

Proposed by: C. Changprai, 1971  
Revised by:  
1. B. Bhubharuang 1988  
2. A. Potichan, 2004

## PHAN SERIES

Field Symbol: Ph

**Distribution:** Occupies small extent in North Thailand.

**Setting:** Phan soils are formed from alluvium and occur on alluvial plains and valley flats. Relief is level to nearly level with few to common scattered termite mounds. Slopes range from 0 to 2%. The average annual precipitation under a Tropical Savanna (Koppen 'Aw') climate ranges from 1,100 to 1,800 mm.

**Drainage, Permeability and Runoff:** Poorly drained. Permeability and surface runoff are slow. The soils are normally flooded by impounded rainwater and occasionally by stream water to depth of not more than 30 cm for a period of 4 to 5 months during the rainy season.

**Vegetation and Land Use:** Transplanting rice is the main crop - grown on these soils. Upland crops such as tobacco and some garden crops are grown where irrigation water is available during the dry season.

**Characteristic Profile Features:** Phan series is a member of the fine, kaolinitic, isohyperthermic Typic (Plinthic) Endoaqualfs. They are very deep soils and characterized by a grayish brown or light brownish gray silty clay loam or clay loam A horizon overlying a light gray or gray clay argillic B horizon. Common to many distinct strong brown to yellowish brown mottles occur throughout the profile with common to many fine to coarse prominent red plinthite in the subsoil. Reaction is slightly acid to moderately alkaline, increasing with depth.

**Typifying Pedon:** Profile code no. is N-36/60 (moist colors unless otherwise stated).

**Location:** Ban Pu Kaeng, Amphoe Phan Changwat Chiang Rai.

**Sheet Name:** Amphoe Mae Chai

**Sheet No.:** 4947 I

**Coordinate:** 793532

**Elevation:** 408-410 m (MSL)

**Relief:** level to nearly level

**Slope:** 0-1 %

**Physiography:** semi-recent terraces

**Parent material:** alluvium

**Drainage:** poorly drained

**Permeability:** slow

**Runoff:** slow

**Ground water depth:** >2 m

**Flooding depth:** 30 cm

**Duration:** 4-5 month

**Frequency:** every year

**Annual rainfall:** 1,733.5 mm

**Mean temp.:** 24 °C

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

**Natural vegetation or land use:** paddy field

**Other:** cracks are about 2 cm wide at surface, fine vertical cracks go down to 60 cm

**Described by:** Chamrong, Mana and Scholten

**Date:** 12 May, 1971

**Revised by:** Aniruth Potichan

**Date:** 26 May, 2004

Horizon	Depth (cm)	Description
Apg	0-10/14	Light brownish gray (10YR6/2) silty clay loam; common fine distinct yellowish brown (10YR5/6) and few coarse strong brown (7.5YR5/8) mottles along roots channels and as a thin layer near surface; weak coarse and medium angular blocky structure; firm, very sticky and plastic; common fine and very fine roots; medium acid (field pH 6.0); abrupt and wavy boundary.
ABg	10/14-28	Light gray (10YR7/2) plough pan clay loam with discernible sand fraction common very fine distinct brownish yellow (10YR6/8) mottles; massive; hard, firm, sticky and plastic; few small soft irregular iron-manganese nodules; very few fine roots; slightly acid (field pH 6.5); clear and smooth boundary.
Btg	28-35/45	Light gray (10YR7/2) clay loam; many fine distinct strong brown (7.5YR5/8) mottles; moderate medium and coarse angular blocky structure; hard, firm, sticky

		and plastic; broken thin clay coatings in tubular pores; very few small soft irregular iron-manganese nodules; slightly acid (field pH 6.5); clear and irregular boundary.
Btgv1	35/45-66	Light gray (10YR7/2) clay; common fine distinct strong brown (7.5YR5/8) and common medium prominent red (2.5YR4/8) mottles; moderate coarse angular blocky structure; firm, sticky and plastic; continuous thin clay coatings along tubular pores and broken moderately thick clay coatings along cracks; no root; neutral (field pH 7.0); gradual and smooth boundary.
Btgv2	66-100+	Light brownish gray (10YR6/2) clay; fine, medium and coarse prominent red (2.5YR4/8) and many medium and coarse distinct strong brown (7.5YR5/8) mottles; moderate coarse angular blocky structure; firm, sticky and plastic; continuous thick clay coatings in tubular pores, patchy thin clay coatings on ped faces; manganese films along some of the fine tubular pores; some of the red plinthite hardening into red ironstone nodules; neutral (field pH 7.0).

**Type Location:**

Phan series was named for Amphoe Phan, Changwat Chian Rai where the typifying pedon was first described.

**Range of Profile Features:**

The A horizon is from 10 to 20 cm thick and has 10YR hues, value of 5 through 7 and chromas of 2 or less and hue of 7.5YR, value 4 or 5 and chroma 1 or less. The structure is weak medium and coarse blocky; massive structure normally occurs in plough pan. Field pH values range from 5.5 to 6.5.

The B horizon has hues of 10YR, values of 6 or 7 and chromas of 2 or less. The B horizon is argillic showing evidence of illuviation in the form of clay coatings mainly in pores and on ped faces. The structure is moderate coarse and medium blocky. Common to many red and yellowish red plinthite with some ironstone nodules are commonly found. Field pH values range from 6.0 to 8.0. During the dry season narrow cracks extend to depths of 60 cm below the soil surface.

**Similar Soil Series:**

Hang Dong series (Hd): soil color has lower value (4-6) and no plinthite in the subsoil.

Chiang Rai series (Cr): has similar profile but the pH value decreases with depth and base saturation is lower than 35 percent.

Sukhothai series (Skt): is a Aeric Plinthic Endoaqualfs and soil color has higher chroma in the upper B horizon.

**Principal Associated Soils:**

These include Hang Dong and Sukhothai series.

**ANALYSIS RESULTS**  
(oven dry basis)

Profile code no.: N-36/60  
Soil series: Phan (Ph)

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			
Pb-777	0-10/14	Apg	21.0	48.5	30.5						sicl	sicl	5.4	4.2	5.6	47
Pb-778	10/14-28	ABg	40.0	32.5	27.5						cl	cl	6.9	5.5	4.7	21
Pb-779	28-35/45	BAG	30.0	35.5	34.5						cl	cl	6.4	4.9	5.8	35
Pb-780	35/45-66	Btg1	20.0	36.0	44.0						c	c	6.4	5.0	5.5	50
Pb-781	66-100+	Btg2	18.0	26.5	55.5						c	c	6.4	5.4	6.4	50

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(c)</sub> kg <sup>-1</sup> )									Base satur <sup>n</sup> (%)		ECEC cmol <sub>(c)</sub> kg <sup>-1</sup> (B+D)	Al KCl extr. cmol <sub>(c)</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)			
0-10/14	0.9	1.24		5.50	0.50	0.10	0.30	6.40	4.90	11.30	9.3	30.5	69	57			0.03
10/14-28	0.3	0.72		3.60	0.30	0.10	0.20	4.20	1.50	5.70	4.9	17.8	86	74			0.01
28-35/45	0.8	0.28		4.30	0.40	0.10	0.20	5.00	2.60	7.60	6.5	18.8	77	66			0.01
35/45-66	1.0	0.30		5.10	0.50	0.10	0.30	6.00	3.40	9.40	8.9	20.2	67	64			0.01
66-100+	1.6	0.30		6.10	0.70	0.10	0.10	7.00	4.30	11.30	11.6	20.9	60	62			0.01

Surveyor: Chamrong, Mana and Scholten

Date: 12 May, 1971