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Research Article

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Identification of plants constituent of conservation forest vegetation Potorono, Sambak, Magelang

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ABSTRACT

The Potorono Sambak Forest has excellent vegetation and helps to maintain clean water availability for the surrounding community. Various types of plants that grow in the Potorono Forest area of Sambak Village, Magelang have never been identified so their types must be identified. This research aims to identify the various types of plants found in the Potorono Forest Area, Sambak, Magelang to help conservation. The research method used in this study is the exploration method. Every plant found during the exploration of the Potorono Forest area is observed for its morphology, documented, and identified using a plant identification book. The obtained data is then entered into a table based on its categorization and analyzed descriptively qualitatively. The research results obtained as many as 80 species of plants consisting of 26 types of trees, 22 types of shrubs, 20 types of herbs, 5 types of lianas, and 5 types of grass. Of the 80 species, they can be grouped into 47 families with the largest number of Moraceae (6 species), Asteraceae (4 species), and Euphorbiaceae. (4 species). Many types of plants are obtained, and they certainly play an important role in the habitat to maintain the balance of the ecosystem. Therefore, all parties must be actively involved in preserving the Potorono forest ecosystem so that it remains sustainable and beneficial for all living beings.

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INTRODUCTION

Indonesia has a vast forest area with a very high level of biodiversity (Astiani et al., 2017; Rintelen et al., 2017). Various species of plants live in Indonesian forests with tropical climates with environmental conditions that are very favorable for plant growth and development. The vast area of forests and the abundance of plant species caused the management and conservation to be carried out not optimally (Nugroho, 2017). Various forest management efforts are being implemented to maximize potential and conservation. One of the forest management efforts being undertaken is joint management between the

government and society. The government in this case is represented by Perum Perhutani which is a state-owned enterprise agency that plays a role in managing the country's forests (Fathyah et al., 2019).

The Potorono forest is a state forest area managed by Perum Perhutani together with the community with the aim of improving the welfare of the surrounding community while still paying attention to the preservation of existing natural resources, both flora and fauna (Santoso & Hidayat, 2019). Potorono forest is a forest area of the country managed by Perum Perhutani together with the community with the aim of improving the well-being of the community around it by keeping an eye on the sustainability of natural resources that exist both flora and fauna. Forest management carried out together with the community is in accordance with the Decree of the Governor of Central Java Number 24 of 2001 concerning Joint Community Forest Management, also known as JCFM. In addition, the forest management system carried out jointly is contained in the Decision of the Forestry Perum Directorate No. 682/Kpts/Dir/2009 on the Guidelines for Forest Management Jointly with the Community (JCFM). Thus, the implementation of the Potorono forest management cooperation has been written and can be a common guideline.

The Potorono forest, Sambak, Magelang has an area of about 91.1 Ha (Hermanto et al., 2021). In this forest area, the community plants several types of plants with economic value, especially coffee. The type of coffee grown in the forest adapts to the altitude and environmental conditions, namely robusta coffee (*Coffea canephora*). Based on initial observations, it is known that in the Potorono forest, there is a spring that flows to the residential area of the surrounding community. The flowing water is used by residents for their daily needs. The condition of the vegetation which is quite dense and good in the Potorono Forest allows the availability of groundwater to minimize the potential for water shortages in the dry season (Binsasi et al., 2017). Therefore, the existence of vegetation in the Potorono forest must always be protected from all efforts that could damage it, either directly or indirectly. One effort that can be made to maintain this is through research exploration activities.

The potential of the Potorono forest has been carried out in several research explorations, including the implementation of the Potorono Sambak program and policy (Santoso, 2019), Ecophysiology and coffee quality (Fiqi, 2022), and strategies for developing robusta coffee in Sambak village (Sholikhin et al., 2021). Several studies that have been conducted focus on examining the policies held by the village related to the implementation of village programs and coffee plants as the village's main local product, which is widely cultivated by the community. No research has been conducted regarding the diversity of vegetation found in the Potorono forest, particularly related to plant species. Research on vegetation in Magelang has been carried out based on investigations, but not in the Potorono forest, rather in the restoration area of the Merapi Volcano National Park concerning ground flora (Purnomo et al., 2017), in the Mount Tidar Magelang area related to herbaceous plants (Handayani & Amanah, 2018), study of Antophyta plants in the city of Magelang (Alamsyah et al., 2020). Thus, this research opens up significant opportunities for the identification of plant species found in the Potorono Forest, allowing for the proper identification of these species. Additionally, the impact of this research is expected to provide support to the village government and the community in the conservation efforts of the Potorono Forest, which has many beneficial potential benefits for the community.

RESEARCH METHODS

This research was conducted in the Potorono forest, Sambak, Magelang, Central Java with location coordinates namely 7° 30'49"S 110°04'18"E (Figure 1). The time for conducting the research is February - March 2022.

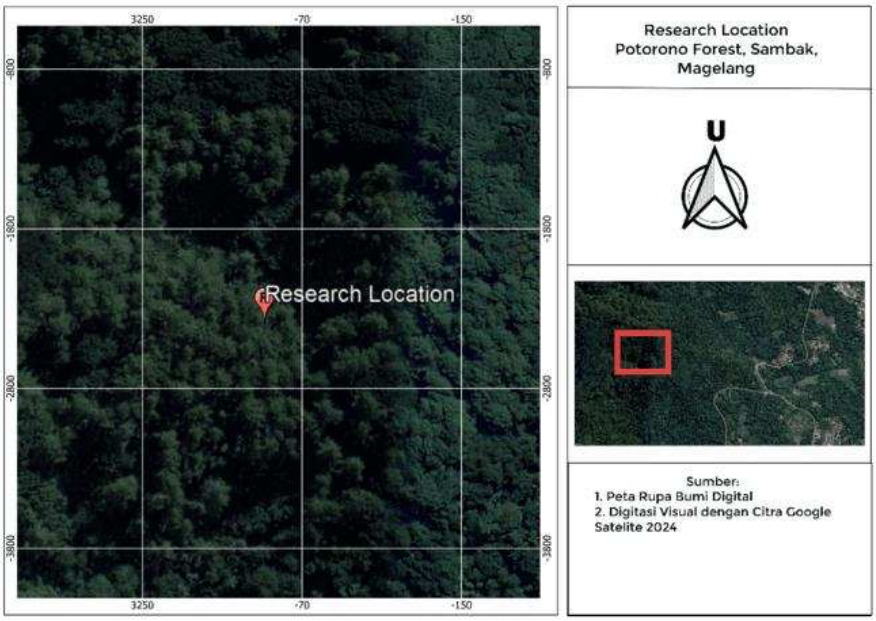

Figure 1. Location of Plant Identification Research in the Potorono Forest, Sambak, Magelang

The research method used for collecting plant species data is the exploration method (Newmaster & Ragupathy, 2010; Agil, 2021) in the Potorono forest area. The abiotic factors measured are soil pH, soil moisture, soil temperature, air temperature, and light intensity (Purbasari & Akhmadi, 2019; Liu et al., 2021). The research sheet was used to record the morphology and identification of the plants obtained. The exploration route for the Potorono forest area was determined in advance to facilitate the process of collecting plant data because there is some quite steep terrain and cliffs. The direction of the plant identification exploration route is clockwise, paying attention to the location around the route so that no plants are missed. Every plant found in the Potorono forest area was observed, its morphology was recorded and documented. From the results of these morphological observations, identification is then carried out with the help of a plant identification reference book (Tjitrosoepomo, 2005). For plants whose species have not been identified, plant samples are taken and a herbarium is made for further identification. All plants that have been obtained are grouped into groups of trees, shrubs, herbs, lianas, and grasses and their family groups are searched for. Then the data was analyzed descriptively and qualitatively to explain in detail and based on reference sources (Sartika et al., 2022).

FINDING AND DISCUSSION

Based on research conducted in the Potorono forest, results were obtained related to abiotic factors and the identification of plant types. The data from measurements of abiotic factors in the Potorono Sambak forest can be seen in Table 1.

Table 1. Results of Measuring Abiotic Factors in the Potorono Forest, Sambak, Magelang

No	Abiotic Factors	Measurement Result
1	pH	6
2	Soil moisture	75 %
3	Soil Temperature	27 ^{0}C
4	Environment Temperatur	28 ^{0}C
5	Light intensity	852x10 Lux

Basically, every plant has different standard abiotic factors for optimal growth, such as minimum, optimum and maximum temperatures (Hatfield & Prueger, 2015). From the measurement results, it can be seen that the soil pH in the Potorono forest is 6, where the pH is close to ideal for plant growth, namely 6.6-7.5 (Achmad & Aji, 2016). However, soil with a pH of 6 is a good condition for the availability of macronutrients which are really needed by plants (Ferrarezi et al., 2022). Thus, these conditions cause various types of plants found in the Potorono forest to grow well.

Furthermore, the results of measuring the soil moisture factor showed a result of 75%, where the soil moisture level was quite high (Merbawani et al., 2021). This is because the vegetation conditions of the Potorono forest are quite dense, so the intensity of sunlight directly hitting the ground is not too much (Charfi et al., 2014). Therefore, water evaporation from the soil can be minimized and stored properly so that it is sufficient to meet the living needs of plants. The results of measuring the next abiotic factor, namely soil and environmental temperature, show that the temperature is still within the optimal range 20–35 °C (Meilianto et al., 2022). Optimal soil and environmental temperatures can reduce evaporation and optimize the performance of enzymes in the plant body that play a role in biochemical reactions (Heinze et al., 2017). The results of plant identification research in the Potorono Sambak forest which was carried out were 80 plant species. All the plants that have been identified can be grouped into 3 large groups. The grouping is as follows.

Tree type plants, the number of tree species identified in the Potorono forest is 26 species consisting of 15 families. The abiotic conditions measured by pH show values close to neutral, making them quite ideal for the growth of various types of trees found there (Barrow, 2017). In addition, the ideal soil temperature, environmental temperature, and soil humidity in the Potorono Forest affect the availability of water and nutrients for the plants' survival needs (Cai et al., 2019). *Durio sp*. and *Parsea americana* are types of plants that are difficult to grow in dry environments (Sudarmono et al., 2023), and these plants are found thriving in the Potorono forest area. The tree species identified can be seen in Table 2.

Table 2. Results of Identification of Tree Species in the Potorono Forest, Sambak, Magelang.

No	Local Name	Scientific Name	Family
1	Pule/ Pulai	*Alstonia scholaris*	Apocynaceae
2	Aren	*Arenga pinnata*	Arecaceae
3	Sarai (Palem)	*Caryota mistis*	Arecaceae
4	Spatudia	*Spathodea sp.*	Bignoniaceae
5	Kaliandra	*Calliandra sp.*	Fabaceae
6	Petai Cina	*Leucaena leucocephala*	Fabaceae
7	Sono Kembang (Angsana)	*Pterocarpus indicus*	Fabaceae
8	Rukem (Rukam)	*Flacourtia rukam*	Flacourtiaceae
9	Melinjo	*Gnetum gnemon*	Gnetaceae
10	Alpokat	*Persea americana*	Lauraceae
11	Kayu manis	*Cinnamomum verum*	Lauraceae.
12	Kantil hutan	*Magnolia sp*	Magnoliaceae
13	Durian	*Durio sp.*	Malvaceae
14	Waru	*Hibiscus tiliaceus*	Malvaceae
15	Mahoni	*Swietenia mahagoni*	Meliaceae
16	Sukun	*Artocarpus altilis*	Moraceae
17	Bendo, terap	*Artocarpus elasticus*	Moraceae
18	Nangka	*Artocarpus heterophyllus*	Moraceae
19	Wilada	*Ficus fistulosa*	Moraceae
20	Ares	*Ficus retusa*	Moraceae
21	Awar-awar	*Ficus septica*	Moraceae
22	Cengkeh	*Syzygium aromaticum*	Myrtaceae

No	Local Name	Scientific Name	Family
23	Salam (Zoo)	*Syzygium polyanthum*	Myrtaceae
24	Kelapa	*Cocos nucifera*	Palmae
25	Pinus	*Pinus merkusii*	Pinaceae
26	Jati	*Tectona grandis*	Verbenaceae

The Moraceae family is the most commonly found among other types of families, namely 6 types, namely *Artocarpus altilis, Artocarpus elasticus, Artocarpus heterophyllus, Ficus fistulosa, F. retusa*, and *F. septica*. Moraceae is a fairly large plant family consisting of 38 genera with around 1000 species (Samsudin, 2020) which are widely distributed in tropical and subtropical areas (Maulidina et al., 2023). Furthermore, the plant family that is most commonly found for tree species is Fabaceae. Three types of plants belonging to the Fabaceae family were found, namely *Calliandra sp., Leucaena leucocephala* and *Pterocarpus indicus*. This family has a very large number of species (7% of flowering plants) and is the third largest in the kingdom plantae (Raj et al., 2022) and grows well in Indonesia (Zahara, 2022). Apart from that, of all the tree species obtained, it is known that there are two types of trees that are quite large in size, that grow in the area, namely *Pinus merkusii* (Figure 2), and *Swietenia mahagoni* (Figure 3). For *P. merkusii* trees with very large sizes, the trees have been utilized by tapping the sap. As is known, pine resin has good adhesive power (Perceka & Ing, 2016) so it is used as an adhesive in the form of gondorukem (Sukadaryati, 2014) and turpentine which has been implemented in various industries such as paper, paint, pharmaceuticals, and cosmetics (Pasaribu & Waluyo, 2021).

Figure 2. *Pinus merkusii* Tree which has a Large Size and the Sap Tapping Process

Figure 3. *Swietenia mahagoni* Tree is Very Large

Shrub type plants, various types of shrub plants have been identified in the Potorono forest. In total, there are 22 species of shrub plants consisting of 16 types of families. The amount is quite large and supported by abiotic factors such as pH, soil temperature, and light intensity, which are quite ideal for shrub growth. Additionally, in the Potorono forest area, some springs greatly influence soil fertility. Musaceae is the family with the most common species, with three types, namely *Musa paradisiaca* var. *sapientum*, *Musa acuminatan balbisiana colla*, and *Musa acuminata*. This plant is the result of planting carried out by local people to harvest its fruit. This is of course in accordance with the status of the forest as a JCFM forest so that there is a role for the community in its management, including planting plants. The types of shrub plants that have been identified from the Potorono Sambak forest are presented in Table 3.

Table 3. Results of Identification of Shrub Types in the Potorono Forest, Sambak, Magelang

No	Local Name	Scientific Name	Family
1	Jalu mampang	*Monstera pertusa*	Araceae
2	Memelong	*Philodendron sp.*	Araceae
3	Puring	*Codiaeum variegatum*	Euphorbiaceae
4	Ubi karet	*Manihot sp.*	Euphorbiaceae
5	Munggur/ Gamal	*Glyricidia sepium*	Fabaceae
6	Miana	*Coleus sp.*	Lamiaceae
7	Andong	*Cordyline fruticosa*	Liliaceae
8	Tanaman Abadi Hijau	*Molineria capitulata*	Liliaceae
9	Kembang sepatu	*Hibiscus rosasinensis*	Malvaceae
10	Pisang ambon	*Musa paradisiaca var. sapientum*	Musaceae
11	Pisang kepok	*Musa acuminatan balbisiana colla*	Musaceae
12	Pisang susu	*Musa acuminata*	Musaceae
13	Belimbing Tanah	*Oxalis barrelieri*	Oxalidaceae
14	Pandan Duri	*Pandanus tectorius*	Pandanacea
15	Sirih Hutan	*Piper aduncum*	Piperaceae
16	Kopi robusta	*Coffea canephora*	Rubiaceae
17	Cabe	*Capsicum frutescens*	Solanaceae
18	Cepoka/ Terong-terongan	*Solanum torvum*	Solanaceae
19	Duri cina	*Triumfetta rhomboidea*	Sparrmanniaceae
20	Puyeng	*Lantana camara*	Verbenaceae
21	Pecut Kuda	*Stachytarpheta jamaicensis*	Verbenaceae
22	Kapulaga	*Elettaria cardamomum*	Zingiberaceae

From the data presented in Table 3, there is a *Coffea canephora* plant which is a plant that produces coffee beans which is being developed by the people of Sambak village. The economic potential is large enough that many people plant *C. canephora*. In Magelang regency, Sambak village is one of the villages that produces robusta coffee (Sholikhin et al., 2021). Herbaceous plants, the results of research in the Potorono forest obtained 20 species of herbaceous plants belonging to 14 types of families. The humid soil conditions and other abiotic factors allow this group of plants to thrive. In detail, the results of identifying herbaceous plants can be seen in Table 4.

Table 4. Results of Identification of Herbaceous Plants in the Potorono Forest, Sambak, Magelang

No	Local Name	Scientific Name	Family
1	Lumbu Kecil	*Colacasia sp*	Araceae
2	Babandotan	*Ageratum conyzoides*	Asteraceae
3	Jewor/ Sintrong	*Crassocephalum crepidioides*	Asteraceae
4	Erigeron	*Erigeron sp.*	Asteraceae
5	Jotang kuda	*Synedrella nodiflora*	Asteraceae
6	Pacar Air	*Impetiens balsamina*	Balsaminaceae

7	Nanas	*Ananas sp.*	Bromeliaceae
8	Pacing	*Cheilocostus speciocus*	Costaceae
9	Paku Garuda	*Pteridium aquilinum*	Dennstaedtiaceae
10	Gadung tikus	*Tacca palmata*	Dioscoreaceae
11	Paku	*Nephrolepis sp*	Dryopteridaceae
12	Meniran Hijau	*Phyllanthus niruri*	Euphorbiaceae
13	Meniran Merah	*Phyllanthus urinaria*	Euphorbiaceae
14	Paku	*Hymenophyllum sp*	Hymenophyllaceae
15	Senduduk Bulu	*Clidemia hirta*	Melastomaceae
16	Kacangan (Legum)	*Arachis sp.*	Papilionaceae
17	Bulu Lutung	*Borrreria laevis*	Rubiaceae
18	Patikan Kerbau	*Borreria alata*	Rubiaceae
19	Paku Rane	*Selaginella sp*	Selaginellaceae
20	Kemadu (Lateng)	*Laportea interrupta*	Urticaceae

Asteraceae is the most commonly found family, with four types of plants including *Ageratum conyzoides, Crassocephalum crepidioides, Erigeron sp.*, and *Synedrella nodiflora*. The next most frequently found family is Euphorbiaceae with two types of plants, namely *Phyllanthus niruri* and *Phyllanthus urinaria*. There are also two types of Rubiaceae, which are included in the herbaceous group, namely *Borreria laevis* and *Borreria alata*. The distribution of the Euphorbiaceae family is spread across Asia, including Indonesia, Singapore, Brunei Darussalam, the Philippines, and Malaysia (Djarwaningsih, 2017). Meanwhile, Rubiaceae has a total of 611 genera and is spread across tropical and subtropical regions (Aziz & Adi, 2020).

Liana type plants, the results of plant identification in the Potorono forest also found groups of liana types of plants. This plant has a distinctive characteristic, namely that it lives on other plants to grow upright (Hidayah et al., 2018). From the research results, five species of liana plants were obtained, which can be seen in Table 5.

Table 5. Results of Identification of Liana Plants in the Potorono PHBM Forest, Sambak, Magelang

No	Local Name	Scientific Name	Family
1	Cincau bulu	*Cyclea barbata*	Menispermaceae
2	Kemukus	*Piper cubeba*	Piperaceae
3	Merica	*Piper nigrum*	Piperaceae
4	Canar Susu	*Smilax macrocarpa*	Smilacaceae
5	Sirih Keraton	*Cissus discolor*	Vitaceae

In the Potorono forest area, quite a lot of *Piper cubeba* and *Piper nigrum* plants were found. Humid environmental conditions enable these two types of plants to live well (Munawaroh & Yuzammi, 2017). Apart from that, these two types of plants are plants grown by the community because they have quite high selling prices. Based on research, *P. cubeba* has benefits as an antibacterial, antioxidant, antihyperuricemic and so on (Andriana et al., 2019; Kumar, 2021). *P. nigrum* is also reported to have potential as an anticancer, antidiabetic, antiinflammatory, analgesic, and so on (Tasleem et al., 2014; Takooree et al., 2019). All the liana plants found grew vigorously with the support of fairly ideal abiotic factors, namely in pH conditions of 6-7.5, where nutrients are available in the soil (Muhammad & Mowidu, 2023).

Grass type plants, for grass plants, there were 5 species consisting of two families, namely Cyperaceae and Poaceae. Poaceae are among the plants that are vulnerable to abiotic stress conditions. Conditions of moist soil, near-neutral pH, and sufficient light intensity allow Poaceae plants to grow well. Table 6 displays the results of identifying grass types.

Table 6. Identification Results of Grass Types in the Potorono Forest, Sambak, Magelang

No	Local Name	Scientific Name	Family
1	Kerisan	*Scleria sp.*	Cyperaceae
2	-	*Ischaemum sp.*	Poaceae
3	Rumput pait	*Paspalum conjugatum*	Poaceae
4	Rumpur keranjang	*Oplismenus hirtellus*	Poaceae
5	Alang-alang	*Imperata cylindrica*	Poaceae

From Table 6, it can be seen that members of the Cyperaceae family obtained one type of plant, namely *Slecria sp*., and in the Poaceae family, four types of plants were obtained, namely *Ischaemum sp., Paspalum conjugatum, Oplismenus hirtellus*, and *Imperata cylindrica*. This plant has very small seeds, making them easy to spread and grow (Hartono et al., 2020). Poaceae is a grass plant that is able to grow in open and closed land areas (Lestari & Christie, 2020). It is known that there are around 737 types of Poaceae in Indonesia (Damayanto & Fefirenta, 2021).

CONCLUSION

There are 80 species of plants identified in the Potorono Forest, Sambak, Magelang, consisting of 26 types of trees, 22 types of shrubs, 20 types of herbs, 5 types of lianas and 5 types of grass. A total of 47 families of all plants were identified, the most commonly found being the families Moraceae (6 species), Asteraceae (4 species), Euphorbiaceae (4 species), Liliaceae (4 species) and Poaceae (4 species). This plant diversity must be preserved and maintained by all components, both society and government, so that the existence of the forest remains sustainable and provides many benefits for life, especially for the community around the Potorono Forest, Sambak. Future research is expected to conduct exploratory analyses of vegetation and fauna diversity, thereby complementing the existing studies and further preserving the ecosystem.

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