

Proposed by: F.R. Moormann, 1962
Revised by: 1. B. Boonsompopphan,
P. Hemsrichart, 1988
2. S. Sukchan,
K. Malairotsiri, 2004

BORABUE SERIES

Field Symbol: Bb

Distribution: Occupies small extent in Northeast Plateau.

Setting: Borabue soils are formed from washed deposit of sandstone overlying a siltstone and occur on the middle part of peneplain. Relief is undulating to rolling. Slopes range from 2 to 8 percent. Elevation is from 170 to 260 m above sea level. The climate is Tropical Savanna (Köppen 'Aw'). Average annual precipitation is from 1,300 to 2,000 mm. Mean annual air temperature is from 26 to 28°C.

Drainage, Permeability and Runoff: Moderately well drained. Permeability is rapid over slow. Surface runoff is rapid to medium. Ground water table falls below 3 meters during the peak of the dry season.

Vegetation and Land Use: Mainly covered by low open dipterocarp forest, but rarely cleared for upland crop cultivation.

Characteristic Profile Feature: The Borabue series is a member of the loamy-skeletal, mixed, semiactive, isohyperthermic Plinthaquic Haplustults. They are moderately deep soils and are characterized by a very dark grayish brown, dark grayish brown or dark brown loamy sand A horizon overlying a light yellowish brown, yellowish brown, brown or reddish yellow loamy sand E horizon which in turn overlies a light yellowish brown or light brown sandy clay loam with strong brown mottled argillic B horizon. The 2B and/or 2C horizons that formed within 75 cm of the soil surface have a light brownish gray, light gray or gray very gravelly clay or very gravelly sandy clay with strong brown, yellowish red and red mottles (plinthite). The coarse fraction consists of ironstone nodules which are derived from iron-rich sandstone. The weathered sandstone fragment, usually occur at some depth between 50 to 100 cm of the surface. Reaction is medium acid to neutral over strongly acid.

Typifying Pedon: Profile code no. is NE-N-31/18 (colors are for moist soil unless otherwise noted).

Location: at km18+200, about 150 meters apart from the right side of the road from Ban Phai to Maha Sarakham, Ban Nong Done, King Amphoe Kud Rang Changwat Maha Sarakham.

Sheet name: -

Sheet no.: -

Coordinate:

Elevation: 120 m

Relief: gently undulating

Slope: 4-5%

Physiography: middle part of peneplain

Parent material: washed deposit of sandstone over siltstone

Drainage: moderately well drained

Permeability: rapid over slow

Runoff: rapid to medium

Ground water depth: >3 m

Flooding depth: -

Duration: -

Frequency: -

Annual rainfall: 1,587.6 mm

Mean temp: 27 °C

Climate type: Tropical Savannah

Natural vegetation or land use: mainly low open dipterocarp forest

Described by: F.R. Moormann, et. al.

Date: 1962

Horizon	Depth (cm)	Description
A	0-6	Dark grayish brown (10YR 4/2) loamy sand; common fine and few fine distinct strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure breaking into fine subangular blocky structure; friable, nonsticky, nonplastic; common very fine and fine interstitial pores, few fine tubular pores; many fine roots, few, medium and coarse roots; slightly acid (field pH 6.5); clear, smooth boundary.

E1	6-15	Light yellowish brown (10YR 6/4) loamy fine sand; few fine distinct strong brown mottles; weak coarse and medium subangular blocky breaking into fine angular blocky structure; friable, nonsticky, nonplastic; many very fine and fine interstitial pores, few fine and medium tubular pores; many fine and medium roots, few large roots; medium acid (field pH 6.0); gradual, smooth boundary.
E2	15-30	Reddish yellow (7.5YR 6/6) loamy fine sand; few fine distinct strong brown mottles; weak coarse and medium breaking into fine subangular blocky structure; friable, nonsticky, nonplastic; many very fine and fine interstitial pores, few fine and medium tubular pores; common fine and medium roots, few large roots; strongly acid (field pH 5.5); gradual, smooth boundary.
BE	30-40	Reddish yellow (7.5YR 6/6) fine sandy loam; common fine distinct strong brown mottles; moderate coarse angular and subangular blocky structure; friable, nonsticky, nonplastic; many very fine and fine interstitial, few fine tubular pores; common fine and medium roots, few large roots; very strongly acid (field pH 5.0); gradual, smooth boundary.
Bt	40-50	Light brown (7.5YR 6/4) sandy clay loam; many fine distinct yellowish red mottles; moderate coarse angular and subangular blocky structure; slightly firm, slightly sticky, slightly plastic; many very fine and fine interstitial pores, few fine and medium tubular pores; some clay bridging between sand grains; few fine subrounded iron concretions; common fine roots, few medium and coarse roots; very strongly acid (field pH 4.5); abrupt, smooth boundary.
2Bt	50-60+	Light brownish gray (10YR 6/2) very gravelly clay (90% coarse fraction); common fine to medium strongly brown and many prominent yellowish red and red mottles; firm, sticky, plastic; broken moderately thick clay coating on ped faces and continuous moderately thick in pores; few fine roots; very strongly acid (field pH 4.5).

Type Location: Name of Amphoe Borabue, Changwat Maha Sarakham

Range of Profile Feature:

The thickness of the A horizon varies from 10 to 20 cm and has 10YR or 7.5YR hues, value of 3 to 5 and chromas of 2 to 4. Structure is blocky. Field pH value is from 5.5 to 6.0.

The E horizon has 10YR or 7.5 YR hues, values of 4 to 6 and chromas of 4 to 8. Structure is weak blocky or single grains. Field pH value is from 5.0-6.0

The B horizon has 7.5YR or 10YR hues, values of 4 to 6 and chromas of 4 to 8. Structure is blocky. Field pH values are from 4.5 to 5.5.

The 2B and 2C horizon has 10YR hue, values of 6 to 7 and chromas of 2 or less. Texture of very gravelly clay loam may occur. Structure is blocky. Field pH values are from 4.5 to 5.5;

but rarely go up to 7.0 or 8.0 due to calcareous sandstone.

Similar Soil Series:

Buntharik series (Bt): is Aeric (Plinthic) Paleaquults.

Principal Associated Soils: These include Korat, Warin and Phon Phisai Soils

ANALYSIS RESULTS **Profile code no.:NE-N-31/18**
(oven dry basis) **Soil series : Borabue (Bb)**

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			
	0-6	A	86.0	11.5	2.5						Ls	Ls	5.1	4.4	0.0	2.6	59
	6-15	E1	86.0	11.0	3.0						Ls	Lfs	5.2	4.2	0.0	0.9	53
	15-30	E2	82	15.5	2.5						Ls	Lfs	5.2	4.0	0.0	1.1	35
	30-40	BE	79	14	7.0						Ls	fsl	5.1	3.9	0.0	1.1	41
	40-50	Bt	66	13	21.0						Scl	Scl	4.6	3.7	0.0	1.1	99
	50-60	2Bt	1	62.5	36.5						Sicl	Vgc	5.3	3.7	0.0	1.4	175

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol ₍₊₎ kg ⁻¹)								Base satur ¹ (%)		ECEC cmol ₍₊₎ kg ⁻¹ (B+D)	Al KCl extr. cmol ₍₊₎ kg ⁻¹ (D)	Electrical conduct ² (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)
0-6	0.5	0.61		0.70	0.40	0.10	0.10	1.30	1.60	2.90	2.30	92.0	57	45		0.07		
6-15	0.7	0.23		0.30	0.30	0.10	0.05	0.75	1.40	2.15	2.00	66.7	38	35		0.03		
15-30	0.2	0.19		0.10	0.30	0.10	0.10	0.60	1.00	1.60	2.00	80.0	30	38		0.01		
30-40	0.3	0.29		0.10	0.40	0.10	0.10	0.70	2.40	3.10	3.00	42.9	23	23		0.01		
40-50	0.7	1.02		0.10	0.70	0.20	0.10	1.10	7.30	8.40	7.70	36.7	14	13		0.01		
50-60	4.1	1.01		0.60	1.10	0.40	0.20	2.30	12.90	15.20	15.00	41.1	15	15		0.01		