

ภาคผนวก

คำอธิบายหน้าตัดดิน (Soil profile description)

Pedon 1

I Information on the site

Profile symbol	: TL-U _s 1 (อยู่ในบริเวณหุดดินสกถนกร)
Classification	: Typic Plinthustalf, loamy-skeletal, mixed, isohyperthermic
Date of examination	: January 30, 2001
Location	: Suan Sak laterite borrow pit, Approximately 1 km North of Amphoe Ban Dan Lan Hoi-Tak road at Km 69-70 Ban Suan Pa, Tambon Wang Takror, Amphoe Lan Hoi, Sukhothai province.
Elevation	: Approximately 96 m (MSL)
Map sheet number	: 4943 III Coorination : 47 556719E, 1879502N
Landform	
1. Physiographic position	: Hill footslope
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 3% Aspect : SE-facing
Land use	: Mixed deciduous forest (degraded)
Annual rainfall	: Approximately 1,200 mm
Mean temperature	: Approximately 28°C
Climate	: Tropical savanna
Orther	: Engineering land use (borrow pit)

II General Information on the soil

Parent material	: Residuum derived from metasedimentary rocks
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
A	0-30	Mixed dark gray (10YR 4/1) 60% and brown (7.5YR 5/2) 40%; sandy loam; moderate fine and medium semi-angular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic; few very fine and fine vesicular pores; many very fine, fine and few medium roots; common variegated sands (mostly pink); slightly acid (field pH 6.5); abrupt, smooth boundary to Bt _c 1.
Bt _c	30-60	Mixed grayish brown (10YR 5/2) 50% and brown (10YR 5/3) 49%; few fine distinct brownish yellow (10YR 6/6) mottles; very gravelly sandy loam; moderate fine and medium semi-angular blocky structure; hard dry, firm moist, slightly sticky and slightly plastic; common clay bridges among sand grains and few faint

		clay coats on pore walls; common very fine and fine vesicular pores; common very fine, fine and medium roots; common variegated sand (mostly pink), few rock fragments of various sizes; neutral (field pH 7.0); abrupt, smooth boundary to Bv1.
Bv1	60-90	Mixed very pale brown (10YR 7/4) 40%, black (5YR 2.5/1) 25%, yellowish brown (10YR 5/8) 20% and red (2.5YR 4/8) 10%; semi-hardened plinthite; very strong network vesicular structure; very hard dry; very few very fine and fine roots; mostly rounded lateritic nodules and concretions; clear, smooth boundary to Bv2.
Bv2	90-130	Mixed pale brown (10YR 6/3) 25%, black (5YR 2.5/1) 25%, weak red (10R 4/2) 15%, red (2.5YR 4/8) 10% and red (10R 4/8) 10%; semi-hardened plinthite; very strong network vesicular structure; very hard dry; very few very fine and fine roots; mixed rounded and subangular lateritic nodules and concretions; clear, smooth boundary to Bv3.
Bv3	130-170	Mixed gray to light gray (10YR 6/1) 30%, black (5YR 2.5/1) 20%, weak red (10R 4/2) 15%, yellowish brown (10YR 5/8) 15%, red (10YR 4/8) 10%, red (2.5YR 4/8) 7% and yellow (10YR 7/8) 3%; semi-hardened plinthite; very strong network vesicular structure; very hard dry; very few very fine and fine roots; mixed rounded and subangular lateritic nodules and concretions and some angular weathered rock fragments; clear, smooth boundary to BCr1.
BCr1	170-200	Mixed yellowish brown (10YR 5/8) 50%, light gray (2.5YR 7/1) 30%, red (2.5YR 5/8) 10%, black (2.5YR 2.5/1) 7% and dusky red (10R 3/4) 3%; very gravelly sandy clay; moderate fine and medium semi-angular blocky structure; very hard dry; very firm moist, very sticky and very plastic; common distinct clay and ferri-argillan coats on pore walls; few fine and medium vesicular pores; very few and very fine roots; common pressure faces and fine cracks, common 0.2-0.5 cm rock fragments partially retaining rock structure, slightly acid (field pH 6.5) clear, smooth boundary to BCr2.
BCr2	200-225+	Mixed light gray (2.5YR 7/1) 40%, yellowish brown (10YR 5/8) 35%, yellowish (2.5Y 8/1) 20%, red (10R 4/8) 3% and black (2.5YR 2.5/1) 2%; very gravelly sandy clay; moderate fine and medium semi-angular blocky structure; very hard dry; very firm moist, very sticky and very plastic; common distinct clay and ferri-argillan coats on pore walls; few fine and medium vesicular pores; practically no roots; common pressure faces and fine cracks, common 0.2-0.5 cm rock fragments partially retaining rock structure, slightly acid (field pH 6.5).

Pedon 2**I Information on the site**

Profile symbol	: TL-U _s 2 (อยู่ในบริเวณหุบดินเชิงกาน)
Classification	: Haplic Plinthustult, fine, kaolinitic, isohyperthermic
Date of examination	: January 24, 2001
Location	: Southern side at 1.6 Km on Rural route from Jambong to Ban Huai Sak, Ban Rong Boe Nok, Tambon Huai Sak, Amphoe Muang, Chiang Rai province.
Elevation	: Approximately 415 m (MSL)
Map sheet number	: 4948 II Coordination : 47 594816E, 2181304N
Landform	
1. Physiographic position	: Summit of low hill
2. Surrounding land form	: Rolling
3. Slope on which profile site	: 9% Aspect : W24°N
Land use	: Orchards of mixed fruit trees e.g. Longon, Litchee, Mango, Tamarind and banana
Annual rainfall	: Approximately 1,700 mm
Mean temperature	: Approximately 24°C
Climate	: Tropical savanna
Orther	: Agriculture

II General Information on the soil

Parent material	: Residuum derived from classic sedimentary rocks (sandstone)
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap	0-15	Mixed yellowish brown (10YR 5/4) 95% and yellowish red (5YR 5/8); sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and very plastic; few distinct clay coat on ped faces and pore walls; common very fine and fine vesicular and few fine simple tubular pores; many very fine, fine and few medium roots; few fine cracks, few fine quartz fragments, few traces of dead roots; strongly acid (field pH 5.5); clear, smooth boundary to Bt.
Bt	15-33	Mixed brown (7.5YR 4/4) 50%, light yellowish brown (10YR 6/4) 40%, red (10R 4/8) 5% and dusky red (10R 3/4) 5%; sandy clay; strong fine and medium

		subangular blocky structure; hard dry, firm moist, moderately sticky and very plastic; common distinct clay coats on ped faces and pore walls; common very fine and fine vesicular and few fine simple tubular pores; many very fine, fine and few medium roots; common fine cracks, few fine quartz fragments, few rock fragment and very few fine charcoal fragments; strongly acid (field pH 5.5); clear, smooth boundary to Btc.
Btc	33-68	Mixed brown (7.5YR 4/4) 40%, yellowish brown (10YR 5/4) 30%, red (10R 4/8) 10%, brownish yellow (10YR 6/8) 10%, light yellowish brown (10YR 6/4) 5% and yellow (2.5Y 8/8) 5%; slightly gravelly sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls with few distinct ferri-argillan coats on ped faces; common very fine and fine vesicular pores; few very fine, common fine, few medium and coarse roots; many fine cracks, few fine quartz fragments, few fine semi-hardened nodules and concretions; strongly acid (field pH 5.5); clear, smooth boundary to Bv1.
Bv1	68-108	Mixed yellowish brown (10YR 5/4) 50%, red (10R 4/8) 30%, brownish yellow (10YR 6/8) 10% and white (2.5Y 8/1) 10%; sandy clay; mixed strong fine and medium subangular blocky structure parting along weak sesqui-oxide separation surfaces and ped faces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on pore walls and some ped faces; very few very fine and common fine vesicular and few fine simple tubular pores; few very fine, common fine, few medium and coarse roots; common very fine and fine cracks, few 0.4 mm weathered quartz fragments, strongly acid (field pH 5.5); clear, smooth boundary to Bv2.
Bv2	108-136	Mixed red (10R 4/8) 50%, yellowish brown (10YR 5/4) 30%, brownish yellow (10YR 6/8) 10% and white (2.5Y 8/1) 10%; gritty sandy clay loam; mixed strong fine and medium subangular blocky structure parting along weak sesqui-oxide separation surfaces and ped faces; hard dry, firm moist, moderately sticky and moderately to very plastic; common distinct clay coats and ferri-argillan on pore walls and some ped faces; few very fine and fine vesicular pores; very few very fine, fine and few medium and coarse roots; common very fine and fine cracks, common very fine and fine quartz fragments, very strongly acid (field pH 5.0); clear, smooth boundary to Bv3.
Bv3	136-170	Mixed yellowish brown (10YR 5/4) 40%, red (10R 4/8) 30%, brownish yellow (10YR 6/8) 20%, weak red (10R 4/4) 5% and white (2.5Y 8/1) 5%; gravelly sandy clay loam; mixed strong fine and medium subangular blocky structure parting along weak sesqui-oxide separation surfaces and ped faces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay

coats and ferri-argillan on pore walls and some ped faces; few very fine and fine vesicular pores; very few very fine and few fine medium and coarse roots; common fine cracks, common fine quartz grains in matrix; very strongly acid (field pH 5.0); clear, smooth boundary to BCrv.

BCrv 170-210+ Mixed red (10R 4/8) 50%, brownish yellow (10YR 6/8) 20%, yellowish brown (10YR 5/4) 15%, white (2.5Y 8/1) 10% and weak red (10R 4/4) 5%; gravelly sandy clay loam; mixed coarse angular and subangular blocky structure partially retaining rock structure; very hard dry, firm moist, slightly sticky and moderately plastic; few clear coats and ferri-argillan in cracks and pore walls; very few very fine and fine vesicular pores; very few very fine, fine, medium and coarse roots; few fine cracks, weathered rocks mixed with clay and iron oxide separations; very strongly acid (field pH 5.0);

Pedon 3

I Information on the site

Profile symbol : TL-U_s3 (อยู่ในบริเวณหุบเขาดินพะเยา)
 Classification : Typic Plinthustult, fine-loamy, kaolinitic, isohyperthermic
 Date of examination : January 25, 2001
 Location : Approximately 600 m East of Mae Chai-Phayao road at Km 773 of Phahonyothin Rd., Ban Rong Ha, Tambon Tam, Amphoe Muang, Phayao province.
 Elevation : Approximately 426 m (MSL)
 Map sheet number : 4947 II Coordination : 47 591653E, 2125302N
 Landform
 1. Physiographic position : Crestal slope (summit) of low hill
 2. Surrounding land form : Undulating
 3. Slope on which profile site : 6%
 Land use : Degraded mixed deciduous forest
 Annual rainfall : Approximately 1,100 mm
 Mean temperature : Approximately 25°C
 Climate : Tropical savanna
 Orther : Agricultural and village setting

II General Information on the soil

Parent material : Old wash over residuum derived from metasedimentary rocks
 Drainage : Well drained
 Permeability : Moderate
 Runoff : Rapid
 Depth of ground water : Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
A	0-5	Yellowish red (5YR 5/8); sandy clay; strong medium and coarse angular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; many very fine, common fine vesicular and few vesicular and few fine simple tubular pores; few very fine, fine, medium and coarse roots; few traces of dead roots; slightly acid (field pH 6.5); clear, smooth boundary to Bt1.
Bt1	5-30	Yellowish red (5YR 5/8); sandy clay; strong fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on pore walls and some on ped faces; common very fine, fine and few medium vesicular pores; few very fine, fine and common medium roots; few traces of dead roots; common fecal pellet in pores; very strongly acid (field pH 5.0); clear, smooth boundary to Bt3.
Bt2	30-55	Yellowish red (5YR 5/8); sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on pore walls and some on ped faces; common very fine and fine vesicular pores; few very fine, common fine and few medium roots; few fine cracks; few small to large dark reddish brown (5YR 2.5/2) krotovinas; very strongly acid (field pH 5.0); gradual, smooth boundary to Bt3.
Bt3	55-80	Yellowish red (5YR 5/8); sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and very plastic; common distinct clay coats on ped faces and pore walls; common very fine and fine vesicular pores; few very fine and few medium roots; few traces of dead roots; few small to large dark reddish brown (5YR 2.5/2) krotovinas; very strongly acid (field pH 5.0); clear, smooth boundary to Bt4.
Bt4	80-110	Yellowish red (5YR 5/8); sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and very plastic; common distinct clay coats on ped faces and pore walls; common very fine and fine vesicular pores; few very fine, common fine, few medium and few coarse roots; few fine cracks; few small to large dark reddish brown (5YR 2.5/2) krotovinas; strongly acid (field pH 5.5); abrupt, smooth boundary to Bt4.
Bv1	110-130	Mixed light brown (7.5YR 6/4) 65% and white (10YR 8/1) 10; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure; very hard dry, very firm moist, moderately sticky and moderately plastic; few distinct clay coats on pore walls (mainly) and few ferri-argillan coats pore walls in nodule; few very fine and fine vesicular pores; few very fine and fine roots;

		few traces of dead roots; common fine cracks; few distinct pressure faces; strongly acid (field pH 5.5); clear, smooth boundary to Bv2.
Bv2	130-150	Mixed light brown (7.5YR 6/4) 30%, white (10YR 8/1) 25%, red (10R 4/8) 15%, yellowish red (5YR 4/6) 10%, weak red (10R 4/4) 10% and brownish yellow (10YR 6/8) 10%; extremely gravelly sandy clay loam; strong fine and medium semi-angular blocky structure parting along nodule surfaces (mainly; very hard dry, very firm moist, moderately sticky and very plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine and few fine vesicular pores; practically no roots; few traces of dead roots; common fine cracks; few distinct pressure faces; strongly acid (field pH 5.5); clear, smooth boundary to Bv3.
Bv3	150-175	Mixed very pale brown (10YR 7/4) 25%, white (10YR 8/1) 20%, red (10R 4/8) 20%, brownish yellow (10YR 6/8) 10% and strong brown (7.5YR 4/6) 10%; very gravelly sandy clay loam; strong fine and medium subangular blocky structure parting along ped faces and nodule surfaces; very hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coats on pore walls and some nodule surfaces; few very fine, fine vesicular and few fine simple tubular pores; practically no roots; few traces of dead roots; common fine cracks; few distinct pressure faces and streak accumulations of clays; strongly acid (field pH 5.5); clear, smooth boundary to Bv4.
Bv4	175-200+	Mixed light brownish gray (10YR 6/2) 40%, red (10R 4/8) 30%, brownish yellow (10YR 6/8) 10%, strong brown (7.5YR 4/6) 10% and reddish brown (5YR 5/4) 10%; very gravelly sandy clay loam; strong fine and medium semi-angular blocky structure parting along nodule surfaces (mainly); very hard dry, very firm moist, moderately sticky and very plastic; few distinct clay coats on ped faces and common distinct clay coats on pore walls and nodule surfaces; few very fine, fine vesicular and few cracks; few distinct pressure faces and streak accumulations of clays; moderately acid (field pH 6.0).

Pedon 4

I Information on the site

Profile symbol	: TL-Us4 (อยู่ในบริเวณหุบดิน โพนพิสัย)
Classification	: Typic Plinthustult, loamy-skeletal, mixed, semiactive, isohyperthermic
Date of examination	: January 30, 2001
Location	: Approximately 400 km South of Ban Phu-Tha Bo (211) road at Km 1-2, Ban Na Dong Wai, Tumbon Hai Sok, Amphoe Ban Phu, Udon Thani province
Elevation	: Approximately 213 m (MSL)

Map sheet number	: 5544 II	Coordination	: 48 234240E, 1958135N
Landform			
1. Physiographic position	: Erosional terrace		
2. Surrounding land form	: Undulating		
3. Slope on which profile site	: 3%	Aspect	: W 20° E (E-facing)
Land use	: Dipterocarp forest (secondary)		
Annual rainfall	: Approximately 1,600->2,000 mm		
Mean temperature	: Approximately 26°C		
Climate	: Tropical savanna with relatively high rainfall		
Other	: Settlement and agriculture		

II General Information on the soil

Parent material	: Local wash over residuum derived from clastic sedimentary rocks
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
A	0-7	Yellowish brown (10YR 5/4); sandy loam; moderate fine and medium semi-angular blocky structure; slightly hard dry, firm moist, slightly sticky and slightly plastic; few faint clay coat on some pore walls; common very fine and fine vesicular pores; many very fine, fine and few medium roots; few fine nodules (1-2 mm); very strongly acid (field pH 5.0); clear, smooth boundary to Bt.
Bt	7-45/52	Yellowish brown (10YR 5/8); sandy clay loam; moderate fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common faint clay coats on ped faces and pore walls; common very fine, common fine vesicular and few common very fine, fine and few medium, coarse roots; some traces of dead roots, very few fine variegated sand; few nodules; moderately acid (field pH 6.0); abrupt, wavy boundary to Btc.
Btc	52-70	Mixed yellowish brown (10YR 5/8) 30%, dusky red (10R 3/3) 25%, dark red (10R 3/6) 15%, black (10YR 2/1) 10%, yellowish brown (10YR 5/6) 10% and strong brown (7.5YR 5/8) 10%; extremely gravel sandy clay loam; moderate fine and medium subangular blocky structure parting along nodules surfaces; hard dry, firm moist, moderately sticky and moderately plastic; few distinct clay coats on ped faces and pore walls; some on nodules surfaces; many very fine, fine vesicular and very few fine simple tubular pores; many very fine, fine roots; few fine crack; slightly acid (field pH 6.5); clear, smooth boundary to Bv1.

Bv1	70-90/95	Mixed dusky red (10R 3/3) 30%, red (10R 4/8) 25%, brownish yellow (10YR 6/6) 20%, black (10YR 2/1) 15% and brownish yellow (10YR 6/8) 10%; extremely gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along nodules surfaces; hard dry, firm moist, moderately sticky and slightly plastic; few distinct clay coats on ped faces and pore walls; few distinct ferri-argillan on nodules and ped surfaces; common very fine, few fine vesicular and few fine simple tubular pores; common very fine, fine roots; no fine earth; strongly acid (field pH 5.5); clear, smooth boundary to Bv2.
Bv2	95-120/130	Mixed dark red (2.5YR 4/8) 40%, light yellowish brown (10YR 6/4) 20%, light gray (10YR 7/1) 10% and black (10YR 2/1) 10%; clear common fine distinct strong brown (10YR 5/8) and clear few fine distinct yellow (10YR 7/6) mottles; gravelly sandy clay loam; strong fine and medium semi-angular blocky structure parting along surfaces of accumulation; hard dry, firm moist, moderately sticky and plastic; common distinct clay coats mainly on ped faces and some on pore walls; common very fine, fine vesicular and fine tubular pores; common fine crack; common semi-hardened and hardened red spots of accumulation; strongly acid (field pH 5.5); clear, smooth boundary to BCrv1.
BCrv1	130-170	Mixed light gray (10YR 7/2) 50%, dark yellowish brown (10YR 4/6) 20%, white (10YR 8/1) 10% and dark red (10R 3/6) 5%; clear common fine distinct strong brown (7.5YR 5/8) mottles; slightly gravelly sandy clay loam; strong fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and few on pore walls; few very fine, common fine vesicular and few fine simple tubular pores; common fine crack; common semi-hardened red spots of accumulation of irregular shape; very strongly acid (field pH 5.0); gradual, smooth boundary to BCrv2.
BCrv2	170-205+	Mixed light gray (10YR 7/2) 40%, dark red (10YR 3/6) 30%, white (10YR 8/1) 10%; clear common fine distinct yellowish brown (10YR 5/8) and clear few fine distinct yellow (10YR 7/6) mottles; slightly gravelly sandy clay loam; strong fine and medium angular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; common distinct clay bridges among sand grains and few distinct clay coats on pore walls; few very fine, common fine vesicular and few fine simple tubular pores; common fine crack; common to many red spots (angular) of accumulation; strongly acid (field pH 5.5)

Pedon 5**I Information on the site**

Profile symbol	: TL-Us6 (อยู่ในบริเวณจุดดิน โพนพิสัย)
Classification	: Typic Plinthustult, clayey-skeletal, mixed, semiactive, isohyperthermic
Date of examination	: January 31, 2001
Location	: Approximately 400 km East of Nongkhai Rubber Reserch Center on Phon Phisai, Pak Kad road at km 54, Ban Nam Pe, Tambon Prabat Na Sing, Amphoe Rattana Wapi, Nongkhai province
Elevation	: Approximately 163 m (MSL)
Map sheet number	: 5645 III Coordination : 48 305473E, 2008604N
Landform	
1. Physiographic position	: Erosional terrace
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 3% Aspect : N 50° E (E-facing)
Land use	: Para rubber (PRIM 600) : Experiment plot in planiting distance
Annual rainfall	: Approximately 1,600-2,500 mm
Mean temperature	: Approximately 26°C
Climate	: Tropical savanna grading to tropical monsoon
Orther	: Sattlement and agriculture

II General Information on the soil

Parent material	: Local Local wash over residuum derived from clastic sedimentary rocks (sandatone)
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap	0-11/14	Mixed dark grayish brown (10YR 4/2) 70% and dark yellowish brown (10YR 4/4) 30%; slightly; gravelly sandy clay loam; moderate fine and medium subangular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coat on pore walls; many very fine, common fine and medium vesicular and few fine simple tubular pores; many very fine, fine and medium roots; presence of some semi-hardened nodules; presence common dark elongated krotovinas; very strongly acid (field pH 4.5); clear, smooth boundary to Bt.
Bt	14-21/25	Mixed light reddish brown (2.5YR 6/4) 60% and pale red (2.5YR 7/4) 40%; clear many fine distinct strong brown (7.5YR 5/8) mottles; gravelly sandy

		clay; strong fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; common very fine, fine and medium vesicular pores; common very fine, fine and medium roots; common nodules and concretion of Fe-oxides (sizes up to 1.5 cm); very strongly acid (field pH 5.0); abrupt, smooth boundary to Btc1.
Btc1	25-50	Mixed dusky red (10R 3/3) 40%, brown (10YR 5/3) 20%, yellowish brown (10YR 5/4) 20%, red (10R 4/8) 10% and dark red (2.5YR 4/8) 10%; very gravelly sandy clay; strong fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on on ped faces and pore walls few distinct ferri-argillan on nodules surfaces and pore walls; few very fine, fine vesicular and few fine simple tubular pores; common very fine, fine roots, many hardened nodules and concretion (various sizes), common crack; two coarse roots extending through Btc1-Btc2; very strongly acid (field pH 5.0); gradual, smooth boundary to Btc2.
Btc2	50-70/75	Mixed dusky red (10R 3/3) 30%, yellowish brown (10YR 5/6) 30%, strong brown (7.5YR 5/8) 20%, dusky red (10R 3/4) 10% and dark red (2.5YR 4/8) 10%; very gravelly sandy clay; moderate fine and medium subangular blocky structure parting along nodules and concretion surfaces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on pore walls few distinct ferri-argillan on nodules surfaces and pore walls; few very fine, fine vesicular pores; common very fine, fine roots, many hardened nodules and concretion (various sizes), common crack; strongly acid (field pH 5.5); clear, wavy boundary to Bv1.
Bv1	75-110	Mixed light yellowish brown (10YR 6/4) 30%, strong brown (7.5YR 4/6) 20%, strong brown (7.5YR 5/8) 20%, dusky red (10R 3/3) 10%, very pale brown (10YR 7/3) 10% and red (10R 4/8) 5%; gravelly sandy clay; strong fine and medium subangular blocky structure parting along nodules and concretion surfaces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and few distinct ferri-argillan on ped faces and pore walls; few very fine, common fine vesicular and few fine simple dendritic tubular pores; few fine; strongly acid (field pH 5.0); clear, smooth boundary to Bv2.
Bv2	110-130	Mixed light gray (2.5YR 7/2) 50%, strong brown (7.5YR 5/8) 20%, strong brown (7.5YR 4/6) 15%, dusky red (10R 3/3) 10% and red (10R 4/8) 5%; gravelly sandy clay; strong fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic;

		common distinct clay coats and ferri-argillan on ped faces and nodules surfaces mainly mixed with on pressure faces; few very fine, fine vesicular and few fine simple tubular pores; common cracks presence of some hardened irregular nodules up to 2 cm; very strongly acid (field pH 5.0); clear, smooth boundary to Bv3.
Bv3	130-170	Mixed light gray (2.5YR 7/2) 60%, strong brown (7.5YR 5/8) 30% and red (10R 4/8) 5%; gritty sandy clay; strong fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces and nodules surfaces mainly mixed with on pressure faces; few very fine, fine vesicular pores; common cracks, common fine nodules semi-hardened separations; very strongly acid (field pH 5.0); clear, smooth boundary to Bv4.
Bv4	170-200+	Mixed light gray (2.5YR 7/2) 60%, strong brown (7.5YR 5/8) 25%, dusky red (10R 3/3) 10% and red (10R 4/8) 5%; gritty sandy clay; strong fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; common distinct clay coats on pore walls and ped faces mixed with some pressure faces; few very fine, fine vesicular few fine simple tubular pores; common cracks, common fine nodules semi-hardened separations; very strongly acid (field pH 4.5)

Pedon 6

I Information on the site

Profile symbol	: TL-Us7 (อยู่ในบริเวณชุดดิน โพนพิสัย)
Classification	: Typic Plinthustult, loamy-skeletal, mixed, isohyperthermic
Date of examination	: January 31, 2001
Location	: Approximately 100 m South of Nam Som Ban Phu road at km 33, Ban Nong Waeng Noi, Tambon Nong Weang, Amphoe Nam Som, Udon Thani province
Elevation	: Approximately 197 m (MSL)
Map sheet number	: 5444 IV Coordination : 48 208451E, 1967532N
Landform	
1. Physiographic position	: Depositional on erosional terrace
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 10% Aspect : N 10° E (N-facing)
Land use	: Dipterocarp forest remnant, tree plantation settlement, borrow pit
Annual rainfall	: Approximately 1,600-1,800 mm
Mean temperature	: Approximately 26°C

Climate : Tropical savanna
 Orther : Agricultural and engineering, use of material

II General Information on the soil

Parent material : Wash over residuum derived from clastic sedimentary rocks
 Drainage : Well drained
 Permeability : Moderate
 Runoff : Moderate
 Depth of ground water : Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
A	0-8	Brown (7.5YR 4/4); very gravelly sandy clay loam; strong fine and medium subangular blocky structure; hard dry, slightly firm moist, slightly sticky and slightly plastic; common faint clay coats on pore walls and ped faces; many very fine, fine and common medium vesicular and few fine tubular pores; many very fine, fine and medium roots; some traces of dead roots; common Fe-oxide nodules and concretion; (fields pH 6.0); clear, smooth boundary to Btc1.
Btc1	8-30	Mixed dusky red (10R 3/3) 60%, dark brown (10YR 3/3) 30% and dark red (2.5YR 4/8) 10%; extremely gravel; strong fine and medium subangular blocky structure; hard dry, slightly firm moist, slightly sticky and slightly plastic; few distinct ferri-argillan and clay coats on pore walls; many very fine, fine and common medium vesicular and few fine tubular pores; many very fine, fine roots; few fine cracks; few large dark krotovinas mainly on soil animal activities; (fields pH 6.0); clear, smooth boundary to Btc2.
Btc2	30-50	Mixed dusky red (10R 3/3) 25%, black (10YR 2/1) 25%, olive brown (2.5YR 4/4) 25%, reddish brown (5YR5/4) 20% and red (2.5YR 4/8) 5%; gravelly sandy clay loam; moderate fine and medium semi-angular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; common distinct ferri-argillan on ped faces and some nodules and concretion surfaces; common very fine, fine vesicular and few fine simple tubular pores; common very fine, fine roots; few fine cracks; common Fe-oxide nodules and concretions are generally of small size; (fields pH 6.0); abrupt, smooth boundary to Bv1.
Bv1	50-100	Mixed dusky red (10R 3/3) 60% and red (2.5YR 4/8) 40%; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; common distinct ferri-argillan on ped faces, pore walls and some nodules surfaces;

		very few very fine, common fine vesicular pores; few very fine roots; few fine cracks; many Fe-oxide nodules and concretions; (fields pH 5.5); clear, smooth boundary to Bv2.
Bv2	100-150	Mixed dusky red (10R 3/3) 50%, red (2.5YR 4/8) 40% and yellow (10YR 7/8) 10%; gravelly sandy clay loam; moderate fine and medium semi-angular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; few distinct ferri-argillan and few distinct clay coats on ped faces and nodules surfaces; few very fine, fine vesicular few fine simple and dendritic tubular pores; practically no roots; common fine cracks; common Fe-oxide nodules and concretions, few quartz fragment; (fields pH 5.5); clear, smooth boundary to Bv3.
Bv3	150-190	Mixed dusky red (10R 3/3) 50%, red (2.5YR 5/8) and light yellowish brown (10YR 6/4) 10%; gravelly sandy clay loam; strong fine and medium semi-angular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; common distinct ferri-argillan and few distinct clay coats on ped faces and nodules surfaces; few very fine, fine vesicular pores; practically no roots; common fine cracks; common Fe-oxide nodules and concretions; (fields pH 5.5); clear, smooth boundary to Bv4b.
Bv4b	190-250+	Mixed yellowish red (5YR 5/6) 50%, dark red (10R 3/6) 15%, very pale brown (10YR 7/3) 10% and yellowish brown (10YR 5/8) 5%; gravelly sandy clay loam; moderate fine and medium subangular blocky structure; hard dry, firm moist, slightly sticky and moderately plastic; common distinct ferri-argillan and few distinct clay coats on ped faces and pore wall; few very fine, fine vesicular pores; practically no roots; common fine cracks; few Fe-oxide nodules and concretions; (fields pH 5.5).

Pedon 7

I Information on the site

Profile symbol	: TL-U8 (อยู่ในบริเวณชุดดิน โพนพิสัย)
Classification	: Typic Plinthustalf, fine-loamy, kaolinitic, isohyperthermic
Date of examination	: February 1, 2001
Location	: Approximately 200 m East of Somdej Phu Phan road at km 97.5, Ban Khaeng Ka Am, Tambon Pha Savel, Amphoe Somdej, Kalasin province
Elevation	: Approximately 208 m (MSL)
Map sheet number	: 5444 I Coordination : 48 375734E, 1855130N
Landform	
1. Physiographic position	: Erosional terrace

2. Surrounding land form	: Undulating
3. Slope on which profile site	: 7% Aspect : S 20° E (S-facing)
Land use	: Tree plantation, settlement, modified some part to be paddy field
Annual rainfall	: Approximately 1,400 mm
Mean temperature	: Approximately 27°C
Climate	: Tropical savanna
Other	: Agricultural and engineering, use

II General Information on the soil

Parent material	: Local wash over residuum derived from sandstone
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap	0-20	Dark brown (10YR 3/3); sandy loam; moderate fine and medium subangular blocky structure; slightly hard dry; slightly firm moist, slightly sticky and moderately plastic; many very fine, medium and few large pores; many very fine, fine and medium roots; slightly acid (fields pH 6.5); abrupt, smooth boundary to A.
A	20-38	Mixed dark brown (10YR 3/3) 90% and very dark grayish brown (10YR 3/2) 10%; sandy loam; moderate fine and medium semi-angular blocky structure; hard dry; firm moist, slightly sticky and slightly plastic; few faint clay coats on ped faces and pore walls; many very fine, common fine and few medium vesicular and few fine simple tubular pores; many very fine, fine and few medium roots; strongly acid (fields pH 5.5); clear, smooth boundary to Bt1.
Bt1	38-60	Dark yellowish brown (10YR 4/4); sandy loam; moderate fine and medium subangular blocky structure; hard dry; slightly firm moist, slightly sticky and moderately plastic; common faint clay coats on ped faces and pore walls; many very fine, common fine and few medium vesicular pores; common very fine, fine roots; very strongly acid (fields pH 5.0); clear, smooth boundary to Bt2.
Bt2	60-91	Mixed strong brow (7.5YR 4/6) 60% and yellowish brown (10YR 5/4) 40%; sandy clay loam; moderate fine and medium subangular blocky structure; hard dry; slightly firm moist, slightly sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; many very

		fine, common fine and few medium vesicular and few fine tubular (various nature) pores; common very fine, fine roots; common fine cracks; very strongly acid (fields pH 4.5); clear, smooth boundary to Bt3.
Bt3	91-120/125	Mixed strong brow (7.5YR 4/6) 50% and yellowish brown (10YR 5/4) 50%; sandy clay; strong fine and medium subangular blocky structure; hard dry; slightly firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; many very fine, common fine and few medium vesicular and few fine tubular (various nature) pores; few very fine, fine roots; few fine cracks; few rock fragments; very strongly acid (fields pH 5.0); abrupt, smooth boundary to Btc.
Btc	125-150	Mixed yellowish brow (10YR 5/4) 40%, black (10YR 2/1) 15%, dark red (10R 3/6) 15%, yellowish brown (10YR 5/8) 10%, red (2.5YR 5/8) 10%, pale yellow (2.5Y 7/4) 5%, dusky red (10R 3/3) 5%; very gravelly sandy clay; moderate fine and medium subangular blocky structure; hard dry; slightly firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; few distinct ferri-argillan on ped faces, common very fine, fine and few medium pores; common very fine, fine and few medium roots; few fine cracks, common Fe and Mn oxide nodules and concretions size up to 2.5 cm; few quartz fragments; very strongly acid (field pH 5.0); clear, smooth boundary to Bv1.
Bv1	150-185	Mixed brownish yellow (10YR 6/6) 50%, yellowish red (5YR 5/8) 20%, black (10YR 2/1) 10%, dusky red (10R 3/3) 10% and weak red (10YR 4/4) 10%; very gravelly sandy clay; moderate fine and medium subangular blocky structure; hard dry; slightly firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; common distinct ferri-argillan on ped faces, common distinct clay coats on ped faces and pore walls, common distinct clay bridge among sand grains; common very fine, fine and few medium pores; few very fine, fine roots; many lateritic nodules and concretions size up to 2.5 cm (various shapes); very strongly acid (field pH 5.0); gradual, smooth boundary to Bv2.
Bv2	185-210+	Mixed brownish yellow (10YR 6/6) 40%, yellowish red (5YR 5/6) 20%, dusky red (10R 3/3) 10%, red (10R 4/6) 10%, black (10YR 2/1) 7%, dark red (10R 3/6) 5%, dark yellowish brown (10YR 4/6) 5% and yellowish brown (10YR 5/8) 3%; very gravelly sandy clay; moderate fine and medium subangular blocky structure; hard dry; slightly firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; common very fine, fine and medium pores; few

very fine, fine roots; few fine cracks, many lateritic nodules and concretions size up to 2.5 cm (various shapes); very strongly acid (field pH 5.0).

Pedon 8

I Information on the site

Profile symbol	: TL-Aq4 (อยู่ในบริเวณชุดดินพาน)
Classification	: Typic Plinthaqualf, fine-loamy, kaolinitic, isohyperthermic
Date of examination	: January 25, 2001
Location	: Approximately 100 m East of Phan-Mae Chai road at Km 773 , Ban Pa Sak Nua, Tambon Mae Yen, Amphoe Phan, Chiang Rai province.
Elevation	: Approximately 409 m (MSL)
Map sheet number	: 4947 I Coordination : 47 579476E, 2151653N
Landform	
1. Physiographic position	: Low terrace in intermontane basin
2. Surrounding land form	: Almost flat
3. Slope on which profile site	: 2%
Land use	: Paddy rice (active)
Annual rainfall	: Approximately 1,700 mm
Mean temperature	: Approximately 24°C
Climate	: Tropical savanna
Orther	: Agricultural

II General Information on the soil

Parent material	: Local alluvium over residuum derived from sedimentary and metasedimentary rocks
Drainage	: Poorly drained
Permeability	: Moderate
Runoff	: Slow
Depth of ground water	: Approximately 70 cm at time of sampling
Flooding	
Depth	: 30-40 cm
Duration	: 4-5 months
Frequency	: Once a year

III Profile description

Horizon	Depth(cm)	Description
Apg	0-10	Gray (10YR 5/1); many medium and coarse prominent strong brown (7.5YR 4/6) sharp root mottles; sandy clay loam; moderate fine and medium subangular blocky structure partially parting to moderate medium

		granular structure; hard dry, very firm moist, moderately sticky and very plastic; common distinct ferri-argillan coat on pore walls; common very fine and fine vesicular and common fine simple tubular pores; many very fine, fine and fine roots; many root mottles; few traces of dead roots, vertical cracks opening few (0.5 width) from surface to 15 cm; strongly acid (field pH 5.5); clear, smooth boundary to Btg1.
Btg1	10-22	Dark reddish gray (2.5YR 5/1); many medium prominent strong brown (7.5YR 5/8) sharp root mottles; sandy clay; moderate fine and medium semi-angular blocky structure; hard dry, very firm moist, moderately sticky and very plastic; common distinct ferri-argillan coat and few faint clay coats on pore walls and ped faces; common very fine and fine vesicular and few fine simple dendritic and tubular pores; common very fine and fine roots; common root mottles; some soft spots and semi-hardened accumulations of iron oxides and manganese oxides; strongly acid (field pH 5.5); clear, smooth boundary to Btg2.
Btg2	22-48	Gray to light gray (10YR 6/1); few medium distinct yellow (10YR 7/8) and many medium prominent yellowish brown (10YR 5/8) mottles; sandy clay; moderate fine and medium angular blocky structure; hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coat on ped faces and few distinct ferri-argillan coat on pore walls; common very fine, fine vesicular and few fine simple tubular pores; very few very fine and fine roots; few spots of accumulation of semi-hardened iron oxides nodules, some accumulations of fecal nodules in tubular pores; strongly acid (field pH 5.5); clear, smooth boundary to Bvg1.
Bvg1	48-76	Mixed light brownish gray (10YR 6/2) 70% and light gray (10YR 7/1) 30%; many coarse distinct yellowish brown (10YR 6/8) mottles; sandy clay; moderate fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coat on ped faces and pore walls; common very fine, fine and few medium vesicular and common fine tubular pores (various nature); very few very fine and fine roots; few fine cracks; common separation spots accumulation of iron oxides; few fine variegated sands; strongly acid (field pH 5.5); abrupt, smooth boundary to Bvg2.
Bvg2	76-90	Mixed light gray (10YR 7/2) 25%, red (10R 4/8) 20%, yellowish brown (10YR 5/8) 20%, very pale brown (10YR 7/4) 15%, very dusky red (10Y 2.5/2) 10% and black (10YR 2/1) 10%; slightly gravelly sandy loam; moderate fine and medium semi-angular blocky structure parting along surfaces of spot accumulations; hard dry, firm moist, slightly sticky and

		slightly plastic; common distinct clay coat on ped faces (mainly) and pore walls; common ferri-argillan coats on sand grains; common very fine, fine and few medium vesicular pores; practically no roots; few fine quartz fragments; common soft accumulations and few hardened nodules of iron oxides; strongly acid (field pH 5.5); abrupt, smooth boundary to 2Bvg3.
2Bvg3	90-115	Mixed light gray (10YR 7/1) 50%, red (10R 4/8) 25%, yellowish brown (10YR 5/8) 15% and back (10YR 2/1) 10%; silty clay; strong fine and medium subangular blocky structure; very hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coat on pore walls and mixed with pressure faces on ped faces; few very fine and fine vesicular and common fine tubular pores (various nature); practically no roots; few traces of dead roots; common fine cracks and common red semi-angular spot of iron oxides accumulations; strongly acid (field pH 5.5); gradual, smooth boundary to 2Bvg4.
2Bvg4	115-150+	Mixed light gray (10YR 7/1) 40%, red (10R 4/8) 20%, light red (10R 6/8) 20%, strong brown (7.5YR 4/6) 10%, very dark brown (10YR 2/2) 5% and back (10YR 2/1) 5%; silty clay; strong fine and medium subangular blocky structure; hard dry, firm moist, sticky and plastic; common distinct clay coat on pore walls and mixed with pressure faces on ped faces; few very fine, fine and medium vesicular and common fine tubular pores; practically no roots; few traces of dead roots; few fine cracks and spot accumulations of dark mineral materials (manganese oxides); strongly acid (field pH 5.5)

Pedon 9

I Information on the site

Profile symbol	: TL-Aq5 (อยู่ในบริเวณหุดดินเพ็ญ)
Classification	: Typic Plinthaqualf, loamy-skeletal, mixed, isohyperthermic
Date of examination	: January 26, 2001
Location	: Approximately 13 m North from turn point to Amphoe Phisali, Ban Nong Sua, Tambon Khok Duo, Amphoe Phisali, Nakhon Sawan province.
Elevation	: Approximately 43 m (MSL)
Map sheet number	: 5140 III Coordination : 47 671860E, 1726371N
Landform	
1. Physiographic position	: Lower part of middle terrace
2. Surrounding land form	: Almost flat
3. Slope on which profile site	: 1% Aspect : South-facing
Land use	: Paddy rice (Chainat 1)

Annual rainfall	: Approximately 1,100 mm
Mean temperature	: Approximately 28°C
Climate	: Tropical savanna
Orther	: Agricultural

II General Information on the soil

Parent material	: Mixed alluvium of diferrent episodes
Drainage	: Somewhat poorly drained
Permeability	: Moderate
Runoff	: Slow
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Apg	0-10/13	Grayish brown (10YR 5/2); common medium distinct dark yellowish brown (10YR 4/6) clear mottles; sandy clay loam; moderate fine and medium semi-angular blocky structure; hard dry, slightly firm moist, very sticky and moderately plastic; few very fine, fine and common fine and few medium vesicular pores; common very fine and fine roots; common roots mottles; strongly acid (field pH 5.5); clear, smooth boundary to Btg1.
Btg1	13-28/32	Brown (7.5YR 5/3); few medium distinct olive yellow (2.5Y 6/6) clear mottles; sandy clay loam; moderately fine and medium semi-angular blocky structure; hard dry, slightly firm moist, moderately sticky and moderately plastic; few distinct clay coats on pore walls (mainly) and common clay bridges among sand grains; common very fine and many fine vesicular pores; few very fine and common fine roots; common traces of dead roots; moderately acid (field pH 6.0); clear, smooth boundary to Btg2.
Btg2	32-54	Mixed pink (7.5YR 7/3) 80% and pinkish gray (7.5YR 6/2) 20%; common medium distinct brownish yellow (10YR 6/8) sharp and few medium prominent black (10YR 2/1) sharp mottles; slightly gravelly sandy clay loam; moderately fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and moderately plastic; common distinct clay coats mainly on pore walls; common very fine, fine and many medium vesicular pores; few very fine and fine roots; common of oriented clay association with pore, some spot of variegated sands; strongly acid (field pH 5.5); abrupt, smooth boundary to Bvg.
Bvg	54-100	Mixed yellowish brown (10YR 5/8) 30%, back (10YR 2/1) 15%, brown (7.5YR 5/2) 15%, red (10R 4/8) 10%, grayish brown (10YR 5/2) 10% and light brown (7.5YR 6/3) 10%; extremely gravelly sandy clay; moderate

		fine and medium semi-angular blocky structure partially mixed with massive plinthite structure; hard dry, firm moist, very sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; common very fine and fine vesicular and few fine tubular pores (various nature); very few very fine and fine roots; common of oriented clay association with pore, some spot of variegated sands; moderately acid (field pH 6.0); abrupt, smooth boundary to Btgb1.
Btgb1	100-128	Mixed light brown (7.5YR 6/3) 70%, pale brown (10YR 6/3) 20% and light brownish (10YR 6/2) 10%; common medium distinct yellowish red (5YR 4/6) clear and few medium prominent red (10R 4/6) sharp mottles; sandy clay; strong fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; many distinct clay coat on ped feces and pore walls; many very fine and common fine vesicular pores; very few very fine and fine roots; semi-hardened iron oxide nodules; few fine cracks; slightly acid (field pH 6.5); clear, smooth boundary to Btgb2.
Btgb2	128-160	Mixed reddish brown (5YR 5/3) 60%, pale brown (10YR 6/3) 30% and light brownish gray (10YR 6/2) 10%; common medium distinct yellowish brown (10YR 5/6) mottles; slightly gravelly sandy clay; strong fine and medium semi-angular blocky structure; hard dry, very firm moist, very sticky and moderately plastic; many distinct clay coat on ped feces and pore walls; common very fine and fine vesicular pores; common fine cracks; few variegated sands; slightly acid (field pH 6.5); abrupt, smooth boundary to Bvgb.
Bvgb	160-200+	Mixed yellowish brown (10YR 5/8) 30%, black (10YR 2/1) 20%, pink (7.5YR 7/3) 20%, yellowish brown (10YR 5/6) 10%, light gray (10YR 7/2) 10%, reddish brown (5YR 4/4) 5% and weak red (10R 4/4) 5%; extremely gravelly sandy clay; massive plinthite structure; very hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coat on pore walls, ped feces, nodule surfaces and on pore walls in nodules; common very fine and fine vesicular pores; practically no roots; few fine cracks; slightly acid (field pH 6.5).

Pedon 10**I Information on the site**

Profile symbol	: TL-Aq6 (อยู่ในบริเวณหูดดินเพ็ญ)
Classification	: Typic Plinthaqult, loamy-skeletal, mixed, semiactive, isohyperthermic
Date of examination	: January 29, 2001
Location	: Approximately 100 km South of Ban Na Kha-Ban SamSao (2225) road from Mitrapap road at Km 9, Ban Na Kham Luang, Tumbon Na Kha, Amphoe Muang, Udon Thani province
Elevation	: Approximately 187 m (MSL)
Map sheet number	: 5544 II Coordination : 48 275139E, 1942117N
Landform	
1. Physiographic position	: Erosional plain
2. Surrounding land form	: Gently Undulating
3. Slope on which profile site	: 2% Aspect : W 20° E (E-facing)
Land use	: Paddy rice
Annual rainfall	: Approximately 1,600 mm
Mean temperature	: Approximately 26°C
Climate	: Tropical savanna
Other	: Agricultural : pond construction

II General Information on the soil

Parent material	: Local wash over residuum derive from fine grain sedimentary rock
Drainage	: Somewhat poorly drained
Permeability	: Moderate
Runoff	: Slow
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap _g	0-15/17	Mixed yellowish brown (10YR 5/4) 45% and grayish brown (10YR 5/2) 30%; many fine distinct strong brown (7.5YR 5/8) mottles; sandy loam; moderate fine and medium semi-angular blocky structure; hard dry, very firm moist, slightly sticky and slightly plastic; many very fine and common fine vesicular pores; many very fine and common fine roots; few traces of dead roots; very strongly acid (field pH 5.0); clear, smooth boundary to Btg ₁ .
Btg ₁	17-31	Mixed yellowish brown (10YR 5/8) 50% and grayish brown (10YR 5/2) 20%; many fine distinct strong brown (7.5YR 5/8) mottles; sandy clay loam; moderate fine and medium angular blocky structure; hard dry, firm

		moist, slightly sticky and moderately plastic; few faint clay coats on ped faces and few distinct ferri-argillan on pore walls; few very fine, common fine vesicular and few simple tubular pores(various sizes); common very fine, fine roots; few dark spot of Fe-Mn oxide accumulations; traces of dead roots; very strongly acid (field pH 5.0); clear, smooth boundary to Btg2.
Btg2	31-50/55	Yellowish brown (10YR 5/8); many fine distinct strong brown (7.5YR 5/8) mottles; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and moderately plastic; common distinct clay coats on ped faces and pore walls; common very fine, fine and medium vesicular and few fine simple tubular pores; few very fine, fine roots; common dead roots; strongly acid (field pH 5.5); abrupt, wavy boundary to Bvg1.
Bvg1	55-78	Mixed very pale brown (10YR 7/4) 40%, dark brown to brown (7.5YR 4/4) 15%, weak red (10R 4/3) 15% and dusky red (10R3/3) 10%; common distinct strong brown (7.5YR 5/8) mottles; gravelly sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and moderately plastic; common distinct clay coats on ped faces; few very fine, common fine vesicular and common fine tubular pores; few very fine, fine roots; few fine crack, common lateritic gravel (nodules and concretions); uneven matrix partially consisting of large spots of gravel accumulation and semi-hardened plinthite; strongly acid (field pH 5.5); clear, broken boundary to Bvg2.
Bvg2	78-119	Mixed drak brown to brown (7.5YR 4/4) 25%, very pale brown (10YR 7/4) 20%, red (10R 4/8) 15%, yellowish brown (10YR 5/8) 10%, dusky red (10R3/3) 10%, yellowish red (5YR 5/8) 10%, weak red (10R 4/4) 5% and strong brown (7.5YR 5/8) 5%; lateritic gravel; plinthite structure compose of irregular nodules and concretion; hard dry, firm moist, sticky and plastic; common distinct clay coats on pore walls and common medium ferri-argillan coating on separation surfaces; few very fine, fine and common medium vesicular pores; very few very fine and fine roots; generally semi-hardened massive plinthite layer; strongly acid (field pH 5.5); abrupt, smooth boundary to BCg1.
BCg1	119-149	Mixed light gray (2.5Y 7/1) 40%, light gray (2.5Y 7/2) 40%, dark red (10R 3/6) 10%, weak red (10R 4/4) 5%, reddish yellow (7.5YR 6/8) 3% and yellow (10YR 7/8) 3%; sandy clay; moderate fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coats on ped faces and some part of pore

		walls mixed with pressure faces; few very fine and fine vesicular and few fine simple tubular pores; practically no roots; common fine cracks; common fine red spots of iron oxides accumulation; very strongly acid (filed pH 5.0); clear, smooth boundary to BCg2.
BCg2	149-180	Mixed light gray (2.5Y 7/1) 75%, dark red (10R 3/6) 10%, weak red (10R 4/4) 10%, reddish yellow (7.5YR 6/8) 3% and yellow (10YR 7/8) 2%; sandy clay; moderate fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; few distinct clay coats on mainly ped faces mixed with many pressure faces; few very fine and fine vesicular and few fine simple tubular pores; practically no roots; common cracks; common fine red spots of Fe-oxides accumulation; very strongly acid (filed pH 5.0); clear, smooth boundary to BCg3.
BCg3	180-200+	Mixed white (2.5Y 8/1) 65%, dark red (10R 3/6) 10%, weak red (10R 4/4) 10%, reddish yellow (7.5YR 6/8) 7%, dusky red (10R 3/3) 5% and yellow (2.5Y 7/8) 3%; sandy clay; moderate fine and medium subangular blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; few distinct clay coats on mainly ped faces mixed with many pressure faces; few very fine and fine vesicular and few fine simple tubular pores; practically no roots; common cracks (various sizes) and some traces of dead roots; common red spots separation; strongly acid (filed pH 5.5)

Pedon 11

I Information on the site

Profile symbol	: TL-Aq8 (อยู่ในบริเวณชุดดินพัทลุง)
Classification	: Typic Plinthaquult, fine, mixed, isohyperthermic
Date of examination	: February 6, 2001
Location	: Approximately 1.1 km North of rural road from Tumpoint Ban Khao Phanom Wang, Ban Khao Phanom Wang, Tambon Phanom Wang, Amphoe Khuan Khanun, Pathalung Province
Elevation	: Approximately 35 m (MSL)
Map sheet number	: 5024 III Coordination : 47 611997E, 0850338N
Landform	
1. Physiographic position	: Middle part of low terrace
2. Surrounding land form	: flat
3. Slope on which profile site	: 0-1%
Land use	: Paddy rice; left idle at time of sampling; rubber, coconut and other tropical tree crops
Annual rainfall	: Approximately 2,500 mm

Mean temperature	: Approximately 27°C
Climate	: Tropical Monsoon
Other	: Agricultural

II General Information on the soil

Parent material	: Mixed alluvium derived from nearby stream sediment and solution of limestone
Drainage	: Poorly drained
Permeability	: Slow
Runoff	: Slow
Depth of ground water	: 110 cm at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Apg	0-15	Dark gray (10YR 4/1); sharp many fine and medium distinct yellowish red (5YR 5/8) and diffuse many medium faint strong brown (7.5YR 5/6) mottles; sandy clay; strong fine and medium semi-angular blocky structure; very hard dry, very firm moist, moderately sticky and moderately plastic; few faint clay coats on pore walls; common very fine, fine and few medium vesicular and common fine tubular pores; common very fine, fine roots; many root mottles, common trace of dead roots; strongly acid (field pH 5.5); clear, smooth boundary to Btg.
Btg	15-32	Gray (10YR 5/1); sharp many fine distinct yellowish red (5YR 4/6) and diffuse many fine olive yellow (2.5Y 6/6) mottles; clay; moderate fine and medium subangular blocky structure; hard dry, slightly firm moist, moderately sticky and very plastic; common distinct clay coat on ped faces and pore walls, few distinct ferri-argillan on pore walls; few very fine, common fine and few medium vesicular and common fine tubular pores; few very fine, fine roots; common fine cracks; strongly acid (field pH 5.5); clear, smooth boundary to Btgc.
Btgc	32-50	Mixed light gray (2.5Y 7/2) 40%, black (10YR 2/1) 20%, yellowish brown (10YR 5/8) 15% and dark red (2.5YR 4/8) 10%; diffuse common coarse faint brownish yellow (10YR 6/6) mottles; slightly gravelly clay; moderate fine and medium subangular blocky structure; very hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coats and few distinct ferri-argillan on ped faces and pore walls; few very fine, fine vesicular and few fine simple tubular pores; very few very fine, fine roots; common fine cracks; common separations of iron oxide, iron oxides and clay (semi-hardened); very strongly acid (field pH 5.0); clear, smooth boundary to Bvg1.

Bvg1	50-75	Mixed light gray (2.5Y 7/2) 40%, black (10YR 2/1) 30%, yellowish brown (10YR 5/8) 20%, dusky red (10R 3/3) 5% and red (10R 4/8) 5%; slightly gravelly sandy clay; moderate fine and medium subangular blocky structure; very hard dry, very firm moist, moderately sticky and very plastic; common distinct clay coats, manganese and ferri-argillan on ped faces and pore walls; few very fine, common fine vesicular and common fine tubular pores; practically on roots; common fine cracks; common manganese oxide and iron oxide separation (semi-hardened); very strongly acid (field pH 5.0); clear, smooth boundary to Bvg2.
Bvg2	75-100	Mixed light gray (10Y 7/1) 50%, brownish yellow (10YR 6/8) 20%, black (10YR 2/1) 10%black, dusky red (10R 3/3) 5% and red (10R 4/8) 5%; slightly gravelly sandy clay; strong fine and medium subangular blocky structure; hard dry, slightly firm moist, very sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces and pore walls; common distinct separation between iron oxide and clays with manganese oxide semi-hardened separation; few very fine, common fine vesicular and common fine tubular pores; practically on roots; common fine cracks; very strongly acid (field pH 4.5); clear, smooth boundary to Bvg3.
Bvg3	110-140	Mixed light gray (10Y 7/1) 50%, brownish yellow (10YR 6/8) 20%, red (10R 4/8) 15% and dark red (10R 3/6) 5%; diffuse common fine faint yellow (10YR 7/8) mottles; sandy clay; strong fine and medium subangular blocky structure; hard dry, slightly firm moist, very sticky and moderately plastic; common distinct semi-hardened separation of clay (hardened) common clay coats and ferri-argillan on ped faces and pore walls; few very fine, fine vesicular and very few fine simple tubular pores; practically on roots; common fine cracks; some fine soft iron oxide separation distribute throughout soil matrix as cluster; very strongly acid (field pH 5.0); clear, smooth boundary to Bvg4.
Bvg4	140-170+	Mixed light gray (10Y 7/1) 30%, brownish yellow (10YR 6/8) 30%, red (10R 4/8) 20% and dark red (10R 3/6) 10%; diffuse common fine faint yellow (10YR 7/8) mottles; sandy clay; moderate fine and medium subangular blocky structure; hard dry, slightly firm moist, moderately sticky and moderately plastic; common clay coats and ferri-argillan on ped faces, pore walls and some separation surface; few very fine, fine vesicular; practically on roots; common fine cracks; common distinct separation iron oxide from clay, common quartz fragment of sand sized and some a larger; very strongly acid (field pH 5.0)

REMARK: Few distinct pressure faces from Bvg2 to Bvg4

Pedon 12**I Information on the site**

Profile symbol	: TL-Aq9 (อยู่ในบริเวณหอดินวิสัย)
Classification	: Typic Plinthaquults, fine-loamy, mixed, isohyperthermic
Date of examination	: February 8, 2001
Location	: Approximately 800 km East of Tung Tako-Lang Suan road at km 50-51 Ban Klong Chon, Tambon Chong Makkaew, Amphoe Tung Tako, Chumphon Province
Elevation	: Approximately 12 m (MSL)
Map sheet number	: 4929 III Coordination : 47 509115E, 1115001N
Landform	
1. Physiographic position	: Lower part of toeslope
2. Surrounding land form	: Gently undulating
3. Slope on which profile site	: 0-2%
Land use	: Oil palm, some coconut
Annual rainfall	: Approximately 2,500 mm
Mean temperature	: Approximately 26°C
Climate	: Tropical Monsoon
Other	: Agricultural and settlement

II General Information on the soil

Parent material	: Local wash mixed with local alluvium derived from metasedimentary rocks
Drainage	: Poorly drained
Permeability	: Moderate
Runoff	: Slow
Depth of ground water	: 110 cm at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Apg1	0-15	Dark gray (10YR 4/1); diffuse common fine faint yellowish brown (10YR 3/4) mottles; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and slightly plastic; common very fine, fine and medium vesicular pores and few fine simple tubular pores; many very fine, fine and medium roots; few root mottles (brownish to yellowish); very strongly acid (field pH 4.5); clear, smooth boundary to Apg2.
Apg2	15-29	Gray (10YR 5/1); clear common medium distinct reddish brown (5YR 4/4) mottles; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and slightly plastic;

		few faint clay coat on ped faces and few faint clay bridges among sand grains; few very fine, fine and few medium vesicular pores; many very fine, fine and medium roots; few fine variegated sands; very strongly acid (field pH 4.5); clear, smooth boundary to Btg.
Btg	29-54	Light gray (10YR 7/1); diffuse many coarse distinct yellowish brown (10YR 5/8) mottles; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and moderately plastic; common faint clay coat on ped faces (mainly); common very fine, fine and few medium vesicular, few fine simple tubular pores; common very fine, fine and few medium roots; few fine crack; few fine variegated sands; very strongly acid (field pH 4.5); clear, smooth boundary to Bvg1.
Bvg1	54-82	Mixed light gray (2.5YR 7/1) 60% and strong brown (7.5YR 5/8) 20%; diffuse many fine and medium distinct brownish yellow (10YR 6/8) mottles; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and moderately plastic; common distinct clay coat and ferri-argillan on ped faces and pore walls; common very fine, fine and few medium vesicular, few fine tubular pores; common very fine, fine and medium roots; few fine crack; few distinct spots of iron oxide separations; very strongly acid (field pH 4.5); clear, smooth boundary to Bvg2.
Bvg2	82-110	Mixed light gray (2.5YR 7/1) 55%, yellowish brown (10YR 5/8) 40% and red (10YR 4/8) 5%; sandy clay; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coat and ferri-argillan on ped faces and pore walls; common very fine, fine and few medium vesicular, few fine tubular pores; common very fine, fine and medium roots; few fine cracks; common distinct spots (reddish yellow) of iron oxide separations; strongly acid (field pH 5.5); clear, smooth boundary to Bvg3.
Bvg3	110-135	Mixed light gray (2.5YR 7/1) 50%, yellowish brown (10YR 5/8) 40%(10YR 4/8) 10%; sandy clay; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coat and ferri-argillan on ped faces and pore walls; common very fine, fine and few medium vesicular and few fine tubular pores; few very fine, fine and medium roots; few fine cracks; many distinct spots of iron oxide separations; strongly acid (field pH 5.5); clear, smooth boundary to Bvg4.
Bvg4	135-160	Mixed light gray (2.5YR 7/1) 40%, yellowish brown (10YR 5/8) 40% and red (10YR 4/8) 20%; sandy clay; moderate fine and medium subangular

		blocky structure; hard dry, very firm moist, moderately sticky and moderately plastic; common distinct clay coat and ferri-argillan on ped faces and pore walls (more light yellow); few very fine, fine and common medium vesicular few fine tubular pores; few very fine, fine and medium roots; common distinct spots (more light yellow) of iron oxide separations; strongly acid (field pH 5.5); clear, smooth boundary to Bvg5.
Bvg5	160-190+	Mixed light yellowish brown (10YR 5/8) 40%, red (10YR 4/8) 40% and gray (2.5YR 7/1) 20%; sandy clay; moderate fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coat and ferri-argillan on ped faces and pore walls and common distinct iron oxide and clay separation (iron oxide generally take various sized and shaped semi-hardened); few very fine, fine and medium vesicular few fine simple tubular pores; few very fine, fine and medium roots; strongly acid (field pH 5.5); clear, smooth boundary to Bvg5.

Pedon 13

I Information on the site

Profile symbol	: TL-Ud1 (อยู่ในบริเวณหุดคินกระบี่)
Classification	: Typic Plinthudult, clayey-skeletal, kaolinitic, isohyperthermic
Date of examination	: December 16, 2000
Location	: Borrow pit, Approximately 0.5 km North of Prachantakham-Kabin Buri road at Km 185.8, Ban Khum Leab, Tambon Khum Tanot, Amphoe Prachantakham, Prachin Buri
Elevation	: Approximately 43 m (MSL)
Map sheet number	: 5337 III Coordination : 47 778880E, 1557486N
Landform	
1. Physiographic position	: Erosional plain
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 2% Aspect : 15° South-west (North-facing)
Land use	: Cassava field and forest remnant
Annual rainfall	: Approximately 1,600-2,000 mm
Mean temperature	: Approximately 27°C
Climate	: Tropical savanna-Tropical Monsoonal Transition
Other	: Agricultural and engineering (borrow pit)

II General Information on the soil

Parent material	: Residuum derived from metasedimentary rock
Drainage	: Well drained
Permeability	: Moderate

Runoff : Moderate
 Depth of ground water : Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap	0-15	Mixed dark brown (7.5YR 3/4) 70% and brown (7.5YR 5/4) 30%; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; slightly hard dry, firm moist, slightly sticky and moderately plastic; common very fine, fine and medium vesicular pores; common very fine and fine, few coarse roots; slightly acid (field pH 6.5); clear, smooth boundary to Btc1.
Btc1	15-32	Yellowish red (5YR 4/6); very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine, few coarse roots; strongly acid (field pH 5.5); gradual, smooth boundary to Btc2.
Btc2	32-60	Yellowish red (5YR 4/6); very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine, few medium roots; moderately acid (field pH 6.0); gradual, smooth boundary to Btc3.
Btc3	60-100	Mixed yellowish red (5YR 4/6) 70% and (5YR 5/6) 30%; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine and fine, few medium roots; slightly acid (field pH 6.5); clear, smooth boundary to Btc4.
Btc4	100-123	Mixed yellowish red (5YR 4/6) 50% and (5YR 5/6) 50%; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine and fine, medium vesicular pores; common very fine, fine and few medium roots; slightly acid (field pH 6.5); gradual, smooth boundary to Btc4.
Btc5	123-142	Mixed yellowish red (5YR 5/8) 50%, (5YR 5/6) 45% and brownish

		yellow (10YR 7/8) 5%; very gravelly sandy clay loam; moderate fine and medium subangular blocky structure parting along lateritic nodules; hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and some nodule surfaces; common very fine, fine and medium vesicular pores; few very fine and fine, few medium roots; very strongly acid (field pH 5.0); abrupt, smooth boundary to Bv1.
Bv1	142-172	Mixed reddish yellow (5YR 6/8) 40%, red (2.5YR 4/8) 25%, yellow (10YR 7/8) 15% and yellowish brown (10YR 5/6) 10%; very gravelly sandy clay loam; strong fine and medium angular blocky structure breaking along lateritic cracks; very hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and nodule surfaces; few fine and medium vesicular pores; very few fine and medium roots; strongly acid (field pH 5.5); gradual, smooth boundary to Bv2.
Bv2	172-200+	Mixed yellowish red (5YR 5/8) 70% and yellow (10YR 7/8) 30%; very gravelly sandy clay loam; strong fine and medium angular blocky structure breaking along lateritic cracks; very hard dry, firm moist, slightly sticky and moderately plastic; few distinct clay coats on pore walls and nodule surfaces; few fine and medium vesicular pores; very few fine and medium roots; many coarse (0.5-2 cm) irregular, hard Fe and Mn oxides; strongly acid (field pH 5.5).

Pedon 14

I Information on the site

Profile symbol	: TL-Ud5 (อยู่ในบริเวณชุดดินเขาขาด)
Classification	: Typic Plinthudult, fine kaolinitic, isohyperthermic
Date of examination	: February 5, 2001
Location	: East of Na San-Wiang Sa road at km 48.7, Ban Klong Prap, Tambon Khlong Prap, Amphoe Na San, Surat Thani Province
Elevation	: Approximately 45 m (MSL)
Map sheet number	: 4826 II Coordination : 47 540646E, 0966087N
Landform	
1. Physiographic position	: Erosional terrace
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 3%
Land use	: Para-rubber mainly with some bananas and other fruit crops
Annual rainfall	: Approximately 2,000 mm
Mean temperature	: Approximately 26-27°C

Climate : Tropical Monsoon
 Orther : Agricultural

II General Information on the soil

Parent material : Mainly residuum derived from metasedimentary rocks
 Drainage : Well drained
 Permeability : Moderate
 Runoff : Moderate
 Depth of ground water : Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap	0-35	Dark grayish brown (10YR 4/2; slightly gravelly sandy clay loam; moderate fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats on ped faces; common very fine, fine, medium vesicular and common tubular pores (various sizes); many very fine, fine and medium roots; common traces of dead roots, few variegated sand; few lateritic nodules and concretion, few rock fragments; slightly acid (field pH 6.5); abrupt, smooth boundary to A.
A	35-42	Mixed brown (10YR 4/3) 70%, light olive brown (2.5Y 5/4) 20% and brown (7.5YR 4/4) 10%; sandy clay; strong fine and medium semi-angular blocky structure; hard dry, firm moist, slightly sticky and very plastic; few distinct clay coats mainly on pore walls; common very fine, fine, medium vesicular and few fine simple tubular pores; many very fine, fine and common medium roots; few fine crack; moderately acid (field pH 6.0); clear, smooth boundary to Bt.
Bt	42-55/90	Mixed brown (10YR 4/3) 90% and (7.5YR 4/4) 10%; sandy clay; moderate fine and medium semi-angular blocky structure; hard dry, firm moist, moderately sticky and very plastic; common distinct clay coats on ped faces; many very fine, fine, few medium vesicular and few fine simple tubular pores; common very fine, fine and medium roots; some traces of dead roots; very few lateritic nodules and concretion; moderately acid (field pH 6.0); clear, semi-broken boundary to Btcl.
Btcl	90-100	Mixed strong brown (7.5YR 5/6) 50%, dusky red (10R 3/3) 30% and dark yellow brown (10YR 4/4) 20%; very gravelly sandy clay; moderate fine and medium subangular blocky structure mainly parting along nodules and concretions surfaces; hard dry, firm moist, moderately

		sticky and moderately plastic; common distinct clay coats on ped faces, pore walls and some of surface of nodules and concretion; common very fine, fine, few medium vesicular and few fine simple tubular pores; many very fine, fine and few medium roots; common fine crack, some traces of dead roots; common many lateritic concretion and nodules of various sized and shaped mostly in range of 3-8 mm; strongly acid (field pH 5.5); clear, smooth boundary to Btc2.
Btc2	100-130	Mixed dusky red (10R 3/3) 50%, strong brown (7.5YR 5/6) 30%, red (10R 4/8) 10%, yellowish red (5YR 5/6) 5% and olive yellow (2.5Y 6/8) 5%; very gravelly sandy clay; moderate fine and medium subangular blocky structure mainly parting along nodules and concretions surfaces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces, pore walls and nodules and concretion surface; few very fine, common fine vesicular pores; common very fine, fine roots; common fine crack; common lateritic nodules and concretion. few small ant nests; strongly acid (field pH 5.5); clear, smooth boundary to Bv1.
Bv1	130-160	Mixed dusky red (10R 3/3) 50%, yellowish brown (10YR 5/8) 20%, strong brown (7.5YR 5/6) 15%, red (10R 4/8) 10%, olive yellow (2.5Y 6/8) 10%, yellowish red (5YR 5/6) 5% and pale yellow (2.5YR 7/4) 5%; very gravelly sandy clay; moderate fine and medium subangular blocky structure mainly parting along nodules and concretions surfaces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces, pore walls and nodules and concretion surface; few very fine, common fine vesicular and few fine simple tubular pores; common very fine, fine roots; common fine crack; common lateritic nodules and concretion; strongly acid (field pH 5.5); clear, smooth boundary to Bv2.
Bv2	160-195	Mixed dusky red (10R 3/3) 30%, strong brown (7.5YR 5/6) 20%, yellowish brown (10YR 5/8) 20%, yellowish red (5YR 5/6) 10%, olive yellow (2.5Y 6/8) 10%, red (10R 4/8) 5%, and pale yellow (2.5YR 7/4) 5%; very gravelly sandy clay; moderate fine and medium subangular blocky structure mainly parting along nodules and concretions surfaces; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces, pore walls and nodules and concretion surface; few very fine, fine vesicular and few fine simple tubular pores; few very fine and fine roots; common fine cracks; common lateritic nodules and concretion; very strongly acid (field pH

		5.0); clear, smooth boundary to Bv3.
Bv3	195-220+	Mixed strong brown (7.5YR 5/6) 30%, olive yellow (2.5Y 6/8) 30%, red (10R 4/8) 10%, dark red (2.5YR 5/8) 10%, pale yellow (2.5YR 7/4) 10% and yellowish brown (10YR 5/8) 10%; slightly gravelly sandy clay loam; moderate fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces and pore walls; few very fine, fine vesicular and fine simple tubular pores; few very fine, fine roots; common cracks, some fine dark spot of very fine lateritic nodules; few iron oxide nodules and concretion; very strongly acid (field pH 5.0).

Pedon 15

I Information on the site

Profile symbol	: TL-Ud7 (อยู่ในบริเวณชุดดินปากคม)
Classification	: Typic Plinthudult, coarse-loamy, mixed, isohyperthermic
Date of examination	: February 7, 2001
Location	: Approximately 20 m South of Kangtang-Ban Wong Wan road at km 3, Ban Bangpout, Tambon Bangpout, Amphoe Kangtang, Trung Province
Elevation	: Approximately 24 m (MSL)
Map sheet number	: 4923 IV Coordination : 47 559919E, 0817682N
Landform	
1. Physiographic position	: Upper footslope of residual hill
2. Surrounding land form	: Undulating
3. Slope on which profile site	: 5%
Land use	: Para-rubber mainly with coconut bananas and settlement
Annual rainfall	: Approximately 2,500 mm
Mean temperature	: Approximately 26°C
Climate	: Tropical Monsoon
Other	: Agricultural

II General Information on the soil

Parent material	: Wash over residuum derived from weathered metasedimentary rocks
Drainage	: Well drained
Permeability	: Moderate
Runoff	: Moderate
Depth of ground water	: Deeper than 2 m at time of sampling

III Profile description

Horizon	Depth(cm)	Description
Ap1	0-10	Mixed yellowish brown (10YR 5/8) 60% and brown (10YR 4/4) 40%; sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and slightly plastic; few faint clay coats on ped faces; common very fine, fine and few medium vesicular pores; common very fine, fine and medium roots; strongly acid (field pH 5.5); clear, smooth boundary to Ap2.
Ap2	10-30	Brown (10YR 4/3); sandy clay loam; moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, slightly sticky and slightly plastic; few faint clay coats on ped faces; common very fine, fine and medium vesicular pores; many very fine, medium and few coarse roots; very strongly acid (field pH 5.0); clear, smooth boundary to Bt1.
Bt1	30-52	Yellowish brown (10YR 5/6); sandy clay loam (light); moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, moderately sticky and moderately plastic; common faint clay coats on ped faces and pore wall; common very fine, fine and few medium vesicular pores; common very fine, fine, medium and few coarse roots; strongly acid (field pH 5.5); clear, smooth boundary to Bt2.
Bt2	52-74	Mixed strong brown (7.5YR 5/8); sandy clay loam (light); moderate fine and medium subangular blocky structure; slightly hard dry, firm moist, moderately sticky and moderately plastic; common faint clay coats on ped faces and pore walls; common very fine, fine and few medium vesicular few fine tabular pores; common very fine, fine, medium and few coarse roots; very strongly acid (field pH 5.0); clear, smooth boundary to Bt3.
Bt3	74-94	Mixed red (2.5YR 5/8) 50%, strong brown (7.5YR 5/8) 40% and yellow (2.5YR 7/6) 10%; sandy clay; strong fine and medium subangular blocky structure; hard dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and few distinct ferri-argillan on pore walls; common very fine, few fine and medium vesicular few fine tabular pores; common very fine, fine and few medium roots; few semi-hardened iron oxide nodules and concretions; few traces of dead roots; strongly acid (field pH 5.5); clear, smooth boundary to Btc.
Btc	94-110	Mixed yellowish brown (10YR 5/8)) 30%, dusky red (10R 3/3) 30%, brownish yellow (10YR 6/8) 20% and red (10R 4/8) 20%; gravelly sandy clay; strong fine and medium subangular blocky structure; hard

		dry, firm moist, moderately sticky and moderately plastic; common distinct clay coats and few distinct ferri-argillan on ped faces pore walls; common very fine, fine and few roots; few fine cracks; common semi-hardened and hardned iron oxide nodules and concretions; very strongly acid (field pH 5.0); clear, smooth boundary to Bv1.
Bv1	110-140	Mixed light red (2.5YR 7/8) 30%, red (10R 4/8) 20%, red (2.5YR 5/6) 20% and strong brown (7.5YR 5/6) 20% and dusky red (10R 3/3) 10%; moderate fine and medium subangular blocky structure; hard dry, firm moist, moderatly sticky and moderately plastic; common distinct clay coats and few distinct ferri-argillan on ped faces and pore walls; few very fine, fine and medium vesicular, few fine simple tubular pores; common very fine, fine and few medium roots; few fine cracks; few semi-hardened and hardned iron oxide nodules and concretions; very strongly acid (field pH 5.0); clear, smooth boundary to Bv2.
Bv2	140-170	Mixed red (2.5YR 5/6) 20%, yellow (10R 7/6) 20%, light brown (7.5YR 6/4) 20%, light gray (2.5Y 7/2) 20%, red (10R 4/8) 10% and reddish brown (5YR 5/4) 10% ; sandy clay; moderate fine and medium subangular blocky structure; hard dry, firm moist, moderatly sticky and moderately plastic; common distinct clay coats and ferri-argillan on ped faces and pore walls and some semi-hardned (soft) nodules and concretions surfaces of various sized and shaped; few very fine, fine and medium vesicular, few very fine, fine simple tubular pores; common very fine, fine and medium roots; common distinct separation of clay and ferri-argillan; very strongly acid (field pH 5.0); clear, smooth boundary to Bv3.
Bv3	170-200+	Mixed light gray (2.5Y 7/2) 25%, red (10R 4/8) 20%, withe (2.5Y 8/1) 15%, red (2.5YR 5/6) 10% and olive yellow (2.5R 6/6) 7%; sharp many fine and medium prominent strong brown (7.5YR 5/8) mottles; sandy clay; moderate fine and medium subangular blocky structure; hard dry, firm moist, sticky and plastic; common distinct clay coats and ferri-argillan on ped faces and pore walls few faint pressure faces; few very fine, fine and medium vesicular few very fine, fine simple tubular pores; few very fine, common fine and medium roots; few fine crack common fine crack; very strongly acid (field pH 4.5)

ตารางภาคผนวกที่ 1 X-ray diffraction spacing obtained from (001) plane of layer-silicate species as related to sample treatment

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), halosite
0.72-0.75	Metahalloysite
0.715	Kaolinite, Chlorite (2 nd -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
0.75	Kaolinite, Chlorite (2 nd -order maximum)
	<u>K-saturate, 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 (2 nd -order maximum)
	<u>K-saturate, heate (550°C)</u>
1.4	Chlorite
0.99-1.01	Mica, Vermiculite (contracted, smectite (contracted))
0.715	Chlorite (2 nd -order maximum)

ที่มา: Whittig (1965)

ตารางผนวกที่ 2 วิธีคาดคะเนระดับความอุดมสมบูรณ์ของดิน โดยการประเมินจากผลการวิเคราะห์ดิน

ระดับความ อุดมสมบูรณ์ ของดิน	ปริมาณ อินทรีย์วัตถุ (g kg ⁻¹)	อัตราร้อยละ ความอิ่มตัวเบส (%)	ความจุ แลกเปลี่ยนแคต ไอออน (cmol kg ⁻¹)	ปริมาณ ฟอสฟอรัสที่เป็น ประโยชน์ (mg kg ⁻¹)	ปริมาณ โพแทสเซียมที่เป็น ประโยชน์ (mg kg ⁻¹)
ต่ำ	< 15 (1)	< 35 (1)	< 10 (1)	< 10 (1)	< 60 (1)
ปานกลาง	15 – 35 (2)	35 – 75 (2)	10 – 25 (2)	10 – 25 (2)	60 – 90 (2)
สูง	> 35 (3)	> 75 (3)	> 25 (3)	> 25 (3)	> 90 (3)

หมายเหตุ วิธีคิดระดับความอุดมสมบูรณ์ของดินใช้วิธีให้คะแนน (ตัวเลขคะแนนอยู่ในวงเล็บในตาราง) ถ้าคะแนนเท่ากับ 7 หรือน้อยกว่า ถือว่าดินมีระดับความอุดมสมบูรณ์ต่ำ ถ้าคะแนนอยู่ระหว่าง 8-12 ถือว่าดินมีความอุดมสมบูรณ์ปานกลาง ถ้ามีคะแนน 13 หรือมากกว่า ถือว่าดินมีความอุดมสมบูรณ์สูง

ที่มา: กองสำรวจดิน (2523)