Jurnal Serambi Engineering JSE
Volume IX, No.2, April 2024 Hal 8417 - 8424
p-ISSN : 2528-3561
e-ISSN : 2541-1934

Ethnobotany of The Medicinal Plants Used by Panton Luas Community, Samadua Subdistrict, Aceh Selatan

Riza Ulhaq[1], Nir Fathiya[2*]

[1]Industrial Engineering Department, Universitas Teuku Umar, Meulaboh Indonesia
[2]Biology Education Department, Universitas Syiah Kuala, Banda Aceh Indonesia
***Corresponding author**: nirfathiya@usk.ac.id

Received: February 20, 2024 Approved: February 29, 2024

Abstract
Panton Luas community in Aceh Selatan Regency maintains local wisdom on the traditional use of medicinal plants. The study aimed to obtain information about the types of medicinal plants and to know how the plants processed by the Panton Luas community are. The method used Participatory Rural Appraisal (PRA). The results showed that the plants used as medicine consisted of 41 plant species under 32 families. The parts of the plant used consisted of leaves (65%), fruit (18%), stems (5%), flowers (5%), seeds (5%), sap (2%), and rhizomes (2%). Habitus used by local people was trees (34%), herbs (29%), shrubs (29%), and bushes (8%). Medicinal plants used by local people consisted of cultivated plants (73%) and wild plants (27%). The processing was done by grinding (39%), boiling (22%), squeezing (17%), eating directly (12%), dripping (5%), rubbing (3%), and chewing (2%). The use of traditional medicinal plants by the Panton Luas people was to treat various diseases. The ethnobotanical study in the Panton Luas community was the first step to document the traditional knowledge of the village community regarding medicinal plants so that it would be transferred to the next generation.
Keywords: *ethnobotany, medicinal plants, panton luas, samadua subdistrict*

Abstrak
Masyarakat Panton Luas di Kabupaten Aceh Selatan tetap menjaga kearifan lokal dalam pemanfaatan tanaman obat secara tradisional. Penelitian ini bertujuan untuk memperoleh informasi mengenai jenis-jenis tumbuhan obat dan mengetahui cara pengolahan tumbuhan yang dilakukan oleh masyarakat Panton Luas. Metode yang digunakan adalah *Participatory Rural Appraisal* (PRA). Hasil penelitian menunjukkan bahwa tumbuhan yang digunakan sebagai obat terdiri dari 41 jenis tumbuhan dalam 32 famili. Bagian tanaman yang dimanfaatkan terdiri dari daun (65%), buah (18%), batang (5%), bunga (5%), biji (5%), getah (2%), dan rimpang (2%). Habitus yang dimanfaatkan masyarakat adalah pohon (34%), tumbuh-tumbuhan (29%), semak (29%), dan semak (8%). Tumbuhan obat yang dimanfaatkan masyarakat terdiri dari tanaman budidaya (73%) dan tanaman liar (27%). Pengolahannya dilakukan dengan cara digiling (39%), direbus (22%), diperas (17%), dimakan langsung (12%), diteteskan (5%), digosok (3%), dan dikunyah (2%). Pemanfaatan tumbuhan obat tradisional oleh masyarakat Panton Luas adalah untuk mengobati berbagai macam penyakit. Kajian etnobotani pada masyarakat Panton Luas merupakan langkah awal untuk mendokumentasikan pengetahuan tradisional masyarakat desa mengenai tanaman obat agar dapat diwariskan kepada generasi berikutnya.
Kata Kunci: *etnobotani, tumbuhan obat, panton luas, kecamatan samadua*

1. Introduction

Indonesia is listed as a country with the highest plant richness. The utilization of plants in Indonesia is used for various needs. One of them as a medicinal plant. Community utilization of plants is studied in ethnobotany studies. Etymologically, ethnobotany comes from the word's ethnology, which means the study of culture, and botany, which means the study of plants. The science of ethnobotany revolves around the utilization of plants by the community as food, timber, cosmetics, medicines, and other applications that can increase human vitality [1].

In developing nations of Asia and Africa, people continue to rely significantly on medicinal herbs in their daily lives. Medicinal plants enhance the security and well-being of the local populace in addition to serving as a supplement or replacement for the usually inadequate modern medical therapies [2]. Herbal medicines have been used to treat illnesses worldwide since the dawn of mankind. Natural products have drawn a lot of interest and contributed to the development of new drugs. Studies have shown that using natural goods has advantages [3].

Medicinal plants are getting importance worldwide because of their characteristic benefits and medicinal value. The increased traditional use and cultural acceptability of these medicinal herbs is making them increasingly significant on a worldwide basis. In addition, they are highly valued and rarely cause adverse effects [4].

The use of plants as traditional medicine in Indonesia has been carried out from generation to generation since time immemorial. The use of medicinal plants is an alternative for the community, considering the high cost of medical treatment. This causes the availability of chemical medicinal raw materials to be limited [5]. The use of medicinal plants by the community is based on local wisdom.

According to [6], local wisdom encompasses all forms of knowledge, conviction, understanding, insight, customs, values, and social norms that guide behavior within a community to address issues and protect the environment. The environment, cultural shifts, technological developments, and relationships within the community all have an impact on the traditional knowledge of the group. Higher cultivation levels will allow people to better handle and utilize the variety of plants. Conversely, people from lower cultural levels will tend to the plants in accordance with their own requirements [7].

One of the communities that still maintains the local wisdom of using medicinal plants traditionally is the Panton Luas community, Samadua Subdistrict, Aceh Selatan Regency. Panton luas consists of 8 villages i.e., Desa Subarang, Desa Madat, Desa Ladang, Desa Alur Semerah, Desa Kota Baru, Desa Dalam, Desa Tengah, and Desa Gunung Ketek. This area is located on the slopes of mountain and hills. Currently, the use of these medicinal plants is limited to passing them on from parents to their children for generations in the family. It will risk the erosion of traditional knowledge along with the influence of modernization, habitat degradation, and the use of chemical drugs. For these reasons, it is necessary to collect data and publish it scientifically on the use of these medicinal plants.

2. Material and Methods

The research was conducted in February-March 2023 in Panton Luas, Samadua Subdistrict, Aceh Selatan Regency. This research is a type of qualitative research using the Participatory Rural Appraisal (PRA) method and the direct observation method. The research subjects are the Panton Luas community, that understands and uses medicinal plants. The informant consists of 50 respondents. The technique of choosing respondents was purposive sampling. The process of collecting data was done through direct interviews. The data was analyzed descriptively. The data obtained is presented in tabular form such us the name of the plant, part of the plant used, and usability. Whereas the proportion of plant parts used, habitus, habitat, and the method of processing medicinal plants are presented in pictures.

3. Results and Discussion

Based on the interview, it is known that there were 41 species of plants within 32 families that were used as medicines (**Table 1**).

Table 1. Types of Medicinal Plants Used by the Panton Luas Community

No.	Local Name	Scientific Name	Family	Organ	Medicinal Used
1.	Daun tahi ayam	*Tagetes erecta*	Asteraceae	Leaf and flower	Stomachache
2.	Minjangan (kayu busuk)	*Chromolaena odorata*	Asteraceae	Leaf	Antifibrinolytic
3.	Capa/ sembung	*Blumea Balsamifera*	Asteraceae	Leaf	Fever
4.	Sambung nyawa	*Gynura procumbens*	Asteraceae	Leaf	hypertension
5.	Bandotan	*Ageratum conyzoides*	Asteraceae	Leaf	Cold
6.	Kelapa	*Cocus nucifera*	Arecaceae	Fruit	Fever
7.	Pinang	*Areca catechu*	Arecaceae	Fruit	Diarrhea
8.	Jambu biji	*Psidium guajava*	Myrtaceae	Leaf dan fruit	Diarrhea
9.	Cengkeh	*Syzygium aromaticum*	Myrtaceae	Flower	Ecchymosis
10.	Ara	*Ficus carica*	Moraceae	Leaf	Ecchymosis
11.	Nangka	*Artocarpus heterophyllus*	Moraceae	Leaf	Scar removal

No.	Local Name	Scientific Name	Family	Organ	Medicinal Used
12.	Timah-Timah/ Timpang air	*Peperomia pellucida.*	Piperaceae	Leaf	Fever
13.	Sirih	*Piper bettle*	Piperaceae	leaf	Itchy skin and mouth treatment
14.	Jarak	*Jatropha curcas*	Euphorbiaceae	Leaf Sap	Mouth ulcer
15.	Puring	*Codiaeum variegatum*	Euphorbiaceae	Leaf	Stomachache
16.	Kemiri	*Aleurites moluccana.*	Euphorbiaceae	Seed	Hair treatment
17.	Kedondong pagar	*Lannea nigritana*	Anacardiaceae	Leaf	Febrifuge
18.	Sidingin/ cocor bebek	*Kalanchoe pinnata*	Crassulaceae	Leaf	Febrifuge
19.	Kelor	*Moringa oleifera*	Moringaceae	leaf	Backache and lactation booster
20.	Serai	*Andropogon nordus*	Poaceae	Stem	Cold
21.	Kumis kucing	*Orthosiphon aristatus*	Lamiaceae	Leaf	Febrifuge
22.	Pala	*Myristica fragrant*	Myristicaceae	Seed	Ecchymosis
23.	Belimbing Wuluh	*Averrhoa bilimbi*	Oxalidaceae	Fruit	Cough
24.	Rambutan	*Nephelium lappaceum*	Sapindaceae	Young Leaf	Cough
25.	Senduduk	*Melastoma malabathricum*	Melastomaceae	Leaf	Fever
26.	Takokak/ rimbang	*Solanum torvum*	Solanaceae	Fruit	Eyes treatment
27.	Pepaya	*Carica papaya*	Caricaceae	Leaf and Fruit	Malaria treatment and constipation
28.	Pacar air	*Impatiens balsamina*	Balsaminaceae	Leaf	Smallpox
29.	Tapak dara	*Catharanthus roseus*	Apocynaceae	Leaf	Diabetes and hypertension
30.	Biduri	*Calotropis gigantea*	Apocynaceae	Leaf	Boil
31.	Lidah buaya	*Aloe vera*	Asphodelaceae	Leaf	Hair loss treatment
32.	Kembang sepatu	*Hibiscus rosa-sinensis*	Malvaceae	Leaf	Fever for kids
33.	Seledri	*Apium graveolens*	Apiaceae	Leaf and Stem	hypertension
34.	Tanaman mangkok	*Polyscias scutellaria*	Araliaceae	Leaf	Cold
35.	Sirsak	*Annona muricata*	Annonaceae	Leaf	Headache
36.	Inai	*Lawsonia inermis*	Lythaceae	Leaf	Postpartum treatment
37.	Kembang merak	*Caesalphinea pulcherrima*	Caesalpiniaceae	Leaf	Fever
38.	Mentimun	*Cucurmis sativus*	Cucurbitaceae	Fruit	Hypertension
39.	Gelinggang	*Cassea alata*	Fabaceae	Leaf	Itchy skin and ringworm treatment
40.	Jahe	*Zingiber officinale*	Zingiberraceae	Rhizome	Cold
41.	Mengkudu	*Morinda citrifolia*	Rubiaceae	Fruit	Cold

The data presented in **Table 1** showed that the Panton Luas community used more Asteraceae as medicinal plants, consisting of 5 species i. e Tagetes, Chromolaena, Blumea, Gynura, and Ageratum. The parts of Asteracea used were the leaves and flowers. Local people believe that the compounds contained in these plants are useful in traditional medicine. According to [8], many Asteraceae species can be included in a healthy diet. The protein content ranges from 0.4 to 6.13 grams per 100 grams of the edible portion,

and the fiber content is from 2.55 to 13.44 grams. Roots, leaves, and flowers are also good sources of Na, K, Ca, and Mg, as well as vitamins A, B, C and D. Most plants have a low-fat content. Based on the research from [9], Species in the Asteraceae family have a high biological potential and are used in traditional medicine to treat a variety of diseases. In addition, [10] explained that traditional knowledge suggests in Asteraceae plants have antioxidant, hepatoprotective, vasodilating, and wound-healing properties. These properties also work to prevent serious illnesses like CVD, liver cirrhosis, and DM.

The Parts of the Plant used

The parts of the plant used consisted of leaves (65%), fruit (18%), stems (5%), flowers (5%), seeds (5%), sap (2%), and rhizomes (2%). Additional research demonstrates the usage of numerous plant organs as a form of medicine [11,12,13]. The leaves are the most used part because of their abundance in nature, they are very easy to find, and their processing is also easier and more practical. In addition, more medicinal properties are also obtained from the leaves. The study of [14] showed that the leaves were simpler to gather and process, and removing a few leaves did not harm the plants. Another study showed that leaves are used more frequently because of their secondary metabolite content [15].

After the leaves, the fruit was the second most used part of the plant. The fruit contains a lot of fiber and water, which can be used as traditional medicines by the local population. This result was also reported by [16], fruit is the most widely use after leaves in other Indonesian regions. According to [17], fruit preserves secondary metabolites and results of photosynthesis produced by a plant. Fruit contains more phytochemicals than other plant organs.

The parts that are least used were the sap and rhizomes. The sap used was from *Jatropa curcas*. *J. curcas* sap demonstrated more potent antibacterial activity [18]. Based on the informant interview, the sap was used the least because not all plants produce sap, and besides that, not all plant sap has medicinal properties. The community also did not use the rhizome much as a traditional medicine. Generally, they used the rhizome of Zingiber plants as cooking spices. The previous study showed that Zingiber used as cooking spices in everyday life [19,20].

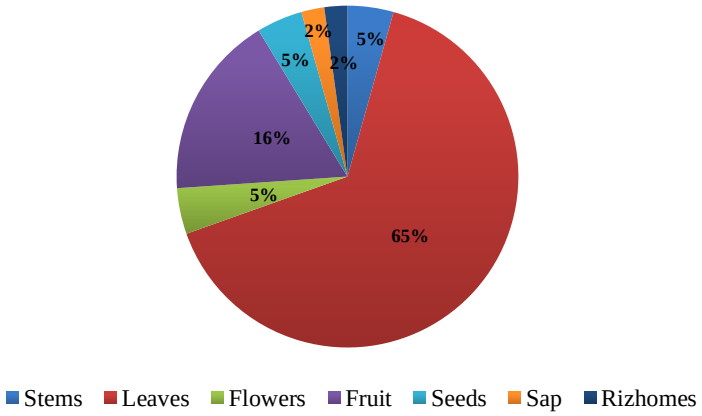

Figure 1. The Parts of the Medicinal Plant used

Medicinal Plant Habitus

The Habitus used by local people were trees (34%), herbs (29%), shrubs (29%), and bushes (8%). Trees are mostly used by local people because they are easy to obtain and some of these species are indeed planted in their yards. It indicates that trees play role important to provide medicines. Other studies also show that trees are the most often used as a source of medicine [21,22]. Herbs and shrubs had the same proportions. They are also easy to obtain in the neighborhood. While bushes were the least used plant habitus. This result also similar with [23], trees have the highest percentage for medicinal use and bushes have the lowest percentage because the use of trees is common among people to collect raw tree materials for medicinal use.

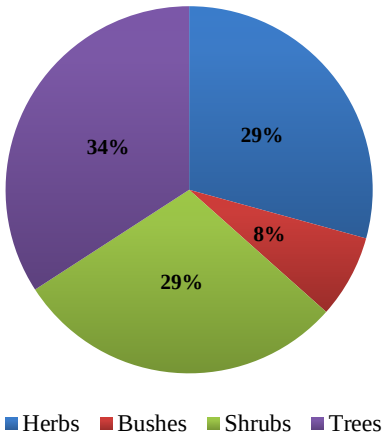

Figure 2. Habitus of the Medicinal Plant used

Medicinal Plant Habitats

Medicinal plants used by the community consisted of cultivated plants (73%) and wild plants (27%). Local people use more cultivated plants than wild plants as medicines. The main reason is people prefer to plant medicinal plants in their gardens or yards (homegarden plants), so they are easier to find those plants than to forage in the forest or neighborhood. According to [24], homegardens are a valuable source of information about ethnomedicinal species and practices. These species are useful for treating acute and everyday illnesses. They are accessible and can be prepared using straightforward techniques, making them excellent for treating conditions like infections or any digestive system afflictions. Home gardens have played a significant role in enhancing health, at least among families. In addition, [25], Indeed, the majority of medicinal plants are cultivated in open fields, where the impacts of weather and soil environments result in plants with varied quantities of physiologically active chemicals.

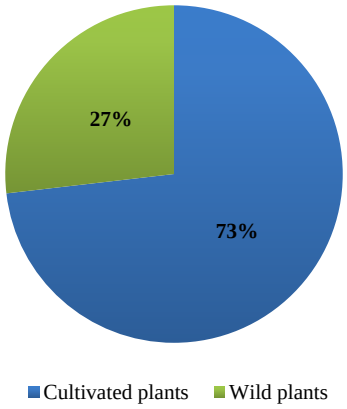

Figure 3. Habitats of the Medicinal Plant used

Medicinal plants processing

The processing was done by grinding (39%), boiling (22%), squeezing (17%), eating directly (12%), dripping (5%), rubbing (3%), and chewing (2%). The grinding process was carried out for external medications (febrifuge, Antifibrinolytic, Ecchymosis, smallpox, boil, hair treatment, and scar removal) and internal medication (stomachache, cold, headache and fever). The part of plants used for grinding was leaf, fruit, and seed. Another study also showed that grinding was the most widely used by local people and the most effective method of preparing medicinal traditional plants to treat various diseases [26].

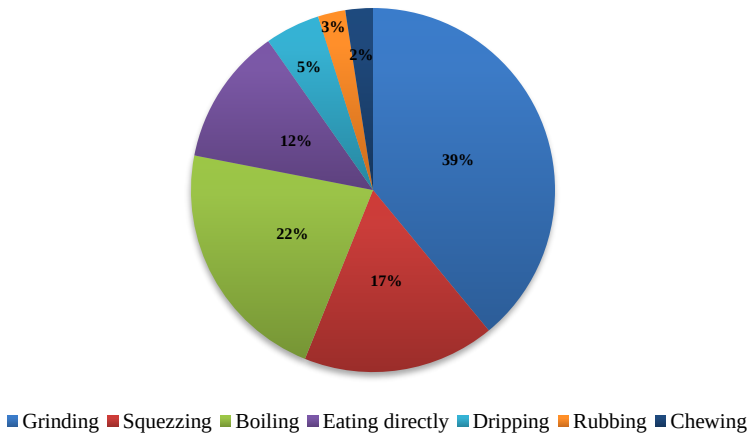

Figure 4. Medicinal Plants processing

Boiling was the second medicinal plants processing. Local people believe that boiling can kill germs in plants, make them safer, and make more compounds contained in plants come out. The extract the decoction according to the dosage. Another study by [27] reported that boiling was also the process more often conducted in the preparation of drugs. People boiled medicinal plants to dissolve the active ingredients quickly in water. The use of traditional medicinal plants by the Panton Luas people was to treat various diseases such as internal and external medication.

Utilization of Medicinal Plants

Generally, people use medicinal plants for their daily needs and it has been passed down from generation to generation based on local wisdom. In its use, this community concocted plants single and mixed them with other plants. The diseases that were treated consist of various kinds of diseases, such as internal and external diseases. According to [28] from generation to generation, the community has received knowledge about plants with medicinal properties that can cure specific diseases through the transmission of local wisdom. Not only do people know which plants are medicinal, but they also know how to prepare them for safe ingestion by boiling, grinding, or consuming them raw. Naturally, utilizing traditional medicine is made people more believe due to the extensive experience involved. It is important to keep in mind that scientific study identifying the chemicals found in medicinal plants supports the use of plants as medicine. This indicates that the knowledge passed down through the generations is consistent with scientific discoveries [29,30,31].

4. Conclusion

Panton Luas community in Aceh Selatan District maintains local wisdom on the traditional use of medicinal plants. The plants used as medicine consisted of 41 plant species under 32 families. The parts of the plant used consisted of leaves (65%), fruit (18%), stems (5%), flowers (5%), seeds (5%), sap (2%), and rhizomes (2%). Habitus used by local people was trees (34%), herbs (29%), shrubs (29%), and bushes (8%). Medicinal plants used by local people consisted of cultivated plants (73%) and wild plants (27%). The processing was done by grinding (39%), boiling (22%), squeezing (17%), eating directly (12%), dripping (5%), rubbing (3%), and chewing (2%). The use of traditional medicinal plants by the Panton Luas people was to treat various diseases.

5. Acknowledgment

Authors thank village heads and local people at Panton Luas area have helped carry out this research.

6. Abbreviations

CVD	Cardiovascular Disease
DM	Diabetes Mellitus

7. References

[1] A. Suproborini, M. Soeprijadi, D. Laksana, dan D. F. Yudiantoro, “Etnobotani Tanaman Antipiretik Masyarakat Dusun Mesu Boto Jatiroto Wonogiri Jawa Tengah,” *Journal of Pharmaceutical Science and Medical Research*, 1 (1), 2018.

[2] M. G. Agidew, "Phytochemical analysis of some selected traditional medicinal plants in Ethiopia," *Bulletin of the National Research Centre*, 46(1). https://doi.org/10.1186/s42269-022-00770-8, 2022.

[3] A. Ayeni, Y. Gong, H. Yuan, H. Yikao, X. Bai, and X. Liao, "Medicinal Plants for Anti-neurodegenerative diseases in West Africa," *Journal of Ethnopharmacology*, 285. https://doi.org/10.1016/j.jep.2021.114468.

[4] W. Zahra, S. N. Rai, H. Birla, S. S. Singh, A. S. Rathore, H. Dilnashin, C. Keswani, and S. P. Singh, "Economic Importance of Medicinal Plants in Asian Countries," *Bioeconomy for Sustainable Development*. 359-377, 2019. https://doi.org/10.1007/978-981-13-9431-7_19.

[5] R. Dewantari, M. L. Lintang, and Nurmiyanti, "Types of Plants used as Traditional Medicines In Ex Residency of Surakarta," *Bioedukasi*, 11 (2): 118-123. 2018, DOI: http://dx.doi.org/10.20961/bioedukasi-uns.v11i2.19672.

[6] N. A. Chukwuone, K. P. Adeosun, and C. A. Chukwuone, "Socioeconomic factors affecting households' use of indigenous forest management practices in managing non-wood forest products : evidence from forest communities in Nigeria derived savannah," *Heliyon*, 6 e05281, 2019, https://doi.org/10.1016/j.heliyon.2020.e05281

[7] M. I. Supiandi, S. Mahanl, S. Zubaidah, H. Julung, and B, Ege, "Ethnobotany of traditional medicinal plants used by Dayak Desa Community in Sintang, West Kalimantan, Indonesia", *Biodiversitas*, 20 (5): 1264-1270, 2022. DOI: 10.13057/biodiv/d200516.

[8] P. García-Herrera, M. C. Sánchez-Mata, M. Camara, Díez-Marqués, C. Fernández-Ruiz, M. Molina, and J. Tardío, "Nutrient composition of six wild edible Mediterranean Asteraceae plants of dietary interest. Journal of Food Composition and Analysis", 34 (2): 163-170, 2014, https://doi.org/10.1016/j.jfca.2014.02.009

[9] A. Sobrinho, S. Morais, E. Souza, and R. Fontenelle. 2017. The genus Eupatorium L. (Asteraceae): A review of their antimicrobial activity. *J. Med. Plant Res*., 11(3): 43-57.

[10] Y. K. Mohanta, A. K. Mishra, A. Nongbet, I. Chakrabartty, D. S. Mahanta, B. Sarma, J. Panda, and S. K. Panda, "Potential Use of the Asteraceae Family as a Cure for Diabetes: *A Review of Ethnopharmacology to Modern day Drug and Nutraceuticals Developments*. 2022.

[11] D. Suharjito, L. K. Darusman, D. Darusman, and E. Suwarno, "Comparing Medicinal Plants Use for Traditional and Modern Herbal Medicine in Long Nah Village of East Kalimantan", *Jurnal Ilmu-ilmu Hayati dan Fisik*, 16 (2): 95-102, 2014. https://jurnal.unpad.ac.id/bionatura/article/view/7570/3467.

[12] F. Yusro, G. Hardiansyah, Erianto, Y. Mariani, D. Nurdwiansyah, Hendarto, dan Aripin, "Potensi Tumbuhan Berkhasiat Obat Di Hutan Penam Ketungau Kabupaten Sintang," *Bioscienties*, 9 (2): 346-361. https://e-journal.undikma.ac.id/index.php/bioscientist, 2021.

[13] H. Julung, M. I. Supiandi, B. Ege, S. Zubaidah, and S. Mahanal, "Ethnobotany of medicinal plants in the Dayak Linoh Tribe in Sintang District, Indonesia", *Biodiversitas*, 24 (2), 2023, DOI: 10.13057/biodiv/d240212.

[14] M. Megersa and N. Tamrat, "Medicinal plants used to treat human and livestock ailments in Basona Werana District, North Shewa Zone, Amhara Region, Ethiopia," *Evidence-Based Complement Altern Med*, 5242033, 2022. DOI: 10.1155/2022/5242033.

[15] C. Jain, S. Khatana, and R. Vijayvergia, "Bioactivity of secondarymetabolites of various plants: A review," *Int J Pharm Sci Res*, 10 (2):494-504, 2019, DOI: 10.13040/IJPSR.0975-8232.10(2).494-04.

[16] Yudiyanto, N. Hakim, dan A. Z. Wakhidah, "Ethnobotany of medicinal plants from Lampung Tribe around Way Kambas National Park, Indonesia," *Nusantara Bioscience*, 14 (1): 84-94, 2022. DOI: 10.13057/nusbiosci/n140111

[17] D, M. Pott, S. Osorio, and J. G. Vallarino, "From Central to Specialized Metabolism: An Overview of Some Secondary Compounds Derived from the Primary Metabolism for Their Role in Conferring Nutritional and Organoleptic Characteristics to Fruit," *Plant Sci*, 10: 1-19, 2019. Doi: 10.3389/fpls.2019.00835.

[18] M. Senou, J. E. Lokonon, E. O. T. R. Abissi, F. Agbogba, R. J. Dehou, E. Medoatinsa, P. Tchogou, B. F. Cachon, A. Houngbeme, E. Attakpa, Agbonon, and A., Moussa, L. B. "Antibacterial Activity and Toxicity of the Sap and Aqueous Extract of the Leaves of *Jatropha multifida* Linn," *Journal of Biosciences and Medicines*, 10 (7). 2022, DOI: 10.4236/jbm.2022.107013.

[19] S. V. Luca, A. Trifan, G. Zengin, K. Sinan, A. I. Uba, I. Korona-Glowniak, and K. Skalicka-Woźniak, "Evaluating the phyto-complexity and poly-pharmacology of spices: The case of *Aframomum melegueta* K. Schum (Zingiberaceae)," Journal of Pharmacy and Technology, 15 (1): 325-328. 2022, DOI : 10.52711/0974-360X.2022.00053.

[20] P. Reena, and N. Sanghamitra, Anti-proliferative activity of *In vitro* zingiberaceae essential oil against human cervical cancer (HeLa) cell line. *Journal of Pharmacy and Technology*, 15 (1): 325-328, 2022. DOI : 10.52711/0974-360X.2022.00053.

[21] M.L.G. Dapar, U. Meve, S. Liede-Schumann, G. J. D. Alejandro, "Ethnomedicinal appraisal and conservation status of medicinal plants among the Manobo tribe of Bayugan City, Philippines," *Biodiversitas* 21 (8): 3843-3855, 2020, DOI: 10.13057/biodiv/d210854.

[22] Y. Nugroho, M. A. Soendjoto, Suyanto, J. Matatula, S. Alam, dan P. Y. A. P. Wirabuana, "Traditional medicinal plants and their utilization by local communities around Lambung Mangkurat Education Forests, South Kalimantan, Indonesia," *Biodiversitas*, 23 (1): 306-314, 2022. DOI: 10.13057/biodiv/d230137.

[23] F. E. Osayimwen, N. Osadolor, and S. O. Okoogua,. "Ethnobotanical Survey of Some Medicinal Plants used in Ikpoba-Okha Local Government Area, Edo State, Nigeria," *Journal of Agroforestry and Environment*, 16 (1), 2023, DOI: https://doi.org/10.55706/jae.

[24] P. P. Panyadee, H. Balslev, P. W. Wong, and A. Inta, "Medicinal plants in homegardens of four ethnic groups in Thailand," *Journal of Ethnopharmacology*, 239, 2019, https://doi.org/10.1016/j.jep.2019.111927.

[25] C. Borges, I. O. Minatel, H. Gomez Gomez, and G. Lima, "Medicinal plants: Influence of environmental factors on the content of secondary metabolites. In: Medicinal Plants and Environmental Challenges, ed. Ghorbanpour, M., Varma, A," (Cham, Switzerland: *Springer Nature*), 259–277, 2017. doi: 10.1007/978-3-319-68717-9.

[26] K. Mesfin, G. Tekle, and T. Tesfay, "Ethnobotanical Study of Traditional Medicinal Plants Used by Indigenous People of Gemad District, Northern Ethiopia," Journal of Medicinal Plants Studies, 1 (4): 32-37, 2013.

[27] R. P. Sari, F. Yusro, and Y. Mariani, "Medicinal plants used by Dayak Kanayatn Traditional Healers in Tonang Village Sengah Temila District Landak Regency," *J Biologi Tropis*, 21 (2): 324-335, 2021, DOI: 10.29303/jbt.v21i2.2557.

[28] N. A. Siregar, A, Anhar, S. and S Rasnovi, "Studi Etnobotani Tumbuhan Obat Pada Masyarakat Kecamatan Sosopan Kabupaten Padang Lawas Provinsi Sumatera Utara," *Jurnal Ilmiah Mahasiswa Pertanian*, 8(4), 1359-1365, 2023.

[29] A. Purnamasari, S. Zelviani, S. Sahara, N. Fuadi, "Analisis Nilai Absorbansi Kadar Flavonoid Tanaman Herbal Menggunakan Spektrofotometer Uv-Vis," *Teknosains: Media Informasi Sains dan Teknologi*, 16(1), 57-64, 2022.

[30] H. A. Simanjuntak, "Studi Pemanfaatan Tumbuhan Obat Antidiare oleh Masyarakat di Etnis Sumatera Utara," *Herbal Medicine Journal*, 4(2), 30-41, 2021.

[31] G. S. Syahputra, M. A. Astuti, P. Piter, dan D. Arbain, "Kajian Etnofarmasi dan Fitokimia Tumbuhan Obat Kampung Adat Urug, Kecamatan Sukajaya, Kabupaten Bogor, Jawa Barat," *Jurnal Tumbuhan Obat Indonesia*, 14(1), 15-35, 2021.