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ANALYSIS OF COMMUNITY STRUCTURE OF *MELIENTHA SUAVIS* (PAK WAAN PAA) FOREST NEARBY HUAY HIN DAM VILLAGE, HOD DISTRICT, CHIANGMAI

Soonthorn Khamyong [1]

บทคัดย่อ :- การวิเคราะห์โครงสร้างของสังคมพืชป่าเต็งรังที่มีผักหวานป่าขึ้นอยู่ ได้ทำการศึกษาในป่าที่อยู่ใกล้กับหมู่บ้านห้วยหินดำ อ. ฮอด จ. เชียงใหม่ ในปีพ.ศ. 2534-2536 ด้วยเหตุที่มีต้นผักหวานป่าค่อนข้างสมบูรณ์กว่าบริเวณอื่น การวิเคราะห์โครงสร้างใช้วิธีศึกษาเชิงปริมาณและเชิงคุณภาพ สำหรับการศึกษาเชิงปริมาณนั้นได้ศึกษาค่าความถี่ ความอุดมสมบูรณ์ ความหนาแน่น และค่าดรรชนีความสำคัญของต้นไม้ต่างๆ รวมทั้งต้นผักหวานป่า พบว่า ผักหวานป่าขึ้นในสังคมพืชที่มีไม้รังเป็นไม้เด่น คือมีค่าความถี่ 100% ความอุดมสมบูรณ์ 62.18 ความหนาแน่น 48.93% ความเด่น 51.83% และดรรชนีความสำคัญ 106.13 ส่วนไม้อื่นๆ เช่น เต็ง เหียง พลวง นั้น มีค่าต่ำมาก ต้นผักหวานป่ามีความถี่ 100% ความอุดมสมบูรณ์ 3.64 ความหนาแน่น 3.18% ความเด่น 2.67% และดรรชนีความสำคัญเท่ากับ 11.22 ซึ่งแสดงให้เห็นว่าต้นผักหวานป่าเป็นพืชที่มีจำนวนประชากรต่อพื้นที่ต่ำ เป็นพันธุ์พืชที่หายากและมีโอกาสจะสูญพันธุ์ได้ง่าย

ABSTRACT:- The analysis of community structure of the Dry Dipterocarp Forest where *Melientha suavis* (Pak Waan Paa) is grown naturally was carried out in the forest adjacent to Huay Hin Dam Village, Hod District, Chiangmai, between 1991 - 1993. Results showed that where *Melientha suavis* in this forest was relatively abundant as compared with other locations. The quantitative description reported involving frquency, abundance, density, dominance and important value index of different trees, including *Melientha suavis*. The dominant tree is *Shorea siamensis* with 100% frequency, abundance of 62.18, relative density of 48.93%, dominance of 51.83% and important value index of 106.13. Other trees such as *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had the small values. *Melientha suavis* had frquency of 100%, abundance of 3.64, density of 3.18%, dominance of 2.67% and important value index of 11.22. It is implied that *Melientha suavis* had the low density. It is assumed that the species will be distinct in most forests in the near future.

INTRODUCTION

Melientha suavis (Pak Waan Paa) is a wild shrubby tree in Family Opiliaceae (Hiepko, 1980). Young shoots of this species are commonly used as food for local people in the northern and the northeastern Thailand (Jacquat & Bertossa, 1990). Since the young shoots of *Melientha suavis* are expensive especially at the beginning of season, about 200 Baht/kg (US$ 8 per kg), *Melientha suavis* in most areas are deteriorated by over harvesting.

[1] Department of Soil Science and Conservation, Faculty of Agriculture, Chiangmai University, Chiangmai 50002

Melientha suavis in the forest are cut at about 1.5-3.0 m above ground level so that it is convenient to collect their young shoots. Over harvesting and stimulated burning by the farmer are the main causes of the distinction of the species. The wound on the stem caused by burning may be damaged by termite. Finally, the tree will be died and disappeared from the forest. In many areas, forest clearing is the most important cause of the disappearance (Khamyong, 1992).

Many local people have tried to cultivate *Melientha suavis* in plantation or home garden (Mathichon, 1990; Nak Kao Pa Nae Jorn, 1992). One farmer in the north has been successfully grown *Melientha suavis* in Longan plantation (Chan See Dang, 1992). However, most farmers usually kept the secret of the planting techniques. The biological and ecological characteristics of this species is considered to be an importance knowledge for the success of the planting.

The objective of this study is to give the ecological data on the community structure of *Melientha suavis* forest based on quantitative and qualitive investigation. The data may be used as the basic knowledge for growing *Melientha suavis*.

DESCRIPTION OF STUDY AREA

The selected study area is the Dry Dipterocarp Forest, with *Shorea siamensis* as dominant species. The area located about 12 km from Huay Hin Dam village or about 37 km from Hod District, Chiangmai. It is a secondary forest, about 550 m above mean sea level. The parent rock is granite. The soil is laterite, and has mainly gravels. It is quite the poor soil and dry site. The slope gradient is about 30-40%. Annual rainfall is about 1,000-1,500 mm.

MATERIALS AND METHODS

The minimal size and number of quadrat were decided before sampling was carried out. The community analysis, including both quantitative and qualitative aspects as described by Greig-Smith (1983), were analysed.

1. Quantitative characteristics

1.1. Minimal area of quadrat

The size of quadrat was increased from 5 x 5, 10 x 10, 15 x 15.....to 50 x 50 m^2. In each size, number and name of tree species higher than 1.3 m were recorded. Five replications were carried out. The species-area curve was obtained, and the minimal area of quadrat was decided at the asymtotic point.

1.2. Minimal number of quadrat

Similar to the minimal area of quadrat, the species-number of quadrat curve was obtained. The asymtote implied to the minimal number of quadrat.

1.3 Relative frequency

$$\text{Frequency} = \frac{\text{Number of occupied quadrats}}{\text{Number of all quadrats}} \times 100$$

$$\text{Relative frequency} = \frac{\text{Number of species i}}{\text{Number of all quadrat}} \times 100$$

1.4 Abundance

$$\text{Abundance} = \frac{\text{Number of species i}}{\text{Number of occupied quadrat}} \times 100$$

1.5 Relative density

$$\text{Relative density} = \frac{\text{Number of species i}}{\text{Number of all species}} \times 100$$

1.6 Relative dominance

$$\text{Relative dominance} = \frac{\text{Sum of basal area of species i}}{\text{Sum of basal area of all species}} \times 100$$

1.7 Importance value index (IVI)

IVI of species i = Relative frequency + Relative density +Relative dominance

2. Qualitative characteristics

The qualitative description of *Meliantha suavis* community was carried out in the following aspects.

2.1 *Species diversity*: The name of all tree species in the sampling quadrats was listed.

2.2 Stratification: The vertical and horizontal structure were depicted. The dominant, codominant, intermediate and ground species were explained.

RESULTS AND DISCUSSION

1. Quantitative characteristics

1.1 Minimal area of quadrat

Figure 1 showed the species-area curves of tree species in the dry dipterocarp forest where *Meliantha suavis* was found. They implied that the number of tree species was increased as the quadrat sizes increased. However, the curves reached the asymtote when the quadrat size was

40 x 40 m^2, and the highest number of tree species was 23. This size would be the minimal size of quadrat for the community structure analysis. Therefore, it was decided to use this size of (40 x 40 m^2)the quadrat for the present study. The results were given in Table 1 to 5.

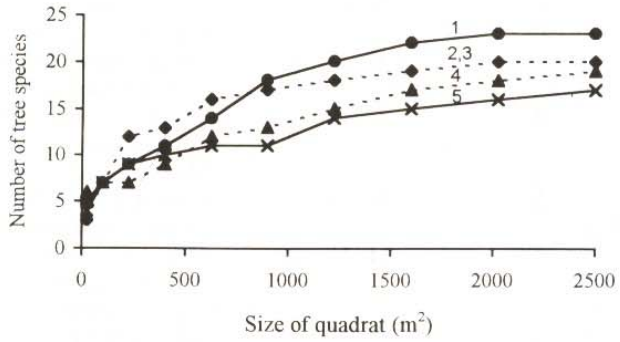

Figure 1. The species-area curves of five sites in the dry dipterocarp forest where *Melientha suavis* is distributed.

Table 1. Number and species of trees in different quadrat sizes in the Dry Dipterocarp Forest nearby Huay Hin Dam Village (November 1992) for site 1

Sizes of plots (m x m)	Number of species		Scientific names
	Number	Accumulation	
5 x 5	6	6	*Shorea siamensis*
			Dillenia obovata
			Phyllanthus emblica
			Micromelum integerrimum
			Dalbergia cultrata
			Unidentify
10 x 10	1	7	*Anneslea fragrans*
15 x 15	0	7	-
20 x 20	2	9	*Shorea obtusa*
			Melientha suavis
25 x 25	3	12	*Quercus kerrii*
30 x 30	1	13	*Buchannania latifolia*
35 x 35	2	15	*Dipterocarpus tuberculatus*
40 x 40	2	17	*Melanorrhorea usitata*
			Terminalia alata
45 x 45	1	18	*Helica nilagirica*
50 x 50	1	19	*Dipterocarpus obtusifolius*

1.2 Minimal number of quadrat

The curve of species-number of quadrats was shown in Figure 2. The number of tree species in various quadrats was different, varying from 16-31 species. The larger number was

Table 2. Number and species of trees in different quadrat sizes in the Dry Dipterocarp Forest nearby Huay Hin Dam Village (November 1992) for site 2

Sizes of plots (m x m)	Number of species		Scientific names
	Number	Accumulation	
5 x 5	2	2	*Shorea siamensis*
			Unidentify
10 x 10	2	4	*Dipterocarpus tuberculatus*
			Anneslea fragrans
15 x 15	2	6	*Phyllanthus emblica*
			Quercus kerrii
20 x 20	2	8	*Shorea obtusa*
25 x 25	2	11	*Dalbergia oliveri*
			Dipterocarpus obtusifolius
30 x 30	3	14	*Helica nilagirica*
			Adina cordiflolia
			Eugenia cumini
35 x 35	4	18	*Shorea obtusa*
			Terminalia chebula
			Dipterocarpus tuberculatus
			Dillenia obovata
40 x 40	1	19	*Terminalia alata*
45 x 45	1	20	*Gardenia erythroclada*
50 x 50	-	20	-

Table 3. Number and species of trees in different quadrat sizes in the Dry Dipterocarp Forest nearby Huay Hin Dam Village (November 1992) for site 3

Sizes of plots (m x m)	Number of species		Scientific names
	Number	Accumulation	
5 x 5	3	3	*Shorea siamensis*
			Dipterocarpus obtusifolius
			Dalbergia cultrata
10 x 10	4	7	Unidentified
			Holigarna kurzii
			Melientha suavis
			Buchannania latifolia
15 x 15	4	12	*Eugenia cumini*
			Vitex pinnata
			Anneslea fragrans
			Dipterocarpus tuberculatus
			Micromelum integerrimum
20 x 20	1	13	*Dillenia obovata*
25 x 25	3	16	*Randia dasycarpa*
			Quercus kerrii
			Shorea obtusa
30 x 30	1	17	*Gardenia erythroclada*
35 x 35	1	18	*Diospiros ehretiodies*
40 x 40	1	19	*Lannea coromandelica*
45 x 45	1	20	*Terminalia alata*
50 x 50	-	20	-

Table 4. Number and species of trees in different quadrat sizes in the Dry Dipterocarp Forest nearby Huay Hin Dam Village (November 1992) for site 4

Sizes of plots (m x m)	Number of species		Scientific names
	Number	Accumulation	
5 x 5	5	5	*Shorea siamensis, S. obtusa*
			Melanorrhoea usitata
			Quercus kerrii
			Unidentify
10 x 10	2	7	*Dipterocarpus obtusifolius*
			Bridelia pierre
15 x 15	2	9	*Terminalia alata*
			Dipterocarpus tuberculatus
20 x 20	2	11	*Melientha suavis*
			Anneslea fragrans
25 x 25	3	14	*Vitex pinnata*
			Phyllanthus emblica
			Micromelum integerrimum
30 x 30	4	18	*Cassia fistula*
			Gardenia erythroclada
			Dipterocarpus tuberculatus
			Holigarna kurzii
35 x 35	2	20	*Terminalia chebula*
			Dalbergia cultrata
40 x 40	2	22	*Buchannania latifolia*
			Dillenia obovata
			Flacourtia indica
45 x 45	1	23	*Eugenia cumini*
50 x 50	-	23	-

Table 5. Number and species of trees in different quadrat sizes in the Dry Dipterocarp Forest nearby Huay Hin Dam Village (November 1992) for site 5

Sizes of plots (m x m)	Number of species		Scientific names
	Number	Accumulation	
5 x 5	4	4	*Vitex pinnata*
			Dalbergia dongnaiensis
			Randia dasycarpa
			Melientha suavis
10 x 10	3	7	*Shorea siamensis*
			Shorea obtusa
			Lagerstroemia balansae
15 x15	2	9	*Dalbergia oliveri*
			Anneslea fragrans
20 x 20	1	10	*Dipterocarpus obtusifolius*
25 x 25	1	11	*Phyllanthus emblica*
30 x 30	-	11	-
35 x 35	3	14	*Melanorrhoea usitata*
			Quercus kerrii
			Adina cordifolia
40 x 40	1	15	*Flacourtia indica*
45 x 45	1	16	*Dipterocarpus tuberculatus*
50 x 50	1	17	*Buchannania latifolia*

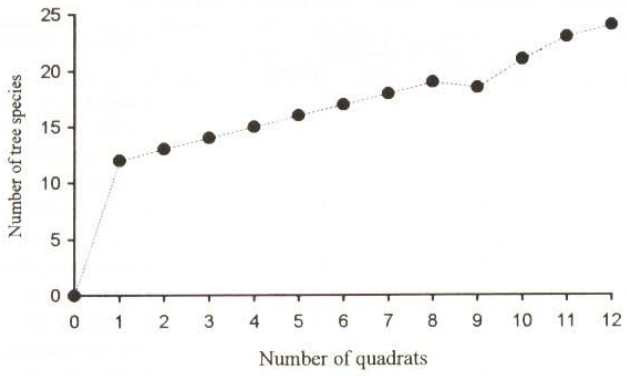

Figure 2. The curve of species-number of quadrats in the dry dipterocarp forest where *Meliantha suavis* is distributed.

found in the ecotone of the dry dipterocarp-mixed deciduous forest. The asymtote was decided at 11 quadrats. Thus, the minimal number of quadrats used in this study was eleven.

1.3 Relative frequency

The data of frequency and relative frequency of all tree species in the study area are given in Table 6.

The results indicated that *Shorea siamensis* had the frequency of 100%. Other dominant trees of *Shorea obtusa, Dipterocarpus obtusifolius* and *D.tuberculatus* had the frequency of 90.91, 81.82 and 54.55%, respectively. Many trees had the intermediate frequency such as *Terminalia chebula, Melanorrhoea usitata, Anneslea fragrans, Quercus kerrii, Bredelia pierre, Dalbergia cultrata* etc.

The tree species which had low frequency were thought to be the rare species in this forest. However, they may distribute in other forests. The tree species such as *Bridelia affins, Afzelia xylocarpa, Blumea balsamifera, Millettia leucantha, Dalbergia dongnaiensis, Pterocarpus macrocarpus* and *Cassia fistula* had the low frequency of 9.09%.

For *Meliantha suavis*, the species had the frequency of 100%. However, it did not mean that this species distributed throughout the forest, since the sampling sites were selected for only those consisted of *Meliantha suavis*. Normally, *Meliantha suavis* was found in patch. It was better to consider more about the density, dominance and important value index rather than the frequency alone.

Table 6. Frequency, abundance, relative frequency, density and dominance, importance value index (IVI) and relative IVI of trees in 11 quadrats in Dry Dipterocarp Forest with *Melientha suavis* at Huay Hin Dam, Hod District, Chiangmai

No.	Tree species	Frequency	Abundance	Relative			IVI	%
				Freq.	Den.	Domi.		
1	*Shorea siamensis*	100.00	62.18	5.37	48.93	51.83	106.13	27.52
2	*Shorea obtusa*	90.91	8.90	4.87	6.97	11.03	22.87	5.94
3	*Dipterocarpus obtusifolius*	81.82	6.22	4.39	4.71	7.53	16.63	4.32
4	*Dipterocarpus tuberculatus*	54.55	9.83	2.93	7.40	5.04	15.37	3.99
5	*Terminalia alata*	72.73	7.13	3.90	5.80	5.92	15.62	4.05
6	*Terminalia chebula*	63.64	1.57	3.42	1.18	0.21	4.81	1.25
7	*Melanorrhoea usitata*	72.73	6.50	3.90	4.04	3.69	11.63	3.02
8	*Holigarna kurzii*	72.73	3.13	3.90	2.82	2.57	9.29	2.41
9	*Anneslea frangrans*	81.82	4.11	4.39	3.08	1.00	8.47	2.20
10	*Quercus kerrii*	72.73	5.50	3.90	4.28	8.04	16.22	4.21
11	*Lannea grandis*	27.27	4.67	2.44	2.92	1.74	7.10	1.84
12	*Canarium kerrii*	45.46	5.80	1.46	3.92	2.57	7.95	2.06
13	*Randia dasycarpa*	63.64	3.29	3.42	2.46	1.40	7.28	1.89
14	*Gardenia erythroclada*	45.46	1.50	2.44	1.20	0.28	3.92	1.02
15	*Morinda coreia*	18.18	1.00	0.98	0.61	0.13	1.72	0.45
16	*Bridelia pierre*	81.82	1.89	4.39	1.20	0.42	6.01	1.55
17	*Bridelia affins*	9.09	4.00	0.49	2.09	0.97	3.55	0.92
18	*Bombax anceps*	27.27	3.67	1.46	2.81	0.81	5.08	1.32
19	*Dillenia obovata*	54.55	2.33	2.93	1.71	0.53	5.17	1.34
20	*Croton longissimus*	27.27	1.67	1.46	2.47	0.47	4.40	1.14
21	*Afzelia xylocarpa*	9.09	2.00	0.49	1.05	9.23	10.77	2.80
22	*Xylia kerrii*	27.27	2.33	1.46	1.57	0.90	3.93	1.02
23	*Helicia nilagirica*	36.36	2.25	1.95	1.48	0.52	3.95	1.03
24	*Blumea balsamifera*	9.09	2.00	0.49	1.05	0.09	1.63	0.42
25	*Lagerstroemia balansae*	27.27	2.00	1.46	1.65	1.80	4.91	1.27
26	*Colona flagrocarpa*	27.27	1.00	1.46	0.64	0.05	2.15	0.56
27	*Eugenia cumini*	54.55	1.71	2.93	1.37	1.77	6.07	1.58
28	*Melientha suavis*	100.00	3.64	5.37	3.18	2.67	11.22	2.91
29	*Adina cordifolia*	45.46	1.60	2.44	1.45	1.43	5.32	1.38
30	*Phyllanthus emblica*	27.27	1.67	1.46	1.18	0.17	2.81	0.73
31	*Strichnos nux-vomica*	9.09	5.00	0.49	3.45	0.59	4.53	1.18
32	*Buchanania latifolia*	81.82	1.67	4.39	1.21	0.31	5.91	1.53
33	*Mellettia leucantha*	9.09	4.00	0.49	2.09	4.73	7.31	1.90
34	*Dalbergia assamica*	72.73	4.50	3.90	3.66	1.85	9.41	2.44
35	*Dalbergia oliveri*	27.27	1.50	1.46	0.99	1.06	3.51	0.91
36	*Dalbergia dongnaiensis*	9.09	1.00	0.49	0.70	1.10	2.29	0.59
37	*Pterocarpus macrocarpus*	9.09	1.00	0.49	0.81	0.03	1.33	0.35
38	Unidentify	9.09	3.00	0.49	3.00	4.46	7.95	2.06
39	*Cassia fistula*	9.09	1.00	0.49	0.76	0.17	1.42	0.37
40	*Castanopsis fissa*	45.46	1.60	2.44	1.34	0.46	4.24	1.10
41	*Vitex pinnata*	54.55	1.67	2.93	1.39	1.15	5.47	1.42
		1863.67	**191.03**	**100**	**100**	**100**	**385.35**	**100**

1.4 Abundance

The result of the abundance of all tree species are given in Table 6. *Shorea siamensis* had the highest abundance, 62.18 individuals/quadrat. The dominant trees such as *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had the lower abundance of 8.90, 6.22 and 9.83 individuals/quadrat, respectively. Other trees had the very low abundance. Some trees had only one individual/quadrat. For *Melientha suavis*, it had 3.64 individuals/quadrat. It is implied that this species had relatively low abundance.

1.5 Relative density

For the relative density, *Shorea siamensis* had the highest density of 48.93%. The dominant trees such as *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had the lower relative density of 6.97, 4.71 and 7.40%. Other trees had the very low density. The relative density of many species was lower than 1.0% (Table 6).

Melientha suavis showed also low relative density of 3.18%. One individual may occurred apart from other individuals. However, in some quadrats they distributed in patch, about one meter apart from each other. The overall density was thus relatively low. There were some difficulties in tree density study, especially the difference in the patterns of distribution (Greig-Smith, 1983).

1.6 Relative dominance

The dominance was calculated from basal area at 1.3 m above ground level. The relative dominance was therefore depended on size of stem (diameter growth) and tree density. In Table 6, *Shorea siamensis* had the highest dominance of 51.83%. The dominant trees such as *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had rather low relative dominance of 11.03, 7.53 and 5.04%, respectively. Other trees also showed low relative dominance.

Melientha suavis had the low relative dominance of 2.67%. It is caused by the small stem and its low density.

1.7 Importance value index (IVI)

The importance value index of all tree species could be calculated from the sum of relative frequency, density and relative dominance. The relative IVI may also be calculated in percentage (Table 6).

Shorea siamensis had the highest value of IVI of 106.13. The dominant trees such as *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had IVI of 22.87, 16.63 and

15.37, respectively. Other trees such as *Terminalia chebula, Melanorrhoea usitata, Quercus kerrii* and *Afzelia xylocarpa* had the IVI of about 10-16. The other trees had the IVI less than 10. For *Meliantha suavis*, it had important value index of 11.22.

For the relative important value index, the value of 27.52% was calculated for *Shorea siamensis*. *S. obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had the relative IVI of 5.94, 4.32 and 3.99%, respectively. The IVI *Meliantha suavis* was only 2.91%. It indicated that this species had the very low importance. However, Kimmins (1987) suggested that the community with few species will have high relative IVI, whereas the community which consist of many species will normally have the low values. It was thought that *Meliantha suavis* forest consisted of intermediate number of tree species. Trees in other forests such as the mixed deciduous-dry evergreen forest showed the relatively low importance value index (Tsutsumi *et al.*, 1983). This may be caused by the high species diversity in this forest.

2. Quanlitative characteristics

2.1 Species diversity

Community diversity refers to the number of different species in the community (Kimmins, 1987). In the Dry Dipterocarp Forest with *Meliantha suavis* (Table 6), there were totally 41 species of trees. However, there were only few ground species in this forest such as *Zingiber* sp., *Arundinaria pusilla* etc. Table 7 shows some ecological data of the study area.

The number of trees per quadrat varied with quadrats, with the average of 130 individuals/quadrat (813 individuals/hectare). The number of tree species/quadrat was varied between 14 and 26. The mean value was 19 species/quadrat. The mean basal area was 2.19 m^2/quadrat (13.63 m^2/ha). Since soil in the study area was shallow, very poor and dry, it was therefore thought that these factors might have high influence on the plant diversity and production in this forest.

Table 7. Community characteristics of *Meliantha suavis* nearby Huay Hin Dam Village, Hod District, Chiangmai

	Quadrat number											Mean
	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	
Area of quadrat, m^2	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600	1600 ± 0.0
Number of trees/quadrat	146	191	132	143	131	100	126	110	106	124	122	130± 25.0
Number of trees/ha	913	1194	825	894	819	625	788	688	663	775	763	813± 155
Number of species/quadrat	19	26	17	16	25	15	18	13	22	19	14	19 ±4.00
Basal area, m^2/quadrat	2.15	3.05	1.99	1.95	2.26	2.24	1.80	1.59	2.09	2.51	2.44	2.19± 0.39
Basal area, m^2/ha	13.44	19.06	12.44	12.19	14.13	14.00	11.25	9.94	13.66	15.69	15.25	13.63± 2.53

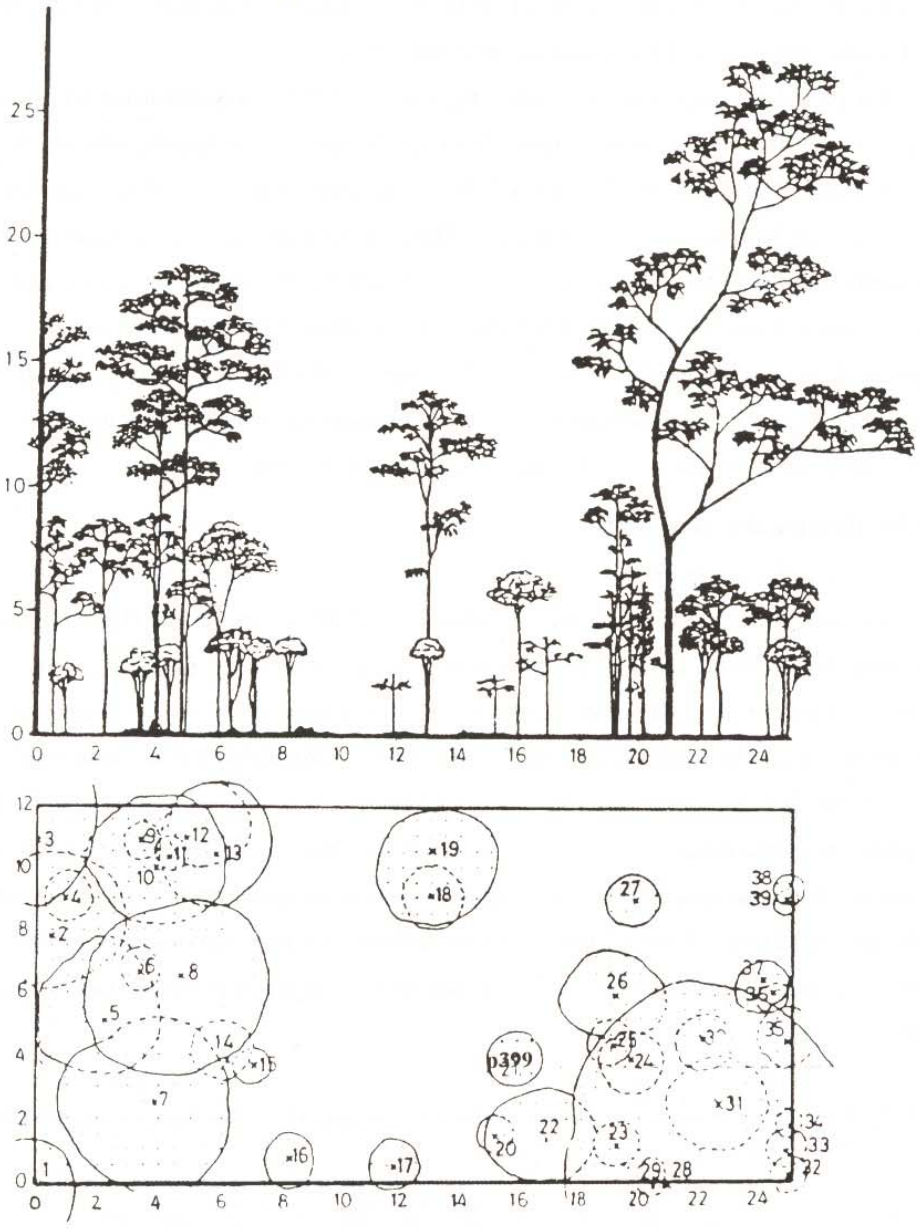

Figure 3. The vertical and horizontal structure of the dry dipterocarp forest consisting of a patch of *Melientha suavis*.

2.2 Stratification

A patch of *Meliantha suavis* was selected and the vertical-horizontal structure of the forest was depicted (Figure 3, Table 8). The upper crown layer was *Shorea siamensis*. The intermediate and small trees were *Dipterocarpus obtusifolius, Canarium kerrii, Shorea obtusa* etc.

Table 8. The list of tree species and their growth in Figure 3

No.	Name	DBH (cm)	Height (m)	Crown width (m)
1	*Shorea siamensis*	17.19	13.0	4.7
2	*Glochidion assamicum*	9.87	8.0	4.4
3	*Eugenia cumini*	24.83	17.0	5.3
4	*Meliantha suavis*	7.32	2.3	1.4
5	*Adina cordifolia*	13.37	9.0	5.0
6	*Meliantha suavis*	5.41	2.5	1.6
7	*Shorea siamensis*	19.74	14.0	5.4
8	*Shorea siamensis*	23.87	18.0	6.6
9	*Meliantha suavis*	13.37	2.5	1.4
10	*Lannea coromandelica*	15.92	8.0	4.4
11	*Meliantha suavis*	8.59	2.6	1.8
12	*Canarium kerrii*	9.87	6.0	2.8
13	*Canarium kerrii*	12.10	8.0	4.4
14	*Meliantha suavis*	12.40	3.5	4.2
15	*Meliantha suavis*	9.87	3.0	1.7
16	*Meliantha suavis*	2.61	3.0	1.8
17	*Dipterocarpus obtusifolius*	1.90	1.8	1.5
18	*Meliantha suavis*	11.48	3.5	2.0
19	*Shorea siamensis*	14.32	13.0	3.7
20	*Dipterocarpus obtusifolius*	1.91	1.8	1.2
21	*Adina cordifolia*	4.46	6.0	1.7
22	*Dipterocarpus obtusifolius*	5.09	4.0	3.4
23	*Irvingia malayana*	6.04	7.5	1.5
24	*Quercus kerrii*	6.37	7.0	2.0
25	*Dipterocarpus obtusifolius*	8.28	6.5	1.6
26	*Shorea siamensis*	13.05	10.0	4.0
27	*Shorea obtusa*	3.82	2.0	1.2
28	*Shorea siamensis*	20.69	27.0	13.3
29	*Dillenia obovata*	4.77	3.5	2.1
30	*Melanorrhoea usitata*	4.14	3.5	1.7
31	*Dillenia obovata*	4.77	6.0	3.0
32	*Flacourtia indica*	5.73	2.5	1.4
33	*Meliantha suavis*	10.50	3.0	1.6
34	*Meliantha suavis*	11.78	2.5	1.9
35	*Shorea obtusa*	10.50	6.0	3.8
36	*Shorea siamensis*	6.05	6.5	2.1
37	*Shorea siamensis*	4.46	3.5	2.3
38	*Meliantha suavis*	5.73	2.3	1.1
39	*Quercus kerrii*	1.91	2.0	1.0

Melientha suavis was cut at 3.0 m. Therefore, it had the lower crown layer. This patch had a relatively high density of *Melientha suavis*, but outside this plot the population was very low.

The horizontal structure implied that the trees grew not so dense in the forest. Approximately 50% of the plot area which was rocky area, was without trees.

CONCLUSIONS

1. *Melientha suavis* was distributed in the dry dipterocart forest in which *Shorea siamensis* was dominant. The forest site was very dry, shallow and poor soil.

2. *Shorea siamensis* in the forest had 100% of frequency, 62.18 of abundance, 48.93% of relative density, 51.83% of relative dominance, 106.13 of importance value index and 27.52% of relative IVI.

3. Other dominant trees including *Shorea obtusa, Dipterocarpus obtusifolius* and *D. tuberculatus* had the relative low values of frequency, density, dominance and importance value index.

4. *Melientha suavis* had frequency of 100%, the abundance of 3.64, relative density of 3.18%, relative dominance of 2.67, importance value index of 11.22 and relative IVI of 2.91%.

5. There were 41 species of trees in *Melientha suavis* forest including the ecotone of the dry dipterocarp-mixed deciduous forests. However, the tree species found in most sites of the *Melientha suavis* forest were about 14-26 species/quadrat. The vertical-horizontal structure of this forest were not complicated. There were large canopy gaps in the forest.

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