

PAPER • OPEN ACCESS

Sustainable Utilization of Hoya species and other bioresources in Ketori, Sanggau, West Kalimantan, Indonesia

To cite this article: Sri Rahayu 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **298** 012039

View the [article online](#) for updates and enhancements.

Sustainable Utilization of Hoya species and other bioresources in Ketori, Sanggau, West Kalimantan, Indonesia

Sri Rahayu*

Center for Plant Conservation Bogor Botanic Gardens, Indonesian Institute of Sciences (LIPI), Jl. Ir. H. Juanda 13 Bogor, Indonesia

*Corresponding Email : sriahayukrb@yahoo.com

Abstract. Indonesia has a high diversity of Hoya species especially in Kalimantan. The Hoyas have been used as ornamental plant and trades internationally, while in local community, some species have been used as medicinal plant. Recently, two new species found in Sanggau, West Kalimantan and has high value as ornamental plant. The species grows in specific habitat i.e. heath forest of the Ketori community forest. The local community was practicing rules in maintaining the biodiversity in their forest, i.e. only members of the community are allowed to use biodiversity (woods, logs, medicinal plant and so on). They controlled also the number of biodiversity used. This practices lead to the conservation and sustainable use of the biodiversity of the forest. The community forest is believed as source of their needs and water shed.

1. Introduction

Two new species of Hoya (Apocynaceae: Asclepiadoideae) were described recently from West Kalimantan, i.e. *Hoya undulata* S.Rahayu & Rodda [1] and *Hoya narcissiflora* S.Rahayu & Rodda [2]. Both species occur in Sanggau District of West Kalimantan, especially at the heath forest of Ketori village. These two new species have been attract Hoya grower to have, so the demand of these species was increasing.

Hoya plant has been increasingly popular as ornamental plant. The demand of Hoya plant is increasing while the propagated plant is still limited. This situation stimulates the Hoya trader to order plants from the villager(s) who live close to the forest and possible to find Hoya plant. The villagers learn how Hoyas become known as an economic commodity or income source. Not only for ornamental plant, Hoyas have been used as medicinal plant [3,4]. For example, in India, *Hoya multiflora* is used to treat stomach ache[5], while in Malaysia used to treat rheumatism [6].

Hoya is belongs to the family Apocynaceae sub family Asclepiadoideae [7]. There are about 400 species of Hoya in the world [8] and Indonesia has been predicted to have the highest Hoya species diversity [9]. Among the Indonesian Island, Kalimantan was assumed to have the richest Hoya species. [8] listed 72 Hoya species in Borneo, while[10] listed only 27 species in Sumatra and [11]only listed 22 species in Java. The number of species is still increasing by the finding of new species.

Hoya is an epiphytic plant, which depend on the present of trees as their phorophyte. Deforestation is still occurs in Kalimantan due to the land conversion to oilpalm plantation and other uses. The impact of deforestation to the habitat degradation and habitat lost become a serious threat for Hoya



population in Kalimantan. There are only some area remain undisturbed, especially in Ketori community forest, the home of the two new Hoya species of West Kalimantan. Ketori community forest located in Ketori Village in Sanggau District, West Kalimantan. The community forest is belong to and managed by the Ketori community. They practice rules to maintain their forest since long time ago.

This study was aimed to observe the use of Hoya species and other bioresources in Ketori community forest by the local people and how they maintain their habitat by means sustainable utilization.

2. Methods

2.1. Study site

The study was conducted at Ketori community forest and Ketori village of Jangkang in Sanggau District, West Kalimantan Indonesia in February 2018 (Fig. 1).

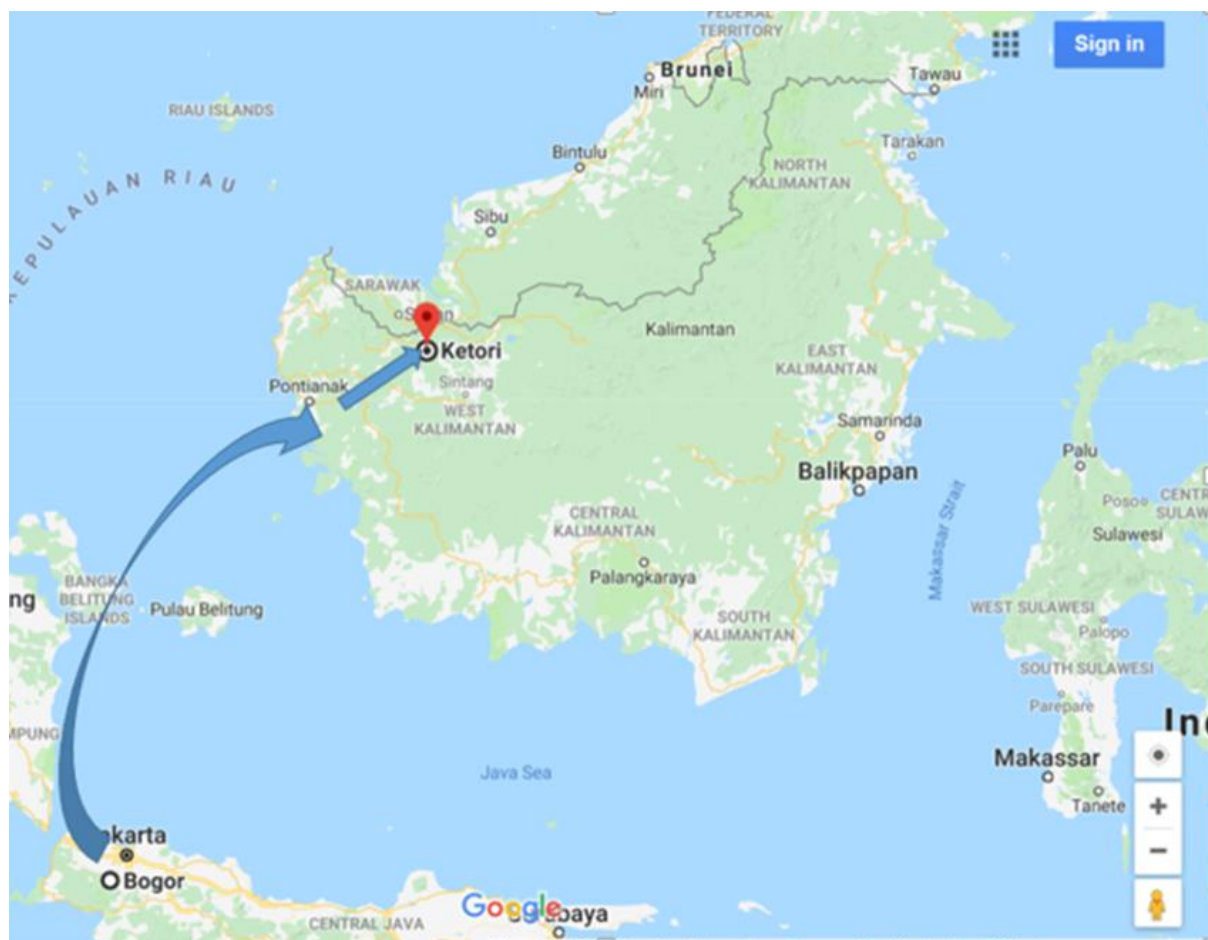


Figure. 1. Study site at Ketori, Sanggau District, West Kalimantan, Indonesia (map source: google)

2.2. Method

The study was based on observation including field exploration and inventory and interview of the villagers of Ketori village on February 2018.

2.2.1. Observation, field exploration and inventory. The observation was done on the Ketori community forest including inventory of Hoya species and other resources used by the villagers in Ketori. The methods were done by using explorative methods, following the usual path inside the forest and go inside for 100 m on the right side and 100 m on the left side after 100 m. All of Hoya species finding were documented and identified by the expertise of the authors as well as by using published paper such as [8,12, 13]. Same thing was done to the other bioresources which were used by the villagers as source of food, feed, medicines, and so on. The identification was done in Bogor Botanic Gardens via the specimen vouchers. Specimen vouchers was made by cutting the part of plants as complete as possible and process into sheets by using alcohol 70% to prevent from insects, and then drying by oven at 60°C for 2 days.

2.2.2. Interview. The interview was done before and after going into the forest. We interviewed 10 people; 6 men and 4 women in the village. We used 10 open questions as follows:

- Are they know about Hoya?
- What is the local name of Hoya?
- How do they use Hoya and what was the purpose of using Hoya?
- Do they propagate Hoya?
- Are they selling Hoya?
- Are they selling plants from the forest?
- What kind of plants are collected and then sold?
- What kind of other plants do they use and collect from the forest?
- What kind of plants from the forest are propagated?
- What is the regulation for using bioresources from the forest.

3. Result and Discussion

3.1. Diversity of Hoya and other bioresources of Ketori community forest

We found 14 Hoya species as listed at Table 1 in the Ketori community forest. The species were found in several habitat in Ketori forest such as heath forest and riverbank.

Table 1. Hoya species in Ketori forest and the local uses

No	Hoya species	Distribution	Population	Local Use
1	<i>Hoya bakoensis</i>	Borneo-Sabah	+	-
2	<i>Hoya beccarii</i>	Borneo, Sumatra	+	-
3	<i>Hoya chewiorum</i>	Borneo	++	-
4	<i>Hoya coronaria</i>	Borneo, Sumatra, Malay Peninsula	++	vegetable, medicine
5	<i>Hoya glabra</i>	Borneo	+	-
6	<i>Hoya ignorata</i>	Borneo, Malay Peninsula, Indochina	+	-
7	<i>Hoya meredithii</i>	Borneo	++	vegetable
8	<i>Hoya mitrata</i>	Borneo, Sumatra, Malay Peninsula	+	-
9	<i>Hoya narcissiflora</i>	Sanggau	++	-
10	<i>Hoya revoluta</i>	Borneo, Sumatra, Malay Peninsula	+	-
11	<i>Hoya scortechinii</i>	Borneo, Sumatra, Malay Peninsula	++	-
12	<i>Hoya sigilatis</i>	Borneo	+	-
13	<i>Hoya undulata</i>	West Kalimantan (Sanggau, Putussibau)	+	-
14	<i>Hoya waymaniae</i>	Borneo	++	medicine

The new species recently published from West Kalimantan were found in Ketori forest, i.e. *Hoya undulata* S. [1] and *Hoya narcissiflora* S. [2]. *Hoya undulata* was firstly found in Putussibau as the type locality, but then found also in Ketori and Jangkang (Sanggau) with the limited population

number (Fig. 2). The type locality of *Hoya narcissiflora* was in Ketori, and the population number is higher. Up to know, *Hoya narcissiflora* (Fig.3) was only known from type locality in Ketori (Sanggau) and there is no new locality record yet. The distribution of other Hoya species (Fig.4) was varied as listed in Table 1. Most of Hoya species found in Ketori forest was endemic species of Borneo.



Figure. 2. *Hoya undulata* S.Rahayu & Rodda, also found in Ketori



Figure.3. *Hoya narcissiflora* S.Rahayu & Rodda, only found in Ketori

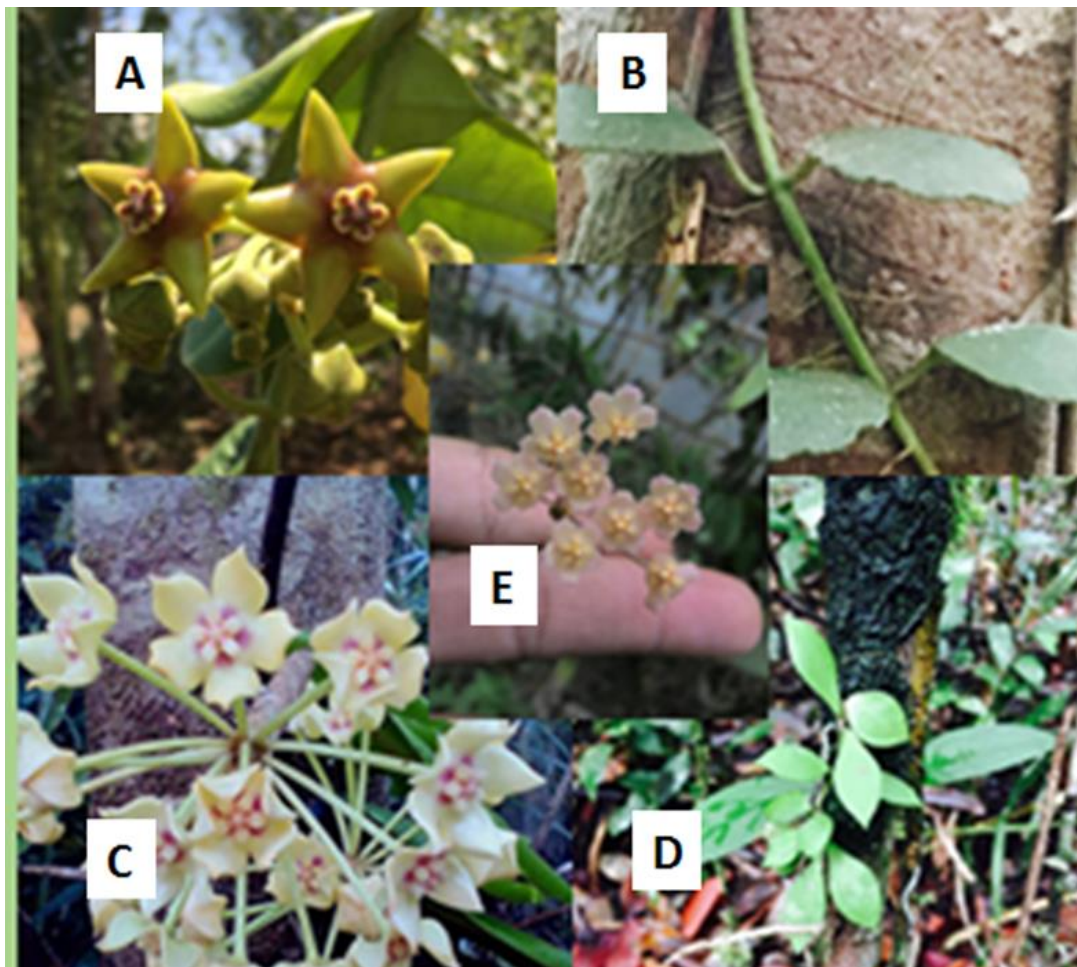


Figure. 4. Another Hoya species found in Ketori: A. *H. coronaria* . B. *H. waymaniae*, C. *Hoya chewiorum*, D. *Hoya bakoensis*, E. *Hoya sigilatis*

There are several interesting plant especially with high horticultural value were found in Ketori forest such as orchids, *Nepethes*, *Aeschynanthus*, *Dischidia*, (Fig. 5), fruits etc. Some of them are listed in Table 2.

These plants have high economic horticultural value. The urban people are now interesting and collecting of these plants and use them as ornamental plant. The Dayak people who live in the rural area around Ketori forest did not use these kind of plants species as ornamentals, as well as for Hoya species, but they use some of them as source of medicines for themselves. But the urban people looking these kind of plants by the chain of trades till reach to the rural people around Ketori forest. Some people in the rural area around Ketori then involve in the trade chain and become a plant trader and plant hunter. But by the rules run by the community of Dayak Ketori, the direct harvest from the forest was limited, and they have to propagate these kind of plant at their backyard.

Another prospective species were the sort of local fruits (Fig. 6) especially from the family Euphorbiaceae and Sapindace as listed in Table 3.

The use of local fruit is not merely for edible fruit, but some species also used as medicinal resources. The local fruit is divers in shapes, color and taste. Most of them were sold in local market and distributed to the bigger city and sometimes they sold to the border between Indonesia and Malaysia (Sarawak) in Entikong.

Table 2. Interesting high horticultural value species found in Ketori Community Forest

No	Plant Species	Family	Distribution	Local Use
1	<i>Aeschynanthus angustifolius</i>	Gesneriaceae	Borneo, Sumatra, Java	-
2	<i>Aeschynanthus albidus</i>	Gesneriaceae	Borneo, Sumatra, Java	-
3	<i>Aeschynanthus pulcher</i>	Gesneriaceae	Borneo, Sumatra, Java	Vegetable
4	<i>Aeschynanthus speciosus</i>	Gesneriaceae	Borneo, Sumatra	-
5	<i>Aeschynanthus sp.</i>	Gesneriaceae	Borneo (Sanggau)	Vegetable
6	<i>Dischidia nummularia</i>	Apocynaceae	Borneo, Sumatra, Java	-
7	<i>Dischidia major</i>	Apocynaceae	Borneo, Sumatra, Java	Medicine
8	<i>Dischidia hirsuta</i>	Apocynaceae	Borneo, Sumatra, Java	-
9	<i>Dischidia estephana</i>	Apocynaceae	Borneo, Malay P.	Medicine
10	<i>Dischidia sp.</i>	Apocynaceae	Borneo (Sanggau)	-
11	<i>Coelogyne speciosa</i>	Orchidaceae	Indonesia	-
12	<i>Cymbidium bicolor</i>	Orchidaceae	Indonesia	-
13	<i>Dendrobium mutabile</i>	Orchidaceae	Indonesia	-
14	<i>Dendrobium sp.</i>	Orchidaceae	Borneo	-
15	<i>Vanda diarei</i>	Orchidaceae	Borneo	-
16	<i>Nepenthes amphularia</i>	Nepenthaceae	Borneo, Sumatra	Medicine
17	<i>Nepenthes gracilis</i>	Nepenthaceae	Borneo, Sumatra	Medicine
18	<i>Nepenthes mirabilis</i>	Nepenthaceae	Borneo, Sumatra	-
19	<i>Nepenthes rafflesiana</i>	Nepenthaceae	Borneo, Sumatra	-

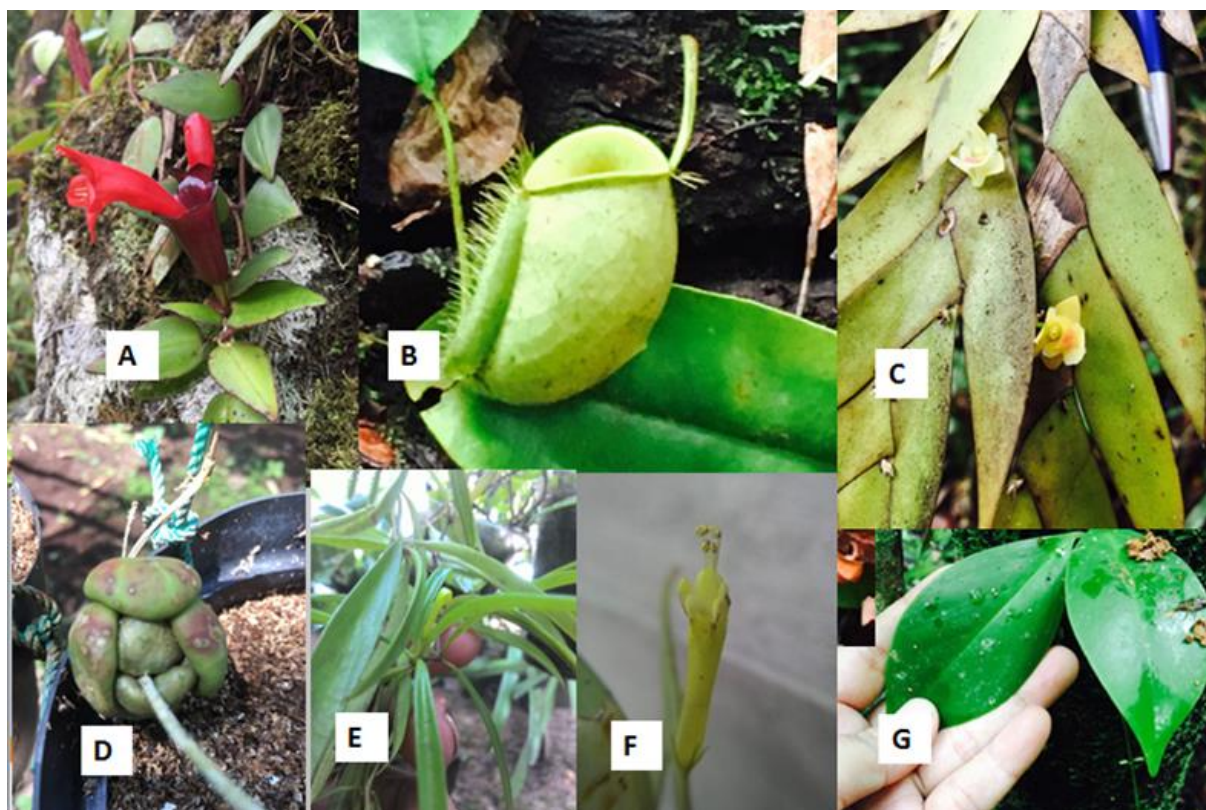


Figure. 5. High ornamental value species at Ketori community forest: A. *Aeschynanthus radicans*, B. *Nepenthes amphularia*, C. *Dendrobium sp.*, D. *Dischidia sp.* E. *Aeschynanthus angustifolius*-leaves. F. *Aeschynanthus angustifolius*-flower, G. *Aeschynanthus sp.*

Table3. Some local interesting fruit in Ketori forest (West Kalimantan)

No	Plant Species	Family	Local Name	Local Use
1	<i>Artocarpus champeden</i>	Moraceae	cempedak	Fruit
2	<i>Artocarpus heterophyllus</i>	Moraceae	kluwih	Fruit
3	<i>Artocarpus integer</i>	Moraceae	nanka	Fruit
4	<i>Artocarpus lanceifolius</i>	Moraceae	terap	Fruit
5	<i>Artocarpus odoratissimus</i>	Moraceae	keledang	Fruit
6	<i>Baccaurea angulata</i>	Euphorbiaceae	ucongk	Fruit
7	<i>Baccaurea macrocarpa</i>	Euphorbiaceae	tampoi	Fruit
8	<i>Baccaurea motleyana</i>	Euphorbiaceae	Ramei	Fruit
9	<i>Baccaurea racemosa</i>	Euphorbiaceae	engkuni	Fruit
10	<i>Durio graveolens</i>	Bombacaceae	durian lay	Fruit, medicine
11	<i>Durio oxyleyanus</i>	Bombacaceae	durian isu	Fruit, medicine
12	<i>Durio zibethinus</i>	Bombacaceae	durian	Fruit
	<i>Lepisanthes rubiginosa</i>	Sapindaceae	kasae	Fruit, medicine
13	<i>Nephelium lappaceum</i>	Sapindaceae	rambutan	Fruit
14	<i>Nephelium sp. (mini)</i>	Sapindaceae	molayan't	Fruit, medicine
15	<i>Nephelium maingayi</i>	Sapindaceae	turo kole	Fruit, medicine
16	<i>Mangifera foetida</i>	Anacardiaceae	Paoh bacang	Fruit, medicine
17	<i>Mangifera pajang</i>	Anacardiaceae	bambangan	Fruit, medicine

**Figure 6.** The local fruit of Ketori community forest: A. *Nephelium maingayi* B. *Nephelium sp.* C. *Baccaurea angulata*, C. *Lepisanthes rubiginosa*, D. *Baccaurea macrocarpa*

3.2. Local wisdom in bioresource and forest mainatanance

Dayak people in Ketori village still rely on the flora diversity in their forest. They also share the biodiversity to other people who life at surrounding Ketori – They are still a big family. But they have strict regulation to the foreigner (not Dayak tribe). Foreigners are forbidden to enter the forest of Ketori except with permission. They may allow foreigner to enter the forest as long as (in their perception) the foreigner will not “steal” or sell the biodiversity in Ketori community forest.

They allowed to using the resource only for domestic need. The use of the biodiversity inside the forest Ketori for sale is forbidden for all the member of Dayak Ketori. They can use for their need directly such as timber for making their houses but not for sale, medicines, food, feed, etc. But there were exception for specific products which were allowed to sell such as agarwood (*Aquilaria malaccensis*) and “damar”gum (*Agathis borneensis*). If somebody collect agarwood or damar, they have to share the revenue to the community after sale.

Regarding with the use of Hoya and other interesting ornamental plants, they did not used as ornamental plant by themselves. They use some kind of plants as source of medicine. The species used is depends on the disease. Several species were also used as raw vegetable. They use *Hoya coronaria* and *Hoya meredithii* as raw vegetable and they believe these species are able to decrease high pressure blood. *Hoya waymaniae* was used to treat stomach ache, and *Dischidias* – the Hoyas relatives – are also used as medicines to treat stomach ache and head ache. They use *Nepenthes* as source of medicines and they also use water of unopened pitcher to wash the dirty eyes.

Local people in Ketori have limited knowledge on the agriculture technique. They are still harvested their needs in the forest and only grow some very important crops close to the village such as rice, maize and cassava. They are not used to grow forest plant. But they have to fulfill the demand of ornamental forest plant without direct harvesting from the forest. They have to learn how to propagate forest ornamental plant at their backyard. Limited knowledge in the propagation and horticultural techniques was the obstacle to produce the best result. Distributing knowledge to local people on how to propagate and grow ornamental forest plant such as Hoyas, orchid, etc. is needed.

4. Conclusion

Hoya species and other ornamental plant were known sparsely by the people of Ketori. Some of them were used as source of medicines and used as vegetable as well. The population of Hoya species and other bioresources were good in Ketori community forest. The people of Ketori village practice their local rules on the forest and biodiversity management for sustainable uses.

References

- [1] Rahayu S Rodda M and Meve U 2015 *Hoya undulata* a new myrmecophytic species from Borneo and the typification of *Hoya darwinii*. *Garden Bull Singapore* 16 12-25
- [2] Rahayu S and Rodda M 2017 *Hoya narcissiflora*, a new species from Borneo *Reinwardtia* 16 16-28
- [3] Zachos E 2005 Practical uses of various Hoya species *Asklepios* 93 10-17
- [4] Wiart C 2006 *Medicinal Plants of Asia and the Pacific* (London: Taylor & Francis Group)
- [5] Ambasta S P 1990 *The Usefull Plants of India* (New Delhi: Publ.& Inform. Dir. Council of Scientific and Industrial Research)
- [6] Burkill H 2002 *A Dictionary of Economic Product of Malay Peninsula Vol 2* (Kuala Lumpur: Ministry-of Agriculture Malaysia)
- [7] Endress M E Liede-Schumann S Meve U 2014 An updated classification for Apocynaceae *Phytotaxa* 159 175-194
- [8] Lamb A L and Rodda M 2016 *A Guide to Hoyas of Borneo* (Kota Kinabalu: Natural History Publications Borneo) p 204
- [9] Kleijn D and vDonkelaar R 2001 Notes on the taxonomy and ecology of the genus *Hoya* (Asclepiadaceae) in Central Sulawesi *Blumea* 46 457-483
- [10] Rahayu S and Wanntorp L 2012 Notes on the species diversity of *Hoya* (Apocynaceae – Asclepiadoideae) of Sumatra. *Asklepios* 113 17–26
- [11] Backer C A and Bakhuizen vd B Jr 1965 *Flora of Java Vol II*. (Groningen: P. Noordhoff)
- [12] Rintz R E 1980 The Biology and cultivation of Hoyas *Asclepiadaceae* 19 9-17
- [13] Lamb A L Gavrus A Emoi B and Gokusing L 2015 The Hoyas of Sabah, a commentary with seven new species and a new subspecies. *Sandakania* 19 1-89

Acknowledgements

We would like to thanks Maskuran (Jangkang) for his assist during study in Ketori, West Kalimantan. We would like also to thanks Mr. Sulaiman Hasim (Pontianak), and A. Amar family for their support for this study, Dr. Joeni Setijo Rahajoe (BO) and Kepala Pusat Penelitian Biologi LIPI for the recommendation letter for collecting the plants by SATS DN.