

Proposed by F.R. Moormann, 1964  
Revised by:  
1. C. Changprai, 1987  
2. S. Udomsri, 2004

**THA KHWANG SERIES**

**Field Symbol: Tq**

**Distribution:** Occupies small extent in the western part of Central Plain and south Peninsular Thailand, mainly in Changwat Ratchaburi, Phetchaburi, Prachuap Khiri Khan and Songkhla.

**Setting:** Tha Khwang soils are formed from marine sediments mixed with riverine alluvium under brackish water influence. They occur in former tidal flats or alluvium plain which grade down to marine deposits and now free of tidal flooding which have been in cultivation for some time or occur in filled up lagoons behind old dune ridges. Relief is flat. Slopes are about 0-1 %. Elevation ranges from 3-4 m above sea level. The climate is both Tropical Savanna and Tropical Monsoon (Köppen 'Aw' and 'Am'). Annual precipitation ranges from 900 to 2,000 mm. Mean annual temperature is 27°C.

**Drainage, Permeability and Surface Runoff:** Poorly drained. Permeability and runoff are slow. These soils are flooded by rain or river water to depths of 1 m or more for six to seven 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 broadcast rice cultivation.

**Characteristic Profile Features:** Tha Khwang series is a member of the Fine, mixed, semiactive, acid, isohyperthermic Vertic (Aeric) Endoaquepts. They are deep soils, strongly acid over very strongly acid soils and are characterized by a brown or dark grayish brown clay loam or silty clay or silty clay loam A horizon overlying a brown or grayish brown clay B horizon. The soils are mottled throughout with yellowish red and strong brown mottles as coatings along pores and root channels and on ped faces in the A horizon, and predominantly red mottles in the B horizon. Yellow jarosite mottles often occur below 1 m from the soil surface but are not diagnostic.

**Typifying Pedon:** Profile code number is SW-52/150

**Location:** approx. 800 m east of Phetchakasem road at km 136.5, Ban Dong Tan, Tambon Don Sai, Amphoe Pak Tho Changwat Ratchaburi.

**Sheet Name:** Amphoe Amphawa

**SheetNo.:** 4935 I

**Coordinate:** 900782

**Elevation:** 8 m MSL.

**Relief:** level to nearly level

**Slope:** 0-1%

**Physiography:** former tidal flats or alluvium plain

**Parent material:** marine sediments mixed with riverine alluvium under brackish water influence

**Drainage:** poorly drained to somewhat poorly drained

**Permeability:** slow

**Runoff:** slow

**Ground water depth:** > 1.5 m

**Flooding depth:** 30-40 cm

**Duration:** 2-3 month

**Frequency:** every year

**Annual rainfall:** 1,112.8 mm

**Mean temp:** 28.2 °C

**Climate type:** Tropical Savannah

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

**Other:**

**Described by:** Pramote Hemsrichart and Pramote Inthong

**Date:** 20 February, 1998

**Revised by:** S. Udomsri

Horizon	Depth (cm)	Description
Apg	0-25/28	Very dark grayish brown (10YR3/2) clay; many coarse distinct strong brown (7.5YR5/6) mottles along roots; strong medium and coarse subangular blocky structure; extremely hard, firm, sticky, plastic; many very fine and fine roots; strongly acid (field pH 5.5); clear, wavy boundary.

Bg1	25/28-50	Mixed light brownish gray (10YR6/2) and brown (10YR5/3) clay; many coarse prominent red (10R4/8), common medium distinct strong brown (7.5YR5/6) and yellowish red (5YR4/6) mottles; strong coarse prismatic breaking to medium and coarse subangular blocky structure; extremely hard, firm, sticky, plastic; few very fine roots; some slickensides, some organic clay, color is very dark grayish brown (10YR3/2), coated on ped faces; very strongly acid (field pH 4.5); gradual, smooth boundary.
Bg2	50-90/100	Brown (7.5YR5/2) clay; many coarse prominent red (10R4/8), common medium distinct strong brown (7.5YR5/8) and few fine distinct yellow (2.5Y6/6) mottles; moderate medium and coarse subangular blocky structure, firm, sticky, plastic; many pressure faces and some slickensides, few spot of jarosite mottles; very strongly acid (field pH 4.5); clear, wavy boundary.
Bg3	90/100-150	Pinkish gray (7.5YR6/2) clay with sand; many coarse prominent dark red (7.5R3/8), common medium distinct strong brown (7.5YR5/8) and few fine yellow (2.5Y6/6) mottles; weak medium and coarse subangular blocky structure; friable, sticky, plastic; some sand coated on ped faces, some iron pipes, few spot of jarosite; very strongly acid (field pH 5.0); gradual, smooth boundary.
Cg	150-200 <sup>+</sup>	Grayish brown (10YR5/2) clay with sand; many medium distinct brownish yellow (10YR6/8) mottles and some spot of very dark gray (10YR3/1); massive; sticky, plastic; some sand coated on crack faces; moderately alkaline (field pH 8.0).

**Type Location:** Name of village, Ban Tha Khwang (Tha Khwao) Tambon Kui Buri, Amphoe Kui buri Changwat Prachuab Khiri Khan.

**Range of Profile Features:**

The A horizon is from 10 to 30 cm thick, has 10YR hue, values of 4 or 5 and chromas of 2 or 3. Structure is weak coarse blocky and field pH values range from 4.5 to 5.5.

The B horizon has 10YR and 7.5YR hues, values of 4 to 6 and chroma of 2. Structure is moderate and strong fine and medium blocky and field pH values range from 4.5 to 5.0, falling to 4.0 below 1 m from the soil surface. Slickensides and gypsum crystals are occasionally found in the subsoil, but are not diagnostic for the series.

**Similar Soil Series:**

Maha Phot series (Ma): has a lower chroma within 75 cm from the soil surface and contain common red mottles.

Ayutthaya series (Ay): has a lower chroma and contains gypsum crystals in the lower A and upper B horizon and contain common red mottles.

Rangsit series (Rs): has a lower chroma and contain jarosite mottles between 50-100 cm and contain common red mottles.

**Principal Associated Soil:** These include the high phase of Rangsit series occupying similar positions; and soils of the old dune ridges such as Bacho and Hua Hin series.

**ANALYSIS RESULTS**

**Profile code No. : SW-52/150**

**(oven dry basis)**

**Soil series : Tha Khwang (Tq)**

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>1</sup>	water	KCl			
413728	0-25/28	Apg	3.0	31.9	65.1	0.0	0.0	0.3	0.9	1.8	c	c	4.8	4.2		18.8	117
413729	25/28-50	Bssg1	25.3	34.1	40.6	0.0	0.6	4.1	13.3	7.3	c	c	4.1	3.3		1.4	117
713730	50-90/100	Bssg2	14.4	39.4	46.2	0.1	0.4	1.4	7.3	5.2	c	c	4.0	3.2		0.6	156
413731	90/100-150	Bg	41.4	34.3	24.3	0.0	0.0	6.0	21.3	14.1	L	c+s	4.2	3.4		0.7	117
413732	150-200	Cg	39.8	32.7	27.5	1.7	1.4	4.7	17.8	14.2	cl	c+s	7.2	6.6		0.4	156

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(c)</sub> kg <sup>-1</sup> )										Base satur <sup>1</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>1</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)			
0-25/28	4.7	5.67		18.40	5.40	0.30	0.70	24.80	26.40	51.20	36.50	56.1	68	48	25.00	0.20		
25/28-50	2.2	0.33		1.90	1.80	0.30	1.50	5.50	12.30	17.80	12.30	30.3	45	31	9.50	4.00		
50-90/100	2.5	0.19		3.00	3.30	0.40	2.70	9.40	9.90	19.30	15.40	33.3	61	49	12.60	3.23		
90/100-150	1.6	0.09		3.10	2.80	0.30	2.80	9.00	4.10	13.10	10.20	42.0	88	69	9.50	0.54		
150-200	2.3	0.03		7.40	4.10	0.40	4.20	16.10	0.80	16.90	13.30	48.4	100	95	16.10	0.00		