Identification of Vegetation in Lio Mountain Prone Areas in Brebes Regency and its Implementation as A Learning E-Module Plant Diversity

Meliya Purnama Sari[1*], Ary Susatyo Nugroho [2], Eko Retno Mulyaningrum [3]

[123]Biology Education Study Program, Faculty of Mathematics Education, Natural Sciences and Information Technology, PGRI University Semarang. Lontar Street No. 1 (East Sidodadi) Tel. (024) 8316377 Fax. (024) 8448217 Semarang-50125.

*liyame426@gmail.com

Abstract.

This research is motivated by the phenomenon of landslides in various regions in Indonesia. In addition, the mountainous area of Lio, Brebes Regency has the potential as a source for making teaching materials for the biology of plant diversity in class X SMA. The aims of this study were: 1) to determine the types of vegetation that can prevent landslides in the mountainous area of Lio, and 2) to know the application of teaching materials in the E-Module to the learning of class X high school students related to plant diversity. The method used is a qualitative method. The population of this study is all vegetation that can prevent landslides in the Lio Mountains area. The samples for this study were grass, shrubs, and trees that could prevent landslides in the mountainous area of Lio, Brebes Regency. Sampling in this study using a purposive sampling technique. Data collection techniques using observation and documentation. Data analysis used qualitative data analysis methods. The results showed that the vegetation that lives and grows in the landslide area of the Lio Mountains, Brebes Regency, includes grass vegetation, shrub vegetation, and tree vegetation. The grass vegetation that lives and grows the most, namely: meniran, buffalo grass, bitter, and bandotan. The bush vegetation that lives and grows the most, namely: Siliguri, sembung vines, secant, and jarong. The tree vegetation that lives and grows the most, namely: cherry, teak, lamtoro, and ketapang.

Keywords: Brebes, E-Modul, landslides, Lio Mountains

1. Introduction

Landslides are natural phenomena that are controlled by geological conditions, rainfall and land use on slopes. In recent years, the intensity of ground motion disasters in Indonesia has increased, with the distribution of disaster areas getting wider. This is caused by the increasing use of land that is not environmentally sound in areas prone to ground movement, as well as high rain intensity with a long duration, or due to the increasing frequency of earthquake occurrences [1].

Vegetation is one part of ecosystem-level biodiversity, especially regarding the diversity of plants, as well as the abundant benefits. The learning material that will be loaded is the diversity of plants to prevent landslides, the teaching materials that will be used, namely the electronic module E-Module.

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Based on the background of the problem explained above, the problem formulation in this research is as follows.:

a. What types of vegetation are found in landslide-prone areas in the Lio mountains, Brebes Regency?

b. What is the validity of the E-Module used in class X high school student learning related to plant diversity material?

It's been recorded that 2,425 incidents of ground motion disasters from 2011 to 2015, with locations spread across various regions in Indonesia. Most of the ground motion events were found in the provinces of Central Java, West Java, East Java, West Sumatra, and East Kalimantan. The ground movement disaster has resulted in 1,163 people dying, 112 people were missing, 973 people were injured and around 48,191 people were displaced.

The function of vegetation is very important in engineering systems for stable slopes in landslide areas. Vegetation functions as an agent for erosion prevention, reducing infiltration and runoff, preventing landslides, and strengthening slopes. [2]. Well-adapted vegetation can provide root strength in binding soil aggregates and as a support pillar for landslides [3]. Local vegetation which has the potential to strengthen soil structure and water storage are two components that dynamically interact with one another. The existence of this connection has been shown by one study which argues that local plants or surrounding vegetation that have strong root strength can prevent landslides. Development by utilizing information and communication technology, one of which is the development of printed module teaching materials into electronic-based modules better known as E-Modules. Jayadiningrat [4] states that E-modules can improve students' critical thinking skills to obtain positive responses from students and provide a high percentage of improvement. Relevance to research is developing and reviewing digital modules and implementing them through an e-learning system. The difference is that the module developed in this study is not problem-solving oriented to increase students' critical thinking and does not use the e-learning system. Development by utilizing information and communication technology, one of which is the development of printed module teaching materials into electronic-based modules better known as E-Modules. The E-module can improve students' critical thinking skills to obtain positive responses from students and provide a high percentage of improvement [4]. Relevance to research is developing and reviewing digital modules and implementing them through an e-learning system. The difference is that the module developed in this study is not problem-solving oriented to increase students' critical thinking and does not use the e-learning system. The importance of this research is to find out the types of vegetation that can prevent landslides in the Lio mountain area. Apart from that, to find out the application of teaching materials in the E-Module in class X high school students learning related to plant diversity. The results of research conducted by Janna [5] show that E-module products are very suitable for use and have received positive responses from all groups so that E-module products can be disseminated widely.

The mountainous area of Lio has the potential as a source for making teaching materials for the biology of plant diversity. This is due to the absence of research results on the identification of landslide-preventing vegetation in the mountainous area of Lio, Brebes district. The results of this research will then be made into a learning E-Module for class X high school students with plant diversity material Based on the problems described above, the researcher had the idea of conducting research by identifying vegetation to prevent landslides in mountainous areas and implementing the results of research using E-module

media for class X high school students. The researcher chose the research title "Identification of Vegetation Preventing Landslide in Areas Lio Mountains in Brebes Regency and Its Implementation as an E-Module for Plant Diversity Learning". The aims of this study were: (1) to determine the types of vegetation found in landslide-prone areas in the Lio Mountains, Brebes Regency; (2) knowing the application of teaching materials in the E-Module to the learning of class X high school students related to plant diversity.

2. Method

The method used in this research is qualitative. The qualitative research method is a research method based on the philosophy of postpositivism, used to research natural object conditions, where the researcher is the key instrument [6]. The population in this study is all vegetation that can prevent landslides in the Lio Mountains area. The research samples are grass, shrubs, and trees that can prevent landslides in the Lio mountain area, Brebes Regency. The sampling technique in this study used a purposive sampling technique. Purposive sampling is a sampling technique with certain considerations [6]. Sampling was based on three observation points, namely: (1) grass-type vegetation within 1 x 1 meter; (2) shrub-type vegetation spaced 2 x 2 meters; and (3) vegetation of tree species 10 x 10 meters apart.

Data collection techniques in this study used observation and documentation techniques. The research procedure was carried out in several stages, namely: (1) making a research design; (2) conducting research; and (3) preparation of research reports. Validation tests were carried out on material expert lecturers and E-module learning media expert lecturers. Data analysis used qualitative data analysis. The researcher analyzed the data by collecting the results from the observations and documentation that had been carried out. In addition, researchers will also re-select related to the results of vegetation documentation and vegetation morphology. Next, namely, the coding step is done by identifying and classifying the types of vegetation. Lastly is the presentation of data, in presenting data researchers can determine the type of morphology, and scientific classification of vegetation or plants that have been found from the results of observations and documentation.

3. Result and Discussion

Results of Plant Vegetation Identification and its Implementation as an E-Module in the Lio Mountains Landslide Prone Area, Brebes Regency

3.1. Results of Plant Vegetation Identification in Landslide Prone Areas of the Lio Mountains, Brebes Regency

The results of observations of grass vegetation in the Lio mountain area of Brebes district, it can be seen that grass vegetation at station 1 of Pangebonan hamlet, Brebes district, ten types of grass were identified, including minjangan, elephant grass, reeds, bandotan, Miscanthus, Spanish needles, grass buffalo, ciplukan, bitter, and meniran. Eight types of grass were identified at station 2 in Cacaban hamlet, Brebes district, including dilata grass, meniran, minjangan, Sambiloto, gadung, ciplukan, bandotan, and buffalo grass. The grass vegetation at station 3 of Jumbleng hamlet, Brebes district, was identified with the emergence of grass types, including pulutan, meniran, buffalo grass, iles-iles, beluntas, gewor, ciplukan, Sambiloto, and bandotan. Based on the results of observations made in the mountainous area of Lio, Brebes district, it can be seen that the dominant types of grass vegetation grow at three stations, including meniran, buffalo grass, Sambiloto, and Bandotan. Meniran is classified as

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kingdom plantae, division spermatophyta, class dicotyledonae, nation euphorbiales, tribe euphorbiaceae, genus phyllanthus. Meniran grows a lot in the mountainous area of Lio, Brebes district. Meniran or phyllanthus niruri, is a wild plant that is easy to find in nature or on the streets. Meniran has a small round leaf shape and at first glance looks similar to the shy princess. Meniran can be used for traditional medicine. Meniran leaves have various benefits for body health, including overcoming kidney stones, overcoming stomach ulcers, improving liver function, relieving uric acid, and lowering blood pressure [7]. Buffalo grass is classified as kingdom Plantae, Tracheophyta division, class Liliopsida, order poales, family poaceae, genus Paspalum, species Paspalum conjugatum. Buffalo grass or paspalum conjugatum is commonly found in the mountainous area of Lio, Brebes Regency. This grass is easy to find on the side of the road and even in the yard of the house. Kalimantan ethnics generally know and use this grass as a wound medicine [8].

Sambiloto is classified as kingdom Plantae, division Tracheophyte, class Magnoliopsida, order lamiales, family Acanthaceae, genus Andrographis wall. ex Nees, species Andrographis paniculata. Sambiloto or andrographis live and grow in the mountainous area of Lio, Brebes district. Sambiloto is native to South Asian countries, such as India and Sri Lanka. The leaves and underground stems are used to make medicine. Sambiloto is a plant that has antibacterial, antioxidant, anti-inflammatory, anticancer, and immune-stimulating properties. Either alone or in combination with other herbs, Sambiloto has been shown to reduce the duration and severity of upper respiratory infections (ARI) [9]. Bandotan is classified as kingdom plantae, spermatophyta division, angiospermae subdivision, dicotyledonae class, asterales nation, asteraceae tribe, clan ageratum, species Ageratum conyzoides L. Bandotan or ageratum conyzoides lives and grows in the mountainous area of Lio, Brebes district. Bandotan is a grass that usually grows wild and is often found in yards or on the side of village roads. many Kalimantan tribes believe this plant is efficacious for treating various kinds of diseases such as stomach aches, childbirth, postpartum, and coughing [8]. This plant is widespread throughout the tropics, even in the subtropics. Imported to Java before 1860, now this weed has spread widely in Indonesia. In South America, this plant is cultivated. According to historical records, bandotan was imported from Mexico. The results of observations of shrub vegetation in the Lio mountainous area of Brebes district, it can be seen that shrub vegetation at station 1 of Pangebonan hamlet, Brebes district, identified eight types of shrubs that live and grow in the area, including alangiaceae, sembung vines, secang, putri embarrassment, grass jelly, chicken droppings, jarong, taro, and sidaguri. Shrub vegetation at station 2 of Cacaban hamlet, Brebes district, eight types of shrubs were identified that live and grow in the area, including coffee, sidaguri, sembung vines, secang, and jarong. In the grass vegetation at station 3 in Jumbleng hamlet, Brebes district, eleven types of shrubs were identified that life and grow in the area, including eldeberi, sidaguri, jarong, embarrassed daughter, costus, wave begonia, konjac, fern, meanwhilenela, secang, and sembung vines. Based on the results of observations made in the mountainous area of Lio, Brebes district, the dominant types of shrub vegetation live and grow at three stations, including sidaguri, sembung creeper, secang, and jarong.

Sidaguri is classified as kingdom Plantae, division Tracheophyta, subdivision spermatophytes, clad angiosperms, order Malvales, family Malvaceae, genus sida, species sida rhombifolia. Sidaguri or sidarhombifolia live and grow in the mountainous area of Lio, Brebes district. Sidaguri is a wild plant suitable for growing in tropical areas like Indonesia. Sidaguri is a shrub with a height of 2 meters, characterized by a round trunk, sympodial

branches with a greenish-white color. All parts of sidaguri contain various beneficial substances such as alkaloids, calcium oxalate, tannins, saponins, phenols, amino acids, and essential oils. In addition, the leaves contain a lot of phlegmatic substances which are used as expectorants and lubricants. Sidaguri stem contains calcium oxalate and tannins. The roots contain alkaloids, steroids, and ephedrine [10]. Creeve vines are classified as kingdom plantae, division magnoliophyta, class magnoliopsida, order asterales, family asteraceae, genus Mikania, species Mikania micrantha kunth. Sembung vines or Mikania micrantha grow a lot in the mountainous area of Lio, Brebes district. Sembung vines have allelochemical compounds in the form of phenols, flavonoids and terpenoids which can inhibit the growth of other plants. Sembung creeping weed is a dangerous weed that causes damage to agricultural land and plantation land. This weed has a high capacity for vegetative and sexual reproduction and has very fast growth [11].

Secang is classified as the kingdom plantae, division magnoliophyta, class magnoliopsida, order fabales, family fabaceae, genus biancaea, and species B. sappan. Secang lives and grows in the mountainous area of Lio, Brebes district. Secang or caesalpinia sappan L is a low shrub or tree plant with a height of 5-10 meters. Plants belonging to the Leguminoceae family and are known to be spread across Southeast Asia, Africa, and America. This plant grows a lot in Java, at an altitude of 1-1700 asl, planted as a border, or grows wild locally. The sappan plant is a shrub with a height of 5-10 meters, the stems, and branches of which have prickly spikes whose shape is crooked and scattered, the stems are round, the color is brownish green. Secang grows wild and is sometimes planted as a hedge or garden border. The leaves of this plant are compound, double-pinnate, the flowers are compound, panicle-shaped with a tubular crown and are yellow in color, the fruit resembles a pod containing 3-4 round, elongated seeds and brownish yellow in color. Timber harvesting can be done starting at the age of 1-2 years and the wood when boiled gives a light ivory-red color, and can be used for painting, giving color to woven materials, cakes, drinks or as ink [12]. Jarong is classified as kingdom Plantae, division tracheophyta, order caryophyllales, family amaranthaceae, genus Achyranthes, species Achyranthes aspera. Jarong lives and grows in the mountainous area of Lio, Brebes district. Jarong plant known in Latin as achyranthes aspera L. is a wild shrub type plant, with a height that can reach 1 meter. Jarong usually grows in dry land with shrubs and grasses. This plant has green woody stems. In the area of Jarong, it is known by the names of network, male jarong, sangketan leaves, nyarang and dodinga. The chemical properties contained in the jarong include akirantin, glucose, galactose, reylose, ramnose, and alkaloids. The seeds contain bentriacontan and sapogenin. The root contains betaine, cedysterone, triterpenoids, and saponins [13].

The results of observations of tree vegetation in the mountainous area of Lio, Brebes district, it can be seen that tree vegetation at station 1 of Pangebonan hamlet, Brebes district, has successfully identified eight types of tree vegetation that live and grow in the area. Tree vegetation at station 1 of Pangebonan hamlet, Brebes district, includes sengon, cherry, teak, turi, trembesi, lamtoro, durian, and ketapang. Tree vegetation at station 2 of Cacaban hamlet, Brebes district, seven types of tree vegetation that live and grow in the area were identified. Tree vegetation at station 2 of Cacaban hamlet, Brebes district, includes ketapang, teak, cherry, mango, cocoa, banyan and lamtoro. Grass vegetation at station 3 of Jumbleng hamlet, Brebes district, identified eight types of trees that live and grow in the area. Tree vegetation at station 3 of Jumbleng hamlet, Brebes district, includes: mango, coconut, gandaria, ketapang, kedoya, teak, lamtoro, and cherry. Based on the results of observations made in the mountainous area

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of Lio, Brebes district, it can be seen that the dominant types of tree vegetation live and grow at three stations, including: kersen, teak, lamtoro, and ketapang. Kersen is classified as a plant kingdom, Divisi Tracheophyta, class Angiosperms, ordo Malvales, family Muntingiaceae, genus Muntingia, species Muntingia calabura [14]. Kersen trees live and grow in the mountainous area of Lio, Brebes district. The cherry tree or muntingia calabura L comes from countries in America with tropical climates, such as Peru and Bolivia. In the 1900s cherry tree seedlings were planted in the Philippines. This tree grows throughout Asia, including Indonesia. Some areas in Indonesia call this tree the talok tree, some call it the baleci tree. The cherry tree is a shrub tree that is only 3-6 meters high. The cherry tree has many branches. The branches grow horizontally, so this tree has a wide canopy.

Teak is classified as kingdom Plantae, division Tracheophyta, class Magnoliopsida, order lamiales, family Lamiaceae, genus Tectona, species Tectona grandis Linn. F. Teak trees live and grow in the mountainous area of Lio, Brebes district. The teak tree is a type of tree with the scientific name Tectona grandis Linn. F. This tree is a tree that produces high quality wood. In English, this tree known as "teak" produces very strong and durable teak wood. The results of teak wood are currently widely used for various human needs, for example raw materials for furniture, furniture, household appliances, and building structure supports [15]. Lamtoro is classified as kingdom plantae, division magnoliophyta, classis magnoliopsida, order fabales, familia mimosaceae, genus leucaena, species Leucaena leucocephala. The lamtoro tree lives and grows in the mountainous area of Lio, Brebes district. The lamtoro plant has a very sturdy root morphology because the taproot penetrates deeply into the ground so that the tree is not easily toppled by wind. The lamtoro tree has a strong stem, so it doesn't break easily. The color of the stem is reddish brown, so it is attractive to look at. The lamtoro tree trunk within one year can reach a diameter of 10-15 cm. The lamtoro leaves are symmetrical, with double compound leaves and green leaves. Lamtoro fruit in the form of pods in bunches. In each fruit bunch can reach 20-30 fruit pods, while in one pod can reach 15-30 seeds. The bunches are large and rather short. The seeds are oval and flat, if it is old the seeds are blackish brown [16]. Ketapang is classified as a kingdom plantae, division magnoliophyta, class magnoliopsida, order myrtales, family combretaceae, genus terminalia, species Terminalia catappa L. Ketapang trees live and grow in the mountainous area of Lio, Brebes district. The ketapang tree has the Latin name terminalia catappa and other names such as: tarisei, talisei, kalis, kris (West Papua), salrisé (North Sulawesi); sarisa, sirisa, sirisal, sarisalo (Mal), lisa (Rote); tiliso, tiliho, ngusu (North Maluku). The ketapang tree is a plant native to Southeast Asia Polynesia, to northern Australia. In addition, this tree can also be found in Central America, South America, East Africa, West Africa, Pakistan, India, and Madagascar. Ketapang trees can reach a height of up to 40 meters and a trunk thickness of up to 1.5 meters. It grows very shady, horizontal, and terraced, and has the appearance of a pagoda [17].

3.2. Implementation of Research Results

The implementation of the research results was carried out in Biology class X students in high school through E-Module media with plant diversity material. The Basic Competencies used are: 1.1 Admiring the order and complexity of God's creation regarding biodiversity, ecosystems, and the environment and 1.3 Being sensitive and concerned about environmental issues, protecting and placing the environment as a manifestation of the practice of the teachings of the religion they adhere to. The formulation of the objectives achieved are (1)

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students can know plants; (2) students can know plant vegetation; and (3) students can understand the benefits of vegetation as a landslide prevention. The allocation of learning time is carried out for 4 hours of lessons. The materials contained in this E-module are (1) plants; (2) plant vegetation; and (3) types of vegetation to prevent landslides. The results of the validation of the e-module media that have been carried out, it is known that the total average value of the proportion is 79% in the very feasible category. The results of validating the e-module media material that has been carried out, it is known that the total average value of the proportion is 79% in the very feasible category. It can be interpreted that the e-module media is suitable for use as a medium for teaching materials in learning plant diversity in class X high school.

The results of the identification of landslide-preventing vegetation can be divided into three types of vegetation, namely: grass vegetation, shrub vegetation, and tree vegetation. The most dominant grass vegetation in the mountainous area of Lio, Brebes Regency, namely: meniran, buffalo grass, bitter, and bandotan. The most dominant shrub vegetation lives and grows in the mountainous area of Lio, Brebes Regency, namely: sidaguri, sembung vines, secang, and jarong. The most dominant tree vegetation lives and grows in the mountainous area of Lio, Brebes Regency, namely: cherry, teak, lamtoro, and ketapang. Grass, shrub and tree vegetation are classified to identify their benefits as landslide prevention of these plants. Plant taxon is one of the classification systems used, namely the binomial nomenclature system which uses two Latin names in naming a living thing, each of which is a genus name and a species name [3]. The results of the research that has been carried out are then implemented in Biology learning with plant diversity material using E-Module media. This is done so that students can know the diversity of plants, can know plant vegetation, and can understand the benefits of plant vegetation that live in landslide-prone areas in the Lio mountains, Brebes Regency.

4. Conclusion

Plant vegetation in the mountainous area of Lio, Brebes Regency, which lives and grows in landslide areas, includes grass vegetation, shrub vegetation, and tree vegetation. The most abundant grass vegetation that lives and grows in the mountainous area of Lio, Brebes Regency, namely: meniran, buffalo grass, bitter, and bandotan. The most abundant bush vegetation that lives and grows in the mountainous area of Lio, Brebes Regency, namely: sidaguri, sembung vines, secang, and jarong. The tree vegetation that lives and grows the most in the mountainous area of Lio, Brebes Regency, namely: cherry, teak, lamtoro, and ketapang. The application of teaching materials in the E-Module to class X high school students learning related to plant diversity is carried out for 4 x 60 minutes with vegetation material on grass, shrubs, and trees. As for Basic Competency: 1.1 Admire the order and complexity of God's creation regarding biodiversity, ecosystems, and the environment. 1.3 Be sensitive and concerned about environmental issues and protect and care for the environment as a manifestation of the practice of the religion they adhere to.

5. Acknowledgements

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Presenting Figures and Tables

In this research there are several attachments that have been included, among others :

1. Results from vegetation data collection at station 1
2. Results from vegetation data collection at station 2
3. Results from vegetation data collection at station 3

Figure 1. Observation from Station 1

Figure 2. Observation from station 2

Figure 3. Observation from station 3

From the results of observations, the researcher then re
corded the results of the research that had been carried out, among others :

Table 1. observation results of grass at station 1

Nama Vegetasi	Famili	Spesies
Meniran	*Phyllanthus*	*Phyllanthus niruri*
Rumput kerbau	*Poaceae*	*Paspalum conjugatum*
Sambiloto	*Acanthaceae*	*Andographis paniculata*
Bandotan	*Ageratum*	*Ageratum conyzoides*
Minjangan	*Asteraceae*	*Chomolaena odorat*
Ruput gajah	*Poaceae*	*Penisetum purpureu*
Alang-alang	*Poaceae*	*Imperata cylindric*
Miskantus	*Poaceae*	*Mischantus giganteus*
Jarum spayol	*Poaceae*	*Bidens alba*
Ciplukan	*Solanaceae*	*Physalis peruviana*

Table 2. results of observations of bushes at station 1

Nama Vegetasi	Famili	Spesies
Sidaguri	*Malvaceae*	*Sida rhombifolia*
Sembung rambat	*Asteraceae*	*Mikania micrantha*
Secang	*Fabaceae*	*Biancaea sappan*

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Jarong	*Amaranthaceae*	*Acyranthes aspera*
Alangiaceae	*Cornaceae*	*Alangiaceae*
Putri malu	*Mimosaceae*	*Mimosa pudica*
Cincau	*Menispermaceae*	*Cyclea barbata*
Tahi ayam	*Verbenaceae*	*Trailing lantana*
Talas	*Araceae*	*Colosacia escutenta*

Table 3. tree observation results at station 1

Nama Vegetasi	Famili	Spesies
Kersen	*Muntingiaceae*	*Muntingia calabura*
Jati	*Lamiaceae*	*Tectona grandis*
Lamtoro	*Mimosaceae*	*Leucaena leucocephala*
Ketapang	*Combretaceae*	*Terminalia catappa*
Sengon	*Fabaceae*	*Paraserianthes falcataria L Nielsen*
Turi	*Fabaceae*	*Sesbania grandiflora*
Trembesi	*Fabaceae*	*Samanea saman*
Durian	*Bombaceae*	*Durio*

Table 4. observation results of grass at station 2

Nama Vegetasi	Famili	Spesies
Meniran	*Phyllanthus*	*Phyllanthus niruri*
Rumput kerbau	*Poaceae*	*Paspalum conjugatum*
Sambiloto	*Acanthaceae*	*Andographis paniculata*
Bandotan	*Ageratum*	*Ageratum conyzoides*
Pulutan	*Malvaceae*	*Urena lobata*
Iles-iles	*Araceae*	*Amorphophopallus variabilis*

Nama Vegetasi	Famili	Spesies
Beluntas	*Asteraceae*	*Pluchea indica*
Gewor	*Commelinaceae*	*Commelina benghalensis*

Table 5. results of observations of bushes at station 2

Nama Vegetasi	Famili	Spesies
Sidaguri	*Malvaceae*	*Sida rhombifolia*
Sembung rambat	*Asteraceae*	*Mikania micrantha*
Secang	*Fabaceae*	*Biancaea sappan*
Jarong	*Amaranthaceae*	*Acyranthes aspera*
Kopi	*Rubiaceae*	*Coffea sp*

Table 6. tree observation results at station 2

Nama Vegetasi	Famili	Spesies
Kersen	*Muntingiaceae*	*Muntingia calabura*
Jati	*Lamiaceae*	*Tectona grandis*
Lamtoro	*Mimosaceae*	*Leucaena leucocephala*
Ketapang	*Combretaceae*	*Terminalia catappa*
Mangga	*Anacardiaceae*	*Mangifera indica*
Kakao	*Sterculiaceae*	*Theobroma cacao*
Beringin	*Moraceae*	*Ficus benjamina*

Table 7. observation results of grass at station 3

Nama Vegetasi	Famili	Spesies
Meniran	*Phyllanthus*	*Phyllanthus niruri*
Rumput kerbau	*Poaceae*	*Paspalum conjugatum*
Sambiloto	*Acanthaceae*	*Andographis paniculata*

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Nama Vegetasi	Famili	Spesies
Bandotan	*Ageratum*	*Ageratum conyzoides*
Pulutan	*Malvaceae*	*Urena lobata*
Iles-iles	*Araceae*	*Amorphophopallus variabilis*
Beluntas	*Asteraceae*	*Pluchea indica*
Gewor	*Commelinaceae*	*Commelina benghalensis*

Table 8. results of observations of bushes at station 3

Nama Vegetasi	Famili	Spesies
Sidaguri	*Malvaceae*	*Sida rhombifolia*
Sembung rambat	*Asteraceae*	*Mikania micrantha*
Secang	*Fabaceae*	*Biancaea sappan*
Jarong	*Amaranthaceae*	*Acyranthes aspera*
Eldeberi	*Caprifoliaceae*	*Sambucus racemosa*
Putri malu	*Fabaceae*	*Mimosa pudica*
Costus	*Costaceae*	*Costus sp*
Begonia gelombang	*Begoniaceae*	*Begonia sp*
Konjak	*Araceae*	*Amorphopallus konjas*
Pakis	*Blechnaceae*	*Stenochlaena tenuifolia*
Selaginela	*Selaginellaceae*	*Selaginella fiabellata*

Table 9. tree observation results at station 3

Nama Vegetasi	Famili	Spesies
Kersen	*Muntingiaceae*	*Muntingia calabura*
Jati	*Lamiaceae*	*Tectona grandis*
Lamtoro	*Mimosaceae*	*Leucaena leucocephala*

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Ketapang	*Combretaceae*	*Terminalia catappa*
Mangga	*Anacardiaceae*	*Mangifera indica*
Kelapa	*Arecaceae*	*Cocos nucifera*
Gandaria	*Anacardiaceae*	*Bouea macrophylla*
Kedoya	*Meliaceae*	*Dysoxylum gaudichaudianum*