

มหาวิทยาลัยเชียงใหม่

ภาคผนวก

Chiang Mai University

## ภาคผนวกที่ ก

ผลการศึกษาคำอธิบายรูปหน้าตัดดิน  
(Soil Profile Descriptions)*Classification:**Soil Taxonomy, 1999:* Fine-loamy, mixed, semiactive, isothermic Typic Hapludults*WRB, 1998:* orthidystri-chromic Luvisols (LVcrhyo)*Site identification number:* HMY 01*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province*Latitude:* 18 degrees 28 minutes 00 seconds N.*Longitude:* 98 degrees 31 minutes 30 seconds E.*Grid reference (UTM):* 499E418N*Slope:* 75 percent*Elevation:* 1,470 m above m.s.l.*Landform:* Steep hillslope*Parent material:* Residuum and colluvium from fine to medium grained biotite granite*Soil moisture regime:* Udic*Soil temperature regime:* Isothermic*Annual precipitation:* 1,529.5 mm*Average annual air temperature:* 17.98 °C\**Average annual soil temperature:* 18.98 °C\**Weather station name:* Mae Ya Noi Station*Permeability class:* Moderate*Drainage class:* Well drained*Water table:* None observed within a depth of 2 m*Land use:* Lower montane forest

*Vegetation: Schima wallichii, Castanopsis acuminatissima, Castanopsis purpurea,*

*Particle-size control section: 14 to 64 cm*

*Diagnostic features: Ochric epipedon, argillic horizon*

*Described by: Jitti Pinthong, Thawil Norkham and Niwat Anongrak*

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

A-----0 to 14 cm; brown to dark brown (10YR4/3) loam; weak fine granular structure; very friable, nonsticky and nonplastic; many fine and common medium roots throughout; many medium tubular pores; strongly acid (pH 5.2); clear smooth boundary.

Bt1---- 14 to 47 cm; yellowish red (5YR5/8) sandy clay loam; weak fine and medium subangular blocky structure; friable, slightly sticky and slightly plastic; many fine and common medium roots; many medium tubular pores; few distinct clay films on faces of peds; very strongly acid (pH 4.6); clear smooth boundary.

Bt2----47 to 84 cm; yellowish red (5YR5/8) sandy clay; moderate fine and medium subangular blocky structure; firm, sticky and slightly plastic; few fine roots; few fine tubular pores; common distinct clay films on faces of peds; extremely acid (pH 4.4); clear smooth boundary.

Bt3----84 to 122 cm; yellowish red (5YR5/8) sandy clay; moderate fine and medium subangular blocky structure; firm, sticky and slightly plastic; few fine tubular pores; many distinct clay films on faces of peds; extremely acid (pH 4.4); clear smooth boundary.

BC1---122 to 165 cm; yellowish red (5YR5/6) sandy clay loam; moderate fine and medium subangular blocky structure; firm, slightly sticky and slightly plastic; few fine tubular pores; extremely acid (pH 4.4); clear smooth boundary.

BC2----165 to 200+ cm; yellowish red (5YR5/6) sandy clay loam; moderate fine and medium subangular blocky structure; firm, nonsticky and nonplastic; extremely acid (pH 4.4);

\* calculated



(A)



(B)

ภาพที่ 1 Photographs showing soil profile HMY01 (A)  
and associated topographic features (B)

**Classification:**

*Soil Taxonomy, 1999* : Fine, mixed or kaolinitic, subactive, isothermic Typic Kandiodults

*WRB, 1998*: chromi-humic Acrisols (AChucr)

**Site identification number:** HMY 02

**Location:** Don Kaew subdistrict, Chom Thong district, Chiang Mai province

**Latitude:** 18 degrees 28 minutes 12 seconds N.

**Longitude:** 98 degrees 31 minutes 12 seconds E.

**Grid reference (UTM):** 494E421N

**Slope:** 30 percent

**Elevation:** 1,460 m above m.s.l.

**Landform:** Gentle hillslope

**Parent material:** Residuum and colluvium from fine to medium grained biotite granite

**Soil moisture regime:** Udic

**Soil temperature regime:** Isothermic

**Annual precipitation:** 1,529.5 mm

**Average annual air temperature:** 19.05 °C\*

**Average annual soil temperature:** 20.05 °C\*

**Weather station name:** Mae Ya Noi Station

**Permeability class:** Moderate

**Drainage class:** Well drained

**Water table:** None observed within a depth of 2 m

**Land use:** Reforested area

**Vegetation:** *Pinus kesiya*, *Gramineae spp.*, *Saccharum procerum*, *Imperata cylindrica*

**Particle-size control section:** 19 to 69 cm

**Diagnostic features:** Ochric epipedon, kandic horizon

**Described by:** Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

- A-----0 to 19 cm; reddish brown (5YR4/4) sandy clay loam; moderate fine granular structure; friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular pores; strongly acid (pH 5.4); clear smooth boundary.
- Bt1---- 19 to 48 cm; red (2.5YR4/8) sandy clay ; moderate fine subangular blocky structure; very firm, moderate sticky and moderate plastic; common medium and common very coarse roots; common fine vesicular pores; few distinct clay films on faces of peds; strongly acid (pH 5.4); clear wavy boundary.
- Bt2----48 to 79 cm; red (2.5YR4/8) clay; moderate fine and medium subangular blocky structure; very firm, moderate sticky and moderate plastic; common fine and common medium roots; few fine vesicular pores; common distinct clay films on faces of peds; strongly acid (pH 5.4); clear smooth boundary.
- Bt3----79 to 115 cm; red (10R5/8) clay; strong fine and medium subangular blocky structure; very firm, very sticky and very plastic; few fine vesicular pores; many distinct clay films on faces of peds; strongly acid (pH 5.4); clear smooth boundary.
- Bt4----115 to 160 cm; red (10R4/8) clay; strong fine and medium subangular blocky structure; very firm, very sticky and very plastic; few fine vesicular pores; many distinct clay films on faces of peds; strongly acid (pH 5.2); clear smooth boundary.
- Bt5----160 to 200+ cm; red (10R4/8) clay ; strong fine and medium subangular blocky structure; very firm, very sticky and very plastic; few fine vesicular pores; many distinct clay films on faces of peds; strongly acid (pH 5.2).

\*calculated



(A)



(B)

ภาพที่ 2 Photographs showing soil profile HMY02(A)  
and associated topographic features (B)

*Classification:*

*Soil Taxonomy, 1999* : Fine, mixed, semiactive, isothermic Typic Paleudults

*WRB, 1998* : orthidystri-chromic Luvisols (LVcrdyo)

*Site identification number:* HMY 03

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 28 minutes 24 seconds N.

*Longitude:* 98 degrees 31 minutes 06 seconds E.

*Grid reference (UTM):* 492E425N

*Slope:* 45 percent

*Elevation:* 1,500 m above m.s.l.

*Landform:* Steep hillslope

*Parent material:* Residuum and colluvium from fine to medium grained biotite granite

*Soil moisture regime:* Udic

*Soil temperature regime:* Isothermic

*Annual precipitation:* 1,529.5 mm

*Average annual air temperature:* 19.81 °C\*

*Average annual soil temperature:* 20.81 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Reforested area

*Vegetation:* *Pinus kesiya*, *Imperata cylindrica*, *Gramineae spp.*

*Particle-size control section:* 23 to 73 cm

*Diagnostic features:* Umbric epipedon, argillic horizon

*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.



- A-----0 to 8 cm; reddish black to black (10R2.5/1-2.5YR2.5/0) loam; weak to moderate fine to medium granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular pores; very strongly acid (pH 5.0); clear wavy boundary.
- AB---- 8 to 23 cm; dusky red (10R3/3-2.5YR3/3) loam to clay loam ; weak to moderate fine to medium granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular pores; very strongly acid (pH 4.8); clear wavy boundary.
- Bt1----23 to 38 cm; dark red (2.5YR3/6) clay loam; weak to moderate fine to medium subangular blocky structure; friable, sticky and plastic; many fine and medium roots; common medium vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 4.8); gradual smooth boundary.
- Bt2----38 to 80 cm; red (2.5YR4/8) clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; few fine roots; many medium vesicular pores; many distinct clay films on faces of peds; very strongly acid (pH 4.6); diffuse smooth boundary.
- Bt3----80 to 125 cm; red (10R5/8-2.5YR5/8) gritty clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; few fine roots; many medium vesicular pores; many distinct clay films on faces of peds; very strongly acid (pH 4.6); diffuse smooth boundary.
- Bt4----125 to 190 cm; red (10R4/8) gritty clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; few fine roots; many medium vesicular pores; many distinct clay films on faces of peds; very strongly acid (pH 4.8); 5 percent quartz pebbles; clear smooth boundary.
- Bt5----190 to 220 cm; red (10R4/8) gritty clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; common medium vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 4.6); clear smooth boundary.

Bt6-----220 to 250 cm; red (10R4/8) gritty clay; moderate medium subangular blocky structure; friable, very Sticky and very plastic; common medium vesicular pores; few fine distinct clay films on faces of peds; very strongly acid (pH 4.6).

\*calculated

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(A)



(B)

ภาพที่ 3 Photographs showing soil profile HMY03 (A)  
and associated topographic features (B)

*Classification:*

*Soil Taxonomy, 1999* : Fine, mixed, subactive, isothermic Typic Paleudults

*WRB, 1998* : chromi-humic-umbric Acrisols (Acumhucr)

*Site identification number:* HMY 04

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 28 minutes 48 seconds N.

*Longitude:* 98 degrees 31 minutes 30 seconds E.

*Grid reference (UTM):* 498E433N

*Slope:* 60 percent

*Elevation:* 1,700 m above m.s.l.

*Landform:* Steep hillslope

*Parent material:* Residuum and colluvium from fine to medium grained biotite granite

*Soil moisture regime:* Udic

*Soil temperature regime:* Isothermic

*Annual precipitation:* 1,529.5 mm

*Average annual air temperature:* 19.62 °C\*

*Average annual soil temperature:* 20.62 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Grassland

*Vegetation:* *Imperata cylindrica*, *Gramineae spp.*,

*Particle-size control section:* 40 to 90 cm

*Diagnostic features:* Umbric epipedon, argillic horizon

*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

- A1-----0 to 10 cm; reddish black (10R2.5/1) loam; moderate fine granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular pores; slightly acid (pH 6.2); clear smooth boundary.
- A2-----10 to 25 cm; dark reddish gray (10R3/1) loam; weak to moderate fine to medium granular structure parting to weak to moderate fine to medium subangular blocky; very friable, slightly sticky and slightly plastic; many fine and common medium roots; many fine and common medium vesicular pores; strongly acid (pH 5.2); clear wavy boundary.
- BA-----25 to 40 cm; reddish brown (2.5YR4/4) clay loam; weak to moderate medium subangular blocky structure parting to weak to moderate fine to medium granular; very friable, slightly sticky and slightly plastic; many fine and medium roots; common medium vesicular pores; very strongly acid (pH 5.0); clear wavy boundary.
- Bt1-----40 to 60 cm; red (10R4/6-2.5YR4/6) clay loam to clay; weak to moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common medium vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 5.0); clear wavy boundary.
- Bt2-----60 to 95 cm; red (10R4/8-2.5YR4/8) gritty clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; few fine vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 4.8); clear smooth boundary.
- Bt3-----95 to 150 cm; red (10R4/8-2.5YR4/8) clay; moderate medium subangular blocky structure parting to moderate fine to medium granular; friable, very sticky and very plastic; few fine roots; few fine vesicular pores; many distinct clay films on faces of peds, very strongly acid (pH 4.8); 5 percent granite cobbles; clear smooth boundary.
- Bt4-----150 to 180 cm; red (10R4/8) clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; common medium vesicular pores; many distinct clay films on faces of peds; very strongly acid (pH 4.8); clear smooth boundary.
- Bt5-----180 to 200+ cm; red (7.5R4/8) clay; moderate medium subangular blocky structure; friable, very sticky and very plastic; common medium vesicular pores; few fine distinct clay films on faces of peds; very strongly acid (pH 4.6).

\*calculated



(A)



(B)

ภาพที่ 4 Photographs showing soil profile HMY04 (A)  
and associated topographic features (B)

*Classification:*

*Soil Taxonomy, 1999:* Fine-loamy, mixed, active, isothermic Humic Hapludults.

*WRB, 1998:* orthidystri-chromic Luvisols (LVcrdyo)

*Site identification number:* HMY 05

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 27 minutes 00 seconds N.

*Longitude:* 98 degrees 32 minutes 24 seconds E.

*Grid reference (UTM):* 513E399N

*Slope:* 50 percent

*Elevation:* 1,345 m above m.s.l.

*Landform:* Steep hillslope

*Parent material:* Residuum and colluvium from fine to medium grained biotite granite

*Soil moisture regime:* Udic

*Soil temperature regime:* Isothermic

*Annual precipitation:* 1,529.5 mm

*Average annual air temperature:* 22.75 °C\*

*Average annual soil temperature:* 23.75 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Lower montane forest

*Vegetation:* *Schima wallichii*, *Castanopsis acuminatissima*, *Castanopsis purpurea*,

*Castanopsis diversifolia*, *Castanopsis indica*

*Particle-size control section:* 12 to 62 cm

*Diagnostic features:* Umbric epipedon, argillic horizon

*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

- A-----0 to 12 cm; reddish black (10R2.5/1) loam; moderate fine granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular pores; slightly acid (pH 6.2); clear smooth boundary.
- Bt1----12 to 30 cm; dark reddish gray (10R3/1) loam; weak to moderate fine to medium granular parting to weak to moderate fine to medium subangular blocky; very friable, slightly sticky and slightly plastic; many fine and common medium roots; many fine and common medium vesicular pores; common distinct clay films on faces of peds; strongly acid (pH 5.2); clear wavy boundary.
- Bt2----30 to 70 cm; reddish brown (2.5YR4/4) clay loam; weak to moderate medium subangular blocky structure; very friable, slightly sticky and slightly plastic; many fine and medium roots; common medium vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 5.0); clear wavy boundary.
- Bt3-----70 to 105 cm; red (10R4/6-2.5YR4/6) clay loam to clay; weak to moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; few fine roots; common medium vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 5.0); clear wavy boundary.
- Bt4-----105 to 134 cm; red (10R4/8-2.5YR4/8) gritty clay; moderate medium subangular blocky structure; friable, sticky and plastic; few fine roots; few fine vesicular pores; common distinct clay films on faces of peds; very strongly acid (pH 4.8); clear smooth boundary.
- Bt5-----134 to 170+ cm; red (10R4/8-2.5YR4/8) clay; moderate medium blocky structure; friable, very sticky and very plastic; few fine roots; few fine vesicular pores; many distinct clay films on faces of peds; very strongly acid (pH 4.8); 5 percent by volume granite cobbles; clear smooth boundary.

\*calculated





(A)



(B)

ภาพที่ 5 Photographs showing soil profile HMY05 (A)  
and associated topographic features (B)

*Classification:*

*Soil Taxonomy, 1999:* Fine, mixed, subactive, isothermic Typic Hapludults

*WRB, 1998:* chromic Acrisols (ACcr)

*Site identification number:* HMY 06

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 26 minutes 54 seconds N.

*Longitude:* 98 degrees 33 minutes 30 seconds E.

*Grid reference (UTM):* 533E397N

*Slope:* 60 percent

*Elevation:* 1,090 m above m.s.l.

*Landform:* Steep hillslope

*Parent material:* Residuum and colluvium from paragneiss and pegmatite

*Soil moisture regime:* Udic

*Soil temperature regime:* Isothermic

*Annual precipitation:* 1,529.5 mm

*Average annual air temperature:* 25.29 °C\*

*Average annual soil temperature:* 26.29 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Pine-dry dipterocarp forest

*Vegetation:* *Pinus kesiya*, *Pinus merkusii*, *Dipterocarpus tuberculatus*, *Gluta usitata*

*Particle-size control section:* 18 to 68 cm

*Diagnostic features:* Ochric epipedon, argillic horizon

*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

- A-----0 to 9 cm; dark reddish brown (5YR3/4-2.5YR3/4) gritty clay loam; moderate to strong very fine to fine crumb structure parting to moderate very fine to fine structure; friable, slightly sticky and slightly plastic; many fine and common medium roots throughout; many fine and common medium vesicular and common medium tubular pores; slightly acid (pH 6.5); clear wavy boundary.
- BA----- 9 to 18 cm; reddish brown (5YR4/4-2.5YR4/4) gritty clay loam to clay; moderate very fine to fine blocky structure; friable, sticky and slightly plastic; many fine and common medium roots; many fine and common medium vesicular and common fine tubular pores; moderately acid (pH 5.2); clear wavy boundary.
- Bt1-----18 to 55 cm; red (2.5YR4/8-10R4/8) clay; moderate fine to medium blocky structure; friable, sticky and plastic; common fine and medium roots; common medium vesicular and few fine tubular pores; common distinct clay films on faces of peds and in pores; moderately acid (pH 5.8); gradual smooth boundary.
- Bt2-----55 to 112 cm; red (10R4/8) clay loam to clay; weak to moderate fine to medium blocky structure; friable, sticky and plastic; few fine roots; common medium vesicular and few fine tubular pores; common distinct clay films on faces of peds and in pores; 5 percent by volume strongly weathering of paragneiss cobbles; moderately acid (pH 6.0); gradual wavy boundary.
- BC1----112 to 170 cm; red (2.5YR4/6) gritty clay loam to loam; weak to moderate fine to medium blocky structure; friable, slightly sticky and slightly plastic; few fine roots; few fine vesicular and few fine tubular pores; over 40 percent by volume strongly weathering of paragneiss boulders; neutral (pH 6.6).
- BC2----170 to 200+ cm; yellowish red to red (5YR5/8-2.5YR5/8) gritty clay loam to loam; friable, slightly sticky and slightly plastic; few fine vesicular and few fine tubular pores; 30 percent by volume strongly weathering of paragneiss boulders; slightly acid to neutral (pH 6.4-6.6).

\*calculated



(A)



(B)

ภาพที่ 6 Photographs showing soil profile HMY06 (A)  
and associated topographic features (B)

*Classification:*

*Soil taxonomy, 1999:* Loamy-skeletal, mixed, active, hyperthermic Typic Dystrustepts

*WRB, 1998:* epidystri-skeletal Cambisols (CMskdye)

*Site identification number:* HMY 07

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 26 minutes 24 seconds N.

*Longitude:* 98 degrees 36 minutes 54 seconds E.

*Grid reference (UTM):* 593E387N

*Slope:* 21 percent

*Elevation:* 450 m above m.s.l.

*Landform:* Lower slope

*Parent material:* Residuum and colluvium from paragneiss and pegmatite

*Soil moisture regime:* Ustic

*Soil temperature regime:* Hyperthermic

*Annual precipitation:* 1,529.5 mm

*Average annual air temperature:* 30.14 °C\*

*Average annual soil temperature:* 31.14 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Dry dipterocarp forest

*Vegetation:* *Shorea siamensis*, *Shorea obtusa*, *Dipterocarpus obtusifolius*,

*Particle-size control section:* 22 to 100 cm

*Diagnostic features:* Ochric epipedon, argillic horizon

*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

- A-----0 to 4 cm; dark yellowish brown (10YR3/4) very gravelly sandy loam; single grains structure; loose to very friable, non sticky and non plastic; common fine and common medium roots throughout; many fine and common medium vesicular and common fine to medium tubular pores; 30 percent by volume quartz pebbles and 20 percent by volume paragneiss pebbles; neutral (pH 6.6); clear wavy boundary.
- Bw1----4 to 22 cm; yellowish brown (10YR5/6) very gravelly loamy sand; single grains structure; loose to very friable, non sticky and non plastic; common fine and common medium roots; common fine and few fine vesicular and few fine tubular pores; 40 percent by volume quartz pebbles and 30 percent by volume paragneiss pebbles; very strongly acid (pH 4.6); clear wavy boundary.
- Bw2----22 to 44 cm; yellowish brown (10YR5/8) very gravelly loamy sand; single grains structure; loose to very friable, non sticky and non plastic; few fine roots; few fine vesicular and few fine tubular pores; 40 percent by volume paragneiss pebbles; very strongly acid (pH 4.6); clear wavy boundary.
- Bw3----44 to 88 cm; brownish yellow (10YR6/6) very gravelly loamy sand; single grains structure; loose to very friable, non sticky and non plastic; few fine vesicular and few fine tubular pores; 35 percent by volume paragneiss pebbles; extremely acid (pH 4.4); clear wavy boundary.
- Bw4----88 to 115+ cm; light gray (10YR7/2) very gravelly loamy sand; single grains structure; loose to very friable, non sticky and non plastic; 35 percent by volume paragneiss pebbles, 30 percent by volume biotite and muscovite fragments; extremely acid (pH 4.4); clear wavy boundary.
- Bw5----115 to 120+ cm; light gray (10YR7/2) very gravelly loamy sand; single grains structure; loose to very friable, non sticky and non plastic; 35 percent by volume paragneiss pebbles; extremely acid (pH 4.4).

\*calculated



(A)



(B)

ภาพที่ 7 Photographs showing soil profile HMY07 (A)  
and associated topographic features (B)

*Classification:*

*Soil Taxonomy, 1999:* Fine, mixed, semiactive, hyperthermic Typic Haplustalfs

*WRB, 1998:* chromi-abruptic Lixisols (LXapcr)

*Site identification number:* HMY 08

*Location:* Don Kaew subdistrict, Chom Thong district, Chiang Mai province

*Latitude:* 18 degrees 26 minutes 06 seconds N.

*Longitude:* 98 degrees 35 minutes 48 seconds E.

*Grid reference (UTM):* 575E383N

*Slope:* 45 percent

*Elevation:* 650 m above m.s.l.

*Landform:* High relief mountain

*Parent material:* Residuum and colluvium from paragneiss and pegmatite

*Soil moisture regime:* Ustic

*Soil temperature regime:* Hyperthermic

*Annual precipitation:* 1,529 mm

*Average annual air temperature:* 29.94 °C\*

*Average annual soil temperature:* 30.94 °C\*

*Weather station name:* Mae Ya Noi Station

*Permeability class:* Moderate

*Drainage class:* Well drained

*Water table:* None observed within a depth of 2 m

*Land use:* Mixed deciduous forest

*Vegetation:* *Tectona grandis*, *Lagerstroemia duppereana*, *Lagerstroemia villosa*,

*Mallettia leucantha*, *Terminalia macronata*, *Lagerstroemia duperreana*,

*Lagerstroemia villosa*, *Thyrsostachys siamensis*, *Bambusa nutans*

*Particle-size control section:* 25 to 100 cm

*Diagnostic features:* Umbric epipedon, argillic horizon



*Described by:* Jitti Pinthong, Thawil Norkham and Niwat Anongrak

In the following pedon description, colors are for moist soil unless otherwise indicated.

Texture terms are for field textures.

A-----0 to 11 cm; very dark gray (10YR3/1) gravelly sandy clay loam; weak fine granular structure; very friable, slightly sticky and non plastic; many fine and many medium roots throughout; many fine and common medium vesicular and common medium tubular pores; 30 percent paragneiss pebbles; neutral (pH 7.0); clear wavy boundary.

BA-----11 to 46 cm; dark brown to brown (10YR4/3) gravelly sandy clay; moderate medium granular structure; very friable, slightly sticky and slightly plastic; many fine and common medium roots; many fine and common medium vesicular and common medium tubular pores; 25 percent paragneiss pebbles; neutral (pH 7.0); clear wavy boundary.

Bt1----46 to 82 cm; dark yellowish brown (10YR4/4) gravelly sandy clay; moderate fine blocky structure; friable, sticky and slightly plastic; few fine and medium roots; few fine vesicular and few fine tubular pores; common distinct clay films on faces of peds and in pores; 20 percent paragneiss pebbles; slightly acid (pH 6.2); clear wavy boundary.

Bt2----82 to 122 cm; dark yellowish brown (10YR4/4) very gravelly sandy clay; moderate fine to medium blocky structure; friable, sticky and plastic; few fine roots; few fine vesicular and few fine tubular pores; common distinct clay films on faces of peds and in pores; 20 percent paragneiss pebbles; strongly acid (pH 5.2); clear wavy boundary.

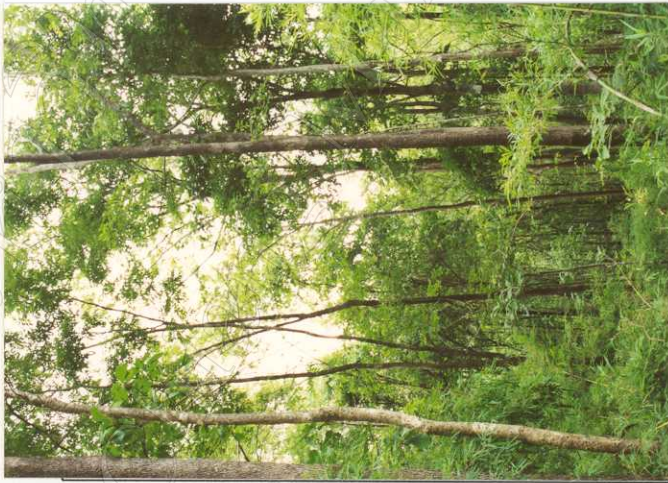
BC1----122 to 180 cm; yellowish brown and yellow (10YR5/4+10YR7/8) very gravelly sandy clay; moderate fine to medium blocky structure; friable, sticky and plastic; few fine vesicular pores; 35 percent paragneiss pebbles; strongly acid (pH 5.2); clear smooth boundary.

BC2----180 to 200+ cm; grayish brown and yellowish brown (10YR5/2+10YR5/6) very gravelly sandy clay; friable, sticky and plastic; few fine vesicular pores; 40 percent paragneiss pebbles; very strongly acid (pH 5.0).

\*calculated



(A)



(B)

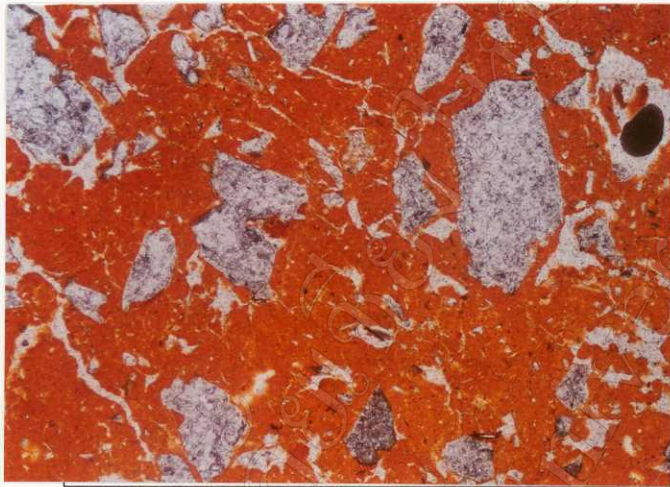
ภาพที่ 8 Photographs showing soil profile HMY08 (A)  
and associated topographic features (B)

ภาคผนวก ข

ผลการศึกษาคำอธิบายแผ่นดินบาง  
(Soil Thin Section Description)

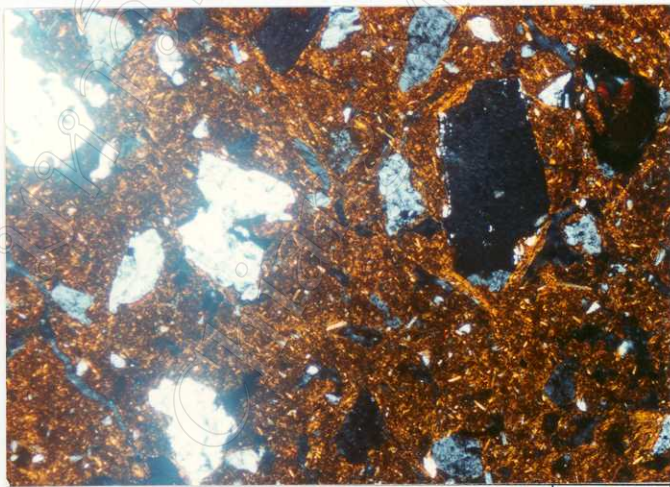
Sample No. TN 1 (HMY01, Bt2: 47-84 cm)

Horizon	Depth (cm)	Description
Bt2	47-84 cm	<p><b>Microstructure</b></p> <p>Complex structure as mixture of subangular blocky structure (70%) and vughy structure (30%), voids are planar voids and vughs, estimated total porosity is 20%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 40:60</p> <p>Coarse fraction: Dominant angular to subangular quartz grains in 10-1,500 <math>\mu\text{m}</math> size range, poorly sorted; frequent broken quartz, few mica (muscovite and biotite) flakes, very few alteration of biotite flakes and feldspar.</p> <p>Fine fraction: Red clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Very few amorphous fine organic materials and very few plant tissue residues.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open porphyric, the b-fabric of the micromass is undifferentiated to weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Textural pedofeatures as very few microlaminated thin clay coating and very few clay fragments in 10-40 <math>\mu\text{m}</math> size range.</p>



(A)

0.3 mm



(B)

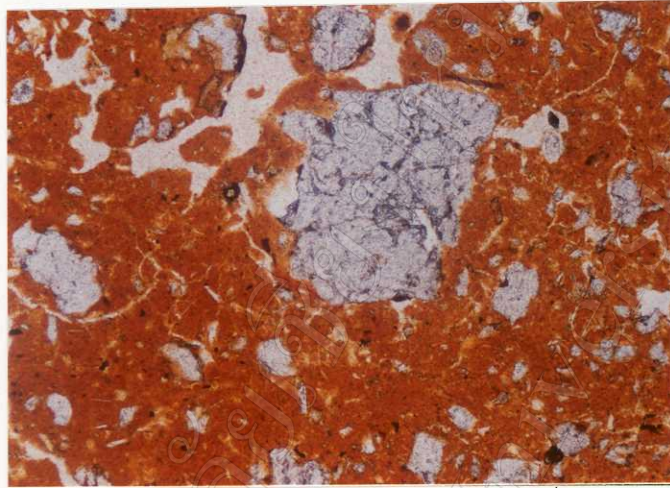
0.3 mm

ภาพที่ 9 Photographs showing micromorphological characteristics of the sample

No. TN 1 (HMY01, Bt2: 47-84 cm) (A) PPL (B) XPL

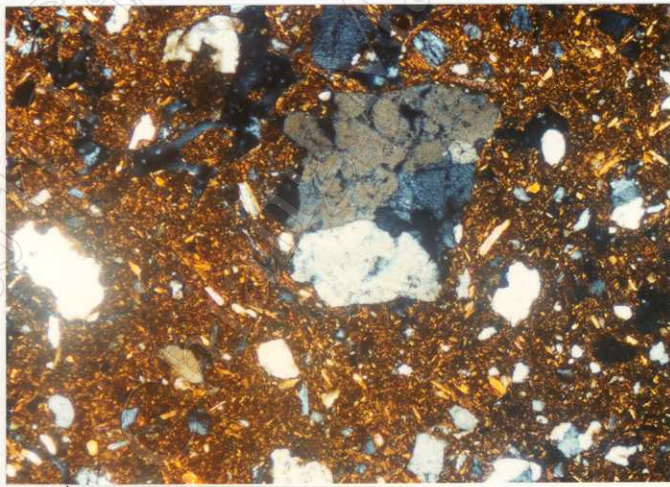
**Sample No. TN 2 (HMY02, Bt3: 79-115 cm)**

<b>Horizon</b>	<b>Depth (cm)</b>	<b>Description</b>
Bt3	79-115 cm	<p><b>Microstructure</b></p> <p>Subangular blocky structure, voids are planar voids, estimated total porosity is 20%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 45:55</p> <p>Coarse fraction: Dominant angular to subangular quartz grains in 10-1,000 <math>\mu\text{m}</math> size range, poorly sorted; few cracked and few polycrystalline quartz, few mica (muscovite and biotite) flakes, few alteration of biotite flakes, few plagioclase , very few alteration of feldspar.</p> <p>Fine fraction: Yellowish red clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Very few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open to double spaced porphyric, the b-fabric of the micromass is weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Textural pedofeatures as very few microlaminated thin clay coating and very few clay fragments in 30-60 <math>\mu\text{m}</math> size range and very few crystalline pedofeatures of gibbsite pseudomorph after feldspar.</p>



(A)

0.3 mm



(B)

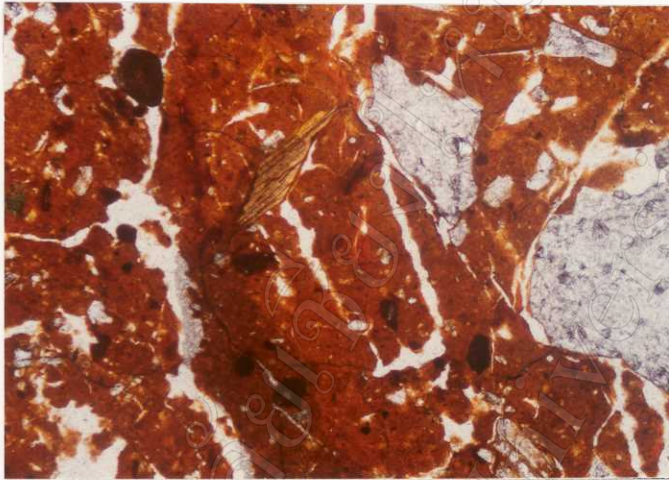
0.3 mm

ภาพที่ 10 Photographs showing micromorphological characteristics of the sample

No. TN 2 (HMY02, Bt3: 79-115 cm) (A) PPL (B) XPL

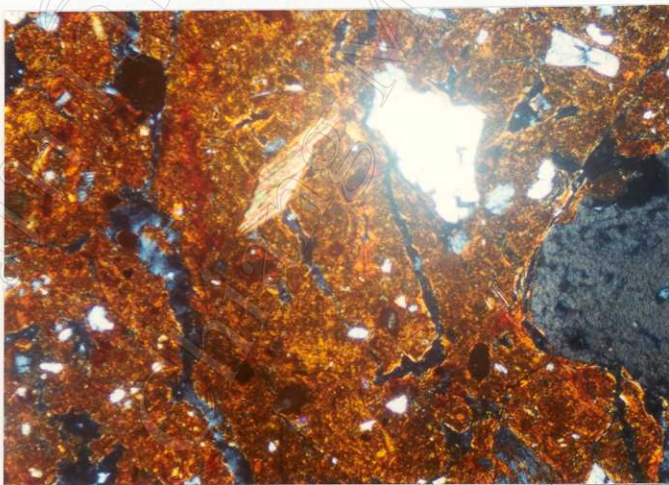
**Sample No. TN 3 (HMY03, Bt3: 80-125 cm)**

<b>Horizon</b>	<b>Depth (cm)</b>	<b>Description</b>
Bt3	80-125 cm	<p><b>Microstructure</b></p> <p>Complex structure as mixture of subangular blocky structure (75%) and vughy structure (25%), voids are planar voids and vughs, estimated total porosity is 20%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 35:65</p> <p>Coarse fraction: Dominant angular to subangular quartz grains in 20-1,000 <math>\mu\text{m}</math> size range, poorly sorted; frequent broken quartz, few plagioclase, few mica (muscovite and biotite) flakes, very few alteration of biotite flakes and feldspar.</p> <p>Fine fraction: Brown clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open porphyric, the b-fabric of the micromass is undifferentiated to weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Few textural pedofeatures as microlaminated clay mixed with iron oxide coating.</p>



(A)

0.3 mm



(B)

0.3 mm

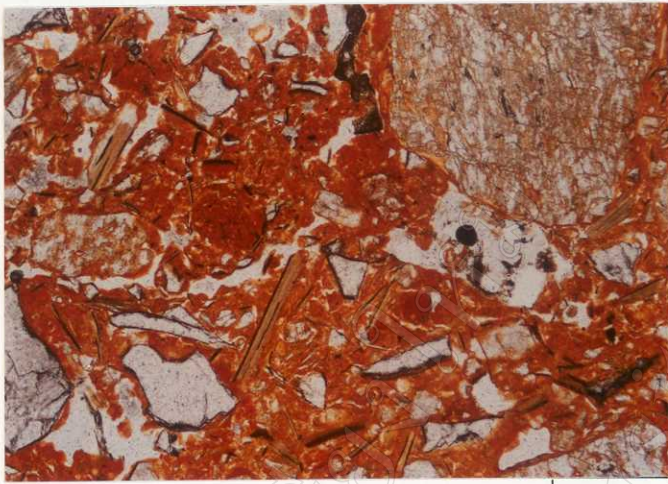
ภาพที่ 11 Photographs showing micromorphological characters of the sample

No. TN 3 (HMY03, Bt3: 80-125 cm) (A) PPL (B) XPL



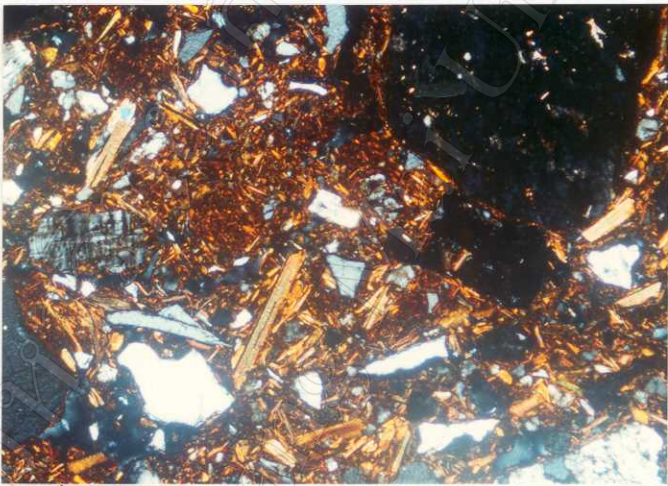
**Sample No. TN 4 (HMY04, Bt2: 60-95 cm)**

Horizon	Depth (cm)	Description
Bt2	60-95 cm	<p><b>Microstructure</b></p> <p>Vughy structure, voids are vughs, estimated total porosity is 20%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 50:50</p> <p>Coarse fraction: Dominant angular to subangular quartz grains in 10-1,000 <math>\mu\text{m}</math> size range, poorly sorted; frequent broken quartz, few K-feldspar, few mica (muscovite and biotite) flakes, very few alteration of biotite flakes, very few alteration of feldspar.</p> <p>Fine fraction: Red clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open to close porphyric, the b-fabric of the micromass is weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Few textural pedofeatures as mica orientation around quartz and feldspar, few textural pedofeture as microlaminated thin clay coating and very few crystalline pedofeatures of gibbsite pseudomorph after feldspar.</p>



(A)

0.3 mm



(B)

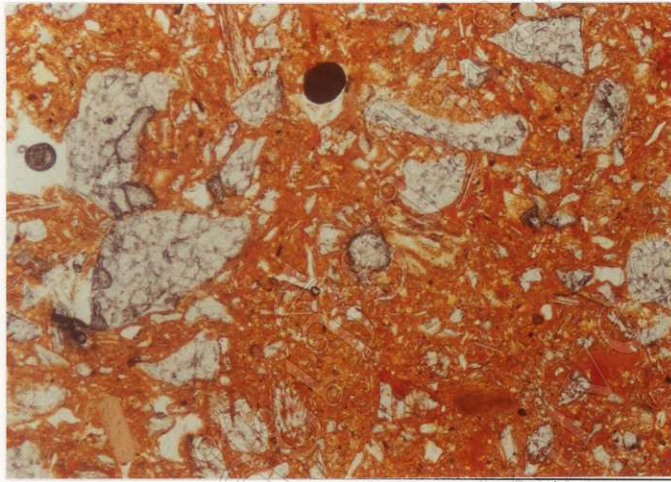
0.3 mm

ภาพที่ 12 Photographs showing micromorphological characteristics of the sample

No. TN 4 (HMY04, Bt2: 60-95 cm) (A) PPL (B) XPL

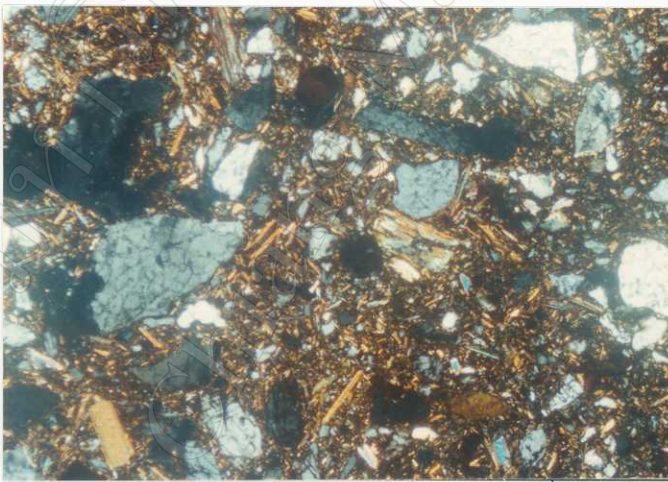
**Sample No. TN 5 (HMY05, Bt2: 30-70 cm)**

Horizon	Depth (cm)	Description
Bt2	30-70 cm	<p><b>Microstructure</b></p> <p>Vughy structure, voids are vughs, estimated total porosity is 20%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 65:35</p> <p>Coarse fraction: Dominant subangular quartz grains in 10-2,000 <math>\mu\text{m}</math> size range, poorly sorted; common cracked and frequent polycrystalline quartz, few mica (muscovite and biotite) flakes, very few alteration of feldspar.</p> <p>Fine fraction: Yellowish red clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open to double spaced porphyric, the b-fabric of the micromass is undifferentiated to weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Frequent textural pedofeatures as microlaminated clay infilling of voids, few clay fragment and very few crystalline pedofeatures of gibbsite pseudomorp after feldspar.</p>



(A)

0.3 mm



(B)

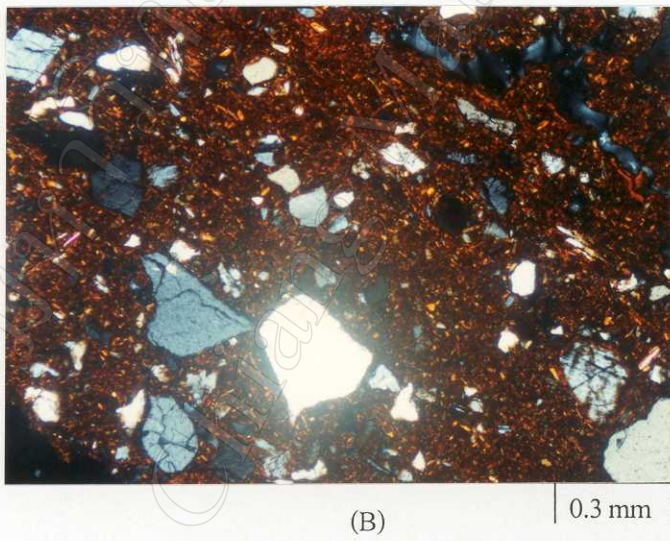
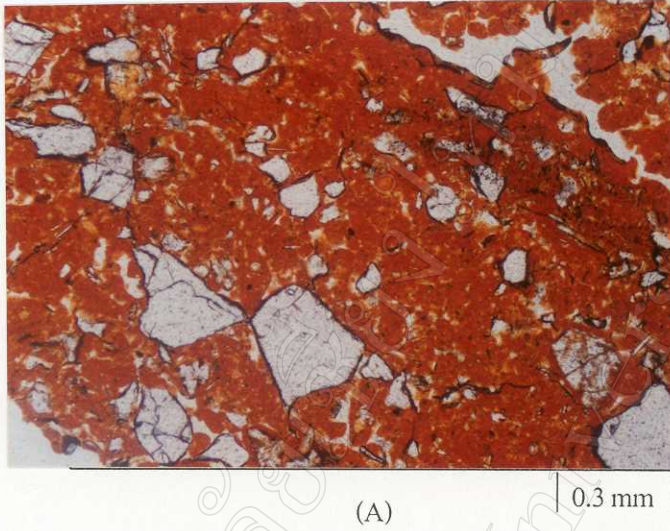
0.3 mm

ภาพที่ 13 Photographs showing micromorphological characteristics of the sample

No. TN 5 (HMY05, Bt2: 30-70 cm) (A) PPL (B) XPL

**Sample No. TN 6 (HMY06, Bt1: 18-55 cm)**

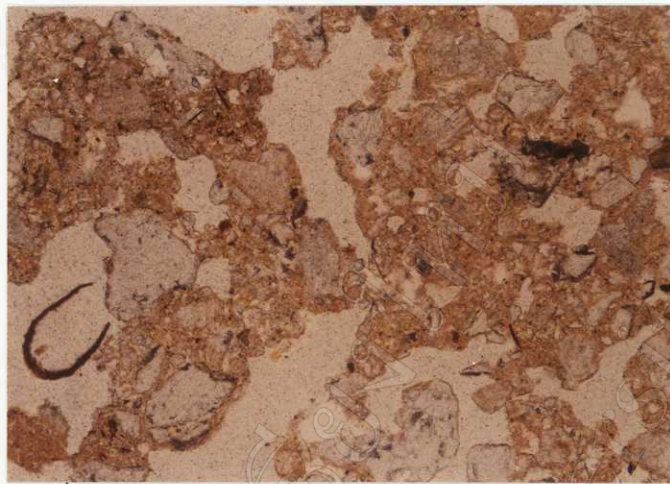
Horizon	Depth (cm)	Description
Bt1	18-55 cm	<p><b>Microstructure</b></p> <p>Complex structure as mixture of subangular blocky structure (70%) and vughy structure (30%), voids are short planar voids and vughs, estimated total porosity is 15%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 50:50</p> <p>Coarse fraction: Dominant angular to subangular quartz grains in 10-1,500 <math>\mu\text{m}</math> size range, poorly sorted; few cracked and few polycrystalline quartz, few mica (muscovite and biotite) flakes, few K-feldspar, few plagiclase, very few alteration of biotite flakes and feldspar.</p> <p>Fine fraction: Red clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Very few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is open to double spaced porphyric, the b-fabric of the micromass is undifferentiated to weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>Frequent textural pedofeatures as clay coating in voids.</p>



ภาพที่ 14 Photographs showing micromorphological characteristics of the sample  
No. TN 6 (HMY06, Bt1: 18-55 cm) (A) PPL (B) XPL

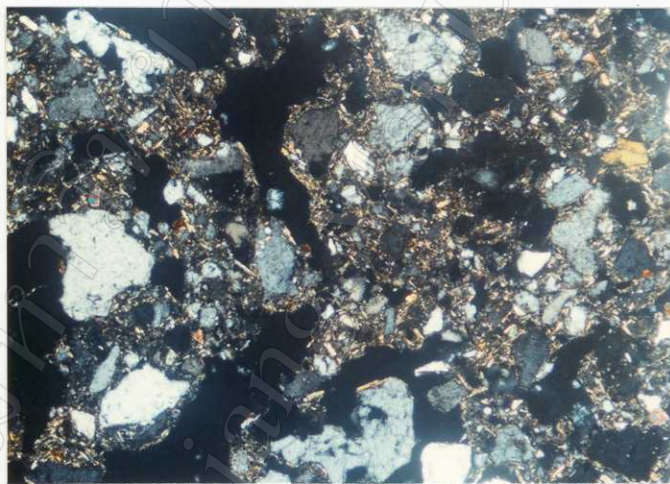
**Sample No. TN 7 (HMY07, Bw2: 22-44 cm)**

<b>Horizon</b>	<b>Depth (cm)</b>	<b>Description</b>
Bw2	22-44 cm	<p><b>Microstructure</b></p> <p>Bridged grain structure, voids are simple packing voids, estimated total porosity is 35%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 80:20</p> <p>Coarse fraction: Dominant subangular quartz grains in 20-3,500 <math>\mu\text{m}</math> size range, poorly sorted; common cracked and common polycrystalline quartz, few mica (muscovite and biotite) flakes, few plagioclase, very few alteration of biotite flakes and feldspar, very few tourmaline.</p> <p>Fine fraction: Yellowish brown clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Few amorphous fine organic materials and very few plant tissue residues.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is geric, the b-fabric of the micromass is undifferentiated to weakly stripple-speckled.</p> <p><b>Pedofeatures</b></p> <p>None present.</p>



(A)

0.3 mm



(B)

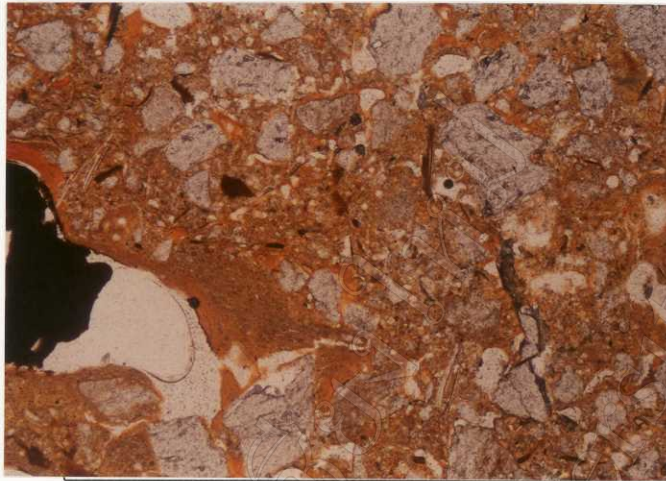
0.3 mm

ภาพที่ 15 Photographs showing micromorphological characteristics of the sample  
No. TN 7 (HMY07, Bw2: 22-44 cm) (A) PPL (B) XPL



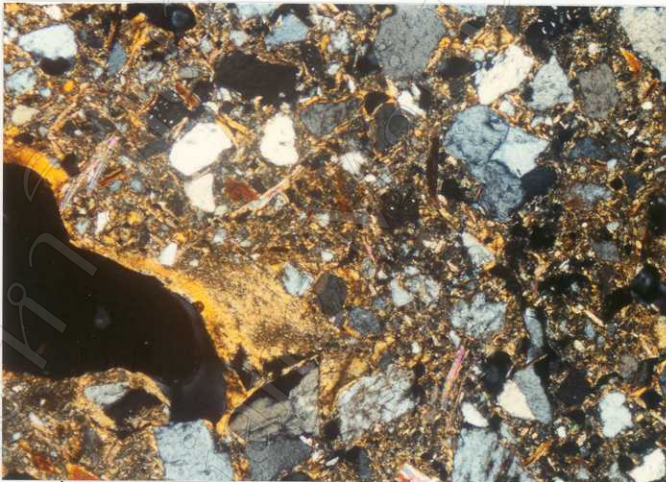
**Sample No. TN 8 (HMY08, Bt1: 46-82 cm)**

<b>Horizon</b>	<b>Depth (cm)</b>	<b>Description</b>
Bt1	46-82 cm	<p><b>Microstructure</b></p> <p>Complex structure as mixture of subangular blocky structure (60%) and bridged grain structure (40%), voids are mainly planar voids, estimated total porosity is 25%.</p> <p><b>Basic mineral components</b></p> <p>c:f ratio at 10 <math>\mu\text{m}</math> is 75:35</p> <p>Coarse fraction: Dominant subangular quartz grains in 20-3,000 <math>\mu\text{m}</math> size range, poorly sorted; common cracked and common polycrystalline quartz, few mica (muscovite and biotite) flakes, few plagioclase, very few alteration of biotite flakes and feldspar, very few tourmaline.</p> <p>Fine fraction: Strong brown clay to fine silt sized materials, dotted and speckled appear under transmitted light.</p> <p><b>Basic organic components</b></p> <p>Few amorphous fine organic materials.</p> <p><b>Groundmass</b></p> <p>The c/f related distribution is close porphyric, the b-fabric of the micromass is mosaic-speckled.</p> <p><b>Pedofeatures</b></p> <p>Common textural pedofeatures as microlaminated clay infilling of voids.</p>



(A)

0.3 mm



(B)

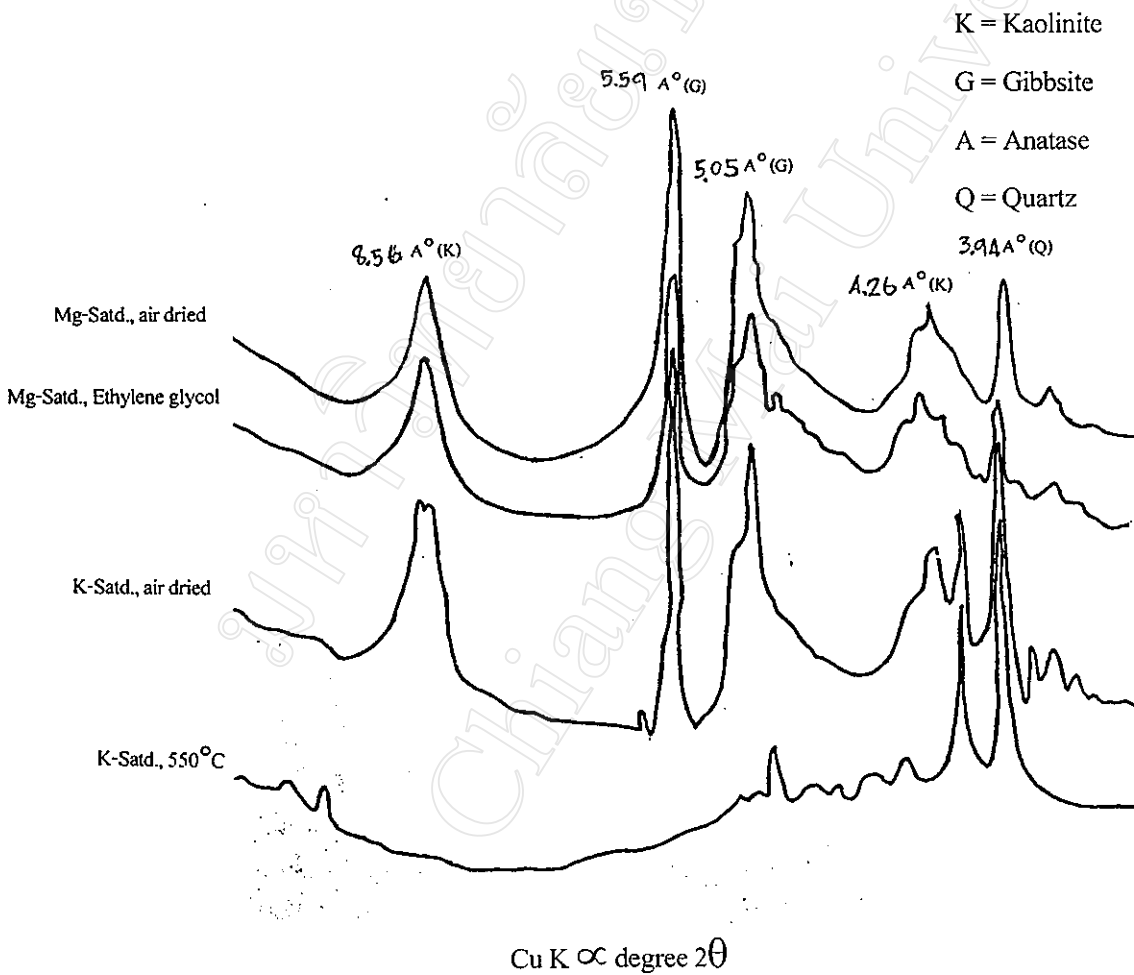
0.3 mm

ภาพที่ 16 Photographs showing micromorphological characteristics of the sample

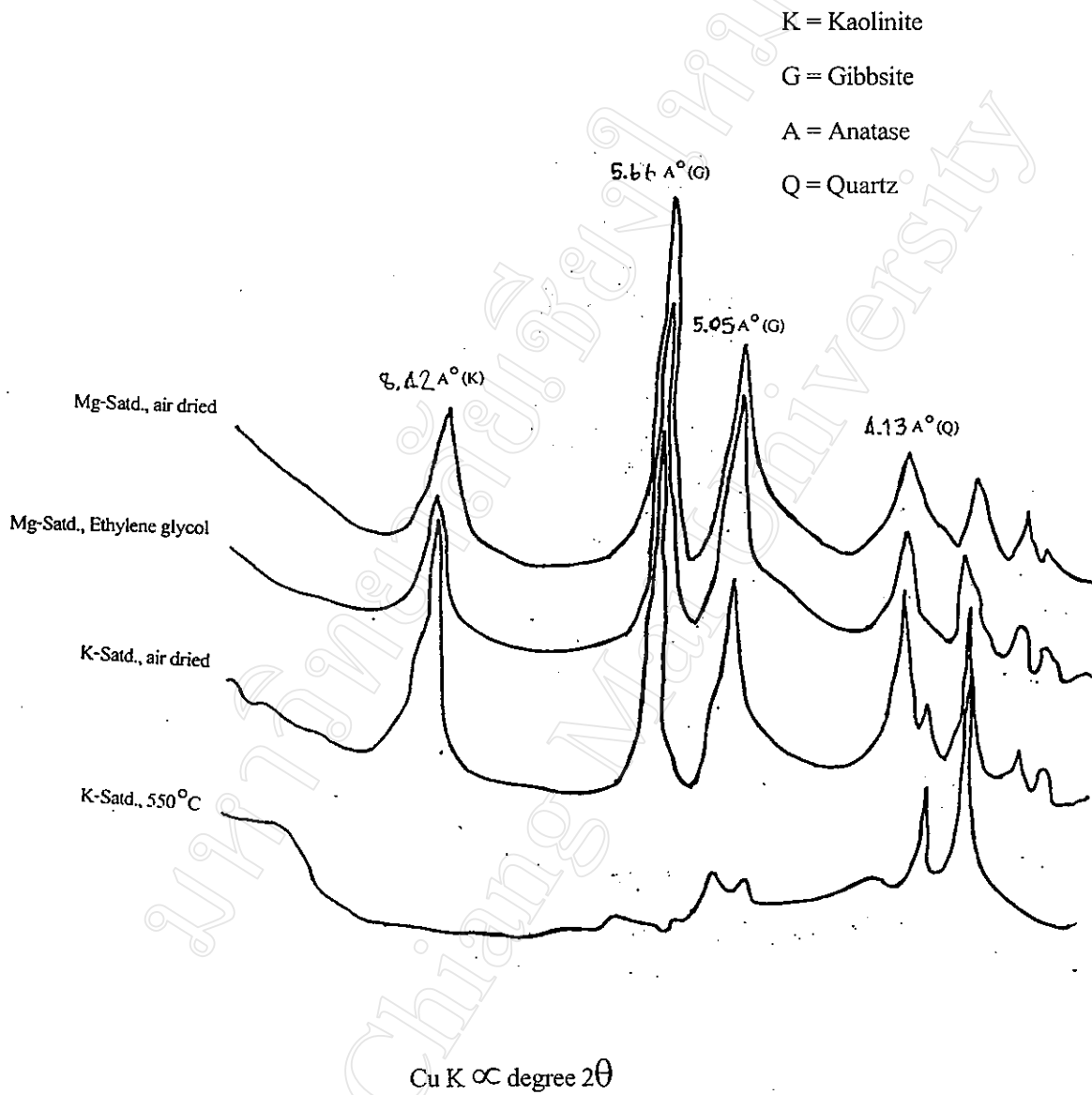
No. TN 8 (HMY08, Bt1: 46-82 cm) (A) PPL (B) XPL

ภาคผนวก ค

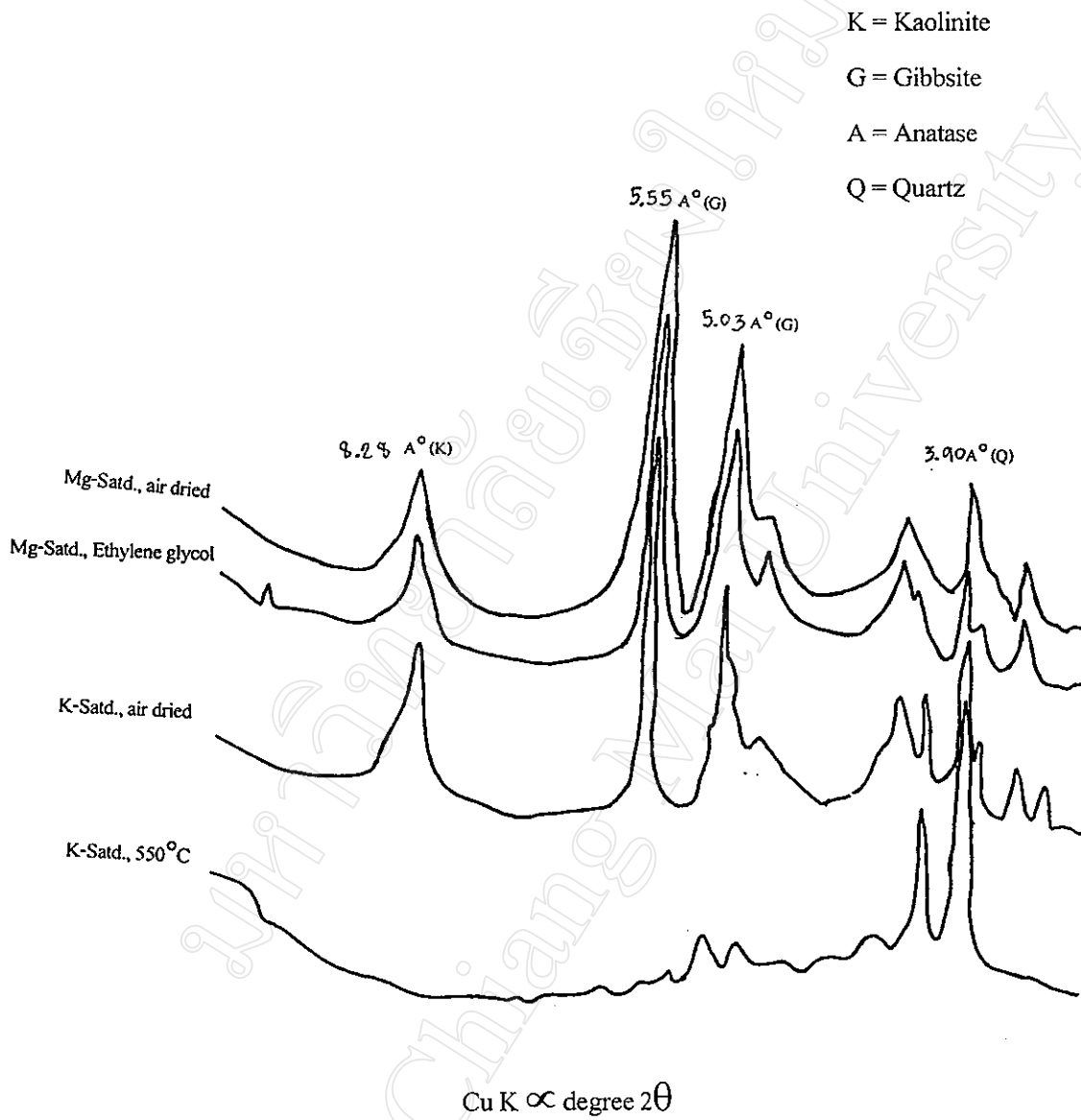
กราฟแสดงผลการวิเคราะห์แร่ดินเหนียว  
(Clay Minerals Analyses)



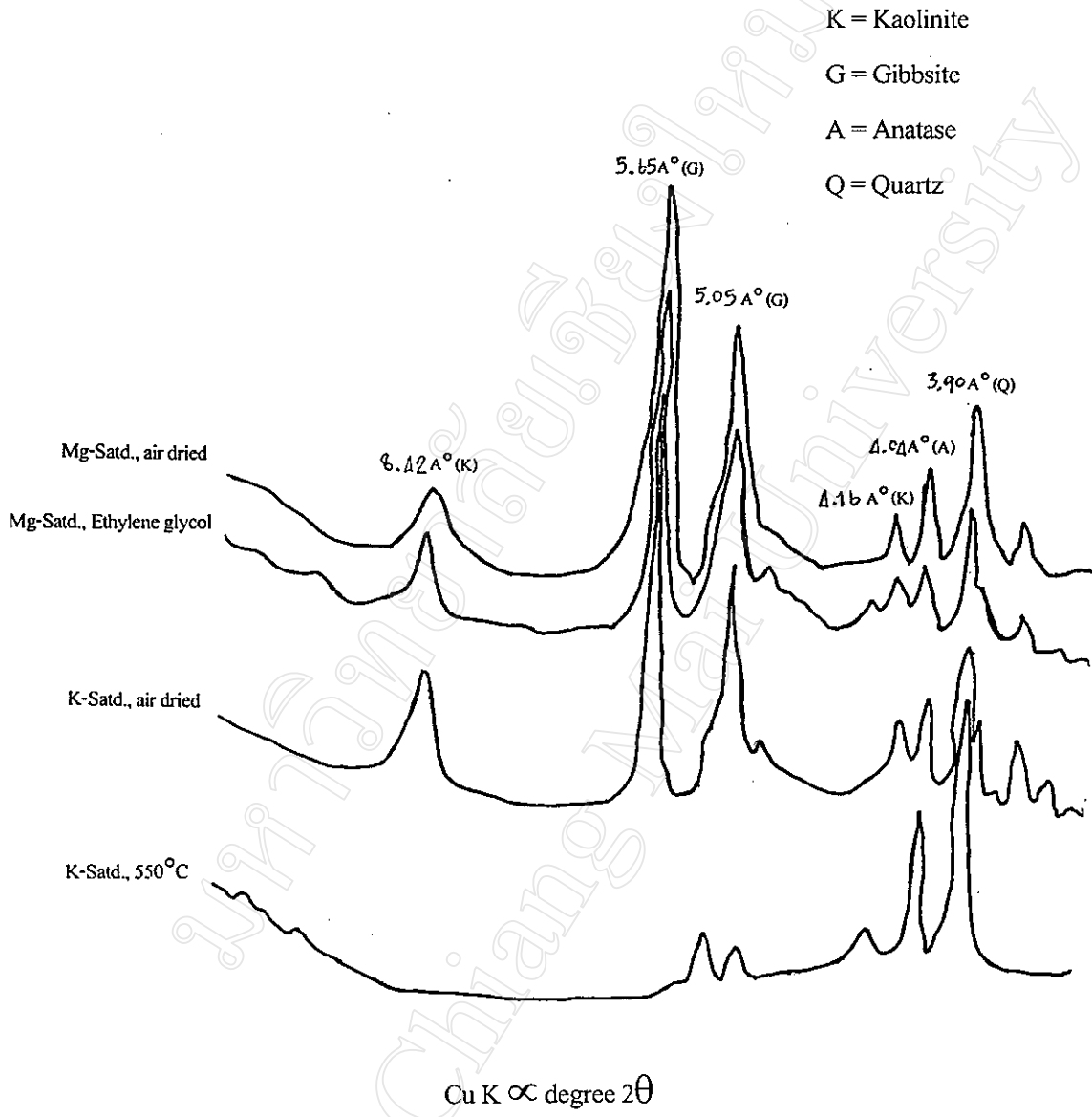
ภาพที่ 17 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
ขนาดดินเหนียวของหน้าตัดดินHMY 01 (Bt2: 47-84 cm.)



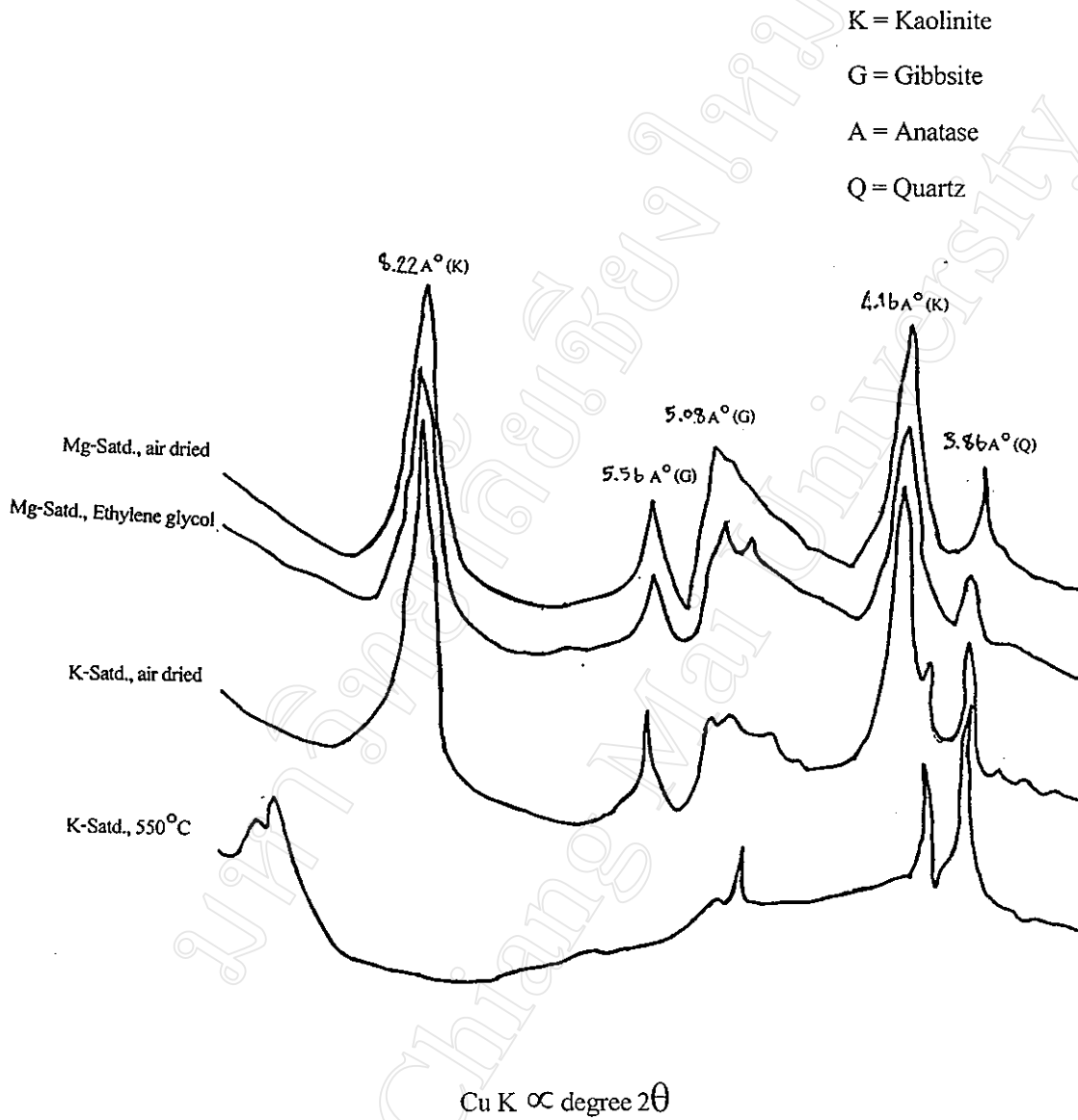
ภาพที่ 18 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
ขนาดดินเหนียวของหน้าตัดดิน HMY 02 (Bt3: 79-115 cm.)



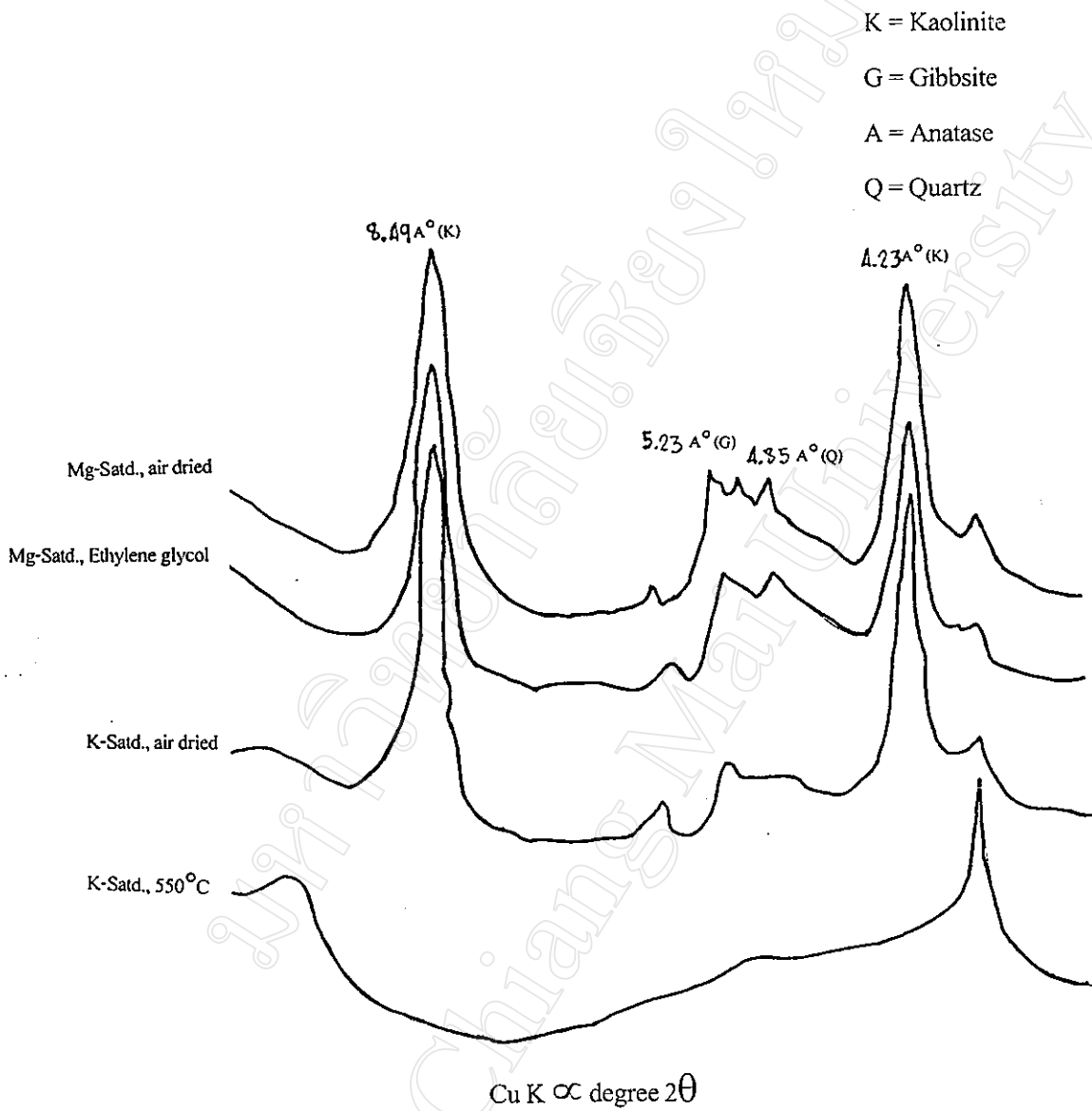
ภาพที่ 19 กราฟแสดงการเลื่อนเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
ขนาดดินเหนียวของหน้าตัดดิน HMY 03 (Bt3: 80-125 cm.)



ภาพที่ 20 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
 ขนาดดินเหนียวของหน้าตัดดินHMY 04 (Bt2: 60-95 cm.)

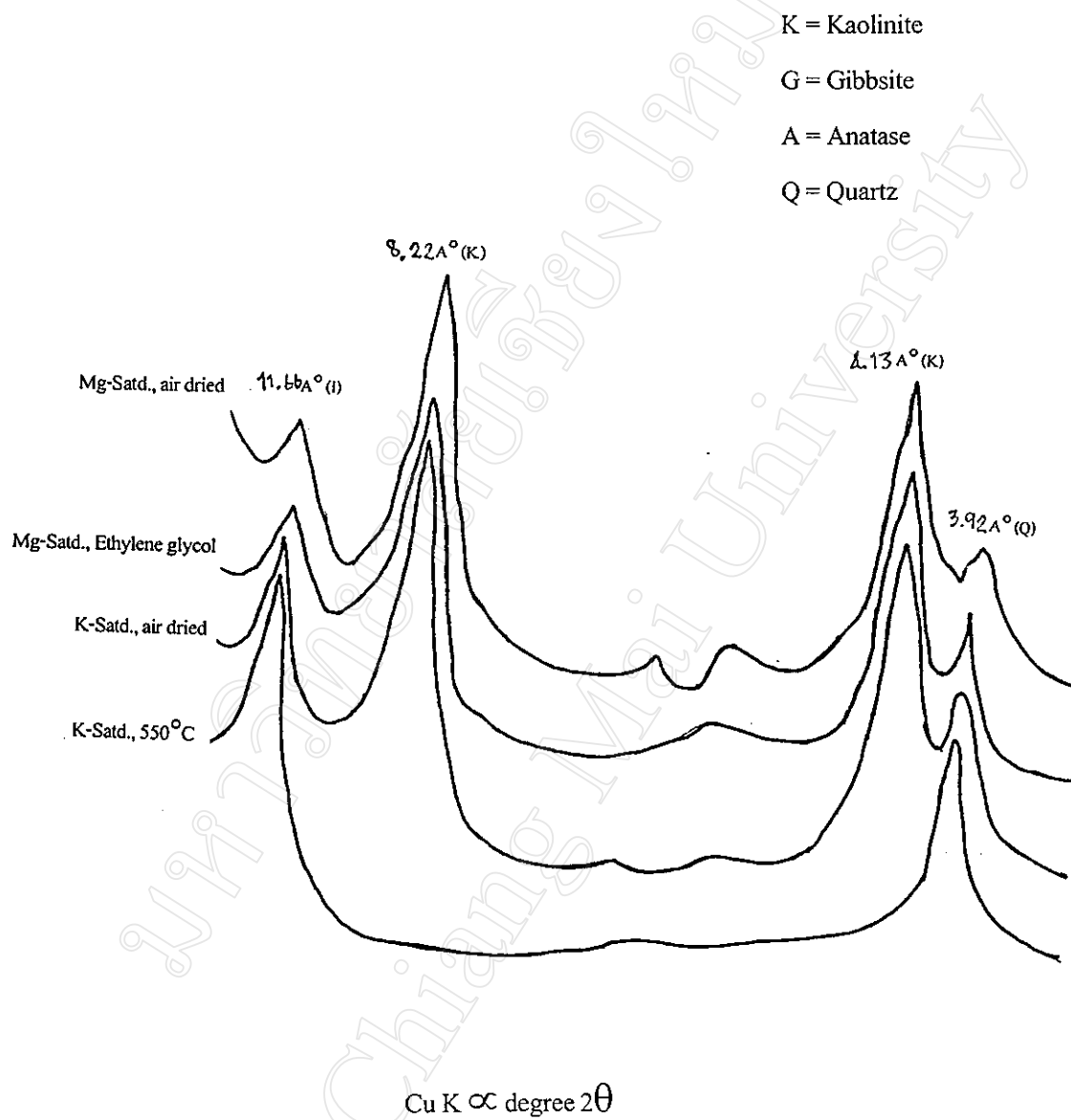


ภาพที่ 21 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
ขนาดดินเหนียวของหน้าตัดดินHMY 05 (Bt2: 30-70 cm.)

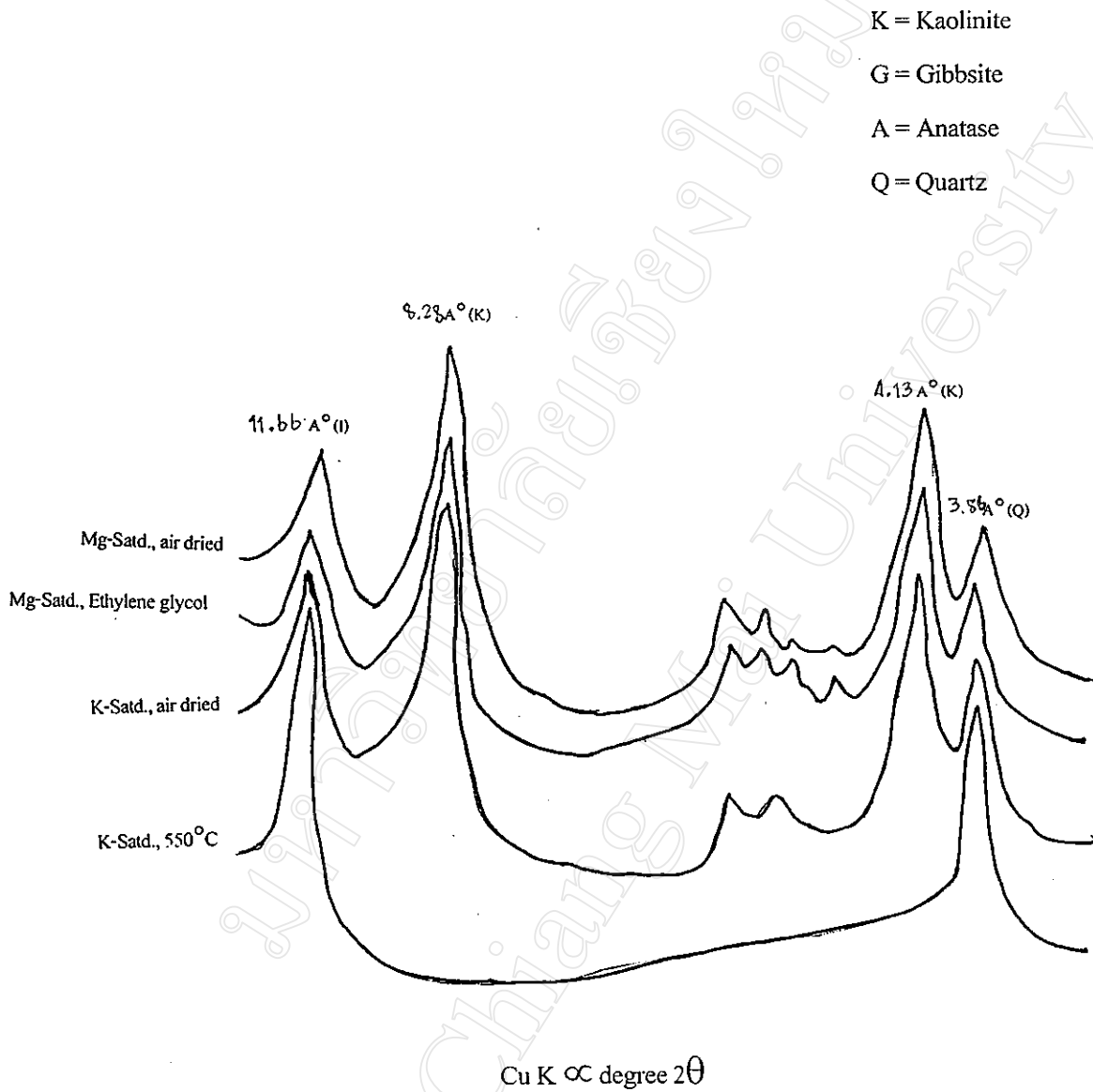


ภาพที่ 22 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
 ขนาดดินเหนียวของหน้าตัดดิน HMY 06 (Bt1: 18-55 cm.)





ภาพที่ 23 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
 ขนาดดินเหนียวของหน้าตัดดิน HMY 07 (Bw2: 22-44 cm.)



ภาพที่ 24 กราฟแสดงการเลี้ยวเบนของรังสีเอกซ์ขององค์ประกอบเชิงแร่ในกลุ่มอนุภาค  
ขนาดดินเหนียวของหน้าตัดดิน HMY 08 (Bt1: 46-82 cm.)

ภาคผนวก ง

ผลการวิเคราะห์ดินทางด้านฟิสิกส์ และเคมี  
(Physical and Chemical Analyses)

ตารางที่ 1 SITE IDENTIFICATION No. : HMY01 fine-loamy, mixed, semiactive, isothermic Typic Hapludults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - -CLAY - - -)		(- - -SILT- - -)		(- - - - -SAND - - - - -)					(>2mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT	OF WHOLE
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	1-	ITY 2	SOIL
			-0.05				-0.02								
←----- Pct of <2mm ----->															
0-14	A	30.40	15.20	54.40	20.80	9.60	7.20	8.00	1.90	20.72	24.60	6.60	0.58	1.12	
14-47	Bt1	35.20	14.40	50.40	25.60	9.60	5.60	8.80	2.40	17.18	19.20	10.12	1.50	2.92	
47-84	Bt2	34.40	13.60	52.00	24.80	9.60	4.00	9.60	4.36	28.42	13.46	5.26	0.50	2.84	
84-122	Bt3	31.20	15.20	53.60	23.20	8.00	5.00	9.60	0.46	23.94	24.80	4.06	0.34	0.96	
122-165	Bw1	24.80	22.40	52.80	22.40	2.40	8.00	14.40	3.04	17.50	24.18	7.34	0.74	0.00	
165-200+	Bw2	25.60	16.00	58.40	24.80	0.80	1.60	14.40	1.40	17.22	29.82	8.92	1.04	0.00	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT	BULK DENSITY	BASE		ECEC	( - - - - pH - - - - )			
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	Δ pH	
	Pct	<2mm		ppm		g/cc	< - - Pct - - >	meq/100 g soils		0.01 N			
0-14	3.80	0.28	13.48	8.50	0.36	1.11	26.06	47.99	8.20		4.5	5.0	-0.50
14-47	0.59	0.06	9.67	1.50	0.18	1.24	15.90	20.37	4.37		3.9	4.9	-1.00
47-84	0.20	0.03	7.69	1.00	0.10	1.23	16.75	15.85	4.03		3.9	4.9	-1.00
84-122	0.16	0.02	6.96	1.00	0.14	1.24	14.12	16.81	3.93		3.9	4.9	-1.00
122-165	0.16	0.02	8.42	1.50	0.07	1.25	20.42	17.62	3.86		4.0	5.1	-1.10
165-200+	0.12	0.02	7.50	1.00	0.19	1.25	15.54	13.47	3.55		4.0	5.0	-1.00

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. ACIDITY	Ext. Al	(- - CEC - -)		
	Ca	Mg	Na	K			SUM BASES	SUM CATS	NH <sub>4</sub> OAc
	<----- meq / 100 g----->								
0-14	4.62	1.19	1.76	0.54	8.11	9.20	0.092	31.12	16.90
14-47	0.62	0.22	1.15	0.45	2.44	5.16	1.927	15.35	11.98
47-84	0.25	0.10	1.24	0.36	1.95	3.88	2.079	11.64	12.30
84-122	0.19	0.10	1.15	0.35	1.79	4.36	2.142	12.68	10.65
122-165	0.37	0.13	1.04	0.31	1.85	2.88	2.009	9.06	10.50
165-200+	0.50	0.16	0.70	0.20	1.56	3.39	1.990	10.04	11.58

ตารางที่ 2 SITE IDENTIFICATION No. : HMY02 :- fine, mixed or kaolinitic, subactive, isothermic Typic

## Kandiudults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - CLAY - -)		(- - SILT - -)		(- - - - SAND - - - - -)					(>2mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT	OF WHOLE
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	I-	ITY 2	SOIL
Pct of <2mm															
0-19	A	31.20	18.40	50.40	21.60	9.60	9.60	8.80	3.18	16.90	22.36	6.90	1.06	0.49	
19-48	Bt1	45.60	12.80	41.60	37.60	8.00	6.40	6.40	1.82	14.38	19.60	4.88	0.92	0.21	
18-79	Bt2	45.60	13.60	40.80	36.80	8.80	6.40	7.20	0.86	13.02	19.20	6.22	1.50	2.91	
79-115	Bt3	52.80	10.40	36.80	36.00	16.80	6.40	4.00	0.62	11.88	21.68	2.08	0.54	0.32	
115-160	Bt4	46.40	13.60	40.00	45.60	0.80	5.60	8.00	2.04	14.56	19.64	2.92	0.84	0.28	
160-200+	Bt5	40.00	20.80	39.20	27.20	12.80	11.20	9.60	3.92	23.64	10.22	1.24	0.18	0.14	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY	BASE SATURATION		ECEC meq/100 g soils	(- - - pH - - -)		
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	ΔpH
	Pct	<2mm		ppm	g/cc	< - - Pct - - >			0.01 N			
0-19	3.48	0.24	14.32	4.50	0.30	0.97	18.55	27.54	5.36	5.0	5.4	-0.40
19-48	2.69	0.19	14.08	1.50	0.05	1.10	4.90	8.57	2.04	4.2	5.0	-0.80
18-79	1.17	0.09	13.60	1.00	0.16	1.17	6.20	10.21	1.18	4.2	5.0	-0.80
79-115	0.34	0.03	13.60	1.00	0.38	1.19	6.65	6.17	0.83	4.4	5.1	-0.70
115-160	0.14	0.02	7.37	1.50	0.69	1.18	4.91	5.08	0.71	4.3	5.2	-0.90
160-200+	0.20	0.02	10.53	1.50	0.53	-	9.27	8.00	3.60	4.3	5.2	-0.90

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)					Ext. ACIDITY	Ext. Al	(- - CEC - -)	
	Ca	Mg	Na	K	SUM BASES			SUM CATS	NH <sub>4</sub> OAc
< - - - - - meq / 100 g - - - - - >									
0-19	2.25	0.66	1.78	0.55	5.24	9.20	0.118	28.25	19.03
19-48	0.37	0.10	0.48	0.11	1.06	8.24	0.983	21.65	12.37
18-79	0.25	0.05	0.35	0.07	0.72	4.36	0.462	11.61	7.05
79-115	0.19	0.06	0.37	0.07	0.69	3.88	0.137	10.38	11.18
115-160	0.12	0.04	0.28	0.06	0.50	3.88	0.211	10.19	9.85
160-200+	0.50	0.16	0.24	0.09	0.99	3.88	2.613	10.68	12.37

ตารางที่ 3 SITE IDENTIFICATION No. : HMY03 :- fine, mixed, semiactive, isothermic Typic Paleudults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - -CLAY - - -)		(- - -SILT - - -)		(- - - - - SAND - - - - -)					(>2mm)
		CLAY LT 0.002	SILT 0.002	SAND 0.05-2	FINE LT 0.0002	CO3 LT 0.002	FINE 0.002	COARSE 0.02 0.05	VF 0.05-0.1	F 0.1-0.25	M 0.25-0.5	C 0.5-1	VC 1-	WT PCT OF WHOLE SOIL
<----- Pct of <2mm ----->														
0-8	A	37.60	28.00	34.40	19.20	18.40	15.20	12.80	1.24	12.36	12.52	6.84	1.44	0.22
8-25	AB	42.40	20.00	37.60	30.40	12.00	9.60	10.40	1.00	10.92	15.40	8.80	1.48	0.27
23-38	Bt1	50.40	17.60	32.00	35.20	15.20	15.20	2.40	1.02	11.44	10.88	6.40	2.26	9.01
38-80	Bt2	52.80	17.60	29.60	34.40	18.40	11.20	6.40	0.62	8.92	10.76	6.94	2.36	7.66
80-125	Bt3	48.80	17.60	33.61	32.80	16.00	14.40	3.20	2.82	16.44	10.18	3.40	0.77	7.10
125-190	Bt4	44.80	19.20	36.00	26.40	18.40	8.80	10.40	2.56	19.20	9.72	3.48	1.04	1.24
190-220	Bt5	34.40	29.60	36.00	18.40	16.00	13.60	16.00	10.40	17.70	4.58	2.62	0.62	3.76
220-250+	Bt6	26.40	21.60	52.00	20.80	5.60	6.40	15.20	4.08	18.64	19.52	7.62	1.94	4.67

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P ppm	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY g/cc	BASE SATURATION		ECEC meq/100 g soils	( - - - - pH - - - - )		
							SUM < - - Pct - - >	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	$\Delta$ pH
0-8	4.27	0.26	16.49	5.50	0.62	0.80	7.68	12.54	3.75	4.3	4.7	-0.40
8-25	2.99	0.20	14.73	4.50	0.46	0.95	4.75	7.08	3.28	4.1	4.8	-0.70
23-38	1.23	0.09	13.23	4.50	0.59	1.08	6.09	6.61	2.64	4.0	4.9	-0.90
38-80	0.73	0.06	12.17	4.50	0.23	1.20	6.53	6.72	2.22	4.0	4.7	-0.70
80-125	0.63	0.05	13.13	2.00	0.41	1.25	6.12	5.94	2.06	4.0	4.7	-0.70
125-190	0.16	0.02	7.27	2.00	0.21	-	4.04	3.96	1.29	4.0	4.5	-0.50
190-220	0.14	0.02	8.75	2.00	0.09	-	5.88	5.05	0.92	4.2	4.5	-0.30
220-250+	0.10	0.01	16.67	2.50	0.04	-	3.37	5.37	0.57	4.2	4.5	-0.30

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. ACIDITY	Ext. Al	(- - CEC - -)		
	Ca	Mg	Na	K			SUM BASES	SUM CATS	NH <sub>4</sub> OAc
<----- meq / 100 g ----->									
0-8	0.94	0.53	0.87	0.38	2.72	13.08	1.026	35.41	21.69
8-25	0.37	0.21	0.63	0.24	1.45	11.62	1.828	30.51	20.49
23-38	0.31	0.08	0.52	0.19	1.10	6.78	1.537	18.05	16.63
38-80	0.12	0.08	0.54	0.19	0.93	5.33	1.286	14.25	13.83
80-125	0.12	0.04	0.46	0.17	0.79	4.84	1.268	12.90	13.31
125-190	0.06	0.04	0.33	0.08	0.51	4.84	0.782	12.62	12.89
190-220	0.06	0.04	0.37	0.06	0.53	3.39	0.394	9.01	10.49
220-250+	0.06	0.04	0.24	0.04	0.38	4.36	0.194	11.27	7.08

ตารางที่ 4 SITE IDENTIFICATION No. : HMY04 :- fine, mixed, semiactive, isothermic Typic Paleudults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - CLAY - -)		(- - SILT - -)		(- - - - SAND - - - - -)					(>2 mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT	PCT
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	1-ITY	OF WHOLE	SOIL
			-0.05				-0.02						2		
<-----Pct of <2mm----->															
0-8	A	37.60	28.00	34.40	19.20	18.40	15.20	12.80	1.24	12.36	12.52	6.84	1.44	0.22	
8-25	AB	42.40	20.00	37.60	30.40	12.00	9.60	10.40	1.00	10.92	15.40	8.80	1.48	0.27	
23-38	Bt1	50.40	17.60	32.00	35.20	15.20	15.20	2.40	1.02	11.44	10.88	6.40	2.26	9.01	
38-80	Bt2	52.80	17.60	29.60	34.40	18.40	11.20	6.40	0.62	8.92	10.76	6.94	2.36	7.66	
80-125	Bt3	48.80	17.60	33.61	32.80	16.00	14.40	3.20	2.82	16.44	10.18	3.40	0.77	7.10	
125-190	Bt4	44.80	19.20	36.00	26.40	18.40	8.80	10.40	2.56	19.20	9.72	3.48	1.04	1.24	
190-220	Bt5	34.40	29.60	36.00	18.40	16.00	13.60	16.00	10.40	17.70	4.58	2.62	0.62	3.76	
220-250+	Bt6	26.40	21.60	52.00	20.80	5.60	6.40	15.20	4.08	18.64	19.52	7.62	1.94	4.67	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY g/cc	BASE SATURATION		ECEC meq/100 g soils	( - - - - pH - - - - )			
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	ΔpH	
	Pct	<2mm		ppm		< - - Pct - - >				0.01 N			
0-8	4.27	0.26	16.49	5.50	0.62	0.80	7.68	12.54	3.75	4.3	4.7	-0.40	
8-25	2.99	0.20	14.73	4.50	0.46	0.95	4.75	7.08	3.28	4.1	4.8	-0.70	
23-38	1.23	0.09	13.23	4.50	0.59	1.08	6.09	6.61	2.64	4.0	4.9	-0.90	
38-80	0.73	0.06	12.17	4.50	0.23	1.20	6.53	6.72	2.22	4.0	4.7	-0.70	
80-125	0.63	0.05	13.13	2.00	0.41	1.25	6.12	5.94	2.06	4.0	4.7	-0.70	
125-190	0.16	0.02	7.27	2.00	0.21	-	4.04	3.96	1.29	4.0	4.5	-0.50	
190-220	0.14	0.02	8.75	2.00	0.09	-	5.88	5.05	0.92	4.2	4.5	-0.30	
220-250+	0.10	0.01	16.67	2.50	0.04		3.37	5.37	0.57	4.2	4.5	-0.30	

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. ACIDITY	Ext. Al	(- - CEC - -)		
	Ca	Mg	Na	K			SUM BASES	SUM CATS	NH <sub>4</sub> OAc
	<----- meq / 100 g ----->								
0-8	0.94	0.53	0.87	0.38	2.72	13.08	1.026	35.41	21.69
8-25	0.37	0.21	0.63	0.24	1.45	11.62	1.828	30.51	20.49
23-38	0.31	0.08	0.52	0.19	1.10	6.78	1.537	18.05	16.63
38-80	0.12	0.08	0.54	0.19	0.93	5.33	1.286	14.25	13.83
80-125	0.12	0.04	0.46	0.17	0.79	4.84	1.268	12.90	13.31
125-190	0.06	0.04	0.33	0.08	0.51	4.84	0.782	12.62	12.89
190-220	0.06	0.04	0.37	0.06	0.53	3.39	0.394	9.01	10.49
220-250+	0.06	0.04	0.24	0.04	0.38	4.36	0.194	11.27	7.08

ตารางที่ 5 SITE IDENTIFICATION No. : HMY05 :- fine-loamy, mixed, active, isothermic Humic Hapludults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - -CLAY - - -)		(- - -SILT - - -)		(- - - - -SAND - - - - -)					(>2mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT	
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.0002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	1-	OF WHOLE	
			-0.05				-0.02						ITY 2	SOIL	
<-----Pct of <2mm----->															
0-12	A	13.60	38.40	48.00	7.20	6.40	23.20	15.20	4.80	31.34	9.56	2.04	0.26	0.81	
12-30	Bt1	26.40	30.40	43.20	14.40	12.00	14.40	16.00	2.30	22.00	14.18	3.80	0.92	1.16	
30-70	Bt2	28.80	29.60	41.60	23.20	5.60	13.60	16.00	0.68	17.16	11.30	3.24	9.22	0.89	
70-105	Bt3	19.20	30.40	50.40	17.60	1.60	16.00	14.40	7.40	31.38	9.24	2.00	0.38	1.16	
105-134	Bt4	20.00	30.40	49.60	14.40	5.60	12.00	18.40	13.14	28.54	7.36	0.52	0.04	0.32	
134-170+	Bt5	16.00	34.40	49.60	14.40	1.60	13.60	20.80	12.02	32.94	4.14	0.50	0.00	0.00	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY	BASE		ECEC	CaSO <sub>4</sub> AS GYPSUM	(- - - - pH - - - -)		
							SUM	NH <sub>4</sub> OAc			1:1	1:1	ΔpH
	Pct	<2mm		ppm		g/cc	< - - Pct - - >		meq/100 g soils	<20 mm RATIO	0.01 N	KCl	H <sub>2</sub> O
0-12	5.42	0.30	18.19	3.00	0.10	0.73	22.56	27.85	8.26	14.39	5.3	5.5	-0.20
12-30	2.31	0.13	17.77	3.50	0.05	0.92	8.12	10.33	2.95	2.53	4.5	5.5	-1.00
30-70	0.57	0.09	6.55	2.00	0.26	1.16	13.50	12.88	2.26	1.24	4.2	5.1	-0.90
70-105	0.30	0.02	14.29	1.50	0.14	1.11	16.26	12.40	1.90	2.06	4.1	5.4	-1.30
105-134	0.18	0.02	9.47	1.50	0.15	1.26	21.95	13.51	2.80	3.13	4.2	5.2	-1.00
134-170+	0.14	0.02	8.75	1.50	0.04	1.42	17.83	15.79	1.15	2.60	4.2	5.2	-1.00

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. SUM BASES	Ext. Al ACIDITY	(- - CEC - -)		
	Ca	Mg	Na	K			SUM CATS	NH <sub>4</sub> OAc	
	<----- meq / 100 g ----->								
0-12	3.43	1.01	2.09	0.88	7.41	10.17	0.849	32.84	26.61
12-30	0.44	0.15	0.89	0.34	1.82	8.24	1.128	22.41	17.62
30-70	0.44	0.15	0.54	0.19	1.32	3.38	0.944	9.78	10.25
70-105	0.25	0.09	0.46	0.14	0.94	1.94	0.960	5.78	7.58
105-134	0.62	0.23	0.63	0.21	1.69	2.40	1.112	7.70	12.51
134-170+	0.44	0.17	0.35	0.09	1.05	1.94	0.098	5.89	6.65

ตารางที่ 6 SITE IDENTIFICATION No. : HMY06 :- fine, mixed, subactive, isothermic Typic Hapludults

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - -CLAY - - -)		(- - -SILT - - -)		(- - - - - SAND - - - - -)					(>2mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT	
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	I-	OF WHOLE	
			-0.05				-0.02						ITY 2	SOIL	
<-----Pct of <2mm----->															
0-9	A	24.00	21.60	54.40	11.20	12.80	10.40	11.20	1.66	16.88	20.70	13.22	1.94	1.40	
9-18	BA	28.00	21.60	50.40	4.80	4.80	14.40	7.20	2.90	16.10	16.22	11.00	4.18	6.98	
18-55	Bt1	52.00	12.80	35.20	3.20	3.20	6.40	6.40	2.88	11.22	10.58	8.02	2.50	0.37	
55-112	Bt2	46.40	15.20	38.40	12.00	12.00	9.60	9.60	2.82	14.86	16.16	4.08	0.48	0.14	
112-170	Bw1	28.00	12.00	60.00	4.80	4.80	7.20	7.20	1.42	11.80	15.44	28.54	2.80	11.61	
170-200+	Bw2	21.60	17.60	60.80	3.20	3.20	12.00	12.00	1.28	20.92	21.46	14.28	2.86	10.32	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT	BULK DENSITY	BASE SATURATION		ECEC	(- - - - - pH - - - - -)		
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	$\Delta$ pH
	Pct	<2mm		ppm	ABLE Fe	g/cc	< - - Pct - - >	meq/100 g soils		0.01 N		
0-9	2.36	0.18	12.90	6.5	0.11	1.14	26.45	33.33	6.36	5.07	5.01	-0.06
9-18	0.99	0.07	14.78	3.00	0.04	1.30	14.90	17.21	3.27	4.54	4.14	-0.40
18-55	0.30	0.03	8.82	1.00	0.10	1.36	16.54	15.80	2.80	4.75	4.23	-0.52
55-112	0.15	0.03	5.00	1.00	0.11	1.36	16.86	14.71	2.18	4.83	4.30	-0.53
112-170	0.04	0.02	2.11	1.00	0.05	1.45	25.65	19.60	2.22	5.13	4.42	-0.71
170-200+	0.02	0.02	1.33	0.50	0.05	-	23.90	16.33	1.53	5.33	4.36	-0.97

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. ACIDITY	Ext. Al	(- - CEC - -)		
	Ca	Mg	Na	K			SUM BASES	SUM CATS	NH <sub>4</sub> OAc
	<----- meq / 100 g ----->								
0-9	2.12	1.05	1.44	0.58	5.19	5.77	1.169	19.62	15.57
9-18	0.25	0.44	1.00	0.43	2.12	4.84	1.154	14.23	12.32
18-55	0.19	0.29	1.00	0.44	1.92	3.88	0.879	11.61	12.15
55-112	0.25	0.27	0.85	0.35	1.72	3.39	0.464	10.20	11.69
112-170	0.37	0.31	0.72	0.27	1.67	1.94	0.553	6.51	8.52
170-200+	0.37	0.31	0.61	0.23	1.52	1.94	0.005	6.36	9.31



ตารางที่ 7 SITE IDENTIFICATION No. : HMY07 :- loamy-skeletal, mixed, active, hyperthermic Typic

## Dystrustepts

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - CLAY - -)		(- - SILT - -)		(- - - - SAND - - - - -)					(>2mm)
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	1-	OF WHOLE
			-0.05				-0.02					ITY 2	SOIL	
-----Pct of <2mm----->														
0-4	A	10.40	9.60	80.00	9.60	0.80	2.40	7.20	2.16	19.72	33.14	12.76	12.22	51.77
4-22	Bw1	10.40	11.20	78.40	8.80	1.60	4.80	6.40	3.80	23.04	15.56	18.68	17.32	44.20
22-44	Bw2	11.20	12.80	76.00	9.60	1.60	2.40	10.40	1.36	14.76	11.70	13.32	34.86	53.98
44-88	Bw3	34.40	12.00	53.60	32.00	2.40	7.20	4.80	4.24	19.58	12.52	10.68	6.58	54.76
88-115+	Bw4	12.00	15.20	72.80	9.60	2.40	8.00	7.20	1.94	11.24	13.88	14.86	30.88	9.36

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY g/cc	BASE SATURATION		ECEC meq/100 g soils	( - - - - pH - - - - )		
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	ΔpH
	Pct	<2mm		ppm			< - - Pct - - >					0.01 N
0-4	2.06	0.15	13.83	8.00	0.05	-	73.46	50.64	7.50	6.0	6.0	0.00
4-22	0.46	0.04	13.14	1.50	0.02	1.41	22.25	24.40	2.80	4.3	5.1	-0.80
22-44	0.10	0.02	5.00	1.00	0.03	1.38	35.12	19.29	3.09	4.2	5.2	-1.00
44-88	0.08	0.02	4.00	1.00	0.02	1.53	8.28	21.28	2.65	4.0	5.5	-1.50
88-115+	0.06	0.16	0.38	1.00	0.03	1.75	63.64	63.76	11.27	3.8	5.0	-1.20

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. SUM BASES	Ext. Al ACIDITY	(- - CEC - -)		
	Ca	Mg	Na	K			SUM CATS	NH <sub>4</sub> OAc	
< - - - - - meq / 100 g - - - - - >									
0-4	5.30	0.45	0.67	0.28	6.70	2.42	0.797	9.12	13.23
4-22	0.62	0.27	0.61	0.22	1.72	6.01	1.075	7.73	7.05
22-44	0.25	0.47	0.46	0.13	1.31	2.42	1.784	3.73	6.79
44-88	0.31	0.58	0.52	0.12	1.53	16.95	1.119	18.48	7.19
88-115+	7.11	1.93	1.28	0.20	10.52	6.01	0.747	16.53	16.50

ตารางที่ 8 SITE IDENTIFICATION No. : HMY08 :- fine, mixed, semiactive, hyperthermic Typic

Haplustalfs

DEPTH (CM)	HORIZON	(- - - TOTAL - - -)			(- - -CLAY - - -)		(- - -SILT - - -)		(- - - - - SAND - - - - -)					(>2mm)	
		CLAY	SILT	SAND	FINE	CO3	FINE	COARSE	VF	F	M	C	VC	WT PCT	PCT
		LT 0.002	0.002	0.05-2	LT 0.0002	LT 0.002	0.002	0.02 0.05	0.05-0.1	0.1-0.25	0.25-0.5	0.5-1	1-	OF WHOLE	SOIL
			-0.05				-0.02						ITY 2		
<-----Pct of <2mm----->															
0-11	A	25.60	10.40	64.00	20.00	5.60	4.80	5.60	3.48	12.92	11.66	17.14	18.80	23.49	
11-46	BA	25.80	18.40	52.80	26.40	2.40	9.60	8.80	0.98	8.22	10.64	12.72	20.24	37.69	
46-82	Bt1	50.40	10.40	39.20	48.80	1.60	2.40	8.00	4.06	11.94	6.98	10.04	6.18	18.24	
82-122	Bt2	40.00	12.80	47.20	39.20	0.80	5.60	7.20	2.80	11.58	10.06	10.00	12.76	35.85	
122-180	BC1	36.80	14.40	48.80	30.40	6.40	4.80	9.60	1.64	12.30	11.34	9.48	14.04	43.03	
180-200+	BC2	36.00	12.80	51.20	32.00	4.00	4.80	8.00	4.12	15.08	15.20	11.90	4.90	43.84	

DEPTH (cm)	ORGN C	TOTAL N	C/N ratio	EXTRACT ABLE P	DITH-CIT EXTRACT ABLE Fe	BULK DENSITY	BASE SATURATION		ECEC meq/100 g soils	(- - - - pH - - - -)		
							SUM	NH <sub>4</sub> OAc		1:1 KCl	1:1 H <sub>2</sub> O	ΔpH
	Pct	<2mm		ppm	g/cc	< - - Pct - - >				0.01 N		
0-11	1.44	0.12	12.31	2.00	0.02	1.16	65.16	60.73	6.83	6.1	6.5	-0.4
11-46	0.73	0.08	9.73	1.50	0.27	1.20	57.29	52.31	4.92	5.9	6.5	-0.6
46-82	0.61	0.08	8.13	1.50	0.31	1.41	80.91	43.11	5.24	5.2	6.0	-0.8
82-122	0.37	0.07	5.52	1.00	0.32	1.46	48.91	57.52	7.65	4.5	5.3	-0.8
122-180	0.21	0.05	4.38	1.00	0.29	1.49	54.08	48.72	5.82	5.0	5.7	-0.7
180-200+	0.19	0.03	5.59	1.00	0.23	-	67.86	58.42	7.89	4.9	5.9	-1.0

DEPTH (cm)	(- - NH <sub>4</sub> OAc EXTRACTABLE BASES - - -)				Ext. ACIDITY	Ext. Al	(- - CEC - -)		
	Ca	Mg	Na	K			SUM BASES	SUM CATS	NH <sub>4</sub> OAc
	<----- meq/ 100 g ----->								
0-11	4.24	0.61	1.35	0.59	6.79	1.45	0.042	10.42	11.18
11-46	2.50	0.64	1.20	0.53	4.87	1.45	0.051	8.50	9.31
46-82	2.50	1.25	0.96	0.42	5.13	0.48	0.113	6.34	11.90
82-122	4.93	0.97	0.76	0.30	6.96	2.91	0.689	14.23	12.10
122-180	3.74	1.13	0.63	0.20	5.70	1.94	0.124	10.54	11.70
180-200+	5.93	1.15	0.57	0.12	7.77	1.47	0.117	11.45	13.30

## ภาคผนวก จ

### เกณฑ์ความสูงต่ำของค่าวิเคราะห์สมบัติของดินที่ใช้ในประเทศไทย

#### ระดับความอุดมสมบูรณ์และเกณฑ์ความสูงต่ำของค่าวิเคราะห์สมบัติของดินที่ใช้ในประเทศไทย

ตารางที่ 9 ระดับความอุดมสมบูรณ์ของดิน

ระดับความอุดม สมบูรณ์ของดิน	O.M. (%)	B.S. (%)	CEC meq/100g	Avai. P (ppm)	Avai. K (ppm)
ต่ำ	< 1.5 (1)	< 3.5 (1)	< 10 (1)	< 10 (1)	< 60 (1)
ปานกลาง	1.5-3.5 (2)	35-75 (2)	10-20 (2)	10-25 (2)	60-90 (2)
สูง	> 3.5 (3)	> 75 (3)	> 20 (3)	> 25 (3)	> 90 (3)

#### หมายเหตุ:

- วิธีการวัดระดับความอุดมสมบูรณ์ของดิน (ตัวเลขในวงเล็บ) ถ้าคะแนนรวมเท่ากับหรือน้อยกว่า 7 ถือว่ามีความอุดมสมบูรณ์ต่ำ ถ้าคะแนนรวมอยู่ระหว่าง 8-12 ถือว่าดินมีความอุดมสมบูรณ์ปานกลาง และถ้าคะแนนรวมเท่ากับหรือมากกว่า 13 ถือว่าดินมีความอุดมสมบูรณ์สูง
- O.M. = อินทรีย์วัตถุ, B.S. = ความอึดตัวของดิน, CEC = ความสามารถในการดูดซับและแลกเปลี่ยนประจุบวก

ตารางแสดงเกณฑ์ความสูงต่ำของค่าวิเคราะห์ทางเคมีบางประการ

ตารางที่ 10 ความอิ่มตัวด้วยประจุบวกต่าง (base saturation)

ระดับ	พิสัย (%)
ต่ำ (low)	< 35
ปานกลาง (moderate)	35-75
สูง (high)	> 75

ตารางที่ 11 ปฏิกริยาดิน (soil reaction), pH (ดิน:น้ำ = 1:1)

ระดับ (rating)	พิสัย (range)
เป็นกรดจัดมาก (extremely acid)	< 4.5
เป็นกรดจัด (very strongly acid)	4.5-5.0
เป็นกรดแก่ (strongly acid)	5.1-5.5
เป็นกรดปานกลาง (moderately acid)	5.6-6.0
เป็นกรดเล็กน้อย (slightly acid)	6.1-6.5
เป็นกลาง (near neutral)	6.6-7.3
เป็นด่างอย่างอ่อน (slightly alkali)	7.4-7.8
เป็นด่างปานกลาง (moderately alkali)	7.9-8.4
เป็นด่างแก่ (strongly alkali)	8.5-9.0
เป็นด่างจัด (extremely alkali)	> 9.0

ตารางที่ 12 ปริมาณโพแทสเซียมที่เป็นประโยชน์ (available K) ( $\text{NH}_4\text{OAc}$ )

ระดับ	พิสัย (ppm)
ต่ำมาก (very low)	< 30
ต่ำ (low)	30-60
ปานกลาง (medium)	60-90
สูง (high)	90-120
สูงมาก (very high)	>120

ตารางที่ 13 อินทรีย์วัตถุ (organic matter)

ระดับ	พิสัย (%)
ต่ำมาก (very low)	< 0.5
ต่ำ (low)	0.5-1.0
ค่อนข้างต่ำ (moderately low)	1.0-1.5
ปานกลาง (medium)	1.5-2.5
ค่อนข้างสูง (moderately high)	2.5-3.5
สูง (high)	3.5-4.5
สูงมาก (very high)	> 4.5

ตารางที่ 14 ความสามารถในการดูดซับและแลกเปลี่ยนประจุบวก

ระดับ	พิสัย (meq/100 g)
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

ตารางที่ 15 ปริมาณฟอสฟอรัสที่เป็นประโยชน์ (available P) (Bray II)

ระดับ	ฟอสฟอรัส (ppm)
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

ตารางที่ 16 ปริมาณด่างที่แลกเปลี่ยนได้ (exchangeable base) ( $\text{NH}_4\text{OAc}$ )

ระดับ	ฟอสฟอรัส (meq/100 g)			
	Exchangeable			
	Ca	Mg	Na	K
ต่ำมาก (very low)	< 2	< 0.3	< 0.1	< 0.2
ต่ำ (low)	2-5	0.3-1.0	0.1-0.3	0.2-0.3
ปานกลาง (medium)	5-10	1.0-3.0	0.3-0.7	0.3-0.6
สูง (high)	10-20	3.0-8.0	0.7-2.0	0.6-1.2
สูงมาก (very high)	> 20	> 8.0	> 2.0	> 1.2

ตารางที่ 17 ระดับความเค็ม

ระดับ	ฟอสฟอรัส (meq/100 g)
ต่ำมาก (very low)	0-2
ต่ำ (low)	> 2-4
ปานกลาง (medium)	> 4-8
สูง (high)	> 8-16
สูงมาก (very high)	> 16