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Structure and Distribution of Rasamala (*Altingia excelsa* Noronha) and Jamuju (*Dacrycarpus imbricatus* Blume de Laub.) in Gunung Gede Pangrango National Park. Case Study of Cimande and Selabintana Resort

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Abstract

The observation of structure and distribution of *A. excelsa* dan *D. imbricatus* was carried out in Cimande and Selabintana Resort of Mount Gede and Pangrango National Park (MGPNP). There were three square plots of 50 x50 m established purposively within the Sub Montane and Montane Zone of both Resorts. For the regeneration observation purpose, each of the plots are divide to smaller squares of different sizes: (1) 10 x 10 m (poles); (2) 5 x 5 m (saplings), and (3) 2 x 2 m (seedlings). The result shows that the highest Importance Value (IVI) of *A. excelsa* is at tree stage in the Sub Montane Zone of Selabintana Resort (26.3%), while the highest IVI for *D. imbricatus* is at tree stage in the Montane Zone of Cimande Resort (24.8%). The distributional pattern of both species is grouped (Ip : 0.5 – 0.8) with the stand structure concentrates on large diameter class.

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The densest *A. excelsa* species is in the Sub Montane Zone of Selabintana Resort (35.4%) on 51 – 60 cm diameter class., while for *D. imbricatus* is in the Montane Zone of Cimande (25%) on 41 – 50 cm diameter class. Furthermore, the result of the CCA (Canonical Correspondence Analysis) method shows that *A. excelsa* is characterized by n-total, cec, bulk density, and c-organic. Meanwhile, the same analysis shows, that *D. imbricatus* is characterized by canopy closure, temperature, humidity, soil pH, sloping area and c-organic

Keywords: Altingia excelsa; Dacrycarpus imbricatus; distribution; structure; MGPNP.

1. Introduction

Rasamala (*A. excelsa*) and jamuju (*D. imbricatus*) are two native species of MGPNP (Mount Gede-Pangrango National Park) area [3,13,22,23]. However, the abundance of both species are commonly found only in its tree stage (d > 20cm), but rarely as juveniles [5,19]. On the other hand, there are constant elevating issues appear within the National Park area such as illegal logging, illegal hunting, and also tenurial related disruptions [9]. The aforementioned social issues, while combined with natural distortions, thus, creating dynamics, of which be able to change the structure and composition of vegetation, or even the succession results [4].

The above-mentioned narrative shows, that the study of structure and distribution of *A. excelsa* and *D. imbricatus* is substantial as a starting point to save both species. This necessariness, although there were previous studies in MGPNP with similar purpose, is relevant, need to be continued, and still worth to do, due to the dynamic characteristics of tropical forest structures and compositions throughout the times [4]. Therefore, this research is to understand the composition, diversity, and structure of *A. excelsa* and *D. imbricatus* at the Montane and Sub Montane Zone of MGPNP area. Furthermore, this study is also to comprehend the distributional patterns and characteristic based on environmental factors.

2. Material and Method

2.1. Study area

This study is carried out in May – June 2017, in two different locations, Cimande and Selabintana, and took place in a primary forest within the MGPNP area. The MGPNP itself is one of the key conservation area, which is ecologically buffering, not only its neighbouring area, but also the area of Great Jakarta. Established in 1980, the national park has currently 24,270.08 ha [16] and is divided into 16 Resorts, which two of the Resorts are Cimande and Selabintana. Geographically, the national park area is located at 106º 51’ – 107º 02’ E and 6º 51’S covering two volcanoes, Mt Gede (2958 mamsl – meters above mean sea level) and Mt. Pangrango (3019 mamsl). Based on the Schmidt-Fergussson classification, the MGPNP area has type A climate (Q = 5 – 9%), with daily temperature between 18 - 25^0, 80 – 90% humidity, and 3000 – 4000 mm annual rainfall [15].

Generally, there are three altitude-based vegetation classifications within the MGPNP area, which are: (1) Sub Montane (1000 – 1500 mamsl); (2) Montane (1500 – 2400 mamsl), and (3) Sub Alpine (2400 mamsl and above). The Sub Montane vegetation is characterized by enormous trees with semi-homogeneous crowns strata. This condition exists due to the sufficient depthness and moisture of its soil enriched with organic compounds.

This ecosystem is dominated by the *Quercus* and *Castanopsis* genus (Fagaceae family), and *S. wallichii*. One of the available large tree species within the zone is *A. excelsa*.

Meanwhile, in the Montane Zone tree crowns are relatively homogeneous, up to 20 meters height, with lower branching compared with the Sub Montane vegetation. The Sub Montane vegetations still be found within this ecosystem, but rarely exist due to high altitude. The Montane Zone vegetations are characterized by *D. imbricatus*, as a large species. Here, large trees become scarce and leaves are generally smaller [17]. More high the altitude is, to the Sub Alpine ecosystem, vegetations are being simpler and shorter with single crown stratum.

Dominant species within the Sub Alpine Zone are *Vaccinium variangifolium* and *Eurya acuminata*. Many species found here has the same genus with temperate zone of the northern hemisphere. Eidelweiss (*Anaphalis javanica*) is found in this Sub Alpine Zone at 2500 mamsl altitude [6].

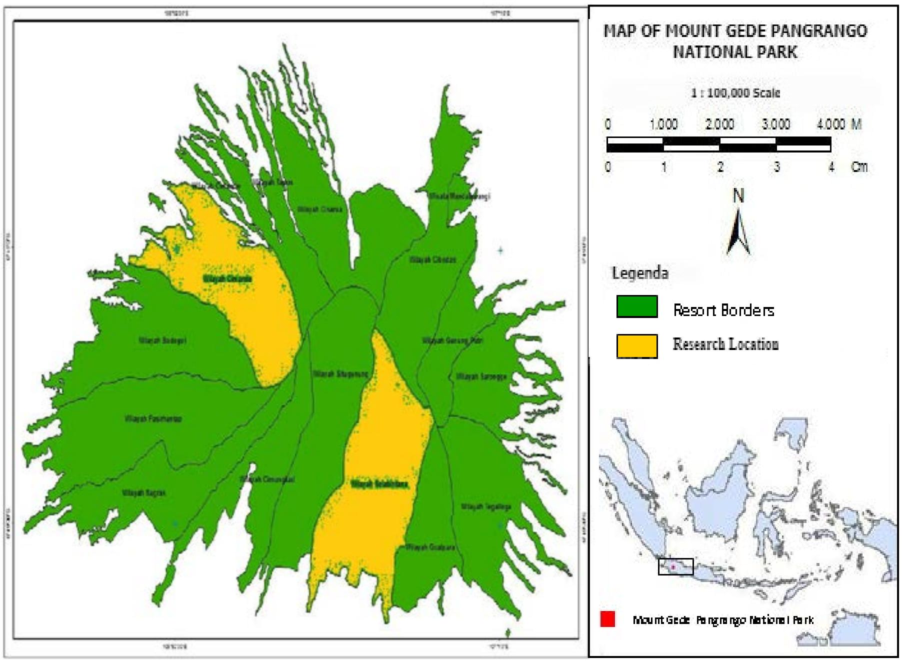


Figure 1: research location

2.2. Tools and Materials

Tools this study equipped are common appliances for vegetation survey activities, such as: GPS, compass, roll meter, haga hypsometer, phiband, sunto clinometer, densiometer, thermometer, plastic bags for soil sample, soil sample rings, adze hoe, tree species identification book and some tools and materials for soil physical and chemical analysis. Meanwhile, objects of this research are tree species within the sampling plots.

2.3. Research Procedures

This study is carried out at locations where *A. excelsa* and *D. Imbricatus* relatively dominant. Some previous researches [3,5,19] reported that *A. excelsa* is abundance in the Sub Montane Zone (1000 – 1500 mamsl), while *D. Imbricatus* in the Montane Zone (1600 – 2400 mamsl). Based on the information, three square plots sized 50 x 50 meters were purposively established at each zone (Montane and Sub Montane) and study location (Cimande and Selabintana). There are six plots established in Cimande, and also six plots in Selabintana. The vegetation is classified according Wyatt Smith criteria, which include seedling, sapling, pole and tree [12]. Each plot separated to subplots for regeneration observation purpose: (1) 10 x 10 meters for poles; (2) 5 x 5 meters for saplings, and (3) 2 x 2 meters for seedlings. Collected data for this study including: (1) individual amount of species (seedlings and saplings); (2) diameter (pole and trees on cm's); (3) individual position at plots (only for *A. excelsa* and *D. imbricatus*); (3) temperature (celcius); (4) humidity (%); (5) altitude (mamsl); (6) area sloping (degree); (7) canopy closure (%), and (8) soil samples, from the depth of 0 – 20 and 20 – 40 cm's, for ex-situ chemical and physical analysis (pH, bulk density, c-organic, n-total, and cec (cation exchange capacity). At each plots of 50 x 50 meters, data collection from number (3) to (8) were undergoing five repetitions, thus the recorded results were the mean value of the data analysis. Furthermore, soil sampling was using composite sampling technique, so all samples represent the observed population [21]. These soil samples were all taken from five different random points of each 50 x 50 meters plot, of which the samples has the same weight for each depth (0 – 20 cm's; 20 – 40 cm's).

2.4. Data Analysis

The domination level of a species against the other is depicted by an Importance Value Index (IVI) [14], while, the diversity level of a species is determined by the richness index (R_1) and speciess diversity (H'). Furthermore, the Dominance Index (C) and the Evenness Index (E) are used for assessing the distributional pattern of a species within a community [14]. Once the above values have been obtained for *A. excelsa* and *D. imbricatus*, the assessment of population structure of both species is calculable. The population structure of *A. excelsa* and *D. imbricatus* is horizontally generated covering diameter class distribution and basal area value (BA). Moreover, Standardized Morisita Index (Ip) is applied to determine the distributional pattern of *A. excelsa* and *D. imbricatus* species. The above-mentioned index is considered as the best model due to its independency to plot area changes [1]. The Ip value is ranging from -1 to 1. Based on the theory, *A. excelsa* and *D. imbricatus* classed as randomly distributed if Ip = 0, distributed in group if Ip > 0, and distributed evenly if Ip < 0. Furthermore, Canonical Correspondence Analysis (CCA) ordinating technique is applied to observe the species distribution of *A. excelsa* and *D. imbricatus* based on the environmental factors [7]. The CCA is a common ordinating technique to assess distribution of a species based on the environmental variables or the plant response to the environmental variables.

3. Result and Discussions

3.1. Species Richness and Diversity

Based on the observation, the abundance level of many species in Montane Zone, while compared with the level in Sub Montane Zone, is tend to decrease. The similar trend is also shown by [2]. The amount of species at each growing stage of each zone are desribed in Table 1.

Table 1: The amount of species found at each growing stage in study location

No	Location	Amount of species			
		Seedling	Sapling	Pole	Tree
1	Selabintana Sub Montane	26	23	18	20
2	Selabintana Montane	19	22	20	18
3	Cimande Sub Montane	28	31	20	22
4	Cimande Montane	15	16	12	11

The richness and diversity index of species is applied in order to quantify the richness and diversity level of each growing stage in both Cimande and Selabintana Resort (Tabel 2).

Table 2: The species richness index (R_1) and diversity index (H') at each growing stage in study location

Index	Growing stage	Selabintana		Cimande	
		Sub Montane	Montane	Sub Montane	Montane
R_1	Seedling	3.96	2.89	4.39	2.67
	Sapling	3.49	3.24	4.83	2.74
	Pole	3.40	3.97	3.71	2.22
	Tree	3.83	3.42	4.32	2.43
H'	Seedling	2.72	2.31	2.77	2.16
	Sapling	2.81	2.53	2.80	2.37
	Pole	2.44	2.42	2.09	1.75
	Tree	2.70	2.27	2.51	2.01

Generally, the diversity index is ranging from 1 – 3.5, where score H' < 2 categorized as low, score 2 > H' < 3 as moderate, and score H' > 3 categorized as high [11]. Based on the above Table 2, the most diverse species in the seedling, sapling and tree stages are occurring in the Sub Montane Zone of Cimande Resort, while the most diverse species in the pole stage is in the Montane Zone of Selabintana Resort. In addition, the above table also shows that the species diversity in each growing stage is categorized as moderate (2 > H' < 3), except for the low diversity (H' < 2) of the pole stage in the Montane Zone of Cimande.

3.2. Species Dominance

Based on the observation, species from the Fagaceae, Theaceae, and Symplocaceae family are dominating the Sub Montane Zone (1176 – 1425 mamsl), while in the altitude ranging from 1647 – 1920 mamsl of the Montane

Zone, the Fagaceae, Theaceae, and Ulmaceae are the most dominant family. Species from the Fagaceae family, such as *Quercus sundaica* and *Castanopsis* sp, also *Schima wallichii* from the Theaceae family are described as large tree species, and able to outpace the diameter and height of *A. excelsa* and *D. imbricatus* [23]. In detail, the dominant species of each growing stage in the study location are shown on the Table 3.

Table 4: The three most dominant species of each growing stage in study location

Location	Growing stage	Species	Family	IVI (%)
Selabintana Sub Montane	Seedling	Castanopsis tunggurrut	Fagaceae	33.3
		Sloanea sigun	Tiliaceae	26.1
		Castanopsis argentea	Fagaceae	21.5
	Sapling	Ficus ribes	Moraceae	21.6
		Castanopsis argentea	Fagaceae	21.3
		Quercus sundaica	Fagaceae	20.9
	Pole	Quercus sundaica	Fagaceae	51.3
		Schefflera lutescens	Araliaceae	44.4
		Symplocos fasciculata	Symplocaceae	30.5
	Tree	Schima wallichii	Theaceae	50.6
		Agathis sp	Araucariaceae	30.4
		Altingia excelsa	Hammamelidaceae	26.3
Selabintana Montane	Seedling	Trema orientalis	Ulmaceae	39.3
		Schima wallichii	Theaceae	31.5
		Castanopsis tunggurrut	Fagaceae	30.0
	Sapling	Ficus ribes	Moraceae	34.8
		Trema orientalis	Ulmaceae	30.2
		Quercus sundaica	Fagaceae	14.8
	Pole	Symplocos fasciculata	Symplocaceae	73.5
		Tremao rientalis	Ulmaceae	38.9
		Schefflera lutescens	Araliaceae	34.7
	Tree	Schima wallichii	Theaceae	97.0
		Symplocos fasciculata	Symplocaceae	37.1
		Trema orientalis	Ulmaceae	29.2
Cimande Sub Montane	Seedling	Symplocos fasciculata	Symplocaceae	33.2
		Cinchona sinensis.	Rubiaceae	24.3
		Schima wallichii	Theaceae	21.7
	Sapling	Symplocos fasciculata	Symplocaceae	30.8
		Cinchona sinensis.	Rubiaceae	26.0
		Litsea resinosa	Lauraceae	22.5
	Pole	Cinchona sinensis.	Rubiaceae	80.8
		Symplocos fasciculata	Symplocaceae	71.3
		Beilschrriedia wightii	Lauraceae	34.8
	Tree	Schima wallichii	Theaceae	89.8
		Beilschrriedia wightii	Lauraceae	29.5
		Dysoxylum arborescens	Meliaceae	28.0
Cimande Montane	Seedling	Castanopsis javanica	Fagaceae	45.7
		Schima wallichii	Theaceae	39.5
		Litsea sp.	Lauraceae	25.7
	Sapling	Castanopsis javanica	Fagaceae	32.4
		Elaeocarpus ganitrus	Elaeocarpaceae	26.4
		Decaspermum fruticosum	Myrtyaceae	23.0
	Pole	Castanopsis javanica	Fagaceae	116
		Decaspermum fruticosum	Myrtyaceae	61.6
		Beilschrriedia wightii	Lauraceae	38.8
	Tree	Castanopsis javanica	Fagaceae	86.1
		Castanopsis argentea	Fagaceae	35.8
		Schima wallichii	Theaceae	35.6

The current domination of the species from the Fagaceae and Theaceae family, which have also been shown in the previous studies shows that, both of the family are competent and be able to efficiently use the resources with better adaptation to the environmental factors changes throughout the times. The other dominating species, such as *S. fasciculata* (Symplocaceae), *D. arborescens* (Meliaceae), *E. ganitrus*, and *F. ribes* (Moraceae), *Litsea* spp, and *Beilschrriedia wightii*) are the species that categorized as the second stratum [12,22], or small trees [23]. Hereafter, the observation also found *C. sinensis* (Sulibra) in Cimande Resort, which is not a native, so thus categorized as Invasive Alien Plant Species [10]. Meanwhile, *A. Excelsa* in its tree stage was only found dominating in the Sub Montane Zone of Selabintana Resort. Same with the rasamala, *D. imbricatus* tree are dominant in its tree stage, but scarce in its younger stages (Table 4).

Table 4: The domination of *A. excelsa* dan *D. imbricatus* in each growing stage based on the observation

Location	**IVI (%) *A. excelsa***				**IVI (%) *D. imbricatus***			
	Seedling	Sapling	Pole	Tree	Seedling	Sapling	Pole	Tree
Selabintana Sub Montane	0.0	0.0	9.9	26.3	0.6	1.1	0.0	0.0
Selabintana Montane	0.0	0.5	2.4	7.2	1.3	0.0	2.8	4.8
Cimande Sub Montane	0.0	0.0	2.5	15.3	0.0	0.0	2.1	0.0
Cimande Montane	0.0	0.0	0.0	9.1	0.0	0.0	4.1	24.8

The IVI score as shown in Table 3 indicates poor regeneration of both species. The same condition have also been reported by [19], which state that the seedlings and saplings of *D. imbricatus* in Cibodas and Selabintana Resort had only 0% IVI score. Another study showed that the tree stage of *A. excelsa* was dominating in Sub Montane Zone of Cibodas Resort, but not single regeneration was found [4]. The dominance and species distribution index are equipped to observe the existance of concentration pattern of particular species, which is shown on Table 5.

Table 5: Species Dominance Index (C) and Species Distribution Index (E) of each growing stage in the study locations

Index	**Growing stage**	**Selabintana**		**Cimande**	
		Sub Montane	**Montane**	**Sub Montane**	**Montane**
C	Seedling	0.09	0.13	0.09	0.15
	Sapling	0.07	0.10	0.09	0.11
	Pole	0.11	0.12	0.19	0.26
	Tree	0.08	0.14	0.12	0.19
E	Seedling	0.75	0.76	0.71	0.74
	Sapling	0.86	0.79	0.71	0.85
	Pole	0.81	0.74	0.61	0.63
	Tree	0.88	0.72	0.67	0.72

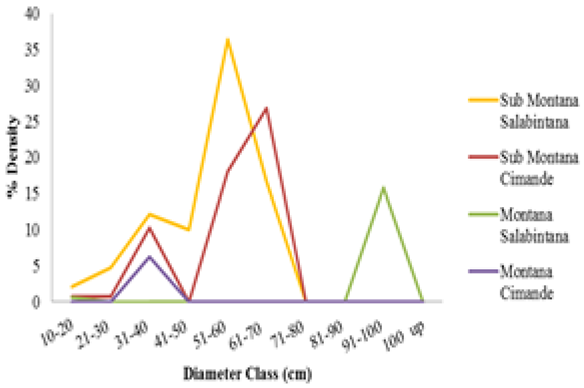
The aforementioned concentration pattern is ranging from 0 – 1, in which maximum distribution is gained if the score is closer to 1, and vice versa. Meanwhile, the dominance index show the abundance of a specific species when the score is closer to 1. The previous Table 2 shows, that the 'E' scores of all locations and growing stages are ranging between 0.61 – 0.88, while the 'C' scores are ranging between 0.07 – 0.26, which shows that all of the species are equally abundant and distributed evenly, not concentrated on single particular species.

3.3. The Stand structure of A. excelsa and D. imbricatus

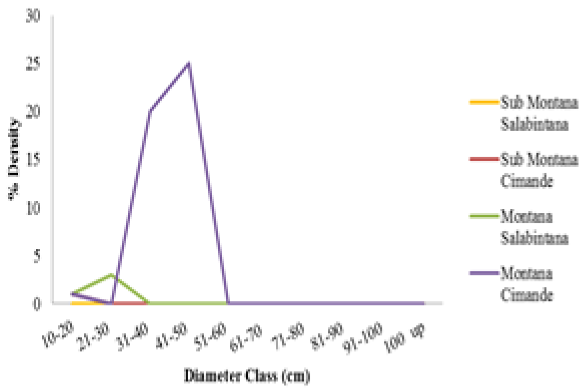
The observation result shows, that *A. excelsa* mostly found (36.4%) on large class diameter (1 – 60 cm diameter) in the Sub Montane Zone of Selabintana Resort, followed by the Sub Montane Zone of Cimande with its diameter ranging from 61 – 70 cm (26.8%). The third position is the Montane Zone, which has 15.8% large tree of the *A. excelsa* (91 – 100 cm diameter). The last is the *A. excelsa* in the Montane Zone of Cimande Resort with only 6.4% large trees category (31 – 40 cm diameter).

On the contrary, *D. imbricatus* in the Sub Montane Zone of Selabintana Resort only been found in seedling formation, similar situation with the dispersal of *D. imbricatus* in the Sub Montane Zone of Cimande which only found in pole formation (1%). Moreover, there are 3 % of *D. imbricatus* tree found in the Montane Zone of Selabintana with diameters ranging from 21 – 30 cm, smaller than what have been found in the Montane Zone of Cimande with diameter ranging 41 – 50 cm (25%).

In more detail, the standing structure of *A. excelsa* and *D. imbricatus* is horizontally depicted by diameter class on Figure 2 and basal area on Table 6.



(a)



(b)

Figure 2: The distribution of diameter class of *A. excelsa* (a) and *D. imbricatus* (b)

These peculiar results are actually correspond with a study result from the northeast Indian [18], which reported that the distribution percentage of diameter class of *A. excelsa* is consimilaring an upside-down pyramid. The percentages are increasing with the bigger diameter class (up to 61 cm). Aside of the diameter class, the horizontal structures of a stand can be observer from the occupation level of a species within a community per area. This level is comprehended by the percentage value of basal area (Table 6).

Table 6: persentase basal area

Lokasi	% Basal Area	
	A. excelsa	*D. imbricatus*
Sub Montana Selabintana	10.9	0.0
Montana Salabinta	3.1	0.4
Sub Montana Cimande	4.8	0.1
Montana Cimande	1.4	8.8

The above Table 6 shows, that the highest occupation level of *A. excelsa* is located in the Sub Montane Zone of Selabintana Resort (10.9%), and the lowet is in the Montane Zone of Cimande Resort (1.4%). Meanwhile, the highest occupation level for *D. imbricatus* is in the Montane Zone of Cimande Resort (8.8%), and the lowest is in the Sub Montane Zone of Selabintana Resort (0%). In general, *A. excelsa* and *D. imbricatus* species largely occupy the area since both species are abundantly found in a large diameter class with high basal area value.

3.4. The Distributional pattern of A. excelsa and D. Imbricatus

Based on the observation plots data, both *A. excelsa* and *D. imbricatus* tend to distribute in group, which is commonly found in nature [9]. This pattern is visually displayed on Figure 3 and 4. Grouped distribution of *A. excelsa* can be clearly seen at plot 3 at 1176 mamsl in Cimande Resorts, and at the altitude of 1218 mamsl in Selabintana Resorts. Meanwhile, the same distribution pattern of *D. imbricatus* is clearly shown at plot 5 of Selabintana Resort at the altitude of 1762 mamsl, and also at plot 4 of Cimande Resort at 1647 mamsl. The aforementioned grouping distributional pattern at each elevation levels indicates the altitude predisposal on the distributional pattern of both species in nature. The distributional pattern of *A. excelsa* dan *D. Imbricatus* is also analyzed by Standardized Morisita Index (SMI) method (Table 7).

Table 7: The distributional pattern of *A. excelsa* and *D. imbricatus* based on the Ip value of Standardized Morisita Index

Location	***A. excelsa***		***D. imbricatus***	
	Ip	**Distribution**	**Ip**	**Distribution**
Selabintana	0.6	Grouped	0.5	Grouped
Cimande	0.6	Grouped	0.8	Grouped

Based on the calculation, both *A. excelsa* and *D. imbricatus* are distribute in group. The same result was also showed by [19] for *D. imbricatus* species in Selabintana Resort, which the same grouping pattern occured in almost growing stages except seedlings. The significance of the Ip values of the observed species are ranging from 0.5 – -0.5, where the value above 0.5 is categorized as distributed in group, while below -0.5 is categorized as evenly distributed [20]. Based on the above-mentioned narrative, it is known that only *D. imbricatus* in Selabintana Resort that not significantly show the grouped distributional pattern.

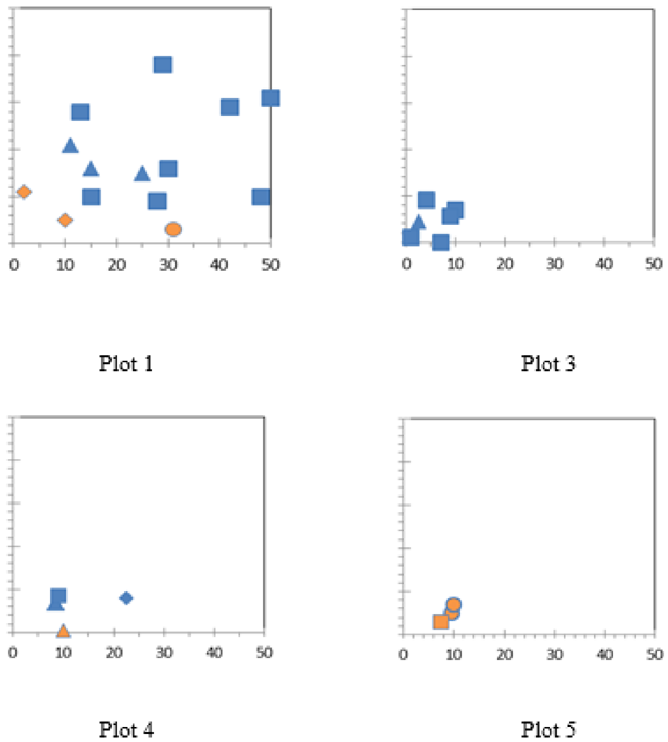


Figure 3: The distribution of *A. excelsa* and *D. imbricatus* in Selabintana. Resort. Legend: **o** (Semai), ◊ (Pancang), **Δ** (Tiang), □ (Pohon); (*A.excelsa*), (*D.imbricatus*)

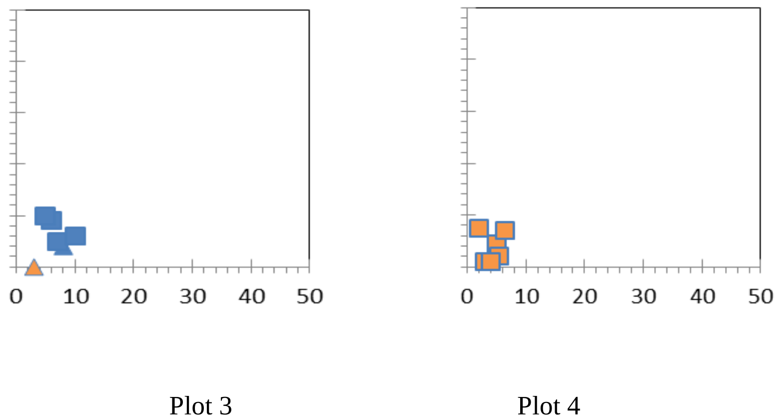
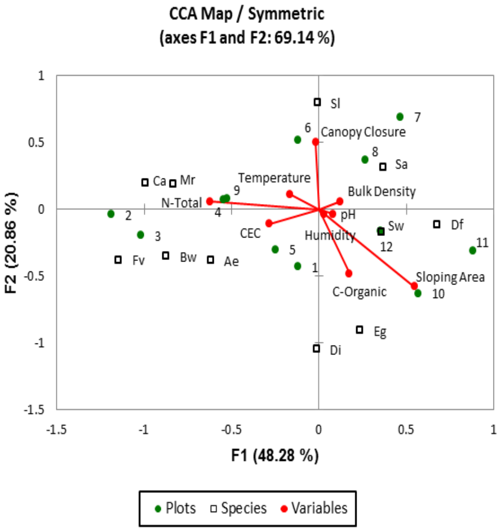


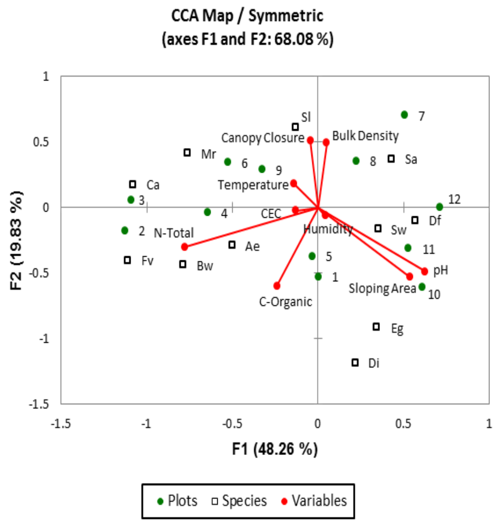
Figure 4: The distribution of *A. excelsa* and *D. imbricatus* in Cimande Resort. Legend: **o** (Semai), ◊ (Pancang), **Δ** (Tiang), □ (Pohon); (*A. excelsa*), (*D. imbricatus*)

3.5. The Relationship of A. excelsa and D. Imbricatus species with the Environmental Factors

The depiction of the relationship between both *A. excelsa* and *D. imbricatus* with their surrounding environments is shown by the ordinating graphic of Correspondence Canonical Analysis (CCA). The graphic (Figure 5) is not only showing the relationship of *A. excelsa* and *D. imbricatus* with their environment, but also displays the other common species found within the sampling plots. The analysis result shows that 69.14% (a) and 68.08% (b) variety of data can explained by this tool.



(a)



(b)

Figure 5: Ordinating graphic (CCA output) species: Ae = *Altingia excelsa,* Bw = *Beilschrriedia wightii,* Ca = *Castanopsis argentea* Df = *Decaspermum fruticosum,* Di = *Dacrycarpus imbricatus,* Eg = *Elaeocarpus ganitrus,* Fv = *Ficus variegate,* Mr = *Macaranga rhizinoides,* Sa = *Symplocos acuminate,* Sl = *Schefflera lutescens,* Sw = *Schima wallichii*), Variables: temperature, canopy closure, sloping area, humidity, soil pH, c-organic, n-total, cec, bulk density (a = soil 0-20 cm's, b = 20-40 cm's), and plots: 1 – 3 (Selabintana Sub Montane), 4 – 6 (Selabintana Montane), 7 – 9 (Cimande Sub Montane), 10 – 12 (Cimande Montane).

Consistently, Figures 5a and 5b show *A. excelsa* is characterized by soil variables such as n-total, cec, and bulk density. The end of the vector line shows the maximum value of the variable. It can be concluded that the abundance of *A. excelsa* is positively correlated with the magnitude of n-total content and the level of soil ability in cation exchange, and negatively correlated with bulk density.

Meanwhile, the abundance of *D. imbricatus* species is more characterized by canopy closure, with a negative correlation. This suggests that the *D. imbricatus* prefer to grow in a more open area. Although it tends to grow in open areas, temperature and humidity are also important factors for the presence of this species. This can be seen from the position of this species against the vector lines of the two variables. The direction of the vector line of the two variables shows the abundance of *D. imbricatus* in line with increasing humidity and decreasing temperature. In addition, soil pH and sloping areas consistently (Figures 5a and 5b) show a positive correlation with the presence of *D. imbricatus*

Inconsistencies seen in c-organic variables. At 0-20 cm's soil depth (Figure 5a), an increase in organic C content characterizes the presence of *D. imbricatus* species, but at 20-40 cm's (Fig. 5b), this variable is closer to *A. excelsa*. The most possible reason for this situation is that the concentration of c-organic in the soil is limited by the depth of the soil. As mentioned earlier, *A. excelsa* is dominant in the Sub Montana Zone, where the soil in this zone is usually deep and rich in organic matter [18].

4. Conclusion

A. excelsa and *D. imbricatus* species are dominant only on tree stage, where its structure is concentrated on large diameters. The distributional pattern of both species are grouped (Ip = 0.5 – 0.8), which are shown by the elevation position of some sampling plots. The aforementioned pattern indicates the influence of the altitude, which affects to the temperature multeities, to both *A. excelsa* and *D. imbricatus* distributional patterns in nature. Moreover, the CCA analysis shows, that *A. excelsa* is characterized by n-total, cec, bulk density, and c-organic. Meanwhile, the same analysis shows, that *D. imbricatus* is characterized by canopy closure, temperature, humidity, soil pH, sloping area and c-organic

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