DIVERSITY AND ABUNDANCE OF MADICINAL PLANTS IN PANGGARON TOURISM FOREST OF CENTRAL JAVA, INDONESIA

by Sri Utami

Full paper

DIVERSITY AND ABUNDANCE OF MADICINAL PLANTS IN PANGGARON TOURISM FOREST OF CENTRAL JAVA, INDONESIA

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Abstract. Forests are ecosystems that contain very high biodiversity in both flora and fauna. Potential resources contained in forests include medicinal plants. Current, the need of medicinal plants as raw materials for traditional medicine is inceasing. This study aims to determine the species of plants that have potential as drugs and its abundance in Penggaron Tourism Forest. Research locations in the mixed forests and pine forests of Penggaron tourism forest. Vegetation sampling was carried out using a plot method with a size of 10 x 10 m for tree strata, 5 x 5 m for shrub strata and 1 x 1 m for grass or herbaceous strata. Each species of medicinal plant found is identified as the species name and each use. The medicinal plants found in Penggaron tourism forest is 24 species, consisting of 15 families. The most commonly found plant species include the Familia Asteraceae (*Chromolaena odorata*, *Crassocephalum crepidiodes* and *Elephantopus scaber*), Malvaceae (*Hibiscus tiliaceus, Sida rhombifolia,* and *Urena lobata*) and Zingeberaceae (*Alpinia galanga, Zingiber officinale* and *Zingiber montanum*). The species of medicinal plants found have 25% tree habitus, 25% shrubs and 50% herbs / grasses. Medicinal plants in the Penggaron forest have not been widely used by people around the forest. It is necessary to socialize the use of medicinal plants wisely to communities around the forest, so that the existence of forests also benefits the surrounding community.

1. Introduction

Indonesia has very large forests and has high biodiversity. About 30,000 plant species live in Indonesia. Most of the wealth of plant species is found in the forest. Among these types of plants 9,600 are medicinal plants [1]. However, not many people have used these medicinal plants for traditional medicine, because only about 800-1,200 species of medicinal plants have been used as traditional medicine [2]. Therefore, research to explore medicinal plants in nature and their use needs to be developed for the raw material needs of traditional medicines.

The need for medicinal plants is increasing, because the world community today has a tendency to back to nature for the treatment of various diseases. Many studies have been carried out regarding the use of medicinal plants by the community for the treatment of diseases. Based on the results of the study, the people around the Gunung Simpang Nature Reserve used 74 species of medicinal plants [3] and the Moronene tribe around the Rawa Aopa Watu Mohai National Park Southeast Sulawesi made use of 65 species of medicinal plants for the treatment of various diseases [4]. In an effort to make the availability of raw materials for traditional medicines, medicinal plants that grow in nature must be conservation.

Penggaron tourism forest is administratively located in Semarang Regency, Central Java Province. Aside from being a tourist spot the forest is ecologically functioning for the catchment area, flora and fauna conservation and as a place of education. As a tourist forest, Penggaron has a high diversity of plants. Among the plants that grow in the Penggaron forest, some are medicinal plants. Research that revealed the species of medicinal plants found in Penggaron tourism forest has never

been done. Therefore, this study aims to determine the diversity and abundance of medicinal plants in Penggaron tourism forest.

2. Materials and Method

The research location in the Penggaron tourist forest, Semarang Regency, Central Java. The study was conducted in two locations, namely in mixed forests and pine forests. Vegetation sampling was carried out using a plot method measuring 10 x 10 m for tree strata, 5 x 5 m for shrub strata and 1 x 1 m for grass or herbaceous strata. Identification of medicinal plants is carried out in the Ecology and Biosystematics laboratory. Research variables include the diversity of medicinal plants, the percentage of habitus and the abundance of species individuals.

Data analysis

1. Diversity of medicinal plants

Data on the diversity of medicinal plants were tabulated and analyzed descriptively by looking at the characteristics of each species using a reference book [5,6].

2. Abundance

Two calculations are carried out, namely absolute abundance and relative abundance. The absolute abundance of each species in each station is calculated using the following formula.

$$K = \frac{\sum individu\ of\ species\ i}{plot\ area}$$

The relative abundance of each species in each station is calculated using the following formula. :

$$KR = \frac{\sum individu\ spesies\ i}{\sum total\ individu} \times 100\%$$

3. Results and Discussion

Penggaron tourism forest has two different forest ecosystems, namely mixed forests and pine forests. The results of species identification in the two study locations found 24 species of medicinal plants from 15 families. The types consist of 6 species of tree, 6 species of shrub and 12 species of herbaceous herbs / grass (Table 1)

Tabel 1. Diversity of medicinal plant species in Penggaron tourism forest, Semarang Regency Central Java.

No	Familia	Species	Lokal names	Habitus	Benefit
1	Amaranthaceae	*Amaranthus spinosus*	Bayam duri	Herbs	Antibacteri
2	Amaranthaceae	*Gomphrena globosa*	Bunga kenop	Herbs	Expectotant
3	Araceae	*Arenga pinnata*	Aren	Tree	Uric acid
4	Asteraceae	*Chromolaena odorata*	Kirinyu	Shrub	Anti inflamasi, antidiabetic
5	Asteraceae	*Crassocephalum crepidiodes*	Sitrong	Shrub	Antioksidan, antidiabetic
6	Asteraceae	*Elephantopus scaber*	Tapak liman	Herb	Antipiuretic, antibiotic
7	Euphorbiaceae	*Phyllanthus niruri*	Meniran	Herbs	Antipiuretic, diuretic, expectorant,
8	Fabaceae	*Clitoria ternatea*	Kembang telang	Herbs	Antioksidan, antibacteri, anti implamasi, anti diabetic
9	Lamiaceae	*Blumea balsamifera*	Sembung	Herbs	Expectorant, antibacteri
10	Malvaceae	*Hibiscus tiliaceus*	Waru	Tree	Diuretik, expectorant
11	Malvaceae	*Sida rhombifolia*	Sidaguri	Shrub	Analgesic, diuretic
12	Malvaceae	*Urena lobata*	Pulutan	Shrub	Antirheumatic
13	Meliaceae	*Melia azadirachta*	Mindi	Shrub	Hypertensi
14	Meliaceae	*Swietenia mahagoni*	Mahoni	Shrub	Hypertensi, anti diabetic, anti rheumatik

15	Melastomaceae	*Melastoma candidum*	Senggani	Herbs	Typiretik, analgesic, diuretik
16	Mimosaceae	*Mimosa pudica*	Putri malu	Herbs	Antidiuretic, transquillizer
17	Moraceae	*Ficus septica*	Awar-awar	Shrub	Anti cancer, anti inflamasi
18	Moringaceae	*Moringa oleifera*	Kelor	Tree	Anticancer
19	Musaceae	*Musa paradisiaca*	Pisang	Tree	Antipiretic, expectorant
20	Rubiaceae	*Paederia foetida*	Sembukan	Herbs	Antidyare
21	Rubiaceae	*Morinda citrifolia*	Mengkudu	Shrub	Hypertensi, expectorant
22	Zingeberaceae	*Alpinia galanga*	Laos	Herbs	Anticancer, antidyare
23	Zingeberaceae	*Zingiber officinale*	Jahe	Herbs	Antioksidan
24	Zingeberaceae	*Zingiber montanum*	Bengle	Herbs	Antipiretic, rheuumatic

Species of medicinal plants in mixed forests, at most from the Asteraceae family (3 species), Malvaceae family (3 species) and Zingeberaceae family (3 species). While the family Amaranthaceae and Meliaceae each consist of 2 species, while the other families each only consist of 1 species (Figure 1). The results of the study in Nepal, stated that the species of medicinal plants that were found were mostly from the Asteraceae family [7], whereas in Thailand the most commonly found medicinal plants were from the Asteraceae and Zingeberaceae families [8]. Research on medicinal plants conducted in Chinglei Pakistan found that the most dominant medicinal plants were Lamiaceae and Asteraceae [9]. From the results of these studies the most commonly found medicinal plants are from the Asteraceae family. The species of plants including the Asteraceae family produce many seeds as a reproductve organ and are easy to grow, so many species of plants are found. The Zingeberaceae family is also a plant that is commonly found in the lower layers of the forest, because the environment is suitable for its growth.

The plant species of the family Asteraceae found in mixed forests are: *Chromolaena odorata*, *Crassocephalum crepidiodes* and *Elephantopus scaber*. One of the most common species of medicinal plants found in Thailand is *Chromolaena odorata* [8]. *Chromolaena odorata* species have a wide distribution and are easily found in the tropics. This species is widely used because it contains phytochemicals that are effective for healing various diseases [8]. In addition, these plants have antibacterial properties [10] that are good for wound healing. Many people around the village of Mount Merapi National Park have used *Chromolaena odorata* and *Elephantopus scaber* as traditional medicines [11].
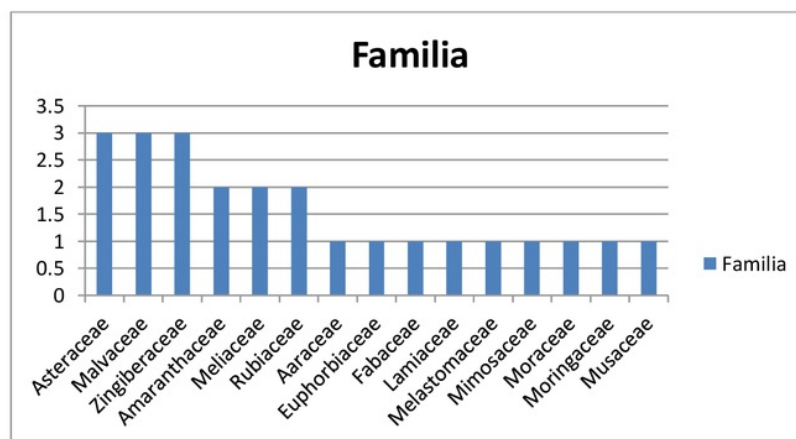

Figure 1. The family found in Penggaron tourist forest, Semarang.

The Zingeberaceae family, which is commonly found in Penggaron forest, is also a growing group that is widely used as traditional medicine. The results of research conducted around the Gunung Simpang nature reserve, the species of plant most widely used by surrounding communities is from the family Zingeberaceae [12].

The medicinal plants found in Penggaron tourism forests have the most herbal/grass habitus (50%), whereas plants that have shrub habitus are only 25% and tree habitus is 25% (Figure 2). Herbs /grass are a group of plants that grow most in the lower layers of the forest. In addition to the easiest group of herbaceous / grass plants, the environmental conditions in the lower layers are very suitable as a place to grow. Most herbaceous plants have large and mild seed reproduction, so they are found in large numbers and in large distribution areas.
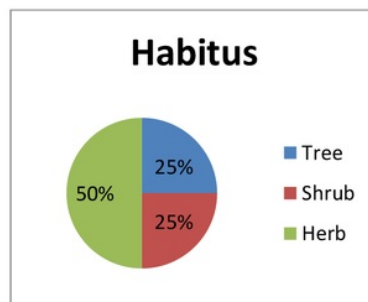

Figure 2. Precentage of mediclinal plant type habitus found in Penggaron Forest, Semarang Regency.

Herbaceous plants are a group of plants that grow in the lower layers of the forest. Herbs and grass plants prefer high humidity and under canopy. Herbs/grass are a forest undergrowth community that has the potential for traditional medicine. In Mount Merapi National Park, there were 23 species of medicinal plants found, but only 4 species that have been used by local people as traditional medicine [11]. The use of medicinal plants by the community around the forest is still limited. This is due to the lack of information and knowledge of the community about the potential of plant species that can be used as a source of traditional medicine.

Based on the abundance of the number of individual species of medicinal plants, there were 2 species of plants which had the highest abundance: *Elephantopus scaber* (tapak liman) and *Clitoria ternatea* (telang flower). Data on the individual abundance of each species can be seen in Table 2.

Elephantopus scaber is a plant that can be used to malaria medicine, diuretic, anemia, dysentery and coughing. The leaves of this plant contain epifriedelinol, lupeol, stiqmasterol, lupeol acetate, deoxyelephantopin and isodeoxyelephantopin. This plant is also known as Javanese viagra because of its ability to trigger male hormones and stimulate the formation of the hormone progesterone [6]. Research on the efficacy of *E. scaber* medicine has been carried out. Plant species *E. scaber* has been shown to prevent and restore hepatotoxicity [13], while *E. mollis* can treat cancer and diabetic [14].

Clitoria ternatea is a plant that is useful for treating swelling and boils. The leaves of this plant contain saponins, polyphenols and phytonins. Part of this plant's flower is also widely used by people as food and drink coloring [6]. The results showed that *C. ternatae* could protect brain cells from the dangers of stress [15].

Tabel 2. The abundance of individual types of medicinal plants in Penggaron tourist forest Semarang

No	Species	Mixed forest		Pinus forest	
		∑ind spec	Abundance (%)	∑ind spec	Abundance (%)
1	*Alpinia galanga*	2	3,85	-	-
2	*Amaranthus spinosus*	9	17,31	-	-
3	*Azadirachta indica*	-	-	1	3,03
4	*Arenga pinnata*	1	1,92	2	6.06
5	*Blumea balsamifera*	1	1,92	-	-
6	*Chromolaena odorata*	1	1,02	3	9,09
7	***Clitoria ternatea***	-	-	**10**	**30,30**
8	*Crassocephalum crepidiodes*	1	1,92	-	-
9	***Elephantopus scaber***	**16**	**30,77**	-	-
10	*Ficus septica*	1	1,92	8	24.24
11	*Hibiscus tiliaceus*	1	1,92	1	3,03
12	*Melastoma candididum*	-		1	3,03
13	*Mimosa pudica*	3	5,77		
14	*Morinda citrifolia*	-	-	1	3,03
15	*Moringaoleifera*	2	3,85		
16	*Musa paradisiaca*	1	1,92	1	3,03
17	*Paederiafoetida*	4	7,69		
18	*Phyllanthus niruri*	-	-	2	6,06
19	*Psidium guajava*	-	-	3	9.09
20	*Sidarhombifolia*	2	3,85	-	-
21	*Swietenia mahagoni*	-	-	-	-
22	*Urena lobata*	4	7,69	-	-
23	*Zingibermontanum*	2	3,85	-	-
24	*Zingiberofficinale*	3	5,77	-	-
	∑ *species*	**17**		**11**	
	∑ *individu*	**52**		**33**	

The presence of medicinal plants in the tourist forest of Penggaron can be used by the surrounding community to be used as a treatment for various diseases. However, its utilization must be based on conservation principles so that forest sustainability is maintained.

4. Conclusion

The medicinal plants found in the Penggaron tourist forest were 24 species, consisting of 15 families. The most found plant species include the Asteraceae family (*Chromolaena odorata*, *Crassocephalum crepidiodes* and *Elephantopus scaber*), Malvaceae (*Hibiscus tiliaceus*, *Sida rhombifolia*, and *Urena lobata) and Zingeberaceae (Alpinia galanga, Zingiber officinale* and *Zingiber montanum*). Species of medicinal plants found to have 25% tree habitus, 25% shrubs and 50% herbaceous / grass. The medicinal plants in the Penggaron forest have not been widely used by people around the forest. It is necessary to socialize the use of medicinal plants wisely to the community around the forest, so that the presence of forests also benefits the surrounding community.

5. Acknowledgements

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