

Proposed by: C. Changprai, 1967
 Revised by:
 1. N. Chorphaka, 1988
 2. P. Wiwatwongwana, 2004

PHU SANA SERIES

Field Symbol: Ps

Distribution: Occupies small extent in Northeast and North Thailand.

Setting: Phu Sana soils are residuum from granitic rock and occur on erosion surface or peneplain remnant. Relief is undulating to rolling which slopes range from 3 to 8 percent. Elevation is from 200 to 450 m above sea level. The climate is Tropical Savanna (Koppen 'Aw'). Average annual precipitation varies from 1,100 to 1,500 mm. Mean annual air temperature is from 26 to 28 °C.

Drainage, Permeability and Runoff: Well drained. Ground water table falls below 5 m all year round. Permeability is rapid over moderate. Surface runoff is rapid.

Vegetation and Land Use: Low open dipterocarp forest. Part are cleared for upland crops such as kenaf, corn, water melon and some upland rice.

Characteristic Profile Features: Phu Sana series is a member of the fine-loamy, mixed, isohyperthermic Kanhaplic Haplustults. They are shallow to gravels and are characterized by a very dark grayish brown to dark brown sandy loam or loamy sand a horizon overlying a yellowish red, reddish yellow or strong brown very gravelly sandy clay loam or very gravelly clay loam argillic B horizon. Weathered granitic rock fragments occur below 80 cm depth from the surface. Reaction is slightly acid to medium acid over medium to strongly acid.

Typifying Pedon: Profile code no. is NE-N-26/21 (Type location) (moist colors Type Location unless otherwise stated).

Location: Left side of Loei-Chiang Khan road at km 230, Amphoe Muang Changwat Loei.

Sheet Name: Ban That

Sheet No.: 5043 III

Coordinate: -

Elevation: -

Relief: gently undulating to undulating

Slope: 2-8%

Physiography: erosion surfaces

Parent material: residuum and colluvium derived from granite

Drainage: well drained

Permeability: rapid over moderate

Runoff: rapid

Ground water depth: >5 m

Flooding depth: -

Duration: -

Frequency: -

Annual rainfall: 1,238.1 mm

Mean temp.: 25.5 °C

Climate type: Tropical Savannah (Aw)

Natural vegetation or land use: dipterocarp forest

Described by: Chaleao and Mana

Date: 15 March, 1972

Revised by: Aniruth Potichan

Date: 23 May, 2004

Horizon	Depth (cm)	Description
A	0-5	Very dark grayish brown (10YR3/2) loamy coarse sand; weak coarse subangular blocky with some granular structure at the uppermost; slightly hard, friable, nonsticky, nonplastic; common fine and medium roots; coarse fraction consists of about 3-5% angular and subangular quartz fragments (2-4 mm in diameter); slightly acid (field pH 6.5); abrupt, smooth boundary.
AB	5-16	Strong brown (7.5YR5/6) gravelly loamy coarse sand; weak coarse subangular blocky structure; slightly hard, friable, nonsticky, nonplastic; few fine animal holes; common fine and medium roots; gravels consist of 2-4 mm in diameter of angular and subangular quartz fragment; moderately acid (field pH 6.0); clear, smooth boundary.

Bt	16-24/30	Yellowish red (5YR4/8) and dark red (2.5YR3/6) very gravelly sandy clay loam (20-30% quartz fragments); moderate coarse and medium subangular blocky structure; slightly firm, sticky, slightly plastic; broken moderately thick clay coatings on ped faces and thick continuous clay coatings in pores, few fine and medium roots; moderately acid (field pH 6.0); clear, wavy boundary.
C1	24/30-100	White (5Y 8/2) and red (10R4/6) gravelly clay (20-30% gravels); massive; firm, sticky, slightly plastic; common fine, medium and few coarse roots; moderately acid (field pH 6.0); gradual, smooth boundary.
C2	100-150+	White (5Y 8/2) and red (10R4/6) very gravelly clay (40-50% angular quartz fragments); massive; firm, sticky, slightly plastic; very few very fine roots; moderately acid (field pH 6.0).

Type Location:

Phu Sana series was named for Phu Sana Mountain range in Changwat Loei which soils of this series were first described at km 230, about 30 m on the left side of Loei - Chiang Khan road.

Range of Profile Feature:

The thickness of the A horizon varies from 10 to 20 cm and has 10 YR hue, values of 2 to 4 and chromas of 1 to 3. Textures of loamy sandy or sandy clay loam many occur. Structure is blocky and/or granular. Field pH value is from 6.0 to 7.0.

The B horizon has 5YR or 7.5YR hues, values of 4 to 7 and chromas of 6-8. Structure is blocky. Field pH value is from 5.0-5.5.

Similar Soil Series:

Pong Tong series (Po): has deeper profile but it is in clayey-skeletal family.

Map Bon series (Mb): has similar profile but it is deeper profile.

Principal Associated Soils:

These include Loei, Chiang Khan series and Slope Complex.

ANALYSIS RESULTS
(oven dry basis)

Profile code no NE-N-26/21
Soil series: Phu Sana series (Ps)

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 ⁿ	water			
53663	0-5	A	80.0	12.9	7.1					ls	lcos	5.7	5.1		6.1	
53664	5-16	AB	83.8	9.9	6.3					ls	glcos	6.1	5.5		3.5	
53665	16-24/30	B+	65.7	9.6	24.7					scl	vg scl	5.7	4.7		1.3	
53666	24/30-100	C1	34.7	9.7	55.6					c	gc	5.6	4.5		1.1	
53667	100-150+	C2	28.7	15.6	55.7					c	vgc	5.7	4.2		0.8	

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	Extr.	SUM	CEC	CEC	B/Cx100	(Bx100)/			
				Ca	Mg	K	Na	cations (B)	acidity (A)	(B+A)	NH ₄ OAc (C)	100g Clay		(B+A)			
0-5	3.9	0.98		1.08	0.99	0.17	0.20	2.44	3.11	5.55	3.96	55.8	62	44			0.001
5-16	2.7	0.20		0.19	0.44	0.07	0.16	0.86	1.33	2.19	1.63	25.9	53	39			0.000
16-24/30	10.6	0.24		0.10	1.29	0.27	0.16	1.82	2.22	4.04	3.26	13.2	56	45			0.000
24/30-100	24.5	0.22		0.30	2.02	0.47	0.16	2.95	4.72	7.67	6.06	10.9	49	38			0.000
100-150+	25.8	0.07		0.29	1.28	0.41	0.16	2.14	5.43	7.57	6.29	11.3	34	28			0.000

Surveyor: Chaleao and Mana

Date: 15 March, 1972