Proceeding of International Conference on Green Technology
Vol.8, No.1, October 2017 Page 71-78
p-ISSN: 2580-7080 | e-ISSN: 2580-7099

The Composition of Plants In *Nepenthes Spp* Community in Customary Forest of Lingkat Lake Kerinci

Try Susanti[1], Indah Kencanawati[2]

Biology Education, Faculty of Education and Teacher Training of UIN STS Jambi and IAIN Kerinci
trysusantiusman@gmail.com, kencanawatiindah@gmail.com
08127331945, 081373501416

Article Info

Article history:

Received Jul 12th, 2017
Revised Aug 20th, 2017
Accepted Oct 26th, 2017

Keyword:

Composition
Nepenthes Spp
Customary Forest
Lingkat Lake Kerinci

ABSTRACT

Nepenthes is a carniforous plant which has a unique shape, size and color of pitcher which makes it is popular as an exotic plant/decorative plant. However, the forest degradation and exploitation of Nepenthes Spp for economic purposes make the existence of natural habitats of Nepenthes Spp are increasingly threatened every year. So that, it is so important to do the research about composition of plant in the Nepenthes Spp community in customary forest of Lingkat Lake Kerinci. The research aimed to sort the species of Nepenthes spp and the species of plants in the community, as well as the important value and diversity of plants species index. The data was collected with the point intercept method, by putting 100 units of sampling, in the form of point intercept sampling framework with a distance 2 meters per sampling unit. The length of sampling unit (sampling framework) was about 1 meter with 10 touch points, the distance among the touch points were 10 cm. Therefore, the numbers of touch points in sampling site was 1000. The result of the research found that there were 3 species of Nepenthes Spp, they were: Nepenthes ampullaria Jack, Nepenthes mirabilis (Lour) Druce dan Nepenthes gracilis Korth. As many as 18 families recorded of 26 species of plants presented in the community of Nepenthes Spp. The highest impotance value was obtained by Nepenthes ampullaria Jack 21.23%, followed by Davalia repens(l.f) Kuhn 11.68% dan Nephrolepis hirsuta (C.Forst) 11.23%. The index of species diversity were low (1.649)

Corresponding Author:

First Author,
Try Susanti
Biology Education,
Faculty of Education and Teacher Training
UIN STS Jambi and IAIN Kerinci

1. INTRODUCTION

Sumatra is a large island in Indonesia with a rich diversity of habitats and a high level of biodiversity, once having over 47 million hectares of forest [Anwar et al. 1984]; however, in 1997 the remaining forest in Sumatra only reached 16.5 million hectares and the number continues to decline mainly due to the conversion of forests to other uses, such as for oil palm, rubber, small-scale land clearing by communities around the forest. This is coupled with forest fires occurring every year] . Furthermore in 2007, Sumatra Island has only 30% forest cover (13 million hectares) and forests in Sumatra have lost 70% of its cover [WWF 2012].

Indonesia is one of the countries that have biodiversity, both flora and fauna are high. The high level of biodiversity is because Indonesia is a tropical country with high rainfall (Efendi et al, 2013). Lingkat Lake is a large volcanic lake, in addition to Lake Kerinci, Kaco Lake and Gunung Tujuh Lake in Kerinci District, Jambi Province. This unspoiled Lahan Lake is located on the edge of the forest of Kerinci Seblat National Park adjacent to Lempur Mudik Village. The extent of approximately 12 ha at an altitude of 1100 m above sea level. The interesting thing on this lake, which can still be heard the sound of animals such as, Siamang and others

when the sun shines. Explore the lake with a raft and see unique colorful stones on the lake's bottom that can be seen from the water surface.

Flora and fauna are very diverse many of us encounter in customary forest, one of the customary forest located in the area of Lake Lingkat Kerinci.Kutan adat is the forest that is within the territory of customary law community. Understanding of customary forest refers to the status of forest area. This has been a prolonged polemic because within the Indonesian legal framework customary forests are regarded as state forests whose rights of management are granted to indigenous peoples. Then there is a change of definition that gives its own status. Act No.41 of 1999 on Forestry, states the status of forests in Indonesia is divided into state forests and forests. State forest refers to forest areas located on land that are not encumbered with land rights (not owned by a person or legal entity). While the forest rights refers to the forest area that is above the land that is encumbered with the right to land. In this provision, the customary forest automatically is categorized as state forest. Until 2012, the Constitutional Court has won a lawsuit of judicial review on the forestry law as stipulated in Decision Number 35 / PUU-X / 2012. The Court considered the customary forest provisions in the law to be contrary to the constitution. Then the status is confirmed as belonging to indigenous peoples, not state forests.

One of the forests in Jambi Province can be found in Kerinci in the Bukit Barisan mountain valley, with 420,000 hectares, 51.19% or 215,000 hectares of protected forests and conservation forests of Kerinci Seblat National Park (TNKS). As a conservation area, the Kerinci Government supports the efforts to conserve biodiversity, and recognition of the existence and status of Indigenous Forest / People's Management Area, but the Indigenous Forest contained in Kerinci is not State Forest but an ulayat right so it should be called Hutan Hak Adat. which still store the plant species richness but not yet disclosed is the Indigenous Forest Lake Lingkat Kerinci. The area is very important in maintaining water use because it acts as a catchment and water catchment area in Jambi Province [Wiriadinata & Setyowati 2000; Setyowati 2003].

Indigenous peoples apply customary provisions and sanctions for violations in the use of forests. The application of provisions is a feature of conservation by indigenous peoples. Some examples of indigenous peoples that impose provisions on forest use include Kerinci community in Jambi [Sari 2011], Serampas community in Jambi [Hariyadi 2009], Baduy community in Banten [Iskandar 2009], and Dayak Kenyah community in East Kalimantan [Purwanto 2003] . SK Kerinci Regent No. 96 Year 1994 About Determination of Upper custemory Forest Water of Lempur Lekuk 50 Tumbi Desa Lempur Gunung Raya District with an area of 858,3 Ha. Vegetation of primary forest, cinnamon and mixed plantation is managed by Permanent Working Institution (LKT) of Lempur custom organitations.

While the functions of Indigenous Forest Rights include:
a) Improve and maintain a microclimate and aesthetic value,
b) Water catchment
c) Creating and harmonizing the physical environment of Adat
d) Support the conservation of Indonesia's biodiversity

The customary Forest in Hulu Air Lempur (known as customary forest of lempur) is included in the area of Indigenous Natural Density of 50 Lumbuk Tumbi Lempur with an area of 858.3 Ha. Indigenous Forest Lempur confirmed by Decree No. Kindergarten II Kerinci No. 96/1994 dated May 10, 1994. The management of indigenous Hutan Lempur is carried out by the Guardianship of Indigenous Peoples Village of Permanent Working Institution of Upper Air Lempur.

The customary Forest 50 Tumbi (Lempur) is managed by the guardianship of customary Forest Peoples Village Permanent Employment Agency Hulu Air Lempur Region includes:
a. Desa Lempur Hilir
b. Desa Lempur Mudik
c. Desa Dusun Baru Lempur and Kelurahan Lempur Tengah

These include locations; Lake Langkat, Lake Nyalo, Bukit Setanggis, Bukit Pematang, Bukit Kemulau and Bukit Batuah with the location and boundaries remain as the map listed. Customary Forest Reserve Area 50 Tumbi (Lempur) is a hilly area with an altitude of 500 to 2505 mdpl . The highest location can be found in Gunung Adat Forest. Degree of slope between 10-85. Most of the Indigenous Forest Dentures 50 Tumbi Lempur are surrounded by plantations dominated by cinnamon (Cassia vera).
The customary Forest Lekuk 50 Tumbi (Lempur) has the potential that consists of:

a. Plants, is; Resin nails, Bambusa sp, Ardisia sp, Syzygium sp, and ficus sp. Here also there are types of medicinal plants, such as Selasih Gunung, Kudo Down, Orchid Jambu, Kap Simpek, Rukam, Bintunangan, Pulut-Pulut dan Paku Jantan. While wood is used for building materials such as Surian, Kayu apit, and Bayo Wood.

b. The customary Forest as a Recreation / Tourism Object

The customary Forest Lekuk 50 Tumbi (Lempur) is also used by the community as a place of recreation, because in this Temedak Traditional Forest there are Waterfalls, Forest Panorama, Traditional building, rice granary, Kerinci House, Panorama of Kerinci Lake from altitude.

The sanctions are :

1. Pays a fine compensation in the form of rice 1 plate and 1 chicken
2. Pays a fine of compensation in the form of rice 20 bushels and 1 goat
3. Pays a fine of compensation in the form of rice 100 bushels and 1 buffalo
4. Destroying any existing cottage and plant buildings in indigenous forest kawasa. One of the many plant communities encountered in the The customary Forest of Lake Lingkat Kerinci is the community of *Nepenthes sp. Nepenthes* was first introduced by J.P. Breyne when making descriptions of plant species originating from Srilanka (1689). The name *Nepenthes* is taken from a wine glass. *Nepenthes* has a uniqueness of the shape, size and color of the pocket. The bag is a leaf tip that changes shape and functions into an insect trap or other small animals. *Nepenthes* grows on nutrient-poor soils, such as limestone, sand, red soil and peat soils. Generally the soil is deficient in nitrogen and phosphorus, with these conditions, often Nepenthes serve as indicators of a habitat / marginal soil (Mansur, 2006).

Nepenthes live in nutrient-poor places, propagate in trees, on sharp cliffs and coexist with other plants such as ferns, resin nails (Glichenia linearis), locals (Melastoma malabatricum), fur coats (Clidemia hirta) and other plants . For example *Nepenthes maximabisa* attached to any tree, which is important there is a layer of moss or leaf litter as a water store and keep moisture, in the dead tree was *N. maximabisa* attached. The bark of dead trees there are many moss, because the weathering that occurs provides good moisture for the growth of moss [Susanti, 2012].

The existence of *Nepenthes* in natural habitats is increasingly threatened by forest fires, logging, conversion of forest land or shrubs into residential areas, cultivation, plantations, forest degradation. The exploitation of Nepenthes from nature is carried out for the sake of the economy alone, so that the rescue effort from extinction threats can be done through conservation efforts covering aspects of the study, ie research includes species variation, dissemination, natural habitat, sustainable use and preservation both in situ and ex situ with cultivation and breeding mechanisms [Cheek & Jebb, 2001; Mansur, 2006; Susanti, 2012].

Nepenthes is the largest genus of the monotypic Nepenthaceae family, occupying the center of diversity and endemicity in the biogeography region of Malesiana, the Indonesian Archipelago, the Great Sunda, Borneo (Borneo, Sarawak, Moran & Clarke, 2010). In Indonesia, 64 species of *Nepenthes*, 31 species have been identified in Sumatra. Particularly in Jambi are found several species namely *Nepenthes ampullaria, N. gracilis, N. mirabilis, N. reinwardtiana, N. spathulata N. tobaica, and N. Aristolochioides* [Clarke et al., 2001; Akhriadi & Hernawati, 2006; Mansur, 2006].

Nepenthes is a unique plant because at the end of the leaf sheets contain a bag containing extracloral nectaria that can captivate and digest various insects so that the plant is known as carnivorous plants. Insects are exploited by the plant to meet the nutrient requirements not obtained from the soil and the main nitrogen source (Gorb et al., 2004). In addition to its unique abilities, *Nepenthes* has the shape, size, and color of varied pockets. It makes *Nepenthes* has its own appeal as an exotic ornamental plant of economic value and traditional medicine for the ethnic community of Kerinci [Susanti, 2014].

Based on the current exposure and phenomenon, and the potential possessed by The customary Forest of Lake Lingkat Kerinci, the writer is interested in raising the title: *"Composition of Plant in Nepenthes spp Community at Indigenous Forest of Lake Lingkat Kerinci"*.

FORMULATION AND LIMITATIONS

The formulation of the problem to be lifted from the above phenomenon is as follows:

1. What kind of Nepenthes is found in the Indigenous Forest of Lake Lingkat Kerinci?
2. How is Plant Composition in the Nepenthes Spp Community in the Indigenous Forest of Lake Lingkat Kerinci?
3. What are the constraints faced in overcoming the threatened existence of Nepenthess in the Indigenous Forest of Lake Lingkat Kerinci?
4. How is the solution done to overcome these obstacles?

From the formulation of the above problem and the focus of the discussion on the existing phenomenon it is necessary to feel this research is limited only to see how the composition of plants in the community of Nepenthes spp in Indigenous Forest Lake Lingkat Kerinci.

2. RESEARCH METHOD

Research is done in stages, adjusted to the conditions and situations where the research. To obtain the community vegetation data Nepenthes performed using point intercept Method, which is placed systematically.

A. Place and Time Research

The study was conducted in the customary forest of Lake Lingkat Kerinci. The materials used in this study were vouchers of *Nepenthes* herbarium specimens from the study site. The working procedure of the study follows the ecological method of systematic touch point method by placing 100 units of samples in the form of a point intercept sampling framework along a transect with a distance of 2 m between sampling units. The sampling unit (pencuplik skeleton) is 1 m long with 10 point touch, the distance between touch points is 10 cm, thus the number of touch points in each footage is 1000 touch point. Data analysis of importance values and diversity indices follow Shannon-Wiener (Ellenberg & Mueller-Dombois, 1974).

$$\mathbf{H'} = -\Sigma \frac{ni}{N} \log \frac{ni}{N}$$

H '= Shannon-Wiener's diversity index
ni = Important value of each species
N = Total value is important

B. Tools and materials

The tool used during this research is a set of stationery, digital camera, GPS, scissors, machetes, small shovel, ground and water pH measuring instrument, steel wire rod measuring ground and water depth, plastic sack, elastic band, bottle collection (15ml), measuring cylinders, hanging labels, newsprint, raffia ropes, duct tape, oven, herbarium label, identification book. The ingredients used in this study were vouchers of *Nepenthes* herbarium specimens derived from various research sites, 70% alcohol, 80% alcohol.

This research uses research instrument in the form of species observation sheet. The species observation sheets were used to record the species of *Nepenthes*, and plant species in the *Nepenthes* community in customary forest of Lake Lingkat Kerinci. Vegetation sampling required a point intercept sampling framework.

C. Technique of Data Collection of Community Vegetation of *Nepenthes Spp*

a. Data collection.

The data collection will be conducted at Indigenous Forest of Lake Lingkat Kerinci. To find out the composition of the Neptent community and plant composition in the Nepenthes sp community, data collection was done through vegetation analysis on the sampling sites of plant communities "dominated" by Nepenthes spp. and / or plant communities where Nepenthes spp. present but not dominant.

The Point Intercept Method can be used to examine lower plant communities such as grass, herbs and bushes (Mueller-Dombois & Ellenberg 1974).

b. Placement of Point Intercept

The placement of the sampling unit is based on the location where the community of *Nepenthes spp*. by using the systematic touch point method (Cox 1967, Curtis & Cottam 1967, Mueller-Dombois & Ellenberg 1974) using the systematic touch point method by placing 100 units of sampling frames along the transect 2 m between sampling units. The sampling unit (pencuplik skeleton) is 1 m long with 10 point touch, the distance between touch points is 10 cm, thus, the number of touch points in each footprint trail is 1000.

Determination of the species name of *Nepenthes spp* was done by matching the specimens and the characteristics of the identification result using reference book: A field Guide to Nepenthes of Sumatra (Akhriadi & Hernawati 2006), Unique Nepenthes Pocket Semar (Mansur 2006), Flora Malesiana (Cheek & Jebb 2001), Pitcher Plants of Borneo (Phillips & Lamb 1996). The names of plant species in the Nepenthes community refer to Flora of Java Vol. 1, Vol. 2, and Vol. 3.

E. Data Analysis Technique Vegetation Community *Nepenthes Spp*

Data analysis is done simultaneously along with the data collection process, with data analysis technique applicable in qualitative and quantitative research. The process of data analysis in qualitative

research includes organizing data, sorting, categorizing, evaluating, comparing, synthesizing, and drawing conclusions (Neuman, 2003).

The analysis of *Nepenthes* Diversity and plant composition in the Nepenthes community was determined by using the equations for calculating the relative closure, relative frequency, in order to obtain an advantage value index (INP). Excellence Value Index (INP) = CR + FR (Brower, Zar and Von Endle 1990; Cox 1967).

The Diversity Index of Nepenthes and plants in the Nepenthes community is determined using the Shannon

$$\mathbf{H'} = -\Sigma \frac{ni}{N} \log \frac{ni}{N}$$

H '= Shannon-Wiener's diversity index
ni = Important value of each species
N = Total value is important
-Wiener equation formula (Mueller-Dombois & Ellenberg 1974; Krebs 1989):

If:
H '<1 = very low species diversity, H'> 1-2 = low species diversity, H '> 2-3 = medium species diversity, H'> 3-4 = high species diversity, H '> 4 = species diversity very high.

2.1. Method of collecting data

Direct observation The researcher performs direct measurement on the research object that is Faculty of Engineering building and fishery faculty where the researcher directly observe the sections listed in the measurement of Greenship criteria in staff room, faculty room, study room and toilet for assessment that need to be observed well and requires accurate, accurate observation.

Interviews utilize potential sources of information and opinions from building occupant resources that know staff, faculty, and students who daily observe and occupy this building. The instruments used in this study are questionnaire sheets, checklist, notebook, pen and also software guidelines Greenship rating tools 1.0.

2.2. Data analisys

In this study, the variables observed on the performance measurement criteria of the Green Building Faculty of Engineering Building and the Faculty of Fisheries, refer to the GBCI Greenship for the Built Building. Therefore, the variables consist of 6 (six) building feasibility matrices, 10 prerequisite criteria, and 41 credit criteria.

3. RESULTS AND ANALYSIS

Based on the research that has been done then got the results of research as follows:

1. Plant communities encountered in the customary Forest of Lake Lingkat Kerinci is a community of *Nepenthes sp* consists of 3 types of *Nepenthes Spp*, namely *Nepenthes ampullaria Jack*, *Nepenthes mirabilis Druce* and *Nepenthes gracilis Korth*.Secara morphology of three types of Nepenthes is described as:

   A. *Nepenthes ampullaria Jack*

   Nepenthes ampullaria Jack is found scattered like a vast expanse of carpets, and this species is the most dominant species found in the Indigenous Forest of Lake Lingkat Kerinci. Description Nepenthes ampullaria Jack based on field findings and identification in the laboratory, the characteristics of Nepenthes ampullaria Jack, Leaf; oblong-lanceolate, coriaceus with fine hairs, mother longitudinal leaf bones clear, 8-14.5 cm long tendrils. Trunk: teres-shaped, rosette, upright and climbing. Green-colored pitchers with red streaks form a hoop, with reduced wings, pitchers, thin green peristome, lid / vertical rounded pockets, matching with pockets, sometimes with red spots and spots (Figure 1)

Figure 1. ***Nepenthes ampullaria Jack*** **(private collection)**

B. Nepenthes mirabilis Druce

Description of *Nepenthes mirabilis Druce* based on field findings and laboratory identification, features Nepenthes mirabilis Druce, Leaf; ellip-lanset, chartaceus, longitudinal leaf bone mother is very clear, 15-18 cm long tendrils. Trunk: teres-shaped, rosette, upright and climbing. Green-colored red pitcher, with reduced wings, cylindrical on top and oval at the bottom, thick green / red peristome, lid / horizontal rounded pockets, matching with pockets, sometimes with red spots.

Figure 1. Nepenthes mirabilis Druce **(private collection)**

C. Nepenthes gracilis Korth

Description *Nepenthes gracilis Korth* based on field findings and identification in the laboratory, features of Nepenthes gracilis Korth, Leaf; lanset,, coriaceus, stemless sessile, vine length 12.6-16.2 cm. Trunk: Triangular shape, rosette, upright and climbing. Green, red, cylinder-shaped pitchers on the top or oval on the bottom, thin green peristome, lid / horizontal rounded pockets, matching with pockets, sometimes with red spots on the outside.

Figure 1. ***Nepenthes gracilis Korth*** **(private collection)**

2. Composition of Nepenthes spp plant found in Indigenous Forest of Lake Lingkat Kerinci Table Type Nepenthes Spp and Plants in Nepenthes Community Forest Lingkat Lake

No	Nama Spesies	Local Name	Famili

1	*Nepenthes mirabilis (Lour.) Druce*	*Kancung beruk*	*Nepentaceae*
2	*Nephenthes ampularia Jack*	*Piuk beruk*	*Nepentaceae*
3	*Nepenthes gracilis (Korth.)*	*Kancung beruk*	*Nepentaceae*
4	*Melastoma affine*	*Senduduk*	*Melastomataceae*
5	*Rhaphidophora acuminata*	*Ampisang*	*Araceae*
6	*Paspalum longifolium Roxb*	*Boukou/rumput australi*	*Poaceae*
7	*Diplazium esculentum (Retz) Sw.*	*Pakis sayur /Paku ayay/paku ayik*	*Woodsiaceae*
8	*Nephrolepis hirsuta (C. Forst.)*	*pakis larat/pedang*	*Davalliaceae*
9	*Mussaenda cf.frondosa L.*	*Musaenda/ Golang-galing*	*Rubiaceae*
10	*Rhododendron javanicum Benn.*	*Rhododendron*	*Ericaceae*
11	*Paspalum conjugatum P.J Bergius*	*Rumput gajah*	*Poaceae*
12	*Schefflera elliptica (Blume) Harms*	*Cakar biwak*	*Araliaceae*
13	*Davalia repens(L.f.) Kuhn*	*Pakis mukut*	*Davalliaceae*
14	*Paspalum sp*	*rumput gajah*	*Poaceae*
15	*Microsorium commutatum Copel*	*pakis simpai*	*Polypodiaceae*
16	*Syzygium pycnanthum Merrill & Perry*	*Kayu kelat putaih*	*Myrtaceae*
17	*Syzygium zeylanicum (L.) DC*	*Kayu kelat nasi*	*Myrtaceae*
18	*Costus speciosus (J.Koenig) C.Specht*	*Pacing tawar*	*Costaceae*
19	*Nephrolepis falcata(Cav) C. Chr*	*Pakis*	*Davalliaceae*
20	*Eleocharis dulcis (Burm.f.)*	*Bigau*	*Cyperaceae*
21	*Cyclosorus heterocarpus (Blume)*	*Paku kunyit-kunyit*	*Thelypteridaceae*
22	*Impatiens platypetala Lindl*	*Inay*	*Balsaminaceae*
23	*Colocasia esculenta (L.)Schott*	*Kmumu Payo*	*Araceae*
24	*Gliechenia linearis*	*Resam*	*Gliecheniaceae*
25	*Leersea hexandra*	*Rumput banto*	*Poaceae*
26	*Imperata cylindrica*	*Ilalang/lalaw*	*Paceae*
27	*Medinilla speciosa Blume*	*Parijoto*	*Melastomataceae*
28	*Hydrocotyle sibthorpioides Lam*		*Araliaceae*
29	*Ficus hispida Linn. F*	*kayu semantung*	*Moraceae*

The composition of *Nepenthes* found in the customary Forest of Lake Lingkat Kerinci is as much as 18 families of 26 plant species present in *Nepenthes Spp* community. The highest interest value was recorded *Nepenthes ampullaria Jack* 21.23%, followed by *Davalia repens* (l.f) Kuhn 11.68% and *Nephrolepis hirsuta* (C.Forst) 11.23%. Low species biodiversity index (1.649).

3. Constraints faced with the decrease in the number of existence of *Nepenthes spp* in the customary Forest of Lake Lingkat Kerinci is the effect of forest degradation and exploitation of *Nepenthes Spp* from nature to economic importance causing existence of *Nepenthes Spp* in natural habitat every year more and more threatened.

Solutions to overcome these obstacles is to utilize the type of *Nepenthes spp* found can be used as necessary by not exploiting for economic interests, and continue to maintain the existence of *Nepenthes spp* in order to remain an ethnic plant that characterizes the area.

4. CONCLUSION

Based on the results of research that has been done in the customary forest of Lake Lingkat Kerinci then it can be concluded:

1. The many plant communities encountered in the customary Forest of Lake Lingkat Kerinci is a community of *Nepenthes sp* consists of 3 types of *Nepenthes Spp,* namely *Nepenthes ampullaria Jack, Nepenthes mirabilis Druce* and *Nepenthes gracilis Korth.*
2. The composition of *Nepenthes* found in the customary Forest of Lake Lingkat Kerinci have 18 families of 26 plant species present in *Nepenthes Spp* community. The highest interest value was recorded *Nepenthes ampullaria Jack* 21.23%, followed by *Davalia repens* (l.f) Kuhn 11.68% and *Nephrolepis hirsuta* (C.Forst) 11.23%. Low species biodiversity index (1.649).
3. Constraints faced with the decrease in the number of existence of *Nepenthess* in customary Forest of Lake Lingkat Kerinci is the effect of forest degradation and exploitation of *Nepenthes Spp* from nature for economic purposes only cause the existence of *Nepenthes Spp* in natural habitat every year is increasingly threatened.
4. The solution is not to exploit *Nepenthes spp* for personal interests and keep *nepenthes spp* in order to remain a plant characteristic of the area.

REFERENCES

Adam, J. (2002). Demographic study of *Nepenthes* species (*Nepenthaceae*) recorded along the trail to the summit of Mount Kinabalu in Sabah, Malaysia. *Pakistan Journal of Biological Sciences*, 5(4), 419-426.

Akhriadi, P., & Hernawati. (2006). A field guide to the *Nepenthes* of Sumatera. Padang: PILI-NGO Movement, Nepenthes team, BP Conservation Programme. Conservation International-Indonesia.

Azwar, F., Kunarso, A., & Rahman, T. (2007). Kantong semar (*Nepenthes* sp.) di hutan Sumatera, tanaman unik yang semakin langka. *Prosiding Ekspose Hasil-Hasil Penelitian*.

Ariyati, W., R., Sya'rani, L., & Arini, E. (2007). Analisis kesesuaian perairan Pulau Karimunjawa dan Pulau Kemujian sebagai lahan budidaya rumput laut menggunakan SIG *Jurnal Pasir Laut, 3*(1), 27-45.

Backer, C. A., & Bakhuizen van Den Brink, R. (1965). Flora of Java (*Spermatophytes* only). Vol. 2. *Angiospermae*, families 111-160.Walter Noordhoff. N.V. Groningen. The Netherlands: 641 hlm.

Cheek, M., & Jebb, M. (2001). *Flora Malesiana. Series I, Seed plants. Volume 15: Nepenthaceae*: National Herbarium Nederland.

Clarke, C., Moran, J., Merbach, M., Frazier, C., & Chua, L. (2001). *Nepenthes* of Sumatra and Peninsular Malaysia. Natural History Publications (Borneo), Kota Kinabalu..

Ellenberg, D., & Mueller-Dombois, D. (1974). *Aims and methods of vegetation ecology*: Wiley New York, New York.

Ellison, A. M., Gotelli, N. J., Brewer, J. S., Cochran-Stafira, D. L., Kneitel, J. M., Miller, T. E., Zamora, R. (2003). The evolutionary ecology of carnivorous plants. *Advances in ecological research*, 33, 1-74.

Gorb, E., Kastner, V., Peressadko, A., Arzt, E., Gaume, L., Rowe, N., & Gorb, S. (2004). Structure and properties of the glandular surface in the digestive zone of the pitcher in the carnivorous plant *Nepenthes* ventrata and its role in insect trapping and retention. *Journal of Experimental Biology*, 207(17), 2947-2963.

Kuswanda, W., & Antoko, B. S. (2016). Keanekaragaman jenis tumbuhan pada berbagai tipe hutan untuk mendukung pengelolaan zona rimba di Taman Nasional Batang Gadis. *Jurnal Penelitian Hutan dan Konservasi Alam*, 5(4), 337-354.

Mansur, M. (2006). *Nepenthes, kantong semar yang unik.* Penebar Swadaya. Jakarta.

Moran, J. A., & Clarke, C. M. (2010). The carnivorous syndrome in *Nepenthes* pitcher plants: current state of knowledge and potential future directions. *Plant signaling & behavior*, 5(6), 644-648.

Mukrimin. (2011). Analisis potensi tegakan hutan produksi di Kecamatan Parangloe, Kabupaten Gowa. *Jurnal Hutan dan Masyarakat, 6*(1), 67-72.

Odum, E. P., & Srigandono, B. (1993). *Dasar-dasar ekologi*: Gadjah Mada University Press.

Phillipps, A., & Lamb, A. (1996). Pitcher-plants of Borneo. *Kota Kinabalu, Sabah: Natural History Publications ix, 171p.-illus., col. illus.*. ISBN 983812009X En Icones, Maps. Geog, 6.

Soegianto, A. (1994). *Ekologi kuantitatif: metode analisis populasi dan komunitas.* Usaha Nasional. Surabaya, 573.

Susanti, T. (2012). *Nepenthes* dan Valuasi ekonomi (suatu upaya konservasi *Nepenthes*). *EDU_BIO| Jurnal Pendidikan Biologi, 3*.

Susanti, T. (2014). *Etnobotany Nepenthes and plant in Nepenthes community based on usage knowledge of the Kerinci Local Society.* Paper presented at the International Conference on Education, Technology, and Sciences, Jambi.

[1]