

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

CHA-AM SERIES

Field Symbol: Ca

Distribution: Occupies moderate extent in the southeastern part of the Central Plain and Changwat Chanthaburi, South East Thailand. Small extent in Peninsular Thailand.

Setting: Cha-am soils are formed from marine sediments mixed with riverine alluvium under brackish water influence and occur on the fringes of tidal flats which are sometimes flooded by sea water. Relief is flat. Slopes are about 0-1%. Elevation ranges from 1-5 m above sea level. The climate are both Tropical Savanna (Köppen 'Aw') and Tropical Monsoon (Köppen 'Am'). Annual precipitation ranges from 1,000 mm to 3,000 mm. Mean annual temperature is 27°C.

Drainage, Permeability and Surface Runoff: poorly drained. Runoff and permeability are slow. These soils are flooded by impounded rainwater to depths of 20-30 cm during the wet season if enclosed by dikes. Areas not enclosed by dikes are prone to periodic flooding by sea water. Groundwater level falls below 1 m during the peak of the dry season.

Vegetation and Land Use: Some areas used for transplanted rice cultivation. Where not cultivated bare patches, scattered rushes and *Salicornia* ssp. occur.

Characteristic Profile Features: Cha-am series is a member of the Very fine, mixed, semiactive, isohyperthermic, Sulfic Endoaquepts. They are deep, neutral to moderately alkaline soils when reduced, but become extremely acid when in an oxidized condition. They are characterized by a thin dark coloured A horizon overlying a paler coloured B horizon which contains pale yellow or yellow catclay mottles within 50 cm from the surface and yellowish red and strong brown iron coatings on ped faces and in pores. This in turn overlies a dark grey to dark greenish grey, reduced marine clay containing undecomposed organic matter and high in sulphur.

Typifying Pedon: Profile code number is SE-14/4

Location: Amphoe Bang Pakong Changwat Chachoengsao.

Sheet Name: Amphoe Bang Bo

Coordinate: 944715

Relief: level to nearly level

Physiography: fringes of tidal flats which are sometimes flooded by sea water.

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

Drainage: poorly drained

Runoff: slow

Flooding depth: - cm

Annual rainfall: 1,314.6 mm

Duration: 4 month

Mean temp: 28.2 °C

Natural vegetation and/or land use: Paddy field

Other: cracks of 4 mm wide down to 40 cm

Described by: Van der Kevie and C. Changprai

Revised by: S. Udomsri

Sheet No.: 5136 II

Elevation: 2.5 m (MSL)

Slope: 0-1%

Permeability: slow

Ground water depth: >1.5 m

Frequency: every year

Climate type: Tropical Savannah

Date: 25 April 1969

Horizon	Depth (cm)	Description
Apg	0-19	Dark grayish brown (10YR4/2) heavy clay; few fine distinct strong brown (7.5YR5/8) mottles, mainly along root channels; weak medium prismatic breaking to coarse subangular blocky structure; firm, sticky, plastic; many fine and few medium roots; very strongly acid (field pH 4.5); clear, slightly wavy boundary.
BAg	19-46	Grayish brown (10YR5/2) heavy clay; many fine and medium prominent yellowish red (5YR4/6-8) mottles, mainly as coatings in root channels and on ped faces; moderate weak medium and coarse subangular

		blocky structure; firm, sticky, plastic; very strongly acid (field pH 4.5); gradual, smooth boundary.
Bjg1	46-90	Grayish brown (10YR5/2) heavy clay; many medium and few coarse distinct pale yellow (2.5Y7/4) mottles, mainly filling in coarse root channels and on ped faces; moderate weak angular and subangular blocky structure; slightly firm, sticky, plastic; very strongly acid (field pH 4.5); gradual, smooth boundary.
Bjg2	90-120	Dark gray to gray (5Y4-5/1) heavy clay; many coarse prominent dark reddish brown (5YR3/3) and reddish brown (5YR4/4) mottles only as coatings on vertical ped faces, few medium and coarse prominent pale yellow (2.5Y7/4) mottles, only very thin coatings on vertical ped faces; moderate coarse angular blocky structure; sticky, plastic; very strongly acid (field pH 5.0); gradual, smooth boundary.
Cg1	120-150	Dark greenish gray (5GY4/1) nearly ripe clay; few dark reddish brown; iron coatings in vertical medium pores; sticky, plastic; slightly hard iron coatings on vertical ped faces; moderately alkaline (field pH 8.0); gradual, smooth boundary.
Cg2	150-200	Dark greenish gray (5GY4/1) half ripe clay; at 100 cm; a thin silty clay layer of 3 cm thick with firm consistence; color close to 5GY5/1; moderately alkaline (field pH 8.0).

Type Location: Name of Amphoe, Amphoe Cha-am Changwat Phetchaburi.

Range of Profile Features:

The A horizon is from 10 to 30 cm thick, has 10YR hue, values of 5 through 2 and chromas of 3 to 1. Structure is weak blocky becoming fluffy granular in the uppermost layer. A thin salt crust may occur on the surface of the soil and few gypsum crystals may be found in the A horizon.

The B horizon has hues of 10YR , 2.5YR or 5Y, values of 5 or 4 and chromas of 1 or 2. Structure is weak blocky.

The C horizon is greenish gray, contains undecomposed organic matter and a high sulphur content.

Similar Soil Series:

Bang Nam Piao series (Bp): occupies more inland positions and without salt in profile, pH values are higher when the soil is in an oxidized condition

Ongkharak series (Ok): founded in former tidal flats that free from sea water and without salt in profile

Principal Associated Soils: Cha-am soils occur in association with Hua Hin series which occupy beach ridges and Tha Chin and Samut Prakan series soils on the tidal flats.

ANALYSIS RESULTS

Profile code No. SE-14/4

(oven dry basis)

Soil series : Cha-am (Ca)

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			
P-833	0-19	Apg	4.5	31.5	64.0						c	c	3.2	3.0	1.6	18.4	40
P-834	19-46	BAg	8.5	28.0	63.5						c	c	3.6	3.3	1.3	10.8	350
P-835	46-90	Bjg1	4.0	15.0	81.0						c	c	3.5	3.3	1.0	10.8	465
P-836	90-120	Bjg2	5.8	13.2	81.0						c	c	3.5	3.2	1.9	10.0	685
P-837	120-150	Cg1	7.0	24.5	68.5						c	c	3.7	3.5	2.7	19.1	1,020
P-838	150-200	Cg2	4.1	34.4	61.5						c	c	6.3	6.2	3.9	117.5	1,295

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)	AI KCl extr. cmol _(c) 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)				
				0-19	9.9	1.51		14.80	26.60	0.10	12.50	54.00	24.80	78.80	25.40			
19-46	7.1	1.40		4.50	12.00	1.00	9.20	26.70	25.70	52.40	26.50	41.7	100	51			2.25	
46-90	9.1	1.06		4.60	12.20	1.10	12.90	30.80	23.60	54.40	29.90	36.9	100	57			4.00	
90-120	8.5	0.91		5.20	19.70	0.80	24.50	50.20	26.20	76.40	28.70	35.4	100	66			4.50	
120-145	6.9	1.06		8.00	30.60	0.90	30.10	69.60	22.00	91.60	29.40	42.9	100	76			5.65	
145-200	9.9	1.51		21.60	27.50	1.60	44.40	95.10	28.30	123.40	33.10	53.8	100	77			6.40	