

PAPER • OPEN ACCESS

## The Role of Plant Diversity In Local Community Of Gili Iyang Island, Sumenep, East Java, Indonesia

To cite this article: S Susiarti *et al* 2019 *IOP Conf. Ser.: Earth Environ. Sci.* **298** 012028

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

# The Role of Plant Diversity In Local Community Of Gili Iyang Island, Sumenep, East Java, Indonesia

S Susiarti\* , VBL Sihotang and Rugayah

Botany Division, Research Center for Biology, Indonesian Institute of Science (LIPI)  
Jl. Raya Jakarta-Bogor Km 46, Cibinong, Indonesia

\*Corresponding Email : susi.etno@yahoo.com

**Abstract.** Indonesia is known as an archipelago with more than 17,000 islands, one of which is Gili Iyang Island. The island is located in the eastern part of Madura island, including in the region of Sumenep regency, East Java Province, Indonesia. Gili Iyang Island is reported as one of the highest oxygen sites in the world with tourism potency such as various caves with its natural beauty. The research was aimed to discover the plant diversity and local wisdom of the community. Data was collected through direct observation, open ended interview with 20 informants in two villages. The results showed that no less than 94 species utilized as food, medicines and other purposes. The plant species used for food such as taal (*Borassus flabellifer* L.), bukkol (*Zizyphus jujuba* Mill.), bille (*Aegle marmelos* (L.) Correa.) and bintaos (*Wrightia pubescens* R.Br.). The latter species is still rare to consume as food, while medicinal materials are landhek (*Barleria prinitis* L), membhe (*Azadirachta indica* A. Juss.) and tanggeri (*Sida rhombifolia* L.).

## 1. Introduction

Sumenep Regency is one of the regencies on Madura Island, East Java Province, Indonesia. Sumenep Regency has 126 islands. There are 48 islands which have inhabitants and one of them is Giliyang Island or Gili Iyang Island. Giliyang Island has an area of 9.15 km<sup>2</sup>, located to the east of Sumenep regency and included in Dungkek district (63.35 km<sup>2</sup>).

This island has its own uniqueness. The oxygen content of the island is above the normal limits, which is 20.9% with LEL (Level Explosive Limit) 0.5%. According to the National Aeronautics and Space Agency (LAPAN) survey results, it was reported that the island's oxygen content was around 21.9%. Also, based on the LAPAN measurements in 2006, it is necessary to follow up on the factors causing the high oxygen concentration, by knowing the role of plant diversity in local people on the island.

We know that the oxygen level of an island / place is very dependent on various environmental factors around it, one of which is a component of the island's inhabitants. The disclosure of the island's biota has never been reported, therefore the research of the role of plant diversity for local people of Giliyang Island needs to be carried out.

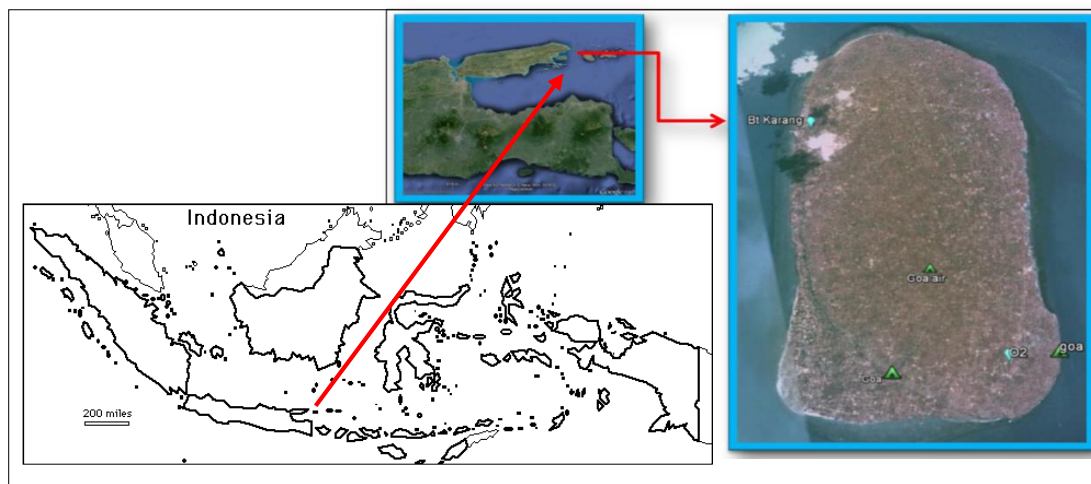
The Research Center for Biology, LIPI in collaboration with Sumenep Regional Development Planning Agency, conducted an inventory of the Gili Iyang island's biota in order to find out what factors caused the high levels of oxygen on the island, through the research of the role of plant diversity on the island. As we know that plants are the main oxygen contributors to this earth, although the levels are lower (20%) compared to plankton which reaches 80% [1]. Local people have mapped



high oxygenated areas in the villages of Bancamara and Banraas. The first location is in the yard, around the house, while the second location is a bit far from the community's residence.

## 2. Methode

The study was conducted on GiliIyang Island, Dungkek district, Sumenep Regency (Figure 1)[2]. The island has two villages with population of 8,321 people in 2014. The study was conducted through two approaches, namely field research to obtain primary data and then enriched through secondary data. Primary data collection was carried out by involving the community through interviews with local community groups and individual community members who have expertise and social status such as village heads (2 people), indigenous elders (4 people), and community members (20 people), both male and female [3,4]. In collecting data, the interview technique used was "open ended". This data collection technique is also used to explore the local knowledge system regarding the plant diversity and their use as food, medicinal ingredients and others. In addition, direct observation in the field was also carried out to document the local name of plants used and plants diversity. We also collect sample specimen (voucher specimen) for identification purposes at the Herbarium Bogoriense, Research Center for Biology - LIPI. Secondary data collected through the literature study by reviewing and analyzing books, articles and other forms of writing that support this research. Likewise with the use of local sources and writings from foreign authors related to research problems.



**Figure 1.** GiliIyang Island located to the East of Madura Island, one of the districts on Sumenep regency, East Java Province, Indonesia

## 3. Results and Discussion

### 3.1. Brief Description of GiliIyang Island

Sumenep Regency is located between  $113^{\circ}32'$  E -  $116^{\circ}16'$  E and  $4^{\circ}55'$  S –  $7^{\circ}24'$  S with the following regional boundaries: North: Java Sea; East: Java Sea / Flores Sea; South: Madura Strait; and West: Pamekasan Regency.

Geographically, Sumenep Regency is divided into two parts, namely: the land area with an area of  $1,146.93 \text{ km}^2$  (54.79%) and the islands with an area of  $946.53 \text{ km}^2$  (45.21%). Administratively, Sumenep Regency is divided into 27 sub-districts, 328 villages and 4 sub-districts. Sumenep Regency has 126 islands that are inhabited or not. Dungkek district has 1 island, Gili Iyang Island, which is located on the east of Madura Island.

The area of Dungkek sub-district is  $63.35 \text{ km}^2$ , with a male population: 16,842 and women: 19,476 people[2]. The area of Gili Iyang Island is 5,5 hectares and consists of two villages namely Banraas

and Bancamara, each with an area of 4 km<sup>2</sup> and 5.15 km<sup>2</sup>. The population in Banraas village (male: 1,609 and female: 1,972 inhabitants) and Bancamara village (male: 2,133 and female: 2,551). The livelihoods of community are farmers, fishermen, and household handicraft industry workers. Based on the Kalianget Meteorological Station, the maximum average temperature in October 2011 was 33,3°C and the average minimum temperature in June 2011 was 24.5 °C.

### 3.2. History of Gili Iyang Island

It is said that the island is inhabited by local people who moved from Sumenep (Madura Island), during the time of Sultan Abdurrachman and also people from Makassar. In 1818, there was a man from Makassar named Daeng Masalle, moving to this island, through Leguna beach which is currently called Banraas village. Then he came through Bancamara, where until now there is still the remains of the old stone fence from the Daeng Masalle family's house. At that time, he looked for a place to live in the north-south of the island. Until now the descendants of Daeng Masalle are the eighth generation.

### 3.3. Local Knowledge of Plant Utilization in Gili Iyang Island

There are several trees which planted surrounded the area such as *Borassus flabellifer*, *Azadirachta indica*. Based on the local wisdom of the community, there are several plants can be utilized such as 94 species of 83 genera, 49 plant family including medicinal ingredients (28 species), vegetables (18 species), fruits (17 species), plants ornamental (16 species), carbohydrate sources (8 species), feed (7 species), spices (6 species), and others (5 species) (Table 1 and Figure 2). There is one species with dual function, *marongghi* (*Moringa oleifera*) is utilized as food ingredient as well as medicinal ingredients.

Local people utilize *bukkol* (*Ziziphus jujuba*), *bille* (*Aegle marmelos*) and *bintaos* (*Wrightia pubescens* R.Br.) as foodstuffs. This latter species (*bintaos*) has never been reported in book of 'Tumbuhan Berguna Indonesia' [4]. This species seldom consumes as food but is used for medicinal plants for malaria in West Timor Island [5].

*Bille* (*Aegle marmelos*) is one of the fruits found in Gili Iyang Island, this fruit has begun to scarce. According to Baliga [6], In India, beside as foodstuff, *bille* is also utilized for the treatment of chronic diarrhea, dysentery and gastric ulcers. In addition to antidiarrhoeal, according to Rahman & Parvin [7], it also contains antimicrobial and anticancer.

From the below table (table 1), beside as food ingredients, *kacangkaju* (*Cajanus cajan*) is utilized for medicine. The seeds are used as vegetables. According to Pal [8] and Primiani & Pujiati [9], kacang kajuis important local Leguminosae plant in dry land of tropical regions. This species contains high protein and isoflavones which is similar to estrogen compounds, so that it looks like estrogen which can be used in the health sector. According to Widiyastuti *et al.* [10], the leaves and stems contain flavonoids and saponins. In addition, the leaves utilize to overcome scabies, relieve cough and use in dialysis. In Gili Iyang Island, the leaves are used as medicinal ingredients. The bioactive content (phytochemical) of the *Cajanus cajan* leaves is higher than the content of the seeds. [11].

In Gili Iyang Island, medicinal plants use for healing toothache, head, stomach, wounds, babies and children disease, recovery after child birth, increase appetite and the endurance. Medicinal ingredients are taken from around the settlement as well as from markets such as garlic (*Allium sativum*), *jeringo* (*Acorus calamus*), and *majakane* (*Quercus lusitanica*). Medicinal plants used on Gili Iyang Island are also included in the Top 100 Indonesian Medicinal plants including *Acorus calamus*, *Piper nigrum*, and *Pluchea indica* [12].

The other medicinal plant is *landhek* (*Barleria prionitis*) which is used for healing toothache. This plant contains toxicity [13]. According to Talukdar *et al.* [14]; [10], *Barleria prionitis*'s leaves also contains saponins, flavonoids, and tannins. *Membhe* (*Azadirachta indica*) contains antibacterial [15].

Based on our interview with the elder people, there was a species also used as medicine, it is called *bidara gunung*. Unfortunately, we couldn't find the specimen. It is possible that *bidara gunung* is the same species with *bidara paek*. *Bidara paek* (*Strychnos* sp.) was collected from Sepanjang island (included in Sumenep regency) [16]. Also, in Sepanjang Island, *Talinum triangulare* is utilized as

medicinal plants and it has economic value. On the contrary, there is no information that the species is used for medicinal plants in Gili Iyang Island.

In Gili Iyang Island, there are many elder people (about 100 years old) who still have activities, such as making mats. Generally, the elderly are not easy to remember food they had used in the past, especially that time was the colonial period such as the Japanese colonial period. In general, they remembered common foodstuffs such as corn (*Zea mays*), *sayurkomak* (*Lablab purpureus*), *sayur kratok* (*Phaseolus lunatus*), banana midrib (*Musa acuminata*), *bioka* leaves (*Manihot glaziovii*), *bintaos* (*Wrightia pubescens*), and *rambote* (?). These species are also known in the village of Karangbudi, another district in Sumenep. According to Kuswandi *et al.* [17], papaya stems or midrib also used as alternative food for making chips.

One of local people also know about *lorkong* which can be used as a substitute for wheat flour. It is made for snacks such as *serpot* cookies. *Lorkong* is also known in Sumenep. In the past, it is known as 'to'toan' in Kangean Island, but there are people in Saronggi District, Sumenep, who use it to this day which is known as 'oto'o' [18]. The scientific name of the plant is *Tacca leontopetaloides*. Unfortunately, we couldn't find this plant because it was the dormant/ sleep period. This plant experienced a normal sleep period in the dry season.

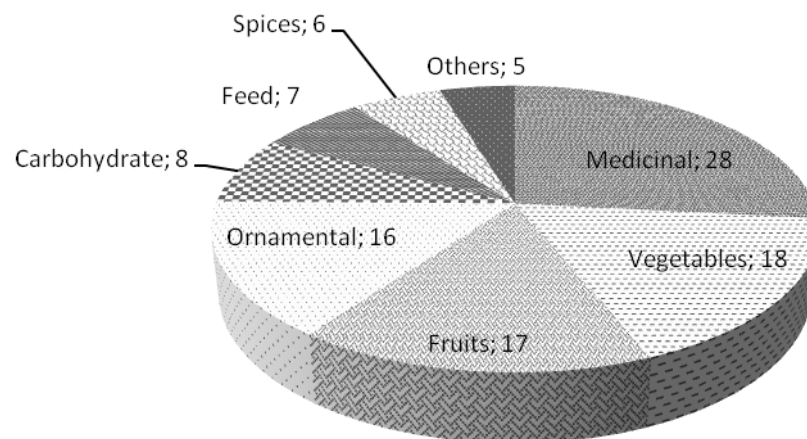
From the opinion of one of the elderly, not only health must be maintained but also the consumed food. Young people feel sick because they do not pay attention to their consumed food. According to Anna [19], as Nir Barzilai (director of the Institute for Aging Research at Yehiva University Albert Einstein College of Medicine), said that someone who can reach 100 years of age may have longevity genes that help them to fight the ill effects of an unhealthy lifestyle. Amy Anderson, a lead researcher of the University of Maryland, said that parents who consume lots of fruits, vegetables, fish, poultry, and low-fat products have a lower risk of death [20].

**Table 1.** List of Plant Species in Gili Iyang Island.

No	Species	Family	Local Name	Potency
1	<i>Acorus calamus</i>	Acoraceae	Jeringo	Medicinal
2	<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Bille	Fruit
3	<i>Aleurites moluccana</i> Willd.	Euphorbiaceae	Kemiri	Spices
4	<i>Allium sativum</i>	Liliaceae	Bebeng potih	Spices
5	<i>Alpinia galanga</i>	Zingiberaceae	laos	Spices
6	<i>Amorphophalus campanulatus</i> Blume	Araceae	Sobeg	Carbohydrate
7	<i>Anisomeles indica</i> (L.) Kuntze	Lamiaceae	Sepnana	Medicinal
8	<i>Annona muricata</i> L.	Annonaceae	Nangka belendhe	Fruit
9	<i>Annona squamosa</i> L.	Annonaceae	Srikaje	Fruit
10	<i>Anredera cordifolia</i> (Ten.) Steenis	Basellaceae	Binahong	Medicinal
11	<i>Averrhoa bilimbi</i> L.	Oxalidaceae	Belimbhing buluh	Fruit
12	<i>Averrhoa carambola</i> L.	Oxalidaceae	Belimbhing	Fruit
13	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Mimbhe	Medicinal, Feed
14	<i>Bambusa vulgaris</i> Schrad.	Poaceae		Ornamental
15	<i>Barleria prionitis</i> L.	Acanthaceae	Landek	Medicinal
16	<i>Benincasa pruriens</i> (Parkinson) W.J. de Wilde & Duyfjes (Thunb.) Cogn.	Cucurbitaceae	Kondur	Vegetable
17	<i>Boesenbergia rotunda</i> (L.) Mansfeld	Zingiberaceae	Temo konce	Medicinal, Spices
18	<i>Borassus flabelifer</i> L.	Arecaceae	Tarebung	Carbohydrate, Feed
19	<i>Bougainvillea spectabilis</i> Willd.	Nyctaginaceae		Ornamental
20	<i>Caesalpinia pulcherrima</i> (L.) Swartz	Caesalpiniaceae	bunga merak	Ornamental
21	<i>Cajanus cajan</i> (L.) Huth	Papilionacea	Kacang kaju	Vegetable, Medicinal
22	<i>Carica papaya</i> L.	Caricaceaea	Pepaya	Fruit, medicinal

No	Species	Family	Local Name	Potency
23	<i>Casuarina equisetifolia</i> J.R. & G. Forst.	Casuarinaceae	Cemara odeng	Ornamental
24	<i>Citrus × aurantium</i> L.	Rutaceae	Jeruk madura	Fruit
25	<i>Cocos nucifera</i>	Arecaceae	Nyior	
26	<i>Codiaeum variegatum</i> (L.) blume	Euphorbiaceae	Puring	Ornamental
27	<i>Cordia dichotoma</i> G. Forst.	Borraginaceae		Boat
28	<i>Cucumis sativa</i> L.	Cucurbitaceae	Temon	Vegetable
29	<i>Cucurbita moschata</i> (Duch.) Poir.	Cucurbitaceae	Labu kuning	Vegetable
30	<i>Curcuma longa</i> L.	Zingiberaceae	Konyek	Medicinal
31	<i>Curcuma aeruginosa</i> Roxb.	Zingiberaceae	Temo ereng	Medicinal
32	<i>Digitaria longiflora</i> (Retz.) Pers	Poaceae		Feed
33	<i>Dioscorea alata</i> L.	Dioscoreaceae	Obi	Carbohydrate
34	<i>Dioscorea bulbifera</i> L.	Dioscoreaceae	Obi	Carbohydrate
35	<i>Dioscorea hispida</i> Dennst.	Dioscoreaceae	Gedung	Carbohydrate
36	<i>Dracaena fruticosa</i> Backer	Liliaceae		Ornamental
37	<i>Eragrostis amabilis</i> (L.) Wight & Arn	Poaceae		Feed
38	<i>Euphorbia tirucalli</i> L.	Euphorbiaceae	Tulang Tulang	Ornamental
39	<i>Ficus superba</i> Miq.	Moraceae		Medicinal
40	<i>Ficus benamina</i> L.	Moraceae	Beringin	Medicinal
41	<i>Fimbristylis cymosa</i> R.Br.	Cyperaceae		Feed
42	<i>Gliricidia sepium</i> (Jacq.) Kunth ex Walp	Fabaceae	Bengkal	Feed
43	<i>Graptophyllum pictum</i> Griff.	Euphorbiaceae		Ornamental
44	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Kembhang sepatu	Ornamental
45	<i>Hoya diversifolia</i> Blume	Asclepiadaceae	Tang katang tasek	Ornamental, Medicinal
46	<i>Ipomoea batatas</i> (L.) L.	Convolvulaceae	Tela	Vegetable, Carbohydrate
47	<i>Jatropha curcas</i> L.	Euphorbiaceae		Medicinal, ornamental
48	<i>Jatropha gossypifolia</i> var. <i>elegans</i> (Pohl) Müll.Arg.	Euphorbiaceae	Kaleke	Ornamental
49	<i>Kaempferia galanga</i> L.	Zingiberaceae	Kencor	Medicinal, Species
50	<i>Lablab purpureus</i> (L.) Sweet.	Papilionaceae	Komak	Vegetable
51	<i>Lannea coromandelica</i> (Houtt.) Merr.	Anacardiaceae	Palembheng	Vegetable, Medicinal, Feed
52	<i>Lawsonia inermis</i>	Lythraceae	Pacar	Medicinal
53	<i>Luffa acutangula</i> (L.) Roxb.	Cucurbitaceae		Vegetable
54	<i>Luffa aegyptiaca</i> Mill.	Cucurbitaceae		Vegetable
55	<i>Mangifera indica</i> L.	Anacardiaceae	Pao	Fruit
56	<i>Manihot esculenta</i> Crantz	Euphorbiaceae	Sabreng	Carbohydrate
57	<i>Manihot glaziovii</i> Muell. Arg.	Euphorbiaceae	Bioka	Vegetable
58	<i>Manilkara zapota</i> (L.) P.Royen	Apocynaceae	Sabu	Fruit
59	<i>Morinda citrifolia</i> L.	Rubiaceae	Koduk	Medicinal
60	<i>Moringa oleifera</i> Lmk.	Moringaceae	Marongghi	Vegetable, Medicinal
61	<i>Musa acuminta</i> Colla	Musaceae	Gedheng	Fruit
62	<i>Orthosiphon aristatus</i> (Blume) Miq.	Lamiaceae	Komis kocing	Medicinal, ornamental

No	Species	Family	Local Name	Potency
63	<i>Paederia foetida</i> L.	Rubiaceae	kasembughen	Medicinal
64	<i>Pandanus amaryllifolius</i> Roxb.	Pandanaceae	Panden	Spices, dye
65	<i>Pandanus dubius</i> Spreng	Pandanaceae	Panden	Ornamental
66	<i>Passiflora edulis</i> Sims.	Passifloraceae	sok dang dang	Fruit
67	<i>Pemphis acidula</i> J.R.& G.Forst.	Lythraceae	Cantigi	Ornamental
68	<i>Phaseolus lunatus</i> L.	Papilionaceae	Kratok	Vegetable
69	<i>Piper betle</i> L.	Piperaceae	Sereh	Medicinal
70	<i>Piper nigrum</i> L.	Piperaceae	Saang	Medicinal
71	<i>Piper retrofractum</i> L.	Piperaceae	Cabbhi Jemo	Medicinal
72	<i>Pluchea indica</i> (L.) Less.	Asteraceae	Beluntas	Medicinal
73	<i>Polytrias indica</i> (Houtt.) Veldkamp	Poaceae		Vegetable
74	<i>Portulaca oleracea</i> L.	Portulacaceae		Vegetable
75	<i>Protium javanicum</i> Burm.f.	Burseraceae	Tanggulun	Medicinal
76	<i>Psidium guajava</i> L.	Myrtaceae	Jembhu	Fruit, Medicinal
77	<i>Punica granatum</i> L.	Punicaceae	Delima	Fruit
78	<i>Quercus lusitanica</i> Lam	Fagaceae	Majakane	Medicinal
79	<i>Sauropus androgynus</i> (L.) Merr	Phyllanthaceae	Katuk	Vegetable
80	<i>Schleichera oleosa</i> (Lour.) Merr.	Sapindaceae	Kosambi	Fruit
81	<i>Senna siamea</i> L.	Caesalpiniaceae		Ornamental
82	<i>Sesbania grandiflora</i> (L.) Poiret	Papilionaceae	Toroy	Vegetable
83	<i>Sida acuta</i> Burm.f.	Malvaceae	Tanggeri	Medicinal
84	<i>Solanum melongena</i> L.	Solanaceae	Terong	Vegetable
85	<i>Spondias pinnata</i> (L.f.) Kurz	Anacardiaceae	Kadungdung	Fruit
86	<i>Syzygium samarangense</i> (Blume) Merr. & Perry	Myrtaceae	Jembhuir	Fruit
87	<i>Tamarindus indica</i> L.	Leguminosae	Accem	Spices
88	<i>Talinum triangulare</i> Vahl	Talinaceae		Ornamental
89	<i>Tectona grandis</i> L.f	Verbenaceae	Jete	Board
90	<i>Wrightia pubescens</i> R.Br.	Apocynaceae	Bintaos	Vegetable
91	<i>Zanthoxylum rhetza</i> (Roxb.) DC.	Rutaceae	Krangean	Carving, putty ship
92	<i>Zea mays</i> L.	Poaceae	Jagung	Carbohydrate
93	<i>Zingiber officinale</i> Rosc.	Zingiberaceae	Jehi	Spices, Medicinal
94	<i>Ziziphus jujuba</i> Mill.	Rhamnaceae	Bukkol	Fruit



**Figure 2.** Graphic of Plants Utilization in Gili Iyang Island

#### 4. Conclusion

The role of plant species diversity in local communities of Gili Iyang Island is described through their local knowledge of plant utilization. They utilize the plants in all aspects of life. The use 94 species of the 83 genera, 49 plant family including medicinal ingredients (28 species), vegetables (18 species), fruits (17 species), ornamental plants (16 species), carbohydrate sources (8 species), feed (7 species), spices (6 species), and others (5 species). Some plants have multiple functions, both utilized for food plants and medicinal ingredients.

#### References

- [1] Anonymous 2012 Kabupaten Sumenep dalam Angka 2012 BPS Kabupaten Sumenep.
- [2] Anonymous 2012 Kecamatan Dungkek dalam Angka 2012 BPS Kabupaten Sumenep .
- [3] Martin GJ 1998 *Ethnobotany A methods manual* Chapman & Hall 268 pp
- [4] Heyne K 1950 *De Nuttige Planten Van Indonesie* Gravenhage Bandung
- [5] Taek M M Prajogo EWB and Agil M 2018 *J Young Pharm.* 10 (2): 187 – 192
- [6] Baliga MS Bhat HP Joseph N and Fasal F 2011 *Food Research International* Vol 44 (7) August 2011: 1768 – 75 Elsevier
- [7] Rahman S and Parvin R 2013 *Asian Pacific Journal of Tropical Disease* 2014 Feb 4 (1): 71-77
- [8] Pal D Mishra P Sachan N and Ghosh AK 2011 *J Adv Pharm Technol Res.*, 2 (4): 207 – 214
- [9] Primiani CN and Pujiati 2016 Leguminosae Kacang Gude (*Cajanus cajan*) dan manfaatnya untuk kesehatan. Proc. of Seminar Nasional Hasil Penelitian. 31- 45
- [10] Widiyastuti Y *et al.* 2016 *Inventaris Tumbuhan Obat Indonesia* Edisi Revisi Jilid 1 Suganda *et al.* (Eds). Badan Litbang Kesehatan, Kementerian Kesehatan RI 193 pp
- [11] Aja PM Alum EU Ezeani NN Nwali BU and Edwin N 2015 *Int. J. of Microbiological Res.* 6(1): 42-46
- [12] Widiyastuti Y *et al.* 2011 *100 TOP TANAMAN Obat Indonesia* Badan Litbang Kesehatan Kementerian Kesehatan RI 201 pp
- [13] Banerjee D Maji AK, Mahapatra S and Banerji P 2012 *Res Journal of Phytochemistry*
- [14] Talukdar SN Rahmanand B and Paul S 2015 *J of Advances in Medical and Pharmaceutical Sciences*, 4 (4): 1 – 13
- [15] Joshi J and Sahu O 2014 *Int. J. of Clinical Nutrition* 2 (2): 36 – 40
- [16] Rugayah Suhardjono and Susiarti S 2010 *Berita Biologi* 10 (2): 205 – 215, Agustus 2010
- [17] Kuswandi Nofiarli and Nasution F 2011 Studi pendahuluan pemanfaatn batang papaya sbg bahan



- baku pembuatan keripik. In: 699 – 703. Proc. of Seminar Nasional Teknologi Inovatif Pasca panen Pertanian III. Bogor, 17 November 2011
- [18] Susiarti S Setyowati N and Rugayah 2012 *Media Komunikasi dan Informasi* 21 (2): 161 - 170 (Juni 2012)
- [19] Anna LK 2011 Panjang Umur Ditentukan Faktor Genetika <http://health.kompas.com/read/2011/08/04/17130622/Panjang.Umur.Ditentukan.Faktor.Genetik> (access on August 27, 2018)
- [20] Ine 2011 Sehat Perpanjang Umur Lansia, Diet Sehat Perpanjang Umur Lansia <http://health.kompas.com/read/2011/01/04/07441356/Diet.Sehat.Perpanjang.Umur.Lansia> (access on August 25, 2014)