

Proposed by S. Luangsirorat, 1972
 Revised by :
 P. Vijarnsorn and staffs, 1988
 W. Sirichuaychoo, 2004

NA THAWI SERIES

Field Symbol: Nat

Distribution: Occupies a small extent in Peninsular Thailand and some areas in Southeast Coast of Thailand.

Setting: Na Thawi soils derived from sandstone or coarse grain clastic rocks and occurred on denudation surface. Elevation ranges from 20 to 60 m above mean sea level. Relief is gently undulating to undulating. Slope ranges from 3 to 8 percent. The climate is Tropical Monsoon (Koppen 'Am'). Average annual precipitation is from 1,800 to 3,000 mm. Average annual air temperature is from 26 °C to 28°C.

Drainage, Permeability and Surface Runoff: Drainage is well drained, permeability is estimated to be rapid and surface runoff is rapid.

Vegetation and Land Use: Originally under Tropical Evergreen Forest. Now almost exclusively used for para rubber, oil palm and fruit trees growing.

Characteristic Profile Features: Na Thawi series is a member of the coarse-loamy, kaolinitic, isohyperthermic Typic Kandiodults (soil taxonomy, 2003). They are very deep soils and are characterized by a very dark gray to dark grayish brown sandy loam surface or A horizon overlying a strong brown or reddish yellow sandy loam upper kandic B horizon. Below these horizon is a yellowish red or reddish yellow sandy loam lower kandic B horizon. Very strongly acid to strongly acid, reaction values range from 4.5 to 5.5.

Typifying Pedon: Na Thawi sandy loam - para rubber plantation, Ban Pa Yang, Amphoe Hat Yai Changwat Songkhla, 6 to 8 percent slopes.

Profile Code Number: S-68/14, described by Lek Moncharoen and staffs, 23 November 1970 (moist colors unless otherwise stated).

Horizon	Depth (cm)	Description
Ap	0-11	Brown to dark brown (7.5YR4/4) sandy loam; weak very fine and fine subangular blocky structure; very friable, nonsticky and nonplastic; many very fine and fine interstitial pores and common fine tubular pores; many fine and few medium roots; strongly acid (field pH 5.5); clear smooth boundary.
Bw	11-26	Strong brown (7.5YR5/6) sandy loam; moderate fine and medium subangular blocky structure; friable, nonsticky and nonplastic; iron oxide coated on sand grains and bridge about 10-20%; common very fine and fine interstitial pores, few fine tubular pores; many fine roots; very strongly acid (field pH 5.0); gradual smooth boundary.
Bt1	26-80	Yellowish red to strong brown (5-7.5YR5/8) sandy loam to sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and nonplastic; patchy thin cutan on ped faces and continuous thin cutan along roots channels; common very fine interstitial and few fine tubular pores; common fine and few medium roots; very strongly acid (field pH 5.0); gradual smooth boundary.
Bt2	80-110	Yellowish red (5YR5/8) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin cutan on ped faces and continuous thin cutan along roots channels; many fine interstitial and common medium tubular pores; few fine roots; very strongly acid (field pH 5.0); gradual smooth boundary.
Bt3	110-160	Red to yellowish red (2.5-5YR5/8) sandy clay loam; moderate medium subangular blocky structure; friable, slightly sticky and slightly plastic; patchy thin cutan on ped faces and continuous thin cutan along roots channels; many

fine interstitial and common medium tubular pores; common medium roots; very strongly acid (field pH 5.0).

Type location:

Name of district, Amphoe Na Thawi, Changwat Songkhla.

Range of Profile Features:

The surface or A horizon loamy sand or sandy loam, has 5 to 15 cm in thickness and has 10YR or 7.5YR hues, values 3 or 4 and chromas 2 or 4. The structure is weak fine subangular blocky. Very strongly acid to strongly acid, reaction values range from 4.5 to 5.5 (determined in laboratory).

The upper kandic B horizon sandy loam, is approximately below 20 cm of the soil surface and has 7.5YR hues, values 5 or 6 and chromas 6 or 8. Texture is sandy loam and gradually increase in clay content up to sandy clay loam. The structure is weak fine and medium subangular blocky.

The lower kandic B sandy loam or sandy clay loam has 7.5YR and grading gradually to 5YR hues, values 5 or 6 and chromas 6 or 8. This reddish color usually occurs below 50 cm but within 1 meter of the soil surface. The structure is weak fine and medium subangular blocky. Very strongly acid to strongly acid, reaction values range from 4.5 to 5.5.

Similar Soil Series:

Sadao series (Sd): coarse-loamy, kaolinitic, isohyperthermic Typic Kandiudults, redder in color throughout the soil profile.

Khlong Thom series (Km): fine-loamy, kaolinitic, isohyperthermic Typic Kandiudults, heavier in texture throughout the soil profile almost the same in soil color (fine-loamy).

Principal Associated Soil:

These include Kho Hong, Sadao, Tha Sae and Khlong Thom series.

Kho Hong series (Kh): coarse-loamy, kaolinitic, isohyperthermic Typic Kandiudults, brownish colors (7.5YR or 10YR 5-6/6-8).

Tha Sae series (Te): fine-loamy, kaolinitic, isohyperthermic Typic Kandiudults, brownish colors (7.5YR or 10YR 5-6/6-8).

ANALYSIS RESULTS

Profile code No.: S-68/14

(oven dry basis)

Soil series: Na Thawi series (Nat)

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 water	1:1 KCl				
			sand	silt	clay	vc	c	m	f	vf	result	estim ⁿ					
Pb-240	0-11	Ap	76.5	16.5	7.0						sl	sl	4.5	4.1		5.6	24
Pb-241	11-26	Bw	75.5	11.5	13.0						sl	sl	4.9	4.2		4.8	27
Pb-242	26-80	Bt1	75.0	12.5	12.5						sl	sl-scl	4.9	4.5		5.0	21
Pb-243	80-110	Bt2	72.0	13.5	14.5						sl	scl	5.0	4.1		4.5	21
Pb-244	110-160	Bt3	73.0	12.5	14.5						sl	scl	4.9	4.2		4.1	15

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 cations (B)	Extr. acidity (A)	SUM (B+A)	CEC NH ₄ OAc (C)	CEC 100g Clay	B/Cx100	(Bx100)				
													(B+A)	(B+A)				
0-11	0.4	0.62		0.30	0.10	0.10	0.10	0.60	2.90	3.50	2.6	37.1	23	17			0.04	
11-26	0.2	0.12		0.10	0.00	0.10	0.10	0.30	2.00	2.30	1.6	12.3	19	13			0.02	
26-80	0.1	0.15		0.20	0.00	0.10	0.10	0.40	1.60	2.00	1.5	12.0	27	20			0.01	
80-110	0.3	0.09		0.20	0.00	0.10	0.10	0.40	1.30	1.70	1.4	9.7	29	24			0.01	
110-160	0.2	0.20		0.20	0.00	0.04	0.10	0.34	1.40	1.74	1.3	9.0	26	20			0.01	

Surveyor: L. Moncharoen & staff

Reported by: W. Sirichuaychoo

Date: Nov. 23, 1970

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