TREE RICHNESS AND FOREST STRUCTURE OF THE FORESTS AROUND YONGSU DOSOYO, JAYAPURA, INDONESIA[1]

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Abstract:
Despite the fact that Papuan rain forests supports high species diversity and a high degree of endemism, this area is only poorly studied. This study was designed to examine tree richness and forest structure at the tropical rainforests at Yongsu Dosoyo, Jayapura. Trees were sampled at 4 transects of 20X125 m located randomly at two different altitudes. Forest structures were sampled at from 2 transects 10x50 m at different altitudes. A total of 125 tree species from 41 families and 71 species at sapling stage from 30 families were recorded. These results indicate that tree richness is similar to tropical lowland rainforest elsewhere.

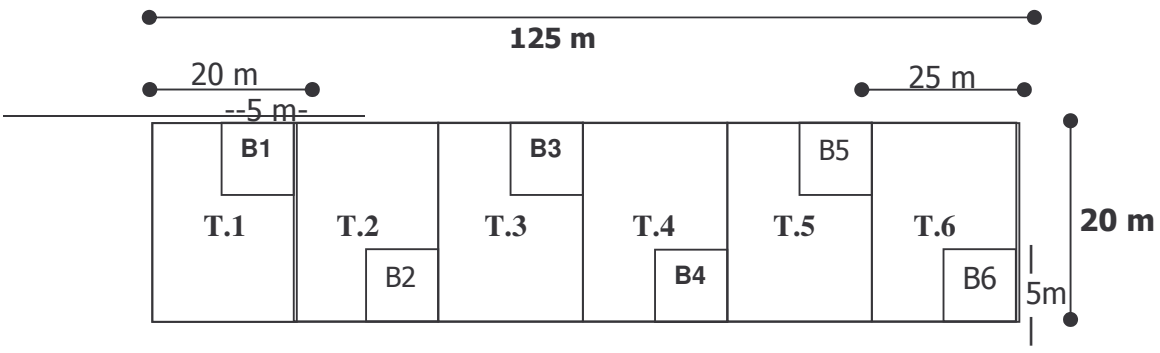
Keywords:
Plant richness, biodiversity, tropical rain forests, Irian Jaya (Papua), Indonesia

Introduction:

Indonesia is among the most biodiverse countries in the world. Irian Jaya (Papua), for instance, contributes more than half Indonesia's biodiversity (CI 1999). Irian also has high species endemism, especially for plants with up to 90% of species endemic to this province (Myers 1988, Johns 1995).This study was designed to examine tree species diversity and forest strata in tropical rain forests at Yongsu Dosoyo, Jayapura.

Methods

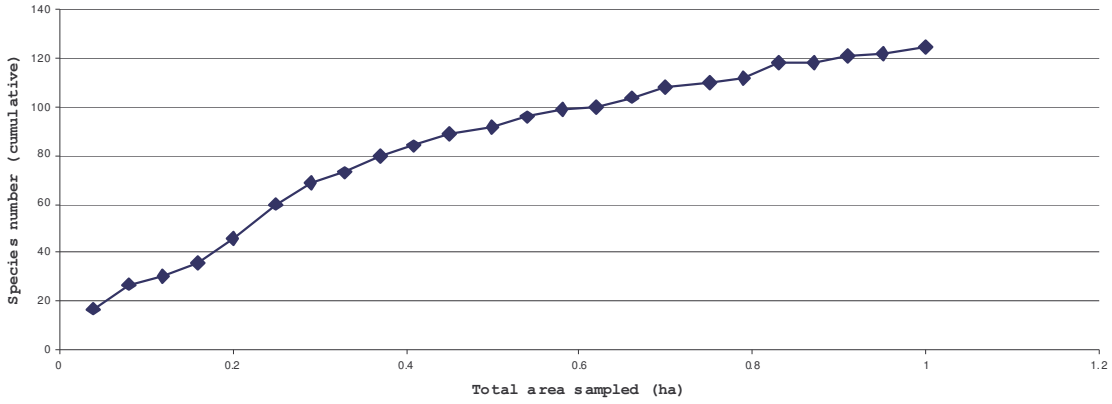
Sampling procedures:
Transects may have been placed randomly,but all trees > 10 cm dbh (ϕ) were sampled. Two transects were located at 100-200 m above sea level (asl), while two others located at 300-400 m asl. In each transect, all trees > 10 cm (at DBH) were sampled in 6 plots of 20x20 m. Saplings (ϕ 2-9,9 cm at 2 cm from ground) were sampled zigzag in 6 sub-plots of 5x5 m (Fig 2). Forest profiles were drawn from 2 transect (10 x50m) at two different altitudes. Tree species diversity was calculated using Shannon-Weaner Index (H) and species composition between transects was calculated using Morsita Index (Krebs 1988, Magurran 1988). Cumulative we constructed a species accumulation curve to determine whether our 4 transects adequabely sampled the forest diversity at this site.



Results:

There were 125 tree species (≥10 cm at asl) from 41 families, and 71 sapling species from 31 families in the 4 transects. There was almost same number of species found on Site 1 and Site 2 (93 and 92 respectively), total stem (295 and 327), index diversity : (≥10 cm at DBH: 4.31 and 4.45), (2 – 9,9 cm at DBH: 3.87 and 3.93) .A Species area curve shows that the number of species is still increasing when the total area sampled is over 1 ha (Fig 3).

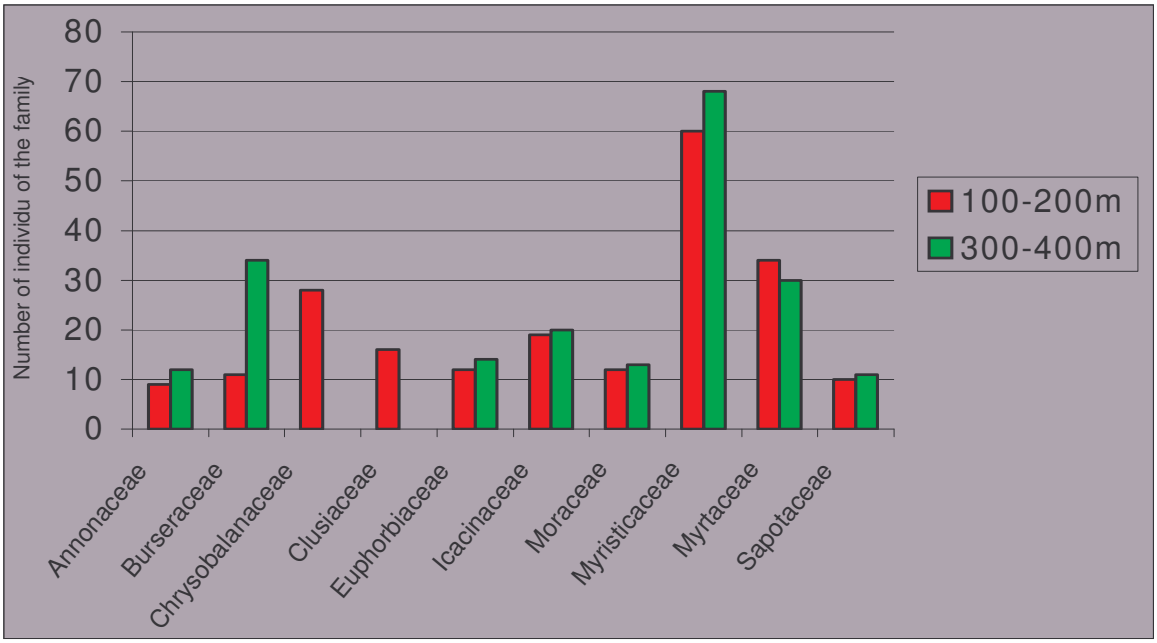
Figure 3. Species Area-Curve, constructed from species data (pooled) from all trees (>10 cm) from all Sites.



Species diversity for transects for Site 1 was 4,315 and 3,865 for Site 2.

Figure 4a shows that there was no difference on tree richness (≥ 10 cm at dbh) for 10 "dominant" families between Site1 and Site 2, except for Chrysobalanaceae, Clusiaceae, and Euphorbiaceae. Similar pattern on species richness can be observed from sapling stage (Fig 4b).

Figure 4a: Species richness for 10 "dominant" families for tree stage (≥ 10 cm) for Site 1 and Site 2.



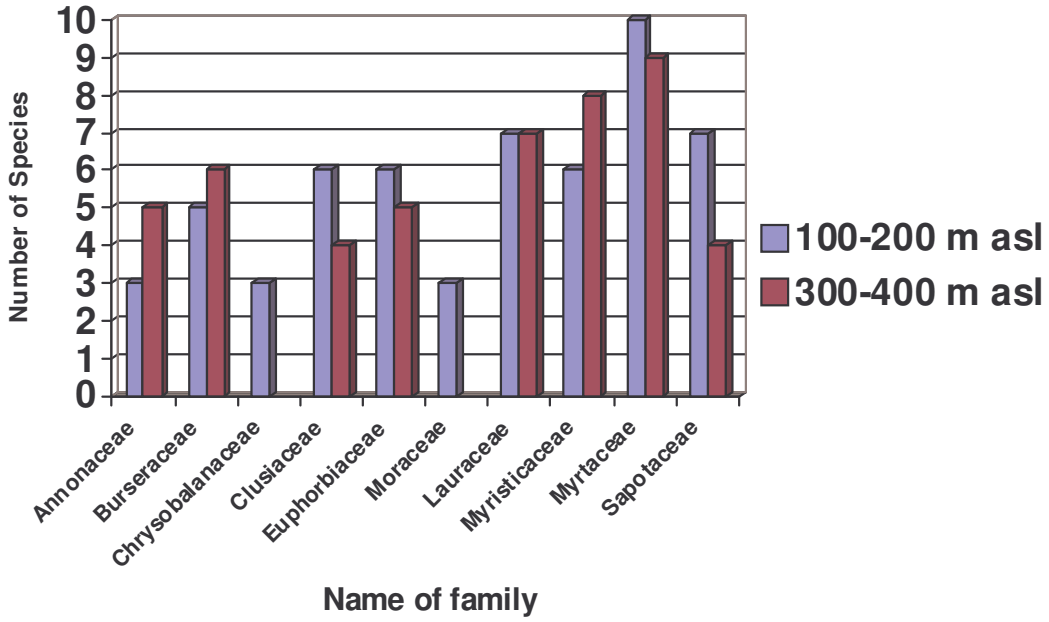
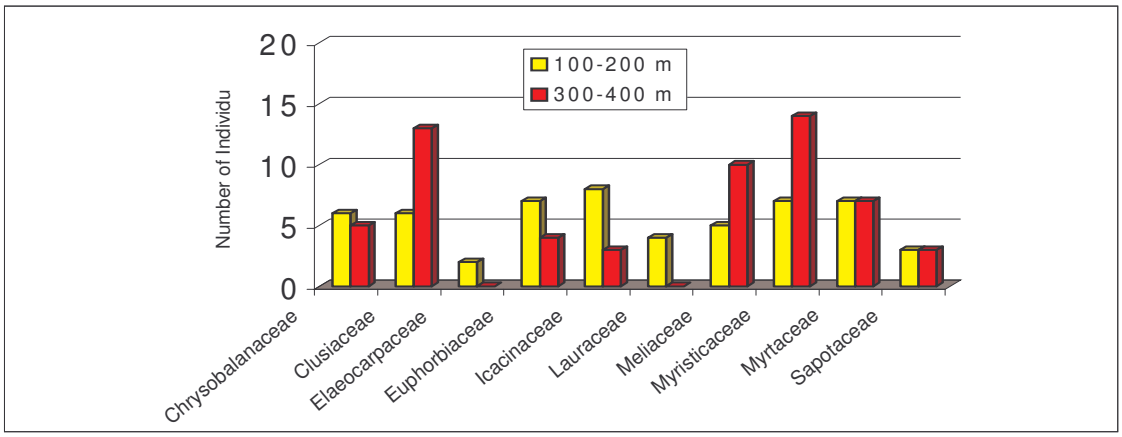
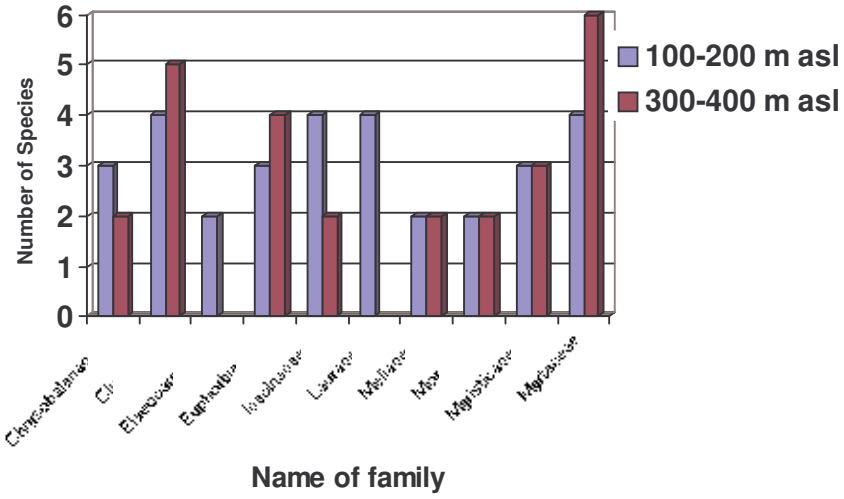


Figure 4b. Sapling richness for 10 dominant families for Site 1 and Site 2.





Profile diagram from shows that the forests in Yongsu Kecil ave 4 strata (Fig 5a, 5b). The first layer reach the height of 30-35m and consist of *Schima wallichii* and *Celtis philippinensis* (Site 1); and *Hopea novoguinensis*, *Schizomeria serrata*, *Palaquim amboinensis*, and *C. philippinensis* (Site 2). The second layer reaches the height of 20-29 m and consists of *Pometia pinnata*, *Gymnacranthera paniculata*, *Xylopia* sp., *Canarium asperum*, and *Garcinia rigida* (Site 1). Site 2 consists of *Xylopia* sp., *C. asperum*, *Syzygium leptoneurum*, and *G. paniculata*. The third layer reach the height of 10-19 m, and dominates by *G. paniculata*, *Diospyrus discolor*, *Mastixiodendrom pachyclados*, and *Pimeleodendron amboinicum* (Site 1). Second layer at the Site2 consists of Syzygium sp3., Actinodaphne angustifolia, Gynotroches axillaris, and Xylopia sp. The fourth layer only reach 1.50 m includes *G. paniculata*, *P. amboinicum*, *C. maluense*, *Gonocaryum littorale*, and *Drypetes longifolia*.

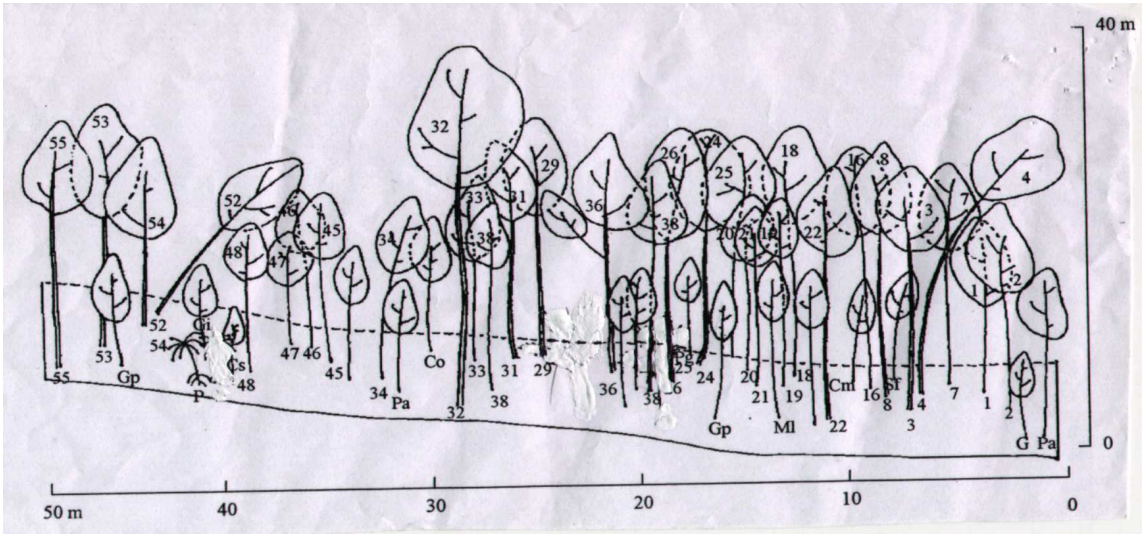


Figure 5a. Forest structure drawn forests at transect 2 (10x50 m) at Site 1.

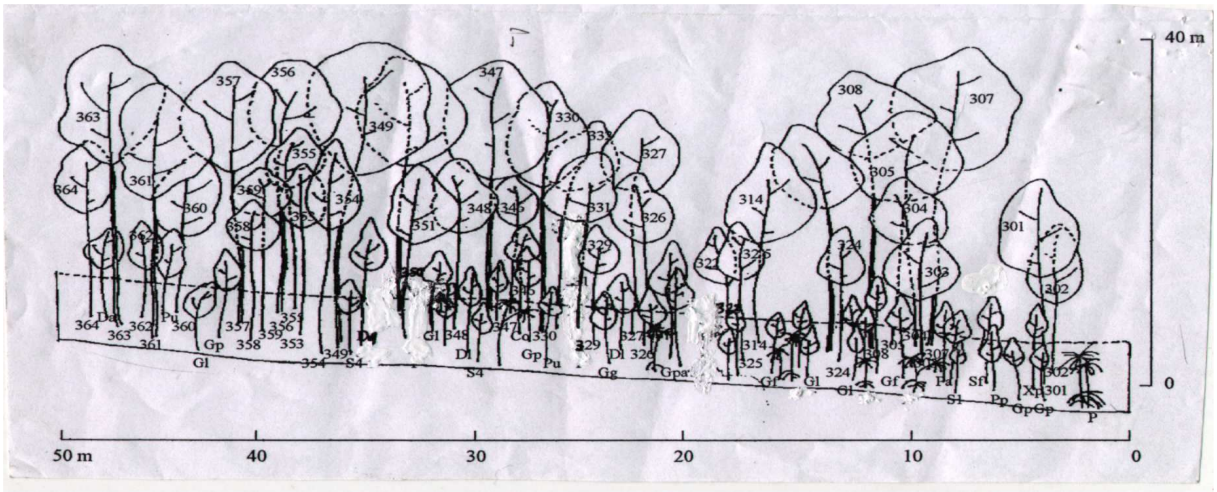


Figure 5b. Forest structure drawn forests at transect 4 (10x50 m) at Site 2.

Discussion

This study by no means sufficient to describe the forest around tree richness and structure around Yemang, Yongsu, as indicates by species-area curve. More plots at different forest habitats and altitudes are need to fully describe tree richness and forest structure. This study, however, shows that tree richness in Yongsu forest is similar to other sites in tropical regions, but still lower than sites in forests Latin America (Whitmore 1975).

Table 1: Biodiversity Tree Species $\phi \geq 10$ cm in sites regions

No	Location	Plot Area (ha)	$\sum$ species	Years Recorded
1.	Moluccas (Halmahera /Maluku utara	0,5	76	1987
2.	Kalimantan	1	149;129; dan 128	1981
3	Panama (USA)	1,5	130	1994
4	Papua New Guinea	1	184;181,152; dan 154	1970
5	Serawak (Malaysia)	1	214; 223	1983

Sources: Whitmore (1975), and Mcdade et al (1994).

To fully understand forest diversity and structure around Jayapura and elsewhere in Papua many more studies are needed. As for Jayapura (in particularly Cyclops Mountains Nature Reserve), studies are needed at different altitudes. Such studies must be broadened to examine the impacts of forest disturbances on other taxa (e.g. birds, herps and mammals).

Acknowledgments:

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APPENDIX 1:

Tree species (diameter ≥ 10 cm) and sapling (diameter 2-9,9 cm) sampled from Site1 and Site 2 (pooled data). Species diversity Index was calculated using Shannon-Weaner Diversity Index.

No	Family	Species name	Site 1	Site 2	Local name
			100-200 m	300-400m	
1	Anacardiaceae	*Campnosperma brevipetiolatum*		1	Terentang
2	Anacardiaceae	*Mangifera minor*		2	
3	Anacardiaceae	*Mangifera sp.*		1	Pauh
4	Anacardiaceae	*Semecarpus cassuvium*		1	
5	Annonaceae	*Polyalthia glauca*	1	3	Kepewai
6	Annonaceae	*Polyathia papuana*		1	Kepewai
7	Annonaceae	*Xylopia sp.*	7	4	Wakoh
8	Anonaceae	*Cyathocalyx biovulatus*	1	2	
9	Anonaceae	*Cyathocalyx papuanus*		2	
10	Apocynaceae	*Alstonia scholaris*	2	1	
11	Apocynaceae	*Cerbera floribunda*	1		Pian-pian
12	Arecaceae	*Pinanga sp*	1		Sirey
13	Areraceae	Sp.1	4	5	Snang
14	Burseraceae	*Canarium asperum*	4	2	Kring
15	Burseraceae	*Canarium hirsutum*		1	Kring
16	Burseraceae	*Canarium maluense*	3	16	Kring
17	Burseraceae	*Canarium oleasum*	2	2	Kring
18	Burseraceae	*Canarium* sp	1	1	Kring
19	Burseraceae	*Canarium sylvestre*	1	12	Kring
20	Celastraceae	*Lophopetalum sp.*		1	
21	Chrysobalanaceae	*Parastemon urophyllus*	20	7	Sisro
22	Chrysobalanaceae	*Parinari nonda*	2		Maa
23	Chrysobalanaceae	*Prunus arborea*	6	3	Nari-nari
24	Clusiaceae	*Calophylum soulatri*	4	3	Wakri/Sulateri
25	Clusiaceae	*Garcinia dulcis*	2		Ekeh/Mundu
26	Clusiaceae	*Garcinia fruticosca*	4	1	Ekeh
27	Clusiaceae	*Garcinia rigida*	3	1	Ekeh
28	Clusiaceae	*Garcinia* sp.	2	2	Ekeh
29	Clusiaceae	*Garcinia* sp.1	1		Ekeh
30	Combretaceae	*Terminalia* sp.		1	
31	Cunoniaceae	*Schizomeria serrata*		5	Ukir
32	Dilleniaceae	*Dillenia quercifolia*	4	6	Saong
33	Dipterocarpaceae	*Hopea novoguinensis*	3	2	
34	Ebenaceae	*Diospyros discolor*	4	4	Mekah
35	Elaecarpaceae	*Elaeocarpus glaber*	3	2	Mra-mra
36	Euphorbiaceae	*Aporosa falcifera*	1		
37	Euphorbiaceae	*Baccaurea papuana*		1	
38	Euphorbiaceae	*Crotom* sp	1		
39	Euphorbiaceae	*Drypetes longifolia*	2		
40	Euphorbiaceae	*Glochidion philippicum*		1	Ekeh
41	Euphorbiaceae	*Glochidion* sp.2		1	
42	Euphorbiaceae	*Macaranga fimbriata*	1	5	Srosirey
43	Euphorbiaceae	*Neoscprthechinia forbesii*	2		Nau bra
44	Euphorbiaceae	*Pimelodendron amboinense*	5	6	Nundua wareuw
45	Fabaceae	*Adenantera pavonina*	2	1	

46	Fabaceae	*Cynometra ramiflora*	3	3	
47	Fabaceae	*Intsia bijuga*	1		Kore Yoswa
48	Gnetaceae	*Gnetum gnemon*	5	1	
49	Icacinaceae	*Gomphandra montana*		1	Sapre / Melinjo
50	Icacinaceae	*Gonocaryum littorale*	12	10	Pea
51	Icacinaceae	*Gonocaryum pyriforme*		1	Yona
52	Icacinaceae	*Medusanthera laxiflora*		3	
53	Icacinaceae	*Plantea excelsa*		5	
54	Icacinaceae	*Stemonurus ammui*	7		Burau-burau
55	Lauraceae	*Actinodaphne angustifolia*		1	
56	Lauraceae	*Beilschmedia* sp.	1		
57	Lauraceae	*Cryptocarya apamaefolia*	2	1	Nasi-naso
58	Lauraceae	*Cryptocarya kamahar*	1	1	Klin
59	Lauraceae	*Cryptocarya sp.*	1		Nokre
60	Lauraceae	*Endiandra acuminata*	1	4	
61	Lauraceae	*Litsea firma*	1	3	
62	Lauraceae	*Litsea* sp.1		1	
63	Lauraceae	*Litsea* sp.2		1	
64	Lauraceae	*Litsea* sp.3	1		
65	Lecythidaceae	*Barringtonia macrostachya*	3	2	Iyang
66	Lecythidaceae	*Barrringtonia racemosa*		1	Iyang
67	Loganiaceae	*Fagraea racemosa*	1	3	
68	Melastomataceae	*Memecylon oleaefolium*	4		Oigre
69	Meliaceae	*Dysoxylum arborescens*	2	5	
70	Meliaceae	*Dysoxylum excelcum*		1	
71	Meliaceae	*Dysoxylum phaeotrichium*		1	
72	Meliaceae	*Dyxoxylum* sp.2	1		
73	Meliaceae	*Reinwardtiodendron*		1	
74	Moraceae	*Ficus* sp .	3		
75	Moraceae	*Paratocarpus venenosus*	1	3	
76	Moraceae	*Prainea papuana*	8	10	Sawon-sawon
77	Myristicaceae	*Gymnacranthera paniculata*	51	40	
78	Myristicaceae	*Horsfieldia hellwigii*	1	2	
79	Myristicaceae	*Horsfieldia kostermansii*		2	Kore Yoswa
80	Myristicaceae	*Horsfieldia sylvestris*	1	2	Kore Yoswa
81	Myristicaceae	*Myristica fatua*	2	6	Kore neka
82	Myristicaceae	*Myristica holrungii*	1	4	Kore neka
83	Myristicaceae	*Myristica lancifolia*	4	5	Kore neka
84	Myristicaceae	*Myristica lepidota*		7	Kore neka
85	Myrsinaceae	*Ardisia* sp.1	1		
86	Myrtaceae	*Rhodamnia moluccana*	1		Oymie
87	Myrtaceae	*Syzygium acuminatisimum*	12	3	Swanteka
88	Myrtaceae	*Syzygium fastigiatum*	10	4	Sisi
89	Myrtaceae	*Syzygium furfuraceum*		1	Bu suan
90	Myrtaceae	*Syzygium leptoneurum*	1	8	Semu
91	Myrtaceae	*Syzygium* sp.2	1	1	
92	Myrtaceae	*Syzygium* sp.3	2	9	
93	Myrtaceae	*Syzygium* sp.4	2	2	Bronsua
94	Myrtaceae	*Syzygium subcorymbosum*	3	1	
95	Myrtaceae	*Tristania* sp.	1	1	Nundua/Pelawan
96	Myrtaceae	*Tristania whiteana*	1		Kendauw
97	Padocarpaceae	*Nageia wallichiana*		1	
98	Pandanaceae	*Pandanus* sp.	1		
99	Podocarpaceae	*Podocarpus neriifolius*	1		Kuku
100	Polygalaceae	*Xanthophyllum papuanum*		3	

101	Rhamnaceae	*Zizhypus angustifolius*	1	2	Yoka
102	Rhizophoraceae	*Gynotroches axillaris*		1	Kore
103	Rubiaceae	*Mastixiodendron pachylados*	6	6	Depasarsi / Loncat
104	Rubiaceae	*Nauclea lanceolata*		3	
105	Rubiaceae	*Timonius sericeus*	1	1	
106	Rutaceae	*Evodia elleryana*		1	
107	Sapindaceae	*Ganophylum falcatum*	1		
108	Sapindaceae	*Pometia pinnata*	5	6	Kri sembah
109	Sapotaceae	*Madhuca* sp.	1		Depasarsi
110	Sapotaceae	*Palaquium amboinense*	1	4	
111	Sapotaceae	*Palaquium obovatum*	1		
112	Sapotaceae	*Palaquium obtusifolium*	1		
113	Sapotaceae	*Palaquium* sp.	1	2	
114	Sapotaceae	*Payena lucida*	1		Droneka
115	Sapotaceae	*Planchonela firma*	4	4	Now-now
116	Sapotaceae	*Planchonella obovata*		1	Now-now
117	Sterculiaceae	*Sterculia* sp.	1		Marwa
118	Theaceae	*Gordonia papuana*	3	5	Yona
119	Theaceae	*Schima wallichii*	2		
120	Theaceae	*Terenstroemia* sp.1	1		Natu-natu
121	Theaceae	*Ternstroemia* sp.	1	1	
122	Tiliaceae	*Microcos* sp.	1		Depasarsi
123	Tiliaceae	*Pentace* sp.	1		
124	Ulmaceae	*Celtis phillippinensis*	2	10	Kra
125	Verbenaceae	*Teijsmanniodendron ahernianum*	2	2	
126	Unidentified		1	3	
	Total stem		295	327	
	Total spesis (S)		92	93	
	Total spesis (S) 1 ha	125			