat tuberculosis, heart diseases and neurological disorders (Abat et al. 2017).

The *F. septica* was used as a mixture of prescription drugs for childbirth, stroke, fever, food poisoning, headache, and HIV-AIDS in this study. In the interview with the village healer who gave this prescription, for HIV-AIDS said that this is his personal experience of being diagnosed with HIV-AIDS and declared cured. This plant is known to have potential as folk medicine to treat colds, fever, fungal and bacterial diseases (Damu et al. 2005), and also as an anti-cancer, especially breast cancer (Nugroho et al. 2015). In addition, the Mamanwa tribe of Surigao del Norte and Agusan del Norte, Mindanao, Philippines uses this plant as a remedy for headaches, stomach aches, and cures skin diseases such as warts (Nuneza et al. 2021) and can treat scabies (Susilo et al. 2017) and burns (Rahman et al. 2013).

Betel (*P. betle*) and areca nut (*A. catechu*) are iconic plants of the tradition/culture of the people of Timor Island in their daily life. In this study, betel nut was used as a prescription mixture for bone fracture, kidney disease and swollen body, while betel nut was used for vomiting, bone fracture and swelling body. Betel is known to have several pharmacologic effects such as antibacterial, antimicrobial, analgesic, anti-inflammatory, antioxidant, antiproliferative, antidiabetic, antiangiogenic (Sakinah et al. 2020; Nayaka et al. 2021; Nurhidayati et al. 2021). Areca nut is also known to have the potential to treat various diseases/disorders such as diabetes, gastrointestinal disorders, ulcer preventive, Heart diseases, CNS disorder (depression, seizures), and also exhibit various pharmacological activities including anti-inflammatory, anti-protzoal, antioxidant, anti-allergic, wound healing activity etc. and the extract of areca palm and its nuts are also useful for preparation of many natural medicinal and cosmetic products (Tiwari and Talreja 2020; Ansari et al. 2021).

This study concluded that Bunaq Tribe used 63 medicinal plant species to treat many kinds of diseases using several methods of preparation. The results of this study can be used as the basis for the conservation and sustainable use of medicinal plants among Bunaq community.

REFERENCES

Abat JK, Kumar S, Mohanty A. 2017. Ethnomedicinal, phytochemical and ethnopharmacological aspects of four medicinal plants of Malvaceae used in Indian traditional medicines: A review. *Medicines* 4 (4): 75. DOI: 10.3390/medicines4040075.

- Albuquerque UP, Lucena RFP, Monteiro JM, Florentino ATN, Almeida CDFCBR. 2006. Evaluating two quantitative ethnobotanical techniques. *Ethnobot Res Appl* 4 (1): 51-60. DOI: 10.17348/era.4.0.51-60.
- Alvionita A, Lambui O, Pitopang R. 2020. Studi etnobotani tumbuhan obat masyarakat Suku Topo Uma di Desa Berdikari Kabupaten Sigi Sulawesi Tengah. *Biocelebes* 14 (2): 105-118. DOI: 10.22487/bioceb.v14i2.15261. [Indonesian]
- Ani N, Sukenti K, Aryanti E, Rohyani IS. 2021. Ethnobotany study of medicinal plants by the Mbojo Tribe community in Ndano Village at the Madapangga Nature Park, Bima, West Nusa Tenggara. *J Biologi Tropis* 21 (2): 456-469. DOI: 10.29303/jbt.v21i2.2666.
- Ansari A, Mahmood T, Bagga P, Ahsan F, Shamim A, Ahmad S, Shariq M, Parveen S. 2021. *Areca catechu*: A phytopharmacological legwork. *Food Front* 2 (2): 163-183. DOI: 10.1002/fft2.70.
- Ashfaq S, Ahmad M, Zafar M, Sultana S, Bahadur S, Abbas N. 2019. Medicinal plant biodiversity used among the rural communities of arid regions of Northern Punjab, Pakistan. *Indian J Tradit Knowl* 18 (2): 226-241.
- Atok AR, Hikmat A, Zuhud EAM. 2010. Etnobotani Masyarakat Suku Bunaq (Studi kasus di Desa Dirun, Kecamatan Lamaknen Kabupaten Belu, Provinsi Nusa Tenggara Timur). *Media Konservasi* 15 (1): 36-42. [Indonesian]
- Backer CA, Bakhuisen van den Brink RC. 1968. *Flora of Java (Spermatophytes. Only)*. Vol. III Wolters-Noordhoff, N.V. Groningen, The Netherlands.
- Belu District Profile. 2020. Profil Daerah Kabupaten Belu Tahun 2020. In Badan Perencanaan Pembangunan, Penelitian dan Pengembangan Daerah Kab. Belu. http://bp4d.belukab.go.id/wp-content/uploads/2021/11/PROFIL-DAERAH-KABUPATEN-BELU-TAHUN-2020_compressed.pdf. [Indonesian]
- Belu District. 2021. Rencana Pembangunan Jangka Menengah Daerah (RPJMD) Kabupaten Belu Tahun 2021-2026. Pemerintah Kabupaten Belu, Belu. [Indonesian]
- Bhagawan WS, Kusumawati D. 2021. Ethnobotanical medicinal plant study of Tengger Tribe in Ranu Pani Village, Indonesia. *Proceedings of the 3rd International Conference on Education & Social Science Research (ICESRE)*. DOI: 10.2139/ssrn.3865725.
- Bussmann RW, Glenn A, Meyer K, Kuhlman A, Townesmith A. 2010. Herbal mixtures in traditional medicine in Northern Peru. *J Ethnobiol Ethnomed* 6 (10): 1-11. DOI: 10.1186/1746-4269-6-10.
- Damu AG, Kuo PC, Shi LS, Li CY, Kuoh CS, Wu PL, Wu TS. 2005. Phenanthroindolizidine alkaloids from the stems of *Ficus septica*. *J Nat Prod* 68 (7): 1071-1075. DOI: 10.1021/np050095o.
- Dapar MLG, Meve U, Liede-Schumann S, Alejandro GJD. 2020. Ethnomedicinal appraisal and conservation status of medicinal plants among the Manobo Tribe of Bayung City, Philippines. *Biodiversitas* 21 (8): 3843-3855. DOI: 10.13057/biodiv/d210854.
- Efremila, Wardenaa E, Lolyta S. 2015. Studi etnobotani tumbuhan obat oleh Etnis Suku Dayak di Desa Kayu Tanam Kecamatan Mandor Kabupaten Landak. *J Hutan Lestari* 3 (2): 234-246. DOI: 10.26418/jhl.v3i2.10310.
- Elfahmi, Woerdenbag HJ, Kayser O. 2014. Jamu: Indonesian traditional herbal medicine towards rational phytopharmacological use. *J Herbal Med* 4 (2): 51-73. DOI: 10.1016/j.jhermed.2014.01.002.
- Faruque MO, Uddin SB, Barlow JW, Hu S, Dong S, Cai Q, Li X, Hu X. 2018. Quantitative ethnobotany of medicinal plants used by indigenous communities in the Bandarban District of Bangladesh. *Front Pharmacol* 9: 40. DOI: 10.3389/fphar.2018.00040.
- Fathir A, Haikal M, Wahyudi D. 2021. Ethnobotanical study of medicinal plants used for maintaining stamina in Madura Ethnic, East Java, Indonesia. *Biodiversitas* 22 (1): 386-392. DOI: 10.13057/biodiv/d220147.
- Husain NA. 2015. Studi Etnobotani dan Identifikasi Tumbuhan Berkhasiat Obat Berbasis Pengetahuan Lokal di Kabupaten Enrekang. [Skripsi]. Universitas Muhammadiyah Makassar, Makassar. [Indonesian]
- Hussain W, Badshah L, Ullah M, Ali M, Ali A, Hussain F. 2018. Quantitative study of medicinal plants used by the communities residing in Koh-e-Safaid Range, northern Pakistani-Afghan borders. *J Ethnobiol Ethnomed* 14 (1): 30. DOI: 10.1186/s13002-018-0229-4.
- Jadid N, Kurniawan E, Himayani CES, Andriyani, Prasetyowati I, Purwani KI, Muslihatin W, Hidayati D, Tjahjaningrum ITD. 2020. An ethnobotanical study of medicinal plants used by the Tengger Tribe in Ngadisari Village, Indonesia. *PLoS ONE* 15 (7): 1-16. DOI: 10.1371/journal.pone.0235886.

- Jima TT, Megersa M. 2018. Ethnobotanical study of medicinal plants used to treat human diseases in Berbere District, Bale Zone of Oromia Regional State, South East Ethiopia. *Evid Based Complement Altern Med* 2018 (2): 16. DOI: 10.1155/2018/8602945.
- Khotimah K, Nurcahayati N, Ridho R. 2018. Studi etnobotani tanaman berkhasiat obat berbasis pengetahuan lokal Masyarakat Suku Osing di Kecamatan Licin Banyuwangi. *Biosense* 1 (1): 36-50. [Indonesian]
- Ledo S, Seran W. 2019. Keanekaragaman tumbuhan obat Taman Wisata Alam Baumata Kabupaten Kupang serta pemanfaatannya oleh masyarakat lokal. *Agrikan: J Agribisnis Perikanan* 12 (2): 299-310. DOI: 10.29239/j.agrikan.12.2.299-310. [Indonesian]
- Molares S, Ladio A. 2012. The usefulness of edible and medicinal Fabaceae in Argentine and Chilean Patagonia: Environmental availability and other sources of supply. *Evid Based Complement Altern Med* 2012 (5): 901918. DOI: 10.1155/2012/901918.
- Nagaike T. 2012. Review of plant species diversity in managed forests in Japan. *ISRN For* 2012: 1-7. DOI: 10.5402/2012/629523.
- Nahdi MS, Kurniawan AP. 2019. Study on the ethnobotany of medicinal plants by people in Gunung Kidul, Yogyakarta, Indonesia. *Nusantara Biosci* 11 (2): 133-141. DOI: 10.13057/nusbiosci/n110204.
- Napagoda MT, Sundarapperuma T, Fonseka D, Amarasiri S, Gunaratna P. 2018. An ethnobotanical study of the medicinal plants used as anti-inflammatory remedies in Gampaha District, Western Province, Sri Lanka. *Scientifica* 2018: 9395052. DOI: 10.1155/2018/9395052.
- Nasri H, Sahinfard N, Rafieian M, Rafieian S, Shirzad M, Rafieian-kopaei M. 2014. Turmeric: A spice with multifunctional medicinal properties. *J Herb Med Pharmacol* 3 (1): 5-8.
- Nayaka NMDMW, Sasadara MMV, Sanjaya DA, Yuda PESK, Dewi NLKAA, Cahyaningsih E, Hartati R. 2021. *Piper betle* (L): Recent review of antibacterial and antifungal properties, safety profiles, and commercial applications. *Molecules* 26 (2321): 1-21. DOI: 10.3390/molecules26082321.
- Nomlani FT, Daud Y, Tae F. 2021. Etnobotani tumbuhan obat tradisional di Desa Huilelot dan Desa Uiasa Kecamatan Semau Kabupaten Kupang. *BIO-EDU: J Pendidikan Biologi* 6 (1): 60-73. DOI: 10.32938/jbe.v6i1.993. [Indonesian]
- Nugroho AE, Akbar FF, Wiyani A, Sudarsono. 2015. Cytotoxic effect and constituent Profile of alkaloid fractions from ethanolic extract of *Ficus septica* Burm. f. leaves on T47D breast cancer cells. *Asian Pac J Cancer Prev* 16 (16): 7337-7342. DOI: 10.7314/APJCP.2015.16.16.7337.
- Nugroho Y, Soendjoto MA, Suyanto, Matatula J, Alam S, Wirabuana PYAP. 2022. Traditional medicinal plants and their utilization by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia. *Biodiversitas* 23 (1): 306-314. DOI: 10.13057/biodiv/d230137.
- Nuneza O, Rodriguez B, Nasiad JG. 2021. Ethnobotanical survey of medicinal plants used by the Mamanwa tribe of Surigao del Norte and Agusan del Norte, Mindanao, Philippines. *Biodiversitas* 22 (6): 3284-3296. DOI: 10.13057/biodiv/d220634.
- Nurhidayati LG, Nugroho AE, Retnoaji B, Sudarsono, Fakhrudin N. 2021. Antiangiogenesis activity of awar-awar leaf extract (*Ficus septica* Burm. F.) in chorioallantoic membrane assay. *Indones J Pharm* 32 (1): 1-9. DOI: 10.22146/ijp.607.
- Rahayu SM, Andini AS. 2019. Ethnobotanical study on medicinal plants in Sesaot Forest, Narmada, West Lombok, Indonesia. *Biosaintifika: J Biol Biol Educ* 11 (2): 234-242. DOI: 10.15294/biosaintifika.v11i2.19314.
- Rahman S, Kosman R, Mukrima I. 2013. Efek ekstrak etanol daun awar-awar (*Ficus septica* Burm. F.) terhadap kemampuan epitelisasi pada tikus (*Rattus norvegicus*). *Bionature* 14 (2): 112-116. [Indonesian]
- Rathaur P, Raja W, Ramteke PW, John SA. 2012. Turmeric — The golden spice of life. *Intl J Pharm Sci Res* 3 (7): 1987-1994. DOI: 10.1201/9781420006322-7.
- Sakinah D, Rusdi, Misfadhila S. 2020. Review of traditional use, phytochemical and pharmacological activity of *Piper betle* L. *Galore Intl J Health Sci Res* 5 (3): 59-66.
- Silalahi M, Nisyawati, Pandiangan D. 2019. Medicinal plants used by the Batak Toba Tribe in Peadundung Village, North Sumatra, Indonesia. *Biodiversitas* 20: 510-525. DOI: 10.13057/biodiv/d200230.
- Silalahi M, Nisyawati. 2018. The ethnobotanical study of edible and medicinal plants in the home garden of Batak Karo Sub-ethnic in North Sumatra, Indonesia. *Biodiversitas* 19 (1): 229-238. DOI: 10.13057/biodiv/d190131.
- Silalahi M, Supriatna J, Walujo EB, Nisyawati. 2015. Local knowledge of medicinal plants in Sub-ethnic Batak Simalungun of North Sumatra, Indonesia. *Biodiversitas* 16 (1): 44-54. DOI: 10.13057/biodiv/d160106.
- Silalahi M. 2020. Pemanfaatan dan bioaktivitas sidaguri (*Sida Rhombifolia*). *Florea: J Biologi dan Pembelajarannya* 7 (1): 22-30. DOI: 10.25273/florea.v7i1.5780. [Indonesian]
- Singh A, Dhariwal S, Navneet. 2018. Traditional uses, antimicrobial potential, pharmacological properties and phytochemistry of *Sida rhombifolia* Linn.: A review. *Intl J Innov Pharm Sci Res* 6 (2): 54-68. DOI: 10.21276/IJIPSR.2018.06.02.263.
- Susilo T, Kusuma YR, Pramu. 2017. Efek pemberian ekstrak awar awar (*Ficus Septica*) terhadap gejala klinis scabies pada kelinci. *J Pengembangan Penyuluhan Pertanian* 14 (25): 125-129. DOI: 10.36626/jppp.v14i25.57. [Indonesian]
- Thounaojam MC, Jadeja RN, Devkar RV, Ramachandran AV. 2010. *Sida rhomboidea* Roxb leaf extract ameliorates gentamicin induced nephrotoxicity and renal dysfunction in rats. *J Ethnopharmacol* 132 (1): 365-367. DOI: 10.1016/j.jep.2010.08.037.
- Tiwari S, Talreja S. 2020. A pharmacological and medicinal study of Areca palm and nuts: An overview. *Res J Pharm Biol Chem Sci* 11 (5): 100-108.
- Yeung AWK, Heinrich M, Kijjoo A, Tzvetkov NT, Atanasov AG. 2020. The ethnopharmacological literature: An analysis of the scientific landscape. *J Ethnopharmacol* 250: 112414. DOI: 10.1016/j.jep.2019.112414.
- Yuliani NN, Hilaria M, Elisma E, Sambara J. 2019. Kajian etnofarmakologi Suku Marae terhadap pengobatan tradisional di Desa Kewar Kecamatan Lamaknen Kabupaten Belu. *J Kesehatan, The 1st Alauddin Pharmaceutical Conference and Expo (ALPHA-C) 2019*: 1-8. DOI: 10.24252/kesehatan.v0i0.11457. [Indonesian]
- Zenderland J, Hart R, Bussmann RW, Zambrana NYP, Sikharulidze S, Kikvidze Z, Kikodze D, Tchelidze D, Khutsishvili M, Batsatsashvili K. 2019. The use of "Use Value": Quantifying importance in ethnobotany. *Econ Bot* 73 (3): 293-303. DOI: 10.1007/s12231-019-09480-1.