

Proposed by: R.L. Pendleton, 1929  
Revised by:  
1. N. Chorphaka, 1987  
2. A. Potichan, 2004

**CHIANG MAI SERIES**

**Field Symbol: Cm**

**Distribution:** Occupies small extent in the north of Thailand along the rivers and streams.

**Setting:** Chiang Mai soils are formed from recent alluvium and occur on the higher parts of river and stream levee. Relief is level to nearly level with locally an undulating micro-relief. Slopes range from 0-3 percent. The climate is Tropical Savanna (Koppen 'Aw'). Average annual precipitation is from 1,100 to 1,500 cm. Mean annual air temperature is 27 °C.

**Drainage, Permeability and Runoff:** Moderately well drained. Permeability is moderate and surface runoff is slow. These soils may be subjected to short periods of flash flood by river water. Ground water table level is dependent on the fluctuation of water level in the river or stream course.

**Vegetation and Land Use:** Mainly used for settlement sites, garden crops and orchards.

**Characteristic Profile Features:** Chiang Mai series is a member of the coarse-loamy, mixed, superactive, nonacid, isohyperthermic Oxyaquic Ustifluvents. They are very deep and stratified soils that are characterized by a brown or grayish brown or dark brown loam, silt loam or sandy loam A horizon overlying a brown or yellowish brown or dark yellowish brown loam, silty clay loam or sandy loam C horizon. Textures of the subsoil are variable, with such stratification but fall in the loamy particle size class in the control section. Faint or distinct mottles usually occur in the subsoil. Reaction is medium acid to neutral over medium to slightly acid in the subsoil.

**Typifying Pedon:** Profile code no. is NE-N-36/14, (Colors are for moist soil unless otherwise noted).

**Location:** Ban Muang Daeng, Amphoe Mae Sai Changwat Chiang Rai.

**Sheet Name:**

**Sheet No.:** 4949 I

**Coordinate:** 936605

**Elevation:** 390 m (MSL)

**Relief:** nearly level

**Slope:** 1-2 %

**Physiography:** levee of Nam Sai river

**Parent material:** recent alluvium

**Drainage:** moderately well drained

**Permeability:** moderate

**Runoff:** slow

**Ground water depth:** >2 m

**Flooding depth:** 30-50 cm

**Duration:** -3-5 days/time

**Frequency:** 1-2 time in 10 years

**Annual rainfall:** 1,530 mm

**Mean temp.:** 24.0 °C

**Climate type:** Tropical Savannah (Aw)

**Natural vegetation or land use:** upland crops; garlic, tobacco

**Described by:** Thamrong and J.D. Cowie

**Date:** 22 January, 1969

**Revised by:** Aniruth Potichan

**Date:** 23 May, 2004

Horizon	Depth (cm)	Description
Ap	0-15	Very pale brown (10YR7/3) dry, yellowish brown (10YR5/4) moist; loamy sand; weak medium and fine subangular blocky with some granular structure in the top 3 cm; friable, nonsticky and nonplastic; abundant fine and very fine roots; moderately acid (field pH 6.0); abrupt and wavy boundary.
C1	15-28	Pale brown (10YR6/3) dry, brown (10YR4/3) moist; sandy loam; many fine faint light gray (10YR7/2) and yellowish brown (10YR6/6) mottles; weak medium and coarse subangular blocky structure; friable, slightly sticky and nonplastic; many very fine roots; slightly acid (field pH 6.5); abrupt and wavy boundary.

C2	28-46	Brown (10YR4/3) fine sandy loam to silt loam; few fine faint reddish brown (5YR4/4) mottles; moderate medium and fine subangular blocky structure; friable, slightly sticky and slightly plastic; many small pieces of charcoals; many very fine roots; slightly acid (field pH 6.5); abrupt and wavy boundary.
C3	46-53	Yellowish brown (10YR5/6) sandy loam; common fine faint yellowish brown (10YR5/4) and few fine distinct brownish yellow (10YR6/8) mottles; weak medium subangular blocky structure; very friable, slightly sticky and nonplastic; few very fine roots; slightly acid (field pH 6.5); clear and smooth boundary.
C4	53-100+	Brown (7.5YR4/4) loamy coarse sand; few medium distinct gray (10YR6/2) mottles increase with depth; very weak medium subangular blocky structure; very friable, nonsticky and nonplastic; few very fine roots; slightly acid (field pH 6.5).

Remark: All horizon contain abundant mica flakes

**Type Location:**

The Chiang Mai series was named for Changwat Chiang Mai in which soils of this series were first described.

**Range of Profile Features:**

The thickness of A horizon varies from 10 to 30 cm and has 10YR or 7.5YR hues, values of 3 to 5 and chromas of 2 to 4. Field pH values are from 5.0 to 7.0.

The subsoil (C horizon) has 10YR or 7.5YR hues, values 4 or 5 and chromas of 3 to 6 in 10YR hues and 2 to 6 in 7.5YR hue. Texture is variable with such stratification and ranges from loam or sandy loam to clay loam or silty clay loam with occasional clay or silty clay layers. Soft iron and manganese nodules commonly occur in this horizon. Field pH values vary from 5.0 to 6.5.

**Similar Soil Series:**

Tha Muang series (Tm): has a similar profile but is in the calcareous family.

Sanphaya series (Sa): has gray color in the surface and subsurface horizon with mottles due to impounded water for rice cultivation.

Rueso series (Ro): has a weakly developed argillic B horizon and an udic moisture regime.

**Principal Associated Soils:**

These include Sanphaya, Kamphaeng Phet, Mae Sai, Ratchaburi and Phimai series. Phimai and Ratchaburi soils occupy on the river basin whereas Sanphaya, Kamphaeng Phet series are on similar position and Mae Sai series occur on the lower part of the river levee.

ANALYSIS RESULTS  
(oven dry basis)

Profile code no.: N-36/14  
Soil series: Chiang Mai series (Cm)

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>n</sup>	water				KCl
P-448	0-15	Ap	70.1	20.2	9.7						sl	ls	6.1	5.1		2.2	99
449	15-28	C1	70.1	17.6	12.3						sl	sl	6.2	5.2		4.8	111
450	28-46	C2	43.0	44.8	12.2						l	fsl-sil	6.3	5.2		39.5	103
451	46-53	C3	45.1	51.0	3.9						sil	sl	6.1	5.1		12.8	55
452	53-100+	C4	72.9	18.3	8.8						sl	lcos	6.5	5.1		12.0	52

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(+)</sub> kg <sup>-1</sup> )									Base satur <sup>n</sup> (%)		ECEC cmol <sub>(+)</sub> kg <sup>-1</sup> (B+D)	Al KCl extr. cmol <sub>(+)</sub> kg <sup>-1</sup> (D)	Electrical conduct <sup>y</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)			
				Ca	Mg	K	Na	cations (B)	acid (A)	(B+A)	(C)	Clay		(B+A)			
0-15	0.7	0.87		4.10	2.00	0.10	0.30	6.50	4.70	11.20	8.1	83.5	80	58			0.03
15-28	1.0	0.69		3.90	2.10	0.10	0.20	6.30	4.30	10.60	8.3	67.5	76	59			0.04
28-46	6.7	1.29		6.50	4.00	0.10	0.20	10.80	8.30	19.10	14.6	119.7	74	57			0.06
46-53	7.0	1.06		6.30	4.40	0.10	0.20	11.00	6.70	17.70	13.9	356.4	79	62			0.06
53-100+	1.1	0.22		3.20	2.40	0.10	0.20	5.90	3.50	9.40	7.5	85.2	79	63			0.01

Surveyor: Thamrong and J.D. Cowie

Date: 22 January, 1969