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Inventory and utilization of the family Rubiaceae in the forests of *Desa* Serdang, Barusjahe, Karo, North Sumatra

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ABSTRAK

Rubiaceae adalah keluarga tumbuhan hutan yang umum di Indonesia, termasuk di banyak hutan desa yang dikelola masyarakat seperti Hutan Desa Serdang di Barusjahe, Karo, Sumatera Utara. Inventarisasi menyeluruh spesies Rubiaceae diperlukan untuk memahami komposisi dan penggunaannya oleh masyarakat setempat. Penelitian ini bertujuan untuk mencatat semua spesies Rubiaceae, memahami karakteristik morfologinya, dan mendokumentasikan pemanfaatannya di hutan desa. Eksplorasi ini mengidentifikasi 18 spesies Rubiaceae dari 12 genera yang berbeda. Sembilan spesies dimanfaatkan oleh masyarakat lokal: empat spesies sebagai obat tradisional, dua spesies sebagai tanaman hias, satu spesies untuk kayu bakar, dan satu spesies untuk tiang rumah/kebun dan alat rumah tangga. Penelitian ini meningkatkan pemahaman tentang spesies Rubiaceae dan penggunaannya di hutan desa Serdang.

Kata Kunci: Eksplorasi, Rubiaceae, Hutan Desa Serdang

ABSTRACT

Rubiaceae is a common forest plant family in Indonesia, including in many community-managed village forests such as the Serdang Village Forest in Barusjahe, Karo, North Sumatra. A thorough inventory of rubiaceous species is needed to understand their composition and usage by local people. This study aims to list all Rubiaceae species, understand their morphological characteristics, and document their utilization in the village forest. The exploration identified 18 species of Rubiaceae from 12 different genera. Nine species are utilized by the local community: four species as traditional medicine, two species as ornamental plants, one species for firewood, and one species for house/garden posts and household tools. This research enhances the understanding of Rubiaceae species and their uses in the Desa Serdang village forest.

Keywords: Exploration, Rubiaceae, Serdang Village Forest

INTRODUCTION

Indonesia is a strategically located tropical archipelago, situated between Asia and Australia and bordered by the Pacific and Indian Oceans. With approximately 17,500 islands and a coastline stretching 95,181 kilometers, Indonesia is rich in natural resources, both on land and at sea (LIPI, 2014). This wealth includes a high level of biodiversity, with diverse flora and fauna in each region, offering significant opportunities for the sustainable use of natural resources. The high level of biodiversity in a region offers

greater opportunities for utilization, as there are more options and resources available to be used. Thus, regions with high biodiversity have a significant potential to gain benefits from biodiversity utilization (Suwarsono et al., 2019). Each region possesses unique variations of plant species, and these differences can be influenced by biological factors and local geographical conditions. Plants play a crucial role in sustaining human life (Tutung, 2019).

One of the most common plant families in Indonesia, including in Sumatra and North Sumatra is Rubiaceae. Rubiaceae is a robust plant family, consisting of 580 genera and 14,000 species (Razafimandimbison & Rydin, 2024), and in Sumatra consisted of about 200 species (Laumonier 1997; Laumonier et al, 2010). According to Murdiyanti et al. (2022), Rubiaceae plants have many ethnobotanical uses, including medicinal purposes, even though the local community may not directly utilize them. Plant species can be used individually for external or internal medical treatments. They are also economically valuable, with uses such as firewood or materials for livestock enclosures. The plants are used externally for treating wounds and internally for various ailments like fever and hypertension (Murdiyanti et al, 2022). The village forest of *Desa* Serdang North Sumatra, which remains largely untouched and located at an altitude of 1300–1700 meters above sea level, serves as a habitat for various Rubiaceae species (Ginting, et al,.2015). Observations have identified five Rubiaceae species at the forest's edge, with the possibility of discovering more species. Given the economic and medicinal potential of these plants, further research is needed to uncover the wealth of Rubiaceae species in the Desa Serdang village forest and explore their potential uses.

METHODOLOGY

Studies sites and species sampling

This research was conducted in the *Desa* Serdang village forest, Barusjahe District, Karo Regency, North Sumatra (**Figure 1**). The research location was selected based on field observations and was carried out in June 2024. The population in this study consists of all Rubiaceae plants found along the trails of *Desa* Serdang village forest.

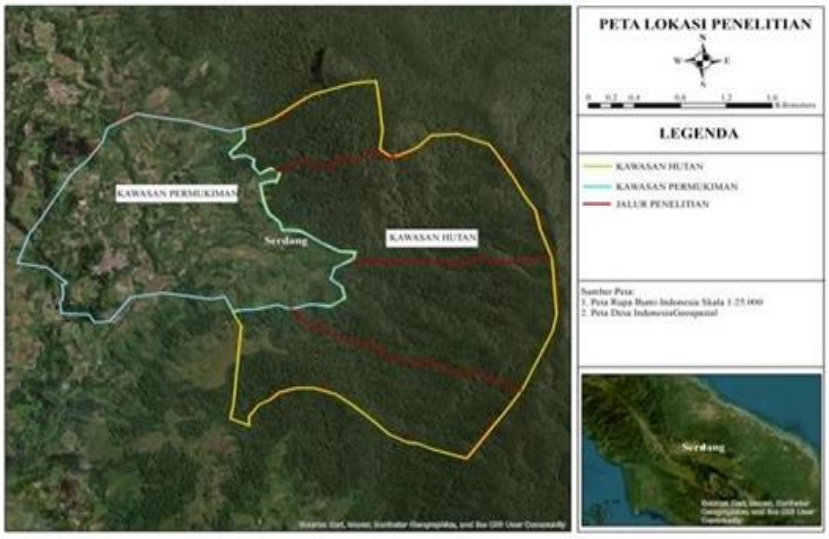

FIGURE 1. Research location map

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Research procedures

This study uses a non-experimental, exploratory descriptive species research method. The exploration was done using the transect method, and observations were made on each Rubiaceae plant found in the study area, recording its location, species, and habitat conditions. The data collected in the field were analyzed descriptively

Data collection stage

The data collection stage is as follows: Exploration is carried out using the survey method along the forest path of *Desa* Serdang, Barus Jahe District, Karo Regency, where Rubiaceae plants are found, exploration takes place over several days, following a predetermined route, for each Rubiaceae plant found at various points, samples are taken, morphological characteristics of Rubiaceae plants are observed using callipers and measuring tapes. The plant height is measured using a tape measure, and the diameter of the stem, leaf spacing, leaf width (cm), and leaf thickness are measured with callipers. Documentation of each sample found is taken as evidence, specimens collected are labeled with their morphological data such as habitat, colour, and leaf shape, samples are converted into herbarium specimens, herbarium samples are then identified. Identification is matched using the Flora Identification Book (1995), the International Plant Name Index (IPNI) website, Plants of the World Online (POWO), and the Biodiversity Heritage Library (BHL).

Interview stage

Plant utilization is studied using interviews to obtain verbal data from informants. The topics addressed in the interviews include plant species plants utilized by the community based on species, the parts of the plants used, such as stems, leaves, fruits, flowers, and seeds, the type of use by the community, such as for medicine, decoration, traditional needs, and as cooking ingredients.

Data analysis techniques

Data analysis was performed descriptively and qualitatively, utilizing various parameters, including the morphological characteristics of roots, stems, leaves, flowers, and fruits, which were compared with identification books and botanical literature.

RESULTS AND DISCUSSION

Based on the exploration results, 18 species of Rubiaceae were found in the village forest of Desa Serdang, consisting of 4 species of trees, 8 species of herbs, and 6 species of shrub. Out of 18 species, 9 are utilized by the people of Desa Serdang, consisting of 4 species as traditional medicine, 2 species as ornamental plants, 1 species for firewood, and 1 species for house/garden posts or household tools. The Rubiaceae species found are listed in **Table 1**.

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TABLE 1. Rubiaceae species list and life-forms in Desa Serdang village forest, Barusjahe, Karo, North Sumatra

No	Jenis	Life-forms
1	*Argostemma ophirense* Maingay ex Hook.f.	Liana
2	*Argostemma parvifolium* Benn.	Herb
3	*Chassalia curviflora* (Wall.) Thwaites.	Shrub
4	*Lasianthus attenuatus* Jack.	Shrub
5	*Lasianthus ridleyi* King & Gamble.	Herb
6	*Lasianthus stercorarius* Blume.	Herb
7	*Lasianthus biflorus* (Blume) M.Gangop. & Chakrab.	Herb
8	*Mycetia griffithii* Z.Q.Song&Razafim	Tree
9	*Mycetia cauliflora* Reinw.	Herb
10	*Neonauclea calycina* (Bartl. Ex D C.) Merr.	Tree
11	*Psychotria montana* Blume.	Herb
12	*Psychotria sarmentosa* Blume.	Liana
13	*Tarenna wallichii* (Hook.f.) Ridl.	Shrub
14	*Timonius wallichianus* Valeton	Herb
15	*Uncaria lanosa* Wall.	Herb
16	*Uncaria nervosa* Elmer.	Herb
17	*Urophyllum streptopodium* Wall.ex Hook.f.	Tree
18	*Wendlandia densiflora* (Blume) D C.	Tree

TABLE 2. Rubiaceae species used by people of Serdang Village Forest, Barusjahe District, Karo Regency, North Sumatra (*see description*).

No	Species	Local Name	Utilization	Parts Used
1.	*Lasianthus stercorarius* Blume	Buas- buas	As parem karo	Leaves and fruit
2.	*Mycetia griffithii* Z.Q.Song&Razafim	Uras-uras	As an ornamental plant	All parts of the plant
3.	*Chassalia curviflora* (Wall.) Thwaites.	Kikores Wungu	As a mixture of massage oils	Flower and leaves
4.	*Lasianthus ridleyi* King & Gamble	Kopi hutan	As pagit-pagit or spice mixture	Seed
5.	*Timonius wallichianus* Valeton	Tedungan	As firewood	Stem
6.	*Argostemma parvifolium* Benn.	Kumis kucing	As an ornamental plant	All parts of the plant
7.	*Uncaria lanosa* Wall.	Kait-kait	As house/garden posts	Stem
8.	*Uncaria nervosa* Elmer	Bajakah	As a traditional medicine and body refreshing stamina	Root
9.	*Neonauclea calycina* (Bartl.ex.LC) Merr.	Bangkal	As a medicine to treat boils or swelling	Leaves

Identification Key for Rubiaceae Found in the Forest of Serdang Village, Barusjahe District, Karo Regency:

The key to the species of Rubiaceae in Desa Serdang Village Forest:

1. a. Stem woody **2**
   b. Stem herbaceous **16**
2. a. Stem erect **3**
   b. Stem creeping **15**
3. a. Stem surface glabrous **4**
   b. Stem surface pubescent **8**
4. a. Leaf opposite **5**

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b. Leaf alternate ..... ***Uncaria nervosa* Elmer**
5. a. Leaf elongated..... **6**
b. Leaf oval ..... ***Chassalia curviflora* (Wall.) Thwaites**
6. a. Leaf colour reddish-green..... ***Wendlandia densiflora* (Blume) DC.**
b. Leaf colour dark green..... **7**
7. a. Fruit shape rounded **17**
b. Fruit shape oblong **11**
8. a. Stem sympodial..... **9**
b. Stem monopodial..... ***Lasianthus attenuatus* Jack**
9. a. Leaf dark green **10**
b. Leaf brownish green **13**
10. a. Leaf oppositely arranged ..... ***Lasianthus ridleyi* King & Gamble**
b. Leaf sparsely arranged..... **11**
11. a. Leaf lanceolate..... ***Mycetia griffithii* Z.Q.Song&Razafim**
b. Leaf elongate **12**
12. a. Leaf margin entire..... ***Tarenna wallichii* (Hook.f.) Ridl.**
b. Leaf margin serrated..... ***Argostemma parvifolium* Benn.**
13. a. Leaf surface glabrous..... ***Mycetia cauliflora* Reinw.**
b. Leaf surface pubescent **14**
14. a. Leaf apex acute ..... ***Timonius wallichianus* Valeton**
b. Leaf apex obtuse..... ***Neonauclea calycina* (Bartl. ex DC.) Merr.**
15. a. Stem hairy, no thorn..... ***Lasianthus stercorarius* Blume**
b. Stem thorny..... ***Uncaria lanosa* Wall.**
16. a. Leaf elongate..... ***Argostemma ophirense* Maingay ex Hook.f**
b. Leaf oval **17**
17. a. Leaf surface glabrous..... ***Psychotria sarmentosa* Blume**
b. Leaf surface scabrous ..... ***Lasianthus biflorus* (Blume) M.Gangop.&Chakrab.**

Descriptions

1. *Argostemma ophirense* Maingay ex Hook.f.

Plant climbing; root fibrous, 2-4 cm long, arise at the stem node, climbing; stem soft, climbing; leaf opposite, elongated, apex acute, green, venation pinnate, surface glabrous, 3-9 cm long x 1-4 cm wide; flower single, stalk 3 cm, sepal 4 brown 4, corolla white. **Uses**: not recorded in *Desa* Serdang Village Forest.

2. *Argostemma parvifolium* Benn.

Plant herbaceous; root fibrous, 3-5 cm long; stem woody, terete, erect, bark pubescent, 1-3 m high; leaf alternate, elongate 3.5-5 cm long x 1-2 cm wide, apex acuminate, margin entire, pubescent, venation pinnate, green. **Uses**: *Argostemma parvifolium* is used by the people of *Desa* Serdang as an ornamental plant (**Table 2**). It is planted in pots and placed around their homes. According to the community, *Argostemma parvifolium* has high aesthetic value, especially due to its yellow flowers, which appear fresh and vibrant. This is also observable in *Desa* Nagalingga, Merek, Karo, where people

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also use *Argostemma parvifolium* from *Gunung* Sibuatan as ornamental plants (Ananda R. 2021).

3. *Chassalia curviflora* (Wall.) Thwaites

Plant shrub; root fibrous, brown, 3-5 cm long; stem terete, brownish green, erect, non-woody, bark glabrous; leaf opposite, elliptic, 9-27 cm long x 7-8 cm wide, margin serrated, base acute, apex acute, upper and lower surfaces green, venation pinnate, prominent adaxially, glabrous; inflorescence a panicle; flower small, corolla tubular, pale purple. **Uses:** The people of *Desa* Serdang utilize *Chassalia curviflora* as an ingredient in the preparation of massage oil, or "minyak karo." (**Table 2**). *Chassalia curviflora* also holds potential for use in traditional medicine. This is also observable in *Gunung* Tilu, Kuningan, West Java, where people use *Chassalia curviflora* as a remedy for ear infections, itching from insect bites, and eye medicine, where leaves are crushed, and extract is applied (Efendi, 2022).

4. *Lasianthus attenuatus* Jack

Plant shrub; root fibrous, brown, 5-9 cm long; stem erect, woody, brownish-green, 2-3.5 m tall, bark pubescent; leaf opposite, petiole short, elongated 8-18 cm long x 3-5.4 cm wide, margin entire, apex acute, glabrous, green. **Uses**: not recorded in *Desa* Serdang Village Forest.

5. *Lasianthus ridleyi* King & Gamble

Plant herbaceous; roots fibrous, brown, 4-7 cm long; stem woody erect, 1-3 m tall, green; leaf opposite, elliptic, 6-11 cm long x 2-3.5 cm wide, margin entire, apex acute, glabrous, slightly rough, green, venation pinnate; fruit on leaf axil, rounded, light green, 0.7-0.9 cm in diameter. **Uses:** The people of *Desa* Serdang commonly use *Lasianthus ridleyi* as "pagit-pagit," a traditional ingredient mixed into cooking spices (**Table 2**).

6. *Lasianthus stercorarius* Blume

Plant herbaceous; root fibrous, brown, 5-8 cm long; stem woody, erect, brown, slender, bark glabrous; leaf opposite, elongated, 9-18 cm long x 3-5.5 cm wide, margin entire, apex acute, green upper and lower surfaces, venation pinnate or palmate; fruit axillar, small, rounded, green. **Uses:** The people of *Desa* Serdang use *Lasianthus stercorarius* as "kuning" or "paremnya karo," a traditional Karo remedy (**Table 2**), as they believe the plant can help reduce swelling or injuries on certain parts of the body. Several species in the genus *Lasianthus* are known to have medicinal properties, and this potential is often explored in the context of traditional medicine (Purwanto, 2010).

7. *Lasianthus biflorus* (Blume) M. Gangop. & Chakrab.

Plant herbaceous; root fibrous, brown, 3-5 cm long; stem soft, terete 1.5-2 m, climbing, green, bark glabrous; leaf petiolate, elliptic, 1-2 cm long x 1 cm wide, margin entire, apex obtuse, glabrous, venation pinnate. **Uses**: not recorded in *Desa* Serdang Village Forest.

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8.*Mycetia griffithii* Z.Q.Song & Razafim; syn**. *Mycetia angustifolia* Z.Q.Song & Razafim.**

Plant small tree; root brown, 3-7 cm long; stem woody, erect, terete, brownish-green, bark pubescent; leaf alternate, shortly petiolated, lanceolate, 9-18 cm long x 1.5-3.5 cm wide, margin entire, apex acute, green upper and lower surfaces, venation pinnate, prominent adaxially, pinnate venation, prominent veins, glabrous; inflorescence in cluster terminally or axillary; corolla funnel-shaped, small, yellow. **Uses:** the people of *Desa* Serdang Village also use *Mycetia griffithii* as an ornamental plant (**Table 2**). It is planted in pots and placed around their homes. According to the people, *Mycetia griffithii* has high aesthetic value, especially due to its yellow flowers, which look fresh and vibrant, as also observed on *Desa* Nagalingga, Merek, Karo, where the collect *M. griffithii* from *Gunung* Sibuatan (Ananda R,2021).

9. *Mycetia cauliflora* Reinw.

Plant herbaceous; root fibrous, 5-7 cm long. Stem woody, erect, bark rugose; leaf opposite, oval-elongated, 9-21 cm long x 3-6 cm wide, margin slightly serrated, apex acute, pubescent, green, venation pinnate; fruit cauliflorous, peduncle 3 cm, white, spherical, 1 cm diameter, aril texture fibrous, slightly sweet and sour. **Uses**: not recorded in *Desa* Serdang Village Forest.

10. *Neonauclea calycina* (Bartl. ex DC.) Merr.

Plant small tree; root fibrous, 5-6 cm long; stem erect, woody, bark rugose, multiplicately branching forming a small tree or shrub; leaf opposite, elongated, margin serrated, apex obtuse, green, slightly pubescent, venation pinnate; inflorescence umbel or panicle; flower small, corolla white; fruit dehiscent capsule or small berry. **Uses:** the community of *Desa* Serdang Village uses *Neonauclea calycina* as a traditional remedy to treat swelling or boils (**Table 2**). Leaves are mashed and applied directly to the swollen or affected area. This practice is also observable in South Kalimantan, where three Dayak tribes—Dayak Pitap, Dayak Deyah, and Dayak Harakit—use *Neonauclea calycina* locally known as s*ungharus* as a remedy for swelling and boils (Suryatinah, Y et al., 2020).

11. *Psychotria montana* Blume

Plant herbaceous; root fibrous, brown, 4-7 cm long; stem woody, erect 1-2.5 m tall, branching from the base; leaf opposite, elongated, 15-18.5 cm long x 3.8-5.7 cm wide, margin entire, apex acute, green, venation pinnate; fruit born on stem base, ellipsoid-spherical, green, 0.7-0.9 cm diameter, turning red or purple when ripe. **Uses**: not recorded in *Desa* Serdang Village Forest.

12. *Psychotria sarmentosa* Blume

Plant climbing vine; root adventitious; stem climbing, watery; leaf opposite, elongated, margin entire, apex obtuse, glabrous, dark green; flower small, corolla white, stamen 5, either prominent or embedded; filaments attached to or below the corolla tube, 0.2-2 mm long; anthers oblong, convex dorsally, 0.5-1 mm long; ovary 2 or 3 chambered,

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0.5-1 mm long; stigma elliptical or narrowly elliptic, blunt or truncated, thin at the edges, papillose, about 0.5 mm long. **Uses**: not recorded in *Desa* Serdang Village Forest.

13. *Tarenna wallichii* (Hook.f.) Ridl.

Plant herbaceous; root fibrous; stem erect, slightly branched, woody, bark rugose; leaf alternate, lanceolate, margin entire, aped acute, slightly rugose, venation pinnate; inflorescence a cluster, flower small, corolla white, star-shaped; fruit axillar, seed spherical, rugose, green. **Uses**: not recorded in *Desa* Serdang Village Forest.

14. *Timonius wallichianus* Valeton

Plant herbaceous; root fibrous, 4-7 cm long; stem terete, woody, erect, 3 m tall; leaf opposite, elongated 12-22 cm long x 5-7.5 cm wide, apex acute, rugose, venation pinnate. **Uses:** collected from the forest as firewood; like the use by a Dayak community in *Desa* Tau Lumbus, Nunukan, North Kalimantan, which also uses *Timmonius wallichianus* as a source of firewood, typically collecting the plant from the forests surrounding the village (Royyani & Oscar, 2015).

15. *Uncaria lanosa* Wall.

Plant herbaceous; root fibrous; stem woody bark rugose, climbing by hooks or spines; leaf opposite elongated, margin entire, apex acute, dark green, pubescent, venation pinnate. **Uses:** the community of *Desa* Serdang uses *Uncaria lanosa* as a post, pole or rod as it reaches 5 meters, making it suitable for such purposes.

16. *Uncaria nervosa* Elmer

Plant herbaceous; root fibrous; stem woody, erect, brown, bark white lenticelled; leaf opposite, elongate, apex obtuse, glabrous, venation pinnate; flower axillar, corolla tubular, green. **Uses:** the root of *Uncaria nervosa* is used by the community as a traditional medicine. It is concocted and drunk to improve overall health and boost the immune system. According to Erwin (2020), it is also observable in Kalimantan, where the local community of Muara Badak believe that the root of this plant can cure various types of cancer. Phytochemical tests conducted on the plant have shown that both the root bark and wood extracts of *Uncaria nervosa* contain alkaloids, flavonoids, terpenoids, and phenolics.

17. *Urophyllum streptopodium* Wall. ex Hook.f.

Plant small tree; root fibrous; stem erect, woody, copiously branched; leaf opposite, elliptic to lanceolate, margin entire, apex acute, glabrous, green; inflorescence in panicles or umbels; flower small, corolla white or cream; fruit small dehiscent capsule or berry. **Uses**: not recorded in *Desa* Serdang Village Forest.

18. *Wendlandia densiflora* (Blume) DC.

Plant small tree; root fibrous, brown, 10-15 cm long; stem woody, erect, redish brown, glabrous, 3-8 m tall; leaf opposite, elongated, 5.5-14 cm long x 2-4.5 cm wide,

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apex acute, margin entire, green, venation pinnate. **Uses**: not recorded in *Desa* Serdang Village Forest.

CONCLUSIONS

Eighteen species of Rubiaceae were found in the village forest of Desa Serdang, consisting of 4 species of trees, 8 species of herbs, and 6 species of shrubs. Out of 18 species, 9 are utilized by the people of Desa Serdang, consisting of 4 species as traditional medicine, 2 species as ornamental plants, 1 species for firewood, and 1 species for house/garden posts or household tools.

AUTHOR CONTRIBUTIONS

A.K.P. compiled the findings, developed the theory, conducted research, and created a herbarium. A.K.P. contributed to the design, implementation of the research, and writing of the research results. W.D.P.S. and Y.E.R. designed and discussed the research design and the research results.

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CONFLICTS OF INTEREST STATEMENT

There are no conflicts to declare

DISCLOSURES AND ETHICS

As a requirement of publication author(s) have provided to the publisher signed confirmation of compliance with legal and ethical obligations including but not limited to the following: authorship and contributorship, conflicts of interest, privacy and confidentiality and (where applicable) protection of human and animal research subjects.

REFERENCES

Ananda,R., Kartika,M., Melfa,A,H. (2021). Keanekargaman jenis tumbuhan hias di Gunung Sibuatan Desa Nagalingga Kecamatan Merek Kabupaten Karo Sumatra Utara. *Klorofil*. 5(1):23-35. http://dx.doi.org/10.30821/kfl:jibt.v5i1.9402

BIOLIB (*Biology Library*). Diakses pada tanggal 15 September 2024, dari https://www.biolib.cz/en/

Efendi, M., Cahyanto, T., & Ramdan, D. M. (2022). Keanekaragaman Tumbuhan Berbiji di Blok Malagembol Cagar Alam Gunung Tilu Jawa Barat. *Jurnal Penelitian Hutan dan Konservasi Alam*, 19(1), 1-31. http://dx.doi.org/10.20886/jphka.2022.19.1.1-31

Erwin. (2020). Review Kandungan Metabolit Sekunder Beberapa Tumbuhan Uncaria yang Terdapat di Kalimantan Timur. *Jurnal Atomik*, 5(1), 18-24. https://jurnal.kimia.fmipa.unmul.ac.id/index.php/JA/article/view/940

GBIF (*Global Biodiversity Information Facility*). Diakses pada tanggal 15 September 2024, dari https://www.gbif.org/

Ginting, B. K., Purwoko, A., Simanjuntak, J. (2015). Kearifan Lokal dalam Pengelolaan Hutan di Desa Serdang Kecamatan Barusjahe, Kabupaten Karo. *Peronema Forestry*

DOI: 10.21009/bioma.v20i2.49337

Science Journal, 4(4), 186-199. https://jurnal.usu.ac.id/index.php/PFSJ/article/view/13175

Laumonier, Y. 1997. The vegetation and physiography of Sumatra. Geobotany 22. Kluwer Academic Publishers, Dordrecht, The Netherlands.

Laumonier Y., Edin A., Kanninen M., Munandar, A.W. (2010) Landscape-scale variation in the structure and biomass of the hill dipterocarp forest of Sumatra: Implications for carbon stock assessments, Forest Ecology and Management, 259 (3): 505-513, https://doi.org/10.1016/j.foreco.2009.11.007

LIPI. (2014). *Kekinian Keanekaragaman Hayati Indonesia (1st ed.)*. LIPI Press.

Murdiyanti, Rahmi.,et al. (2022). Kajian Etnobotani Famili Rubiaceae di Kebun Raya Banua Banjarbaru, Kalimantan Selatan, Indonesia. *Agricultural Journal*, 5(2):274-288. https://doi.org/10.37637/ab.v5i2.944

Purwantoro, R. S., Siregar, H. M., Sudarmono, & Praptiwi. Uji Bakteri Lasianthus (Rubiaceae) Sebagai Tumbuhan Berkhasiat Obat dan Upaya Perbanyakannya. *Buletin Kebun Raya*, *13*(2), 86-93. https://doi.org/10.14203/bkr.v13i2.61

POWO (*Plants of the World Online*). Diakses pada tanggal 15 September 2024, dari https://powoscience.kew.org/

Razafimandimbison, S. G., & Rydin, C. (2024). Phylogeny and classification of the coffee family (Rubiaceae, Gentianales): Overview and outlook. *Taxon*, 73(3), 673-717. https://doi.org/10.1002/tax.13167

Royyani, M. F. & Efendy, O. (2015). Kajian Etnobotani Masyarakat Dayak di Desa Tau Lumbis, Kabupaten Nunukan, Propinsi Kalimantan Utara, Indonesia. *Jurnal Ilmu-Ilmu Hayati*, 14(5), 177-185. https://biologyjournal.brin.go.id/index.php/berita_biologi/article/view/1852

Suryatinah, Y., Wijaya, N. R., & Tjandrarini, D. H. (2020). Eksplorasi dan Inventarisasi Tumbuhan Obat Lokal Berpotensi Sebagai Antiinflamasi di Tiga Suku Dayak, Kalimantan Selatan. *Buletin Plasma Nutfah*, 26(1), 63-76. https://doi.org/10.21082/blpn.v26n1.2020.p63-76

Suwarsono, E. ,Dicky, R, P., Miftachurahma, W . (2019). Kajian Database Keanekaragaman Hayati Kota Semarang. *Jurnal Riptek*. 13(1): 79-91. https://doi.org/10.35475/riptek.v13i1.53

Tjitrosoepomo, G. (2010). *Taksonomi Tumbuhan Spermatophyta*. Yogyakarta: Gajah Mada University press.

Tutung,H.(2019). Potensi dan Keanekaragaman Tumbuhan Obat di Kecamatan Ulu Ere Kabupaten Bantaeng. *Skripsi*. Universitas Muhammadiyah Makassar.

Zhu, H. (2015). Paralasianthus (Rubiaceae), a New Genus from Southeast Asia. *Phytotaxa*, 202(4), 273-278. http://dx.doi.org/10.11646/phytotaxa.202.4.5

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