

Proposed by: F. R. Moormann, 1962  
Revised by:  
1. B. Bhubharuang, 1988  
2. A. Potichan, 2004

**SAN PA TONG SERIES**

**Field Symbol: Sp**

**Distribution:** Occupies moderate extent in North Thailand and Northeast Thailand.

**Setting:** San Pa Tong soils are formed from old alluvium on the older terraces and fans. They occupy gently to rolling terrains with 2 to 20% slopes. The climate is a Tropical Savanna climate (Koppen 'Aw').

**Drainage, Permeability and Runoff:** Moderately well drained. Permeability is moderate to rapid. Runoff is slow to medium. Ground water level falls below 1 m throughout the year.

**Vegetation and Land Use:** Originally mixed deciduous and dipterocarpous forest. However, parts are cleared for upland crops and fruit trees such as cassava, sugarcane, peanuts, longan, mango.

**Characteristic Profile Features:** San Pa Tong series is a member of the coarse-loamy, siliceous, semiactive, isohyperthermic Typic (Kandic) Paleustults. They are very deep soils and are characterized by a dark grayish brown or dark brown sandy loam A horizon overlying pale brown, light yellowish brown sandy loam argillic B which may grade to sandy clay loam in very deep subsoil. Reaction is moderately acid to slightly acid at the surface and very strongly acid to strongly acid in the subsoil.

**Typifying Pedon:** Profile code no. is NE-N-29/94 (moist colours unless otherwise stated).

**Location:** South-west of Ban Don Daeng, Amphoe Ban Phaeng, Changwat Nakhon Phanom.

**Sheet Name:** Amphoe Ban Phaeng

**Sheet No.:** 5844 IV

**Coordinate:** -

**Elevation:** 148 m (MSL)

**Relief:** gently undulating

**Slope:** 3-5%

**Physiography:** terraces

**Parent material:** old alluvium

**Drainage:** moderately well drained

**Permeability:** moderate to rapid

**Runoff:** slow

**Ground water depth:** >1 m

**Flooding depth:** -

**Duration:** -

**Frequency:** -

**Annual rainfall:** 2,324.3 mm

**Mean temp.:** 25.9 °C

**Climate type:** Tropical Savannah (Aw)

**Natural vegetation or land use:** Upland crops

**Described by:** A. Suteemeechaikul

**Date:** Dec. 25 1981

**Revised by:** Aniruth Potichan

**Date:** 27 May, 2004

Horizon	Depth (cm)	Description
Ap	0-11	Very dark grayish brown (10YR3/2) sandy loam; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many medium and fine roots; strongly acid (field pH 5.5); clear and smooth boundary.
BA	11-30	Very dark grayish brown (10YR3/2) sandy loam; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine to medium roots; strongly acid (field pH 5.5); clear and smooth boundary.
Bt1	30-75	Dark brown to brown (10YR4/3) sandy loam; moderate fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; patchy thin cutans on ped faces and in pores; few fine roots; strongly acid (field pH 5.5); clear and smooth boundary.

Bt2	75-120	Yellowish brown to brown (10YR5/4) sandy loam; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; patchy thin cutan on ped faces and in pores; few roots; strongly acid (field pH 5.5); clear and smooth boundary.
Bt3	120-150+	Pale brown (10YR6/3) sandy loam; moderate medium and coarse subangular blocky structure; hard, friable to firm, slightly sticky and slightly plastic; strongly acid (field pH 5.5).

**Type Location:**

The first description from Ban Gard, Amphoe San Pa Tong, Changwat Chiang Mai.

**Range of Profile Features:**

Thickness of the A horizon ranges from 10 to 30 cm. Matrix colors are in 10YR and 7.5 YR hues with values of 3 to 5 and Chromas 2 through 4, although darker colours may occur if there is a high proportion of charcoal in the surface layer due to burning. Structure is weak to moderate, fine and medium blocky. Field pH values range from 5.5 to 6.5.

The argillic B horizon may have sandy clay loam textures in the deeper layers, however it is still in the coarse-loamy family. Matrix colour are mainly brown (hue 10YR with value of 4 to 6 and chroma of 3 to 4; hue 7.5YR with values 4 to 6 and chromas 2 to 4). Structure is moderate, medium and coarse blocky. Field pH values range from 4.5 to 5.5. Rounded quartz gravels may be found below 100 cm from the surface, but are not diagnostic for the series.

**Similar Soil Series:**

Khorat series (Kt): moderately well drained with mottles occurring in the deeper B horizon and fine-loamy family.

**Principal Associated Soils:**

These include Khorat series occupying similar position, Roi Et and Lampang series occupying lower position on the semi-recent terrace; Warin, Yasothon, Mae Rim series on the higher terraces.

**Remarks:**

During early surveys San Pa Tong series was restricted to the North of Thailand and Khorat series to the North East Plateau. Recent studies, however, have indicated that the two original concepts were identical consequently Khorat had been restricted to moderately well drained soils (fine loamy) and San Pa Tong to well drained soils (coarse-loamy). Areas mapped as Khorat series in early surveys of the North East can now be expected to contain both soil series and in the same way areas mapped as San Pa Tong in early surveys of North Thailand can also be expected to contain both series.

**ANALYSIS RESULTS**  
(oven dry basis)

Profile code no.: NE-N-29/94  
Soil series: San Pa Tong (Sp)

Lab No.	Depth (cm)	Horizon	Particle size distribution analysis (% by weight)									Texture		pH		CaCO <sub>3</sub> %	P, mg kg <sup>-1</sup> Bray 2	K, mg kg <sup>-1</sup> NH <sub>4</sub> OAc
			USDA grading			Sand-fraction grading						Lab	Field	1:1	1:1			
			sand	silt	clay	vc	c	m	f	vf	result	estim <sup>n</sup>	water	KCl				
5/6897	0-11	Ap	75.1	19.8	5.1	0.2	13.7	13.7	35.3	12.2	sl-ls	sl	4.8	4.0		5.3	39	
5/6898	11-30	BA	72.7	17.2	10.1	0.5	2.3	13.8	33.8	22.3	sl	sl	4.9	3.9		2.9	19	
5/6899	30-75	Bt1	72.7	18.3	9.0	0.4	2.7	13.5	33.6	22.5	sl	sl	4.6	3.9		2.9	15	
5/6900	75-120	Bt2	74.0	15.0	11.0	0.3	2.5	13.1	33.6	24.5	sl	sl	4.8	3.9		2.3	13	
5/6901	120-150	Bt3	73.2	14.3	12.5	0.5	2.6	13.3	33.4	23.4	sl	scl	4.7	3.7		2.0	13	

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(+)</sub> kg <sup>-1</sup> )										Base satur <sup>n</sup> (%)		ECEC cmol <sub>(+)</sub> kg <sup>-1</sup> (B+D)	Al KCl extr. cmol <sub>(+)</sub> kg <sup>-1</sup> (D)	Electrical conduct <sup>y</sup> (ECx10 <sup>6</sup> ) dS m <sup>-1</sup>
				Ca Mg K Na				SUM cations (B)	Extr. acidity (A)	SUM (B+A)	CEC NH <sub>4</sub> OAc (C)	CEC 100g Clay	B/Cx100	(Bx100)/(B+A)				
				Ca	Mg	K	Na	cations (B)	acid (A)	(B+A)	(C)	Clay						
0-11	3.1	2.80		1.50	0.50	0.10	0.20	2.30	8.20	10.50	5.6	109.8	41	22			0.05	
11-30	3.4	0.86		0.50	0.30	0.05	0.20	1.05	7.00	8.05	4.2	41.6	25	13			0.05	
30-75	3.9	0.51		0.50	0.30	0.04	0.20	1.04	5.20	6.24	3.1	34.4	34	17			0.00	
75-120	2.4	0.35		0.30	0.10	0.04	0.20	0.64	3.80	4.44	2.5	22.7	26	14			0.00	
120-150	2.8	0.25		0.30	0.10	0.04	0.20	0.64	3.30	3.94	2.9	23.2	22	16			0.00	

Surveyor: A. Suteemeechaikul

Date: Dec. 25 1981