LEMBAR

HASIL PENILAIAN SEJAWAT SEBIDANG ATAU PEER REVIEW

KARYA ILMIAH : PROSIDING*

Judul Karya Ilmiah : Diversity and Abundance of Medicinal Plants in Penggaron Tourism Forest of Semarang, Central Java Indonesia

Jumlah Penulis : 2 orang

Status Pengusul : penulis ke-1

Identitas Makalah :
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Kategori Publikasi Makalah : [✓] Prosiding Forum Ilmiah Internasional

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Bidang ilmu/Unit kerja : Biologi/ Dep. Biologi FSM

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The 8th International Seminar on New Paradigm and Innovation on Natural Science and Its Application

IOP Conf. Series: Journal of Physics: Conf. Series **1217** (2019) 011001 doi:10.1088/1742-6596/1217/1/011001

PREFACE

The 8th International Seminar on New Paradigm and Innovation on Natural Sciences and Its Application (ISNPINSA-8) is annual seminars organized by Faculty of Sciences and Mathematics (FSM) Diponegoro University and has been successfully conducted since 2011. The ISNPINSA-8 was held in Semarang, Indonesia on September 26th 2018. The aims of ISNPINSA are to facilitate brain storming and state of the art information in field of sciences and mathematics; to increase innovation of technology that can be applied in industries; to contribute in formulating strategy to increase the role of science for community; and to stimulate collaboration between industries, researchers and government to increase community welfare. The theme of 8th ISNPINSA in 2018 is "*Science and Applied Science for Sustainable Development Goals*".

The number of participants of the seminar were 272 including keynote speakers, invited speakers, oral presenters, poster presenters, and non presenters coming from various institutions of various countries, including Japan, Philippines, Thailand, Malaysia, Australia, Bangladesh, China, Kazakhtan, Vietnam and those who come from all parts of Indonesia consist of researchers, lecturers, postgraduate and undergraduate students from various universities. There are 272 papers were presented in this seminar, consist of 5 keynote speakers, 237 oral presentations, and 30 poster presentations. After the selection process, there are 184 articles selected papers to be published in the present conference proceeding. This is the largest number of papers and participants for eight times the implementation of ISNPINSA. The scope of the field of participants comes from various fields including biology, physics, chemistry, statistics, mathematics, informatics, environment, public health, and relevant fields that contribute to sustainable development.

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Opening ceremony by Dr.Eng. Ali Khumaeni (Chairman of The 8th ISNPINSA 2018)

Welcoming speech by Prof. Dr. Widowati (Dean of Faculty of Science and Mathematics, Diponegoro University)

Welcoming speech by Prof. Dr. Ambariyanto, M.Sc (Vice Rector of Research and Innovation, Diponegoro University)

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Photo session (Organizing Committee)

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Plenary Session by Prof. Dr Henk Heijnis **(**Australian Nuclear Science and Technology Organization (ANSTO), Australia)

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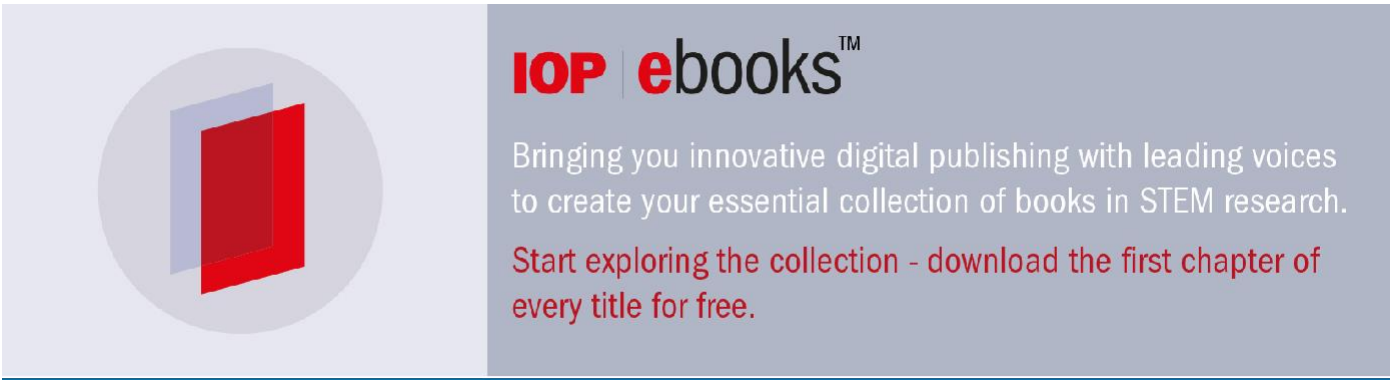
Diversity and abundance of medicinal plants in Penggaron tourism forest of Central Java, Indonesia



Diversity and abundance of medicinal plants in Penggaron tourism forest of Central Java, Indonesia

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Abstract. Nowadays, the need for medicinal plants as raw materials of traditional medicine is increasing. This study aims to determine the plant species that potential as medicine and its abundance in Penggaron Tourism Forest. Study sites were 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 was identified up to species level and determined their benefit. The medicinal plants found in the study site was 24 species, consisting of 15 families. The most commonly found plant species i.e., the Familia Asteraceae (*Chromolaena odorata, Crassocephalum crepidiodes*, and *Elephantopus scaber*), Malvaceae (*Hibiscus tiliaceus, Sida rhombifolia*, and *Urena lobata*) and Zingiberaceae (*Alpinia galanga, Zingiber officinale*, and *Zingiber montanum*). The habitus of found medicinal plants were 25% tree, 25% shrubs and 50% herbs/grasses. Medicinal plants in the Penggaron forest have not been widely used by people around the forest.

1. Introduction

Indonesia has a tropical rain forests with second highest biodiversity in the world after Brazil. About 30,000 plant species live in Indonesia. 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, the research to explore medicinal plants in nature and their potential benefit needs to be developed for the raw material needs of traditional medicines.

The need for medicinal plants is increasing because the world community today tends 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 conserved.

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 for education. As a tourism forest, Penggaron has a high diversity of plants. Among the plants that grow in the Penggaron forest, some are medicinal plants. Study that revealed the species of medicinal plants found in Penggaron tourism forest has never been done.

1

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

2. Materials and Method

The research location was in the Penggaron tourist forest, Semarang Regency, Central Java. The study was conducted in two locations i.e., 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 was 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.

Data analysis. The 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]. Abundance: Two calculations are carried out, namely absolute abundance and relative abundance. The absolute abundance of each species in each station was calculated using the following formula.

$$K = \frac{\Sigma}{\quad}$$

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

$$\frac{\Sigma}{\Sigma} \times 100\%$$

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 six species of tree, six species of shrub and 12 species of herbaceous herbs/grass (Table 1)

Table 1. The diversity of medicinal plant species in Penggaron tourism forest, Semarang Regency Central Java.

No	Familia	Species	Local names	Habitus	Benefit
1	Amaranthaceae	*Amaranthus spinosus*	Bayam duri	Herbs	Antibacterial
2	Amaranthaceae	*Gomphrena globosa*	Bunga kenop	Herbs	Expectorant
3	Araceae	*Arenga pinnata*	Aren	Tree	Uric acid
4	Asteraceae	*Chromolaena odorata*	Kirinyu	Shrub	Anti inflames, 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

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 the mixed forests, at most were from the Asteraceae family (3 species), Malvaceae family (3 species) and Zingiberaceae family (3 species). While the Amaranthaceae family and Meliaceae, each consist of 2 species, while the other families each only consist of 1 species (Figure 1). The study in Nepal stated that they found species of medicinal plants were mostly from the Asteraceae family [7], whereas in Thailand the most commonly found medicinal plants were from the Asteraceae and Zingiberaceae families [8]. The study 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 reproductive organ and are easy to grow, so many species of plants are found. The Zingiberaceae 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 the 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].

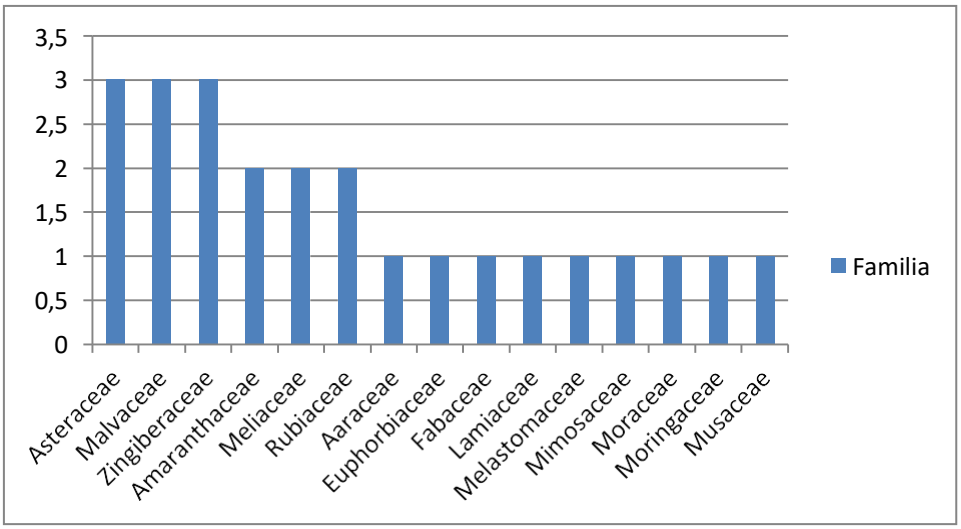

Figure 1. The family plant found in Penggaron tourist forest, Semarang.

The Zingiberaceae 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 the plant most widely used by surrounding communities is from the family Zingiberaceae [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 are 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 large distribution areas.

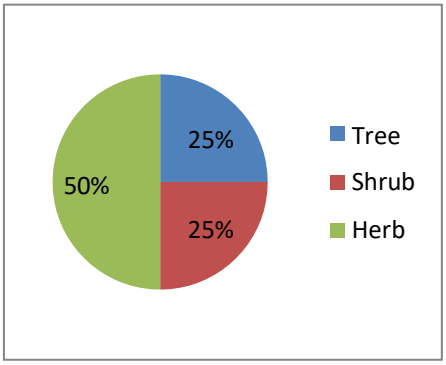

Figure 2. Percentage of medicinal plant type habitus found in Penggaron Forest, Semarang Regency.

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 area 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 four 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 species abundance of medicinal plants, there were two species of plants which rank 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 for malaria medicine, diuretic, anemia, dysentery, and coughing. The leaves of this plant contain epifriedelinol, lupeol, stigmasterol, 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 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].

Table 2. The abundance of individual types of medicinal plants in Penggaron tourism 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 tourism forest of Penggaron can be used by the surrounding community 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 tourism 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 Zingiberaceae (Alpinia galanga, Zingiber officinale,* and *Zingiber montanum*). In term of habitus, the found medicinal plants are 25% tree, 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.

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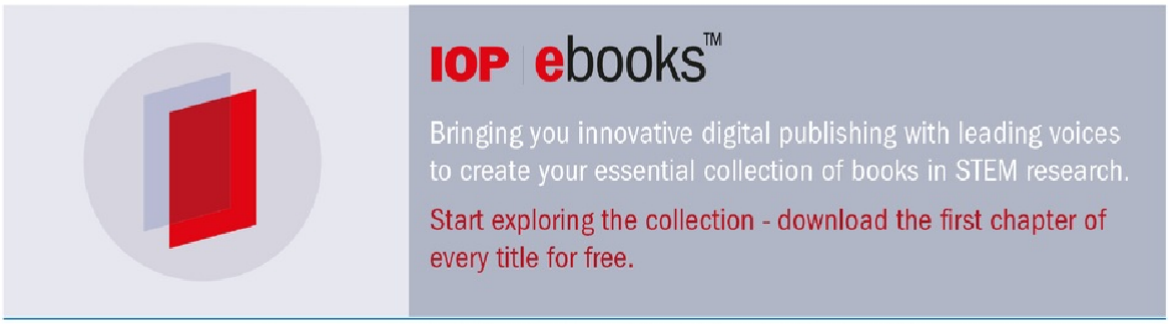

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Diversity and abundance of medicinal plants in Penggaron tourism forest of Central Java, Indonesia

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Abstract. Nowadays, the need for medicinal plants as raw materials of traditional medicine is increasing. This study aims to determine the plant species that potential as medicine and its abundance in Penggaron Tourism Forest. Study sites were 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 was identified up to species level and determined their benefit. The medicinal plants found in the study site was 24 species, consisting of 15 families. The most commonly found plant species i.e., the Familia Asteraceae (*Chromolaena odorata, Crassocephalum crepidiodes*, and *Elephantopus scaber*), Malvaceae (*Hibiscus tiliaceus, Sida rhombifolia*, and *Urena lobata*) and Zingiberaceae (*Alpinia galanga, Zingiber officinale*, and *Zingiber montanum*). The habitus of found medicinal plants were 25% tree, 25% shrubs and 50% herbs/grasses. Medicinal plants in the Penggaron forest have not been widely used by people around the forest.

1. Introduction

Indonesia has a tropical rain forests with second highest biodiversity in the world after Brazil. About 30,000 plant species live in Indonesia. 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, the research to explore medicinal plants in nature and their potential benefit needs to be developed for the raw material needs of traditional medicines.

The need for medicinal plants is increasing because the world community today tends 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 conserved.

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 for education. As a tourism forest, Penggaron has a high diversity of plants. Among the plants that grow in the Penggaron forest, some are medicinal plants. Study that revealed the species of medicinal plants found in Penggaron tourism forest has never been done.

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

2. Materials and Method

The research location was in the Penggaron tourist forest, Semarang Regency, Central Java. The study was conducted in two locations i.e., 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 was 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.

Data analysis. The 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]. Abundance: Two calculations are carried out, namely absolute abundance and relative abundance. The absolute abundance of each species in each station was calculated using the following formula.

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

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

$$KR = \frac{\sum individual\ of\ i-species}{\sum total\ individu} \times 100\%$$

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 six species of tree, six species of shrub and 12 species of herbaceous herbs/grass (Table 1)

Table 1. The diversity of medicinal plant species in Penggaron tourism forest, Semarang Regency Central Java.

No	Familia	Species	Local names	Habitus	Benefit
1	Amaranthaceae	*Amaranthus spinosus*	Bayam duri	Herbs	Antibacterial
2	Amaranthaceae	*Gomphrena globosa*	Bunga kenop	Herbs	Expectorant
3	Araceae	*Arenga pinnata*	Aren	Tree	Uric acid
4	Asteraceae	*Chromolaena odorata*	Kirinyu	Shrub	Anti inflames, 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

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 the mixed forests, at most were from the Asteraceae family (3 species), Malvaceae family (3 species) and Zingiberaceae family (3 species). While the Amaranthaceae family and Meliaceae, each consist of 2 species, while the other families each only consist of 1 species (Figure 1). The study in Nepal stated that they found species of medicinal plants were mostly from the Asteraceae family [7], whereas in Thailand the most commonly found medicinal plants were from the Asteraceae and Zingiberaceae families [8]. The study 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 reproductive organ and are easy to grow, so many species of plants are found. The Zingiberaceae 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 the 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].

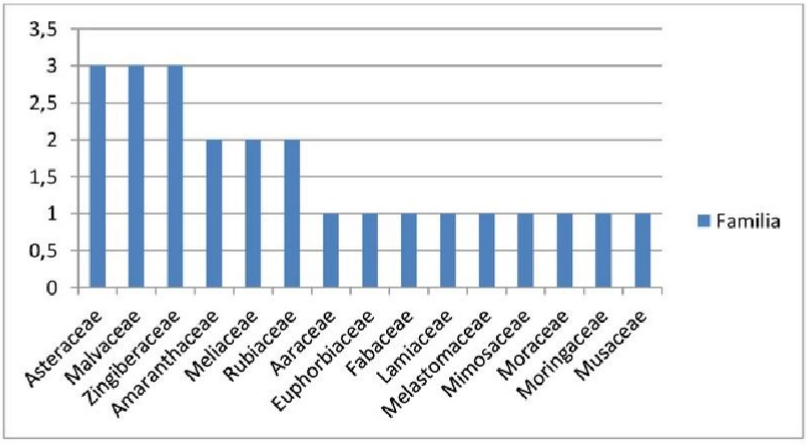

Figure 1. The family plant found in Penggaron tourist forest, Semarang.

The Zingiberaceae 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 the plant most widely used by surrounding communities is from the family Zingiberaceae [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 are 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 large distribution areas.

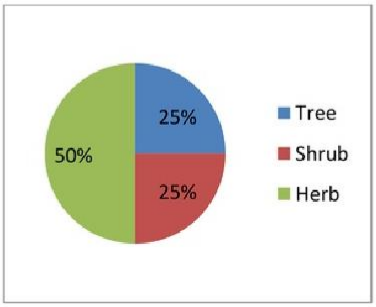

Figure 2. Percentage of medicinal plant type habitus found in Penggaron Forest, Semarang Regency.

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 area 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 four 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 species abundance of medicinal plants, there were two species of plants which rank 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 for malaria medicine, diuretic, anemia, dysentery, and coughing. The leaves of this plant contain epifriedelinol, lupeol, stigmasterol, 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 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].

Table 2. The abundance of individual types of medicinal plants in Penggaron tourism 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 tourism forest of Penggaron can be used by the surrounding community 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 tourism 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 Zingiberaceae (Alpinia galanga, Zingiber officinale,* and *Zingiber montanum*). In term of habitus, the found medicinal plants are 25% tree, 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.

Acknowledgments

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