

Proposed by F.R. Moormann, 1963
Revised by:
1. C. Changprai, 1987
2. S. Udomsri, 2004

SAPPHAYA SERIES

Field Symbol: Sa

Distribution: Occupies small extent in the Central Plain, North and Central Highlands.

Setting: Sapphaya soils are formed from alluvium and occur on the lower parts of stream and river levees. Relief is flat to nearly flat. Slopes are about 0-1%. The climate is Tropical Savanna (Köppen 'Aw') Mean annual precipitation ranges from 1,200 mm to 1,400 mm. Mean annual temperature is 27°C.

Drainage, Permeability and Surface Runoff: Moderately well drained to somewhat poorly drained. Permeability is slow to moderate and runoff is slow. These soils are flooded by impounded rainwater or river to depths of up to 50 cm for four or five months during the rainy season. Sometimes this area flooded by irrigation. Groundwater level falls below 1.5 m from the soil surface during the peak of the dry season.

Vegetation and Land Use: Mainly used for broadcasted rice cultivation. Vegetables, beans and tobacco may be grown during the dry season if local irrigation water is available.

Characteristic Profile Features: Sapphaya series is a member of the Fine-loamy, mixed, active, nonacid, isohyperthermic Aquic (Fluventic) Haplustepts. They are deep, medium acid to neutral soils. They are characterized by a dark grayish brown or very dark grayish brown loam or silty clay loam A horizon, overlying a stratified brown or grayish brown loam, clay loam or silty clay loam B horizon and loamy sand to sandy loam C horizon approximately 100 cm from the soil surface. These soils are mottled throughout, the mottling in the surface layer being 'inverted gley' caused by the impounding of water and puddling of the soil for wetland rice cultivation. Mottles in the B or C horizon are mainly dark yellowish brown, strong brown and dark brown in colour. Mica flakes occur throughout the profile.

Typifying Pedon: Profile code number is SW-52/103

Location: About 1.5 km south of Wat Chai Rat, Ban Wang Kha, Tambon Tha Chumphon, Amphoe Photharam Changwat Ratchaburi.

Sheet Name: Changwat Ratchaburi

SheetNo.: 4936 II

Coordinate: 889138

Elevation: 5 m MSL.

Relief: level to nearly level

Slope: 0-1%

Physiography: alluvium plain

Parent material: alluvium

Drainage: moderately well drained to somewhat poorly drained

Permeability: slow

Runoff: slow

Ground water depth: >1.55 m

Flooding depth: 30 cm

Duration: 3-4 month

Frequency: every year

Annual rainfall: 1,051.8 mm

Mean temp: 27.9 °C

Climate type: Tropical Savannah

Natural vegetation and/or land use: paddy field and mung bean during dry season

Other:

Described by: Preedee Donsakul

Date: 20 May, 1981

Revised by: S. Udomsri

Horizon	Depth (cm)	Description
Ap1	0-12	Dark brown (10YR3/3) silty clay loam; common fine distinct strong brown (7.5YR4/6) mottles; fine crumb and weak fine subangular blocky structure; friable, sticky, plastic; many fine roots; common decayed rice stems; moderately alkaline (field pH 8.0); clear, smooth boundary.
Ap2	12-29	Very dark grayish brown (10YR3/2) silty clay loam to silty clay; common fine distinct strong brown (7.5YR4/6) mottles; moderate medium

		subangular blocky structure; firm, sticky, plastic; many very fine, common fine roots; moderately alkaline (field pH 8.0); clear, smooth boundary.
B1	29-48	Dark yellowish brown to yellowish brown (10YR4/4-5/4) sandy loam; common fine distinct strong brown (7.5YR4/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; biological activities; moderately alkaline (field pH 8.0); clear, smooth boundary.
B2	48-62	Dark grayish brown (10YR4/2) clay loam; common fine distinct yellowish brown (10YR5/6) mottles; weak medium subangular blocky structure; firm, sticky, plastic; very few very fine roots; few soft and slightly hard Fe&Mn concretions; moderately alkaline (field pH 8.0); gradual, smooth boundary.
B3	62-85	Grayish brown (10YR5/2) clay loam; common fine distinct yellowish brown (10YR5/6) mottles; weak medium subangular blocky structure; firm, sticky, plastic; very few very fine roots; few soft and slightly hard Fe&Mn concretions; moderately alkaline (field pH 8.0); gradual, smooth boundary.
B4	85-117	Brown (10YR5/3) clay loam; common fine distinct yellowish brown (10YR5/6) mottles; weak fine and medium subangular blocky structure; firm, sticky, plastic; few soft Fe&Mn concretions; about 3% of secondary lime concretions Ø 2-5 mm; moderately alkaline (field pH 8.0); clear, smooth boundary.
C1	117-133	Yellowish brown (10YR5/6) loamy sand; few fine faint mottles; weak fine subangular blocky structure; very friable, nonsticky, nonplastic; moderately alkaline (field pH 8.0); gradual, smooth boundary.
C2	133-155 ⁺	Yellowish brown (10YR5/4) fine sandy loam; common fine faint yellowish brown (10YR5/6) mottles; weak fine subangular blocky structure; friable, slightly sticky, slightly plastic; few soft and slightly hard Fe&Mn concretions; moderately alkaline (field pH 8.0).

Remarks:mica flakes throughout profile and increase with depth.

Type Location: Name of Amphoe, Amphoe Sapphaya, Changwat Chai Nat.

Range of Profile Features:

The A horizon is from 10 to 20 cm thick, has 10YR hue, values of 3 through 5 and chromas of 3 or 2. Structure is week crumb and weak fine blocky. Field pH values range from 6.0 to 7.0.

The B horizon has 10YR and 7.5YR hues, values of 4 and 5 and chromas of 2 and 4 in 7.5YR, and 2 and 3 in 10YR . 5YR hues, values 5 and chromas 3 and 4 occur in Nan province. Structure is week to moderate, fine and medium blocky and field pH values range from 5.5 to 6,5. Although stratified and texture varies from layer to layer, they remain in the fine loamy particle size class. In some areas a sand or sandy loam layer may occur in the deeper C horizon approximately 1 m from the soil surface. Few, soft, iron/manganese nodules may occur in the horizon,

Similar Soil Series:

Tha Muang series (Tm): well drained soils and does not have inverted gley at the surface, but may contain mottles in the lower part of the C horizon.

Ratchaburi series (Rb): has a cambic horizon with a member of fine family and poorly drained to somewhat poorly drained.

Principal Associated Soils: These include Tha Muang series occupying the higher parts of levees; and Ratchaburi series which occupy lower positions on the flood plain.

Remarks: In many soil survey reports this series name has been spelt 'Sapphaya'; however, the official Thai Government spelling is in fact Sapphaya.

ANALYSIS RESULTS

Profile code No.: Sw-52/103

(oven dry basis)

Soil series : Sapphaya (Sa)

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				
4/19385	0-12	Ap1	12.9	52.4	34.7	0.0	0.2	0.4	5.6	6.7	sicl	sicl	7.9	7.1		19.2	90	
4/19386	12-29	Ap2	23.4	39.4	37.2	0.0	0.3	0.9	10.4	11.8	cl	icl to s	7.9	6.5		4.4	63	
4/19387	29-48	B1	52.0	27.2	20.8	0.0	0.2	2.1	24.7	25.0	scl	sl	7.6	6.6		6.1	39	
4/19388	48-62	B2	40.5	33.1	26.4	0.2	1.5	4.1	17.0	17.7	l	cl	7.6	6.6		2.5	45	
4/19389	62-85	B3	35.4	34.6	30.0	0.2	2.2	4.6	14.2	14.2	cl	cl	7.9	6.1		3.8	48	
4/19390	85-117	B4	36.8	33.6	29.6	0.5	1.6	3.0	11.8	19.9	cl	cl	8.8	7.1		5.4	45	
4/19391	117-133	C1	79.2	8.7	12.1	0.0	0.2	2.2	49.8	27.0	sl	ls	9.3	7.5		11.0	19	
4/19392	133-155	C2	66.7	24.6	8.7	0.4	0.7	2.0	34.4	29.2	sl	fsl	9.3	7.5		15.4	25	

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)	AI 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)			
0-12	4.50	1.53		28.50	1.20	0.20	0.60	30.50	0.80	31.30	18.10	52.2	100	97			0.85	
12-29	4.2	1.22		19.10	1.40	0.20	0.80	21.50	1.70	23.20	19.70	53.0	100	93			0.45	
29-48	2.40	0.32		6.40	0.80	0.10	0.70	8.00	1.30	9.30	8.40	40.4	95	86			0.27	
48-62	3.10	0.44		10.40	1.40	0.10	1.20	13.10	1.50	14.60	13.10	49.6	100	90			0.40	
62-85	3.60	0.44		10.70	2.00	0.10	1.60	14.40	1.10	15.50	14.80	49.3	97	93			0.45	
85-117	3.30	0.32		21.00	2.40	0.10	2.00	25.50	0.00	25.50	12.80	43.2	100	100			0.50	
117-133	0.7	0.14		13.20	1.20	0.05	1.10	15.55	0.00	15.55	3.90	32.2	100	100			0.23	
133-155	2.8	0.09		14.80	1.40	0.06	1.30	17.56	0.00	17.56	5.00	57.5	100	100			0.27	