

Proposed by: F.R. Moormann-1961  
Revised by: 1. B. Boonsompopphan,  
P. Hemsrichart, 1988  
2. S. Sukchan, 2004

## UDON SERIES

**Field Symbol: Ud**

**Distribution:** Occupies small extent in Northeast Thailand.

**Setting:** Udon soils are formed from wash deposit and occur on the lower part of peneplain. Relief is nearly level to gently undulating which slopes range from 1 to 3 percent. Elevation is from 120 to 170 m above sea level. The climate is Tropical Savanna (Köppen 'Aw'). Average annual precipitation is from 1,100 to 1,500 mm. Mean annual air temperature varies from 26 to 28°C.

**Drainage Permeability and Runoff:** Somewhat poorly drained soils. Ground water table falls below 3 m during the peak of the dry period. Permeability is moderate. Surface runoff is medium.

**Vegetation and Land Use:** Sparse vegetation. Parts are used for transplanted rice cultivation and salt-making sources.

**Characteristic Profile Features:** The Udon series are a member of coarse-loamy, mixed, active, nonacid, isohyperthermic, Typic Halaquepts. They are deep, stratified soils and are characterized by a light brown, brown or grayish brown loamy sand or sandy loam A horizon overlying variable color and texture, but mainly are pinkish gray, light brownish gray or gray sandy clay loam, sandy clay or clay alternating with sandy loam or loamy sand B and C horizons. These soils are mottled throughout the profile with brownish and/or yellowish colors. They contain large quantity of soluble salts. The white salt crust at the surface in the dry season is a main diagnostic feature for these soils. Reaction is slightly acid to mildly alkaline over moderately alkaline.

**Typifying Pedon:** Profile code no. is NE-S-20/52 (moist colors unless otherwise stated).

**Location:** Amphoe Non Thai Changwat Nakhon Ratchasima

**Sheet Name:** Amphoe Non Thai

**Coordinate:**

**Relief:** nearly level to gently undulating

**Physiography:** lower part of peneplain

**Parent material:** washed deposits

**Drainage:** somewhat poorly drained

**Runoff:** medium

**Flooding depth:** -

**Annual rainfall:** 1,070 mm

**Natural vegetation and/or land use:** sparse vegetation, transplanted rice cultivation & salt making sources

**Other:**

**Described by:** S. Kittiyarak

**Revised by:**

**Horizon**      **Depth (cm)**

Ap              0-12

Light brown (7.5YR 6/4) sandy loam; common fine yellowish red mottles; weak fine subangular blocky structure; soft, friable, nonsticky, nonplastic; common fine roots; slightly acid (field pH 6.5); gradual, smooth boundary.

Apg             12-30

Pinkish gray (7.5YR 7/2) sandy loam; few and common fine reddish yellow mottles; weak fine subangular blocky structure; slightly hard, firm, nonsticky, nonplastic; few fine roots; neutral (field pH 7.0), abrupt, smooth boundary.

**Description**

**Sheet No.:** 5439 III

**Elevation:** 120-170 m

**Slope:** 1-3%

**Permeability:** moderate

**Ground water depth:** >3 m

**Frequency:** -

**Climate type:** Tropical Savannah

**Date:** 18 Jan. 1972

Bg1	30-60	Gray (10YR 6/1) clay with few spots of sand; few fine strong brown and brownish yellow mottles; weak to moderate fine to medium subangular blocky structure; slightly sticky, plastic; common rounded ironstone nodules (Ø 3 mm) and few spots of soft iron-manganese nodules; moderately alkaline (field pH 8.0); clear, smooth boundary.
Bg2	60-90	Light gray (10YR 7/1) sandy loam; many fine yellow mottles; moderate fine to medium subangular blocky structure; slightly sticky, slightly plastic; common fine tubular pores; few slightly hard iron-manganese nodules moderately alkaline (field pH 8.0) clear, smooth boundary.
Bg3	90-105	Light gray (7.5YR 7/2) sandy clay loam; many medium reddish yellow mottles; moderate fine to medium subangular blocky structures; firm, slightly sticky, nonplastic; few soft iron-manganese nodules; common fine tubular pores; moderately alkaline (field pH 8.0); clear, smooth boundary.
Bg4	105-120	Light gray (10YR 7/1) sandy loam; many medium reddish yellow mottles; moderate fine to medium subangular blocky structure; slightly sticky, slightly plastic; common fine tubular pores; moderately alkaline (field pH 8.0); clear, smooth boundary.
Bg5	120-150	Light gray (10YR 7/1) clay with some discernable sand fraction; many medium brownish yellow mottles; moderate fine to medium subangular blocky structure; slightly sticky, plastic; few soft iron-manganese nodules; strongly alkaline (field pH 8.5).

**Type Location:** The Udon series was named for Changwat Udon Thani, in which soils of this series were first described in Amphoe Mueang, Changwat Udon Thani.

**Range of Profile Features:**

The thickness of an A or Ap horizon is from 10 to 30 cm and has 10YR, 7.5YR or 5YR hues, values of 5 to 7 and chromas of 2 to 4. Structure is weak platy and/or weak fine and medium blocky. Field pH values vary from 6.5 to 8.0.

The subsoil (B horizon) has 7.5YR or 10YR hues, values of 5 to 7 and chromas of 1 to 4. Textures is variable and stratified of sand and clay materials. Structure is weak fine blocky to massive. Field pH values are from 7.0 to 8.5.

**Similar Soil Series:**

Kula Ronghai series (Ki): has natric horizon and contain less soluble salt.

Roi Et series (Re): has lower pH values throughout the profile and contain very small of soluble salts.

**Principal Associated Soils:** These include Roi Et, Khorat and Ubon series.

**ANALYSIS RESULTS      Profile code no.:NE-S-20/52**  
**(oven dry basis)              Soil series : Udon (ud)**

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			
Pc-267	0-12	Ap	57.0	36.5	6.5						sl	sl	5.4	4.9	-	1.4	29
Pc-268	12-30	Apg	52.0	41.5	6.5						sl	sl	6.7	5.5	-	1.3	21
Pc-269	30-60	Bg1	42.5	38.0	19.5						l	c+s	7.3	6.1	0.9	1.3	32
Pc-270	60-90	Bg2	58.5	26.5	15.0						sl	scl	7.5	6.4	0.6	1.1	41
Pc-271	90-105	Bg3	67.0	6.0	27.0						scl	scl	7.7	6.6	0.6	0.8	50
Pc-272	105-120	Bg4	57.0	25.0	18.0						sl	sl	7.6	6.7	0.3	0.9	73
Pc-273	120-150	Bg5	64.0	21.0	15.0						sl	c+s	7.7	6.7	0.6	0.8	64

Depth (cm)	Air dried to oven dried	C %	N %	Exchange capacity and cations (cmol <sub>(+)</sub> kg <sup>-1</sup> )										Base satur <sup>1</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>2</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)				
				0-12	0.9	0.37		2.20	0.80	0.10	6.20	9.30	0.90	10.20	3.10			
12-30	1.0	0.05		1.40	0.50	0.04	1.90	3.84	0.60	4.44	2.90	44.6	100	86			0.28	
30-60	3.0	0.18		4.40	2.20	0.10	6.30	13.00	1.60	14.60	11.60	59.5	100	89			0.31	
60-90	1.9	0.41		3.70	2.00	0.10	6.40	12.20	1.10	13.30	9.80	65.3	100	92			0.28	
90-105	1.1	0.27		3.00	1.60	0.10	5.90	10.60	1.00	11.60	7.70	28.5	100	91			0.44	
105-120	1.8	0.21		3.80	2.30	0.20	8.00	14.30	1.30	15.60	11.60	64.4	100	92			0.30	
120-150	1.1	0.03		3.10	1.80	0.10	7.20	12.20	1.20	13.40	8.90	59.3	100	91			0.36	