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HERBACEOUS PLANT DIVERSITY IN THE RESTORATION AREA OF SORAYA RESEARCH STATION IN LEUSER ECOSYSTEM

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ABSTRACT

Herbaceous plants are closed seed plants (Agiosperms) which are classified as cosmopolite, have high life competitiveness, are not affected by weather and climate so that they are able to live in any habitat. This study aims to identify types of herbaceous plants and analyze the level of diversity. Identification is carried out to find out the names and groupings, while diversity analysis is carried out to find out the number of types or the number of individuals. This research was conducted in the Restoration area of the Soraya Research Station in the Leuser Ecosystem Area in December 2021. The Soraya Research Station Restoration Area is an area to restore the state of the forest that has been damaged to its original condition or almost resembles its original condition, which began in 2019. The research method uses a line transect with a length of 100 m, and sampling is carried out with a 1x1 plot making technique, per 20 m line transect 18 plots are taken. The results of this study found 3431 individuals of herbaceous plants from 40 species and 26 families. Asystasia gangetica species is the most dominant species reaching 585 individuals while the family of Poaceae is the family with the highest number of species, namely 5 species species, with an H'2,743 value categorized with moderate diversity values.

Keywords : Diversity, Herbaceous Plans, Identification, The Soraya Research Station

ABSTRAK

Tumbuhan herba merupakan tumbuhan biji tertutup (Agiospermae) yang tergolong bersifat kosmopolit, memiliki daya saing hidup yang tinggi, tidak terpengaruh cuaca dan iklim sehingga mampu hidup pada habitat apa saja. Penelitian ini bertujuan untuk mengindetifikasi jenis tumbuhan herba dan menganalisis tingkat keanekaragaman. Identifikasi dilakukan untuk mengetahui nama serta pengelompokkan, sedangkan analisis keanekaragaman dilakukan untuk mengetahui jumlah jenis atau jumlah individu. Penelitian ini dilakukan di kawasan Restorasi Stasiun Riset Soraya Kawasan Ekosistem Leuser pada bulan Desember 2021. Kawasan Restorasi Stasiun Riset Soraya merupakan kawasan pengembalian kembali keadaan hutan yang mengalami kerusakan ke kondisi semula atau hampir menyerupai kondisi semula, yang mulai dilakukan tahun 2019. Metode penelitian menggunakan line transect dengan panjang 100 m, dan pengambilan sampel dilakukan dengan teknik pembuatan plot 1x1, per 20 m line transect dilakukan pengambilan sampel sebanyak 18 plot. Hasil pada penelitian ini ditemukan nya 3431 individu tumbuhan herba dari 40 Spesies dan 26 familia. Spesies Asystasia gangetica merupakan spesies yang paling dominan mencapai 585 individu sedangkan familia dari Poaceae merupakan familiar dengan jumlah jenis terbanyak yakni 5 jenis spesies, dengan perolehan nilai H'2,743 yang dikategorikan dengan nilai keanekaragaman sedang.

Kata kunci : *Keanekaragaman, Tumbuhan Herba, Identifikasi, Stasiun Riset Soraya*

Introduction

The Restoration Area is a new area that began to be developed in 2019, with 99 ha of land divided into three conditions: land that is still being harvested and has not been logged, land that has already been logged, and land that has been planted with pioneer trees. Soraya Station, located at 2º55'25" N and 97º55'25" E, is the third research station established in 1994 by the Leuser Management Unit within the Leuser Ecosystem but outside Gunung Leuser National Park. Soraya Research Station is located in Pasir Belo Village, Sultan Daulat, Subulussalam City. It is bounded by the Sampuan Ruam river to the north, Alas river to the west, Soraya river to the east, and Pangakasen river to the south. In addition, there is also Dasan mountain to the East.

Identification of herbaceous plants is a method of introducing herbaceous plants by determining the botanical name and taxon of herbaceous plants to be recognized. identification and classification can be started by observing the characters or morphological characteristics of roots, tubers, rhizomes, stems, leaves, and other plant parts Sembodo (2010). According to Ainiyah et al (2017), herbaceous plants have a role as a food source, for animals that occupy the area, as an indicator of soil fertility, litter producers in improving soil fertility, preventing landslides in an area, by absorbing excess rainwater to be protected from the danger of erosion. Erosion that occurs continuously can wash away nutrients in the top layer of soil resulting in loss of soil fertility. Furthermore, Anaputra et al (2015) added that the role of herbs is also important when experiencing succession which is characterized by many pioneer plants, a source of germplasm wealth, for example, such as the preservation of wildlife as a component of the ecosystem which is influenced by the presence and diversity of lower plants as a place of life and other functions.

Diversity is a term that mentions the number of types / number of individuals (Saputra et al., 2016). The diversity of herbaceous plant species found in nature is influenced by biotic and abiotic factors. Biotic factors include animals and microorganisms, abiotic factors include soil, water, air, light, temperature, soil pH, and nutrients. Both factors have a huge influence on the growth and development of a herbaceous plant so that there is interaction between them (Marhamah et al., 2016).

Methods

This research was conducted in the soraya research station restoration area, subulussalam city. The research was conducted from March 18 to 25, 2021. The tools used in this research include: stationery, camera, raffia rope, plastic bags, Soil Taster, GPS, and Thermohygrometer.

The working procedure for collecting research data in the field, the first stage is to determine four data collection points consisting of seven transect lines. The first point consists of three line transects, the second point consists of one line transect, and the third point consists of one line transect, and the fourth point consists of two line transects. Then the transeck line was drawn straight along 100 m, data collection was determined every 20m/transeck, and 18 1x1m plots were taken for quadrant data collection. Furthermore, the herbaceous plants found were photographed. The data that has been obtained is used as a data reference and documentation as well as the

identification of the herbaceous plant species. Identification was assisted by experts from FKL (Leuser Conservation Forum).

Data obtained from the results of the study were analyzed using the shanon-winners method and the Important Value Index (INP) formula :

$$(H') = \sum_{i=1}^{i=n} pi \ln pi \quad \ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Description:

$\hat{H}$ = Diversity index

Pi = ni/N, the ratio of the number of individuals of the i-th species to the total number of individuals.

Ni = number of individuals of the i- species

N = Total number of individuals

With criteria:

$\hat{H} < 1$ = Low diversity

$1 < \hat{H} < 3$ = Medium diversity

$\hat{H} > 3$ = high diversity

Important Value Index (INP) formula :

$$INP = KR + FR \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (2)$$

Description :

INP : Index of importance

KR : relative density value

FR : relative frequency value

$$KR = \left[\frac{absolute\ density\ value\ absolute\ density\ value}{total\ number\ of\ individuals}\right] \times 100\ldots\ldots\ldots\ldots\ldots\ldots\ldots (3)$$

$$KM = \frac{number\ of\ individuals\ of\ the\ species}{sample\ plot} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4)$$

Description :

KR : Relative density

KM : Absolute Density

$$FR = \left[\frac{number\ of\ plots\ containing\ individuals\ of\ the\ species}{absolute\ frequency\ value}\right] \times 100 \quad \ldots\ldots\ldots\ldots\ldots (5)$$

$$FM = \frac{\text{number of plots containing individuals of the species}}{total\ number\ of\ plots} \quad \ldots\ldots\ldots\ldots\ldots\ldots (6)$$

Description :

FR : Relative frequency

FM : Absolute frequency

Results and Discussion

From the results of data collection and calculations, the diversity value or H' value was obtained as shown in Table 1.

Table 1.

No	Scientific Name	Σ	Pi	Ln Pi	Pi Ln Pi	H'
1	*Asystasia gangetica*	585	0,17	-1,769	-0,301	0,301
2	*Andrographis paniculata*	4	0,001	-6,754	-0,007	0,007
3	*Ceratopteris thalictroides* L.	345	0,1	-2,297	-0,23	0,23
4	*Trianthema portulacastrum* L.	7	0,002	-6,194	-0,012	0,012
5	*Mikania micrantha* Kunth	110	0,032	-3,44	-0,11	0,11
6	*Acmella paniculata*	120	0,034	-3,353	-0,117	0,117
7	*Ageratum conyzoides*	29	0,008	-4,773	-0,04	0,04
8	*Diplazium esculentum* (Retz)	128	0,037	-3,288	-0,122	0,122
9	*Stenochlaena palustris*	1	0	-8,14	-0,002	0,002
10	*Hippobroma longiflora*	9	0,002	-5,943	-0,015	0,015
11	*Cleome rutidospermae*	53	0,015	-4,17	-0,064	0,064
12	*Commelina difusa*	16	0,004	-5,368	-0,025	0,025
13	*Lepistemon binectariferum*	142	0,041	-3,184	-0,131	0,131
14	*Cyperus cephalotes*	5	0,001	-6,531	-0,009	0,009
15	*Cyperus alternifolius* L.	1	0	-8,14	-0,002	0,002
16	*Euphorbia heterophylla*	9	0,002	-5,943	-0,015	0,015
17	*Euporbhia hirta* L.	46	0,013	-4,311	-0,057	0,057
18	*Uraria picta*	2	0	-7,447	-0,004	0,004
19	*Centrosema pubescens* Benth	94	0,027	-3,597	-0,098	0,098
20	*Mimosa pudica*	89	0,025	-3,651	-0,094	0,094
21	*Bauhinia purpurea*	3	0	-7,041	-0,006	0,006
22	*Molineria latifolia*	19	0,005	-5,196	-0,028	0,028
23	*Hyptis capitata*	31	0,009	-4,706	-0,042	0,042
24	*Pericampilus glaucus*	64	0,018	-3,981	-0,074	0,074
25	*Nepholaris exaltata*	503	0,146	-1,92	-0,281	0,281
26	*Nervilia puncata*	3	0	-7,041	-0,006	0,006
27	*Passiflora foetida*	24	0,007	-4,962	-0,034	0,034
28	*Phylantus ninuri*	3	0	-7,041	-0,006	0,006
29	*Piper betle*	1	0	-8,14	-0,002	0,002
30	*Peperomia pellucida* L.	11	0,003	-5,742	-0,018	0,018
31	*Scoparia dulcis*	2	0	-7,447	-0,004	0,004
32	*Leersia hexandra*	297	0,086	-2,446	-0,211	0,211
33	*Paspalum conjugatum*	206	0,06	-2,812	-0,168	0,168
34	*Ehrharta erecta*	229	0,066	-2,706	-0,18	0,18
35	*Digitaria sp.*	15	0,004	-5,432	-0,023	0,023
36	*Oplismenus burmanii*	1	0	-8,14	-0,002	0,002

No	Scientific Name	Σ	Pi	Ln Pi	Pi Ln Pi	H'
37	*Oldenlandia corymbosa* L.	2	0	-7,447	-0,004	0,004
38	*Stachytarpheta indica*	220	0,064	-2,746	-0,176	0,176
39	*Lantana camara*	1	0	-8,14	-0,002	0,002
40	*Curcuma longa*	1	0	-8,14	-0,002	0,002
		3431				**2,743**

From the data table above, it is known that the diversity value or H' value is 2.743 and is stated with a medium level of diversity.

Tabel 2.

No	Regional Name	Scientific Name	KR	FR	INP
1	Rerukut	*Asystasia gangetica*	17,05	11,216	28,267
2	Kerpe Kemangi	*Andrographis paniculata*	0,116	0,38	0,496
3	Kekaras	*Ceratopteris thalictroides* L.	10,055	4,942	14,998
4	Beberteh	*Trianthema portulacastrum* L.	0,204	0,19	0,394
5	Akar Atom	*Mikania micrantha* Kunth	3,206	7,794	11
6	Sesubang	*Acmella paniculata*	3,497	1,711	5,208
7	Dilembu	*Ageratum conyzoides*	0,845	0,76	1,605
8	Pakis Biasa	*Diplazium esculentum* (Retz)	3,73	4,562	8,293
9	Akar Pakis	*Stenochlaena palustris*	0,029	0,19	0,219
10	Bunga Katarak	*Hippobroma longiflora*	0,262	1,711	1,973
11	Maman Rawan	*Cleome rutidospermae*	1,544	0,76	2,305
12	Urip-Urip	*Commelina difusa*	0,466	0,57	1,036
13	Akar Jejanggut	*Lepistemon binectariferum*	4,138	11,596	15,735
14	Kerpe Unte-Unte	*Cyperus cephalotes*	0,145	0,19	0,335
15	Beberlung	*Cyperus alternifolius* L.	0,029	0,19	0,219
16	Kate Emas	*Euphorbia heterophylla*	0,262	0,19	0,452
17	Patikan Kebo	*Euporbhia hirta* L.	1,34	0,57	1,911
18	Kucingan	*Uraria picta*	0,058	0,19	0,248
19	Akar Kacang	*Centrosema pubescens* Benth	2,739	7,224	9,964
20	Putri Malu Merah	*Mimosa pudica*	2,594	2,661	5,255
21	Akar Tapak Kambing	*Bauhinia purpurea*	0,087	0,19	0,277
22	Kekopor	*Molineria latifolia*	0,553	0,38	0,934
23	Sesugi	*Hyptis capitata*	0,903	1,901	2,804
24	Akar Gadung	*Pericampilus glaucus*	1,865	4,182	6,047
25	Pakis Kunyit	*Nepholaris exaltata*	14,66	10,076	24,736
26	Pegagan	*Nervilia puncata*	0,087	0,19	0,277
27	Gegambut	*Passiflora foetida*	0,699	2,281	2,98
28	Meniran	*Phylantus ninuri*	0,087	0,19	0,277
29	Sirih Hutan	*Piper betle*	0,029	0,19	0,219

No	Regional Name	Scientific Name	KR	FR	INP
30	Kerpe Petimah	*Peperomia pellucida* L.	0,32	0,19	0,51
31	Sesemuh	*Scoparia dulcis*	0,058	0,19	0,248
32	Kekumil	*Leersia hexandra*	8,656	5,893	14,549
33	Paitan	*Paspalum conjugatum*	6,004	5,323	11,327
34	Teteles	*Ehrharta erecta*	6,674	5,513	12,187
35	Bebuluh	*Digitaria sp.*	0,437	0,19	0,627
36	Rumput sarang buaya	*Oplismenus burmanii*	0,029	0,19	0,219
37	Kerpe Gegarang	*Oldenlandia corymbosa* L.	0,058	0,38	0,438
38	bunga taik ayam	*Stachytarpheta indica*	6,412	4,562	10,974
39	Lantana Camara	*Lantana camara*	0,029	0,19	0,219
40	Kunyit	*Curcuma longa*	0,029	0,19	0,219
					200

From the data table above, it is known that the INP value above shows the highest INP value is shown in the Rerukut species (Asystasia gangetica) which is 28.267%.

Based on the data that has been obtained there are 3431 individuals consisting of 40 species and 26 families, rerukut species (Asystasia gangetica) with a total of 585 individuals is the most dominating species, Asystasia gangetica has a strong competitive life. This plant can immediately recover and return to life in a relatively faster time range, environmental factors greatly affect the growth rate of Asystasia gangetica, this species is found more in areas that have a high level of light intensity compared to shaded areas. This opinion is in accordance with the statement from (Firison et al, 2019), suggesting that the height of a plant greatly affects the growth of lower plants because tree crowns can block incoming light so that the rate of photosynthesis is inhibited and there is a decrease in the type of lower plants.

Based on the results, it is known that herbaceous plants in the restoration area of the soraya research station in the leuser ecosystem area have a diversity value or H' value of 2.743 and are stated with a moderate level of diversity. Plant diversity is influenced by the total number of individuals and the number of species. Pariyanto et al (2020), state that the diversity index (H') which has a value of 1 is included in the low category, a value of 2 is included in the medium category and a value of 3 is included in the high category. Pariyanto et al (2020) added that the diversity of herbaceous plant species in the forest can be known if the diversity index value is high then the diversity is high, and vice versa if the diversity index value is small then the diversity is low.

Based on the results of the research that has been obtained, the highest INP value is obtained by the rerukut species (Asystasia gangetica), namely 28.26%, Ramadani et al (2021) added that the INP value is used to determine the dominance of a species over others. The higher the INP of a species, the greater its mastery in the community. A community is said to dominate if its presence can control other species in the community (Rosanti, 2012).

Conclusion

The species composition of herbaceous plants in the Soraya Research Station Restoration area of the Leuser Ecosystem was obtained as many as 40 species and 26 families, the rerukut species (Asystasia gangetica) with a total of 585 individuals was the most dominating species. The highest INP value is obtained by the rerukut species (Asystasia gangetica) which is 28.26%. The diversity index value or H' value is 2.743 and is stated with a moderate level of diversity.

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