

Proposed by: F.R. Moormann et.al-1961
Revised by: 1. P. Hemsrichart, 1988
B. Boonsompophan,
2. K. Malairodsiri,
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PHEN SERIES

Field Symbol: Pn

Distribution: Occupies small to moderate extent in Northeast Thailand.

Setting: Phen soils are formed from old alluvium over shale and/or siltstone, fine grained sandstone and occur on the lower part of peneplain. Relief is level to gently undulating. Slopes are 2 percent or less. Elevation is from 150 to 200 m above sea level. The climate is Tropical Savanna (Köppen 'Aw'). Average annual precipitation is from 1,100 to 2,200 mm. Mean annual air temperature varies from 26 to 28°C.

Drainage, Permeability and Runoff: Poorly drained soils. Flooded in the wet season by impounded rain water up to 30 cm deep for 3 to 4 months. Ground water table falls below 3 meters during the peak of the dry period. Permeability is moderate over slow. Surface runoff is slow.

Vegetation and Land Use: Transplanted rice with some scattered dipterocarp spp.

Characteristic Profile Features: The Phen series is a member of the loamy-skeletal mixed subactive, isohyperthermic Aeric Plinthic Paleaquults. They are shallow to layer of loose ironstone nodules within 50 cm depth of the surface. These soils are characterized by a grayish brown or brown loam or sandy loam (gravelly) A horizon overlying a brown or strong brown gravelly loam or gravelly sandy clay loam upper argillic B horizon and light brown or pinkish gray gravelly clay loam or gravelly sandy clay loam lower argillic B horizon which in turn overlies gray or light gray clay C horizon. They are mottled throughout the profile with colors of strong brown, yellowish brown and/or yellowish red at the surface and strong brown, dark brown, yellowish red and/or red in the subsoil. Reaction is medium to very strongly acid throughout the profile.

Typifying Pedon: Profile code no. is NE-N-59/22 (moist colors unless otherwise stated).

Location: Ban Phon Phisai, Amphoe Phon Phisai Changwat Nong Khai.

Sheet Name:

Sheet No.: 5665 III

Coordinate: 024070

Elevation:

Relief: nearly level

Slope: 1%

Physiography: lower part of peneplain

Parent material: alluvium over shale and/or siltstone, fine grained sandstone

Drainage: somewhat poorly drained

Permeability: moderate over slow

Runoff:

Ground water depth: >1.5 m

Flooding depth: 10-15 cm

Duration: 3-4 month

Frequency: every year

Annual rainfall:

Mean temp: 26-28 °C

Climate type: Tropical Savannah

Natural vegetation and/or land use: transplanted rice

Described by: P.Vijarnsorn, et.at.

Date: 27 July 1979

Revised by:

Horizon	Depth(cm)	Description
Apg	0-14	Grayish brown (10YR 5/2) loam; few fine faint dark yellowish brown (10 YR 4/6) mottles; weak medium subangular blocky structure; friable, slightly sticky, slightly plastic, few termite holes; strong acid (field pH 5.5); clear, smooth boundary.
Btg	14-45	Gray to grayish brown (10 YR 5/1-2) clay loam; many fine distinct yellowish brown (10 YR 5/8) and strong brown (7.5 YR 5/8) mottles; weak coarse subangular blocky structure; friable, slightly sticky, slightly plastic; patchy thin clay coating on ped faces; few fine roots; few termite holes; strong acid (field pH 5.5); abrupt smooth boundary.

Btc	45-77	Light brownish gray to pale brown (10 YR 6/2-3) very gravelly clay loam; many fine distinct strong brown (7.5 YR 5,8) and common fine prominent red (2.5 YR 4/8) mottles; (coated color around gravels) ;massive to weak medium subangular blocky structure friable, sticky, plastic; patchy thin clay coating on ped faces; gravels composed of 70 percent hard ironstone nodules; very strongly acid (field pH 5.0); clear,smooth boundary.
BCg1	77-120	Light brownish gray (10YR 6/2) slightly gravelly clay; many fine distinct yellowish brown (7.5 YR 5/8) and prominent red (2.5 YR 4/8) mottles; massive to weak medium subangular blocky structures; friable, sticky, plastic; patchy thin clay coating on ped faces; gravels composed of soft red shale (2.5YR4/8-10 YR 4/8) and ironstone nodules; very strongly acid; (field pH 4.5); clear, smooth boundary.
BCg2	120-180	Pinkish gray (10YR 7/2) slightly gravelly clay loam; many fine distinct yellowish brown (7.5 YR 5/8) and prominent red (2.5 YR 4/8) mottles; massive to weak medium subangular blocky structure;friable, sticky, plastic;gravels composed of soft red shale (2.5 YR 4,8) and ironstone nodules; very strongly acid (field pH 4.5).

Type Location: The Phen series was named for Amphoe Phen, Changwat Udon in which soils of this series were first described.

Range of Profile Feature:

The thickness of the A horizon varies from 10 to 20 cm and has 10YR or 7.5YR hues, values of 3 to 6 and chromas of 2 to 4. Textures of sandy clay loam or loamy sand may occur. Structure is weak fine to moderate blocky. Field pH value is from 5.5 to 6.5.

The B horizon has 7.5YR or 10YR hues; values of 5 to 6 and chromas of 2 or less in the upper part and of 2 to 4 in the lower part of the horizon. Texture of sandy clay may occur. Structure is weak to moderate medium and/or coarse blocky. Field pH value is from 4.5 to 5.5.

The C horizon has 10YR or 7.5YR hues, values of 5 to 7 and chroma of 2 or less. Structure is weak to moderate medium and/or coarse blocky. Field pH value is from 4.5 to 5.5.

Similar Soil Series:

On series (On): has a layer of semi-consolidated and/or consolidated ironstone and occurs on the lower part of peneplain.

Principal Associated Soils: These include Phon Phisai soils where occupy on the upper of peneplain.

ANALYSIS RESULTS **Profile code no.:NE-N-59/22**
(oven dry basis) **Soil series : Phen (Pn)**

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				
0-14	0-14	Apg	40.8	43.3	15.9							l	l	4.7	3.7		2.5	33
14-45	14-45	Btg	38.2	30.4	31.4							cl	cl	4.5	3.6		2.5	37
	45-77	Btc	25.5	40.0	34.5							cl	vg.cl	4.9	3.7		1.8	63
	77-120	Bcg1	24.1	42.3	33.6							cl	slg.cl	4.8	3.7		1.8	79
	120-180	Bcg2	25.9	37.3	36.8							cl	slg.cl	4.9	3.7		1.4	114

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol _(c) kg ⁻¹)										Base satur ¹ (%)		ECEC cmol _(c) kg ⁻¹ (B+D)	Al KCl extr. cmol _(c) kg ⁻¹ (D)	Electrical conduct ¹ (ECx10 ⁶) dS m ⁻¹
				Ca	Mg	K	Na	SUM		CEC	CEC	B/Cx100	(Bx100)/					
								cations (B)	acidity (A)					(B+A)	NH ₄ OAc (C)			
0-14	1.1	0.85		1.00	0.30	0.05	0.10	1.45	7.00	8.45	5.20	32.7	28	17			0.08	
14-45	1.1	0.60		0.50	0.20	0.05	0.20	0.95	7.90	8.85	5.60	17.8	17	11			0.06	
45-77	1.8	0.48		0.60	0.20	0.10	0.20	1.10	8.30	9.40	7.10	20.6	15	12			0.03	
77-120	1.9	0.31		0.30	0.10	0.10	0.30	0.80	9.50	10.30	7.10	21.1	11	8			0.03	
120-180	1.8	0.60		0.20	0.10	0.20	0.20	0.70	9.60	10.30	7.70	20.9	9	7			0.03	