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Identification of Diversity of Medicinal Plants in Bukit Mayana Forest Area, Kuningan Regency

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Abstract**:** *Bukit Mayana Forest Area is a forest area in Kuningan Regency with an area of ±43 ha with a diversity of medicinal plant species that have not been fully identified. The purpose of this study was to identify the diversity of medicinal plants in the Bukit Mayana Forest Area, Kuningan Regency. The method used is a single-plot method that is placed by purposive sampling with a size of 100 x 80 meters which is divided into sub-plots with a total of 20 plots. The data obtained are then analyzed using the important value index (INP), species diversity index (H'), species richness index (R'). The results showed that medicinal plants were found in 34 types from 23 families. The highest important value index (INP) at the tree, pole, and stake levels is Ficus fistulosa with index values of 38.16%, 91.13%, and 64.68% and seedling levels are Coffea with an index value of 15.26%. The species diversity index (H') is medium with values of 1 < H' > 3 and the species wealth index is low with R' < 3.5.*
Keywords: *Identification; species diversity; Mayana; single plot; Purposive Sampling*

1. INTRODUCTION

Medicinal plants are one of the natural resources that are the best source of chemical components to be used as a treatment of various diseases (Sharma *et al*, 2020). This plant has a close genetic relationship, chemical components and curative effects with other medicinal plants (Hao *et al*, 2020). The use of medicinal plants is widely carried out by the community traditionally and makes primary health services easily available (Segi *et al*, 2018).

Traditional medicine of natural origin has become popular because it has abundant chemical components with therapy (Macedo *et al*, 2018; Santo *et al*, 2020*) and has pharmacological effects* (Hao *et al*, 2020) such as analgesic (Uritu et al, 2018), anti-inflammatory (Oguntibeju, 2018), anti-diabetic, anti-hypertensive (Chukwuma *et al*, 2019), anti-microbial and anti-cancer (Tan et al, 2018).

Wicaksono (2020) said that the area that can be one of the sources of medicinal plant populations is forests. Many medicinal plants in Kuningan Regency have been identified, including in the Karangsari Research Station Area in Gunung Ciremai National Park which was identified as 31 species from 26 families (Ismail *et al*, 2021), Mount Pakuan Protected Forest Area 32 species from 27 families (Herlina *et al*, 2016), in the Gunung Tilu Area 21 species from 14 families (Hendrayana *et al*, 2023).

Bukit Mayana Forest Area is one of the forest areas in Kuningan Regency with an area of ±43 ha consisting of natural forests of about ±15 ha and production forests of around ±28 ha, this forest is an area that is not included in the conservation area and is located adjacent to settlements so that human activities in the area are quite high, this can interfere with the population and plant sustainability (Rahmadiana *et al*, 2018).

Research by Alfiyasin *et al* (2018) said that the vegetation composition of the Javan eagle (*Nisaetus bartelsi*) habitat in the Bukit Mayana Forest Area amounted to 43 species consisting of 22 types for pole level and 39 types for tree level with the highest INP being the type of *Dysoxylum*

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gaudichaudianum. This type based on research by Wang et al (2020) is a medicinal plant that has anti-inflammatory, antitumor, antibacterial, and diuretic activities.

This indicates that the potential of medicinal plants in the Bukit Mayana Forest Area has not been identified as a whole and there is still a lack of research on medicinal plants carried out in the area, therefore it is necessary to identify the diversity of medicinal plants in various growth levels.

2. RESEARCH METHODOLOGY

This research was conducted in the Bukit Mayana Forest Area, Kuningan Regency, vegetation data collection was carried out using a single square-shaped sample plot with a size of 100 m x 80 m and a sub-plot measuring 20 m x 20 m as many as 20 plots using the *Purposive Sampling method* (Figure 1). This sub-plot is divided into several sizes based on plant growth rates including: a) 20 x 20 m for tree level, b). 10 x 10 m for pole level, c). 5 x 5 m for stake level, and d). 2 x 2 m for seedling level and undergrowth. After vegetation data was obtained, type identification with morphological characteristics was carried out based on the plant morphology book by Gembong Tjitrosoepomo and the flora book by Dr. C.G.G.J van Steenis (Armanda, 2018).

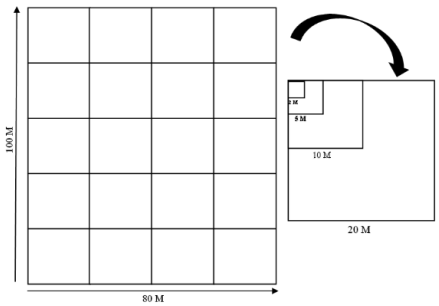

Figure 1. Observation Example Tile Design

Data Analysis

Data on medicinal plants that have been obtained are then analyzed using the following indices:

1. Important Value Index (INP)

The Important Value Index (INP) is an index that describes a type that has a role in the ecosystem (Ledo *et al*, 2019), this index is calculated using the following formula:

$$INP = FR + KR$$

$$INP = FR + KR + DR$$

Information:

- Growth rate of seedlings and undergrowth INP = FR+ KR
- Growth rate of trees, poles, and saplings INP = FR + KR + DR

2. Shannon-Wiener Species Diversity Index (H')

The Species Diversity Index is used to measure the stability of an ecosystem, seen from the high and low Index values obtained. Index (Retang *et al*, 2023) Species Diversity is calculated using the following formula:

$$H' = - \sum Ni \, Ln \, Pi$$

Information:

H' = Shannon-wiener Diversity Index
Pi = Proportion of important values of the type Found in the i-th type
Ln = Logaritma natural
N = Total number of individuals of all types

3. Margalef Species Richness Indeks (R')

Species Richness Indeks used to determine the level of type richness in each individual found (Komul *et al*, 2021). This index is calculated using the following formula:

$$R' = \frac{S - 1}{Ln \, N}$$

Information:

R' = Margalef Species Richness Indeks
S = Number of Types
N = Total Individuals
Ln = Logaritma Natural

3. RESULTS AND DISCUSSION

The composition of medicinal plants

The results of observations in the Bukit Mayana Forest Area found 34 types of medicinal plants classified into 23 families (Table 1). The

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types that are widely found are the families Asteraceae, Fabaceae, and Rubiaceae with each type found as many as 3 types.

Table 1. Types of Medicinal Plants in the Mayana Hill Forest Area (Retang *et al*, 2023)

No	Type Name	Family
1	*Ficus fistulosa*	Moraceae
2	*Gluta renghas*	Anacardiaceae
3	*Piper aduncum*	Piperaceae
4	*Ageratum conyzoides*	Asteraceae
5	*Arenga pinnata*	Arecaceae
6	*Artocarpus heterophyllus*	Moraceae
7	*Bambusa*	Poaceae
8	*Calliandra calothyrsus*	Fabaceae
9	*Centella asiatica*	Mackinlayaceae
10	*Cinnamomum inners*	Lauraceae
11	*Cocos nucifera*	Arecaceae
12	*Coffea*	Rubiaceae
13	*Colocasia esculenta*	Araceae
14	*Dioscorea hispida*	Dioscoreaceae
15	*Diplazium sp.*	Athyriaceae
16	*Durio zibethinus*	Malvaceae
17	*Elettaria cardamomum*	Zingiberaceae
18	*Gnetum gnemon*	Gnetaceae
19	*Hibiscus macrophyllus*	Malvaceae
20	*Microstegium vimineum*	Poaceae
21	*Mikania micrantha*	Asteraceae
22	*Molineria capitulata*	Hypoxidaceae
23	*Myristica fragrans*	Myristicaceae
24	*Neolamarckia cadamba*	Rubiaceae
25	*Paraserianthes falcataria*	Fabaceae
26	*Parkia speciosa*	Fabaceae
27	*Rubia cordifolia*	Rubiaceae
28	*Selaginella doederleinii*	Selaginellaceae
29	*Stachytarpheta mutabilis*	Verbenaceae
30	*Swietenia macrophylla*	Meliaceae
31	*Tectona grandis*	Lamiaceae
32	*Toona ciliata*	Meliaceae
33	*Urena lobata*	Mavaceae
34	*Vernonia amygdalina*	Asteraceae

Asteraceae is one of the most common families found in the Mayana Hill Forest Area compared to others. This is because the Asteraceae family is a group of plants that can live in almost all habitat types (Fauziana *et al*, 2019; Rahmawati *et al*, 2021). This result is the same as the research of Nafeesa *et al* (2021) that the Asteraceae family is most commonly found in the hills of Bhimber Pakistan compared to other families with 11 species. In Oman the family Asteraceae is found the second most with 14 species (Patzelt *et al*, 2022). Plants belonging to the Asteraceae family have many benefits for the world of health because they have pharmacological effects such as antioxidants, anti-hyperlipidemia, vasoreklasan, antithrombotic, dieuretic. In addition, this plant has contributed to cardiovascular diseases such as heart attacks, strokes, coronary heart disease, hypertension (Michel et *al*, 2020) *and lowers uric acid levels* (Amal *et al*, 2021).

Fabaceae is one of the plant groups with the number of types found in this study, which is as many as 3 types. The Fabaceae family around the world has around 18,000 species that have been identified with leguminous fruit characteristics and also inhabited by trees, shrubs, and shrubs (Sukaeningsih *et al*, 2021). Based on research by Bibi *et al* (2021) that the second most plants found in Lower Tanawal Pakistan are the fabaceae family with 24 species, then in Paraguay the most are found with 14 species (Cervantes *et al*, 2023). Plants that fall into the Fabaceae family based on several species have pharmacological effects including anti-cancer, anti-inflammatory, antioxidant, antibacterial, antifungal, antimicrobial used in traditional medicine (Oliveira *et al*, 2018; Aly *et al*, 2019; Oladeji *et al*, 2020).

Rubiaceae is the third family with the most types in this study with 3 species found. This family grows and develops widely almost all over the world in addition to polar regions and deserts (Haris *et al*, 2019). Plants that fall into the family can grow at an altitude of 10-600 meters in varying conditions consisting of habitus trees, shrubs, understory plants and herbs (Naemah *et al*, 2020). Plants that belong to the Rubiaceae family found in Africa are the second most after the Fabaceae family with 318 species found (Van Wyk, 2020). Then based on Rao's research (2018) Rubiaceae is the most family identified in the

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Andhra University Area of India with 14 species, and in the City Forest Area of the University of Malaysia with 7 species (Majuakim *et al*, 2018). With a wide distribution, the Rubiaceae family is useful as a medicine because it has pharmacological effects including antioxidants (Suksungworn *et al*, 2021), antifungal (dos Santos et al, 2021), anticancer, anti-inflammatory, antibacterial, and antidiabetic (Das *et al*, 2020).

Important Value Index (IVI)

Based on the results of the analysis of the important value index (IVI) for all growth rates i.e., tree level – seedling rates vary greatly (Figure 2). The highest important value index (IVI) for tree, pole, and sapling levels is the type of *Ficus fistulosa* from the family Moraceae with growth rate index values of 38.16%, 91.13%, and 64.68% respectively. Then for the seedling level the index with the highest value is the type of *Coffea* from the Rubiaceae family with an index value of 15.26%. This result is different from the research of Alfiyasin *et al* (2018) that the highest important value index at the pole level is the type of *Dysoxylum gaudichaudianum* (81.15%) and the tree level is the type of *Lasianthus constrictus* (37.10%).

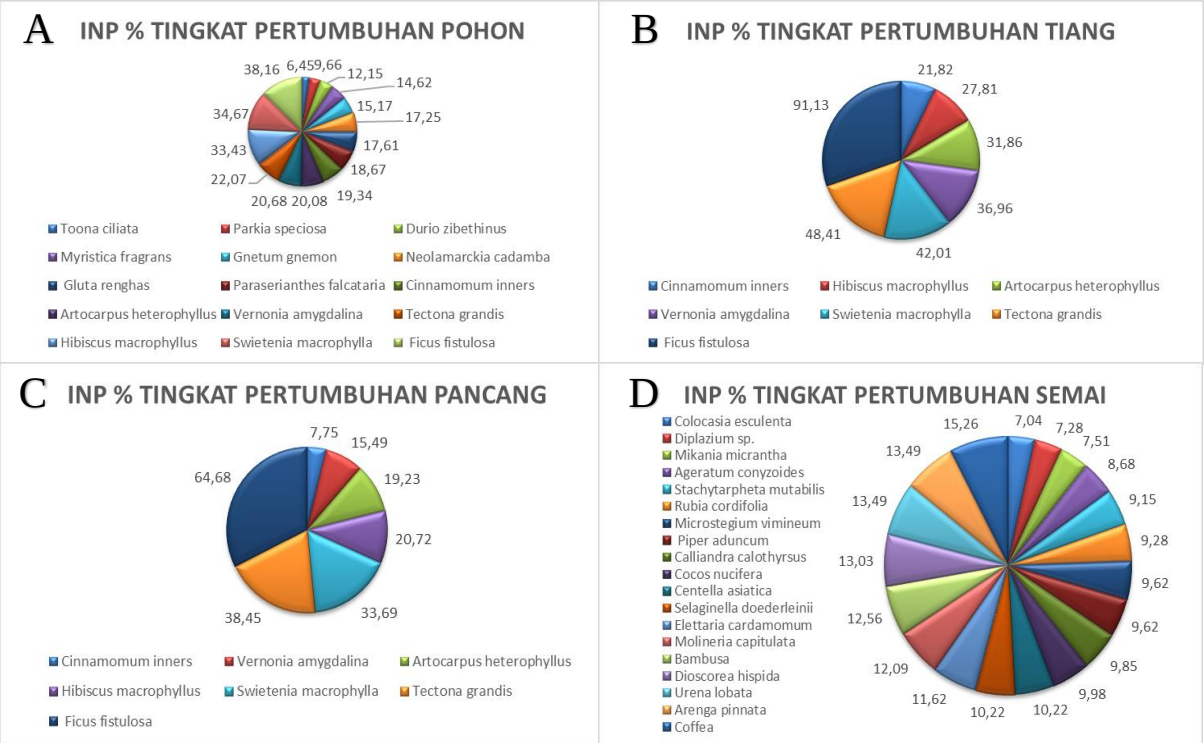

Figure 2. Important Value Index (IVI) in Various Growth Rates

Ficus fistulosa has pharmacological effects such as anti-oxidant, antimicrobial (Raka *et al* 2019), anti-HIV (Khairunisa *et al*, 2020; Safitri *et al*, 2022), anti-inflammatory (Zhang *et al*, 2020), and anti-viral (Putra et *al*, 2020). *Ficus fistulosa* is a plant that is the habitat of Javan langur mammals (*Trachypithecus auratus*) (Supartono *et al*, 2018; Alfiyasin *et al*, 2018) and spread in Kuningan Regency starting from the southern region, namely the Bukit Barisan area, the western region, namely the Karangsari Research Station (TNGC), the northern region, namely Seda (TNGC), and the eastern region, namely Mount Tilu (Hendrayana *et al*, 2021). Then *Coffea* is a tropical type of plant spread in developing countries such as Indonesia which has pharmacological effects such as anti-cancer, anti-

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inflammatory, anti-bacteri, anti-diabeteuic, and anti-atherochloretic (Al-Asmarii *et al*, 2020).

Species Diversity Index (H')

Based on the results of the analysis, the species diversity index (H') for different growth rates is almost the same. For tree growth rate, the species diversity index is 2.621, pole growth rate is 1.838, sapling growth rate is 1.744, and seedling growth rate is 2.906. This shows that species diversity for various growth levels in the Bukit Mayana Forest Area is classified as medium with a value of 1 < H' > 3.

Species Richness Indeks (R')

Based on the results of the analysis, the species richness index (R') for various growth rates is classified as the same. The tree growth rate is 3.27, the pole growth rate is 1.70, the sapling growth rate is 1.23, and the seedling growth rate is 2.97. Therefore, species richness for various growth rates in the Bukit Mayana Forest Area is low with an R' value of < 3.5. The species diversity index (H') and species richness index (R') are presented in figure 3.

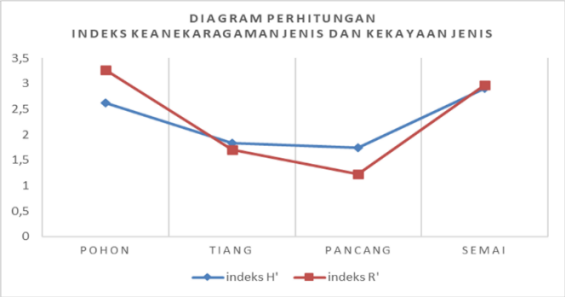

Figure 3. Species Diversity Index (H') and Species Richness (R') Diagram

4. CONCLUSION

The Bukit Mayana Forest Area has the potential for medicinal plants with high species diversity consisting of 34 species and classified into 23 families dominated by the families Asteraceae, Fabaceae, and Rubiaceae, so that in the future there will need to be regulations governing the management of medicinal plants in the Bukit Mayana Forest Area.

5. ACKNOWLEDGMENTS

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