Reference soil Indonesia 48: Acrisol

Description

MICRORELIEF: isolated mounds(termites) and dimples or craddle as result of uprooted trees, closed depression. These big trees probably taken away by local people. Monolith sampled in Tropenbos project.

Classification

WRB 2006:

Stagnic Cutanic Acrisol (Albic Alumic Hyperdystric)
12-38 cm albic horizon
38-155 cm argic horizon
reducing conditions
stagnic colour pattern

FAO-UNESCO-ISRIC 1988:

Alumi- Gleyic Acrisol
0-12 cm ochric A horizon
12-38 cm albic E horizon
38-155 cm argic B horizon
stagnic properties

FAO-UNESCO 1974:

Gleyic Acrisol
0-12 cm ochric A horizon
12-38 cm albic E horizon
38-155 cm argillic B horizon
ferric properties
hydromorphic properties

Site description

General information:

Names of person(s) who described the profile	: Oldeman PH
General description of location of profile (e.g., town, province)	: East Kalimantan, Sambodja,Wanariset, 2km on and 150m S of road to Semoi
Climate classification according to Köppen	: Af
Date	: January 1992
Latitude / Longitude	: S -0.9933333º / E 116.957º

Physiography:

The altitude of the soil profile relative to mean sea level, specified in meters	: 16 m asl
Regional landform	: low hill
Topography of the surrounding country	: steeply dissected
Physiographic Unit in the immediate surrounding of the site	: SW-NE oriented ridges
The slope refers to the inclination of the land immediately surrounding the site. The measured	: 46 %

or estimated slope angle is specified to the nearest per cent	
The physiographic position of the site where the profile is located	: middle slope
Form of the slope surrounding the site	: straight
Slope Aspect of the site	: west

Parent material:

The main parent rock/ material over which the soil has been formed (1st entry)	: sandstone/siltstone
Mode of Accumulation or deposition of parent material (1st entry)	: residual material
Texture of parent material (1st entry)	: silty
Weathering status of solid rock (1st entry)	: highly
Resistance against weathering (solid rock) (1st entry)	: poor
Depth1 of lithological boundary	: cm
The main parent rock/ material over which the soil has been formed (2nd entry)	:
Texture of parent material (2nd entry)	: silty
Resistance against weathering (solid rock) (2nd entry)	:
Soil Depth; depth to which roots can easily penetrate throughout the year	: cm

Hydrology and drainage:

Depth of groundwater table	: cm
Groundwater Top	: cm
Groundwater Bottom	: cm
Kind of groundwater table	: no groundwater table observed
Top Stagnating Layer	: cm
Bottom Stagnating Layer	: cm
Runoff	: medium
Flooding frequency	: never
Estimated permeablity (class) of least permeable part of the profile	: slow
Drainage Class	: imperfect
To Drainage Class	:
Moisture conditions of the profile: dry from -to	: cm
Moisture conditions of the profile: moist from -to	: 0-155 cm
Wet From - To	: cm

Land use / vegetation:

Current land use at the site	: (semi-)natural vegetation
Major crops	:
Main type of irrigation	:
Rotation scheme	:
Vegetation Type;The natural vegetation at the site	: deciduous forest
Status of vegetation	: primary
Remarks on Land Use / Vegetation	: VEGETATION: Primary forest, big trees probably taken away by local people

Erosion and aggredation:

Soil erosion type (1st entry)	:
Occurrence of soil aggradation	: absent
Slope Stability	: stable

Surface characteristics:

Microrelief type: small-scale differences in relief in the direct vicinity of the site	: termite/ant mounds
Microrelief Pattern	: isolated
Microrelief Height	: 20
Rockiness	: none
Stoniness	:
Average size of stones	:
Shape of stones (on average)	:
Cracks	: no cracks observed
Slaking of aggregates by tillage, rainfall or frost	: no surface slaking/crusting observed
Evidence of salt	: non-saline
Evidence of alkali	: non-alkaline

Nearest climate station:

Station	: Sambodja
Country	: Indonesia
WMO Code	: 9999
Distance	: 10 km E (good)
Latitude / Longitude	: S 1º2 / E 117º5

Climate data*:

dataType(Station)	: nrecord	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation (mm)(Sambodja)	: 30	214	225	272	267	210	166	147	161	152	124	231	244	2413
Mean temperature (°C)(Sepinggan-Balikpapan)	: 16	27	27	27	28	27	27	27	27	27	28	28	27	27.3
Relative humidity (%)(Sepinggan-Balikpapan)	: 16	83	83	84	84	85	86	86	87	85	84	84	85	84.7
Epot. - Penman (mm)(Sepinggan-Balikpapan)	: 16	120	109	126	120	128	103	110	116	125	133	118	117	1425
Bright sunshine (%)(Sepinggan-Balikpapan)	: 16	40	35	36	38	42	35	39	40	44	45	39	35	39

*Data are considered representative for site

Profile description:

Ah 0-3 cm	:	dark brown (10YR 3/3, moist), sandy loam, moderate medium granular, very friable slightly sticky slightly plastic, common very fine medium continuous exped and inped interstitial random pores moderately porous (40-60 vol%), no inclusions, no fragments, very frequent mycelium and worm channels, gradual wavy boundary to,
A/E 3-12 cm	:	dark brown (10YR 3/3, moist), loam, moderate medium subangular blocky, friable slightly sticky slightly plastic, common very fine medium continuous exped and inped interstitial random pores highly porous (>60 vol%), no inclusions, no fragments, frequent worm channels and termite channels, gradual wavy boundary to,
E 12-38 cm	:	brownish yellow (10YR 6/8, moist), loam, moderate medium and coarse subangular blocky, friable, few fine distinct diffuse mottles (10 YR 8/2) and few fine distinct mottles (5 YR 5/8), common fine coarse continuous exped and inped interstitial random pores highly porous (>60 vol%), no inclusions, no fragments, frequent worm channels and termite channels, gradual wavy boundary to,

Btg1 38-80 cm : brownish yellow (10YR 6/8, moist), sandy clay loam, moderate to strong medium and coarse subangular blocky, friable slightly sticky slightly plastic, common medium distinct diffuse mottles (10 YR 7/1) and few fine distinct mottles (5 YR 7/1), few medium tubular pores and few tubular pores, no inclusions, no fragments, few worm channels and termite channels, diffuse wavy boundary to,

Btg2 60-105 cm : strong brown (7.5YR 5/8, moist), sandy clay, strong coarse subangular blocky, firm sticky plastic, common medium prominent clear mottles (5 YR 5/8) and few fine prominent mottles (10 YR 7/1), patchy moderately thick clay on pedfaces cutans, few fine tubular pores, few large dendritic hard ferruginous concretions, no fragments, no, diffuse irregular boundary to,

Btoc 105-155 cm : brownish yellow (10YR 6/8, moist), clay, strong coarse subangular blocky, firm sticky plastic, many coarse prominent clear mottles (5 YR 5/8) and common coarse prominent mottles (10 YR 7/1), patchy thin clay on pedfaces cutans, no pores, few large dendritic hard ferruginous concretions, no fragments, no,

Physical

Particle size distribution:

Depth (cm)		Gravel (%)	Very Coarse Sand (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Very Fine Sand (%)	Total Sand (%)	Coarse Silt (%)	Fine Silt (%)	Total Silt (%)	Clay (%)
0-3	:	-	0.7	1.2	24.0	23.4	13.8	63.1	14.6	9.9	24.5	12.4
3-12	:	-	0.0	0.5	20.4	23.9	12.7	57.5	18.2	9.1	27.3	15.2
12-38	:	-	0.2	0.2	18.0	21.8	15.6	55.8	14.8	12.2	27	17.1
38-60	:	-	0.0	0.2	19.0	22.3	12.8	54.3	8.4	16.2	24.6	21.1
60-105	:	-	0.4	0.6	15.3	18.9	11.4	46.6	9.5	16.0	25.5	27.9
105-155	:	-	3.0	2.4	11.7	14.2	11.6	42.9	9.1	15.5	24.6	32.6

Water retention characteristics

Depth (cm)		Bulk Density (kg/dm³)	pF 0 (% w/v)	pF 1.0 (% w/v)	pF 1.5 (% w/v)	pF 2.0 (% w/v)	pF 2.3 (% w/v)	pF 2.7 (% w/v)	pF 3.4 (% w/v)	pF 4.2 (% w/v)	pF 2.5 (%)	Bulk Density (kg/dm³)	pF 0 (% w/v)	pF 1.0 (% w/v)	pF 1.5 (% w/v)	pF 2.0 (% w/v)	pF 2.3 (% w/v)	pF 2.7 (% w/v)	pF 3.4 (% w/v)	pF 4.2 (% w/v)	pF 2.5 (%)
0-3	:	-	-	-	-	-	-	-	-	-	-	1.285	44.1	41.4	36.2	32.4	29.5	27.3	20.4	16.5	-
3-12	:	1.285	44.1	41.4	36.2	32.4	29.5	27.3	20.4	16.5	-	1.626	33.1	32.9	31.1	28.7	26.9	25.6	24.4	22.1	-
12-38	:	-	-	-	-	-	-	-	-	-	-	1.617	36	35.8	33.7	31.6	29.9	28.8	28.2	25.3	-
38-60	:	1.626	33.1	32.9	31.1	28.7	26.9	25.6	24.4	22.1	-	1.657	36.2	36	34.7	33	31.1	29.7	28.4	26.4	-
60-105	:	1.617	36.0	35.8	33.7	31.6	29.9	28.8	28.2	25.3	-										
105-155	:	1.657	36.2	36.0	34.7	33.0	31.1	29.7	28.4	26.4	-										

Other physical data

Depth (cm)		Bulk Density (kg/dm³)	Spec. Surf. Area (m2/g)	COLE (cm/cm)	Water Disp. Clay (%)	Clay (%)
0-3	:	-	-	-	4.3	12.4
3-12	:	-	-	-	6.3	15.2
12-38	:	-	-	-	7.6	17.1
38-60	:	-	-	-	15.7	21.1
60-105	:	-	-	-	17.4	27.9
105-155	:	-	-	-	2.2	32.6

Chemical characteristics:

Depth (cm)		pH H2O	pH KCl	EC 1 : 2.5 (mS/cm)	CaCO3 (%)	Org. C (%)	Org. N (%)	C / N	Exch. Acid (cmol/kg)	Exch. Al (cmol/kg)	Ca (cmol/kg)	Mg (cmol/kg)	K (cmol/kg)	Na (cmol/kg)	Sum Cations (cmol/kg)
0-3	:	3.7	3.2	0.28	-	3.76	0.17	22	3.4	2	0.4	0.3	0.2	0.0	0.9
3-12	:	3.8	3.6	0.20	-	1.02	0.07	15	3.8	2.9	0.0	0.0	0.1	0.1	0.2
12-38	:	4.0	3.8	0.12	-	0.50	0.05	10	3.4	2.5	0.2	0.0	0.0	0.1	0.3
38-60	:	4.2	3.8	0.05	-	0.20	0.03	7	3.6	2.5	0.2	0.0	0.0	0.0	0.2
60-105	:	4.3	3.8	0.05	-	0.19	0.03	6	4.3	2.9	0.0	0.0	0.0	0.0	0
105-155	:	4.4	3.9	0.04	-	0.21	0.04	5	4	2.9	0.0	0.0	0.0	0.0	0

Depth (cm)		CEC Soil (cmol/kg)	CEC Clay (cmol/kg)	CEC Org (cmol/kg)	ECEC (cmol/kg)	Base sat. (%)	Al sat. (%)	ESP (%)
0-3	:	8.1	65	13.2	-	11	25	0
3-12	:	4.6	30	3.6	-	4	63	2
12-38	:	3.9	23	1.8	-	8	64	3
38-60	:	3.5	17	0.7	-	6	71	0
60-105	:	5.1	18	0.7	-	0	57	0
105-155	:	7.2	22	0.7	-	0	40	0

Depth (cm)		pH NaF	P Retention (%)	OD OE	Melanic Index	Fe o (wt%)	Al o (wt%)	Si o (wt%)	Fe d (wt%)	Al d (wt%)	Fe p (wt%)	Al p (wt%)	C p (wt%)
0-3	:	-	-	-	-	-	-	-	0.50	0.10	-	-	-
3-12	:	-	-	-	-	-	-	-	0.70	0.10	-	-	-
12-38	:	-	-	-	-	-	-	-	0.80	0.10	-	-	-
38-60	:	-	-	-	-	-	-	-	1.10	0.10	-	-	-
60-105	:	-	-	-	-	-	-	-	1.30	0.10	-	-	-
105-155	:	-	-	-	-	-	-	-	4.20	0.30	-	-	-

Clay mineralogy:

Depth (cm)		Kaolinite	Mica / illite	Vermiculite	Chlorite	Smec	Halloysite	Mixed layer	Quar	Feldspar	Gibbsite	Goethite	Hematite
0-3	:	very large	small	-	-	-	-	medium	small	-	-	small	-
3-12	:	very large	small	-	-	-	-	medium	small	-	-	small	-
12-38	:	very large	small	-	-	-	-	medium	small	-	-	small	-
38-60	:	very large	small	-	-	-	-	medium	small	-	-	small	-
60-105	:	very large	small	-	-	-	-	medium	small	-	-	small	-
105-155	:	very large	small	-	-	-	-	medium	small	-	-	small	-

Rare clay minerals:

Depth (cm)		Pyroxene	Amphibole	Calcite	Lepidocrocite	Pyrophyllite	Weddelite	Augite
0-3	:	-	-	-	small	-	-	-
3-12	:	-	-	-	small	-	-	-
12-38	:	-	-	-	small	-	-	-
38-60	:	-	-	-	medium	-	-	-
60-105	:	-	-	-	medium	-	-	-
105-155	:	-	-	-	small	-	-	-

Source of analyzing procedures:

Laboratory	Attribute	Description	Proc. ref
ISRIC	Al d	Al; Atomic Absorption Spectrometry	12.1-1.2
ISRIC	Al sat.	Calculation; Exchangeable Al / (exchangeable bases+Al+H) or Al / CEC	11.1.4-1.4.3
ISRIC	Base sat.	Calculation; Sum of Exchangeable Cations (Na, K, Ca, Mg) / CEC soil	labmanual
ISRIC	Bulk Density	Soill density excluding mass liquid, including interparticle space	18-3
ISRIC	C / N	Calculation; Organic Carbon / Organic Nitrogen	labmanual
ISRIC	Ca	Exchangeable bases with 1 M ammonium acetate at pH 7; Ca by atomic absorption spectrometry	9-4 and 9-5.3
ISRIC	CEC Clay	Calculation; ((CEC soil - CEC org.m.)/ clay %)*100	9-6.3
ISRIC	CEC Org	CEC organic matter; expert estimate for charge per unit C	9-6.3
ISRIC	CEC Soil	CEC; with index cation in buffered solution pH7	9-4 and 9-5.3.3
ISRIC	Clay; < 0.002 mm	Fraction by Pipette analysis; after removal CaCO3 and organic matter, dispersion and sedimentation	3-4.7
ISRIC	EC 1 : 2.5	Electro Conductivity of a soil / water (1:2.5) suspension	4-1.4 and 13-4
ISRIC	ESP	Calculation; (Exchangeable Na / CEC soil) * 100	9-6.3
ISRIC	Exch. Acid	Extraction by 1 M KCl; titration with NaOH	11.1.4-1.4.2
ISRIC	Exch. Al	Extraction by 1 M KCl; Al by atomic absorption spectrometry	11.1.4-1.4.3
ISRIC	Fe d	Fe; Atomic Absorption Spectrometry	12-1.2
ISRIC	Goethite	Goethite; relative abundance scale 0 - 7	16-1
ISRIC	K	Exchangeable bases with 1 M ammonium acetate at pH 7; K by flame atomic emission spectrometry	9-6.1
ISRIC	Kaolinite	Kaolinite; relative abundance scale 0 - 7	16-1
ISRIC	Lepidocrocite	Lepidocrocite; in clay fraction (non clay mineral)	16-1
ISRIC	Mg	Exchangeable bases with 1 M ammonium acetate at pH 7; Mg by atomic absorption spectrometry	9-4 and 9-5.3
ISRIC	Mica / Illite	Mica / ilitele; relative abundance scale 0 - 7	16-1
ISRIC	Mixed-layer	Mixed layer minerals; relative abundance scale 0 - 7	16-1
ISRIC	Na	Exchangeable bases with 1 M ammonium acetate at pH 7; Na by flame atomic emission spectrometry	9-4 and 9-5.3
ISRIC	Organic Carbon	Wet combustion of organic matter by potassium dichromate and sulphuric acid at about 125 degrees Celcius. Residual dichromate is back titrated against ferrous sulphate. To compensate for incomplete destruction an emprical correction factor of 1.3 is applied	5
ISRIC	Organic Nitrogen	Organic Matter is digested in sulphuric acid (and hydrogen peroxide) with selenium as catalyst. Nitrogen is converted to ammonium sulphate. The solution is made alkaline and ammonia is distilled off. The evolved ammonia is trapped in boric acid and titrated with standardized acid solution	6
ISRIC	pF 0	Moisture content of soil in a ring sample at tension of 0.1 kPa head of water	18-3
ISRIC	pF 1.0	Moisture content of soil in a ring sample at tension of 1 kPa head of water	18-3
ISRIC	pF 1.5	Moisture content of soil in a ring sample at tension of 3.2 kPa head of water	18-3
ISRIC	pF 2.0	Moisture content of soil in a ring sample at tension of 10 kPa head of water	18-3
ISRIC	pF 2.3	Moisture content of soil in a ring sample at tension of 20 kPa head of water	18-3
ISRIC	pF 2.7	Moisture content of soil in a ring sample at tension of 50 kPa head of water	18-3
ISRIC	pF 3.4	Moisture content of soil in a ring sample at tension of 250 kPa head of water	18-3
ISRIC	pF 4.2	Moisture content of soil in a ring sample at tension of 1.5 MPa head of water	18-3
ISRIC	pH H2O	pH electrode; in supernatant suspension	4-1

ISRIC	pH KCl	In supernatant suspension; potentiometrically	**4-1**
ISRIC	Quartz	Quartz; relative abundance scale 0 -7	**16-1**
ISRIC	Sand; 0.10 - 0.05 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.25 - 0.10 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.5 - 0.25 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 1.0 - 0.5 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 2.0 - 0.05 mm	Total sand fractions by sieving; after removal CaCO3 and organic matter	**3-5**
ISRIC	Sand; 2.0 - 1.0 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Silt; 0.02 - 0.002 mm	Fraction by Pipette analysis ; after removal CaCO3 and organic matter, dispersion and sedimentation	**3-4.7**
ISRIC	Silt; 0.05 - 0.002 mm	Calculation; Sum fractions Silt 0.05 - 0.02 mm	**3-4.7**
ISRIC	Silt; 0.05 - 0.02 mm	Fraction by Pipette analysis ; after removal CaCO3 and organic matter, dispersion and sedimentation	**3-4.7**
ISRIC	Sum cations	Sum of Exchangeable Cations (Ca, Mg, Na, K) with 1 M ammonium acetate at pH 7	**9-**
ISRIC	Water Dispersable Clay	Fraction by Pipette analysis; without any pretreatment	**3-8**

*ref: no labmanual available, link to presumable used analytical methode

Other classification

USDA-SCS (1975) : fine-loamy mixed isohyperthermic

Classification (other) :

Very deep, imperfectly drained, brownish yellow clayey soil with a loamy elluviation horizon from a depth of 12 to 38 cm. The overlying topsoil is a dark brown sandy loam. The B-horizon has (in places thick) clay cutans.