



ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
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คำอธิบายหน้าตัดดิน (soil profile description)

Pedon 1

I Information on the Site

Profile symbol	: Pedon 1
Soil name	: Huai Suea Thao series 1 (tentative)
Classification	: Typic Paleustalf, very-fine, mixed, subactive, isohyperthermic
Date of examination	: May 26, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Inside Huai Suea Thao school and approximately 300 m east from Ban Huai Suea Thao. Tambon Phabong. Mueang District. Mae Hong Son Province. Approximately 19° 15' 26" N. 97° 54' 27" E. (Grid Reference: 852299, Sheet: 4547 I)
Elevation	: 240 m (MSL)
Landform	
1. Physiographic position	: Lower backslope
2. Surrounding landform	: Low relief mountain
3. Slope on which profile site	: Moderately steep (28%), N 86° E aspect
Vegetation and Landuse	: Under mixed deciduous forest. Land is also used for watershed forest protected area
Annual rainfall	: Approximately 1,344.7 mm
Mean temperature	: Approximately 22.9°C
Other	: Forest fire caused by human in the dry season

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with limestone in Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Moderately sheet erosion
Human influence	: Nil

III Profile Description

Horizon	Depth (cm)	Description
A	0-12/14	Dark grayish brown (10YR4/2); clay loam; moderate fine and weak medium granular structure and moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, common medium and few coarse vesicular pores; common fine, medium and coarse roots; moderately acid (field pH 5.8);

		clear and wavy boundary to Bt1.
Bt1	12/14-35	Dark brown to brown (7.5YR4/4); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few coarse vesicular pores; common fine, medium and coarse roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt2.
Bt2	35-54	Strong brown (7.5YR4/6); clay; moderate fine and medium subangular blocky structure and moderate coarse angular blocky structure; very firm, very sticky, very plastic; common fine and medium vesicular pores; few fine, common medium, few coarse few very coarse roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt3.
Bt3	54-70	Strong brown (7.5YR4/6); clay; strong fine, strong medium and moderate coarse angular blocky structure; very firm, very sticky, very plastic; few angular gravels (2-5 cm) of weathered shale; common fine, common medium and few coarse vesicular pores; few fine, common medium and few coarse roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt4.
Bt4	70-94	Strong brown (7.5YR4/6); clay; strong fine, strong medium and moderate coarse angular blocky structure; very firm, very sticky, very plastic; common fine and medium vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt5.
Bt5	94-118	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse angular blocky structure; very firm, very sticky, very plastic; common fine, common medium and few coarse vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt6.
Bt6	118-140	Dark yellowish brown (10YR4/4); slightly gravelly clay; moderate fine, medium and coarse angular blocky structure; very firm, very sticky, very plastic; common angular gravels (1-3 cm) of weathered shale; common fine, common medium and few very coarse vesicular pores; few medium, coarse and very coarse roots; strongly acid (field pH 5.4); clear and smooth boundary to BC1.
BC1	140-161/164	Dark yellowish brown (10YR4/4); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (0.5-5 cm) of weathered shale; common fine, common medium and few very coarse vesicular pores; few medium and coarse roots; moderately acid (field pH 5.6); clear and wavy boundary to BC2.
BC2	161/164-222+	Dark yellowish brown (10YR4/4); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (0.5-7 cm) and common angular stones (8-12 cm) of weathered shale; common fine and medium vesicular pores; few medium roots; moderately acid (field pH 5.6).

Pedon 2**I Information on the Site**

Profile symbol	: Pedon 2
Soil name	: Huai Suea Thao series 2 (tentative)
Classification	: Typic Paleustalf, fine, mixed, subactive, isohyperthermic
Date of examination	: May 24, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 200 m west from Ban Huai Suea Thao. Tambon Pha Bong. Mueang District. Mae Hong Son Province. Approximately 19° 15' 28" N. 97° 54' 03" E. (Grid Reference: 844300, Sheet: 4547 I)
Elevation	: 270 m (MSL)
Landform	
1. Physiographic position	: Lower backslope
2. Surrounding landform	: Low relief mountain
3. Slope on which profile site	: Steep (36%), N 66° E aspect
Vegetation and Landuse	: Under mixed deciduous forest. Land is also used for tropical orchard (mango)
Annual rainfall	: Approximately 1,344.7 mm
Mean temperature	: Approximately 22.9°C
Other	: Nil

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with limestone in Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Moderately sheet erosion and slightly rill erosion.
Human influence	: Plough layer, small amounts farmyard manure and lime is used

III Profile Description

Horizon	Depth (cm)	Description
Ap	0-8/14	Dark brown (10YR4/3); slightly gravelly clay loam; weak fine granular structure and moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (0.5-2 cm) of weathered shale; common fine, common medium and few coarse vesicular pores; common fine and medium roots; moderately acid (field pH 6.0); clear and

		wavy boundary to Bt1.
Bt1	8/14-30	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and common very coarse vesicular pores; few fine, common medium and few coarse roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt2.
Bt2	30-59	Strong brown (7.5YR5/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few fine, medium, coarse and very coarse roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt 3.
Bt3	59-88	Strong brown (7.5YR5/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common round stones (8-10 cm) of strongly weathered shale; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt4.
Bt4	88-111	Strong brown (7.5YR5/6); clay; moderate fine and medium subangular blocky structure and moderate medium angular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt5.
Bt5	111-137	Strong brown (7.5YR5/6); clay; moderate fine and medium angular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt6.
Bt6	137-165/168	Strong brown (7.5YR5/8); clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common round stones (8-12 cm) of strongly weathered shale; common fine and medium vesicular pores; few medium and coarse roots; strongly acid (field pH 5.4); clear and wavy boundary to BC1.
BC1	165/168-201	Strong brown (7.5YR5/8); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; many angular gravels (1-3 cm) of weathered shale; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to BC2.
BC2	201-230+	Strong brown (7.5YR5/8); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; many angular gravels (1-3 cm) of weathered shale; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4).

Pedon 3**I Information on the Site**

Profile symbol	: Pedon 3
Soil name	: Huai Nam Pong series 1 (tentative)
Classification	: Typic Haplustult, fine, mixed, subactive, isohyperthermic
Date of examination	: May 27, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 500 m north from Ban Huai Nam Pong. Tambon Na Pu Pom. Pang Mapha District. Mae Hong Son Province. Approximately 19° 34' 10" N. 98° 07' 59" E. (Grid Reference: 091640, Sheet: 4648 III)
Elevation	: 460 m (MSL)
Landform	
1. Physiographic position	: Middle backslope
2. Surrounding landform	: Low relief mountain
3. Slope on which profile site	: Moderately steep (25%), S 84° E aspect
Vegetation and Landuse	: Under mixed deciduous forest. Land is also used for watershed forest protected area
Annual rainfall	: Approximately 1,344.7 mm
Mean temperature	: Approximately 22.9°C
Other	: Forest fire caused by human in the dry season

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with sandstone in Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Moderately sheet erosion
Human influence	: Nil

III Profile Description

Horizon	Depth (cm)	Description
A	0-5/7	Dark brown (10YR4/3); clay loam; moderate fine and weak medium granular structure and moderately fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium vesicular pores; common fine and many medium roots; moderately acid (field pH 5.6); clear and wavy boundary to BA.
BA	5/7-14/17	Dark yellowish brown (10YR4/4); clay loam; weak fine granular structure and moderate fine and medium subangular blocky

		structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; common fine and medium roots; strongly acid (field pH 5.2); clear and wavy boundary to Bt1.
Bt1	14/17-31	Strong brown (7.5YR4/6); clay; moderate fine and medium subangular structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; common fine and medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt2.
Bt2	31-53	Yellowish red (5YR4/6); clay; moderate fine and medium subangular structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few fine and common medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt3.
Bt3	53-76	Yellowish red (5YR4/6); clay; moderate fine, medium and coarse subangular structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt4.
Bt4	76-101	Yellowish red (5YR4/6); clay; moderate fine, medium and coarse subangular structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to BC.
BC	101-132	Yellowish red (5YR4/6) with strong brown (7.5YR5/8); gravelly clay; moderate fine and medium subangular structure and moderate coarse angular structure; firm, moderately sticky, moderately plastic; common round gravels (1-3 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Cr.
Cr	132-150	Strong brown (7.5YR5/8) with brownish yellow (10YR6/8); gravelly clay; moderate fine, medium and coarse angular structure; firm, moderately sticky, moderately plastic; many angular gravels (2-5 cm) of weathered shale; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to R.
R	150-213+	Fresh shale.

Pedon 4**I Information on the Site**

Profile symbol	: Pedon 4
Soil name	: Huai Nam Pong series 2 (tentative)
Classification	: Typic Paleustalf, very-fine, mixed, subactive, isohyperthermic
Date of examination	: May 27, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 300 m west from Ban Huai Nam Pong. Tambon Na Pu Pom. Pang Mapha District. Mae Hong Son Province. Approximately 19° 33' 52" N. 98° 07' 55" E. (Grid Reference: 089638, Sheet: 4648 III)
Elevation	: 410 m (MSL)
Landform	
1. Physiographic position	: Lower backslope
2. Surrounding landform	: Low relief mountain
3. Slope on which profile site	: Moderately steep (24%), S 62° E aspect
Vegetation and Landuse	: Under mixed deciduous forest. Land is also used for tropical orchard (mango)
Annual rainfall	: Approximately 1,344.7 mm
Mean temperature	: Approximately 22.9°C
Other	: Nil

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with limestone in Carboniferous period
Drainage	: Moderately well drained to well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Moderately sheet erosion and slightly rill erosion
Human influence	: Plough layer, small amounts farmyard manure is used.

III Profile Description

Horizon	Depth (cm)	Description
Ap	0-10/14	Dark brown (10YR4/3); clay loam; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few coarse vesicular pores; common fine, common medium, few coarse and few very coarse roots; strongly acid (field pH 5.4); clear and wavy boundary to Bt1.

Bt1	10/14-28	Dark yellowish brown (10YR4/4); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; common fine and medium roots; very strongly acid (field pH 5.0); clear and smooth boundary to Bt2.
Bt2	28-54	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; very firm, very sticky, very plastic; common fine, medium and very coarse vesicular pores; few fine and medium roots; very strongly acid (field pH 5.0); clear and smooth boundary to Bt3.
Bt3	54-68/75	Strong brown (7.5YR4/6); slightly gravelly clay; moderate fine and medium subangular blocky structure and moderate medium and coarse angular blocky structure; very firm, very sticky, very plastic; common angular gravels (1-3 cm) of weathered shale; common fine and medium vesicular pores; few medium roots; very strongly acid (field pH 5.0); clear and wavy boundary to Bt4.
Bt4	68/75-95	Strong brown (7.5YR4/6) with yellowish brown (10YR5/6); gravelly clay; strong fine, strong medium and moderate coarse angular blocky structure; very firm, very sticky, very plastic; many angular gravels (1-3 cm) of weathered shale; common fine and few medium vesicular pores; few medium roots; strongly acid (field pH 5.2); clear and smooth boundary to BC1.
BC1	95-127	Strong brown (7.5YR4/6) with brownish yellow (10YR6/8); gravelly clay; strong fine, strong medium and moderate coarse angular blocky structure; firm, moderately sticky, moderately plastic; many angular gravels (1-3 cm) of weathered shale; common fine and few medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to BC2.
BC2	127-154	Strong brown (7.5YR5/6), brownish yellow (10YR6/8) and brown pale (10YR6/3); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; many angular gravels (1-3 cm) of weathered shale; common fine and few medium vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to Cr.
Cr	154-183	Strong brown (7.5YR5/6), brownish yellow (10YR6/8) and brown pale (10YR6/3); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; many angular gravels (1-3 cm) and common angular stones (10-20 cm) of weathered shale; common fine and few medium vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to R.
R	183-215+	Fresh shale.

Pedon 5**I Information on the Site**

Profile symbol	: Pedon 5
Soil name	: Ruam Thai series 1 (tentative)
Classification	: Typic Paleudult, fine, kaolinitic, subactive, isothermic
Date of examination	: May 25, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 500 m southeast from Ban Ruam Thai. Tambon Mok Jum Pae. Mueang District. Mae Hong Son Province. Approximately 19° 29' 45" N. 97° 55' 05" E. (Grid Reference: 862562, Sheet: 4547 I)
Elevation	: 1,160 m (MSL)
Landform	
1. Physiographic position	: Middle backslope
2. Surrounding landform	: Mountainous
3. Slope on which profile site	: Moderately steep (34%), N 34° W aspect
Vegetation and Landuse	: Under hill evergreen forest. Land is also used for watershed forest protected area
Annual rainfall	: Approximately 1,732.0 mm
Mean temperature	: Approximately 20.0°C
Other	: Nil

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with sandstone in Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Slightly sheet erosion
Human influence	: Nil

III Profile Description

Horizon	Depth (cm)	Description
A	0-8/10	Very dark grayish brown (10YR3/2); clay loam; moderate fine and weak medium granular structure and moderate fine subangular blocky structure; friable, slightly sticky, slightly plastic; common fine and medium vesicular pores; common fine and medium roots; very strongly acid (field pH 4.8); clear and wavy boundary to BA.
BA	8/10-30	Dark brown to brown (7.5YR4/4); clay; moderate fine, moderate medium and weak coarse subangular blocky structure; firm,

		moderately sticky, moderately plastic; common fine, common medium, few coarse and few very coarse vesicular pores; common fine, common medium and few coarse roots; very strongly acid (field pH 4.8); clear and smooth boundary to Bt1.
Bt1	30-45	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium, few coarse and few very coarse vesicular pores; few fine, medium and coarse roots; very strongly acid (field pH 4.8); clear and smooth boundary to Bt2.
Bt2	45-76	Strong brown (7.5YR5/6); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; few fine, medium and coarse roots; very strongly acid (field pH 4.8); clear and smooth boundary to Bt3.
Bt3	76-101	Strong brown (7.5YR5/6); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; few fine and medium roots; very strongly acid (field pH 4.6); clear and smooth boundary to Bt4.
Bt4	101-123/128	Strong brown (7.5YR5/6); slightly gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; very strongly acid (field pH 4.8); clear and wavy boundary to Bt5.
Bt5	123/128-150	Strong brown (7.5YR5/6); slightly gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-4 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; very strongly acid (field pH 5.0); clear and smooth boundary to Bt6.
Bt6	150-170/175	Strong brown (7.5YR5/6); slightly gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-4 cm) of weathered shale and sandstone; common fine, common medium and few very coarse vesicular pores; few medium roots; strongly acid (field pH 5.2); clear and wavy boundary to Bt7.
Bt7	170/175-204+	Strong brown (7.5YR5/6); slightly gravelly clay; moderate fine and medium subangular blocky structure and moderate coarse angular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.2).

Pedon 6**I Information on the Site**

Profile symbol	: Pedon 6
Soil name	: Ruam Thai series 2 (tentative)
Classification	: Typic Hapludult, fine, kaolinitic, subactive, isothermic
Date of examination	: May 25, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 100 m south from Ban Ruam Thai. Tambon Mok Jum Pae. Mueang District. Mae Hong Son Province. Approximately 19° 29' 52" N. 97° 54' 46" E. (Grid Reference: 859564, Sheet: 4547 I)
Elevation	: 1,150 m (MSL)
Landform	
1. Physiographic position	: Middle backslope
2. Surrounding landform	: Mountainous
3. Slope on which profile site	: Moderately steep (22%), S 12° E aspect
Vegetation and Landuse	: Under hill evergreen forest. Land is also used for temperate orchard (peach and japanese apricot)
Annual rainfall	: Approximately 1,732.0 mm
Mean temperature	: Approximately 20.0°C
Other	: Bench terrace

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with sandstone in Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Slightly sheet erosion
Human influence	: Bench terrace and plough layer, small amounts farmyard manure and lime is used

III Profile Description

Horizon	Depth (cm)	Description
Ap	0-14/17	Dark brown to brown (7.5YR4/4); slightly gravelly clay loam; weak fine granular structure and moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine, common medium and few coarse vesicular pores; common fine and many medium roots; very

BA	14/17-33	strongly acid (field pH 4.8); clear and wavy boundary to BA. Strong brown (7.5YR4/6); gravelly clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine, common medium and few coarse vesicular pores; common fine and many medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt1.
Bt1	33-55	Yellowish red (5YR4/6); gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine, common medium and few coarse vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt2.
Bt2	55-82	Yellowish red (5YR4/6); very gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, slightly plastic; many round gravels (1-4 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few fine and common medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt3.
Bt3	82-103	Red (2.5YR4/6); gravelly clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to 2Bt4.
2Bt4	103-127	Yellowish red (5YR4/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few very coarse vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to 2Bt5.
2Bt5	127-148	Yellowish red (5YR4/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to 2Bt6.
2Bt6	148-169	Yellowish red (5YR4/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to 2Bt7.
2Bt7	169-200+	Yellowish red (5YR4/6); clay; moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4).

Pedon 7**I Information on the Site**

Profile symbol	: Pedon 7
Soil name	: Pho No Khi series 1 (tentative)
Classification	: Typic Paleudult, very-fine, kaolinitic, subactive, isothermic
Date of examination	: May 28, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 300 m east from Ban Pho No Khi. Tambon Huai Pong. Mueang District. Mae Hong Son Province. Approximately 18° 56' 54" N. 98° 04' 50" E. (Grid Reference: 031956, Sheet: 4646 IV)
Elevation	: 1,210 m (MSL)
Landform	
1. Physiographic position	: Middle backslope
2. Surrounding landform	: Mountainous
3. Slope on which profile site	: Steep (40%), S 80° W aspect
Vegetation and Landuse	: Under hill evergreen forest. Land is also used for watershed forest protected area
Annual rainfall	: Approximately 1,732.0 mm
Mean temperature	: Approximately 20.0°C
Other	: Nil

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with sandstone in Silurian to Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Slightly sheet erosion
Human influence	: Nil

III Profile Description

Horizon	Depth (cm)	Description
A	0-9/12	Dark brown (10YR4/3); clay loam; moderate fine granular structure and moderate fine and medium subangular blocky structure; friable, slightly sticky, slightly plastic; common fine, medium and coarse vesicular pores; common fine and many medium roots; very strongly acid (field pH 5.0); clear and wavy boundary to BA.
BA	9/12-26	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse

		subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few coarse vesicular pores; few fine, common medium and few very coarse roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt1.
Bt1	26-48	Strong brown (7.5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; very firm, very sticky, very plastic; common fine, common medium and few coarse vesicular pores; few fine and common medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt2.
Bt2	48-62/74	Yellowish red (5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; very firm, very sticky, very plastic; common fine, common medium, few coarse and few very coarse vesicular pores; few fine and medium roots; strongly acid (field pH 5.2); clear and wavy boundary to Bt3.
Bt3	62/74-92	Yellowish red (5YR4/6); slightly gravelly clay; moderate fine, medium and coarse subangular blocky structure; very firm, very sticky, very plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine, common medium and few coarse vesicular pores; few medium and coarse roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt4.
Bt4	92-120	Red (2.5YR4/8); slightly gravelly clay; moderate fine and medium subangular blocky structure and moderate coarse angular blocky structure; very firm, very sticky, very plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine, common medium and few very coarse vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt5.
Bt5	120-144	Red (2.5YR4/8); gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to 2Bt6.
2Bt6	144-171	Yellowish red (5YR5/6); clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common fine and few medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to 2Bt7.
2Bt7	171-205+	Yellowish red (5YR5/8); slightly gravelly clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common round gravels (1-2 cm) of weathered shale and sandstone; common fine and few medium vesicular pores; few medium roots; strongly acid (field pH 5.4).

Pedon 8**I Information on the Site**

Profile symbol	: Pedon 8
Soil name	: Pho No Khi series 2 (tentative)
Classification	: Typic Paleudult, fine, kaolinitic, subactive, isothermic
Date of examination	: May 28, 2007
Described by	: Niwat Anongrak, Boondeaw Boonmun, Chackapong Chaiwong, Ninlaphat Khongphaung, Pasakorn Kawichai and Phattapong Manajuti
Location	: Approximately 100 m north from Ban Pho No Khi. Tambon Huai Pong. Mueang District. Mae Hong Son Province. Approximately 18° 57' 15" N. 98° 04' 38" E. (Grid Reference: 028960, Sheet: 4646 IV)
Elevation	: 1,180 m (MSL)
Landform	
1. Physiographic position	: Lower backslope
2. Surrounding landform	: Mountainous
3. Slope on which profile site	: Strongly sloping (18%), N 50° E aspect
Vegetation and Landuse	: Under hill evergreen forest. Land is also used for temperate orchard (japanese apricot)
Annual rainfall	: Approximately 1,732.0 mm
Mean temperature	: Approximately 20.0°C
Other	: Nil

II General Information on the Soil

Parent material	: Derived " <i>in situ</i> " from shale interbedded with sandstone in Silurian to Carboniferous period
Drainage	: Well drained
Moisture condition in profile	: Moist throughout
Depth of ground water table	: Nil
Surface stones and rock outcrops	: No stones and rock outcrops
Evidence of erosion	: Moderately sheet erosion and slightly rill erosion
Human influence	: Plough layer, small amounts farmyard manure is used

III Profile Description

Horizon	Depth (cm)	Description
Ap	0-10/12	Dark brown (10YR4/3); clay loam; weak fine granular structure and moderate fine and medium subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium and few coarse vesicular pores; common fine and medium roots; strongly acid (field pH 5.2); clear and wavy boundary to BA.

BA	10/12-24	Dark brown to brown (7.5YR4/4); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few fine, common medium and few coarse roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt1.
Bt1	24-45	Reddish brown (5YR4/4); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine, common medium, few coarse and common very coarse vesicular pores; few fine and common medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt2.
Bt2	45-66/73	Yellowish red (5YR4/6); clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common fine and medium vesicular pores; few medium and coarse roots; strongly acid (field pH 5.2); clear and wavy boundary to Bt3.
Bt3	66/73-100	Yellowish red (5YR4/6); slightly gravelly clay, moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (1-3 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.2); clear and smooth boundary to Bt4.
Bt4	100-122	Red (2.5YR4/6); slightly gravelly clay; moderate fine, medium and coarse subangular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (1-4 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and smooth boundary to Bt5.
Bt5	122-160/163	Red (2.5YR4/6); gravelly clay; moderate fine and medium subangular blocky structure and moderate coarse angular blocky structure; firm, moderately sticky, moderately plastic; common angular gravels (1-5 cm) of weathered shale and sandstone; common fine and medium vesicular pores; few medium roots; strongly acid (field pH 5.4); clear and wavy boundary to 2Bt6.
2Bt6	160/163-187	Yellowish red (5YR5/6); clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common fine and few medium vesicular pores; few medium roots; moderately acid (field pH 5.6); clear and smooth boundary to 2Bt7.
2Bt7	187-210+	Yellowish red (5YR5/6); clay; moderate fine, medium and coarse angular blocky structure; firm, moderately sticky, moderately plastic; common fine and few medium vesicular pores; few medium roots; moderately acid (field pH 5.6).

ตารางภาคผนวกที่ 1 ผลการวิเคราะห์สมบัติทางกายภาพของดินที่ทำการศึกษา

Depth (cm)	Horizon	Particle size distribution (----- g kg ⁻¹ -----)		Texture class	Gravel content (%)	Bulk density (----- Mg m ⁻³ -----)	Particle density	Total porosity	FC	PWP	AWCA	K _{sat} (cm h ⁻¹)
		Sand (-----)	Silt Clay (-----)									
Pedon 1 Typic Paleustalf, very-fine, mixed, subactive, isohyperthermic												
0-12/14	A	117	389 494	clay	2.3	1.15	2.30	50.00	31.59	19.34	12.25	0.97
12/14-35	Bt1	70	358 572	clay	2.0	1.30	2.40	45.83	27.62	15.12	12.50	-
35-54	Bt2	65	295 640	clay	1.7	1.27	2.39	46.86	26.69	19.88	6.81	0.96
54-70	Bt3	82	274 644	clay	1.5	1.30	2.35	44.68	28.41	20.51	7.90	-
70-94	Bt4	78	306 616	clay	1.0	1.19	2.41	50.62	29.05	20.56	8.49	-
94-118	Bt5	100	324 576	clay	0.7	1.22	2.33	47.64	25.80	19.80	6.00	-
118-140	Bt6	84	344 572	clay	2.4	1.31	2.37	44.73	26.68	19.64	7.04	-
140-161/164	BC1	105	367 528	clay	25.8	1.26	2.35	46.38	25.36	18.55	6.81	-
161/164-222+	BC2	127	369 504	clay	24.2	1.37	2.34	41.45	25.25	17.82	7.43	-
Pedon 2 Typic Paleustalf, fine, mixed, subactive, isohyperthermic												
0-8/14	Ap	243	313 444	clay	6.2	1.29	2.38	45.80	24.41	15.18	9.23	1.53
8/14-30	Bt1	174	298 528	clay	2.7	1.40	2.30	39.13	25.39	18.86	6.53	-
30-59	Bt2	137	275 588	clay	1.7	1.49	2.37	37.13	24.56	20.45	4.11	0.54
59-88	Bt3	135	333 532	clay	1.5	1.36	2.37	42.62	26.68	18.85	7.83	-
88-111	Bt4	146	358 496	clay	1.3	1.47	2.39	38.49	24.71	18.11	6.60	-
111-137	Bt5	156	352 492	clay	1.6	1.44	2.40	40.00	24.14	18.17	5.97	-
137-165/168	Bt6	150	366 484	clay	2.2	1.41	2.36	40.25	24.26	18.20	6.06	-
165/168-201	BC1	170	366 464	clay	34.2	1.46	2.43	39.92	22.63	17.82	4.81	-
201-230+	BC2	165	397 438	clay	31.4	1.44	2.42	40.50	22.85	13.84	9.01	-

ตารางภาคผนวกที่ 1 (ต่อ)

Depth (cm)	Horizon	Particle size distribution (----- g kg ⁻¹ -----)		Texture class	Gravel content (%)	Bulk density (----- Mg m ⁻³ -----)	Particle density	Total porosity (----- % -----)	FC	PWP	AWCA	K _{sat} (cm h ⁻¹)
		Sand (-----)	Silt Clay (-----)									
Pedon 5 Typic Paleudult, fine, kaolinitic, subactive, isothermic												
0-8/10	A	420	188 392	clay loam	2.0	0.91	2.11	56.87	32.21	17.75	14.46	1.37
8/10-30	BA	401	175 424	clay	1.1	1.02	2.27	55.07	32.01	17.15	14.86	-
30-45	Bt1	388	176 436	clay	0.4	1.00	2.18	54.13	31.23	17.52	13.71	-
45-76	Bt2	406	190 404	clay	0.3	1.12	2.27	50.66	28.36	17.08	11.28	1.48
76-101	Bt3	406	150 444	clay	1.9	1.16	2.21	47.51	27.56	17.13	10.43	-
101-123/128	Bt4	410	178 412	clay	4.8	1.19	2.21	46.15	27.87	17.69	10.18	-
123/128-150	Bt5	404	200 396	clay loam	11.6	1.25	2.12	41.04	28.14	17.06	11.08	-
150-170/175	Bt6	399	205 396	clay loam	11.1	1.08	2.19	50.68	28.31	17.43	10.88	-
170/175-204+	Bt7	427	189 384	clay loam	6.9	1.23	2.48	50.40	28.92	17.40	11.52	-
Pedon 6 Typic Paleudult, fine, kaolinitic, subactive, isothermic												
0-14/17	Ap	202	157 641	clay	4.5	0.97	2.31	58.01	31.31	20.80	10.51	1.50
14/17-33	BA	208	184 607	clay	19.3	1.32	2.36	44.07	34.26	20.99	13.27	-
33-55	Bt1	210	149 641	clay	15.1	1.23	2.60	52.69	32.29	20.81	11.48	1.66
55-82	Bt2	281	187 532	clay	40.5	1.32	2.61	49.43	22.70	19.19	3.51	-
82-103	Bt3	260	228 512	clay	17.6	1.34	2.80	52.14	27.00	21.24	5.76	-
103-127	2Bt4	215	281 504	clay	1.9	1.25	2.70	53.70	31.33	22.15	9.18	-
127-148	2Bt5	203	305 492	clay	1.7	1.23	2.39	48.54	31.81	21.56	10.25	-
148-169	2Bt6	224	327 448	clay	2.4	1.18	2.60	54.62	32.22	21.04	11.18	-
169-200+	2Bt7	198	338 464	clay	2.2	1.19	2.46	51.63	34.27	22.16	12.11	-

ตารางภาคผนวกที่ 1 (ต่อ)

Depth (cm)	Horizon	Particle size distribution (----- g kg ⁻¹ -----)		Texture class	Gravel content (%)	Bulk density (----- Mg m ⁻³ -----)	Particle density	Total porosity	FC	PWP	AWCA	K _{sat} (cm h ⁻¹)
		Sand (-----)	Silt Clay (-----)									
Pedon 7 Typic Paleudult, very-fine, kaolinitic, subactive, isothermic												
0-9/12	A	145	287 568	clay	2.3	0.62	2.10	70.48	54.36	30.11	24.25	0.85
9/12-26	BA	173	219 608	clay	2.8	0.80	2.22	63.96	51.34	25.77	25.57	-
26-48	Bt1	174	166 660	clay	2.6	0.91	2.22	59.01	39.80	23.24	16.56	-
48-62/74	Bt2	175	177 648	clay	3.3	1.12	2.20	49.09	33.18	23.14	10.04	1.61
62/74-92	Bt3	176	200 624	clay	11.5	1.21	2.28	46.93	27.87	23.16	4.71	-
92-120	Bt4	184	180 636	clay	10.7	1.35	2.36	42.80	27.51	23.49	4.02	-
120-144	Bt5	195	221 584	clay	19.4	1.45	2.41	39.83	28.48	24.23	4.25	-
144-171	2Bt6	157	299 544	clay	3.6	1.30	2.63	50.57	30.00	25.55	4.45	-
171-205+	2Bt7	213	291 496	clay	11.1	1.38	2.50	44.80	33.73	23.60	10.13	-
Pedon 8 Typic Paleudult, fine, kaolinitic, subactive, isothermic												
0-10/12	Ap	367	132 502	clay	0.4	0.97	2.33	58.37	34.65	19.56	15.09	1.63
10/12-24	BA	260	103 637	clay	0.4	0.99	2.25	56.00	34.16	18.09	16.07	-
24-45	Bt1	373	112 515	clay	0.9	1.08	2.46	56.10	28.75	18.64	10.11	-
45-66/73	Bt2	382	94 524	clay	1.7	1.19	2.34	49.15	29.15	17.69	11.46	2.25
66/73-100	Bt3	370	114 516	clay	5.0	1.21	2.46	50.81	25.97	17.71	8.26	-
100-122	Bt4	384	120 496	clay	6.2	1.38	2.32	40.52	25.51	17.49	8.02	-
122-160/163	Bt5	405	156 438	clay	19.7	1.39	2.45	43.27	22.52	17.55	4.97	-
160/163-187	2Bt6	269	188 542	clay	0.8	1.34	2.63	49.05	26.75	16.05	10.70	-
187-210+	2Bt7	223	221 556	clay	1.0	1.33	2.44	45.49	33.08	22.79	10.29	-

ตารางภาคผนวกที่ 2 ผลการวิเคราะห์สมบัติทางเคมีของดินที่ทำการศึกษา

Depth (cm)	Horizon	pH 1:1		OM (---g kg ⁻¹ ----	Total N (---g kg ⁻¹ ----	Avai. P	Avai. K	Extractable bases				Sum bases cmol kg ⁻¹ -----	Extr. acidity	CEC		BS by sum (%)
		H ₂ O	KCl					Ca	Mg	Na	K			by sum	NH ₄ OAc	
Pedon 1 Typic Paleustalf, very-fine, mixed, subactive, isohyperthermic																
0-12/14	A	5.5	4.8	40.71	1.93	5.45	66.28	7.75	4.36	0.11	0.17	12.39	2.86	15.25	17.79	81.25
12/14-35	Bt1	5.2	4.2	16.49	0.97	2.11	34.28	3.75	3.57	0.15	0.09	7.56	3.10	10.66	12.74	70.92
35-54	Bt2	5.2	3.8	11.81	1.17	1.93	33.53	2.86	2.79	0.21	0.09	5.95	3.46	9.41	11.59	63.23
54-70	Bt3	5.2	3.8	9.25	0.92	1.93	50.08	2.40	2.21	0.20	0.13	4.94	3.15	8.09	11.48	61.06
70-94	Bt4	5.3	3.8	8.77	0.82	1.93	51.18	2.43	2.18	0.23	0.13	4.97	2.08	7.05	11.32	70.50
94-118	Bt5	5.3	3.8	8.07	0.75	2.28	24.45	2.78	2.18	0.22	0.06	5.24	2.69	7.93	11.43	66.08
118-140	Bt6	5.3	3.8	8.20	0.81	2.28	34.78	3.17	2.29	0.14	0.09	5.69	2.73	8.42	11.58	67.58
140-161/164	BC1	5.4	3.8	9.94	0.78	2.81	23.29	4.12	3.13	0.14	0.06	7.45	2.40	9.85	11.15	75.63
161/164-222+	BC2	5.4	3.7	7.34	0.64	3.34	26.35	3.06	2.17	0.13	0.07	5.43	2.69	8.12	11.80	66.87
Pedon 2 Typic Paleustalf, fine, mixed, subactive, isohyperthermic																
0-8/14	Ap	5.6	4.8	29.98	1.69	6.86	46.67	5.91	1.13	0.12	0.12	7.28	2.56	9.84	11.65	73.98
8/14-30	Bt1	5.2	3.8	15.89	1.16	3.51	28.04	1.69	0.49	0.13	0.07	2.38	2.74	5.12	8.71	46.48
30-59	Bt2	5.2	3.8	10.67	0.96	4.20	23.45	0.85	0.43	0.13	0.06	1.47	2.65	4.12	7.60	35.68
59-88	Bt3	5.2	3.8	12.30	0.93	4.75	23.16	1.18	0.22	0.14	0.06	1.60	1.89	3.49	7.05	45.85
88-111	Bt4	5.3	3.9	8.93	0.87	4.04	21.72	1.27	0.14	0.08	0.06	1.55	1.78	3.33	6.43	46.55
111-137	Bt5	5.3	3.9	7.89	0.84	5.80	15.80	1.73	0.12	0.09	0.04	1.98	1.85	3.83	6.48	51.70
137-165/168	Bt6	5.3	3.9	8.53	0.88	2.63	14.04	1.62	0.11	0.07	0.04	1.84	2.12	3.96	6.71	46.46
165/168-201	BC1	5.4	3.9	7.51	0.84	2.81	13.98	2.02	0.12	0.10	0.04	2.28	2.30	4.58	6.79	49.78
201-230+	BC2	5.4	3.9	6.74	0.90	2.63	13.48	1.96	0.09	0.13	0.03	2.21	1.95	4.16	6.62	53.13

ตารางภาคผนวกที่ 2 (ต่อ)

Depth (cm)	Horizon	pH 1:1		OM (---g kg ⁻¹ ----	Total N (---g kg ⁻¹ ----	A vai. P (---mg kg ⁻¹ ----	A vai. K	Extractable bases				Sum bases cmol kg ⁻¹ -----	Extr. acidity	CEC		BS by sum (%)
		H ₂ O	KCl					Ca	Mg	Na	K			by sum	NH ₄ OAc	
Pedon 5 Typic Paleudult, fine, kaolinitic, subactive, isothermic																
0-8/10	A	4.5	4.0	68.48	2.81	20.06	106.46	1.67	0.32	0.14	0.27	2.40	7.23	9.63	15.98	24.92
8/10-30	BA	4.5	3.9	28.64	1.38	8.62	20.06	0.10	0.06	0.12	0.05	0.33	4.42	4.75	7.80	6.95
30-45	Bt1	4.6	3.8	21.89	0.74	7.56	16.99	0.09	0.06	0.13	0.04	0.32	3.56	3.88	7.19	8.25
45-76	Bt2	4.8	3.7	10.70	0.46	8.80	8.41	0.09	0.03	0.12	0.02	0.26	2.85	3.11	4.60	8.36
76-101	Bt3	4.8	3.7	10.71	0.38	3.43	8.15	0.08	0.03	0.12	0.02	0.25	2.74	2.99	5.40	8.36
101-123/128	Bt4	5.0	4.1	8.46	0.36	7.92	4.86	0.18	0.04	0.17	0.01	0.40	2.30	2.70	4.49	14.81
123/128-150	Bt5	5.0	4.1	6.70	0.18	5.28	9.06	0.16	0.03	0.15	0.02	0.36	2.30	2.66	4.26	13.53
150-170/175	Bt6	5.0	4.1	6.55	0.27	3.69	8.36	0.20	0.03	0.17	0.02	0.42	2.17	2.59	4.36	16.22
170/175-204+	Bt7	5.1	4.2	5.41	0.23	4.04	7.24	0.25	0.04	0.17	0.02	0.48	2.16	2.64	4.34	18.18
Pedon 6 Typic Paleudult, fine, kaolinitic, subactive, isothermic																
0-14/17	Ap	4.5	4.0	49.75	2.27	7.92	91.74	0.49	0.19	0.13	0.23	1.04	6.55	7.59	12.41	13.70
14/17-33	BA	4.8	4.0	34.33	1.55	3.51	21.76	0.17	0.06	0.13	0.06	0.42	5.15	5.57	10.47	7.54
33-55	Bt1	5.1	4.1	20.62	0.93	3.16	16.83	0.15	0.05	0.11	0.04	0.35	3.51	3.86	5.19	9.07
55-82	Bt2	5.2	4.4	11.50	0.53	3.34	7.60	0.13	0.06	0.11	0.02	0.32	2.63	2.95	3.48	10.85
82-103	Bt3	5.3	4.7	8.45	0.18	2.46	6.52	0.17	0.10	0.12	0.02	0.41	2.16	2.57	3.17	15.95
103-127	2Bt4	5.4	4.5	7.53	0.30	1.93	6.78	0.19	0.07	0.11	0.02	0.39	2.58	2.97	3.57	13.13
127-148	2Bt5	5.5	4.1	6.82	0.23	2.81	8.12	0.24	0.05	0.10	0.02	0.41	2.14	2.55	3.67	16.08
148-169	2Bt6	5.4	4.0	5.56	0.18	2.61	12.08	0.30	0.04	0.10	0.03	0.47	2.08	2.55	3.96	18.43
169-200+	2Bt7	5.4	4.1	4.83	0.23	1.75	18.21	0.26	0.03	0.09	0.05	0.43	2.36	2.79	4.43	15.41

ตารางภาคผนวกที่ 2 (ต่อ)

Depth (cm)	Horizon	pH 1:1		OM (--- g kg ⁻¹ ---)	Total N (--- g kg ⁻¹ ---)	A vai. P (--- mg kg ⁻¹ ---)	A vai. K	Extractable bases				Sum bases cmol kg ⁻¹	Extr. acidity	CEC		BS by sum (%)
		H ₂ O	KCl					Ca	Mg	Na	K			by sum	NH ₄ OAc	
Pedon 7 Typic Paleudult, very-fine, kaolinitic, subactive, isothermic																
0-9/12	A	4.9	3.8	90.28	3.53	11.96	43.67	0.08	0.11	0.15	0.11	0.45	8.63	9.08	22.38	4.96
9/12-26	BA	5.2	4.1	52.71	2.14	8.44	33.08	0.07	0.10	0.12	0.08	0.37	6.72	7.09	15.06	5.22
26-48	Bt1	5.2	4.1	28.79	1.16	5.45	23.32	0.05	0.04	0.14	0.06	0.29	4.67	4.96	10.11	5.85
48-62/74	Bt2	5.1	4.2	11.20	0.59	4.57	12.31	0.06	0.03	0.11	0.03	0.23	3.11	3.34	6.34	6.89
62/74-92	Bt3	5.3	4.2	9.72	0.41	2.11	9.28	0.04	0.02	0.09	0.02	0.17	2.73	2.90	5.97	5.86
92-120	Bt4	5.4	4.1	4.63	0.18	5.10	8.08	0.06	0.02	0.08	0.02	0.18	1.64	1.82	4.32	9.89
120-144	Bt5	5.3	4.1	3.38	0.20	7.74	6.42	0.07	0.03	0.06	0.02	0.18	2.10	2.28	4.30	7.89
144-171	2Bt6	5.4	4.0	3.60	0.13	5.28	8.64	0.06	0.01	0.05	0.02	0.14	2.16	2.30	3.99	6.09
171-205+	2Bt7	5.4	4.1	3.35	0.04	4.82	6.64	0.05	0.02	0.11	0.02	0.20	1.86	2.06	3.82	9.71
Pedon 8 Typic Paleudult, fine, kaolinitic, subactive, isothermic																
0-10/12	Ap	5.0	4.2	53.80	1.89	13.73	68.80	0.26	0.28	0.12	0.18	0.84	6.73	7.57	15.40	11.10
10/12-24	BA	5.0	4.2	36.04	1.49	3.87	30.12	0.08	0.10	0.13	0.08	0.39	5.01	5.40	10.36	7.22
24-45	Bt1	5.0	4.2	19.49	0.92	2.81	17.63	0.07	0.06	0.14	0.05	0.32	3.91	4.23	7.58	7.57
45-66/73	Bt2	5.1	4.2	12.38	0.59	5.63	10.64	0.07	0.03	0.12	0.03	0.25	3.01	3.26	5.74	7.67
66/73-100	Bt3	5.2	4.3	7.99	0.43	5.45	9.35	0.14	0.09	0.11	0.02	0.36	2.27	2.63	5.02	13.69
100-122	Bt4	5.3	4.3	6.34	0.34	2.63	10.12	0.14	0.08	0.11	0.03	0.36	1.95	2.31	3.84	15.58
122-160/163	Bt5	5.4	4.2	4.85	0.25	2.99	9.64	0.14	0.06	0.08	0.02	0.30	1.42	1.72	2.78	17.44
160/163-187	2Bt6	5.5	4.1	4.96	0.23	1.75	7.82	0.15	0.09	0.08	0.02	0.34	2.36	2.70	4.30	12.59
187-210+	2Bt7	5.4	4.1	4.60	0.24	1.58	9.73	0.12	0.10	0.13	0.02	0.37	2.06	2.43	4.62	15.23

ตารางภาคผนวกที่ 3 การแบ่งกลุ่มของเนื้อดิน (เอิบ, 2547; Soil Survey Division Staff, 1993)

คำเรียกทั่วไป	ลักษณะเนื้อดิน	ชั้นเนื้อดินต่างๆ (texture classes)
ดินทราย (sandy soils)	เนื้อหยาบ (coarse textured)	ได้แก่ ทรายชนิดต่างๆ (ทรายหยาบ ทรายละเอียด ทรายละเอียดมาก) ทรายปนดินร่วนชนิดต่างๆ (ทรายหยาบปนดินร่วน ทรายปนดินร่วน ทรายละเอียดปนดินร่วน และทรายละเอียดมากปนดินร่วน)
ดินร่วน (loamy soils)	เนื้อหยาบปานกลาง (moderately coarse-textured)	ได้แก่ ดินร่วนปนทรายหยาบ ดินร่วนปนทราย ดินร่วนปนทรายละเอียด
	เนื้อปานกลาง (medium-textured)	ได้แก่ ดินร่วนปนทรายละเอียดมาก ดินร่วน ดินร่วนปนทรายแป้ง และทรายแป้ง
	เนื้อละเอียดปานกลาง (moderately fine-textured)	ได้แก่ ดินร่วนเหนียว ดินร่วนเหนียวปนทราย ดินร่วนเหนียวปนทรายแป้ง
ดินเหนียว (clayey soils)	เนื้อละเอียด (fine textured)	ได้แก่ ดินเหนียวปนทราย ดินเหนียวปนทรายแป้ง และดินเหนียว

ตารางภาคผนวกที่ 4 เกณฑ์การแบ่งระดับความหนาแน่นรวมของดิน (นงคราญ, 2529)

ระดับ (rating)	ฟิลล์ (Mg m^{-3})
ต่ำ	< 1.2
ค่อนข้างต่ำ	1.2-1.4
ปานกลาง	1.4-1.6
ค่อนข้างสูง	1.6-1.8
สูง	1.8-2.0
สูงมาก	> 2.0

ตารางภาคผนวกที่ 5 เกณฑ์การแบ่งระดับค่าการนำน้ำของดินในสภาพอิ่มตัว (K_{sat}) (Soil Survey Division Staff, 1993)

ระดับ (rating)	ฟิลล์	
	$\mu\text{m s}^{-1}$	cm hr^{-1}
ต่ำมาก	< 0.01	< 0.0036
ต่ำ	0.01-0.1	0.0036-0.036
ค่อนข้างต่ำ	0.1-1	0.036-0.36
ค่อนข้างสูง	1-10	0.36-3.6
สูง	10-100	3.6-36
สูงมาก	≥ 100	≥ 36

ตารางภาคผนวกที่ 6 ชื่อจำกัดต่างๆ ที่ใช้ในการประเมินระดับสมบัติทางเคมี และการประเมิน
ความอุดมสมบูรณ์ของดิน (Land Classification Division and FAO Project
Staff, 1973; Soil Survey Division Staff, 1993)

1. ปฏิกริยาของดิน (soil reaction), pH (ดิน : น้ำ = 1 : 1)

ระดับ (rating)	พิสัย (pH)
กรดรุนแรงมากที่สุด (ultra acid)	< 3.5
กรดรุนแรงมาก (extremely acid)	3.5-4.4
กรดจัดมาก (very strongly acid)	4.5-5.0
กรดจัด (strongly acid)	5.1-5.5
กรดปานกลาง (moderately acid)	5.6-6.0
กรดเล็กน้อย (slightly acid)	6.1-6.5
เป็นกลาง (neutral)	6.6-7.3
ด่างเล็กน้อย (slightly alkaline)	7.4-7.8
ด่างปานกลาง (moderately alkaline)	7.9-8.4
ด่างจัด (strongly alkaline)	8.5-9.0
ด่างจัดมาก (very strongly alkaline)	> 9.0

2. อินทรีย์วัตถุ (organic matter) (% organic carbon x 1.724)

ระดับ (rating)	พิสัย (g kg ⁻¹)
ต่ำมาก (very low)	< 5
ต่ำ (low)	5-10
ค่อนข้างต่ำ (moderately low)	10-15
ปานกลาง (medium)	15-25
ค่อนข้างสูง (moderately high)	25-35
สูง (high)	35-45
สูงมาก (very high)	> 45

3. ปริมาณ ไนโตรเจนรวม (total nitrogen)

ระดับ (rating)	พิสัย (g kg ⁻¹)
ต่ำมาก (very low)	< 1.0
ต่ำ (low)	1.0-2.0
ปานกลาง (medium)	2.0-5.0
สูง (high)	5.0-7.5
สูงมาก (very high)	> 7.5

4. ปริมาณฟอสฟอรัสที่เป็นประโยชน์ (available phosphorus) (Bray II)

ระดับ (rating)	พิสัย (mg kg ⁻¹)
ต่ำมาก (very low)	< 3
ต่ำ (low)	3-6
ค่อนข้างต่ำ (moderately low)	6-10
ปานกลาง (medium)	10-15
ค่อนข้างสูง (moderately high)	15-25
สูง (high)	25-45
สูงมาก (very high)	> 45

5. ปริมาณโพแทสเซียมที่เป็นประโยชน์ (available potassium) (NH₄OAc)

ระดับ (rating)	พิสัย (mg kg ⁻¹)
ต่ำมาก (very low)	< 30
ต่ำ (low)	30-60
ปานกลาง (medium)	60-90
สูง (high)	90-120
สูงมาก (very high)	> 120

6. ปริมาณแคลเซียมที่สกัดได้ (extractable calcium) (NH₄OAc)

ระดับ (rating)	พิสัย (cmol kg ⁻¹)
ต่ำมาก (very low)	< 2
ต่ำ (low)	2-5
ปานกลาง (medium)	5-10
สูง (high)	10-20
สูงมาก (very high)	> 20

7. ปริมาณแมกนีเซียมที่สกัดได้ (extractable magnesium) (NH₄OAc)

ระดับ (rating)	พิสัย (cmol kg ⁻¹)
ต่ำมาก (very low)	< 0.3
ต่ำ (low)	0.3-1.0
ปานกลาง (medium)	1.0-3.0
สูง (high)	3.0-8.0
สูงมาก (very high)	> 8.0

8. ปริมาณ โขเดียมที่สกัดได้ (extractable sodium) (NH_4OAc)

ระดับ (rating)	พิสัย (cmol kg^{-1})
ต่ำมาก (very low)	< 0.1
ต่ำ (low)	0.1-0.3
ปานกลาง (medium)	0.3-0.7
สูง (high)	0.7-2.0
สูงมาก (very high)	> 2.0

9. ปริมาณ โพแทสเซียมที่สกัดได้ (extractable potassium) (NH_4OAc)

ระดับ (rating)	พิสัย (cmol kg^{-1})
ต่ำมาก (very low)	< 0.2
ต่ำ (low)	0.2-0.3
ปานกลาง (medium)	0.3-0.6
สูง (high)	0.6-1.2
สูงมาก (very high)	> 1.2

10. ปริมาณด่างที่สกัดได้ (extractable bases) (NH_4OAc)

ระดับ (rating)	พิสัย (cmol kg^{-1})
ต่ำมาก (very low)	< 2.6
ต่ำ (low)	2.6-6.6
ปานกลาง (medium)	6.6-14.3
สูง (high)	14.3-31.2
สูงมาก (very high)	> 31.2

11. ความจุแลกเปลี่ยนไอออนบวก (cation exchange capacity; CEC)

ระดับ (rating)	พิสัย (cmol kg^{-1})
ต่ำมาก (very low)	< 3
ต่ำ (low)	3-5
ค่อนข้างต่ำ (moderately low)	5-10
ปานกลาง (medium)	10-15
ค่อนข้างสูง (moderately high)	15-20
สูง (high)	20-30
สูงมาก (very high)	>30

12. การอิ่มตัวด้วยไอออนที่เป็นด่าง (base saturation)

ระดับ (rating)	พิสัย (cmol kg^{-1})
ต่ำ (low)	< 35
ปานกลาง (medium)	35-75
สูง (high)	> 75

ตารางภาคผนวกที่ 7 เกณฑ์การแบ่งระดับปริมาณความเป็นกรดที่สกัดได้ (extractable acidity)
(นงคราญ, 2529)

ระดับ (rating)	ฟิสัย (cmol kg ⁻¹)
ต่ำมาก	< 1
ต่ำ	1-2
ปานกลาง	2-5
ค่อนข้างสูง	5-10
สูง	10-20
สูงมาก	> 20

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
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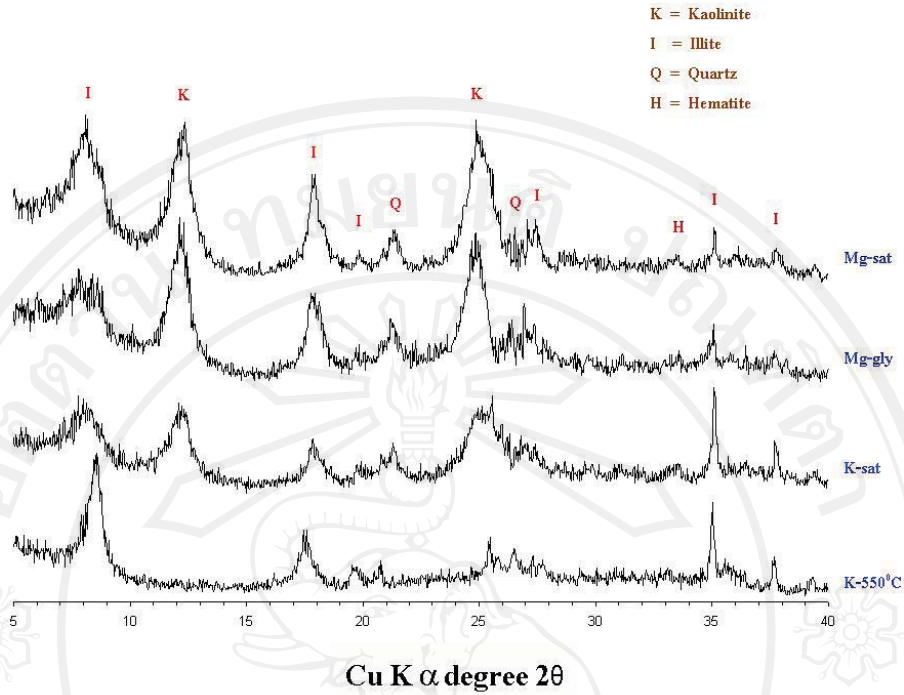
ตารางภาคผนวกที่ 8 X-ray diffraction spacing obtained from (001) planes of layer-silicate species as related to sample treatment (Whitting, 1965)

Diffraction spacing (nm)	Mineral (or minerals) Indicated
	<u>Mg-saturated, air dried</u>
1.4-1.5	Smectite, vermiculite, chlorite
0.99-1.01	Mica (illite), halloysite
0.72-0.75	Metahalloysite
0.715	Kaolinite, chlorite (2nd-order maximum)
	<u>Mg-saturated, glycerol-solvated</u>
1.77-1.80	Smectite
1.4-1.5	Vermiculite, chlorite
1.08	Halloysite
0.99-1.01	Mica (illite)
0.72-0.75	Metahalloysite
0.715	Kaolinite, chlorite (2nd-order maximum)
	<u>K-saturated, air-dried</u>
1.4-1.5	Chlorite, vermiculite (with interlayer aluminium)
1.24-1.28	Smectite
0.99-1.01	Mica (illite), halloysite, vermiculite (contracted)
0.72-0.75	Metahalloysite
0.715	Kaolinite, chlorite (2nd-order maximum)
	<u>K-saturated, heated (550⁰C)</u>
1.4	Chlorite
0.99-1.01	Mica, vermiculite (contracted), smectite (contracted)
0.715	Chlorite (2nd-order maximum)

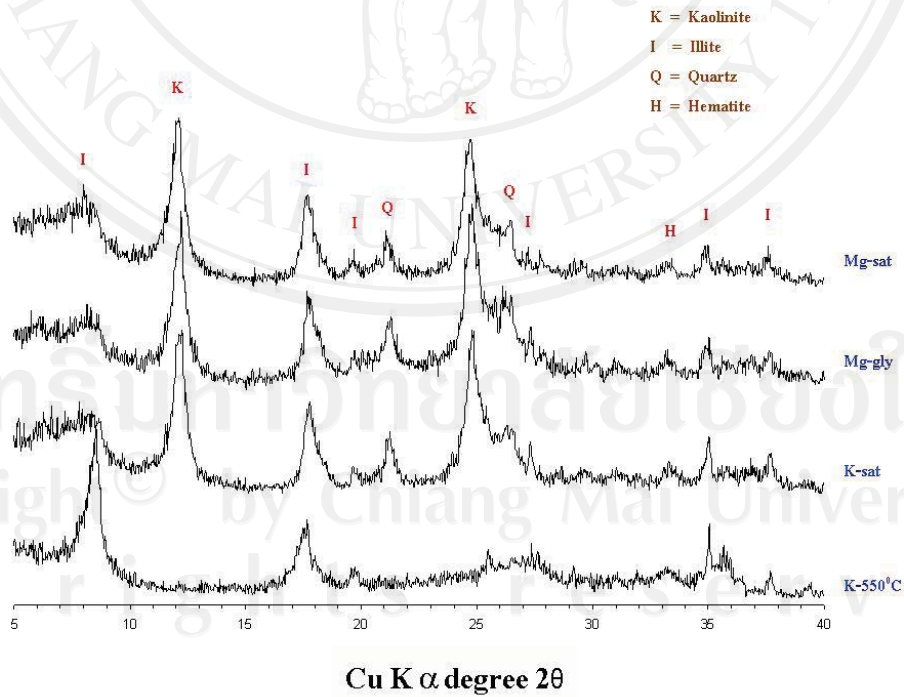
ตารางภาคผนวกที่ 9 วิธีคาดคะเนระดับความอุดมสมบูรณ์ของดิน โดยการประเมินจากผลการวิเคราะห์ดิน (ตัดแปลงจากกองสำรวจและจำแนกดิน, 2543)

ระดับความ อุดมสมบูรณ์ ของดิน	ปริมาณ อินทรีย์วัตถุ (g kg ⁻¹)	ปริมาณ ฟอสฟอรัส ที่เป็นประโยชน์ (mg kg ⁻¹)	ปริมาณ โพแทสเซียม ที่เป็นประโยชน์ (mg kg ⁻¹)	ความจุแลกเปลี่ยน ไอออนบวก (cmol kg ⁻¹)	อัตราร้อยละ ความอิ่มตัวบส (%)
ต่ำ	< 10 (1)	< 6 (1)	< 30 (1)	< 5 (1)	< 20 (1)
ค่อนข้างต่ำ	10-15 (2)	6-10 (2)	30-60 (2)	5-10 (2)	20-35 (2)
ปานกลาง	15-25 (3)	10-15 (3)	60-75 (3)	10-15 (3)	35-50 (3)
ค่อนข้างสูง	25-35 (4)	15-25 (4)	75-90 (4)	15-20 (4)	50-75 (4)
สูง	> 35 (5)	> 25 (5)	> 90 (5)	> 20 (5)	> 75 (5)

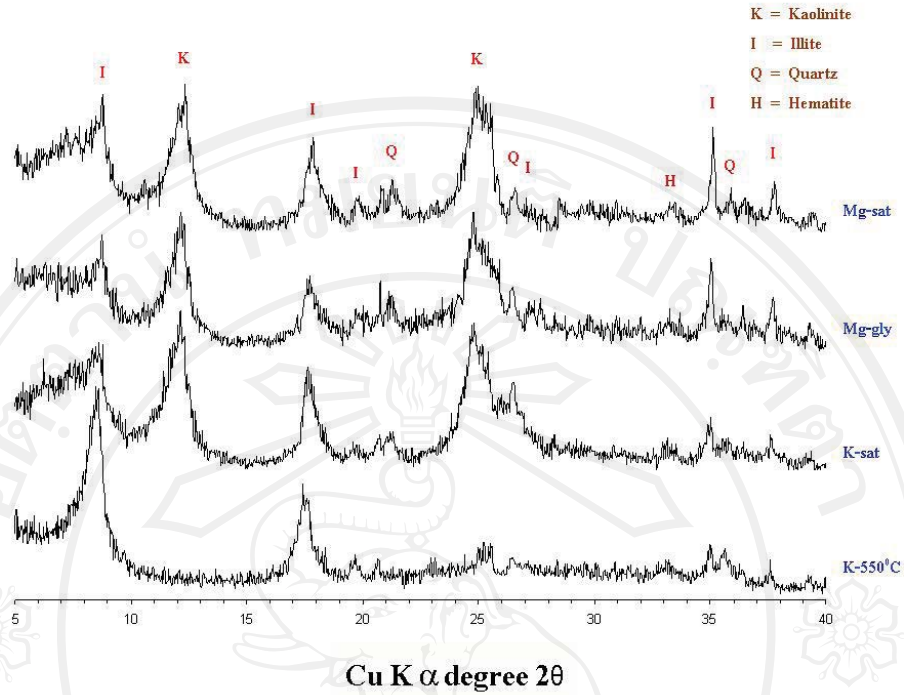
หมายเหตุ วิธีคิดระดับความอุดมสมบูรณ์ของดิน ใช้วิธีให้คะแนน (ตัวเลขคะแนนอยู่ในวงเล็บในตาราง)
 ถ้าคะแนนเท่ากับ 7 หรือน้อยกว่า ถือว่าดินมีระดับความอุดมสมบูรณ์ต่ำ
 ถ้าคะแนนอยู่ระหว่าง 8-12 ถือว่าดินมีระดับความอุดมสมบูรณ์ค่อนข้างต่ำ
 ถ้าคะแนนอยู่ระหว่าง 13-17 ถือว่าดินมีระดับความอุดมสมบูรณ์ปานกลาง
 ถ้าคะแนนอยู่ระหว่าง 18-22 ถือว่าดินมีระดับความอุดมสมบูรณ์ค่อนข้างสูง
 ถ้าคะแนนมากกว่า 23 ถือว่าดินมีระดับความอุดมสมบูรณ์สูง



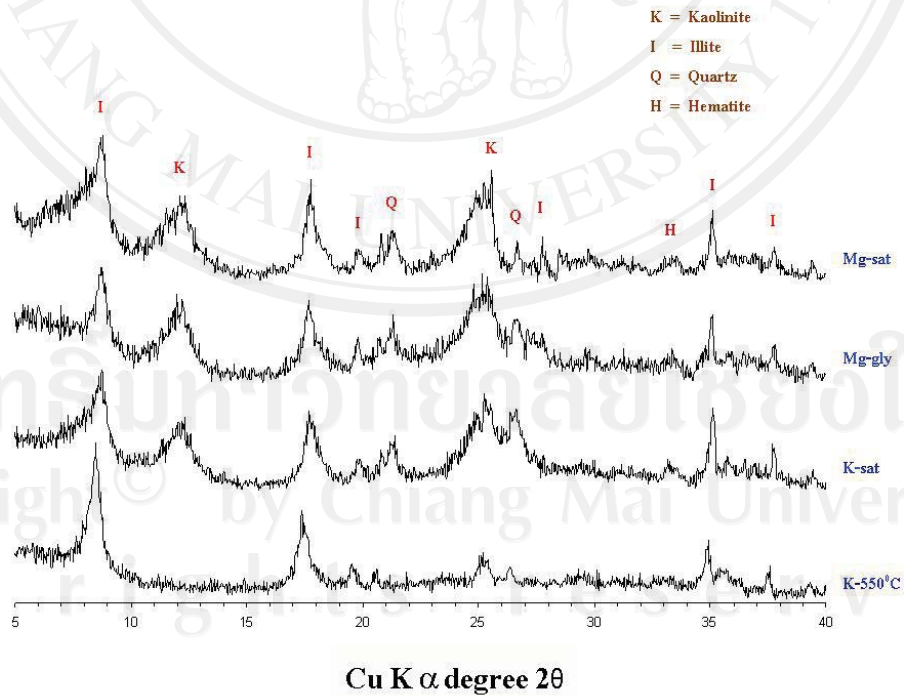
ภาพภาคผนวกที่ 1 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 1 ชั้น Bt2 ช่วงความถี่ 35-54 เซนติเมตร



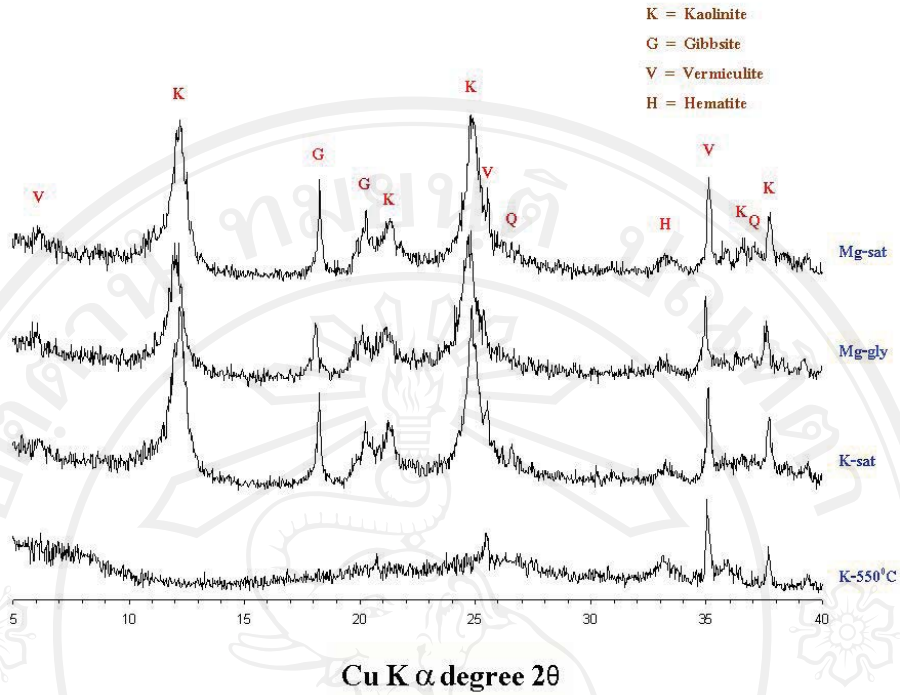
ภาพภาคผนวกที่ 2 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 2 ชั้น Bt2 ช่วงความถี่ 30-59 เซนติเมตร



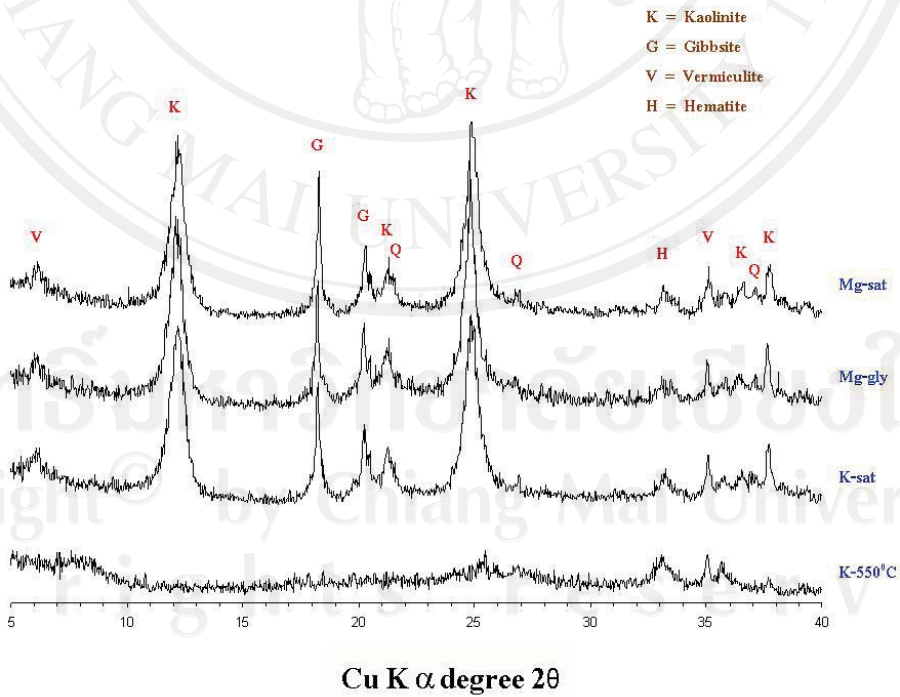
ภาพภาคผนวกที่ 3 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 3 ชั้น Bt2 ช่วงความลึก 31-53 เซนติเมตร



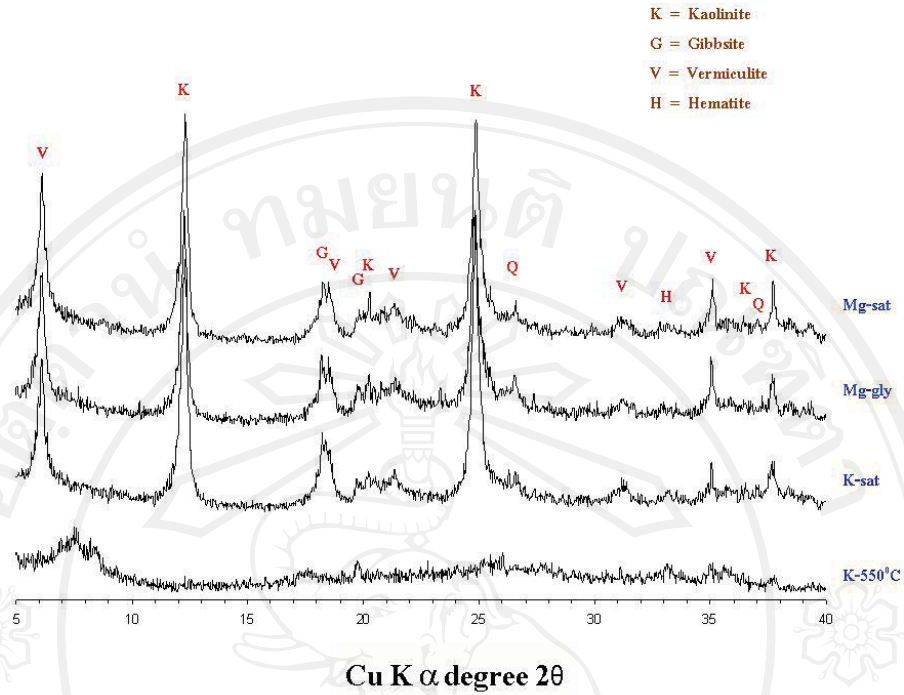
ภาพภาคผนวกที่ 4 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 4 ชั้น Bt2 ช่วงความลึก 28-54 เซนติเมตร



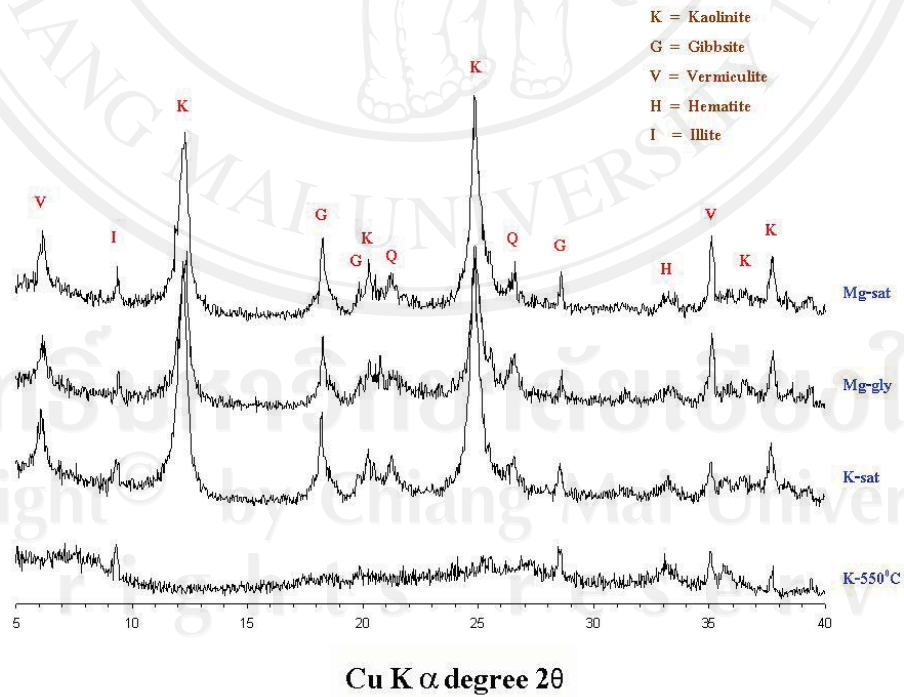
ภาพภาคผนวกที่ 5 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 5 ชั้น Bt1 ช่วงความลึก 30-45 เซนติเมตร



ภาพภาคผนวกที่ 6 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 6 ชั้น Bt1 ช่วงความลึก 33-55 เซนติเมตร



ภาพภาคผนวกที่ 7 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 7 ชั้น Bt1 ช่วงความลึก 26-48 เซนติเมตร



ภาพภาคผนวกที่ 8 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาคขนาดดินเหนียว ของพีคอน 8 ชั้น Bt2 ช่วงความลึก 45-66/73 เซนติเมตร

ประวัติผู้เขียน

ชื่อ - สกุล	นายบุญเดียว บุญหมั่น
วัน เดือน ปี เกิด	15 พฤษภาคม 2525
ประวัติการศึกษา	สำเร็จการศึกษาชั้นมัธยมศึกษาปีที่ 6 จากโรงเรียนปงพัฒนาวิทยาคม จังหวัดพะเยา ปีการศึกษา 2543 สำเร็จการศึกษาปริญญาตรี สาขาวิชาปฐพีศาสตร์และอนุรักษศาสตร์ คณะเกษตรศาสตร์ มหาวิทยาลัยเชียงใหม่ ปีการศึกษา 2547
ประวัติการทำงาน	ปี พ.ศ. 2552-ปัจจุบัน รัับราชการตำแหน่ง นักสำรวจดินปฏิบัติการ ส่วนวางแผนการใช้ที่ดิน สำนักงานพัฒนาที่ดินเขต 7 กรมพัฒนาที่ดิน กระทรวงเกษตรและสหกรณ์

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่
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