

ภาคผนวก ก.

การอธิบายรูปหน้าตัดดิน

มหาวิทยาลัยเชียงใหม่
Chiang Mai University

Pedon No. 1**I. Information on the Site**

- a. Profile number : 1 (DDF1-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 14 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soortorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 52' 54.0" N. 98° 52' 12.0" E. Sheet : 4746 I
- g. Elevation : 980 meters
- h. Land form :
- i. physiographic position : on ridge
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Upper slope) moderately steep (17%), N 10° W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

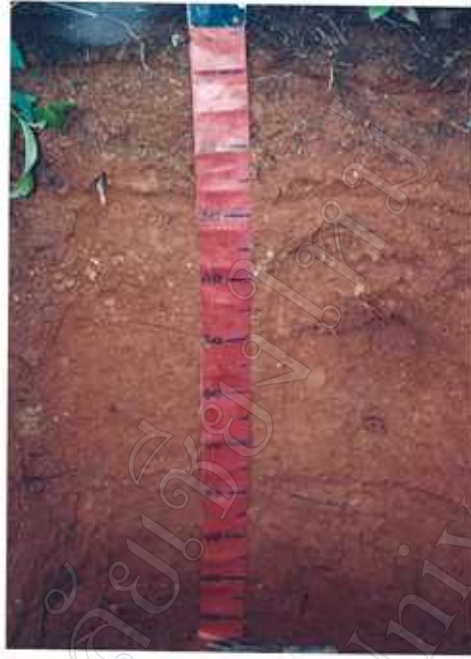
III. Profile Description

Horizon	Depth (cm.)	Description
A	0-3	Very dark grayish brown (10YR3/2) moist and dark brown (10YR3/3) dry, sandy clay loam; weak very fine and fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, few angular quartz and flat mica gravel (0.2-1.0 cm); abrupt, smooth boundary; pH 5.8
AB	3-10	Dark brown (7.5YR4/4) moist and brown (7.5YR5/4) dry, sandy clay loam; weak medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, frequent angular quartz and flat mica gravel (0.2-1.0 cm); abrupt, smooth boundary; pH 5.0
Bt1	10-30	Red (2.5YR4/6) moist and red (2.5YR4/8) dry, clay; moderate medium subangular blocky; sticky, plastic, friable to firm moist, slightly hard to hard dry; no rocks, frequent angular quartz and flat mica gravel (0.2-2.0 cm); clear, smooth boundary; pH 4.8
Bt2	30-50	Red (2.5YR4/8) moist and red (2.5YR5/8) dry, clay; moderate medium subangular blocky; sticky, plastic, firm moist, hard dry; very few angular gravel (1.0-5.0 cm) of a strongly weathered gneiss, frequent angular quartz and flat mica gravel (0.2-2.0 cm); smooth boundary; pH 5.4
Bt3	50-78	Red (2.5YR4/8) moist and red (2.5YR5/8) dry, clay; strong medium subangular blocky; sticky, plastic, firm moist, hard dry; very few rounded gravel (1.0-2.0 cm) of a strongly weathered gneiss, few angular quartz and flat mica gravel (0.2-2.0 cm); clear, smooth boundary; pH 5.6
Bt4	78-117	Red (2.5YR4/8) moist and red (2.5YR5/8) dry, clay; strong medium subangular blocky; slightly sticky to sticky, slightly plastic, friable moist, slightly hard dry; very few rounded stones (10.0-20.0 cm) of a strongly weathered gneiss, few angular quartz and flat mica gravel (0.2-2.0 cm); clear, smooth boundary; pH 5.8
Bt5	117-152+	Red (2.5YR4/8) moist and red (2.5YR5/8) dry, clay; weak medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; very few rounded stones (15.0-25.0 cm) of a strongly weathered gneiss, few angular quartz and flat mica gravel (0.2-2.0 cm); pH 5.8

ANALYTICAL DATA FOR PEDON NO.1

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
1. (DDF1-U)	0-3	A	37.36	53.46	16.44	30.10	SCL	1.02	21.79
	3-10	AB	51.95	51.36	15.41	33.23	SCL	1.24	17.84
	10-30	Bt1	47.16	29.22	15.50	55.28	C	1.46	20.24
	30-50	Bt2	27.14	23.52	16.30	60.18	C	1.48	18.96
	50-78	Bt3	12.14	27.96	15.89	56.15	C	1.64	20.09
	78-117	Bt4	16.38	35.05	17.01	47.94	C	1.50	20.60

No.	Depth (cm)	pH 1:1 H ₂ O	OM (%)	OC (%)	N	C/N Ratio	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
							P (ppm)	K	Ca	Mg	Na		
1. (DDF1-U)	0-3	5.28	5.86	3.40	0.14	24.19	10.02	0.70	3.08	1.05	0.09	21.76	23.71
	3-10	4.87	4.24	2.46	0.11	22.02	6.92	0.48	1.25	0.50	0.07	14.56	16.21
	10-30	4.69	1.62	0.94	0.05	18.04	2.87	0.27	0.31	0.17	0.05	8.92	12.22
	30-50	5.04	0.59	0.34	0.03	12.15	2.09	0.24	0.28	0.13	0.05	7.99	13.27
	50-78	5.19	0.31	0.18	0.02	9.66	2.14	0.21	0.41	0.12	0.04	6.16	15.98
	78-117	5.32	0.25	0.14	0.01	10.17	2.03	0.14	0.35	0.11	0.04	5.46	15.18



(A)



(B)

Plate 1 Photographs showing soil profile number 1 (A) and associated to topographic features (B)

Pedon No. 2**I. Information on the Site**

- a. Profile number : 2 (DDF1-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinatic, isothermic, Typic Paleustults
- d. Date of examination : 14 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 52' 54.0" N. 98° 52' 12.0" E. Sheet: 4746 I
- g. Elevation : 955 meters.
- h. Land form :
- i. physiographic position : on convex slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Middle slope) steep (50%), N 60° W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 72 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-3/6	Dark brown (10YR3/3) moist and yellowish brown (10YR5/4) dry, sandy clay loam; weak fine and medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; abrupt, smooth boundary; pH 5.6
AB	3/6-18	Reddish brown (5YR4/4) moist and yellowish red (5YR5/6) dry, clay; moderate fine granular and subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, wavy boundary; pH 5.8
Bt1	18-38	Red (2.5YR4/6) moist and red (2.5YR4/8) dry, clay; moderate medium subangular blocky; sticky, plastic, firm moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
Bt2	38-72	Red (2.5YR4/6) moist and red (2.5YR4/8) dry, clay; moderate medium subangular blocky; sticky, plastic, firm to very firm moist, slightly hard to hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
Bt3	72-106	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; no rocks, no mineral fragments; clear, smooth boundary; pH 5.6
Bt4	106-140	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; no rocks, no mineral fragments; clear, smooth boundary; pH 5.6
Bt5	140-157+	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; no rocks, no mineral fragments; pH 5.8

ANALYTICAL DATA FOR PEDON NO.2

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
2. (DDFI-M)	0-3/6	A	1.92	51.52	19.48	29.00	SCL	1.15	23.43
	3/6-18	BA	1.37	40.26	17.70	42.04	C	1.25	21.09
	18-38	Bt1	0.64	26.74	18.37	54.89	C	1.39	23.44
	38-72	Bt2	0.59	24.93	15.35	59.72	C	1.34	22.82
	72-106	Bt3	0.99	29.80	14.47	55.73	C	1.34	21.77
	106-140	Bt4	0.68	27.52	14.40	58.08	C	1.20	21.94

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1					P	K	Ca	Mg	Na		
		H ₂ O	(%)				(ppm)	(me/100g soil)					
2. (DDFI-M)	0-3/6	4.94	5.89	3.42	0.14	23.79	7.12	0.77	1.56	1.03	0.10	18.15	19.14
	3/6-18	5.11	2.33	1.35	0.07	19.54	4.02	0.39	0.39	0.41	0.07	8.21	17.11
	18-38	4.85	1.12	0.65	0.04	16.51	2.30	0.26	0.28	0.36	0.07	5.73	17.03
	38-72	4.99	0.58	0.33	0.03	12.64	2.39	0.23	0.25	0.20	0.07	5.07	16.73
	72-106	5.20	0.38	0.22	0.02	9.81	2.29	0.21	0.23	0.13	0.05	4.63	15.11
	106-140	5.11	0.36	0.21	0.02	8.84	2.87	0.23	0.25	0.15	0.06	4.94	15.60



(A)



(B)

Plate 2 Photographs showing soil profile number 2 (A) and associated topographic features (B)

Pedon No. 3**I. Information on the Site**

- a. Profile number : 3 (DDF1-L)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 12 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 52' 54.0" N, 98° 52' 12.0" E. Sheet: 4746 I
- g. Elevation : 940 meters
- h. Land form :
- i. physiographic position : on convex slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Lower slope) steep (46%), N 65° W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature (°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 55 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-5	Dark brown (7.5YR3/2) moist and dark brown (10YR4/3) dry, sandy clay loam; moderate fine and medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; abrupt, smooth boundary; pH 5.6
AB	5-15/20	Yellowish red (5YR4/6) moist and yellowish red (5YR5/6) dry, sandy clay; moderate fine and medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, wavy boundary; pH 5.0
Bt1	15/20-55	Red (2.5YR4/6) moist and red (2.5YR5/6) dry, clay; moderate medium subangular blocky; slightly sticky, slightly plastic to plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.2
Bt2	55-95	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
Bt3	95-125	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
Bt4	125-152+	Red (2.5YR4/6) moist, clay; moderate medium subangular blocky; slightly sticky, plastic, friable to firm moist; no rocks, no mineral fragments; pH 5.4

ANALYTICAL DATA FOR PEDON NO.3

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
3. (DDFI-L)	0-5	A	3.18	57.72	18.28	24.00	SCL	1.01	24.83
	5-15/20	AB	2.82	44.56	17.64	37.80	CL	1.25	19.70
	15/20-55	Bt1	2.03	33.68	18.57	47.75	C	1.34	20.30
	55-95	Bt2	3.72	32.87	17.83	49.30	C	1.28	21.90
	95-125	Bt3	3.37	32.69	19.98	47.33	C	1.36	20.92

No.	Depth (cm)	pH 1:1 H ₂ O	OM	OC (%)	N	C/N Ratio	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
							P	K	Ca	Mg	Na		
							(ppm)	(me/100g soil)					
3. (DDFI-L)	0-5	5.16	5.96	3.45	0.19	18.58	8.83	0.74	1.48	0.90	0.09	13.47	24.11
	5-15/20	4.71	2.25	1.30	0.08	15.37	3.59	0.43	0.28	0.25	0.08	5.03	21.07
	15/20-55	4.89	0.69	0.40	0.03	13.33	2.64	0.34	0.22	0.14	0.08	3.82	21.41
	55-95	5.14	0.31	0.18	0.02	9.55	2.18	0.23	0.25	0.12	0.06	4.83	15.26
	95-125	5.22	0.14	0.08	0.02	5.05	2.53	0.18	0.24	0.14	0.06	4.33	14.64



(A)



(B)

Plate 3 Photographs showing soil profile number 3 (A) and associated topographic features (B)

Pedon No. 4**I. Information on the Site**

- a. Profile number : 4 (DDF2-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Ustic Palehumults
- d. Date of examination : 19 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 52' 36.0" N, 98° 52' 8.4" E. Sheet: 4746 I
- g. Elevation : 1,015 meters
- h. Land form :
- i. physiographic position : on ridge
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Upper slope) slightly steep 12%, N 50°W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion .
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-5	Very dark grayish brown (10YR3/2) moist and grayish brown (10YR5/2) dry, sandy loam; moderate fine and medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; abrupt, smooth boundary; pH 5.6
BA	5-17/20	Yellowish red (5YR5/6) moist and reddish yellow (5YR7/8) dry, clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, wavy boundary; pH 5.0
Bt1	17/20-45	Yellowish red (5YR4/8) moist and yellowish red (5YR5/8) dry, clay; moderate medium subangular blocky; sticky, plastic to very plastic, firm moist, slightly hard to hard dry; clear, smooth boundary; pH 5.2
Bt2	45-73	Yellowish red (5YR5/8) moist and reddish yellow (5YR7/8) dry, clay; moderate medium subangular blocky; sticky to very sticky, plastic, firm to very firm moist, hard dry; clear, smooth boundary; pH 5.4
Bt3	73-105/110	Yellowish red (5YR5/8) moist and reddish yellow (5YR7/8) dry, clay; weak fine subangular blocky; sticky, plastic, firm moist, slightly hard to hard dry; clear, wavy boundary; pH 5.8
Bt4	105/110-130+	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; weak fine subangular blocky; sticky, plastic, firm moist, slightly hard to hard dry; pH 5.8

ANALYTICAL DATA FOR PEDON NO.4

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
4. (DDF2-U)	0-5	A	4.78	62.36	18.36	19.28	SL	0.96	29.08
	5-17/20	BA	6.54	44.36	17.84	37.80	CL	1.41	20.96
	17/20-45	Bt1	6.63	31.51	14.08	54.41	C	1.40	22.10
	45-73	Bt2	17.43	29.17	15.82	55.01	C	1.46	21.40
	73-105/110	Bt3	36.96	29.01	15.71	55.28	C	1.38	20.03
	105/110-130+	Bt4	33.85	27.24	17.28	55.48	C	1.50	19.23

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1				Ratio	P	K	Ca	Mg	Na		
		H ₂ O	H ₂ O (%)				(ppm)	(me/100g soil)					
4. (DDF2-U)	0-5	5.03	8.18	4.74	0.15	31.54	12.33	0.43	1.63	0.63	0.07	15.46	18.62
	5-17/20	4.80	2.48	1.44	0.06	25.17	4.26	0.32	0.31	0.24	0.08	7.86	12.31
	17/20-45	5.02	1.19	0.69	0.03	23.57	2.33	0.26	0.26	0.16	0.06	7.00	11.72
	45-73	5.30	0.75	0.44	0.02	20.09	1.57	0.20	0.21	0.13	0.06	5.55	13.19
	73-105/110	5.49	0.51	0.29	0.02	15.76	1.07	0.20	0.26	0.13	0.03	10.09	12.43
	105/110-130+	5.52	0.48	0.28	0.02	17.03	1.07	0.17	0.25	0.14	0.03	8.27	12.87



(A)



(B)

Plate 4 Photographs showing soil profile number 4 (A) and associated topographic features (B)

Pedon No. 5**I. Information on the Site**

- a. Profile number : 5 (DDF3-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinatic, isothermic, Typic Paleustults
- d. Date of examination : 19 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 52' 36.0" N. 98° 52' 8.4" E. Sheet : 4746 I
- g. Elevation : 1,005 meters
- h. Land form :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 82 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion .
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-5	Very dark grayish brown (10YR3/2) moist and grayish brown (10YR5/2) dry, sandy clay loam; moderate fine and medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; abrupt, wavy boundary; pH 5.2
BA	5-33	Light red (2.5YR6/8) moist and reddish yellow (5YR7/8) dry, clay; moderate medium subangular blocky; sticky, plastic, firm moist, slightly hard to hard dry; clear, smooth boundary; pH 5.0
Bt1	33-57	Light red (2.5YR6/8) moist and reddish yellow (5YR7/8) dry, clay; moderate medium subangular blocky; very sticky, plastic to very plastic, firm to very firm moist, hard dry; clear, wavy boundary; pH 5.6
Bt2	57-82	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; moderate medium subangular blocky; sticky to very sticky, plastic, firm moist, slightly hard to hard dry; clear, wavy boundary; pH 5.8
Bt3	82-100/110	Light red (2.5YR6/8) moist, clay; moderate medium subangular blocky; sticky, plastic, firm moist; abrupt, wavy boundary; pH 5.8
B4	100/110-144+	Light red (2.5YR6/8) moist, clay loam; weak fine subangular blocky; sticky, plastic, firm moist; pH 5.6

ANALYTICAL DATA FOR PEDON NO.5

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
S. (DDF2-M)	0-5	A	5.98	50.24	16.28	33.48	SCL	1.29	24.26
	5-33	BA	11.17	26.81	16.46	56.73	C	1.40	23.68
	33-57	Bt1	12.97	26.07	16.99	56.94	C	1.43	23.59
	57-82	Bt2	19.05	31.96	17.76	50.28	C	1.32	19.97
	82-100/110	Bt3	18.82	27.54	24.37	48.09	C	1.52	20.57
	100/110-144+	Bt4	19.17	32.24	28.28	39.48	CL	1.41	19.41

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1				Ratio	P	K	Ca	Mg	Na		
		H ₂ O	OC (%)				(ppm)	(me/100g soil)					
S. (DDF2-M)	0-5	4.98	6.17	3.58	0.14	25.44	14.50	0.45	1.29	0.50	0.07	16.64	14.84
	5-33	4.73	1.76	1.02	0.04	23.21	3.50	0.28	0.18	0.19	0.04	7.37	15.99
	33-57	5.14	0.78	0.45	0.02	20.58	1.68	0.23	0.12	0.13	0.04	5.64	15.78
	57-82	5.52	0.44	0.26	0.02	15.53	1.16	0.22	0.10	0.06	0.03	4.51	13.98
	82-100/110	5.54	0.41	0.24	0.01	19.77	0.91	0.19	0.12	0.05	0.03	4.67	15.08
	100/110-144+	5.44	0.35	0.20	0.01	18.40	1.20	0.18	0.10	0.05	0.04	4.19	10.18



(A)



(B)

Plate 5 Photographs showing soil profile number 5 (A) and associated topographic features (B)

Pedon No. 6**I. Information on the Site**

- a. Profile number : 6 (DDF3-L)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 19 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 52' 36.0" N. 98° 52' 8.4" E. Sheet: 4746 I
- g. Elevation : 990 meters
- h. Landform :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Lower slope) steep (51%), N 40°W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus obtusifolius* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 75/80 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion .
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-5	Very dark grayish brown (10YR3/2) moist and light brownish gray (10YR6/2) dry, sandy clay loam; moderate medium and coarse granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; clear, smooth boundary; pH 6.2
AB	5-20	Brown (7.5YR5/4) moist and light brown (7.5YR6/4) dry, sandy clay; moderate medium granular and subangular blocky; slightly sticky to sticky, slightly plastic, friable moist, slightly hard dry; clear, smooth boundary; pH 5.4
B1	20-48	Yellowish red (5YR5/8) moist and reddish yellow (5YR7/8) dry, clay loam; moderate medium and coarse subangular blocky; slightly sticky to sticky, slightly plastic to plastic, firm moist, slightly hard dry; clear, wavy boundary; pH 5.2
Bt2	48-75/80	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; moderate medium and coarse subangular blocky; ticky, plastic, firm moist, hard dry; clear, wavy boundary; pH 5.4
Bt3	75/80-120/125	Red (2.5YR4/6) moist, clay; weak medium subangular blocky; very sticky, very plastic, firm to very firm moist; clear, wavy boundary; pH 5.6
Bt4	120/125-160+	Red (2.5YR4/6) moist, clay; weak medium subangular blocky; sticky to very sticky, plastic, firm moist; pH 5.8

ANALYTICAL DATA FOR PEDON NO.6

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
6. (DDF2-L)	0-5	A	5.78	58.24	17.28	24.48	SCL	1.11	22.20
	5-20	AB	2.90	47.57	15.28	37.15	SC	1.54	18.58
	20-48	Bt1	4.30	40.52	21.14	38.34	CL	1.38	19.10
	48-75/80	Bt2	4.41	35.31	12.69	52.00	C	1.53	19.77
	75/80-120/125	Bt3	10.18	32.18	12.78	55.04	C	1.59	21.13
	120/125-160+	Bt4	12.23	32.24	13.28	54.48	C	1.49	21.24

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1				Ratio	P	K	Ca	Mg	Na		
		H ₂ O		(%)			(ppm)		(me/100g soil)				
6. (DDF2-L)	0-5	5.43	5.42	3.15	0.15	21.08	17.00	0.84	1.53	1.13	0.10	23.98	15.04
	5-20	5.15	2.36	1.37	0.06	22.26	6.78	0.60	0.25	0.28	0.08	10.19	12.48
	20-48	4.96	0.99	0.58	0.03	17.68	3.94	0.48	0.11	0.13	0.07	5.70	13.55
	48-75/80	5.16	0.54	0.31	0.02	12.84	1.50	0.42	0.09	0.13	0.06	6.66	14.16
	75/80-120/125	5.39	0.34	0.20	0.02	11.03	1.11	0.37	0.10	0.15	0.05	8.57	14.64
	120/125-160+	5.43	0.30	0.17	0.02	9.59	1.02	0.36	0.10	0.17	0.05	7.43	14.80



(A)



(B)

Plate 6 Photographs showing soil profile number 6 (A) and associated topographic features (B)

Pedon No. 7**I. Information on the Site**

- a. Profile number : 7 (DDF3-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Very fine, kaolinatic, isothermic, Typic Paleustults
- d. Date of examination : 16 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 53' 32.4" N. 98° 52' 6.0" E. Sheet: 4746 I
- g. Elevation : 860 meters
- h. Land form :
- i. physiographic position : below summit surface 10 meters
- ii. surrounding land form : mountaunous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Upper slope) moderately steep (16%), N 80° W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocapus tuberculatus* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-paragneiss or very fine sandstone rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion and slight rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-4	Dark brown (10YR3/3) moist and brown (10YR5/3) dry, clay loam; moderate fine and medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); abrupt, smooth boundary; pH 5.6
BA	4-12	Yellowish red (5YR5/6) moist and reddish yellow (7.5YR6/8) dry, clay; weak very coarse subangular blocky; sticky, plastic, firm moist, slightly hard to hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.0
Bt1	12-38	Yellowish red (5YR5/6) moist and reddish yellow (7.5YR6/6) dry, clay; moderate medium subangular blocky; sticky to very sticky, plastic to very plastic, firm to very firm moist, hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 5.6
Bt2	38-57	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; moderate medium subangular blocky; sticky to very sticky, plastic to very plastic, firm to very firm moist, hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 5.8
Bt3	57-80	Red (2.5YR4/8) moist and light red (2.5YR6/8) dry, clay; moderate medium and coarse subangular blocky; sticky to very sticky, plastic to very plastic, firm to very firm moist, hard dry; no rocks, frequent angular quartz gravel (0.2-2.0 cm); clear, wavy boundary; pH 6.0
Bt4	80-109	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; moderate medium and coarse subangular blocky; sticky, plastic, firm moist, hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 6.0
Bt5	109-133+	Light red (2.5YR6/6) moist and light red (2.5YR6/8) dry, clay; moderate medium and coarse subangular blocky; sticky, plastic, firm moist, hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); pH 6.0

ANALYTICAL DATA FOR PEDON NO.7

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
7. (DDF3-U)	0-4	A	3.91	45.80	17.36	36.84	SC	1.30	21.12
	4-12	BA	2.95	22.68	10.98	66.34	C	1.38	30.72
	12-38	Bt1	1.59	18.57	11.28	70.15	C	1.24	30.34
	38-57	Bt2	6.33	15.32	14.29	70.39	C	1.32	28.97
	57-80	Bt3	21.06	14.80	16.02	69.18	C	1.31	28.65
	80-109	Bt4	5.44	9.49	25.45	65.06	C	1.33	31.76
	109-133+	Bt5	2.96	8.80	30.28	60.92	C	1.39	29.22

No.	Depth (cm)	pH 1:1 H ₂ O	OM	OC (%)	N	C/N Ratio	Ext. P (ppm)	Ext. K	Ext. Ca (me/100g soil)	Ext. Mg	Ext. Na	BS (%)	CEC (me/100gsoil)
7. (DDF3-U)	0-4	5.36	4.36	2.53	0.12	20.85	3.50	0.70	4.21	0.98	0.10	26.26	22.86
	4-12	5.03	2.57	1.49	0.07	20.03	1.63	0.45	1.54	0.65	0.09	15.18	20.63
	12-38	5.33	1.01	0.59	0.03	17.74	0.88	0.38	0.62	0.24	0.08	8.77	20.32
	38-57	5.53	0.62	0.36	0.03	12.11	0.67	0.24	0.88	0.27	0.06	7.90	24.79
	57-80	5.67	0.52	0.30	0.02	14.86	0.67	0.18	1.17	0.35	0.06	10.67	22.85
	80-109	5.63	0.40	0.23	0.01	19.11	0.84	0.10	1.27	0.30	0.06	12.05	19.14
	109-133+	5.61	0.36	0.21	0.01	21.96	0.83	0.08	1.38	0.26	0.06	12.89	18.26



(A)



(B)

Plate 7 Photographs showing soil profile number 7 (A) and associated topographic features (B)

Pedon No. 8**I. Information on the Site**

- a. Profile number : 8 (DDF3-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Very fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 16 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 53' 32.4" N. 98° 52' 6.0" E. Sheet: 4746 I
- g. Elevation : 850 meters
- h. Land form :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Middle slope) moderately steep (24%), N 85°W aspect
- j. Vegetation and Land-use : Under dry dipterocarp forest (*Dipterocarpus tuberculatus* association)
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-paragneiss or very fine sandstone rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 53 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion and slight rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-2	Dark grayish brown (10YR4/2) moist and pale brown (10YR6/3) dry, sandy clay loam; moderate medium and coarse granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); abrupt, smooth boundary; pH 7.0
BA	2-10/13	Yellowish red (5YR5/6) moist and reddish yellow (5YR7/8) dry, clay; moderate medium subangular blocky; sticky to very sticky, plastic to very plastic, firm to very firm moist, slightly hard to hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.2
Bt1	10/13-28	Yellowish red (5YR5/6) moist and yellowish red (5YR5/8) dry, clay; moderate medium subangular blocky; very sticky, very plastic, very firm moist, hard to very hard dry; no rocks, few angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.2
Bt2	28-53	Light red (2.5YR6/8) moist and light red (2.5YR6/8) dry, clay; moderate medium subangular blocky; very sticky, very plastic, very firm moist, hard to very hard dry; no rocks, few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 5.8
Bt3	53-77	Light red (2.5YR6/8) moist, clay; moderate coarse subangular blocky; sticky to very sticky, plastic to very plastic, firm moist; no rocks, frequent angular quartz gravel (0.2-2.0 cm); clear, smooth boundary; pH 5.8
Bt4	77-122/130	Light red (2.5YR6/8) moist, clay; moderate coarse subangular blocky; sticky to very sticky, plastic, firm moist; no rocks, frequent angular quartz gravel (0.2-2.0 cm); clear, wavy boundary; pH 5.8 (Sample number 116)
Bt5	122/130-148+	Light red (2.5YR6/8) moist, clay; weak coarse subangular blocky; sticky to very sticky, plastic, firm moist; no rocks, very few angular quartz gravel (0.2-1.0 cm); pH 6.0

ANALYTICAL DATA FOR PEDON NO.8

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
8. (DDF3-M)	0-2	A	4.42	55.80	21.28	22.92	SCL	1.32	25.66
	2-10/13	BA	7.36	24.33	16.91	58.76	C	1.31	31.00
	10/13-28	Bt1	14.14	10.77	11.73	77.50	C	1.18	28.95
	28-53	Bt2	11.21	11.80	13.80	74.40	C	1.37	29.78
	53-77	Bt3	16.21	16.76	17.11	66.13	C	1.35	27.96
	77-122/130	Bt4	12.12	21.48	16.72	62.10	C	1.39	27.09
	122/130-148+	Bt5	3.36	23.08	14.44	62.48	C	1.27	22.84

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1				Ratio	P	K	Ca	Mg	Na		
		H ₂ O	(%)				(ppm)		(me/100g soil)				
8. (DDF3-M)	0-2	5.86	6.19	3.59	0.17	21.62	10.67	0.75	5.90	1.58	0.08	32.63	27.69
	2-10/13	5.29	3.39	1.97	0.10	20.04	6.01	0.58	2.52	1.01	0.08	19.92	20.99
	10/13-28	5.23	1.33	0.77	0.04	19.66	1.35	0.41	0.59	0.48	0.08	9.25	20.67
	28-53	5.43	0.88	0.51	0.03	17.58	0.83	0.27	0.62	0.39	0.06	8.58	22.08
	53-77	5.55	0.65	0.38	0.02	17.62	0.78	0.17	0.73	0.40	0.05	6.35	26.62
	77-122/130	5.59	0.41	0.24	0.01	16.18	0.69	0.12	0.96	0.43	0.05	9.50	21.17
	122/130-148+	5.60	0.28	0.16	0.01	13.35	0.75	0.12	1.02	0.40	0.05	11.12	18.36



(A)



(B)

Plate 8 Photographs showing soil profile number 8 (A) and associated topographic features (B)

Pedon No.9**I. Information on the Site**

- a. Profile number : 9 (DDF3-L)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Very fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 16 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 53' 32.4" N. 98° 52' 6.0" E. Sheet: 4746 I
- g. Elevation : 840 meters
- h. Land form :
- i. physiographic position : on convex slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Lower slope) moderately steep (18%), S 70°W aspect
- j. Vegetation and Land-use : Under ecotone of dry dipterocarp forest with dry evergreen forest
: Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss or very fine sandstone rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 55 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-5	Very dark grayish brown (10YR3/2) moist and brown (10YR5/3) dry, sandy clay loam; moderate medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, few angular quartz gravel (0.2-1.0 cm); abrupt, smooth boundary; pH 6.2
AB	5-17	Dark brown (10YR4/3) moist and pale brown (10YR6/3) dry, clay; moderate fine and medium granular; sticky, plastic, friable to firm moist, slightly hard to hard dry; no rocks, few angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.0
Bt1	17-25/30	Yellowish red (5YR5/6) moist and yellowish red (5YR5/8) dry, clay; moderate medium subangular blocky; very sticky, very plastic, firm to very firm moist, hard to very hard dry; no rocks, frequent angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.4
Bt2	25/30-55	Yellowish red (5YR5/6) moist and yellowish red (5YR5/8) dry, clay; moderate medium subangular blocky; very sticky, very plastic, very firm moist, hard to very hard dry; no rocks, frequent angular quartz gravel (0.2-2.0 cm); clear, smooth boundary; pH 6.0
Bt3	55-92	Light red (2.5YR6/8) moist, clay; moderate coarse subangular blocky; very sticky, very plastic, very firm moist; no rocks, frequent few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 6.0
Bt4	92-120	Light red (2.5YR6/8) moist, clay; moderate medium subangular blocky; very sticky, very plastic, firm to very firm moist; no rocks, few angular quartz gravel (0.2-1.0 cm); clear, smooth boundary; pH 6.2
B(t)5	120-138+	Light red (2.5YR6/8) moist, clay; moderate medium subangular blocky; very sticky, plastic, firm moist; no rocks, few angular quartz gravel (0.2-1.0 cm); pH 6.2

ANALYTICAL DATA FOR PEDON NO.9

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
9. (DDF3-L)	0-5	A	23.89	50.08	20.44	29.48	SCL	0.96	29.01
	5-17	AB	25.51	23.00	17.36	59.64	C	1.37	25.06
	17-25/30	Bt1	41.09	13.65	13.01	73.34	C	1.34	28.94
	25/30-55	Bt2	39.87	10.90	14.08	75.02	C	1.36	30.47
	55-92	Bt3	27.07	11.46	18.68	69.86	C	1.42	29.62
	92-120	Bt4	26.32	13.08	26.87	60.05	C	1.44	26.02
	120-138+	Bt5	27.79	13.08	29.44	57.48	C	1.48	27.42

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1 H ₂ O	OC (%)			Ratio	P	K	Ca	Mg	Na		
		(me/100g soil)											
9. (DDF3-L)	0-5	5.33	7.74	4.49	0.23	19.80	18.33	0.56	6.71	1.70	0.09	31.88	29.34
	5-17	4.92	2.48	1.44	0.08	18.38	3.38	0.38	1.32	0.65	0.06	11.83	20.99
	17-25/30	5.19	1.47	0.85	0.05	16.62	1.39	0.46	1.55	0.50	0.06	11.83	23.25
	25/30-55	5.47	1.02	0.59	0.04	16.26	0.73	0.49	1.81	0.39	0.06	12.76	24.55
	55-92	5.75	0.53	0.31	0.02	14.49	0.56	0.38	2.50	0.47	0.07	13.76	29.39
	92-120	5.76	0.37	0.21	0.01	16.42	0.42	0.25	2.40	0.56	0.06	13.71	28.52
	120-138+	5.76	0.34	0.20	0.01	17.38	0.42	0.24	2.33	0.58	0.06	13.35	30.32



(A)



(B)

Plate 9 Photographs showing soil profile number 9 (A) and associated topographic features (B)

Pedon No. 10**I. Information on the Site**

- a. Profile number : 10 (MDF-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Rhodic Cambisols
- USDA : Fine-loamy, mix, isothermic Typic Dystrustepts
- d. Date of examination : 15 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 54' 9.6" N. 98° 52' 13.2" E. Sheet: 4746 I
- g. Elevation : 860 meters
- h. Land form :
- i. physiographic position : on convex slope near ridge
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Upper slope) steep (32%), N 60°W aspect
- j. Vegetation and Land-use : Under mixed deciduous forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature (°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from weathered and very fine sandstone rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Slight sheet erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-3/5	Dark brown (7.5YR3/2) moist and dark brown (7.5YR4/3) dry, sandy clay loam; moderate fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.8
A2	3/5-16	Dark reddish brown (5YR3/3) moist and reddish brown (5YR4/4) dry, clay; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
B(t)1	16-40	Reddish brown (2.5YR4/4) moist and yellowish red (5YR4/6) dry, clay; moderate medium subangular blocky; slightly sticky, slightly plastic, friable to firm moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.0
B2	40-65	Dark red (2.5YR3/6) moist and red (2.5YR4/6) dry, sandy clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; very few angular gravel (1.0-2.0 cm) of a strongly weathered sandstone, very few angular quartz gravel (0.2-2.0 cm); clear, wavy boundary; pH 5.0
B3	65-87	Dark red (2.5YR3/6) moist and red (2.5YR4/6) dry, sandy clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; few angular gravel (1.0-5.0 cm) of weathered very fine sandstone, angular quartz gravel (0.2-2.0 cm); clear, wavy boundary; pH 5.2
CB	87-135+	Dark red (2.5YR3/6) moist and red (2.5YR4/6) dry, sandy clay loam; weak to moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; frequent angular boulders (more than 25.0 cm) of weathered very fine sandstone, no mineral fragments; pH 5.2

ANALYTICAL DATA FOR PEDON NO.10

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
10. (MDF-U)	0-3/5	A1	3.35	53.80	22.36	23.84	SCL	1.00	27.74
	3/5-16	A2	7.17	43.72	24.44	31.84	SCL	1.02	27.75
	16-40	B(t)1	3.39	36.13	19.86	44.01	C	1.31	24.48
	40-65	B2	5.99	49.00	18.56	32.44	SCL	1.24	24.94
	65-87	B3	28.15	51.89	16.32	31.79	SCL	1.30	23.02
	87-135+	CB	45.32	47.80	18.36	33.84	SCL	1.32	23.15

No.	Depth (cm)	pH 1:1 H ₂ O	OM	OC (%)	N	C/N Ratio	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
							P	K	Ca	Mg	Na		
							(ppm)	(me/100g soil)					
10. (MDF-U)	0-3/5	5.36	8.12	4.71	0.29	16.26	4.42	0.99	7.08	1.60	0.12	38.42	26.65
	3/5-16	4.91	4.63	2.69	0.18	15.23	1.91	0.78	2.64	0.72	0.10	17.11	24.54
	16-40	4.68	2.45	1.42	0.09	15.33	0.91	0.45	0.61	0.22	0.07	8.81	19.65
	40-65	4.75	1.83	1.06	0.07	15.40	1.03	0.32	0.38	0.09	0.06	5.08	19.65
	65-87	4.84	1.64	0.95	0.06	14.81	1.92	0.36	0.41	0.06	0.06	4.95	21.99
	87-135+	4.90	1.42	0.82	0.06	14.38	0.67	0.39	0.44	0.05	0.07	5.91	24.33



(A)



(B)

Plate 10 Photographs showing soil profile number 10 (A) and associated topographic features (B)

Pedon No. 11**I. Information on the Site**

- a. Profile number : 11 (MDF-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Rhodic Cambisols
- USDA : Fine-loamy, mix, isothermic Typic Dystrustepts
- d. Date of examination : 15 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 54' 9.6" N. 98° 52' 13.2" E. Sheet: 4746 I
- g. Elevation : 850 meters
- h. Land form :
- i. physiographic position : on straight slope near ridge
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Middle slope) very steep (56%), N 80°W aspect
- j. Vegetation and Land-use : Under mixed deciduous forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from weathered very fine sandstone rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : Fairly stony and fairly rocky.
- f. Evidence of erosion : Moderate sheet erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-2	Very dark grayish brown (10YR3/2) moist and dark brown (10YR4/3) dry, sandy clay loam; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, soft to slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 6.2
A2	2-16	Very dark grayish brown (10YR3/2) moist and dark brown (10YR4/3) dry, loam; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, soft to slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.6
Bw1	16-30	Dark reddish brown (5YR3/3) moist and reddish brown (5YR4/4) dry, sandy loam; moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; very few angular gravel (1.0-2.0 cm) of weathered very fine sandstone, no mineral fragments; clear, smooth boundary; pH 5.0
Bw2	30-40/50	Dark reddish brown (5YR3/3) moist and reddish brown (5YR4/4) dry, sandy loam; moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; few angular gravel (1.0-2.0 cm) of weathered very fine sandstone, no mineral fragments; clear, wavy boundary; pH 5.0
BC	40/50-90	Dark red (2.5YR3/6) moist and yellowish red (5YR4/8) dry, sandy loam; moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; very frequent angular stones and boulders (7.5-30.0 cm) of weathered very fine sandstone, no mineral fragments; gradual, wavy boundary; pH 5.2
CB	90-130+	Dark red (2.5YR3/6) moist and yellowish red (5YR4/8) dry, loamy sand to sandy loam; no structure; slightly sticky, slightly plastic, very friable moist, soft to slightly hard dry; dominant angular boulders (more than 50.0 cm) of weathered very fine sandstone, no mineral fragments; pH 5.2

ANALYTICAL DATA FOR PEDON NO.11

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
11, (MDF-M)	0-2	A1	4.43	50.80	27.36	21.84	SCL	0.94	28.20
	2-16	A2	3.39	48.80	30.50	20.70	L	1.11	26.52
	16-30	Bw1	5.11	52.09	27.79	20.12	SCL	1.16	26.00
	30-40/50	Bw2	11.39	53.47	26.69	19.84	SL	1.30	22.11
	40/50-90	CB	33.18	52.14	27.58	20.28	SCL	1.32	22.06

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1 H ₂ O		(%)	Ratio	P (ppm)	K	Ca	Mg	Na			
11, (MDF-M)	0-2	5.80	9.71	5.63	0.31	18.24	6.17	1.27	8.00	2.35	0.13	42.85	29.30
	2-16	5.27	6.85	3.97	0.24	16.49	3.21	1.03	3.39	1.28	0.11	23.35	24.54
	16-30	4.84	4.01	2.32	0.14	16.12	1.25	0.64	0.73	0.34	0.08	10.93	16.76
	30-40/50	4.82	3.14	1.82	0.11	16.35	1.02	0.48	0.63	0.19	0.07	8.90	15.64
	40/50-90	5.07	3.25	1.89	0.11	17.29	1.57	0.49	2.75	0.55	0.07	17.59	23.16



(A)



(B)

Plate 11 Photographs showing soil profile number 11 (A) and associated topographic features (B)

Pedon No. 12**I. Information on the Site**

- a. Profile number : 12 (MDF-L)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine-loamy, kaolinitic, isothermic, Ustic Palehumults
- d. Date of examination : 15 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti , Soontorn Khamyong , Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 54' 9.6" N. 98° 52' 13.2" E. Sheet: 4746 I
- g. Elevation : 820 meters
- h. Landform :
- i. physiographic position : on concave slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Lower slope) steep (45%), N 60° W aspect
- j. Vegetation and Land-use : Under mixed deciduous forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from very fine sandstone.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : Fairly stony and very few rocks.
- f. Evidence of erosion : Moderate sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Forest fire caused by human.

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-5	Very dark grayish brown (10YR3/2) moist and dark brown (10YR4/3) dry, loam; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 6.2
A2	5-15/20	Very dark grayish brown (10YR3/2) moist and dark brown (10YR4/3) dry, loam; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.8
AB	15/20-35/40	Dark brown (7.5YR3/2) moist and brown (7.5YR4/4) dry, loam; weak medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.2
B1	35/40-60	Dark reddish brown (5YR3/4) moist and yellowish red (5YR5/6) dry, clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.0
B(t)2	60-100	Reddish brown (5YR4/4) moist and yellowish red (5YR4/6) dry, clay loam; moderate medium subangular blocky; slightly sticky to sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; abrupt, smooth boundary; pH 5.2
B(t)3	100-130	Reddish brown (2.5YR4/4) moist and red (2.5YR4/6) dry, clay loam; moderate medium subangular blocky; slightly sticky to plastic, slightly plastic, friable to firm moist, slightly hard dry; very few rounded stones (7.5-10.0 cm) of weathered very fine sandstone, no mineral fragments; abrupt, smooth boundary; pH 5.4
B4	130-155+	Reddish brown (2.5YR4/4) moist and red (2.5YR4/6) dry, sandy clay loam to clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; very few rounded stones (7.5-10.0 cm) of weathered very fine sandstone, no mineral fragments; pH 5.2

ANALYTICAL DATA FOR PEDON NO.12

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
12. (MDF-L)	0-5	A1	1.08	47.80	30.36	21.84	L	1.18	26.09
	5-15/20	A2	0.22	42.00	33.56	24.44	L	1.24	25.50
	15/20-35/40	AB	1.22	40.80	34.36	24.84	L	1.32	24.19
	35/40-60	Bt1	1.32	39.91	29.92	30.17	CL	1.41	23.48
	60-100	B(t)2	1.92	38.30	24.36	37.34	CL	1.29	23.32
	100-130	B(t)3	2.55	37.80	22.36	39.84	CL	1.16	24.73

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		i:1				Ratio	P	K	Ca	Mg	Na		
		H ₂ O	(%)				(ppm)	(me/100g soil)					
12. (MDF-L)	0-5	5.79	7.55	4.38	0.25	17.74	3.50	1.06	10.88	2.25	0.12	42.49	39.01
	5-15/20	5.61	4.79	2.78	0.17	16.44	1.32	0.78	7.07	2.17	0.10	36.48	29.30
	15/20-35/40	5.23	3.17	1.84	0.11	16.86	0.73	0.80	2.73	1.57	0.10	27.20	19.80
	35/40-60	5.13	2.35	1.37	0.09	16.07	0.52	0.62	1.45	0.86	0.09	13.72	22.50
	60-100	5.02	1.53	0.89	0.06	14.43	0.75	0.57	1.32	0.70	0.09	13.68	19.73
	100-130	5.11	1.31	0.76	0.06	13.37	0.67	0.55	1.31	0.74	0.09	13.65	19.49



(A)



(B)

Plate 12 Photographs showing soil profile number 12 (A) and associated topographic features (B)

Pedon No. 13**I. Information on the Site**

- a. Profile number : 13 (DEF-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 11 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 53' 0.0" N. 98° 52' 2.4" E. Sheet: 4746 I
- g. Elevation : 940 meters
- h. Land form :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Upper slope) steep (50%), S 60° W aspect
- j. Vegetation and Land-use : Under dry evergreen forest.
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature (°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Moderate sheet erosion and slight rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-5	Dark brown (10YR3/3) moist and brown (10YR5/3) dry, sandy clay loam; moderate fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; abrupt, smooth boundary; pH 5.2
A2	5-15/20	Dark brown (10YR4/3) moist and brown (10YR5/3) dry, clay loam; moderate medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, wavy boundary; pH 5.2
AB	15/20-40	Brown (7.5YR5/4) moist and light brown (7.5YR6/4) dry, clay; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks; no mineral fragments; clear, wavy boundary; pH 5.2
B1	40-65	Yellowish red (5YR5/6) moist and reddish yellow (5YR6/6) dry, clay; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.2
Bt2	65-100	Yellowish red (5YR5/6) moist and reddish yellow (5YR6/6) dry, clay; moderate medium subangular blocky; slightly sticky, slightly plastic, friable to firm moist, slightly hard dry; no rocks, very few angular quartz and flat muscovite gravel (0.3-1.0 cm); clear, smooth boundary; pH 5.4
B(t)3	100-140	Reddish yellow (5YR6/6) moist and reddish yellow (5YR7/6) dry, clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, very few angular quartz and flat muscovite gravel (0.3-1.0 cm); clear, smooth boundary; pH 5.2
B4	140-150+	Reddish yellow (5YR6/6) moist and reddish yellow (5YR7/6) dry, clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, few angular quartz and flat muscovite gravel (0.5-1.5 cm); pH 5.2

ANALYTICAL DATA FOR PEDON NO.13

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
13. (DEF-U)	0-5	A1	3.08	46.96	24.40	28.64	SCL	1.06	24.83
	5-15/20	A2	5.57	43.52	23.44	33.04	CL	1.16	22.11
	15/20-40	AB	8.48	39.80	20.40	39.80	CL	1.39	18.61
	40-65	Bt1	7.22	34.96	20.60	44.76	C	1.50	18.19
	65-100	Bt2	5.69	36.33	21.52	42.15	C	1.55	18.43
	100-140	B(t)3	12.05	37.36	23.00	39.64	CL	1.48	17.97

No.	Depth (cm)	pH 1:1 H ₂ O	OM (%)	OC (%)	N Ratio	C/N Ratio	Ext. P (ppm)	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS (%)	CEC (me/100gsoil)
13. (DEF-U)	0-5	5.10	5.34	3.10	0.19	16.01	5.39	0.63	2.14	0.99	0.11	17.30	27.42
	5-15/20	4.75	1.98	1.15	0.11	10.58	3.21	0.44	0.40	0.26	0.08	6.80	22.16
	15/20-40	4.79	0.99	0.58	0.06	9.31	2.53	0.37	0.29	0.22	0.07	7.54	17.58
	40-65	4.82	0.52	0.30	0.03	10.78	2.20	0.28	0.26	0.18	0.06	5.08	16.18
	65-100	4.94	0.27	0.16	0.02	7.33	2.01	0.19	0.38	0.15	0.05	5.28	15.50
	100-140	4.98	0.22	0.13	0.02	6.89	1.93	0.17	0.36	0.11	0.06	4.39	19.65



(A)



(B)

Plate 13 Photographs showing soil profile number 13 (A) and associated topographic features (B)

Pedon No. 14**I. Information on the Site**

- a. Profile number : 14 (DEF-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, kaolinitic, isothermic, Typic Paleustults
- d. Date of examination : 12 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 53' 0.0" N. 98° 52' 2.4" E. Sheet: 4746 I
- g. Elevation : 930 meters
- h. Land form :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Middle slope) steep (52%), S 70° W aspect
- j. Vegetation and Land-use : Under dry evergreen forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of groundwater table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Severe sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil.

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-5	Dark brown (10YR3/3) moist and brown (10YR5/3) dry, sandy clay loam; moderate medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; abrupt, smooth boundary; pH 5.8
A2	5-15	Dark brown (7.5YR4/4) moist and brown (7.5YR5/4) dry, clay loam; moderate medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
AB	15-30	Dark brown (7.5YR4/4) moist and brown (7.5YR5/4) dry, clay; moderate medium and coarse subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; no rocks, no mineral fragments; clear, smooth boundary; pH 5.4
Bt1	30-50	Yellowish red (5YR4/6) moist and yellowish red (5YR5/6) dry, clay; moderate coarse subangular blocky; slightly sticky to sticky, plastic, firm moist, slightly hard to hard dry; very few angular gravel (4.0-6.0 cm) of weathered gneiss, very few angular quartz gravel (0.5-2.0 cm); clear, wavy boundary; pH 5.2
Bt2	50-85	Yellowish red (5YR4/6) moist and yellowish red (5YR5/6) dry, clay; moderate coarse subangular blocky; slightly sticky to sticky, plastic, firm moist, slightly hard to hard dry; no rocks, very few angular quartz gravel (0.3-1.5 cm); clear, wavy boundary; pH 5.4
Bt3	85-110	Yellowish red (5YR4/8) moist and yellowish red (5YR5/8) dry, clay; moderate coarse subangular blocky; slightly sticky to sticky, plastic, firm moist, slightly hard to hard dry; no rocks, very few angular quartz gravel (0.2-1.0 cm); clear, wavy boundary; pH 5.6
B(t)4	110-140+	Yellowish red (5YR4/8) moist and yellowish red (5YR5/8) dry, clay; moderate coarse subangular blocky; slightly sticky to sticky, slightly plastic, firm moist, slightly hard dry; no rocks, few angular quartz gravel (0.5-3.0 cm); pH 5.6

ANALYTICAL DATA FOR PEDON NO.14

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
14. (DEF-M)	0-5	A1	0.00	48.96	25.40	25.64	SCL	1.08	25.92
	5-15	A2	1.44	41.26	27.80	30.94	CL	1.11	23.24
	15-30	AB	2.21	33.20	23.85	42.95	C	1.38	19.29
	30-50	Bt1	6.15	27.52	21.98	50.50	C	1.46	20.90
	50-85	Bt2	8.53	25.52	19.77	54.71	C	1.41	21.67
	85-110	Bt3	13.42	25.08	21.08	53.84	C	1.32	20.61
	110-140+	Bt4	15.68	26.52	22.28	51.20	C	1.34	20.16

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100g soil)
		1:1 H ₂ O		(%)		Ratio	P (ppm)	K	Ca	Mg	Na		
14. (DEF-M)	0-5	5.71	7.09	4.11	0.26	15.82	6.35	0.95	4.29	2.15	0.12	28.74	30.22
	5-15	5.23	2.74	1.59	0.10	15.47	2.80	0.68	0.87	0.85	0.09	15.57	18.24
	15-30	5.02	1.78	1.03	0.08	13.63	2.49	0.64	0.46	0.60	0.09	12.86	18.27
	30-50	4.97	1.24	0.72	0.06	12.64	2.29	0.58	0.37	0.57	0.09	9.39	17.12
	50-85	5.05	0.68	0.40	0.04	9.63	2.10	0.50	0.33	0.62	0.09	8.50	18.96
	85-110	5.29	0.50	0.29	0.03	10.83	2.02	0.56	0.25	0.33	0.08	8.08	17.65
	110-140+	5.30	0.47	0.27	0.02	10.87	1.93	0.60	0.27	0.21	0.09	4.95	23.93



(A)



(B)

Plate 14 Photographs showing soil profile number 14 (A) and associated topographic features (B)

Pedon No. 15**I. Information on the Site**

- a. Profile number : 15 (DEF-L)
 b. Soil series : Unknown
 c. Higher category classification :
 FAO : Dystric Cambisols
 USDA : Fine loamy, mix, isothermic Typic Dystrustepts
 d. Date of examination : 12 March 1997
 e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
 f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
 Approximately 18° 53' 0.0" N. 98° 52' 2.4" E. Sheet: 4746 I
 g. Elevation : 900 meters
 h. Land form :
 i. physiographic position : on convex slope
 ii. surrounding land form : mountainous
 iii. microtopography : nil
 i. Slope on which profile is sited : (Lower slope) very steep (80%), N 80° W aspect
 j. Vegetation and Land-use : Under dry evergreen forest
 : Land is also used for the watershed forest protected area.
 k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained to somewhat excessively drained.
- c. Moisture condition in profile : Dry throughout.
- d. Depth of groundwater table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and very few rocks.
- f. Evidence of erosion : Severe sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil.

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-7/15	Dark brown (10YR4/3) moist and brown (10YR5/3) dry, sandy clay loam; moderate medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, wavy boundary; pH 5.8
AB	7/15-30/35	Dark yellowish brown (10YR4/4) moist and yellowish brown (10YR5/4) dry, sandy clay loam; moderate medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, no mineral fragments; clear, wavy boundary; pH 5.4
Bw1	30/35-55	Brown (7.5YR5/4) moist and strong brown (7.5YR5/6) dry, sandy clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, few angular quartz and flat mica gravel (0.3-2.0 cm); clear, wavy boundary; pH 5.4
Bw2	55-70	Brown (7.5YR5/4) moist and strong brown (7.5YR5/6) dry, sandy clay loam; weak fine and medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; no rocks, frequent angular quartz and flat mica gravel (0.2-3.0 cm); clear, smooth boundary; pH 5.6
Bw3	70-85/90	Light brown (7.5YR6/4) moist and pink (7.5YR7/4) dry, sandy loam; weak fine and medium subangular blocky; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; very few angular gravel (2.0-5.0 cm) of a strongly weathered gneiss and schist, frequent angular quartz and flat mica gravel (0.2-2.0 cm); clear, wavy boundary; pH 5.8
BC1	85/90-125	Yellowish brown (10YR5/4) moist and light yellowish brown (10YR6/4) dry, sandy loam; weak medium subangular blocky; slightly sticky, slightly plastic, very friable moist, slightly hard dry; few angular stones (8.0-10.0 cm) of a strongly weathered schist, few angular quartz and flat mica gravel (0.2-2.0 cm); gradual, wavy boundary; pH 5.6
BC2	125-160	Yellowish brown (10YR5/4) moist and light yellowish brown (10YR6/4) dry, sandy loam; weak medium subangular blocky; slightly sticky, slightly plastic, very friable moist, slightly hard dry; few angular stones (15.0-25.0 cm) of a strongly weathered gneiss, few angular quartz and flat mica gravel (0.2-2.0 cm); gradual, wavy boundary; pH 5.6
CB	160-175+	Brown (10YR5/3) moist and pale brown (10YR6/3) dry, loamy sand; weak fine subangular blocky ; non sticky to slightly sticky, non plastic to slightly plastic, very friable, slightly hard dry; very frequent angular boulders (more than 25.0 cm) of a strongly weathered gneiss, few angular quartz and flat mica gravel (0.2-3.0 cm); pH 5.4

ANALYTICAL DATA FOR PEDON NO.15

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
15. (DEF-L)	0-7/15	A1	6.79	50.98	26.64	22.38	SCL	1.02	26.61
	7/15-30/35	AB	12.69	52.21	23.14	24.65	SCL	1.24	19.78
	30/35-55	Bw1	24.54	56.15	20.38	23.47	SCL	1.19	14.32
	55-70	Bw2	39.63	56.85	21.48	21.67	SCL	1.30	14.23
	70-85/90	Bw3	39.56	59.43	21.28	19.29	SL	1.41	12.30
	85/90-125	BC1	24.81	59.45	23.28	17.27	SL	1.54	17.96

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1			Ratio	P	K	Ca	Mg	Na			
		H ₂ O	(%)			(ppm)	(me/100g soil)						
15. (DEF-L)	0-7/15	5.21	3.32	1.93	0.15	12.79	5.99	0.47	2.67	1.08	0.08	23.02	22.87
	7/15-30/35	5.01	1.18	0.68	0.07	10.49	3.15	0.42	0.43	0.55	0.07	10.68	15.14
	30/35-55	5.08	0.75	0.44	0.04	11.27	2.78	0.47	0.37	0.44	0.08	12.19	12.67
	55-70	5.05	0.47	0.27	0.02	11.87	3.00	0.43	0.34	0.33	0.07	13.71	10.12
	70-85/90	5.18	0.31	0.18	0.01	12.83	2.85	0.37	0.33	0.28	0.07	8.79	13.83
	85/90-125	5.33	0.26	0.15	0.01	13.82	3.53	0.39	0.29	0.23	0.07	5.91	20.32



(A)



(B)

Plate 15 Photographs showing soil profile number 15 (A) and associated topographic features (B)

Pedon No. 16**I. Information on the Site**

- a. Profile number : 16 (HEF-U)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, mix, thermic, Ustic Palehumults
- d. Date of examination : 18 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 52' 6.0" N. 98° 52' 0.0" E. Sheet: 4746 I
- g. Elevation : 1,130 meters
- h. Land form :
- i. physiographic position : on convex slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Upper slope) very steep (58%), N 25°E aspect
- j. Vegetation and Land-use : Under hill evergreen forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently derived "in situ" from deeply weathered Ortho-Paragneiss rocks.
- b. Drainage : Well drained.
- c. Moisture condition in profile : Top 60/63 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Severe sheet erosion and moderate rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-7	Dark brown (10YR3/3) moist and brown (10YR5/3) dry, sandy clay loam; moderate fine granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, smooth boundary; pH 5.8
AB	7-20	Dark reddish brown (5YR3/4) moist and brown (7.5YR4/4) dry, clay loam; weak medium granular; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, smooth boundary; pH 5.4
Bt1	20-40	Yellowish red (5YR4/6) moist and yellowish red (5YR4/8) dry, clay; moderate medium subangular blocky; sticky, plastic, firm moist, slightly hard dry; clear, smooth boundary; pH 5.2
Bt2	40-60/63	Yellowish red (5YR4/8) moist and yellowish red (5YR5/8) dry, clay; moderate coarse subangular blocky; sticky, plastic to very plastic, firm moist, slightly hard to hard dry; clear, wavy boundary; pH 5.0
Bt3	60/63-89/95	Red (2.5YR4/6) moist, clay; moderate coarse subangular blocky; sticky, plastic, firm moist; clear, wavy boundary; pH 5.0
Bt4	89/95-125	Red (2.5YR4/6) moist, clay; weak medium subangular blocky; sticky, plastic, firm moist; clear, smooth boundary; pH 5.2
B(t)5	125-145+	Red (2.5YR4/6) moist, clay; weak medium subangular blocky; sticky, plastic, friable to firm moist; pH 5.2

ANALYTICAL DATA FOR PEDON NO.16

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
16. (HEF-U)	0-7	A	10.22	43.79	25.02	31.19	CL	0.79	41.11
	7-20	AB	9.67	37.31	26.44	36.25	CL	0.74	37.13
	20-40	Bt1	6.37	29.08	21.44	49.48	C	0.92	32.72
	40-60/63	Bt2	4.00	29.22	20.30	50.48	C	0.98	28.25
	60/63-89/95	Bt3	3.59	32.65	18.05	49.30	C	1.22	27.68
	89/95-125	Bt4	3.00	35.08	19.71	45.21	C	1.28	24.06
	125-145+	Bt5	2.97	35.08	20.44	44.48	C	1.31	23.40

No.	Depth (cm)	pH 1:1 H ₂ O	OM (%)	OC (%)	N	C/N Ratio	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
							P	K	Ca	Mg	Na		
							(ppm)		(me/100g soil)				
16. (HEF-U)	0-7	5.28	10.31	5.98	0.30	20.19	21.29	1.06	3.81	0.85	0.11	23.45	24.80
	7-20	5.19	6.72	3.90	0.21	18.81	9.82	0.69	1.45	0.37	0.09	13.84	19.58
	20-40	4.95	3.45	2.00	0.11	18.12	3.67	0.39	0.31	0.08	0.06	8.93	13.95
	40-60/63	4.78	2.06	1.19	0.07	16.67	2.33	0.23	0.21	0.06	0.05	5.26	12.09
	60/63-89/95	4.72	1.41	0.82	0.04	19.50	2.40	0.15	0.20	0.05	0.03	5.15	11.08
	89/95-125	4.81	0.86	0.50	0.03	18.77	1.63	0.11	0.19	0.05	0.03	3.77	15.25
	125-145+	4.83	0.78	0.45	0.02	18.79	1.35	0.11	0.19	0.05	0.04	3.40	17.00



(A)



(B)

Plate 16 Photographs showing soil profile number 16 (A) and associated topographic features (B)

Pedon No. 17**I. Information on the Site**

- a. Profile number : 17 (HEF-M)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine, mix, thermic, Ustic Palehumults
- d. Date of examination : 18 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden. Amphoe Mae Rim. Changwat Chiang Mai.
- Approximately 18° 52' 6.0" N. 98° 52' 0.0" E. Sheet: 4746 I
- g. Elevation : 1,110 meters
- h. Land form :
- i. physiographic position : on straight slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- I. Slope on which profile is sited : (Middle slope) very steep (72%), N 35°E aspect
- j. Vegetation and Land-use : Under hill evergreen forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature (°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss rocks.
- b. Drainage : Well drained to somewhat excessively drained .
- c. Moisture condition in profile : Top 80/85 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Slight sheet erosion and slight rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A1	0-5	Very dark grayish brown (10YR3/2) moist and dark grayish brown (10YR5/3) dry, sandy loam; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; moderate fine granular; abrupt, smooth boundary; pH 6.6
A2	5-20	Very dark grayish brown (10YR3/2) moist and brown (10YR4/3) dry, sandy loam; weak medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; clear, smooth boundary; pH 5.6
AB	20-45	Dark brown (7.5YR3/2) moist and brown (7.5YR4/4) dry, sandy loam; weak medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; clear, smooth boundary; pH 5.4
B1	45-80/85	Dark reddish brown (5YR3/4) moist and reddish brown (5YR4/4) dry, sandy clay loam; moderate coarse subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, wavy boundary; pH 5.2
B(t)2	80/85-105	Dark reddish brown (5YR3/4) moist, clay loam; moderate coarse subangular blocky; slightly sticky to plastic, slightly plastic, friable moist; clear, smooth boundary; pH 5.2
B(t)3	105-132	Yellowish red (5YR4/6) moist, clay; weak medium subangular blocky; sticky, plastic, friable to firm moist; clear, smooth boundary; pH 5.2
B(t)4	132-153+	Yellowish red (5YR4/6) moist, clay loam; slightly sticky, slightly plastic to plastic, friable to friable moist; weak medium subangular blocky; slightly sticky, slightly plastic to plastic, very friable to friable moist, slightly hard dry; pH 5.2

ANALYTICAL DATA FOR PEDON NO.17

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
17. (HEF-M)	0-5	A1	4.46	73.08	14.44	12.48	SL	0.72	51.98
	5-20	A2	5.62	68.08	19.77	12.15	SL	0.84	47.55
	20-45	AB	2.90	65.74	18.02	16.24	SL	0.77	40.01
	45-80/85	Bt1	3.10	51.36	21.83	26.81	SCL	0.94	33.88
	80/85-105	Bt2	4.11	44.47	18.14	37.39	CL	1.18	25.09
	105-132	Bt3	7.80	41.36	17.36	41.28	C	1.23	22.62

No.	Depth (cm)	pH	OM	OC	N	C/N	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
		1:1					P	K	Ca	Mg	Na		
		H ₂ O	(%)				(ppm)	(me/100g soil)					
17. (HEF-M)	0-5	6.09	12.50	7.25	0.43	16.83	22.83	1.85	12.33	2.72	0.19	43.63	43.53
	5-20	5.26	6.79	3.94	0.27	14.75	9.67	0.81	0.57	0.28	0.11	12.55	17.49
	20-45	5.15	4.32	2.51	0.15	16.30	4.63	0.49	0.22	0.10	0.08	6.83	12.59
	45-80/85	4.97	2.48	1.44	0.09	16.66	2.83	0.45	0.16	0.07	0.07	7.92	12.01
	80/85-105	4.91	1.52	0.88	0.05	16.83	2.14	0.37	0.14	0.08	0.06	4.73	15.32
	105-132	4.90	1.16	0.67	0.04	15.54	2.03	0.38	0.15	0.08	0.06	4.40	16.80



(A)



(B)

Plate 17 Photographs showing soil profile number 17 (A) and associated topographic features (B)

Pedon No. 18**I. Information on the Site**

- a. Profile number : 18 (HEF-L)
- b. Soil series : Unknown
- c. Higher category classification :
- FAO : Humic Alisols
- USDA : Fine-loamy, mix, thermic, Ustic Palehumults
- d. Date of examination : 18 March 1997
- e. Author : Chaturong Laorpansakul, Dusit Manajuti, Soontorn Khamyong, Niwat Anongrak
- f. Location : Queen Sirikit Botanic Garden, Amphoe Mae Rim, Changwat Chiang Mai.
- Approximately 18° 52' 6.0" N, 98° 52' 0.0" E. Sheet: 4746 I
- g. Elevation : 1,080 meters
- h. Land form :
- i. physiographic position : on concave slope
- ii. surrounding land form : mountainous
- iii. microtopography : nil
- i. Slope on which profile is sited : (Lower slope) very steep (65%), N 25°E aspect
- j. Vegetation and Land-use : Under hill evergreen forest
- : Land is also used for the watershed forest protected area.
- k. Climate : Data derived from Nong Hoy Highland Agricultural Research meteorological station.

Average of 10 years (1990- 1999)

Month	JAN	FEB	MAR	API	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Mean monthly rainfall (mm.)	1.1	10.1	15.0	77.5	187.7	147.7	222.9	280.2	228.6	132.7	55.6	10.8
Mean monthly temperature(°C)	18.0	20.2	23.5	25.2	25.1	24.8	24.9	24.3	24.1	22.9	20.7	18.0

Mean annual rainfall : 1368.0 mm.

Mean annual temperature : 22.6 °C

II. General Information on the Soil

- a. Parent material : Apparently residual and colluvial material derived from Ortho-Paragneiss rocks.
- b. Drainage : Well drained to somewhat excessively drained .
- c. Moisture condition in profile : Top 75 centimeters of profile dry, moist below.
- d. Depth of ground water table : Nil.
- e. Presence of surface stones and rock outcrops : No stones and no rocks.
- f. Evidence of erosion : Slight sheet erosion and slight rill erosion.
- g. Presence of salt or alkali : Nil.
- h. Human influence : Nil

III. Profile Description

Horizon	Depth (cm.)	Description
A	0-10	Dark brown (7.5YR3/2) moist and brown (10YR4/3) dry, sandy loam; moderate medium granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; abrupt, smooth boundary; pH 5.6
AB	10-25	Dark brown (7.5YR3/2) moist and brown (10YR4/3) dry, sandy clay loam; weak fine granular; slightly sticky, slightly plastic, very friable to friable moist, slightly hard dry; clear, smooth boundary; pH 5.2
Bt1	25-50/55	Reddish brown (5YR4/4) moist and yellowish red (5YR5/6) dry, sandy clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, wavy boundary; pH 5.0
Bt2	50/55-75	Yellowish red (5YR4/8) moist and yellowish red (5YR5/6) dry, sandy clay loam; moderate medium subangular blocky; slightly sticky, slightly plastic, friable moist, slightly hard dry; clear, wavy boundary; pH 5.0
Bt3	75-108/113	Yellowish red (5YR4/8) moist, sandy clay loam; weak fine subangular blocky; slightly sticky, slightly plastic, friable moist; clear, wavy boundary; pH 5.4 (Sample number 155)
Bt4	108/113-152+	Yellowish red (5YR4/8) moist, sandy clay loam; weak fine subangular blocky; slightly sticky, slightly plastic, friable moist; pH 5.2

ANALYTICAL DATA FOR PEDON NO.18

No.	Depth (cm.)	Horizon	Gravel (%)	Particle Size Distribution (%)			Texture Class	Bulk Density (g/cc)	Field Capacity (%)
				Sand	Silt	Clay			
18. (HEF-L)	0-10	A	11.23	68.86	17.36	13.78	SL	1.13	25.47
	10-25	AB	10.45	50.36	22.36	27.28	SCL	1.25	22.38
	25-50/55	Bt1	10.91	48.36	20.36	31.28	SCL	1.38	19.99
	50/55-75	Bt2	16.80	48.36	20.36	31.28	SCL	1.30	18.63
	75-108/113	Bt3	24.99	49.54	17.19	33.27	SCL	1.46	19.92
	108/113-152+	Bt4	24.97	52.36	15.36	32.28	SCL	1.46	21.12

No.	Depth (cm)	pH 1:1 H ₂ O	OM (%)	OC (%)	N	C/N Ratio	Ext.	Ext.	Ext.	Ext.	Ext.	BS (%)	CEC (me/100gsoil)
							P (ppm)	K	Ca	Mg	Na		
18. (HEF-L)	0-10	5.11	5.49	3.19	0.20	16.15	5.08	0.83	2.27	0.80	0.11	21.33	19.07
	10-25	4.83	2.90	1.68	0.11	15.45	2.89	0.63	0.55	0.44	0.09	13.43	14.15
	25-50/55	4.62	2.01	1.17	0.08	15.15	2.03	0.52	0.35	0.41	0.08	12.29	11.72
	50/55-75	4.66	1.26	0.73	0.06	12.95	1.67	0.51	0.24	0.33	0.08	9.28	12.48
	75-108/133	5.72	0.97	0.56	0.05	11.26	1.89	0.68	0.24	0.37	0.10	9.02	15.10
	108/133-152+	4.96	0.69	0.40	0.04	11.07	1.83	0.58	0.19	0.30	0.08	8.38	14.19



(A)



(B)

Plate 18 Photographs showing soil profile number 18 (A) and associated topographic features (B)

ภาคผนวก ข.

ตารางภาคผนวกที่ 1-5

มหาวิทยาลัยเชียงใหม่
Chiang Mai University

ตารางภาคผนวกที่ 1 สมบัติทางเคมีของดินป่าไม้ (ครั้งที่ 1 เดือนมีนาคม 2540) บริเวณสวนพฤกษศาสตร์สมเด็จพระนางเจ้าสิริกิติ์ จังหวัดเชียงใหม่

Sample No.	Depth (cm.)	pH	OM	OC	N	C/N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS	CEC
		1:1 H ₂ O	(%)	(%)		ratio	(ppm.)		(me/100g soil)	(%)	(me/100g soil)		
1. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (940-980 ม. MSL)													
1. (บน)	0-3	5.77	6.22	3.61	0.18	20.16	18.55	0.58	3.05	1.21	0.06	28.47	19.30
	3-10	5.25	4.25	2.46	0.13	19.21	10.69	0.40	1.32	0.59	0.05	21.63	12.87
	10-30	5.09	1.51	0.87	0.06	13.97	5.85	0.19	0.16	0.14	0.03	4.16	19.24
	30-50	5.47	0.48	0.28	0.04	7.14	4.78	0.10	0.16	0.09	0.02	2.48	23.76
	50-78	5.58	0.25	0.14	0.04	3.69	4.93	0.09	0.16	0.09	0.02	2.00	26.66
	78-117	5.72	0.37	0.21	0.03	6.43	4.81	0.05	0.22	0.09	0.02	2.29	23.52
2. (กลาง)	0-3/6	5.66	6.68	3.87	0.14	27.29	9.85	0.81	2.19	1.54	0.06	27.75	18.69
	3/6-18	5.99	2.64	1.53	0.08	19.30	7.91	0.41	0.38	0.51	0.04	6.74	25.63
	18-38	5.45	1.03	0.60	0.05	12.12	5.19	0.28	0.31	0.38	0.03	5.59	22.68
	38-72	5.37	0.61	0.35	0.04	9.24	5.68	0.23	0.22	0.24	0.03	3.91	25.45
	72-106	5.60	0.38	0.22	0.03	6.57	5.38	0.19	0.25	0.15	0.03	4.23	21.72
	106-140	5.50	0.29	0.17	0.03	4.95	7.10	0.22	0.31	0.16	0.03	4.23	23.28
3. (ล่าง)	0-5	5.67	6.28	3.64	0.19	18.97	10.00	0.88	0.94	1.11	0.04	15.92	21.45
	5-15/20	5.00	2.71	1.57	0.11	13.96	5.86	0.47	0.31	0.32	0.04	7.46	19.50
	15/20-55	5.19	0.90	0.52	0.04	11.87	5.63	0.38	0.21	0.15	0.03	3.79	27.98
	55-95	5.38	0.43	0.25	0.03	7.28	5.11	0.29	0.33	0.15	0.02	5.91	16.76
	95-125	5.45	0.15	0.09	0.03	2.76	6.59	0.22	0.30	0.17	0.02	7.25	12.66
2. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (990-1,015 ม. MSL)													
1. (บน)	0-5	5.51	8.82	5.12	0.16	32.38	13.00	0.48	1.88	0.89	0.04	15.50	23.39
	5-17/20	4.97	2.99	1.73	0.07	23.72	3.74	0.36	0.27	0.27	0.04	8.43	15.07
	17/20-45	5.18	1.58	0.91	0.05	19.34	2.43	0.31	0.18	0.18	0.04	6.18	16.65
	45-73	5.46	0.93	0.54	0.04	15.05	1.63	0.25	0.13	0.14	0.04	4.03	21.67
	73-105/110	5.79	0.65	0.38	0.03	11.85	1.20	0.25	0.30	0.18	0.04	4.14	26.02
	105/110-130+	5.83	0.70	0.41	0.04	11.60	1.20	0.23	0.25	0.19	0.04	3.72	27.47
2. (กลาง)	0-5	5.12	6.10	3.54	0.15	24.40	6.00	0.45	0.75	0.52	0.04	14.41	14.76
	5-33	4.99	1.94	1.12	0.06	18.19	2.71	0.28	0.15	0.18	0.04	3.19	30.27
	33-57	5.58	0.91	0.53	0.03	17.54	1.18	0.22	0.13	0.15	0.04	2.80	30.51
	57-82	5.87	0.60	0.35	0.03	13.66	0.96	0.21	0.13	0.09	0.04	3.67	21.08
	82-100/110	5.84	0.64	0.37	0.02	16.86	0.74	0.22	0.11	0.06	0.04	2.78	26.73
	100/110-144+	5.66	0.53	0.31	0.02	13.97	1.60	0.14	0.06	0.06	0.03	4.12	14.44
3. (ล่าง)	0-5	6.14	6.16	3.57	0.16	22.61	16.00	1.05	2.19	1.75	0.05	33.16	16.64
	5-20	5.68	3.22	1.87	0.07	27.60	6.50	0.67	0.29	0.34	0.05	18.66	9.42
	20-48	5.15	1.22	0.71	0.05	15.50	6.89	0.50	0.13	0.16	0.04	8.72	13.70
	48-75/80	5.36	0.72	0.42	0.04	10.48	1.60	0.42	0.09	0.17	0.04	4.99	21.33
	75/80-120/125	5.68	0.55	0.32	0.03	10.08	1.08	0.37	0.06	0.21	0.04	4.69	21.85
	120/125-160+	5.71	0.54	0.31	0.03	10.10	1.05	0.35	0.06	0.25	0.04	5.27	19.78
3. ป่าเต็งรังที่มีไม้พวงเป็นพันธุ์ไม้เด่น													
1. (บน)	0-4	5.66	5.74	3.33	0.17	19.94	5.50	0.65	5.50	1.02	0.06	35.72	21.67
	4-12	5.21	2.89	1.68	0.09	18.11	2.09	0.35	1.84	0.70	0.03	9.63	33.21
	12-38	5.67	1.20	0.70	0.05	14.45	0.84	0.37	0.74	0.31	0.04	5.05	35.63
	38-57	5.88	0.70	0.40	0.03	14.72	0.50	0.27	0.96	0.30	0.04	4.39	42.88
	57-80	5.94	0.70	0.40	0.03	15.53	0.50	0.21	1.00	0.39	0.03	4.58	42.21
	80-109	5.95	0.58	0.34	0.02	16.25	0.88	0.09	1.18	0.33	0.03	5.53	34.54
	109-133+	5.92	0.54	0.31	0.02	17.40	0.50	0.06	1.31	0.29	0.03	5.88	33.24
2. (กลาง)	0-2	7.04	8.70	5.05	0.22	22.94	15.00	1.05	8.44	2.29	0.05	54.66	22.45
	2-10/13	5.77	4.22	2.45	0.13	19.41	5.46	0.64	3.20	1.24	0.04	21.63	25.53
	10/13-28	5.46	1.44	0.83	0.06	15.06	0.78	0.41	0.50	0.53	0.04	5.46	33.97
	28-53	5.73	0.98	0.57	0.04	13.53	0.50	0.29	0.47	0.40	0.04	4.03	37.81
	53-77	5.82	0.81	0.47	0.03	13.97	0.50	0.20	0.61	0.42	0.03	4.01	39.35
	77-122/130	5.88	0.57	0.33	0.02	13.74	0.27	0.13	0.81	0.48	0.03	5.00	34.52
	122/130-148+	5.92	0.43	0.25	0.02	11.34	0.25	0.12	0.88	0.46	0.03	6.02	29.36
3. (ล่าง)	0-5	6.11	8.29	4.81	0.28	17.11	31.00	0.63	7.50	2.03	0.05	41.51	25.59
	5-17	4.93	2.94	1.70	0.09	18.25	5.33	0.33	0.97	0.64	0.04	9.31	24.77
	17-25/30	5.24	1.76	1.02	0.07	15.55	2.04	0.41	1.13	0.55	0.04	8.05	30.68
	25/30-55	5.64	1.23	0.71	0.05	14.27	0.75	0.46	1.40	0.44	0.04	7.41	36.45
	55-92	6.08	0.71	0.41	0.03	13.37	0.42	0.38	2.06	0.50	0.04	7.54	44.06
	92-120	6.14	0.59	0.34	0.02	15.80	0.25	0.25	2.04	0.59	0.04	10.03	32.23
	120-138+	6.14	0.56	0.32	0.02	16.24	0.25	0.24	2.00	0.60	0.04	11.23	28.42

ตารางภาคผนวกที่ 1 (ต่อ)

Sample No.	Depth (cm.)	pH 1:1	OM	OC	N	C/N ratio	Ext. P (ppm.)	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS (%)	CEC (me/100g soil)
4. ป่าเบญจพรรณ													
1. (บน)	0-3/5	5.78	8.88	5.15	0.29	17.76	5.50	1.01	8.50	2.06	0.07	40.39	30.46
	3/5-16	5.20	4.95	2.87	0.20	14.42	2.40	0.87	3.51	0.99	0.07	20.24	29.86
	16-40	4.94	2.53	1.47	0.10	14.57	1.14	0.42	0.50	0.26	0.04	5.24	30.70
	40-65	5.11	1.95	1.13	0.07	15.30	0.50	0.36	0.28	0.13	0.04	4.57	25.39
	65-87	5.17	1.81	1.05	0.07	14.96	0.50	0.40	0.38	0.08	0.04	4.76	27.26
	87-135+	5.24	1.56	0.90	0.07	12.93	0.50	0.39	0.38	0.06	0.04	3.87	32.97
2. (กลาง)	0-2	6.13	11.08	6.43	0.34	19.01	7.50	1.34	10.00	2.86	0.08	55.67	27.00
	2-16	5.66	6.91	4.01	0.26	15.38	3.63	1.29	3.86	1.70	0.08	28.89	26.52
	16-30	5.07	4.51	2.62	0.17	15.46	1.32	0.83	1.14	0.56	0.07	15.05	21.26
	30-40/50	4.98	3.69	2.14	0.13	16.11	1.23	0.53	0.83	0.30	0.05	11.32	19.47
	40/50-90	5.32	3.65	2.12	0.13	16.23	2.00	0.56	2.30	0.62	0.05	16.54	24.18
3. (ล่าง)	0-5	6.21	8.09	4.69	0.26	18.12	4.50	1.37	9.38	2.50	0.09	45.68	30.93
	5-15/20	5.73	4.71	2.73	0.18	14.96	1.27	0.79	6.65	2.26	0.07	45.76	22.64
	15/20-35/40	5.30	3.49	2.02	0.13	15.73	0.57	0.82	2.54	1.45	0.06	22.18	24.59
	35/40-60	5.38	2.64	1.53	0.10	15.30	0.50	0.63	1.24	0.84	0.06	16.13	20.52
	60-100	5.14	1.82	1.05	0.07	15.48	0.50	0.55	1.16	0.71	0.05	13.85	21.35
100-130	5.18	1.63	0.95	0.07	14.33	0.50	0.55	1.19	0.77	0.05	13.77	21.98	
5. ป่าดิบแล้ง													
1. (บน)	0-5	5.16	4.62	2.68	0.17	15.58	7.18	0.55	0.86	0.83	0.05	18.17	15.20
	5-15/20	5.14	1.85	1.07	0.08	13.41	4.94	0.45	0.50	0.31	0.05	11.97	15.05
	15/20-40	5.26	0.68	0.40	0.05	8.01	4.86	0.37	0.47	0.29	0.04	11.54	13.24
	40-65	5.25	0.55	0.32	0.04	8.19	4.71	0.27	0.34	0.23	0.03	7.07	16.66
	65-100	5.35	0.29	0.17	0.03	5.58	4.81	0.18	0.47	0.19	0.03	7.23	15.24
	100-140	5.22	0.25	0.15	0.02	6.04	4.80	0.14	0.47	0.13	0.02	6.07	16.27
2. (กลาง)	0-5	5.95	7.30	4.23	0.28	15.29	7.55	0.82	1.88	2.31	0.07	33.03	17.35
	5-15	5.51	2.67	1.55	0.10	15.69	4.90	0.59	1.13	1.03	0.07	31.69	10.85
	15-30	5.38	1.66	0.96	0.09	11.00	4.97	0.59	0.65	0.80	0.06	22.23	12.13
	30-50	5.32	1.17	0.68	0.06	10.52	4.88	0.54	0.55	0.74	0.06	11.70	20.49
	50-85	5.36	0.59	0.34	0.05	7.07	4.79	0.46	0.58	0.70	0.05	8.70	25.93
	85-110	5.62	0.58	0.34	0.04	8.54	4.77	0.54	0.31	0.35	0.03	6.08	24.80
3. (ล่าง)	110-140+	5.61	0.58	0.34	0.04	9.09	4.80	0.54	0.31	0.23	0.03	5.25	26.75
	0-7/15	5.66	3.52	2.04	0.18	11.46	10.65	0.48	2.45	1.24	0.04	33.28	13.58
	7/15-30/35	5.35	1.41	0.82	0.10	8.48	7.04	0.34	0.60	0.74	0.03	18.11	10.93
	30/35-55	5.45	0.80	0.47	0.07	7.17	5.67	0.44	0.47	0.54	0.05	23.62	8.19
	55-70	5.54	0.61	0.35	0.04	8.45	6.33	0.49	0.52	0.43	0.05	30.52	6.43
	70-85/90	5.68	0.38	0.22	0.03	7.36	6.04	0.48	0.45	0.38	0.06	20.42	9.18
85/90-125	5.63	0.27	0.15	0.02	7.25	8.08	0.46	0.26	0.32	0.06	13.07	12.17	
6. ป่าดิบเขา													
1. (บน)	0-7	5.69	9.73	5.65	0.28	20.04	24.14	1.05	2.79	0.99	0.05	25.52	20.85
	7-20	5.33	5.78	3.35	0.17	19.47	9.50	0.52	0.42	0.20	0.04	8.90	17.51
	20-40	5.19	2.32	1.35	0.10	13.87	3.00	0.25	0.13	0.04	0.04	3.50	21.82
	40-60/63	5.01	1.83	1.06	0.09	11.51	2.93	0.14	0.13	0.06	0.03	4.47	14.09
	60/63-89/95	5.10	1.35	0.79	0.05	15.89	2.20	0.12	0.13	0.06	0.03	4.18	14.84
	89/95-125	5.19	0.84	0.49	0.03	14.31	1.40	0.08	0.13	0.04	0.03	1.96	28.02
	125-145+	5.21	0.76	0.44	0.03	14.22	1.05	0.08	0.13	0.04	0.03	1.64	32.66
2. (กลาง)	0-5	6.62	12.00	6.96	0.35	19.83	25.50	1.86	12.50	2.60	0.06	63.64	27.63
	5-20	5.56	6.77	3.92	0.28	14.19	12.67	0.92	0.67	0.34	0.05	9.67	24.80
	20-45	5.43	3.87	2.25	0.15	14.53	4.70	0.39	0.38	0.12	0.04	9.54	13.31
	45-80/85	5.17	2.56	1.48	0.09	16.80	3.20	0.39	0.23	0.09	0.04	8.87	11.93
	80/85-105	5.22	1.41	0.82	0.06	14.32	2.69	0.31	0.13	0.08	0.04	5.66	15.63
	105-132	5.13	1.13	0.66	0.04	16.39	1.60	0.35	0.13	0.08	0.04	3.86	24.21
	0-10	5.60	6.31	3.66	0.21	17.37	7.75	1.08	2.91	1.04	0.05	30.69	17.98
3. (ล่าง)	10-25	5.14	2.81	1.63	0.11	14.49	3.00	0.75	0.65	0.55	0.04	24.99	9.58
	25-50/55	4.64	1.74	1.01	0.07	13.85	1.77	0.51	0.32	0.42	0.04	20.07	8.38
	50/55-75	4.75	1.16	0.67	0.06	11.57	1.83	0.49	0.15	0.30	0.04	12.57	10.63
	75-108/133	6.16	0.93	0.54	0.06	9.68	2.17	0.77	0.19	0.41	0.05	11.04	17.04
108/133-152+	5.29	0.80	0.46	0.04	10.55	2.50	0.56	0.13	0.29	0.04	7.94	17.58	

ตารางภาคผนวกที่ 2 สมบัติทางเคมีของดินป่าไม้ (ครั้งที่ 2 เดือนสิงหาคม 2540) บริเวณสวนพฤกษศาสตร์สมเด็จพระนางเจ้าสิริกิติ์ จังหวัดเชียงใหม่

Sample No.	Depth (cm.)	pH	OM	OC	N	C/N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS	CEC
		1:1	H ₂ O			ratio	me/100g soil			(me/100g soil)			
			%				ppm.			%			
1. ป่าเต็งรังที่มีไม้ทิ้งเป็นพื้นดิน (940-980 ม. MSL)													
1.	0-3	5.03	4.84	2.81	0.08	35.16	5.50	0.62	2.75	0.94	0.11	28.54	18.91
(บน)	3-10	4.67	3.18	1.84	0.07	26.38	4.07	0.44	1.10	0.46	0.07	16.42	16.42
	10-30	4.51	1.12	0.65	0.03	21.68	1.50	0.23	0.44	0.15	0.03	10.32	11.04
	30-50	4.90	0.38	0.22	0.01	18.36	1.00	0.14	0.41	0.10	0.02	8.93	9.08
	50-78	5.09	0.20	0.12	0.01	22.69	1.00	0.10	0.25	0.10	0.01	6.85	8.23
	78-117	5.18	0.12	0.07	0.00	143.62	0.78	0.05	0.28	0.09	0.01	4.35	12.15
2.	0-3/6	4.44	4.90	2.84	0.14	20.37	6.50	0.94	1.38	1.13	0.14	20.37	23.81
(กลาง)	3/6-18	4.71	1.59	0.92	0.05	17.33	2.54	0.51	0.25	0.52	0.09	13.78	16.11
	18-38	4.56	0.91	0.53	0.03	15.28	1.10	0.34	0.24	0.42	0.08	11.21	15.80
	38-72	4.85	0.45	0.26	0.02	13.96	1.00	0.26	0.19	0.20	0.06	8.91	13.54
	72-106	5.07	0.26	0.15	0.01	11.77	1.00	0.22	0.19	0.14	0.05	7.05	14.32
	106-140	4.94	0.36	0.21	0.02	13.22	1.00	0.24	0.19	0.16	0.05	8.14	13.89
3.	0-5	4.52	5.40	3.13	0.20	15.39	12.00	0.95	1.50	0.85	0.14	16.37	28.80
(ล่าง)	5-15/20	4.47	2.21	1.28	0.10	13.40	4.00	0.51	0.19	0.27	0.10	9.89	19.69
	15/20-55	4.56	0.62	0.36	0.03	11.64	1.80	0.45	0.19	0.17	0.09	9.59	17.51
	55-95	4.94	0.24	0.14	0.02	9.21	0.94	0.33	0.19	0.14	0.06	13.07	9.92
	95-125	5.02	0.11	0.06	0.01	5.75	0.50	0.25	0.19	0.16	0.04	6.88	15.26
2. ป่าเต็งรังที่มีไม้ทิ้งเป็นพื้นดิน (990-1,015 ม. MSL)													
1.	0-5	4.53	6.26	3.63	0.12	29.77	9.00	0.29	1.06	0.38	0.08	13.55	18.35
(บน)	5-17/20	4.55	2.57	1.49	0.05	28.14	3.11	0.27	0.38	0.24	0.06	11.60	13.29
	17/20-45	4.86	1.17	0.68	0.02	29.77	1.81	0.28	0.38	0.18	0.06	12.32	11.84
	45-73	5.16	0.77	0.45	0.02	28.10	2.07	0.17	0.22	0.13	0.04	9.46	9.58
	73-105/110	5.34	0.53	0.30	0.01	29.39	1.00	0.16	0.29	0.13	0.03	10.22	8.84
	105/110-130+	5.35	0.48	0.28	0.01	28.84	1.00	0.12	0.25	0.11	0.03	10.65	7.63
2.	0-5	4.87	5.88	3.41	0.14	24.60	12.50	0.35	1.63	0.50	0.08	31.02	10.42
(กลาง)	5-33	4.41	1.90	1.10	0.04	27.80	3.36	0.24	0.23	0.23	0.05	9.41	12.99
	33-57	4.74	0.80	0.46	0.02	25.30	1.94	0.16	0.13	0.12	0.04	6.94	11.70
	57-82	5.20	0.39	0.23	0.01	20.90	1.06	0.14	0.08	0.05	0.02	3.22	15.64
	82-100/110	5.23	0.42	0.24	0.01	27.58	1.00	0.09	0.13	0.03	0.02	3.32	14.10
	100/110-144+	5.14	0.38	0.22	0.00	83.73	1.00	0.11	0.13	0.03	0.02	5.06	9.53
3.	0-5	4.79	5.00	2.90	0.15	18.89	12.00	0.53	2.25	0.88	0.13	37.50	13.21
(ล่าง)	5-20	4.72	1.96	1.14	0.05	21.16	5.67	0.42	0.27	0.21	0.10	14.65	13.33
	20-48	4.63	0.96	0.56	0.03	22.14	2.21	0.34	0.13	0.12	0.08	10.21	13.18
	48-75/80	4.88	0.56	0.33	0.02	21.16	1.20	0.30	0.13	0.11	0.08	8.54	15.20
	75/80-120/125	5.06	0.34	0.20	0.01	30.04	1.00	0.27	0.18	0.16	0.07	7.11	18.64
	120/125-160+	5.10	0.27	0.16	0.01	29.75	1.00	0.25	0.19	0.19	0.06	6.23	20.51
3. ป่าเต็งรังที่มีไม้ทิ้งเป็นพื้นดิน													
1.	0-4	4.90	3.69	2.14	0.09	23.45	3.00	0.44	2.25	0.83	0.12	28.65	16.48
(บน)	4-12	4.77	2.89	1.68	0.08	21.61	1.69	0.48	1.84	0.95	0.12	31.49	14.29
	12-38	4.96	1.05	0.61	0.02	25.89	1.15	0.32	0.58	0.29	0.09	12.53	16.88
	38-57	5.18	0.72	0.42	0.01	33.15	1.00	0.22	0.78	0.29	0.06	8.86	21.15
	57-80	5.36	0.52	0.30	0.01	24.43	1.00	0.21	1.41	0.40	0.05	16.27	15.75
	80-109	5.33	0.43	0.25	0.01	31.27	1.00	0.09	1.27	0.33	0.04	21.07	9.90
	109-133+	5.32	0.36	0.21	0.01	33.99	1.00	0.08	1.44	0.27	0.03	19.65	10.78
2.	0-2	4.99	5.39	3.13	0.15	21.33	5.00	0.46	3.88	1.38	0.12	31.13	22.19
(กลาง)	2-10/13	4.79	3.01	1.74	0.09	20.38	2.53	0.45	1.76	1.02	0.11	25.80	16.78
	10/13-28	4.91	1.13	0.66	0.04	18.15	1.00	0.38	0.66	0.51	0.09	14.61	16.58
	28-53	5.08	0.81	0.47	0.03	17.55	1.00	0.27	0.63	0.41	0.06	9.93	19.08
	53-77	5.25	0.63	0.36	0.02	19.49	1.00	0.17	0.76	0.42	0.04	6.23	27.33
	77-122/130	5.28	0.39	0.22	0.01	20.99	1.00	0.11	1.00	0.43	0.03	9.90	18.40
	122/130-148+	5.27	0.27	0.16	0.01	25.50	1.00	0.10	1.13	0.38	0.03	11.48	16.80
3.	0-5	4.54	8.46	4.91	0.20	24.31	12.00	0.47	6.00	1.50	0.13	36.18	25.63
(ล่าง)	5-17	4.69	2.22	1.29	0.07	17.73	1.42	0.30	1.24	0.67	0.07	16.13	18.14
	17-25/30	4.93	1.37	0.80	0.04	19.02	1.00	0.33	1.29	0.51	0.08	15.38	19.22
	25/30-55	5.26	0.90	0.52	0.02	21.41	0.73	0.35	1.44	0.42	0.09	16.65	18.52
	55-92	5.53	0.49	0.29	0.02	18.31	0.50	0.32	2.13	0.55	0.08	24.47	15.51
	92-120	5.48	0.34	0.20	0.01	19.26	0.50	0.24	2.19	0.65	0.06	26.16	13.97
	120-138+	5.47	0.34	0.20	0.01	20.43	0.50	0.22	2.19	0.67	0.05	25.99	13.91

ตารางภาคผนวกที่ 2 (ต่อ)

Sample No.	Depth (cm.)	pH 1:1 H ₂ O	OM (%)	OC (%)	N (%)	C/N ratio	Ext. P (ppm.)	Ext. K (me/100g soil)	Ext. Ca (me/100g soil)	Ext. Mg (me/100g soil)	Ext. Na (me/100g soil)	BS (%)	CEC (me/100g soil)	
4. ป่าเบญจพรรณ														
1. (บน)	0-3/5	4.90	6.67	3.87	0.27	14.22	4.75	1.27	6.75	1.52	0.20	59.70	19.26	
	3/5-16	4.42	3.96	2.29	0.15	15.40	1.98	0.80	1.74	0.41	0.13	20.91	20.34	
	16-40	4.25	2.33	1.35	0.09	15.82	1.08	0.47	0.74	0.24	0.09	11.89	19.19	
	40-65	4.24	1.66	0.96	0.06	14.85	2.10	0.35	0.50	0.08	0.06	6.33	25.02	
	65-87	4.33	1.61	0.94	0.07	13.70	4.75	0.39	0.52	0.06	0.07	5.66	29.28	
	87-135+	4.48	1.36	0.79	0.06	12.66	1.00	0.43	0.56	0.04	0.08	5.50	32.60	
2. (กลาง)	0-2	5.10	6.60	3.83	0.25	15.31	5.00	1.26	6.50	1.83	0.21	57.26	20.36	
	2-16	4.66	5.65	3.28	0.21	15.90	2.79	0.89	2.16	0.78	0.15	24.22	22.14	
	16-30	4.48	3.43	1.99	0.12	16.36	1.14	0.55	0.64	0.19	0.10	12.90	18.83	
	30-40/50	4.52	2.52	1.46	0.09	16.75	1.00	0.48	0.63	0.12	0.09	12.33	16.94	
3. (ล่าง)	40/50-90	4.75	2.53	1.47	0.09	17.12	1.56	0.47	2.92	0.52	0.09	28.98	16.65	
	0-5	5.33	6.19	3.59	0.22	16.11	3.50	0.83	11.06	2.19	0.18	66.74	23.87	
	5-15/20	5.56	4.47	2.59	0.15	17.81	1.20	0.54	6.39	2.48	0.15	44.98	24.31	
	15/20-35/40	5.13	3.02	1.75	0.10	18.02	0.56	0.62	2.55	2.09	0.15	39.18	17.31	
5. (ล่าง)	35/40-60	4.75	2.11	1.23	0.08	15.70	0.50	0.48	1.13	0.91	0.11	13.86	26.32	
	60-100	4.76	1.28	0.74	0.05	13.48	0.50	0.45	1.13	0.76	0.11	17.68	19.33	
	100-130	4.90	1.10	0.64	0.05	12.32	0.50	0.44	1.13	0.79	0.10	18.57	17.94	
	5. ป่าดิบแล้ง													
1. (บน)	0-5	4.86	4.95	2.87	0.20	14.54	5.50	0.58	2.13	1.04	0.16	36.36	14.80	
	5-15/20	4.58	1.81	1.05	0.18	5.92	3.80	0.40	0.21	0.23	0.10	16.28	11.15	
	15/20-40	4.52	1.06	0.61	0.10	6.19	1.78	0.35	0.13	0.21	0.09	22.21	7.07	
	40-65	4.64	0.48	0.28	0.02	11.57	1.40	0.27	0.14	0.18	0.07	12.28	10.58	
	65-100	4.79	0.28	0.16	0.02	8.91	0.71	0.20	0.29	0.12	0.05	10.72	10.24	
	100-140	4.93	0.12	0.07	0.02	3.78	0.50	0.17	0.25	0.08	0.05	11.60	9.05	
2. (กลาง)	0-5	5.34	5.52	3.20	0.22	14.42	6.50	1.10	4.94	2.34	0.02	48.06	21.52	
	5-15	4.73	2.32	1.34	0.09	15.46	2.25	0.54	0.31	0.52	0.13	13.75	19.51	
	15-30	4.66	1.34	0.78	0.05	15.22	1.17	0.49	0.17	0.33	0.12	14.95	14.63	
	30-50	4.76	0.89	0.52	0.04	12.93	1.00	0.48	0.13	0.38	0.11	15.28	13.90	
	50-85	4.90	0.60	0.35	0.03	12.05	1.00	0.45	0.13	0.48	0.11	18.58	11.53	
	85-110	5.20	0.38	0.22	0.02	14.10	0.80	0.47	0.15	0.32	0.11	11.13	18.00	
3. (ล่าง)	110-140+	5.20	0.36	0.21	0.02	13.22	0.50	0.53	0.19	0.18	0.12	8.93	23.37	
	0-7/15	4.84	2.82	1.63	0.13	12.29	4.91	0.44	1.89	1.13	0.10	32.11	13.93	
	7/15-30/35	4.78	1.10	0.64	0.05	12.80	1.50	0.45	0.19	0.52	0.08	15.64	12.65	
	30/35-55	4.80	0.88	0.51	0.03	19.32	2.17	0.50	0.23	0.43	0.09	18.67	11.26	
	55-70	4.93	0.43	0.25	0.01	20.30	2.17	0.40	0.21	0.31	0.08	19.13	9.16	
	70-85/90	5.04	0.25	0.14	0.01	26.44	1.79	0.33	0.19	0.26	0.07	12.06	12.38	
6. (ล่าง)	85/90-125	5.15	0.12	0.07	0.00	26.44	1.50	0.28	0.27	0.24	0.06	9.40	14.63	
	6. ป่าดิบเขา													
	1. (บน)	0-7	4.66	9.86	5.72	0.30	18.94	16.64	0.99	3.40	0.88	0.19	28.69	24.84
		7-20	4.84	6.69	3.88	0.21	18.70	9.12	0.62	1.17	0.37	0.15	15.05	24.10
		20-40	4.56	4.70	2.73	0.13	21.13	5.00	0.29	0.31	0.08	0.08	11.21	12.89
		40-60/63	4.66	2.58	1.50	0.07	22.51	2.03	0.20	0.25	0.06	0.04	6.35	14.56
60/63-89/95		4.52	1.56	0.90	0.04	24.48	2.89	0.11	0.19	0.04	0.02	4.47	12.48	
89/95-125		4.53	0.95	0.55	0.02	29.06	1.98	0.08	0.19	0.04	0.02	5.15	10.16	
2. (กลาง)	125-145+	4.55	0.87	0.50	0.01	33.83	1.50	0.06	0.19	0.04	0.02	6.02	8.48	
	0-5	5.27	12.20	7.08	0.49	14.58	18.00	1.63	12.00	3.25	0.26	47.20	41.30	
	5-20	4.98	4.79	2.78	0.24	11.78	7.50	0.67	0.58	0.28	0.15	15.11	19.98	
	20-45	4.83	3.65	2.12	0.12	17.69	3.20	0.45	0.13	0.10	0.10	8.83	19.41	
	45-80/85	4.63	2.12	1.23	0.07	17.30	1.73	0.35	0.16	0.08	0.08	8.09	18.01	
	80/85-105	4.60	1.53	0.89	0.04	21.25	1.78	0.31	0.19	0.10	0.07	6.61	20.25	
3. (ล่าง)	105-132	4.62	1.00	0.58	0.03	20.66	1.00	0.29	0.19	0.09	0.06	8.65	14.13	
	0-10	4.67	4.45	2.58	0.18	14.74	2.50	0.64	1.84	0.73	0.14	21.64	21.38	
	10-25	4.43	2.45	1.42	0.09	15.70	2.83	0.47	0.71	0.52	0.11	13.77	20.25	
	25-50/55	4.41	1.56	0.90	0.06	15.04	2.27	0.42	0.48	0.55	0.10	14.70	16.61	
	50/55-75	4.41	1.09	0.63	0.05	13.99	1.67	0.46	0.35	0.44	0.11	15.82	14.76	
	75-108/133	5.30	0.88	0.51	0.04	14.15	1.75	0.58	0.29	0.40	0.14	15.35	17.13	
108/133-152+	4.59	0.61	0.35	0.03	13.90	1.50	0.48	0.19	0.29	0.11	16.11	12.70		

ตารางภาคผนวกที่ 3 สมบัติทางเคมีของดินป่าไม้ (ครั้งที่ 3 เดือนธันวาคม 2540) บริเวณสวนพฤกษศาสตร์สมเด็จพระนางเจ้าสิริกิติ์ จังหวัดเชียงใหม่

Sample No.	Depth (cm.)	pH	OM	OC	N	C/N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS	CEC
		1:1				ratio						(%)	(me/100g soil)
		H ₂ O	(%)				(ppm.)	(me/100g soil)				(%)	(me/100g soil)
1. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (940-980 ม. MSL)													
1.	0-3	5.05	6.51	3.78	0.16	23.26	6.00	0.90	3.44	0.99	0.10	19.15	32.91
(บน)	3-10	4.70	5.31	3.08	0.14	22.44	6.00	0.59	1.34	0.46	0.09	16.80	19.34
	10-30	4.49	2.23	1.29	0.06	20.33	1.25	0.38	0.34	0.22	0.10	30.22	6.37
	30-50	4.75	0.90	0.52	0.03	15.86	0.50	0.47	0.28	0.20	0.10	27.71	6.97
	50-78	4.89	0.49	0.28	0.01	23.05	0.50	0.45	0.81	0.15	0.09	17.49	13.06
	78-117	5.06	0.25	0.14	0.01	16.94	0.50	0.33	0.53	0.15	0.10	20.09	9.86
2.	0-3/6	4.73	6.09	3.53	0.15	23.68	5.00	0.55	1.13	0.44	0.10	20.72	14.92
(กลาง)	3/6-18	4.64	2.77	1.61	0.08	21.34	1.63	0.25	0.52	0.19	0.07	17.58	9.58
	18-38	4.56	1.44	0.84	0.04	23.87	0.60	0.16	0.28	0.27	0.10	12.29	13.43
	38-72	4.77	0.67	0.39	0.02	17.40	0.50	0.21	0.32	0.17	0.10	15.08	11.21
	72-106	4.94	0.49	0.29	0.02	13.85	0.50	0.20	0.25	0.11	0.07	13.81	9.29
	106-140	4.89	0.43	0.25	0.02	11.84	0.50	0.23	0.25	0.13	0.08	14.76	9.63
3.	0-5	5.30	6.19	3.59	0.16	22.12	4.50	0.38	2.00	0.75	0.08	17.90	22.07
(ล่าง)	5-15/20	4.67	1.83	1.06	0.05	22.82	0.90	0.31	0.33	0.17	0.12	8.26	24.01
	15/20-55	4.91	0.54	0.32	0.01	21.18	0.50	0.19	0.28	0.10	0.12	9.14	18.74
	55-95	5.11	0.25	0.15	0.01	22.25	0.50	0.06	0.23	0.08	0.10	7.30	19.11
	95-125	5.20	0.16	0.09	0.01	17.56	0.50	0.06	0.24	0.10	0.11	9.29	15.99
2. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (990-1,015 ม. MSL)													
1.	0-5	5.06	9.45	5.48	0.17	32.03	15.00	0.54	1.94	0.63	0.09	28.10	14.13
(บน)	5-17/20	4.87	1.88	1.09	0.05	24.06	5.93	0.33	0.28	0.22	0.05	15.47	8.57
	17/20-45	5.02	0.81	0.47	0.02	26.95	2.74	0.20	0.21	0.12	0.08	19.49	6.67
	45-73	5.28	0.55	0.32	0.01	24.08	1.00	0.18	0.28	0.11	0.13	21.92	8.33
	73-105/110	5.34	0.35	0.20	0.01	14.56	1.00	0.18	0.19	0.10	0.02	29.42	2.43
	105/110-130+	5.38	0.26	0.15	0.00	34.37	1.00	0.17	0.24	0.10	0.03	23.86	3.50
2.	0-5	4.96	6.54	3.79	0.14	27.36	25.00	0.56	1.50	0.47	0.09	17.58	19.35
(กลาง)	5-33	4.79	1.46	0.85	0.03	27.38	4.43	0.31	0.16	0.16	0.04	22.12	4.72
	33-57	5.10	0.63	0.37	0.02	20.86	1.94	0.31	0.12	0.12	0.04	17.58	5.14
	57-82	5.49	0.33	0.19	0.01	14.76	1.46	0.30	0.10	0.05	0.04	16.67	5.21
	82-100/110	5.54	0.17	0.10	0.01	18.84	1.00	0.26	0.11	0.05	0.04	18.11	4.40
	100/110-144+	5.52	0.15	0.09	0.01	9.92	1.00	0.28	0.11	0.04	0.05	14.92	6.57
3.	0-5	5.37	5.11	2.96	0.14	21.79	23.00	0.95	0.16	0.75	0.13	20.72	15.27
(ล่าง)	5-20	5.04	1.89	1.10	0.06	17.46	8.17	0.70	0.19	0.29	0.10	14.92	14.71
	20-48	5.09	0.80	0.46	0.03	17.25	2.71	0.59	0.07	0.09	0.08	11.33	13.77
	48-75/80	5.25	0.33	0.19	0.02	10.88	1.70	0.54	0.06	0.10	0.06	21.46	5.95
	75/80-120/125	5.44	0.13	0.08	0.02	5.00	1.25	0.46	0.06	0.08	0.05	33.12	3.43
	120/125-160+	5.47	0.08	0.05	0.02	2.64	1.00	0.49	0.06	0.06	0.05	26.69	4.33
3. ป่าเต็งรังที่มีไม้ผลัดใบเป็นพันธุ์ไม้เด่น													
1.	0-4	5.52	3.64	2.11	0.11	20.05	2.00	1.00	4.88	1.08	0.13	27.16	30.42
(บน)	4-12	5.11	1.93	1.12	0.05	21.08	1.13	0.53	0.94	0.30	0.11	19.84	14.40
	12-38	5.35	0.78	0.45	0.03	16.52	0.65	0.46	0.55	0.13	0.10	25.92	8.46
	38-57	5.51	0.45	0.26	0.05	5.31	0.50	0.21	0.90	0.20	0.09	21.40	10.33
	57-80	5.70	0.33	0.19	0.02	8.76	0.50	0.13	1.10	0.24	0.11	23.96	10.59
	80-109	5.60	0.18	0.10	0.01	14.08	0.66	0.10	1.38	0.24	0.10	20.98	12.99
	109-133+	5.58	0.18	0.10	0.00	23.80	1.00	0.10	1.38	0.21	0.11	25.75	10.77
2.	0-2	5.56	4.48	2.60	0.13	19.74	12.00	0.74	5.38	1.08	0.08	20.72	38.42
(กลาง)	2-10/13	5.30	2.95	1.71	0.08	20.63	10.05	0.65	2.59	0.76	0.09	23.77	20.66
	10/13-28	5.31	1.41	0.82	0.03	31.60	2.27	0.43	0.63	0.40	0.10	21.17	11.46
	28-53	5.46	0.87	0.50	0.02	26.59	0.98	0.25	0.76	0.36	0.09	23.79	9.36
	53-77	5.59	0.53	0.31	0.01	24.69	0.85	0.14	0.83	0.36	0.09	17.00	13.19
	77-122/130	5.61	0.27	0.16	0.01	17.03	0.80	0.12	1.07	0.39	0.09	23.59	10.60
	122/130-148+	5.62	0.15	0.09	0.01	9.92	1.00	0.13	1.06	0.38	0.09	27.32	8.91
3.	0-5	5.34	6.47	3.75	0.20	19.01	12.00	0.58	6.63	1.58	0.10	26.53	36.80
(ล่าง)	5-17	5.12	2.29	1.33	0.07	19.24	3.38	0.53	1.74	0.65	0.07	18.07	20.06
	17-25/30	5.41	1.28	0.74	0.05	15.99	1.14	0.65	2.23	0.44	0.07	20.43	19.84
	25/30-55	5.51	0.92	0.53	0.03	15.51	0.73	0.67	2.59	0.30	0.08	23.11	18.68
	55-92	5.65	0.39	0.23	0.02	13.02	0.77	0.43	3.33	0.35	0.10	17.69	28.59
	92-120	5.67	0.17	0.10	0.01	14.18	0.50	0.27	2.99	0.43	0.10	11.86	39.37
	120-138+	5.66	0.12	0.07	0.00	15.86	0.50	0.26	2.81	0.46	0.10	9.26	48.64

ตารางภาคผนวกที่ 3 (ต่อ)

Sample No.	Depth (cm.)	pH 1:1	OM	OC	N	C/N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na	BS	CEC
			H ₂ O (%)		Ratio		(ppm.)		(me/100g soil)			(%)	(me/100g soil)
4. ป่าเบญจพรรณ													
1.	0-3/5	5.41	8.81	5.11	0.31	16.64	3.00	0.69	6.00	1.21	0.10	29.36	30.24
(บน)	3/5-16	5.11	4.99	2.89	0.18	15.99	1.33	0.69	2.68	0.74	0.10	21.93	23.43
	16-40	4.85	2.48	1.44	0.09	15.72	0.50	0.46	0.60	0.16	0.09	23.00	9.06
	40-65	4.91	1.89	1.10	0.07	16.03	0.50	0.26	0.36	0.06	0.08	15.89	9.43
	65-87	5.02	1.50	0.87	0.05	16.02	0.50	0.30	0.33	0.04	0.08	15.77	9.43
	87-135+	4.97	1.34	0.78	0.04	19.68	0.50	0.33	0.38	0.04	0.08	21.98	7.12
2.	0-2	6.16	11.44	6.64	0.34	19.64	6.00	1.21	7.50	2.34	0.10	29.67	40.53
(กลาง)	2-16	5.48	8.00	4.64	0.26	18.07	3.21	0.90	4.14	1.34	0.08	29.00	24.97
	16-30	4.97	4.08	2.37	0.14	16.70	1.29	0.55	0.41	0.26	0.07	18.80	10.18
	30-40/50	4.95	3.21	1.86	0.11	16.34	0.83	0.44	0.42	0.15	0.06	15.75	10.52
	40/50-90	5.15	3.58	2.07	0.11	18.66	1.17	0.44	3.04	0.50	0.07	16.31	28.65
3.	0-5	5.84	8.38	4.86	0.26	18.78	2.50	0.96	12.19	2.06	0.08	25.75	62.24
(ล่าง)	5-15/20	5.54	5.19	3.01	0.18	16.83	1.50	1.02	8.18	1.77	0.09	28.98	40.96
	15/20-35/40	5.25	3.02	1.75	0.10	17.16	1.06	0.96	3.11	1.17	0.10	35.54	17.50
	35/40-60	5.25	2.32	1.34	0.08	17.44	0.56	0.74	1.97	0.84	0.10	21.91	20.67
	60-100	5.15	1.50	0.87	0.06	14.12	1.25	0.71	1.69	0.62	0.10	21.90	18.50
	100-130	5.24	1.20	0.70	0.05	13.22	1.00	0.68	1.63	0.66	0.11	21.82	18.55
5. ป่าดิบแล้ง													
1.	0-5	5.28	6.44	3.74	0.21	17.74	3.50	0.74	3.44	1.10	0.12	12.40	52.25
(บน)	5-15/20	4.52	2.29	1.33	0.07	19.37	0.90	0.48	0.50	0.23	0.10	5.62	40.09
	15/20-40	4.60	1.24	0.72	0.04	19.43	0.94	0.39	0.26	0.17	0.08	5.15	32.45
	40-65	4.57	0.55	0.32	0.02	14.51	0.50	0.30	0.31	0.13	0.07	6.69	21.29
	65-100	4.68	0.26	0.15	0.02	8.77	0.50	0.20	0.37	0.12	0.08	7.15	21.03
	100-140	4.80	0.29	0.17	0.01	12.78	0.50	0.18	0.38	0.10	0.10	4.87	33.63
2.	0-5	5.83	8.45	4.90	0.28	17.45	5.00	0.92	6.06	1.79	0.08	18.53	51.78
(กลาง)	5-15	5.47	3.24	1.88	0.12	15.30	1.25	0.91	1.17	1.01	0.07	15.70	24.37
	15-30	5.02	2.35	1.36	0.09	15.28	1.33	0.84	0.57	0.67	0.09	18.84	16.06
	30-50	4.85	1.65	0.96	0.07	14.54	1.00	0.73	0.44	0.60	0.10	16.49	16.98
	50-85	4.88	0.86	0.50	0.05	10.75	0.50	0.59	0.29	0.67	0.11	13.37	19.43
	85-110	5.04	0.53	0.31	0.02	12.42	0.50	0.67	0.28	0.32	0.10	22.51	10.15
	110-140+	5.09	0.46	0.27	0.02	12.16	0.50	0.72	0.31	0.23	0.11	10.83	21.66
3.	0-7/15	5.12	3.64	2.11	0.14	14.94	2.41	0.51	3.68	0.86	0.09	14.47	41.11
(ล่าง)	7/15-30/35	4.89	1.02	0.59	0.05	12.10	0.92	0.47	0.50	0.39	0.10	10.72	21.83
	30/35-55	4.98	0.58	0.33	0.02	13.45	0.50	0.48	0.42	0.34	0.09	11.36	18.57
	55-70	4.68	0.37	0.21	0.01	14.54	0.50	0.40	0.29	0.27	0.08	11.98	14.78
	70-85/90	4.82	0.32	0.19	0.01	24.68	0.71	0.29	0.36	0.20	0.08	8.37	19.94
	85/90-125	5.21	0.39	0.23	0.01	26.00	1.00	0.44	0.33	0.14	0.09	5.39	34.15
6. ป่าดิบเขา													
1.	0-7	5.48	11.35	6.58	0.31	21.57	23.07	1.15	5.25	0.69	0.09	27.83	28.69
(บน)	7-20	5.40	7.70	4.47	0.24	18.43	10.85	0.92	2.75	0.54	0.09	29.82	17.13
	20-40	5.10	3.33	1.93	0.11	18.34	3.00	0.64	0.50	0.13	0.08	28.42	7.13
	40-60/63	4.66	1.77	1.03	0.06	18.22	2.03	0.35	0.25	0.04	0.08	18.46	7.63
	60/63-89/95	4.55	1.32	0.77	0.04	19.37	2.11	0.21	0.29	0.06	0.05	17.71	5.91
	89/95-125	4.70	0.78	0.45	0.03	17.14	1.50	0.17	0.25	0.06	0.05	13.14	7.58
	125-145+	4.72	0.71	0.41	0.03	15.64	1.50	0.18	0.25	0.06	0.06	11.62	9.85
2.	0-5	6.37	13.30	7.71	0.46	16.91	25.00	2.05	12.50	2.31	0.25	31.40	61.67
(กลาง)	5-20	5.24	8.81	5.11	0.29	17.73	8.83	0.84	0.46	0.22	0.13	36.11	7.70
	20-45	5.21	5.44	3.15	0.19	16.87	6.00	0.62	0.15	0.08	0.09	34.82	5.05
	45-80/85	5.11	2.75	1.60	0.10	16.09	3.57	0.62	0.08	0.05	0.09	27.00	6.08
	80/85-105	4.92	1.61	0.94	0.06	16.12	1.94	0.49	0.12	0.05	0.08	14.30	10.06
	105-132	4.94	1.34	0.78	0.06	12.65	3.50	0.49	0.13	0.05	0.09	12.72	12.06
3.	0-10	5.07	5.72	3.32	0.21	16.09	5.00	0.76	2.06	0.63	0.14	26.93	17.84
(ล่าง)	10-25	4.91	3.46	2.01	0.12	16.14	2.83	0.66	0.31	0.26	0.11	18.58	12.63
	25-50/55	4.82	2.73	1.58	0.10	16.19	2.05	0.62	0.25	0.25	0.10	20.67	10.17
	50/55-75	4.83	1.53	0.89	0.07	13.46	1.50	0.58	0.22	0.25	0.10	17.37	12.06
	75-108/133	5.70	1.09	0.63	0.06	10.98	1.75	0.70	0.23	0.29	0.12	21.62	11.14
	108/133-152+	5.00	0.67	0.39	0.04	9.84	1.50	0.69	0.25	0.31	0.09	17.27	12.30

ตารางภาคผนวกที่ 4 ธาตุอาหารที่สะสมเฉลี่ยตลอดทั้งชั้นดินในป่าชนิดต่างๆ บริเวณสวนพฤกษศาสตร์สมเด็จพระนางเจ้าสิริกิติ์ จังหวัดเชียงใหม่

หนุมที่	ระดับความลึก ของดิน (ซม.)	ปริมาณ อนุภาคดิน ขนาด <2.0 มม.	OM	OC	Total-N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na
			(t/ha)	(kg/ha)						
1. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (ระดับความสูง 940-980 ม. MSL)										
1 (บน)	0-3	136.73	8.01	4.64	0.19	1.37	37.40	84.17	17.16	2.85
	3-10	409.09	17.36	10.07	0.46	2.83	75.86	102.39	24.72	6.39
	10-30	1959.44	31.68	18.37	1.02	5.62	204.72	122.47	39.80	24.29
	30-50	2101.37	12.29	7.13	0.59	4.40	195.69	118.20	33.05	22.22
	50-78	3484.92	10.79	6.26	0.65	7.47	286.78	283.15	49.11	31.48
	78-117	5645.68	13.90	8.06	0.79	11.47	310.18	390.85	73.68	54.51
	รวม	13737.23	94.04	54.54	3.69	33.15	1110.64	1101.24	237.54	141.74
2 (กลาง)	0-3/6	542.48	31.95	18.53	0.78	3.86	161.95	169.53	67.25	12.66
	3/6-18	1725.02	40.27	23.36	1.20	6.94	262.39	133.37	84.73	27.43
	18-38	2590.02	29.12	16.89	1.02	5.94	262.51	143.53	110.79	39.90
	38-72	4388.43	25.32	14.68	1.16	10.51	401.53	215.12	106.15	62.14
	72-106	3813.33	14.44	8.37	0.85	8.74	305.77	175.47	61.18	43.90
	106-140	1983.84	7.14	4.14	0.47	5.69	178.14	99.19	34.72	25.21
	รวม	15043.12	148.24	85.98	5.48	41.68	1572.29	936.21	464.84	211.25
3 (ล่าง)	0-5	461.44	27.49	15.94	0.86	4.08	132.86	136.51	50.04	9.61
	5-15/20	1484.64	33.38	19.36	1.26	5.32	249.79	81.66	45.10	28.52
	15/20-55	4847.20	33.42	19.39	1.45	12.81	639.97	216.77	81.41	87.18
	55-95	4931.82	15.25	8.84	0.93	10.77	433.85	247.88	72.83	71.22
	95-125	3427.36	4.76	2.76	0.55	8.67	237.66	166.01	57.91	46.53
	รวม	15152.46	114.30	66.30	5.04	41.65	1694.12	848.82	307.29	243.06
	เฉลี่ย	14644.27	118.86	68.94	4.74	38.83	1459.02	962.09	336.55	198.68
2. ป่าเต็งรังที่มีไม้เพียงเป็นพันธุ์ไม้เด่น (ระดับความสูง 990-1,015 ม. MSL)										
4 (บน)	0-5	465.02	38.02	22.05	0.70	5.74	78.84	151.13	35.07	7.19
	5-17/20	1671.87	41.44	24.04	0.95	7.12	207.31	104.13	48.27	19.58
	17/20-45	3829.62	45.38	26.32	1.12	8.91	393.33	196.42	74.03	51.21
	45-73	3605.11	27.04	15.68	0.78	5.65	282.55	148.17	54.67	55.45
	73-105/110	3462.77	17.58	10.20	0.65	3.69	266.77	179.54	55.98	24.45
	105/110-130+	1844.36	8.85	5.13	0.30	1.97	124.03	90.68	29.97	14.26
	รวม	14878.75	178.32	103.43	4.50	33.08	1352.84	870.07	297.99	172.16
5 (กลาง)	0-5	458.86	28.33	16.43	0.65	6.65	81.21	118.54	27.34	7.16
	5-33	3293.13	58.12	33.71	1.45	11.52	357.23	117.12	74.54	32.74
	33-57	3482.61	27.15	15.74	0.77	5.86	314.69	85.01	54.90	29.73
	57-82	3551.07	15.70	9.10	0.59	4.12	299.93	71.61	26.28	27.50
	82-100/110	2821.69	11.59	6.72	0.34	2.58	209.60	65.63	16.20	20.42
	100/110-144+	2094.79	7.40	4.29	0.23	2.51	145.66	41.90	11.35	17.46
	รวม	15702.15	148.27	86.00	4.02	33.24	1408.31	499.81	210.61	135.01
6 (ล่าง)	0-5	439.87	23.86	13.84	0.66	7.48	144.13	134.89	59.38	10.60
	5-20	1986.28	46.85	27.18	1.22	13.46	462.43	99.31	67.04	38.38
	20-48	4031.89	40.05	23.23	1.31	15.88	748.12	85.92	60.48	61.13
	48-75/80	4197.10	22.61	13.12	1.02	6.31	683.85	75.32	64.59	55.77
	75/80-120/125	4140.28	14.08	8.16	0.74	4.60	591.01	85.20	74.47	51.75
	120/125-160+	1658.96	4.92	2.85	0.30	1.69	233.72	34.36	33.18	20.07
	รวม	16454.38	152.37	88.38	5.25	49.41	2863.25	515.20	359.13	237.70
	เฉลี่ย	15678.43	159.66	92.60	4.59	38.58	1874.80	628.36	289.24	181.62

ตารางที่ภาคผนวกที่ 4 (ต่อ)

หมวดที่	ระดับความลึก ของดิน (ซม.)	ปริมาณ อนุภาคดิน ขนาด <2.00 มม.	(t/ha)			(kg/ha)				
			OM	OC	Total-N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na
3. ป่าเต็งรังที่มีไม้ผลวงเป็นพันธุ์ไม้เด่น										
7 (บน)	0-4	378.46	16.49	9.56	0.46	1.32	103.13	318.54	44.47	8.89
	4-12	817.70	21.03	12.19	0.61	1.34	144.25	251.27	63.80	16.53
	12-38	2489.20	25.17	14.60	0.82	2.20	368.85	309.55	72.36	45.28
	38-57	2150.77	13.39	7.76	0.64	1.43	199.31	378.89	68.53	29.95
	57-80	2619.42	13.51	7.84	0.53	1.75	186.35	613.04	109.00	38.84
	80-109	2900.20	11.51	6.67	0.35	2.45	107.51	739.22	104.42	38.10
	109-133+	1627.72	5.86	3.40	0.15	1.36	51.79	447.62	50.19	21.27
	รวม	12983.47	106.96	62.03	3.56	11.84	1161.19	3058.14	512.77	198.87
8 (กลาง)	0-2	218.72	13.54	7.85	0.36	2.33	64.01	257.91	41.56	4.11
	2-10/13	965.23	32.75	19.00	0.95	5.80	218.16	485.79	116.76	18.14
	10/13-28	1578.74	20.96	12.16	0.62	2.13	250.12	187.58	91.22	27.30
	28-53	2681.33	23.73	13.76	0.78	2.22	281.64	330.25	124.37	37.57
	53-77	2575.76	16.86	9.78	0.56	2.02	170.55	378.31	123.20	31.84
	77-122/130	4141.44	17.01	9.87	0.61	2.85	187.90	797.65	215.17	48.03
	122/130-148+	1114.36	3.16	1.83	0.14	0.84	51.43	227.52	53.86	12.85
รวม	13275.58	128.01	74.25	4.01	18.19	1223.80	2665.00	766.13	179.84	
9 (ต่ำ)	0-5	444.35	34.39	19.95	1.01	8.15	96.99	596.17	90.91	9.33
	5-17	1351.20	33.55	19.46	1.06	4.56	202.49	356.57	105.98	18.47
	17-25/30	1251.16	18.40	10.67	0.64	1.74	226.38	387.26	74.77	18.72
	25/30-55	3147.78	31.98	18.55	1.14	2.31	603.93	1139.88	146.66	48.92
	55-92	4600.18	24.36	14.13	0.98	2.59	676.68	2303.99	257.15	75.18
	92-120	2357.88	8.62	5.00	0.30	0.98	233.95	1133.92	157.75	34.53
	120-138+	1103.85	3.75	2.18	0.13	0.46	101.85	515.13	76.35	15.86
	รวม	14256.40	155.07	89.94	5.25	20.80	2142.26	6432.91	909.58	221.00
เฉลี่ย	13505.15	130.01	75.41	4.28	16.94	1509.08	4052.02	729.49	199.91	
4. ป่าเบญจพรรณ										
10 (บน)	0-3/5	312.06	25.34	14.70	0.90	1.38	120.69	442.09	59.81	8.76
	3/5-16	949.18	43.97	25.50	1.67	1.81	290.49	501.62	81.60	21.86
	16-40	2495.17	61.01	35.38	2.31	2.27	435.52	306.70	66.88	40.55
	40-65	2563.70	47.02	27.27	1.77	2.65	324.09	194.41	26.92	36.75
	65-87	1880.28	30.85	17.89	1.21	3.60	267.44	153.84	13.10	28.08
	87-135+	1186.30	16.85	9.77	0.68	0.79	178.14	103.80	6.92	18.39
	รวม	9386.69	225.03	130.51	8.54	12.50	1616.37	1702.45	255.24	154.38
11 (ต่ำ)	0-5	498.71	37.67	21.85	1.23	1.75	205.39	1084.69	134.65	13.55
	5-15/20	1017.79	48.75	28.28	1.72	1.35	310.78	1439.32	264.80	24.17
	15/20-35/40	2131.64	67.67	39.25	2.33	1.56	664.40	1165.74	401.90	51.34
	35/40-60	2516.94	59.27	34.38	2.14	1.31	608.14	728.28	259.85	52.23
	60-100	4947.33	75.61	43.85	3.04	3.71	1097.40	1308.57	413.31	101.01
	100-130	2525.94	33.09	19.19	1.43	1.68	546.61	662.64	224.18	50.10
รวม	13638.35	322.06	186.80	11.89	11.35	3432.71	6389.25	1698.69	292.39	
เฉลี่ย	11512.52	273.54	158.66	10.22	11.92	2524.54	4045.85	976.96	223.39	

ตารางภาคผนวกที่ 4 (ต่อ)

หลุมที่	ระดับความลึก ของดิน (ซม.)	ปริมาณ อนุภาคดิน ขนาด <2.00 มม.	OM	OC	Total-N	Ext. P	Ext. K	Ext. Ca	Ext. Mg	Ext. Na
			(t/ha)	(kg/ha)						
5. ป่าดิบเต็ง										
12 (บน)	0-5	146.42	7.81	4.53	0.28	0.79	35.78	62.69	17.45	3.75
	5-15/20	1471.57	29.19	16.93	1.60	4.73	254.65	118.95	45.17	28.88
	15/20-40	2834.33	28.16	16.34	1.75	7.16	411.31	163.37	75.17	46.12
	40-65	3427.85	17.97	10.42	0.97	7.55	375.21	180.25	73.70	45.56
	65-100	4476.75	12.26	7.11	0.97	8.99	337.50	337.09	78.35	53.43
	100-140	2850.73	6.27	3.64	0.53	5.51	184.11	207.87	36.23	38.60
	รวม	15207.65	101.67	58.97	6.10	34.73	1598.55	1070.21	326.07	216.35
13 (กลาง)	0-5	409.16	29.01	16.83	1.06	2.60	151.22	351.20	105.41	11.00
	5-15	1233.16	33.79	19.60	1.27	3.45	327.61	215.16	126.29	25.76
	15-30	1951.20	34.80	20.18	1.48	4.86	488.02	180.89	141.28	41.67
	30-50	2527.73	31.26	18.13	1.43	5.79	573.37	186.95	173.41	53.32
	50-85	4644.20	31.76	18.42	1.91	9.73	907.97	306.85	342.83	94.54
	85-110	2658.32	13.20	7.66	0.71	5.38	582.17	130.70	104.72	48.74
	110-140+	1853.31	8.65	5.02	0.46	3.58	430.89	100.39	47.49	36.87
รวม	15277.08	182.46	105.83	8.33	35.39	3461.26	1472.13	1041.43	331.89	
14 (ล่าง)	0-7/15	1148.54	38.17	22.14	1.73	6.88	212.50	614.40	148.57	19.90
	7/15-30/35	2204.97	25.93	15.04	1.43	6.95	359.61	189.20	145.28	35.66
	30/35-55	2489.56	18.73	10.86	0.96	6.92	460.22	184.99	130.72	43.83
	55-70	1630.39	7.63	4.42	0.37	4.89	272.86	110.96	65.40	27.17
	70-85/90	2055.70	6.46	3.75	0.29	5.85	294.96	135.82	69.00	33.13
	85/90-125	4112.65	10.69	6.20	0.45	14.51	632.61	237.05	114.97	64.97
	รวม	13641.81	107.61	62.41	5.24	45.99	2232.77	1472.43	673.93	224.66
เฉลี่ย	14708.85	130.58	75.74	6.56	38.70	2430.86	1338.26	680.48	250.97	
6. ป่าดิบเขา										
15 (บน)	0-7	398.29	41.08	23.83	1.18	8.48	164.79	303.70	40.73	9.95
	7-20	954.73	64.20	37.23	1.98	9.38	256.60	276.63	42.60	20.24
	20-40	1714.97	59.17	34.32	1.89	6.29	262.62	107.19	17.15	24.58
	40-60/63	2216.44	45.66	26.48	1.59	5.17	197.72	92.35	14.78	25.25
	60/63-89/95	3382.38	47.76	27.70	1.42	8.11	193.58	135.39	21.99	26.48
	89/95-125	2421.02	20.74	12.03	0.64	3.94	105.31	90.79	14.37	18.98
	125-145+	1138.19	8.88	5.15	0.27	1.54	47.65	42.68	6.64	10.13
รวม	12226.02	287.49	166.74	8.98	42.91	1228.28	1048.72	158.25	135.62	
16 (กลาง)	0-5	289.80	36.23	21.01	1.25	6.62	209.07	714.84	94.67	12.72
	5-20	990.56	67.23	38.99	2.64	9.58	311.59	112.81	33.29	24.53
	20-45	1993.14	86.10	49.94	3.06	9.23	378.36	86.04	23.42	35.74
	45-80/85	3721.98	92.16	53.45	3.21	10.55	655.85	116.62	32.77	60.32
	80/85-105	2174.46	32.99	19.13	1.14	4.65	314.61	62.01	20.64	31.43
	105-132	1984.01	22.95	13.31	0.86	4.03	291.12	57.87	18.19	28.34
รวม	11153.95	337.65	195.84	12.16	44.65	2160.59	1150.19	222.98	193.59	
17 (ล่าง)	0-10	1085.27	59.60	34.57	2.14	5.52	349.37	492.89	104.01	27.13
	10-25	1673.42	48.60	28.19	1.82	4.83	409.48	185.47	88.78	34.10
	25-50/55	3287.27	66.07	38.32	2.53	6.67	663.21	232.60	160.50	60.28
	50/55-75	2820.36	35.51	20.59	1.59	4.70	558.16	134.75	110.86	55.00
	75-108/133	3167.49	30.62	17.76	1.58	5.98	843.04	149.07	140.55	74.23
	108/133-152+	2125.98	14.74	8.55	0.77	3.90	479.62	79.72	76.18	38.69
รวม	14159.79	255.14	147.98	10.43	31.60	3302.88	1274.51	680.88	289.43	
เฉลี่ย	12513.25	293.42	170.19	10.52	39.72	2230.58	1157.81	354.04	206.21	

ตารางภาคผนวกที่ 5 ข้อจำกัดต่างๆ และการแบ่งระดับของข้อจำกัดของสมบัติทางเคมีบางประการที่ใช้
ประเมินความอุดมสมบูรณ์ของดิน (FAO Project Staff และ Land Classification
Division, 1973)

1. ปฏิกริยาของดิน (Soil reaction) pH (ดิน : น้ำ = 1 : 1)

ระดับ (Rating)		พิสัย (Range)
กรดจัดมาก	(extremely acid)	< 4.5
กรดจัด	(very strongly acid)	4.5-5.0
กรดแก่	(strongly acid)	5.1-5.5
กรดปานกลาง	(moderately acid)	5.6-6.0
กรดเล็กน้อย	(slightly acid)	6.1-6.5
กลาง	(neutral)	6.6-7.3
ด่างอย่างอ่อน	(Slightly alkaline)	7.4-7.8
ด่างปานกลาง	(moderately alkaline)	7.9-8.4
ด่างแก่	(strongly alkaline)	8.5-9.0
ด่างจัด	(extremely alkaline)	> 9.0

2. ปริมาณอินทรีย์วัตถุ (Organic Matter, O.M.)

ระดับ (Rating)		พิสัย (Range) (%)
ต่ำมาก	(VL)	< 0.5
ต่ำ	(L)	0.5-1.0
ค่อนข้างต่ำ	(ML)	1.0-1.5
ปานกลาง	(M)	1.5-2.5
ค่อนข้างสูง	(MH)	2.5-3.5
สูง	(H)	3.5-4.5
สูงมาก	(VH)	> 4.5

ตารางภาคผนวกที่ 5 (ต่อ)

3. ค่าการอิ่มตัวด้วยประจุบวกที่เป็นด่าง (*Base Saturation, B.S.*)

ระดับ (Rating)		พิสัย (Range) (%)
ต่ำ	(L)	< 35
ปานกลาง	(M)	35-75
สูง	(H)	> 75

4. ค่าความจุในการแลกเปลี่ยนประจุบวก (*Cation Exchange Capacity, C.E.C.*)

ระดับ (Rating)		พิสัย (Range) (me/100g soil)
ต่ำมาก	(VL)	< 3.0
ต่ำ	(L)	3.0-5.0
ค่อนข้างต่ำ	(ML)	5.0-10.0
ปานกลาง	(M)	10.0-15.0
ค่อนข้างสูง	(MH)	15.0-20.0
สูง	(H)	20.0-30.0
สูงมาก	(VH)	> 30.0

5. ปริมาณฟอสฟอรัสที่สกัดได้ (*Extractable P*)

ระดับ (Rating)		พิสัย (Range) (ppm)
ต่ำมาก	(VL)	< 3.0
ต่ำ	(L)	3.0-6.0
ค่อนข้างต่ำ	(ML)	6.0-10.0
ปานกลาง	(M)	10.0-15.0
ค่อนข้างสูง	(MH)	15.0-25.0
สูง	(H)	25.0-45.0
สูงมาก	(VH)	> 45.0

ตารางภาคผนวกที่ 5 (ต่อ)

6. ปริมาณโพแทสเซียมที่สกัดได้ (*Extractable K*)

ระดับ (Rating)		พิสัย (Range) (ppm)
ต่ำมาก	(VL)	< 30.0
ต่ำ	(L)	30.0-60.0
ปานกลาง	(M)	60.0-90.0
สูง	(H)	90.0-120.0
สูงมาก	(VH)	> 120.0

7. ปริมาณค่าที่สกัดได้ (*Extractable base*)

ระดับ (Rating)		พิสัย (Range) (me/100g soil)			
		Ext. Ca	Ext. Mg	Ext. K	Ext. Na
ต่ำมาก	(VL)	< 2.0	< 0.3	< 0.2	< 0.1
ต่ำ	(L)	2.0-5.0	0.3-1.0	0.2-0.3	0.1-0.3
ปานกลาง	(M)	5.0-10.0	1.0-3.0	0.3-0.6	0.3-0.7
สูง	(H)	10.0-20.0	3.0-8.0	0.6-1.2	0.7-2.0
สูงมาก	(VH)	> 20.0	> 8.0	> 1.2	> 2.0

หมายเหตุ	VL	=	ต่ำมาก (Very Low)
	L	=	ต่ำ (Low)
	ML	=	ค่อนข้างต่ำ (Moderately Low)
	M	=	ปานกลาง (Moderate)
	MH	=	ค่อนข้างสูง (Moderately High)
	H	=	สูง (High)
	VH	=	สูงมาก (Very High)

ตารางภาคผนวกที่ 5 (ต่อ)

8. การประเมินระดับความอุดมสมบูรณ์ของดิน โดยใช้คุณสมบัติทางเคมีบางประการ

ระดับความอุดม สมบูรณ์ของดิน	O.M.* (%)	B.S.* (%)	C.E.C.* me/100g soil	P* (ppm)	K* (ppm)
ต่ำ	< 1.5 (1)	< 35.0 (1)	< 10.0 (1)	< 10.0 (1)	< 60.0 (1)
ปานกลาง	1.5-3.5 (2)	35.0-70.0 (2)	10.0-20.0 (2)	10.0-25.0 (2)	60.0-90.0 (2)
สูง	> 3.5 (3)	> 70.0 (3)	> 20.0 (3)	> 25.0 (3)	> 90.0 (3)

หมายเหตุ

* แต่ละค่ามีการให้คะแนน โดยกำหนดเกณฑ์ดังต่อไปนี้

ต่ำ (L = 1 คะแนน), ปานกลาง (M = 2 คะแนน) และสูง (H = 3 คะแนน)

คะแนนรวมของดินน้อยกว่าหรือเท่ากับ 7 มีระดับความอุดมสมบูรณ์ต่ำ (L)

คะแนนรวมของดินอยู่ในช่วง 8-12 มีระดับความอุดมสมบูรณ์ปานกลาง (M)

คะแนนรวมของดินมากกว่าหรือเท่ากับ 13 มีระดับความอุดมสมบูรณ์สูง (H)

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