

Proposed by: C. Changprai,
 F.R. Moormann -1967
 Revised by: 1. B. Boonsompopphan,
 P. Hemsrichart, 1988
 2. K. Malairotsiri, 2004

THAT PHANOM SERIES

Field Symbol: Tp

Distribution: Occupies small extent in Northeast and North Thailand.

Setting: That Phanom soils are formed from alluvium and occur on lower part of old levees. Relief is nearly level to gently undulating which slopes range from 1 to 4 percent. Elevation is variable depending on the region. The climate is Tropical Savanna (Köppen 'Aw'). Average annual precipitation varies from 1,200 mm. Mean annual temperature is from 26 to 28°C.

Drainage, Permeability and Runoff: Moderately well drained; Permeability is moderate and surface runoff is medium. Ground water table during the peak of the dry period falls below 3 meters.

Vegetation and Land Use: Originally mixed deciduous and dipterocarp forests. Parts are cleared for upland crops such as corn, groundnut, tobacco, upland rice and some fruit crops such as papaya, custard apple and pineapple. Some areas are covered by secondary vegetation.

Characteristic Profile Features: The That Phanom series is a member of the fine-silty, mixed, semiactive, Isohyperthermic, Ultic Haplustalfs. They are deep soils and are characterized by a dark brown or dark grayish brown silt loam or loam A horizon overlying a reddish brown or brown silt loam or silty clay loam upper argillic B horizon which in turn overlies a yellowish red or red silty clay loam or clay loam lower argillic B horizon. Mottles of pinkish gray or light yellowish brown and/or strong brown colors usually occur in the lower B and the C horizons. Reaction is medium acid to neutral over slightly acid.

Typifying Pedon: Profile code no. is NE-N-29/14 (moist colors unless otherwise stated).

Location: Amphoe That Phanom Changwat Nakhon Phanom.

Sheet Name: Amphoe That Phanom

Sheet No.: 5942 IV

Coordinate:

Elevation:

Relief: nearly level to gently undulating

Slope: 1-4%

Physiography: flood plain (lower part of levee)

Parent material: alluvium

Drainage: moderately well drained

Permeability: moderate

Runoff: medium

Ground water depth: >3 m

Flooding depth: -

Duration: -

Frequency: -

Annual rainfall: 2,324.3 mm

Mean temp: 25.9 °C

Climate type: Tropical Savannah

Natural vegetation and/or land use: mixed deciduous and dipterocarp forest; parts are cleared for upland crops such as corn, groundnuts, tobacco etc.

Described by: C. Changprai

Date: 20 Feb. 1969

Horizon	Depth (cm)	Description
Ap	0-16	Dark brown (7.5YR 3/2) silt loam; strong fine and medium granular structure; hard, firm, nonsticky, slightly plastic; few fine tubular and interstitial pores; common fine mica flakes; common very fine roots; medium acid; (field pH 6.0) gradual, smooth boundary.
BA	16-33	Reddish brown (5YR 4/4) silty clay loam; moderate medium subangular blocky structure; hard, firm, slightly sticky, slightly plastic; common fine tubular and few fine interstitial pores; few pieces of charcoal; common fine roots; medium acid; (field pH 6.0); gradual, smooth boundary.
Bt1	33-90 cm	Reddish brown (5YR 4/4) silty clay loam; common fine faint red (10 R 4/4) mottles; strong medium and coarse subangular blocky structure; hard, firm, sticky, plastic; common fine and medium interstitial and tubular pores; common broken moderately thick clay coating on ped faces;

		medium acid (field pH 6.0); gradual, smooth boundary.
Bt2	90-120	Red (10R 4/8) silty clay; many fine pinkish gray (5YR 6/2) mottles; hard, firm, sticky, plastic; broken moderately thick clay coating on ped faces; medium acid; (field pH 6.0); gradual, smooth boundary.
Bt3	120-170	Red (10 R 4/6) clay; many fine and medium light reddish brown (5 YR 6/3) mottles; hard, firm, sticky, plastic; common soft iron-manganese concretions; medium acid (field pH 6.0); gradual, smooth boundary.
BC	170-210	Red (10 R 4/8) clay; many medium light yellowish brown (10 YR 6/4) mottles; hard, firm, sticky, plastic; slightly acid (field pH 6.5).

Type Location: The That Phanom series was named for Amphoe That Phanom, Changwat Nakhon Phanom, in which soils of these series were first described at the site of longitude 104° 39' 34" East and latitude 17° 05' 36" North.

Range of Profile Features:

Thickness of the A horizon varies from 10 to 30 cm and has 7.5YR or 10YR hues, values of 3 or 4 and chromas of 2 to 4. Texture of sandy loam may occur. Structure is fine and/or medium granular and/or moderate medium blocky. Field pH value is from 5.5 to 7.0.

The B horizon has 5YR or 7.5YR hues, values of 4 or 5 and chromas of 3 or 4 in the upper part and 5YR or 2.5YR or 10R hues, values of 4 or 5 and chromas of 4 to 8 in the lower part. Texture of silty clay or clay may occur in the deeper B and the C horizon. Structure is moderate to strong medium and coarse blocky; Field pH value is from 5.0 to 6.5.

Similar Soil Series:

Kamphaeng Saen series (Ks): has higher pH value in the subsoil.

Pran Buri series (Pr): lighter texture in the subsoil; clay fraction less than 25 percent.

Principal Associated Soils: These include Nakhon Phanom, Sapphaya, Kamphaeng Phet soils. Sapphaya and Nakhon Phanom soils occupy on the lower part of the natural river levee.

ANALYSIS RESULTS

Profile code no.:NE-N-29/14

(oven dry basis)

Soil series : That Phanom (Tp)

Lab No.	Depth (cm)	Horizon	Particle size distribution analysis (% by weight)								Texture		pH		CaCO ₃ %	P, mg kg ⁻¹ Bray 2	K, mg kg ⁻¹ NH ₄ OAc
			USDA grading			Sand-fraction grading					Lab	Field	1:1	1:1			
			sand	silt	clay	vc	c	m	f	vf	result	estim ¹	water	KCl			
P-603	0-16	Ap	34.6	50.6	14.8						sil	sil	5.6	4.8	0.0	4.8	67
P-604	16-33	Bt1	24.5	52.6	22.9						sil	sicl	5.3	4.0	0.3	4.4	55
P-605	33-90	Bt2	24.0	50.9	25.1						sil	sicl	5.2	4.0	0.3	4.4	62
P-606	90-120	Bt3	13.9	42.2	43.9						sic	sic	5.3	3.9	0.0	5.0	102
P-607	120-170	Bt4	19.0	47.0	34.0						sicl	c	5.4	4.0	0.3	4.8	81
P-608	170-210	Bt5	26.5	47.0	26.5						l	c	5.3	4.0	0.0	4.4	55

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol ₍₊₎ kg ⁻¹)										Base satur ⁿ (%)		ECEC cmol ₍₊₎ kg ⁻¹ (B+D)	Al KCl extr. cmol ₍₊₎ kg ⁻¹ (D)	Electrical conduct ^y (ECx10 ⁶) dS m ⁻¹
				Ca		Mg	K	Na	SUM cations (B)	Extr. acidity (A)	SUM (B+A)	CEC NH ₄ OAc (C)	CEC 100g Clay	B/Cx100	(Bx100)/(B+A)			
0-16	0.9	1.10		4.00	1.30	0.20	0.20	5.70	6.30	12.00	7.40	50.0	77	48			0.01	
16-33	0.9	0.42		1.30	1.20	0.10	0.20	2.80	6.90	9.70	6.60	28.8	42	29			0.01	
33-90	-	0.24		0.80	1.50	0.10	0.20	2.60	6.90	9.50	7.20	28.7	36	27			0.01	
90-120	2.2	0.22		1.40	2.30	0.30	0.20	4.20	6.60	13.80	13.80	31.5	30	30			0.01	
120-170	-	0.13		1.10	2.00	0.20	0.20	3.50	8.30	11.80	9.60	28.2	36	30			0.01	
170-210	1.9	0.08		0.70	2.00	0.10	0.20	3.00	7.10	10.10	8.00	30.2	38	30			0.01	