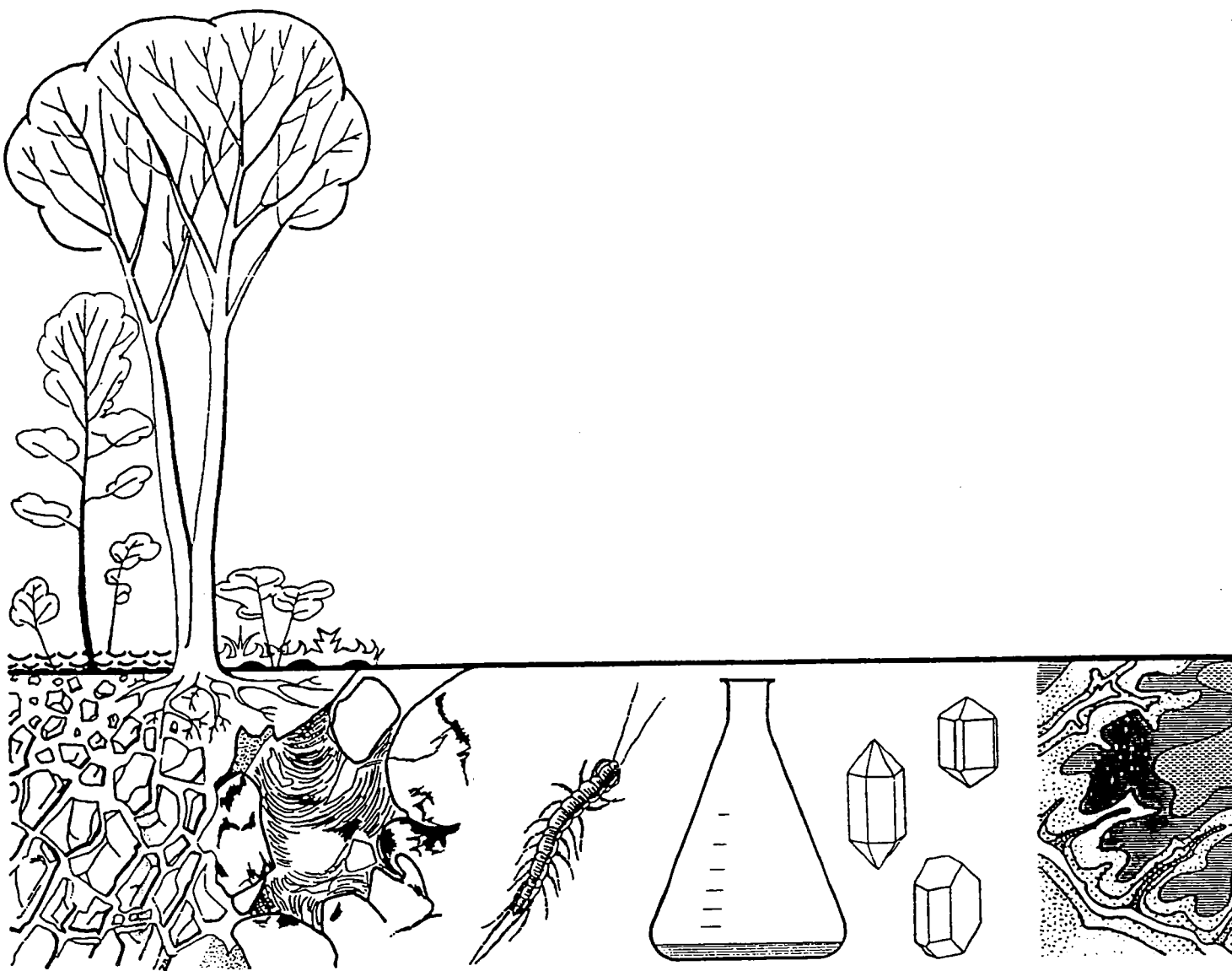




gids bij de bodemprofielen

in het International Soil Reference and Information Centre, Wageningen

**bodemkunde, basisdoctoraal
fysische geografie**

inhoud

weinig gedifferentieerde bodemprofielen

DE	10	Lithic Leptosol	1
FI	6	Dystric Regosol	2
HU	2	"Rendzic Leptosol"	4

gedifferentieerde profielen

vochtige, koele en gematigde streken

DE	11	Dystric Cambisol	6
NL	5	Haplic Luvisol	8
IE	9	Haplic Podzol	10
SE	17	Gleyic Podzol	12

koele en warme continentale streken

FR	11	Stagnic Podzoluvisol	14
SU	5	Haplic Greyzem	16
CN	41	Haplic Phaeozem	18
RO	2	Calcic Chernozem	20
SU	8	Calcic Kastanozem	22

gematigde en warme (sub)aride streken

TR	8	Haplic Calcisol	24
OM	3	Haplic Gypsisol	26
HU	11	Gleyic Solonchak	28
ZA	11	Haplic Solonetz	30

grondwateroverlast

NL	..	Eutric Fluvisol (gley)	32
TH	1	Thionic Fluvisol	34

mens

NL	..	equivalent for Fimic Anthrosol (Laarpodzolgrond)	36
CN	9	Cumulic Anthrosol	38
NL	..	Urbic Anthrosol	40

ANNEX

bijzondere uitgangsmaterialen en overige profielen

GL	2	Fibric Histosol	41
ES	11	Rendzic Leptosol	42
CN	14	Sodic Solonchak	44
ID	29	Haplic Andosol	46
NA	9	Eutric Vertisol	48
UY	1	Dystric Planosol	50

overheersend tropische streken

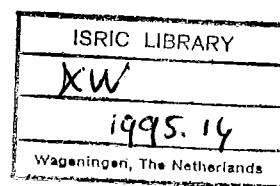
sterk tot zeer sterk verweerde profielen

CN	21	Haplic Acrisol	52
IN	9	Ferric Lixisol	54
ZM	10	Rhodic Ferralsol	56
KE	1	Humic Nitosol	58
BR	27	Humic Plinthosol	60

FAO/UNESCO (1988) : LITHIC LEPTOSOL

DIAGNOSTIC CRITERIA : ochric A horizon
soil moisture regime : udic
soil temperature regime : frigid

LOCAL CLASSIFICATION : Ranker



LOCATION : Nordrhein-Westfalen, Eifel, Hollerath, 40 km SSE of Aachen
550 m a.s.l.

RELIEF : moderately steep, 15 %, no evidence of erosion

WATER TABLE : --

PARENT MATERIAL : shales, siltloam

VEGETATION/ LAND USE : forest, Fagus sylvatica and some Picea excelsa

CLIMATE METEO STATION		Köppen : Cfb	: NÜRBURG, 50°21'N / 6°57'E, 626 m a.s.l.; 40 km ESE of site, moderately relevant												
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Penman	mm	30	0	0	15	41	80	102	115	101	73	39	14	0	580
precipitation	mm	30	69	60	46	66	71	91	76	88	59	59	64	62	811
T mean	°C	30	-1.6	-0.9	2.6	6.0	10.5	13.5	15.2	15.0	12.3	7.3	2.9	-0.4	6.9

METEO STATION			: BOTRANGE (Belgium), 50°30'N / 06°06'E, 693 m a.s.l.; 20 km SW of site, moderately relevant												
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Penman	mm		2	5	22	42	69	83	77	62	39	15	1	2	419
precipitation	mm		135	131	101	103	107	118	147	135	106	112	130	185	1510
T mean	°C		-2.2	-1.0	1.8	5.3	9.3	12.8	13.6	13.0	11.6	7.4	2.0	-0.6	6.1

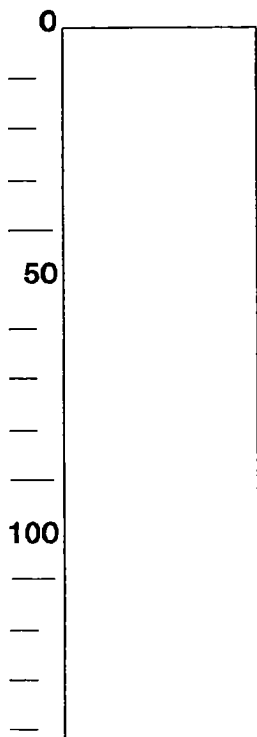
PROFILE DESCRIPTION (approximate):

O 10 - 0 cm slightly decomposed litter

Ah 0 - 5 cm very dark brown gravelly siltloam

R > 5 cm weathered shales

ANALYTICAL DATA not available



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FAO/UNESCO (1988) : DYSTRIC REGOSOL

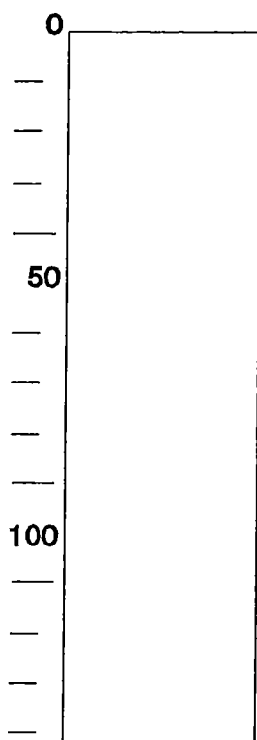
DIAGNOSTIC CRITERIA : ochric A horizon
soil moisture regime : udic
soil temperature regime : frigid

LOCAL CLASSIFICATION :

LOCATION : Kangasala, 20 km E of Tampere, 61°32'N / 24°0' E
m a.s.l.

RELIEF: :
WATER TABLE: : unknown
PARENT MATERIAL: : Holocene varved clay
VEGETATION/ LAND USE :

CLIMATE		Köppen : Dfb													
METEO STATION		: TAMPERE 61°28'N / 23°46'E, 84 m a.s.l., 20 km W of the site, relevant													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
EP Thornthwaite	mm		0	0	0	17	69	103	126	100	61	26	0	0	502
precipitation	mm	30	38	30	25	35	42	48	76	75	57	57	49	41	573
T mean	°C	30	-7.8	-7.8	-4.2	2.5	8.9	14.0	17.3	15.5	10.5	4.6	-0.2	-4.0	4.0



PROFILE DESCRIPTION (from monolith):

O	2 - 0 cm	litter
Ah1	0 - 6 cm	very dark grayish brown (2.5 Y 3/1) silt loam; very fine angular blocky; clear smooth boundary to
Ah2	6 - 15 cm	light brownish gray (2.5 Y 6/2) silt loam; moderate, fine and medium platy; clear smooth boundary to
ACg	15 - 20 cm	light gray (5 Y 7/2) silt loam; moderate, coarse and very coarse platy; abrupt smooth boundary to
Cg1	20 - 35 cm	light gray (5 Y 7/2) silt loam; very few, very fine, prominent dark brown mottles; massive; hard, firm; gradual smooth boundary to
Cg2	35 - 60 cm	light olive gray (5 Y 6/2) and gray (5 Y 5/1) cryoturbate varved silty clay loam; massive; hard, firm; common coarse distinct diffuse reddish yellow (7.5 YR 6/8) mottles, clear wavy boundary to
Cg3	60 - 120 cm	light olive gray (5 Y 6/2) and gray (5 Y 5/1) varved silty clay loam (varves 1.5 to 2 cm apart); massive; hard, firm; common coarse prominent diffuse reddish yellow (7.5 YR 6/8) and very few prominent sharp dark reddish brown (5 YR 3/6) mottles

ANALYTICAL DATA provided by the Agric.Research Centre, Inst.of Soil Science, Vantaa, 1978, unless stated otherwise:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)								WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	600	200	60	20	20	20			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah1	0	4	-	-	1.2	0.3	2.7	24.7	43.8	27.3		0.64								
Ah2	4	18	-	1.2	1.2	0.9	2.8	24.1	46.0	23.8		0.88								
Cg1	18	35	-	1.3	1.6	1.0	2.5	21.8	45.7	26.1		1.02								
Cg2	35	50	-	3.0	1.9	1.1	2.9	17.9	43.0	30.2										
Cg2,3	50	80	-	0.8	0.8	0.6	2.5	19.4	42.9	33.0										
Cg3	80	120	-	0.3	0.4	0.2	2.2	20.6	42.7	33.6		1.08								

N.B. Class limits according to Finnish standards

Hor.	pH	pH	% CaCO3	ORG. MATTER		EXCHANGEABLE CATIONS					EXCH.	ACID.	CEC	CEC	CEC	ECEC	BASE SAT	AL SAT	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC					
Ah1	4.9	4.1		12.4	0.88	12.1	4.8	0.6	0.1	17.6	23.4					41.0	43		0.12	
Ah2	4.9	3.8		4.8	0.31	2.9	1.8	0.2	0.1	5.0	16.2					21.1	24		0.07	
Cg1	5.5	3.8		-	0.06	1.8	1.3	0.2	0.1	3.4	6.1					9.5	36		0.04	
Cg2	5.8	4.1		0.6	0.03														0.03	
Cg2,3	5.9	4.1																	0.03	
Cg3	6.1	4.0				3.9	4.0	0.2	0.1	8.2	2.2					10.4	79		0.03	

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. LOSS	SiO2/ Al2O3/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Fe2O3
Ah1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah2	65.0	15.4	5.4	1.7	2.0	2.9	2.9								
Cg1	-	-	-	-	-	-	-								
Cg2	64.2	15.6	6.0	1.7	2.2	3.2	3.0								
Cg2,3	-	-	-	-	-	-	-								
Cg3	-	-	-	-	-	-	-								

														EXTRACTABLE ELEMENTS %								
CLAY MINERALOGY (1 = very weak .. 8 = very strong)														by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE		Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	Pret	pHNaF
Ah1	-	-	-	-	-	-	-	-	-	-	-	-		-	-	-	0.7	-	-	-	-	-
Ah2																	1.0					
Cg1																	0.7					
Cg2																	0.9					
Cg2,3																	0.9					
Cg3																	-					

Hor.	TRACE ELEMENTS TOTAL SOIL mg/kg									
	Co	Cr	Cu	Mn	Mo	Ni	Pb	Sr	V	Zn
Ah1	15	97	26	1900	4.4	28	32	610	150	43
Ah2	19	120	24	1800	4.5	31	27	690	190	41
Cg1	20	140	20	1800	5.7	33	21	690	190	38
Cg2	-	-	-	-	-	-	-	-	-	-
Cg2,3	-	-	-	-	-	-	-	-	-	-
Cg3	22	150	37	1700	2.5	38	25	1000	210	43

FAO/UNESCO (1988) : according to the book: C A L C I C K A S T A N O Z E M; not Rendzic L¹ Mosol!

DIAGNOSTIC CRITERIA : mollic A horizon
soil moisture regime : udic
soil temperature regime : mesic

LOCAL CLASSIFICATION : Black Rendzina

LOCATION : Sorskút, Dunazug-Mountain, Transdanubian Mountains, 20 km SW of Budapest
250 m a.s.l.

RELIEF: : flat, no evidence of erosion

WATER TABLE: : --

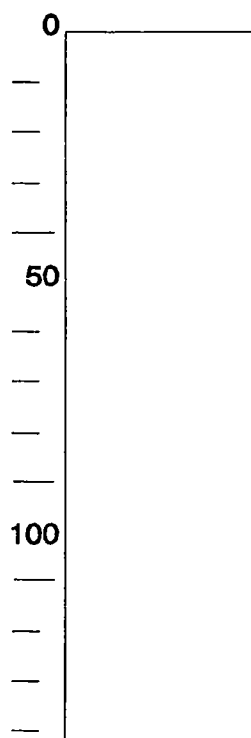
PARENT MATERIAL: : Miocene Sarmatian limestones and marls

VEGETATION/ LAND USE : grassland with few oak trees

CLIMATE Köppen : Cfb

METEO STATION : BUDAPEST 47°31'N / 19°02'E, 120 m a.s.l., 20 km NE of the site, moderately relevant

		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Thornthwaite	mm	30	0	2	23	51	100	124	140	122	77	43	13	2	697
precipitation	mm	30	42	44	39	45	72	76	54	51	34	56	69	48	630
T mean	°C	30	-1.1	1.0	5.8	11.8	16.8	20.2	22.2	21.4	17.4	11.3	5.8	1.5	11.2



PROFILE DESCRIPTION :

Ah1	0 - 10 cm	very dark greyish brown (10 YR 3/2, moist) gravelly sandy loam; strong medium crumb; common weathered limestone fragments; strongly calcareous;
Ah2	10 - 40 cm	dark brown (10 YR 3/3, moist) gravelly sandy loam; moderate medium crumb; common weathered limestone fragments; strongly calcareous; abrupt smooth boundary to
C	> 40 cm	white (10 YR 8/2, moist) very gravelly loamy sand; structureless; marly limestone

ADDITIONAL REMARKS

Nomenclature / FAO/Unesco classification. The soil is too deep to be classified as a Lithosol (defined as less than 30 cm). Discrepancy between on the one hand the genesis and morphology of the profile which is rather common for soils developed on highly calcareous materials (like marls, debris of soft limestone) and resembles the classical rendzina (FAO/Unesco: Rendzic Leptosol) and on the other hand the strict application of taxonomic classification as applied in FAO/Unesco leading to a taxonomic Calcic Kastanozem (which is not corresponding to the ecological Kastanozem).

ANALYTICAL DATA provided by the Research Institute of Soil and Agrochemistry, Budapest, 1981, unless stated otherwise:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS	BULK	pF							
			>2000	2000	1000	500	250	100	50	20	2	<2			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH		% CaCO3	ORG. MATTER		EXCHANGEABLE CATIONS					EXCH. ACID.		CEC soil	CEC clay	CEC OrgC	ECEC	BASE		AL SAT	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum	H+Al	Al					SAT	SAT			
Ah1	7.2	7.5	12.3	7.2	0.63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah2	7.5	7.5	11.9	6.6	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION										IGN. LOSS	SiO2/ Al2O3/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Fe2O3
Ah1	42.8	22.0	8.9	2.0	2.4	2.9	-	0.6	0.2	1.0	16.2				
Ah2	46.2	24.3	9.8	1.2	2.5	3.0	-	0.6	0.2	1.0	12.4				

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE ELEMENTS %								AL		Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								mg/kg			
													Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	P205	K20			
Ah1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	123	161	-	-	
Ah2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

FAO/UNESCO (1988) : DYSTRIC CAMBISOL

DIAGNOSTIC CRITERIA : ochric A horizon, cambic B horizon
soil moisture regime : udic
soil temperature regime : frigid

LOCAL CLASSIFICATION : Braunerde mit geringem Basengehalt

LOCATION : Nordrhein-Westfalen, Eifel, Hollerath, 40 km SSE of Aachen
550 m a.s.l.

RELIEF: : moderately steep, 15 %, no evidence of erosion

WATER TABLE: : --

PARENT MATERIAL: : colluvium derived from shale/siltstone

VEGETATION/ LAND USE : coniferous forest, *Picea abies* and *P. excelsa*.

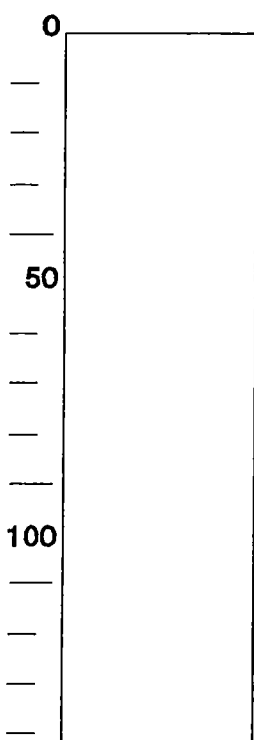
CLIMATE Köppen : Cfb

METEO STATION : NÜRBURG, 50°21'N / 6°57'E, 626 m a.s.l.; 40 km ESE of site, moderately relevant

		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Perman	mm	30	0	0	15	41	80	102	115	101	73	39	14	0	580
precipitation	mm	30	69	60	46	66	71	91	76	88	59	59	64	62	811
T mean	°C	30	-1.6	-0.9	2.6	6.0	10.5	13.5	15.2	15.0	12.3	7.3	2.9	-0.4	6.9

METEO STATION : BOTRANGE (Belgium), 50°30'N / 06°06'E, 693 m a.s.l.; 20 km SW of site (moderately relevant)

		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Perman	mm		2	5	22	42	69	83	77	62	39	15	1	2	419
precipitation	mm		135	131	101	103	107	118	147	135	106	112	130	185	1510
T mean	°C		-2.2	-1.0	1.8	5.3	9.3	12.8	13.6	13.0	11.6	7.4	2.0	-0.6	6.1



PROFILE DESCRIPTION :

O	5 - 0 cm	litter
A1	0 - 9 cm	dark brown (7.5YR 3/2, moist) slightly gravelly silt loam; strong very fine crumb; very friable; highly porous;
B1	9 - 15 cm	dull yellowish brown (10YR 5/5, moist) slightly gravelly silt loam; very friable; highly porous;
B2	15 - 65 cm	yellowish brown (10YR 5/6, moist) slightly gravelly silt loam; weak very fine subangular blocky; very friable; highly porous;
C1	> 65 cm	light olive brown (2.5Y 5/6, moist) slightly gravelly; very friable; highly porous;

ANALYTICAL DATA:

		----- PARTICLE SIZE DISTRIBUTION (µm) -----																		-----											
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	TOT	50	20	TOT	<2	WDIS	BULK	pF	-----														
			1000	500	250	100	50	SAND	20	2	SILT			CLAY	DENS	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2								
O1	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O2	5	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah	0	9	-	-	-	-	-	-	8	21	42	63	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B1	9	15	-	-	-	-	-	-	11	20	56	77	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B2	15	40	-	-	-	-	-	-	16	21	34	56	29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B2	40	60	-	-	-	-	-	-	18	20	35	55	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C1	65	75	-	-	-	-	-	-	25	19	33	51	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG. MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum										
O1	2.9	2.3	-	33.9	1.40	26.4	0.7	0.2	0.2	27.5	-	-	10.8			27.5	*	-	-	-
O2	3.1	2.4	-	44.4	1.78	16.0	0.7	0.1	0.2	17.0	-	-	10.4			17.0	*	-	-	-
Ah	3.1	2.4	-	7.9	0.33	0.0	0.2	0.1	0.0	0.3	-	-	41.8			0.3	1	-	-	-
B1	4.3	3.8	-	1.3	0.10	0.0	0.0	0.1	0.0	0.1	-	-	16.8			4.7	0.1	1	-	-
B2	4.2	3.8	-	0.5	0.08	0.0	0.0	0.1	0.0	0.1	-	-	13.3			1.8	0.1	1	-	-
B2	4.2	3.7	-	0.2	0.08	0.0	0.0	0.1	0.0	0.1	-	-	9.0			0.8	0.1	1	-	-
C1	3.4	2.7	-	5.3	0.24	0.0	0.1	0.1	0.0	0.2	-	-	36.4			0.2	1	-	-	-

----- ELEMENTAL COMPOSITION OF TOTAL SOIL -----												IGN.		SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS						
O1	22.3	4.4	1.6	0.16	0.15	0.65	0.13	0.29	0.02	0.19	70.3	-	-	8.6	37.1	7.0	4.3
O2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah	60.9	12.5	4.8	0.05	0.43	2.23	0.34	0.85	0.04	0.13	17.8	-	-	8.3	33.8	6.6	4.1
B1	65.6	15.3	6.1	0.06	0.62	2.78	0.40	0.92	0.09	0.11	7.4	-	-	7.3	28.6	5.8	3.9
B2	67.4	14.9	5.6	0.07	0.79	2.70	0.47	0.96	0.09	0.09	5.4	-	-	7.7	32.0	6.2	4.2
B2	62.3	18.4	7.0	0.01	0.64	3.66	0.66	0.98	0.09	0.11	4.9	-	-	5.7	23.7	4.6	4.1
C1	60.6	13.9	6.1	0.04	0.52	2.41	0.41	0.88	0.05	0.13	13.5	-	-	7.4	26.4	5.8	3.6

----- ELEMENTAL COMPOSITION OF CLAY FRACTION -----												IGN.		SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS						
O1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
O2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah	46.7	26.0	7.1	0.0	0.8	3.9	0.7	0.9	0.0	0.2	10.8	-	-	3.0	17.2	2.6	5.7
B1	46.6	27.6	9.3	0.0	1.0	3.7	0.7	0.9	0.1	0.2	9.3	-	-	2.9	13.1	2.4	4.6
B2	45.8	28.2	9.1	0.0	1.2	3.6	0.7	0.9	0.1	0.2	8.6	-	-	2.8	13.2	2.3	4.8
B2	52.3	31.7	9.0	0.0	1.1	5.6	1.2	1.0	0.1	0.2	6.9	-	-	2.8	15.2	2.4	5.4
C1	49.3	24.2	10.4	0.3	2.8	6.0	0.0	1.1	0.1	0.3	6.5	-	-	3.5	12.4	2.7	3.6

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
O1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
O2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ah	6	6	2	2	4		4	6	4		4		-	-	-	-	-	-	-	-	-	
B1	6		6		6		4	6	4		0		-	-	-	-	-	-	-	-	-	
B2	6		6		6		4	6	4		2		-	-	-	-	-	-	-	-	-	
B2	6		4		6		4	6	6		4		-	-	-	-	-	-	-	-	-	
C1	6	4	4		6		6	6	4		2		-	-	-	-	-	-	-	-	-	

FAO/UNESCO (1988) : H A P L I C L U V I S O L

DIAGNOSTIC CRITERIA : argic B horizon
soil moisture regime : udic
soil temperature regime : mesic

LOCAL CLASSIFICATION : radebrikgrond / bergbrikgrond

LOCATION : Sittard, brickyard W of railway station; 51°0'0"N / 5°48'0"E
20 m a.s.l.

RELIEF : plateau, flat

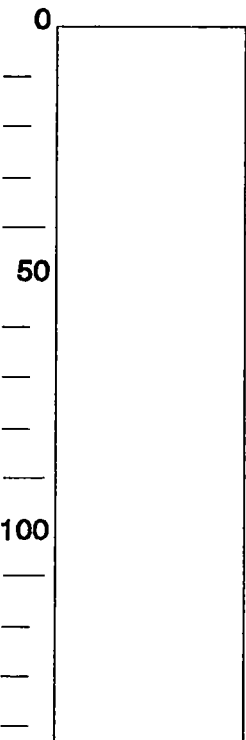
WATER TABLE Kind : no watertable observed

DRAINAGE : well drained

PARENT MATERIAL : loess, Weichselian, calcareous

LAND USE : non agricultural land

CLIMATE	Köppen : Cfb														
METEO STATION	: ZUID-LIMBURG, 50°55'N / 5°46'E, 115 m a.s.l.; 10 km SW of the site; moderately relevant														
	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
	Years														
ET Thornthwaite	mm	15	4	7	28	48	84	106	119	109	76	47	21	11	659
precipitation	mm	15	63	56	46	48	64	66	85	90	73	49	62	61	763
T mean	°C	15	2.1	2.2	5.9	9.2	13.1	15.9	17.7	17.4	15.1	10.5	6.3	3.6	9.9



PROFILE DESCRIPTION :

Ap	0 - 21 cm	dark brown (10 YR 4/3, moist) silt loam; weak subangular blocky; friable; few fine roots; abrupt smooth boundary to
AhE	21 - 26 cm	dark yellowish brown (10 YR 4/4, moist) silt loam; moderate fine platy; friable; thin unspecified cutans on horizontal pedfaces; few fine roots; few worm channels; clear irregular boundary to
BE	26 - 46 cm	dark yellowish brown (10 YR 4/4, moist) silt loam; moderate medium platy; friable; thin unspecified cutans on pedfaces; few fine roots; few worm channels; clear irregular boundary to
Bt1	46 - 65 cm	brown (7.5 YR 4/4, moist) silt loam; moderate very coarse prismatic parting to, weak medium subangular blocky; friable; common fine prominent clear very pale brown (10 YR 7/3) mottles; broken thin clay cutans; few fine roots; few worm channels; gradual wavy boundary to
Bt2	65 - 95 cm	7.5 YR 4/3, moist silt loam; moderate very coarse prismatic parting to, weak medium subangular blocky; friable; common fine prominent clear very pale brown (10 YR 7/3) mottles; broken thin clay cutans; few fine roots; worm channels; gradual smooth boundary to
B3	95 - 135 cm	dark yellowish brown (10 YR 4/4, moist) silt loam; moderate very coarse prismatic parting to, weak medium subangular blocky; friable; common fine prominent clear very pale brown (10 YR 7/3) mottles; patchy thin clay cutans; few fine roots; worm channels; gradual smooth boundary to
BC	135 - 180 cm	dark yellowish brown (10 YR 4/4, moist) silt loam; friable; common fine prominent clear very pale brown (10 YR 7/3) mottles; non calcareous
Ck	> 250 cm	very pale brow (10 YR 7/3, moist) silt loam, strongly calcareous

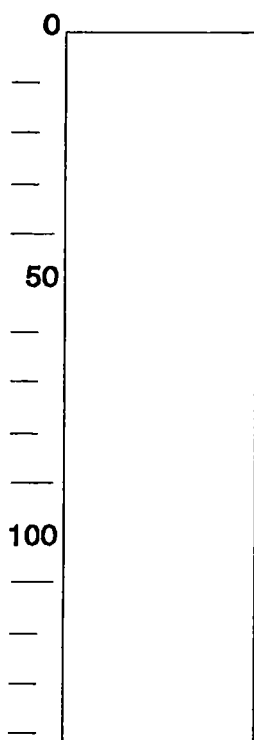
ANALYTICAL DATA (from equivalent profiles; partly from De Bakker and Edelman-Vlam, 1976, partly Utrecht University):

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)					WDIS		BULK		pF							
			>2000	2000	200	50	20	<2	CLAY	DENS		0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ap	0 - 21	0		3.1	15.1	57.8	14.0	9.9											
AhE	21 - 26	0		2.1	14.4	51.6	18.9	13.1											
BE	26 - 46																		
Bt1	46 - 65																		
Bt2	65 - 95	0		0.3	10.5	53.3	15.8	20.2											
B3	95 - 135																		
BC	135 - 180	0		0.1	12.6	53.7	17.4	16.2											
Ck	> 250	0		0.3	14.6	57.8	14.9	12.3											

Hor.	pH	pH	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH.	ACID.	CEC	CEC	CEC	ECEC	BASE	Al	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC		SAT	SAT		
Ap	4.9	3.8	-	1.2	0.12	6.2	0.6	0.6	0.1	7.5				11.1		67		155		
AhE	5.2	4.2	-	0.4	0.05	4.2	0.7	0.4	0.0	5.2				7.9		66		130		
BE																				
Bt1																				
Bt2	6.1	4.6	-	0.3	0.03	9.0	1.1	0.3	0.1	10.5				12.3		85		160		
B3																				
BC	6.5	5.4	0.0	0.1	0.02	8.4	0.6	0.2	0.1	9.3				9.0		100		130		
Ck	8.0	7.2	13.7	0.1	0.01	31.1	1.1	0.1	0.1	32.4				6.9		100		160		

CLAY MINERALOGY (1 = very weak .. 8 = very strong)														EXTRACTABLE Fe, Al, Si, Mn %					
by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)																			
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE		Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)
Ap														0.4			1.63		
AhE														0.5			1.58		
BE																			
Bt1																	2.63		
Bt2														0.4			3.32		
B3																			
BC														0.3			2.51		
Ck														0.1			2.12		

FAO/UNESCO (1988)	: HUMIC ^{HAPLIC} P O D Z O L (placic phase)
DIAGNOSTIC CRITERIA	: spodic B horizon soil moisture regime : udic soil temperature regime : mesic
LOCAL CLASSIFICATION	: Peaty iron-pan podzol
LOCATION	: Mallaranny, County Mayo 50 m a.s.l.
RELIEF:	: gently sloping, 4 %
WATER TABLE:	: --
PARENT MATERIAL:	: glacial till, at 85 cm over Precambrian schists and quartzites
VEGETATION/ LAND USE	: dwarf shrub consiting of heath (<i>Erica mediterranea</i>) and low grasses
CLIMATE	Köppen : Cfb
METEO STATION	: BELMULLET (BÉAL AN MHIURTHID) 54°14'N / 10°00'W, 9 m a.s.l.; 35 km N of site; mod. relevant
	No. of Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Annual
	Years
EP Thornthwaite	mm 10 10 21 34 48 72 86 95 86 67 50 27 21 624
precipitation	mm 10 108 64 82 70 75 80 76 95 108 116 127 131 1132
T mean	°C 10 5.1 6.1 7.2 8.6 10.7 13.1 13.9 14.0 13.1 10.9 7.8 6.2 9.7



PROFILE DESCRIPTION :

O	0 - 7 cm	black (5YR 2/1.5, dry) moderate fine subangular blocky;
E	7 - 40 cm	light brownish grey (10YR 6/2, dry) slightly gravelly sand; moderate coarse subangular blocky;
Bh	40 - 49 cm	dark reddish brown (5YR 3/3, dry) gravelly sand; moderate medium subangular blocky;
Bms	49 - 50 cm	strong brown (7.5YR 5/6, dry) strong very coarse platy;
Bs	50 - 62 cm	reddish yellow (7.5YR 7/6, dry) gravelly sand; moderate medium subangular blocky;
C	62 - 87 cm	very pale brown (10YR 7/4, dry) gravelly sand; single grain;

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (µm)														pF							
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	TOT	50	20	TOT	WDIS	BULK		0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
			1000	500	250	100	50	SAND	20	2	SILT	<2	CLAY	DENS									
O	0 - 7	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	10 - 30	15	17	16	17	21	11	82	11	6	17	1	-	-	-	-	-	-	-	-	-	-	-
E	30 - 36	35	7	11	18	26	13	75	14	7	21	4	-	-	-	-	-	-	-	-	-	-	-
Bh/Bms	40 - 55	32	16	16	17	19	10	77	13	8	21	2	-	-	-	-	-	-	-	-	-	-	-
C	70 - 80	30	13	14	16	23	14	80	13	5	18	2	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS				EXCH. ACID.	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum	H+Al	Al						
O	3.8	2.8	-	24.0	0.83	-	-	-	-	-	-	-	-	-	-	-	-	-
E	4.6	3.9	-	0.6	0.04	0.0	0.1	0.0	0.0	0.1	-	-	-	-	6	-	-	-
E	4.4	3.8	-	1.4	0.05	0.0	0.1	0.1	0.0	0.2	-	-	-	-	5	-	-	-
BhBms	4.5	4.2	-	0.3	0.02	0.0	0.1	0.1	0.0	0.2	-	-	-	-	22	-	-	-
C	5.0	4.6	-	0.2	0.32	0.0	0.1	0.1	0.0	0.2	-	-	-	-	22	-	-	-

ELEMENTAL COMPOSITION OF TOTAL SOIL											IGN.	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS				
O	53.9	3.6	0.9	0.11	0.31	1.06	0.57	0.19	-	0.05	40.0	25.4	159	21.9	6.3
E	85.8	7.4	0.7	0.03	0.41	2.01	1.17	0.35	-	-	1.6	19.7	326	18.6	16.6
E	84.2	7.7	0.9	0.03	0.62	2.05	0.85	0.47	-	-	3.1	18.6	249	17.3	13.4
BhBms	80.3	7.3	4.8	0.06	0.52	2.02	0.86	0.53	0.02	0.07	2.0	18.7	44.5	13.2	2.4
C	83.7	7.6	3.7	0.08	1.07	2.14	0.79	0.45	0.05	0.08	1.7	18.7	60.2	14.3	3.2

ELEMENTAL COMPOSITION OF CLAY FRACTION											IGN.	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS				
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	51.6	25.3	4.27	0.1	1.7	6.4	0.2	2.1	0.0	0.3	8.3	3.5	31.7	3.1	9.2
E	47.8	25.4	4.9	0.0	2.1	5.5	0.3	1.8	0.0	0.3	10.4	3.2	25.4	2.8	8.0
BhBms	35.9	18.7	26.3	0.0	1.7	3.8	0.3	1.2	0.2	0.8	10.3	3.3	3.6	1.7	1.1
C	42.8	21.5	16.5	0.1	2.3	4.7	0.4	0.8	0.3	0.7	9.5	3.4	6.8	2.3	2.0

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
O	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	-	-	
E	6			6	6		6	6	4				0.0	0.1	-	0.1	0.1	0.1	0.1	-	-	
E	6		4	6	6		6	6	4				0.4	0.1	-	1.5	0.1	0.1	0.0	-	-	
BhBms	6		6		6		4	4	2				0.2	0.1	-	0.8	0.1	0.0	0.0	-	-	
C	6			6		6	4	4	2				-	-	-	-	-	-	-	-	-	

SAND MINERALOGY																						
Hor.	HEAVY	LIGHT	light fraction				heavy fraction															
			QU	FE	PL	RE	OP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
O	-	-																				
E	1.3	98.7	81	7	12	0	11	1	7	0	3	0	1	65	25							
E	1.3	98.7	84	6	10	0	19	1	14	1	4	1	4	52	23							
BhBms	4.2	95.8	87	6	7	0	42	0	13	2	7	0	3	47	28							
c	3.9	96.1	82	8	10	0	23	0	2	0	4	0	2	68	24							

key all horizons: QU = quartz; FE = feldspar; PL = plagioclase; RE = rest group light min.; OP = opaque
A = tourmaline; B = zircon; C = rutile; D = anatase; E = brookite; F = epidote;
G = chloritic matter; H = muscovite

FAO/UNESCO (1988) : G L E Y I C P O D Z O L

DIAGNOSTIC CRITERIA : spodic B horizon
soil moisture regime : udic / aquic
soil temperature regime : frigid

LOCAL CLASSIFICATION : iron humus podzol

LOCATION : Vindeln, Västerbottens Lan
245 m a.s.l.

RELIEF: : gently sloping 4 %, middle slope

WATER TABLE: : unknown

PARENT MATERIAL: : glaciofluvial deposits

VEGETATION/ LAND USE : Northern coniferous forest, Pinus sp., Abies sp., Betula sp., Vaccinium sp., mosses

CLIMATE Köppen : Dfc

METEO STATION : UMEA, 63°50'N / 20°17'E, 11 m a.s.l.; 50 km SSE of site, moderately relevant

	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
	Years														
EP Thornthwaite	mm	30	0	0	2	57	96	122	98	58	22	0	0	455	
precipitation	mm	30	49	30	27	34	28	49	63	77	61	59	67	601	
T mean	°C	30	-8.1	-8.1	-4.6	1.0	6.9	12.1	15.7	14.1	9.3	3.4	-1.2	-4.5	3.0

PROFILE DESCRIPTION :

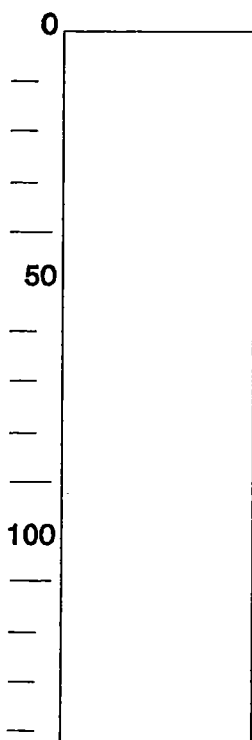
O 10 - 0 cm litter of needles, moderately decomposed; gradual smooth boundary to

E 0 - 24 cm light grey (10YR 7/1, dry) slightly gravelly loamy sand; moderate platy; gradual boundary to

Bhs1 24 - 35 cm brown (7.5YR 5/4, dry) gravelly loamy sand; platy; gradual boundary to

Bhs2 35 - 44 cm brown (7.5YR 5/4, dry) gravelly loamy sand; platy; gradual boundary to

Bgs 44 - 80 cm light grey (2.5Y 7/2, dry) gravelly sandy loam; weak platy and massive; gradual boundary to



ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (μm)										pF									
		>2000	2000	1000	500	250	100	TOT	50	20	WDIS	BULK									
Hor.	Top	Bot.	1000	500	250	100	50	SAND	20	2	<2	CLAY	DENS	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
O	8	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	0	15	13	-	-	-	-	83	10	6	1	-	-	-	-	-	-	-	-	-	-
E	15	20	16	-	-	-	-	84	7	8	1	-	-	-	-	-	-	-	-	-	-
Bhs	20	35	18	-	-	-	-	28	15	13	0	-	-	-	-	-	-	-	-	-	-
Bhs	35	50	22	-	-	-	-	71	15	13	0	-	-	-	-	-	-	-	-	-	-
Bgs	50	65	24	-	-	-	-	70	15	13	2	-	-	-	-	-	-	-	-	-	-
Bgs	65	80	29	-	-	-	-	66	18	15	1	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH.	ACID.	CEC	CEC	CEC	ECEC	BASE	Al	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC		SAT	SAT		
O	3.4	2.6	-	39.4	1.17	3.4	5.6	2.6	0.2	11.8	-	-	133		11.8	9	-	0.01		
E	4.5	3.3	-	0.6	0.03	0.3	0.2	0.1	0.0	0.6	-	-	3.3		0.6	18	-	0.04		
E	4.7	3.5	-	0.9	0.04	0.0	0.1	0.0	0.0	0.1	-	-	5.9		0.1	2	-	0.04		
Bhs	4.9	3.8	-	5.8	0.20	0.5	0.2	0.1	0.1	0.9	-	-	55.1		0.9	2	-	0.05		
Bhs	5.3	4.2	-	2.3	0.09	0.0	0.0	0.0	0.1	0.1	-	-	26.4		0.1	0	-	0.03		
Bgs	5.3	4.4	-	0.8	0.04	0.0	0.0	0.0	0.0	0.0	-	-	10.6		0.0	0	-	0.03		
Bgs	5.3	4.4	-	0.5	0.03	0.0	0.0	0.0	0.0	0.0	-	-	5.7		0.0	0	-	0.03		

ELEMENTAL COMPOSITION OF TOTAL SOIL												IGN.		SiO2/	SiO2/	SiO2/	Al2O3/
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS	Al2O3	Fe2O3	Al2O3	Fe2O3	Al2O3	Fe2O3
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	80.6	11.8	0.8	1.26	0.16	3.44	-	0.32	0.02	0.01	1.3	11.6	268	11.1	23.1		
E	79.2	12.6	1.9	1.72	0.65	3.13	-	0.49	0.03	0.10	1.8	10.7	111	9.7	10.4		
Bhs	69.0	14.2	4.8	2.10	0.88	2.58	-	0.51	0.04	0.14	3.3	8.2	38.3	6.8	4.6		
Bhs	70.8	14.5	3.4	2.18	0.85	2.74	-	0.50	0.04	0.11	3.2	8.3	55.4	7.2	6.7		
Bgs	72.7	13.0	2.9	2.20	0.95	2.75	-	0.49	0.04	0.12	2.8	9.5	66.7	8.3	7.0		
Bgs	74.4	13.0	2.7	2.21	0.88	2.76	-	0.51	0.04	0.09	1.9	9.7	73.4	8.6	7.6		

ELEMENTAL COMPOSITION OF CLAY FRACTION												IGN.		SiO2/	SiO2/	SiO2/	Al2O3/
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS	Al2O3	Fe2O3	Al2O3	Fe2O3	Al2O3	Fe2O3
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	53.7	18.0	1.8	0.4	0.9	3.3	-	3.5	0.0	0.2	16.5	5.1	78.4	4.8	15.5		
no other horizons																	

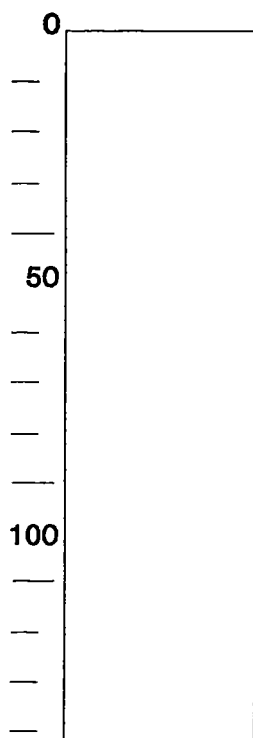
													EXTRACTABLE Fe, Al, Si, Mn %								
CLAY MINERALOGY (1 = very weak .. 8 = very strong)													by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	Pret	pHNaF
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0	-	-	-	-	-
E	4	4					4	4	4				-	-	-	0.0	-	-	-	-	-
E	4	4					4	4	4				-	-	-	0.2	-	-	-	-	-
Bhs	2	4			4		4	4	4				-	-	-	1.5	-	-	-	-	-
Bhs	2				2			4	4				-	-	-	0.6	-	-	-	-	-
Bgs	2		2		4		2	4	4				-	-	-	0.5	-	-	-	-	-
Bgs	2		2		4		2	4	4				-	-	-	0.2	-	-	-	-	-

SAND MINERALOGY		SAND MINERALOGY																				
Hor.	HEAVY	LIGHT	light fraction				heavy fraction															
			QU	FE	PL	RE	OP	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
O	-	-																				
E	2.8	97.2	68	18	14	0	8	0	16	0	0	1	0	1	3	15	63	0	1			
E	3.3	96.7	62	21	17	0	5	0	13	0	1	0	1	1	0	16	66	1	1			
Bhs	-	-																				
Bhs	5.8	94.2	66	21	13	0	2	1	10	0	0	0	0	1	2	17	70	0	0			
Bgs	-	-																				
Bgs	6.1	93.9	68	20	12	0	4	0	23	1	0	0	0	0	1	16	57	0	2			

key : QU = quartz; FE = feldspar; PL = plagioclase; RE = rest group light min.; OP = opaque
A = tourmaline; B = grenat; C = rutile; D = anatase; E = titanite; F = disthene; G = andalusite;
H = sillimanite (fibrous); I = epidote; J = green hornblende; K = hypersthene; L = other minerals & unknown

FAO/UNESCO (1988)	: STAGNIC PODZOLUVISOL
DIAGNOSTIC CRITERIA	: ^{order} umbric A horizon, argic B horizon, stagnic features soil moisture regime : aquic / udic soil temperature regime : mesic
LOCAL CLASSIFICATION	: sol lessivé à pseudogley
LOCATION	: Département Ardennes, Bois des Hingues, 7 km W of Rocroi 345 m a.s.l.
RELIEF:	: nearly level, 1 % sloping
WATER TABLE:	: no evidence
DRAINAGE	: poor
PARENT MATERIAL:	: limon de plateau (non-calcareous loess-like deposits)
VEGETATION/ LAND USE	: deciduous forest, Betula sp., Quercus sp., Vaccinium myrtillis, grasses

CLIMATE	Köppen : Cfb
METEO STATION	: REIMS, 49°18'N / 4°02'E, 99 m a.s.l.; 80 km SSW of site; moderately relevant
	No. of Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Annual
	Years
EP (PenMon)	mm 5 13 36 65 91 101 110 91 56 27 0 3 598
precipitation	mm 30 49 44 36 41 52 51 57 63 58 47 48 52 598
T mean	°C 2.0 3.0 6.5 9.6 13.3 16.4 18.3 18.1 15.4 10.6 6.2 3.1 10.2



PROFILE DESCRIPTION :

O1	0 - 1 cm	forest litter; leaves, undecomposed;
O2	1 - 6 cm	leaves, matted, slightly decomposed;
Ah1	6 - 13 cm	black (10YR 2/1, moist) silt loam; organic matter, highly decomposed; massive and pockets of moderate medium crumb; very friable; many roots; clear boundary to
Ah2	13 - 27 cm	very dark brown (10YR 2/2, moist) silt loam; organic matter, highly decomposed; massive; very friable; many roots; clear boundary to
AE	27 - 30 cm	greyish brown (10YR 5/2, moist) silt loam; with light gray (10YR7/2) vertical streaks of Ah down into E and Bgt1 horizons; weak coarse angular blocky; many roots; clear boundary to
E	30 - 41 cm	pale brown (10YR 6/3, moist) silt loam; weak very coarse angular blocky; frequent pedotubules; irregular boundary to
Bgt1	41 - 78 cm	light yellowish brown (10YR6/4, moist) silt loam; weak coarse angular blocky; with strong brown (7.5YR5/8) mottles; frequent pedotubules; few rounded quartz stones; diffuse boundary to
Bgt2	78 - 116 cm	brownish yellow (10YR6/8, moist) silt loam; moderate medium angular blocky; with light gray (2.5Y7/2) mottles; frequent iron-manganese nodules below 92 cm; diffuse boundary to
Bgtx	> 116 cm	brownish yellow (10YR6/8, moist) silt loam; moderate medium angular blocky; with light gray (2.5Y7/2) mottles; fragipan

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (µm)																pF							
Hor.	Top			>2000	2000	1000	500	250	100	50	20	WDIS	BULK				2.0								
		Bot.		1000	500	250	100	50	20	2	<2			CLAY	DENS	0.0		1.0	1.5	2.3	2.7	3.4	4.2		
Ah1	0 - 7	-	1	1	1	1	1	1	25	31	39	-	-	-	-	-	-	-	-	-					
Ah2	7 - 21	-	0	0	1	2	2	2	31	36	29	-	-	-	-	-	-	-	-	-					
AE	24 - 35	-	0	1	1	2	1	1	27	35	34	-	-	-	-	-	-	-	-	-					
Bgt1	37 - 72	-	0	1	1	2	2	2	25	29	30	-	-	-	-	-	-	-	-	-					
Bgt2	80 - 110	-	0	1	1	2	3	3	36	33	24	-	-	-	-	-	-	-	-	-					
Btgx	110 - 128	-	0	1	1	2	2	2	38	32	24	-	-	-	-	-	-	-	-	-					

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum										
Ah1	3.9	3.3	-	9.3	0.64	0.1	0.5	0.3	0.0	0.9	33.5	-	46.3			34.4	2	-	-	
Ah2	4.3	3.8	-	6.2	0.34	0.1	0.0	0.1	0.0	0.2	24.8	-	31.4			25.0	1	-	-	
AE	4.6	4.0	-	1.8	0.10	0.0	0.0	0.1	0.0	0.1	14.2	-	8.2			14.3	1	-	-	
Bgt1	4.6	3.9	-	0.7	0.10	0.3	0.0	0.1	0.0	0.4	15.5	-	14.7			15.9	3	-	-	
Bgt2	4.9	3.8	-	0.3	0.07	0.8	0.2	0.2	0.0	1.2	11.8	-	13.8			13.0	9	-	-	
Btgx	5.2	3.7	-	0.3	0.03	6.1	0.9	0.2	0.0	7.2	10.4	-	14.7			17.6	49	-	-	

ELEMENTAL COMPOSITION OF TOTAL SOIL												IGN.		SiO2/	SiO2/	SiO2/	Al2O3/
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS	Al2O3	Fe2O3	R2O3	Fe2O3	R2O3	Fe2O3
Ah1	67.6	7.0	1.7	0.14	0.27	1.26	-	0.83	0.01	0.16	21.6	16.4	106	14.2	6.5		
Ah2	76.2	8.2	1.4	0.14	0.40	1.46	-	0.94	0.01	0.12	12.1	15.8	145	14.2	9.2		
AE	80.2	9.5	1.9	0.18	0.48	1.77	-	0.98	0.01	0.06	5.2	14.3	112	12.7	7.8		
Bgt1	77.1	10.9	4.1	0.17	0.77	1.93	-	0.92	0.02	0.05	4.5	12.0	50.1	9.7	4.2		
Bgt2	77.5	11.2	4.3	0.18	0.96	2.07	-	0.90	0.05	0.07	3.5	11.7	48.0	9.4	4.1		
Btgx	76.9	11.0	4.1	0.24	0.85	1.97	-	0.88	0.03	0.08	3.4	11.9	49.9	9.6	4.2		

ELEMENTAL COMPOSITION OF CLAY FRACTION												IGN.		SiO2/	SiO2/	SiO2/	Al2O3/
Hor.	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS	Al2O3	Fe2O3	R2O3	Fe2O3	R2O3	Fe2O3
Ah1	48.9	25.4	6.5	0.4	1.2	2.1	-	1.3	0.0	1.0	11.7	3.3	20.0	2.8	6.1		
Ah2	48.5	27.3	4.6	0.0	1.2	2.4	-	1.4	0.0	0.7	12.0	3.0	28.0	2.7	9.3		
AE	49.2	27.3	5.7	0.0	1.5	2.5	-	1.2	0.0	0.4	10.1	3.1	25.1	2.7	8.2		
Bgt1	47.3	25.1	12.6	0.0	1.8	2.3	-	1.0	0.0	0.2	9.0	3.2	10.0	2.4	3.1		
Bgt2	49.4	23.9	10.0	0.0	1.9	2.6	-	1.0	0.1	0.2	8.6	3.5	13.1	2.8	3.7		
Btgx	50.7	24.0	9.7	0.0	1.9	2.7	-	1.1	0.1	0.2	8.2	3.6	13.9	2.8	3.9		

EXTRACTABLE Fe, Al, Si, Mn %															
by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)														Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE			
Ah1	2	6		4	4	2			0.5	0.4	0.0	0.7	0.3	0.5	0.6
Ah2	2	6		4	4	2			0.3	0.5	0.0	0.3	0.4	0.2	0.5
AE	4	6		2	6	2			0.5	0.4	0.0	1.3	0.3	0.2	0.5
Bgt1	4	4		4	6	4			0.4	0.3	0.0	2.0	0.4	0.3	0.5
Bgt2	4	4		4	6	4			0.6	0.3	0.0	1.7	0.3	0.1	0.3
Btgx	4	4		4	6	4			0.6	0.2	0.0	0.5	0.2	0.1	0.2

FAO/UNESCO (1988) : H A P L I C G R E Y Z E M

DIAGNOSTIC CRITERIA : mollic A horizon, argic B horizon
soil moisture regime : xeric
soil temperature regime : frigid

LOCAL CLASSIFICATION : Grey moderately podzolized forest soil

LOCATION : Belgorod oblast, Russia, right bank of Vorskla river
? m a.s.l.

RELIEF : flat

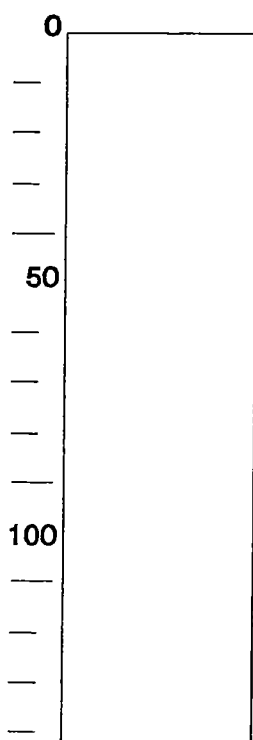
WATER TABLE : no evidence

DRAINAGE : well drained

PARENT MATERIAL: : loess, loamy texture (Russian designation: loess-like loam)

VEGETATION/ LAND USE : Forest steppe with oak and maple

CLIMATE		Köppen : Df													
MET. STATIONS		: KHARKOV, UKRAINE, 49°56'N / 36°17'E, 152 m a.s.l.; 50 km S of the site, moderately relevant													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Years														
EP Thornthwaite	mm	0	0	0	24	92	122	132	116	64	22	0	0	572	
precipitation	mm	29	44	35	29	32	45	58	59	52	40	32	43	46	515
T mean	°C	25	-7.1	-6.5	-1.6	7.8	15.0	18.9	21.1	19.9	14.1	7.3	0.7	-4.0	7.1



PROFILE DESCRIPTION :

O	1 - 0 cm	leaves, moderately decomposed; abrupt smooth boundary to
Ah1	0 - 8 cm	very dark grey (10YR 3/1, dry) silt loam; strong fine crumb and strong fine subangular blocky; friable; many very fine to coarse roots throughout; frequent coprogenic elements and pedotubules; clear boundary to
Ah2	8 - 18 cm	greyish brown (10YR 4.5/2, dry) silt loam; moderate medium subangular blocky; friable; frequent pedotubules and coprogenic elements; clear smooth boundary to
Bth	18 - 27 cm	greyish brown (10YR 4.5/2, dry) silt loam; strong medium subangular blocky; clear boundary to
Bt1	27 - 50 cm	brown (10YR 4.5/2.5, dry) silty clay loam; strong coarse subangular blocky; patchy thin humus cutans and abundant silica powder on pedfaces; gradual boundary to
Bt2	58 - 100 cm	brown (10YR 5/3, dry) silty clay loam; weak medium prismatic and weak medium subangular blocky; patchy thin humus cutans and occasional silica powder on pedfaces; gradual boundary to
B3	100 - 135 cm	silt loam; massive; gradual boundary to
Bck	135 - 150 cm	silt loam; frequent threadlike calcareous soft segregations; calcareous;

ANALYTICAL DATA provided by the Dokuchaev Institute of Soil Science at Moscow, unless stated otherwise:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (μm)							PHYS CLAY		BULK DENS	pF							
			>1000	1000	250	50	10	5	<1	<10/ μm			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
O	1	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah1	0	8	0	-	1	17	42	-	10	12	-	15	37	-	-	-	-	-	-	-
Ah2	10	18	0	-	1	20	47	-	8	11	-	12	31	-	-	-	-	-	-	-
Bth	18	27	0	-	1	20	43	-	9	10	-	17	35	-	-	-	-	-	-	-
Bt1	30	45	0	-	1	15	39	-	7	9	-	27	43	-	-	-	-	-	-	-
Bt2	60	75	0	-	1	15	39	-	7	7	-	30	44	-	-	-	-	-	-	-
B3	110	130	0	-	2	19	39	-	7	9	-	24	39	-	-	-	-	-	-	-
Bck	135	140	0	-	3	20	31	-	6	7	-	22	36	-	-	-	-	-	-	-

N.B. Textural classes according to Russian class limits.

Hor.	pH			ORG. MATTER		EXCHANGEABLE CATIONS				HYDROL.		CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
	H2O	KCl	CaCO3	C	N	Ca	Mg	K	Na	sum	ACID.								
O	6.6	6.1	0.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah1	7.0	5.6	0.0	4.1	0.39	24.0	3.2	-	-	-	3.3	-	-	-	-	-	-	-	-
Ah2	6.9	5.9	0.0	0.9	0.14	8.5	1.8	-	-	-	2.6	-	-	-	-	-	-	-	-
Bth	6.0	4.8	0.0	0.5	0.09	9.8	1.2	-	-	-	4.4	-	-	-	-	-	-	-	-
Bt1	5.8	4.4	0.0	0.5	0.06	13.4	4.7	-	-	-	4.1	-	-	-	-	-	-	-	-
Bt2	5.2	4.3	0.0	0.2	0.05	14.7	8.5	-	-	-	3.9	-	-	-	-	-	-	-	-
B3	5.6	4.4	0.0	-	-	16.5	4.1	-	-	-	1.7	-	-	-	-	-	-	-	-
Bck	8.1	7.3	5.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. LOSS	SiO2/ Al2O3/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/ Fe2O3
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah1	83.7	8.9	2.4	1.60	0.50	-	-	-	-	-	10.1	16.0	91.5	13.6	5.7
Ah2	84.6	8.9	2.3	1.00	0.50	-	-	-	-	-	3.2	16.1	96.5	13.8	6.0
Bth	83.4	9.5	2.9	1.00	0.80	-	-	-	-	-	2.5	14.9	75.4	12.4	5.1
Bt1	79.7	11.4	4.1	1.20	1.20	-	-	-	-	-	3.1	11.9	51.0	9.6	4.3
Bt2	78.0	12.3	4.5	1.20	1.40	-	-	-	-	-	3.0	10.8	45.5	8.7	4.2
B3	81.2	10.5	3.8	1.30	1.10	-	-	-	-	-	2.5	13.1	56.0	10.6	4.3
Bck	76.1	9.9	3.7	7.50	1.20	-	-	-	-	-	6.4	13.0	53.9	10.5	4.1

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION <2 μm										IGN. LOSS	SiO2/ Al2O3/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/ Fe2O3
O	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ah1	54.9	18.9	9.7	0.6	2.2	3.5	-	1.1	0.3	0.5	8.4	4.9	15.1	3.7	3.1
Ah2	55.8	19.5	10.0	0.5	2.2	3.4	-	1.1	0.2	0.4	7.5	4.9	14.9	3.7	3.1
Bth	55.2	20.3	10.5	0.3	2.4	3.2	-	0.9	0.1	0.3	7.5	4.6	14.0	3.5	3.0
Bt1	54.5	20.9	10.9	0.2	2.5	3.0	-	0.8	0.1	0.3	7.5	4.4	13.2	3.3	3.0
Bt2	54.3	20.8	10.9	0.1	2.5	2.9	-	0.8	0.1	0.2	7.7	4.4	13.2	3.3	3.0
B3	55.3	20.7	10.7	0.2	2.5	2.9	-	0.8	0.1	0.3	7.7	4.5	13.7	3.4	3.0
Bck	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

analytical data on elemental composition of the clay fraction < 2 μm provided by ISRIC

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith(d) & -pyroph.(p) Fe(o) Al(o) Si(o) Fe(d) Al(d) Fe(p) Al(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE										
Ah1	3		1	3	2				4	1			-	-	-	-	-	-	-	-		
Bt2	2			5	2				3				-	-	-	-	-	-	-	-		
Clay mineralogy (at 20 cm intervals) carried out by ISRIC, available from ISRIC laboratory files																						

Clay mineralogy (at 20 cm intervals) carried out by ISRIC, available from ISRIC laboratory files

FAO/UNESCO (1988) : Fluvi - H A P L I C P H A E O Z E M (siltic)

DIAGNOSTIC CRITERIA : mollic A horizon
soil moisture regime : ustic
soil temperature regime : frigid

LOCAL CLASSIFICATION : Luvic Chernozem

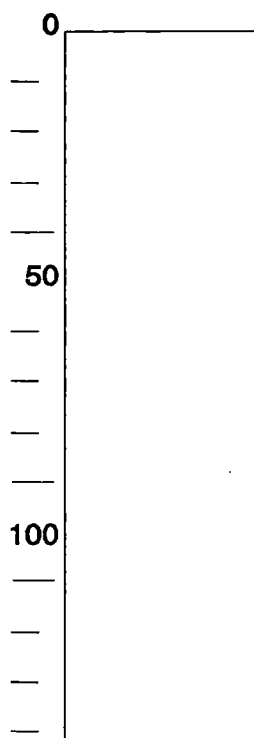
LOCATION : Heilongjiang Province, Bangpu, km 38 along road Harbin - Suihua
150 m a.s.l.
RELIEF : nearly flat, alluvial terrace
WATER TABLE: : not observed
DRAINAGE : well drained
PARENT MATERIAL: : loess, loamy
VEGETATION/ LAND USE : low level arable farming; no irrigation; continuous crop rotation: maize/maize/soybean

CLIMATE Köppen : Dwa
METEO STATION : HULAN; 46°00'N / 126°36'E; 127 m a.s.l.; 10 km NNE of site; very relevant

		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
precipitation	mm	26	3	3	10	24	40	70	150	107	61	23	5	5	500
T mean	°C	26	-20.4	-16.4	-5.3	5.8	14.3	20.1	22.9	21.1	14.5	5.2	-6.3	-16.5	3.3

METEO STATION : HARBIN; 45°41'N / 126°37'E; 172 m a.s.l.; 43 km SSW of site; moderately relevant

		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
ETo (PenMon)	mm	30	10	16	47	99	154	149	141	125	99	68	31	14	952
pan evaporation	mm	30	11	23	78	190	295	246	205	170	139	99	40	14	1509
precipitation	mm	30	4	5	11	24	38	78	161	97	66	28	7	6	523
T mean	°C	30	-19.4	-15.4	-4.8	6.0	14.3	20.0	22.8	21.1	14.4	5.6	-5.7	-15.6	3.6



PROFILE DESCRIPTION :

Ap	0 - 30 cm	Black (10YR 2/1, moist) and gray (10YR 4.5/1, dry) silt loam; very weak massive parting to weak to moderate fine crumb structure; friable, slightly hard; many very fine tubular pores; many very fine and common fine roots; non calcareous (10% HCl); clear smooth boundary to
Ah	30 - 70 cm	Very dark brown (10YR 2/1.5, moist) silty clay loam; very weak massive parting to weak to moderate fine crumb structure; friable, slightly hard; few coarse prominent clear dark brown (7.5YR 4/3) mottles; many very fine tubular pores and fine to coarse vertical continuous tubular pores; many very fine and common fine roots; frequent krotovinas and worm channels; non calcareous (10% HCl); gradual wavy boundary to
A/C	70 - 110 cm	Very dark brown (10YR 2/1.5, moist) and dark brown (10YR 3/3, moist) silty clay loam; weak to moderate medium subangular blocky structure; friable, slightly hard; common coarse distinct diffuse dark brown (7.5YR 4/4) mottles; patchy thin clay and humus cutans; many very fine tubular pores and fine to coarse vertical continuous tubular pores; very fine and fine roots; frequent krotovinas; non calcareous (10% HCl); diffuse smooth boundary to
C	110 - 160 cm	Brown (7.5YR 4/4, moist) silty clay loam; weak to moderate medium to coarse subangular blocky structure; friable, slightly hard; common coarse distinct diffuse dark brown (10YR 3/3) mottles; clay and humus cutans; many very fine tubular pores and medium to coarse vertical continuous tubular pores; very fine roots; few krotovinas; non calcareous (10% HCl)

ANALYTICAL DATA :

Hor.	Top	-----		PARTICLE SIZE DISTRIBUTION (µm)										-----		BULK DENS	-----									
		Bot.		>2000	2000	1000	500	250	100	50	20	WDIS	CLAY	0.0	1.0		1.5	2.0	2.3	2.7	3.4	4.2				
Ap	0 - 30	-	0	0	0	0	0	7	28	26	38	-	1.30	46	42	41	38	36	34	31	25					
Ah	30 - 70	-	0	0	0	0	0	6	32	21	41	-	1.23	50	44	42	38	35	33	30	23					
A/C	70 - 110	-	0	0	0	0	4	30	29	36	-	1.41	45	42	41	38	36	35	32	23						
C	110 - 150	-	0	0	0	0	2	30	38	30	-	-	-	-	-	-	-	-	-	-						

Hor.	pH	pH	CaCO3	ORG.MATTER		EXCHANGEABLE			CATIONS		EXCH.	ACID.	CEC	CEC	CEC	ECEC	BASE	Al	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum										
Ap	6.5	5.5	1.3	1.67	0.16	23.7	6.6	0.6	0.4	31.3	-	-	25.6	68	5.8	31.3	122	-	0.13	
Ah	6.6	5.3	0.7	1.25	0.10	23.3	6.3	0.3	0.2	30.1	-	-	32.0	78	4.4	30.1	94	-	0.05	
A/C	6.5	4.9	0.7	0.58	0.06	20.1	6.0	0.3	0.5	26.9	-	-	25.7	71	2.0	26.9	105	-	0.01	
C	6.0	4.6	-	0.31	0.04	18.6	4.9	0.3	0.4	24.2	-	-	21.6	72	1.1	24.2	112	-	0.08	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn %								Avail.P mg/kg
	Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	
Ap	3		2	8	3				2	1											34.6
Ah	3		2	8	3				1	-											7.5
A/C	3		2	7	3				1	1											12.4
C	3		3	8	3				1	1											16.7

FAO/UNESCO (1988) : Vermic - CALCIC CHERNOZEM

DIAGNOSTIC CRITERIA : mollic A horizon, calcic horizon, soft powdery lime
 soil moisture regime : ustic
 soil temperature regime : mesic

LOCAL CLASSIFICATION : Vermic Chernozem

LOCATION : Stefan voda village, 12 km N of Calarasi, S Romania
 50 m a.s.l.

RELIEF : almost flat, 1 %

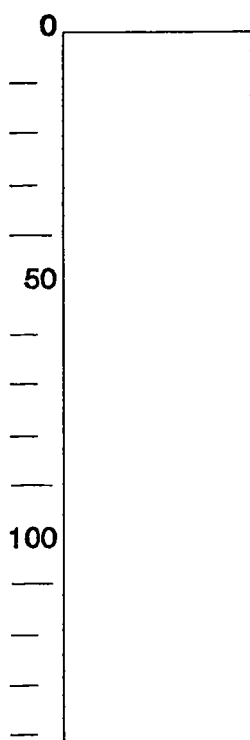
WATER TABLE : no evidence

DRAINAGE : well drained

PARENT MATERIAL: : loess

VEGETATION/ LAND USE : arable land (fallow after wheat)

CLIMATE		Köppen : Cfa													
METEO STATION		: CALARASI, 44°12'N / 27°21'E, 26 m a.s.l.; 12 km S of the site; good relevance													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
EP Thorntwaite	mm	60	0	0	17	52	97	127	147	127	86	47	16	1	717
precipitation	mm	60	38	31	31	37	52	72	56	34	38	34	41	39	503
T mean	°C	60	-2.0	0.1	5.3	11.6	17.1	20.8	23.1	22.0	18.1	12.3	6.2	0.7	11.3



PROFILE DESCRIPTION :

Ap	0 - 20 cm	black (10YR 2/1, moist), very dark greyish brown (10YR 3/2, dry) silty clay loam; moderate fine to coarse granular to porous massive; slightly sticky, slightly plastic, friable, slightly hard; many very fine to medium, interstitial pores, moderately porous; common fine roots; coprogenic elements and krotovinas; clear smooth boundary to
Ah(k)	20 - 38 cm	very dark brown (10YR 2/1.5, moist), very dark greyish brown (10YR 3/2, dry) silty clay loam; strong fine granular to strong coarse granular; slightly sticky, slightly plastic, friable, slightly hard; many very fine to medium, interstitial pores, highly porous; common fine roots; very frequent coprogenic elements and krotovinas; > 30 cm calcareous (HCl); gradual smooth boundary to
ACK1	38 - 58 cm	very dark greyish brown (10YR 3/2, moist), dark greyish brown (10YR 4/2, dry) silty clay loam; moderate medium subangular blocky and moderate coarse subangular blocky; slightly sticky, slightly plastic, friable, slightly hard; many very fine to medium, interstitial pores, highly porous; common fine roots; few small threadlike calcareous crystals, pseudomycelia; very frequent coprogenic elements and krotovinas; strongly calcareous (HCl); gradual smooth boundary to
ACK2	58 - 92 cm	dark brown (10YR 4/2.5, moist), pale brown (10YR 5.5/2.5, dry) silt loam; very weak medium subangular blocky; slightly sticky, slightly plastic, friable, slightly hard; many to many, very fine to medium, interstitial pores, highly porous; common fine roots; threadlike calcareous crystals, pseudomycelia; frequent coprogenic elements and krotovinas; strongly calcareous (HCl); clear smooth boundary to
Ck1	92 - 125 cm	yellowish brown (10YR 5/3.5, moist), pale brown (10YR 6/3, dry) silt loam; porous massive; slightly sticky, slightly plastic, friable, slightly hard; many very fine to medium, interstitial pores, moderately porous; few fine roots; pseudomycelia and large calcareous concretions; few coprogenic elements and krotovinas; strongly calcareous (HCl); gradual smooth boundary to
Ck2	125 - 150 cm	yellowish brown (10YR 5/4, moist), pale brown (10YR 6/3, dry) silt loam; porous massive; slightly sticky, slightly plastic, friable, slightly hard; many very fine to medium, interstitial pores, moderately porous; few fine roots; few large calcareous concretions; few coprogenic elements and krotovinas; strongly calcareous (HCl);

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS		BULK DENS	pF									
			>2000	2000	1000	500	250	100	50	20	10	5	<2	CLAY		0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2		
			1000	500	250	100	50	20	2																
Ap	0	-	20	-	0	1	4	7	3		28	29	29	-	-	-	-	-	-	-	-	-	-	-	-
ACK1	38	-	58	-	0	1	4	8	3		30	26	28	-	1.30	52	51	43	35	32	28	16	14		
ACK2	58	-	92	-	0	1	4	8	3		32	26	26	-	1.26	52	49	43	34	30	26	15	12		
CK1	92	-	125	-	0	1	3	5	2		34	31	24	-	1.35	53	51	45	37	32	26	15	11		

Hor.	pH			ORG.MATTER		EXCHANGEABLE CATIONS				EXCH. ACID.	CEC	CEC	CEC	ECEC	BASE	Al	EC2.5	ESP
	H2O	KCl	CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil		clay	OrgC		
Ap	7.7	7.0	3.1	2.5	0.17	20.0	2.9	0.3	0.0	23.2			28.9		23.2	80	-	0.24
ACK1	7.7	7.3	7.8	1.5	0.15	19.4	1.8	0.3	0.0	21.5	-	-	23.8		21.5	90	-	0.49
ACK2	8.1	7.4	15.8	0.9	0.10	16.1	1.6	0.2	0.0	17.9	-	-	18.0		17.9	99	-	0.25
Ck1	8.4	7.5	24.2	0.5	0.09	13.1	2.2	0.2	0.0	15.5	-	-	13.5		15.5	100	-	0.23
exchangeable bases and CEC soil determined by NH4-acetate at pH 8.2																		

exchangeable bases and CEC soil determined by NH4-acetate at pH 8.2

Hor.	WATER SOLUBLE SALTS										PH	EC5	ECE	SAR	
	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	Sum cat.					Sum ann.
Ap	0.4	0.1	0.0	0.0	0.5	0.0	0.4	0.1	0.1	0.1	0.6	-	0.10	-	0.03
ACK1	0.9	0.1	0.0	0.0	1.0	0.0	0.5	0.1	0.1	0.4	1.0	-	0.19	-	0.02
ACK2	0.6	0.1	0.0	0.0	0.7	0.0	0.6	0.1	0.1	0.0	0.7	-	0.12	-	0.03
ck1	0.5	0.1	0.0	0.0	0.7	0.0	0.6	0.1	0.1	0.0	0.8	-	0.12	-	0.03

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN.		SiO2/ Al2O3/ Fe2O3/ R2O3			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS		Al2O3	Fe2O3	R2O3	Fe2O3
Ap	70.4	11.7	4.3	1.36	1.49	2.04	-	0.80	0.10	0.16	6.8	10.3	43.2	8.3	4.2	
ACK1	67.9	11.2	4.2	3.90	1.57	1.90	-	0.75	0.09	0.17	7.8	10.3	43.3	8.3	4.2	
ACK2	62.5	10.3	3.9	8.41	1.82	1.75	-	0.70	0.08	0.14	10.0	10.3	42.6	8.3	4.2	
CK1	56.8	10.0	3.8	13.43	2.30	1.61	-	0.67	0.07	0.13	13.0	9.7	40.1	7.8	4.1	

EXTRACTABLE Fe, Al, Si, Mn %														by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)		Pret	pHNaF
CLAY MINERALOGY (1 = very weak .. 8 = very strong)														Fe(o)	Al(o)		
Hor. MI VE CH SM KA HA ML QU FE GI GO HE														Si(o)	Fe(d)	Al(d)	Fe(p)
Ap	6	4	4	6				6	2					0.1	0.2	0.0	0.8
ACK1	6	4	6	6				6	2					0.1	0.2	0.1	1.5
ACK2	6	4	6	6				6	2					0.1	0.1	0.0	0.9
CK1	4	4	6	6				6	2					0.1	0.1	0.0	0.5

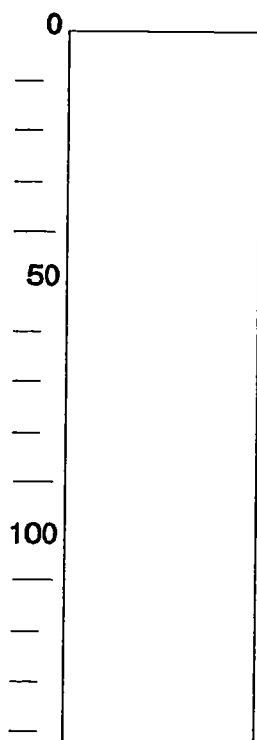
FAO/UNESCO (1988) : CALCIC KASTANOZEM

DIAGNOSTIC CRITERIA : mollic A horizon, calcic horizon
soil moisture regime : xeric
soil temperature regime : frigid

LOCAL CLASSIFICATION : dark chestnut loamy soil

LOCATION : Saratov oblast
RELIEF : unknown
WATER TABLE : not observed
DRAINAGE : well drained
PARENT MATERIAL : clay, clayey texture (Russian designation Syrt clay)
VEGETATION/ LAND USE : arable land

CLIMATE		Köppen : Df													
METEO STATION		: SARATOV, 51°34'N / 46°2'E, 156 m a.s.l., relevance unknown													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
ET	mm		not available												
relative humidity	%	7	84	81	84	69	59	59	60	61	64	72	85	85	72
precipitation	mm	29	34	23	20	27	46	43	51	39	33	32	37	33	418
T mean	°C		not available												
bright sunshine	%	3	21	35	41	43	53	49	54	61	38	59	20	18	41



PROFILE DESCRIPTION :

Ap	0 - 19 cm	dark brown (7.5YR3 3/2, moist) silty clay loam; moderate coarse subangular blocky and moderate platy; many very fine to coarse roots; few pedotubules and coprogenic elements; calcareous (HCl); gradual boundary to
Ah	19 - 35 cm	very dark greyish brown (10YR 3/2, moist) silty clay loam; moderate very fine subangular blocky; fine roots; few pedotubules and coprogenic elements; calcareous (HCl); clear smooth boundary to
AB	35 - 50 cm	brown (10YR 5/3, moist) silty clay loam; moderate subangular blocky; common prominent very dark greyish brown (10YR 3/2, moist) humus cutans on vertical pedfaces; coprogenic elements and pedotubules; calcareous (HCl); gradual smooth boundary to
Bck1	50 - 60 cm	brown (10YR 5/3, moist) silty clay loam; moderate subangular blocky; few distinct humus cutans on vertical pedfaces; many roots; frequent medium irregular hard calcareous nodules; slightly calcareous; gradual smooth boundary to
Bck2	60 - 105 cm	light yellowish brown (10YR 6/4, moist) silty clay loam; moderately coherent massive parting to moderate medium to coarse angular blocky; few medium irregular hard calcareous nodules; slightly calcareous (HCl); gradual smooth boundary to
C	> 105 cm	silty clay loam; slightly calcareous (HCl);

Description of the profile according to Russian description, with additional information from the monolith.

ANALYTICAL DATA (provided by the Dokuchaev Institute of Soil Science, Moscow, unless stated otherwise):

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)							PHYS CLAY <10µm	BULK DENS	pF							
			>1000	1000	250	50	10	5	1			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ap	0 - 15	0	-	-	0	1	20	-	25	9	-	45	79	-	-	-	-	-	-
Ah	15 - 25	0	-	-	0	2	20	-	25	9	-	44	78	-	-	-	-	-	-
Ah	25 - 35	0	-	-	0	0	19	-	30	8	-	44	80	-	-	-	-	-	-
AB	35 - 50	0	-	-	0	7	19	-	23	8	-	42	73	-	-	-	-	-	-
Bck1	50 - 65	0	-	-	1	1	21	-	24	8	-	43	75	-	-	-	-	-	-
Bck2	65 - 85	0	-	-	0	2	20	-	24	7	-	43	74	-	-	-	-	-	-
Bck2	85 - 105	0	-	-	0	6	19	-	24	8	-	41	72	-	-	-	-	-	-
(C)	190 - 210	0	-	-	0	2	20	-	26	9	-	42	77	-	-	-	-	-	-

N.B. textural classes according to Russian class limits.

Hor.	pH	pH	CaCO3	ORG.MATTER		EXCHANGEABLE			CATIONS		EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum										
Ap	7.1	6.8	-	2.4	0.19	25.5	8.0	0.4	0.4	34.3	-	-	-	-	-	-	-	-	-	-
Ah	7.2	6.8	-	2.3	0.17	25.1	8.6	1.0	0.2	34.9	-	-	-	-	-	-	-	-	-	-
Ah	7.3	7.1	-	1.6	0.15	26.8	10.1	1.0	0.3	38.2	-	-	-	-	-	-	-	-	-	-
AB	7.7	7.4	-	1.4	0.14	-	-	-	0.1	-	-	-	-	-	-	-	-	-	-	-
Bck1	8.0	7.5	-	1.0	0.13	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-
Bck2	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-
Bck2	8.4	7.6	-	-	-	-	-	-	1.1	-	-	-	-	-	-	-	-	-	-	-
(C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Analytical data pH by ISRIC.

Hor.	WATER SOLUBLE SALTS				CO3	HCO3	Cl	SO4	NO3	Sum cat.	Sum ann.	PH	EC5	ECE	SAR
	Ca	Mg	Na	K											
Ap	0.3	0.1	0.3	-	0.7	-	0.3	0.1	0.3	-	0.7	-	-	-	-
Ah	0.2	0.2	0.0	-	0.3	-	0.3	0.0	0.0	-	0.3	-	-	-	-
Ah	0.9	0.3	0.0	-	1.1	-	1.0	0.0	0.1	-	1.1	-	-	-	-
AB	1.0	0.4	0.0	-	1.4	-	1.1	0.0	0.2	-	1.3	-	-	-	-
Bck1	1.0	0.3	0.1	-	1.3	-	1.2	0.0	0.1	-	1.3	-	-	-	-
Bck2	0.4	0.5	0.7	-	1.5	-	1.3	0.1	0.2	-	1.5	-	-	-	-
Bck2	0.4	0.1	1.4	-	1.8	-	1.7	0.0	0.1	-	1.8	-	-	-	-
(C)	0.3	0.4	3.8	-	4.5	-	1.2	0.8	2.5	-	4.5	-	-	-	-

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. P2O5 LOSS	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO						
Ap	68.7	15.5	4.5	1.70	2.10	1.23	1.17	0.07	0.40	0.06	8.2	7.5	40.0	6.3	5.3
Ah	68.6	15.4	4.8	1.62	2.12	1.25	1.24	0.07	0.41	0.09	7.2	7.6	37.5	6.3	5.0
Ah	68.8	15.1	4.9	1.47	2.25	1.31	1.24	0.07	0.41	0.18	7.0	7.7	36.8	6.4	4.8
AB	68.9	12.8	5.6	1.80	4.39	1.49	1.28	0.07	0.46	0.07	8.1	9.1	32.3	7.1	3.5
Bck1	68.9	13.0	5.8	1.82	4.30	1.62	1.41	0.08	0.46	0.13	8.0	9.0	31.2	7.0	3.5
Bck2	68.9	13.7	6.0	1.83	2.68	1.65	1.60	0.08	0.43	0.15	8.6	8.5	30.1	6.7	3.5
Bck2	68.3	13.7	6.1	1.83	3.28	1.82	1.66	0.08	0.47	0.14	9.4	8.5	29.4	6.6	3.5
(C)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Data concern the non-carbonate and non-sulphate part of the soil															

Data concern the non-carbonate and non-sulphate part of the soil

FAO/UNESCO (1988) : H A P L I C C A L C I S O L

DIAGNOSTIC CRITERIA : ochric A horizon, cambic B horizon, calcic horizon
 soil moisture regime : aridic, limit to xeric
 soil temperature regime : mesic

LOCAL CLASSIFICATION : sierozem

LOCATION : 16 km W of Karapinar, Konya basin, Central Anatolia
 1003 m a.s.l.

RELIEF : almost flat 0 %

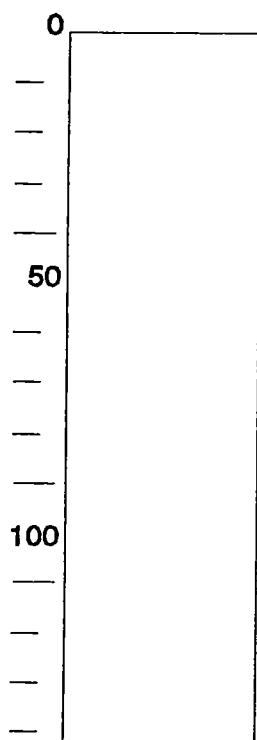
WATER TABLE : no evidence

DRAINAGE : moderately well

PARENT MATERIAL : clayey lacustrine Pleistocene sediments

VEGETATION/ LAND USE : semi natural grassland, grazed steppe

CLIMATE		Köppen : Dsa													
METEO STATIONS		: CUMRA 37°34'N / 32°38'E and KARAPINAR (WMO: 17.2470), 37°41'N / 33°32'E, 1004 m a.s.l CUMRA 40 km W of site (moderate); KARAPINAR 7 km WSW of site; very relevant													
combined data		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
EP Frere, Popov	mm		11	24	55	93	136	181	230	203	130	60	25	13	1161
precipitation	mm	16	36	32	30	22	42	18	2	1	8	14	26	46	277
max amount P mm/24hrs			32.4	33.0	21.4	29.5	27.5	25.1	17.0	4.4	14.9	28.0	25.6	20.6	33.0
mean no. days P<=0.1mm			7.0	7.6	7.0	6.0	7.8	4.0	0.6	0.2	1.6	2.9	4.5	8.5	57.7
mean no. days with snow			4.4	4.0	1.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1.1	2.3	13.1
T mean	°C	7	-0.4	1.6	5.8	10.4	15.2	19.7	22.7	21.9	17.0	11.1	6.3	3.0	11.2
T max	°C	7	5.2	7.8	12.7	18.1	22.5	27.2	30.4	30.5	26.4	20.0	14.2	8.2	18.6
T min	°C	7	-5.4	-4.1	-0.4	2.3	6.8	10.2	12.6	11.7	7.3	2.4	-0.6	-1.6	3.4
T mean soil -50 cm	°C		4.5	4.7	7.5	12.0	16.5	20.5	23.5	24.0	21.2	16.6	12.5	7.5	14.3



PROFILE DESCRIPTION :

Ah1	0 - 3 cm	greyish brown (2.5Y 5/2, moist), light grey (2.5Y 7/2, dry) loam; moderate very fine platy; non sticky, slightly plastic, very friable, soft; common roots; strongly calcareous (HCl); abrupt smooth boundary to
Ah2	3 - 33 cm	greyish brown (2.5Y 5/2, moist), light grey (2.5Y 7/2, dry) silty clay loam; moderate medium granular; slightly sticky, plastic, friable, very hard; few roots; strongly calcareous (HCl); abrupt smooth boundary to
B(c)k	33 - 55 cm	pale yellow (5Y 6.5/3, moist), white (2.5Y 8/2, dry) silt loam; moderate coarse angular blocky; non sticky, plastic, friable, very hard; strongly calcareous (HCl); clear smooth boundary to
Bk	55 - 83 cm	greyish brown (2.5Y 5/2, moist), white (2.5Y 7.5/2, dry) silty clay loam; strong coarse angular blocky; sticky, plastic, friable, hard; strongly calcareous (HCl); gradual smooth boundary to
C	> 83 cm	light brownish grey (2.5Y 6/2, moist), white (2.5Y 7.5/2, dry) silty clay loam; moderate coarse angular blocky; sticky, plastic, friable, very hard; few roots; strongly calcareous (HCl)

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	10	5			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah1	0 - 3	-	0	0	0	0	3	7	14	19	56	-	-	-	-	-	-	-	-	-	-	-
Ah2	3 - 33	-	0	0	1	3	5	12	15	64	-	-	-	-	-	-	-	-	-	-	-	-
B(c)k	33 - 55	-	0	0	1	2	3	10	15	69	-	-	-	-	-	-	-	-	-	-	-	-
Bk	55 - 83	-	0	0	1	3	12	20	63	-	-	-	-	-	-	-	-	-	-	-	-	-
C	83 - 110	-	0	0	0	2	4	11	22	61	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS				EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	dS/m EC2.5	ESP
Ah1	8.0	7.3	50.4	1.1	0.13	24.3	2.2	1.8	0.1	28.4	-	-	17.2	-	28.4	>100	-	0.27	
Ah2	8.2	7.4	55.9	0.8	0.11	20.8	2.6	1.3	0.2	24.9	-	-	17.4	-	24.9	100	-	0.26	
B(c)k	8.5	7.9	64.3	0.6	0.07	18.2	8.3	0.4	0.4	27.3	-	-	15.8	-	27.3	>100	-	0.87	2
Bk	8.5	8.0	68.4	0.3	0.05	17.8	11.8	0.4	0.5	30.5	-	-	15.9	-	30.5	>100	-	1.79	2
C	8.1	7.7	60.8	0.2	0.04	20.0	10.8	0.4	0.5	31.7	-	-	15.6	-	31.7	>100	-	4.20	3

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL %										IGN. P2O5	LOSS	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3	% CaSO4	P2O5 mg/kg
Ah1	31.4	7.8	3.1	25.47	2.41	1.38	-	0.38	0.04	0.17	26.0	6.8	27.0	5.5	3.9	-	-	758
Ah2	28.3	7.2	2.8	27.31	2.43	1.24	-	0.33	0.03	0.16	27.6	6.7	26.9	5.3	4.0	-	-	349
B(c)k	23.3	6.0	2.4	29.94	2.93	0.77	-	0.27	0.02	0.13	30.4	6.6	25.8	5.3	3.9	0.1	-	440
Bk	26.3	7.1	2.8	28.28	3.22	0.80	-	0.33	0.03	0.12	28.2	6.3	25.0	5.0	4.0	0.1	-	529
C	26.3	7.0	2.8	28.16	3.24	0.85	-	0.32	0.03	0.11	27.6	6.4	25.0	5.1	3.9	0.2	-	384

remarks: P2O5 citric acid extr.

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION %										IGN. P2O5	LOSS	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
Ah1	51.4	18.7	8.5	1.7	4.3	3.3	-	0.8	0.1	0.3	10.2	4.7	16.0	3.6	3.4	
Ah2	41.9	17.3	7.9	4.3	4.6	3.0	-	0.7	0.1	0.3	12.4	4.8	16.7	3.7	3.5	
B(c)k	38.5	13.4	6.3	8.7	4.1	1.9	-	0.6	0.1	0.2	26.3	4.9	16.2	3.8	3.3	
Bk	42.2	15.4	7.2	11.2	4.4	2.1	-	0.6	0.1	0.2	16.4	4.7	15.5	3.6	3.3	
C	42.7	15.5	7.2	10.9	4.6	2.0	-	0.6	0.0	0.1	16.4	4.7	15.7	3.6	3.4	

EXTRACTABLE Fe, Al, Si, Mn %																
CLAY MINERALOGY (1 = very weak .. 8 = very strong)																
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	MX		Pret	pHNaF
Ah1	4	4	4	4	4	2			2	0.1	0.2	0.1	0.2	0.0	0.0	-
Ah2	4	4	4	4	4	2			2	0.1	0.1	0.1	0.1	0.0	0.0	-
B(c)k	4	4	6	4	4	2			2	0.1	0.1	0.1	0.1	0.0	0.1	-
Bk	4	4	6	4	4	2			2	0.1	0.1	0.1	0.1	0.0	0.2	-
C	4	4	6	4	4	2			2	0.1	0.1	0.1	0.1	0.0	0.1	-

Remarks: Light minerals: ca 15 % K-felspar, ca 37 % plagioclase
Heavy minerals: 15 - 20 % pyroxene, 71 - 87 % amphiboles, 2 % epidote, 1 - 2 % garnet

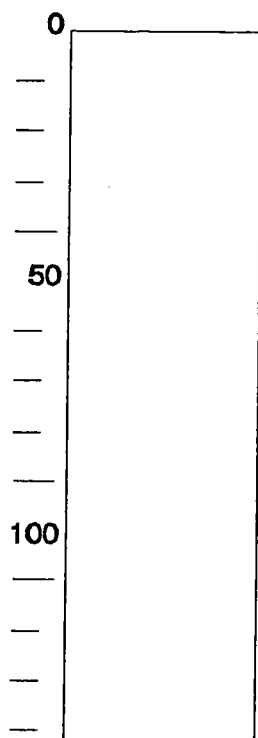
FAO/UNESCO (1988) : CALCIC GYPSSOL

DIAGNOSTIC CRITERIA : ochric A horizon, cambic B horizon, gypsic horizon, calcic horizon
soil moisture regime : aridic
soil temperature regime : hyperthermic

LOCAL CLASSIFICATION : Gypsic Yermosol, Yy3m Series

LOCATION : Huwayyah south, 650 m S of graded track to Mahdah, 8 km N of Buriami
between 300 and 600 m a.s.l.
RELIEF : nearly level, 1 %
WATER TABLE : - 190 cm (groundwater)
DRAINAGE : well drained
PARENT MATERIAL : sandy alluvium overlying gravelly deposits at 85 cm
VEGETATION/ LAND USE : xeromorphic dwarf-shrub, natural vegetation: Haloxylon salicornum, Citrullus colocynthus,
few Acacia sp.

CLIMATE		Köppen : Bwh													
METEO STATION		: SJARJAH (U A E) 25°20'N / 55°24'E, 5 m a.s.l., 150 km WNW of the site, relevance poor (altitude)													
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Penman	mm	-	31	37	56	100	171	185	205	200	170	144	86	47	1432
relative humidity	%	10	71	72	68	65	62	65	64	65	69	70	69	72	68
precipitation	mm	12	23	23	10	5	0	0	0	0	0	0	10	30	101
max precip	mm		59	106	48	11	6	0	1	<1	<1	2	113	63	229
days with precip >0.1mm		12	2	2	1	<1	0	0	0	0	0	0	<1	2	9
T mean	°C	11	17.8	18.9	21.1	24.2	28.1	30.6	32.8	33.6	31.1	27.5	24.2	20.0	25.8
T max	°C	11	23.3	23.9	26.7	30.0	33.9	36.1	37.8	39.4	37.2	33.3	30.6	25.6	31.7
T min	°C	11	12.2	13.9	15.6	18.3	22.2	25.0	27.8	27.8	25.0	21.7	17.8	14.4	20.0
windspeed(at 2m)	m/s		3.1	3.1	3.1	3.1	3.1	3.1	3.1	3.1	2.6	2.6	2.6	2.6	2.9



PROFILE DESCRIPTION :

A	0 - 20 cm	yellowish brown (10 YR 5/6, moist) fine sandy loam; very weak medium subangular blocky; friable; few fine pores; common fine roots; gradual smooth boundary to
Bw	20 - 35 cm	yellowish brown (10 YR 5/4, moist) fine sandy loam; weak medium subangular blocky; friable; many fine pores; few coarse roots and fine roots; gradual smooth boundary to
Bkg	35 - 85 cm	10 YR 5/5, moist slightly gravelly sandy clay loam (with gravel layer between 35 and 45 cm); weak medium subangular blocky; friable; faint reddish yellow (5 YR 6/6) mottles; many fine pores; few coarse roots; very few small irregular hard calcareous concretions; clear wavy boundary to
2Byg	85 - 115 cm	10 YR 5/5, moist gravelly sandy clay loam; massive; very firm; many distinct strong brown (7.5 YR 5/8) mottles; very frequent small irregular hard gypsiferous crystal and very few concretions; weakly cemented; gradual smooth boundary to
3Byg	115 - 140 cm	very pale brown (10 YR 7/3, moist) sandy clay loam; massive; many distinct strong brown (7.5 YR 5/8) mottles; abundant medium angular hard gypsum concretions and small gypsiferous crystals; weakly cemented;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	2	20			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
A	0 - 5	-	4	3	2	33	44		3	5	7	-	-	-	-	-	-	-	-	-	-	-
A	5 - 20	-	5	2	2	27	40		5	9	9	-	-	-	-	-	-	-	-	-	-	-
Bw	20 - 35	-	5	2	2	25	40		6	7	12	-	-	-	-	-	-	-	-	-	-	-
Bkg	40 - 80	-	2	1	2	29	41		5	8	12	-	-	-	-	-	-	-	-	-	-	-
2Byg	90 - 120	40	0	0	1	20	35		5	18	20	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	AL SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum										
A	7.9	7.8	36.4	0.2	-	11.1	0.8	0.4	0.0	12.3	-	-	5.4		12.3	**	-	1.90		
A	8.6	8.1	40.6	0.1	-	6.5	1.0	0.4	0.0	7.9	-	-	6.2		7.9	100	-	0.18		
Bw	8.7	8.1	41.6	0.1	-	5.7	1.1	0.4	0.0	7.2	-	-	4.7		7.2	**	-	0.16		
Bkg	8.5	8.1	36.9	0.0	-	5.1	0.8	0.3	0.0	6.2	-	-	3.4		6.2	**	-	0.21		
2Byg	7.9	7.5	29.3	0.0	-	41.5	0.2	0.2	0.0	41.9	-	-	3.4		41.9	**	-	2.00		
remark samples 1 - 5: CEC: ** means largely over 100 % base saturation																				
remark samples 1 - 4: Materials <50 µm: calcite(xxx), dolomite(x), gypsum(trace)																				
remark sample 5: Materials <50 µm: calcite(xxx), gypsum(x)																				

Hor.	WATER SOLUBLE SALTS										pH	EC5	ECE	SAR
	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3	Sum cat.				
A	4.8	1.2	0.7	0.3		1.7	0.8	3.7				0.13	0.75	
A	4.7	1.4	0.4	0.2		1.3	0.4	4.5				0.19	0.61	
Bw	11.0	3.1	0.6	0.6		1.3	0.6	14.0				0.13	1.14	
Bkg	26.0	6.0	0.9	0.3		1.6	7.6	24.4				0.80	2.04	
2Byg	28.5	1.7	0.7	0.2		0.9	0.5	29.4				1.74	1.94	

data provided by Sultanate of Oman Ministry of Agriculture and Fishery (Groundw.Dev.Consult.Int.,Ltd), Ruwi, Oman

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
A	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	
A	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	
Bw	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	
Bkg	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	
2Bvg	-	-	-	-	-	-	-	-	-	-	-	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-	-	

FAO/UNESCO (1988) : Sodi - G L E Y I C S O L O N C H A K

DIAGNOSTIC CRITERIA : ochric A horizon, cambic B horizon, calcic horizon, salic properties
 soil moisture regime : aquic
 soil temperature regime : mesic

LOCAL CLASSIFICATION : sodic solonchak

LOCATION : Apaj, 40 km S of Budapest
 115 m a.s.l.

RELIEF : flat, 0 %

WATER TABLE : - 75 cm

DRAINAGE :

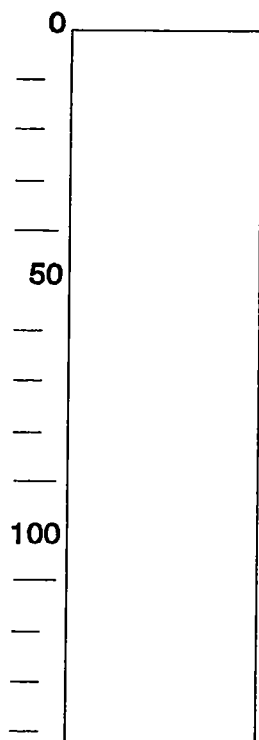
PARENT MATERIAL : calcareous sandy Donau alluvia

VEGETATION/ LAND USE : salt tolerant semi-natural grassland

CLIMATE Köppen : Cfb

METEO STATION : BUDAPEST 47°31'N / 19°02'E, 120 m a.s.l., 25 km N of the site, good relevance

		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Thornthwaite	mm	30	0	2	23	51	100	124	140	122	77	43	13	2	697
precipitation	mm	30	42	44	39	45	72	76	54	51	34	56	69	48	630
T mean	°C	30	-1.1	1.0	5.8	11.8	16.8	20.2	22.2	21.4	17.4	11.3	5.8	1.5	11.2



PROFILE DESCRIPTION :

Ah _{zg}	0 - 4 cm	grey (5Y 6/1, dry) sandy loam; moderate coarse subangular blocky; calcareous (HCl) throughout;
AB _{zg}	4 - 16 cm	light grey (5Y 7/1, dry) loam; moderate coarse subangular blocky and moderate coarse platy; calcareous (HCl);
Bw _{zg1}	16 - 29 cm	light grey (5Y 7/1, dry) loam; moderate medium angular blocky; calcareous (HCl);
Bw _{zg2}	29 - 41 cm	light grey (5Y 7/1, dry) sandy clay loam; moderate coarse angular blocky; calcareous (HCl);
BC _{zg}	41 - 55 cm	white (5Y 8/1, dry) sandy loam; moderate; calcareous (HCl);
C1 _{zg}	55 - 90 cm	light grey (5Y 7/2, dry) loamy sand; structureless; calcareous (HCl);
C2 _{zg}	> 90 cm	light grey (5Y 7/2, dry) sand; structureless; calcareous (HCl) throughout;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	10	5			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah _{zg}	0 - 4	0	0	1	10	32	23	16	10	8	-	-	-	-	-	-	-	-	-	-	-	-
AB _{zg}	4 - 16	0	0	1	7	24	18	16	14	18	-	-	-	-	-	-	-	-	-	-	-	-
B _{zg1}	16 - 29	0	0	1	6	20	17	13	19	25	-	-	-	-	-	-	-	-	-	-	-	-
B _{zg2}	29 - 41	0	1	1	5	23	21	12	15	23	-	-	-	-	-	-	-	-	-	-	-	-
BC _{zg}	41 - 55	0	0	1	6	32	26	9	11	15	-	-	-	-	-	-	-	-	-	-	-	-
C1 _{zg}	55 - 70	0	0	0	9	49	26	5	6	6	-	-	-	-	-	-	-	-	-	-	-	-
C2 _{zg}	90 - 100	0	0	1	10	29	28	10	13	9	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH			ORG. MATTER		EXCHANGEABLE CATIONS					EXCH. ACID.	CEC	CEC	CEC	BASE	Al	EC2.5	ESP
	H ₂ O	KCl	CaCO ₃	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC	ECEC	SAT	SAT
Ah _{zg}	9.9	9.7	11.0	0.4	0.05	-	-	-	-	-	-	-	-	-	-	-	4.00	46
AB _{zg}	9.9	9.3	16.3	0.4	0.04	-	-	-	-	-	-	-	-	-	-	-	1.95	55
B _{zg1}	9.9	8.6	25.3	0.2	0.04	-	-	-	-	-	-	-	-	-	-	-	1.18	50
B _{zg2}	10.0	8.7	37.0	0.2	0.03	-	-	-	-	-	-	-	-	-	-	-	0.96	42
BC _{zg}	10.0	9.0	35.8	0.1	0.01	-	-	-	-	-	-	-	-	-	-	-	0.90	50
C1 _{zg}	10.0	9.2	23.7	0.1	0.01	-	-	-	-	-	-	-	-	-	-	-	0.87	-
C2 _{zg}	10.0	9.1	31.3	0.1	0.01	-	-	-	-	-	-	-	-	-	-	-	0.58	-

data on ESP provided by RISSAC, Budapest

Hor.	WATER SOLUBLE SALTS				CO ₃	HCO ₃	Cl	SO ₄	NO ₃	Sum cat.	Sum an.	PH	EC5	ECE	SAR
	Ca	Mg	Na	K											
Ah _{zg}	0.0	0.0	11.9	0.1	12.0	5.7	4.0	1.8	2.9	-	14.4	-	2.18	-	119.20
AB _{zg}	0.0	0.0	6.2	0.1	6.3	3.8	4.6	1.0	1.1	-	10.5	-	1.22	-	31.00
B _{zg1}	0.0	0.1	4.3	0.1	4.4	3.7	13.2	0.3	0.7	-	17.9	-	0.78	-	17.40
B _{zg2}	0.0	0.1	3.7	0.1	3.9	2.9	8.2	0.3	0.4	-	11.9	-	0.63	-	15.00
BC _{zg}	0.0	0.0	3.0	0.1	3.2	2.1	2.4	0.3	0.5	-	5.3	-	0.55	-	15.10
C1 _{zg}	0.0	0.0	2.2	0.1	2.3	1.4	0.8	0.5	0.6	-	3.2	-	0.50	-	12.70
C2 _{zg}	0.0	0.0	1.9	0.1	2.0	1.2	0.9	0.3	0.4	-	2.7	-	0.40	-	11.00

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. LOSS	SiO ₂ / Al ₂ O ₃			
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	K ₂ O	Na ₂ O	TiO ₂	MnO ₂	P ₂ O ₅		Al ₂ O ₃	Fe ₂ O ₃	R ₂ O ₃	Al ₂ O ₃ / Fe ₂ O ₃
Ah _{zg}	77.5	6.1	1.7	4.79	1.97	1.20	-	0.54	0.04	0.13	5.8	21.6	121	18.3	5.6
AB _{zg}	68.7	8.0	2.5	7.19	2.78	1.50	-	0.56	0.06	0.12	8.5	14.6	73.2	12.2	5.0
B _{zg1}	60.7	8.2	2.8	10.57	3.36	1.51	-	0.50	0.05	0.11	12.1	12.6	57.7	10.3	4.6
B _{zg2}	50.4	7.1	2.5	15.18	4.99	1.27	-	0.42	0.04	0.10	17.5	12.0	53.7	9.8	4.5
BC _{zg}	53.9	6.3	2.1	13.88	5.38	1.16	-	0.40	0.04	0.10	16.5	14.5	68.3	12.0	4.7
C1 _{zg}	67.4	5.5	1.6	9.89	3.43	1.10	-	0.32	0.03	0.07	11.0	20.8	112	17.5	5.4
C2 _{zg}	58.6	6.7	2.1	10.08	5.99	1.30	-	0.29	0.04	0.07	14.4	14.8	74.3	12.4	5.0

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION										IGN. LOSS	SiO ₂ / Al ₂ O ₃			
	SiO ₂	Al ₂ O ₃	Fe ₂ O ₃	CaO	MgO	K ₂ O	Na ₂ O	TiO ₂	MnO ₂	P ₂ O ₅		Al ₂ O ₃	Fe ₂ O ₃	R ₂ O ₃	Al ₂ O ₃ / Fe ₂ O ₃
Ah _{zg}	51.4	19.4	8.6	1.0	4.8	3.9	-	0.8	0.1	0.2	8.2	4.5	15.7	3.5	3.5
AB _{zg}	51.5	20.4	8.9	0.6	4.6	4.0	-	0.8	0.1	0.2	7.4	4.3	15.2	3.3	3.5
B _{zg1}	51.6	21.1	9.4	0.8	4.4	3.9	-	0.7	0.1	0.2	7.6	4.2	14.4	3.2	3.5
B _{zg2}	41.0	17.2	7.6	9.7	5.1	3.0	-	0.6	0.1	0.2	15.2	4.0	14.1	3.1	3.5
BC _{zg}	42.8	18.3	7.9	6.8	4.7	3.1	-	0.6	0.1	0.2	13.3	4.0	14.2	3.1	3.6
C1 _{zg}	49.4	20.6	9.3	1.1	4.6	3.5	-	0.7	0.1	0.6	8.3	4.1	13.9	3.1	3.4
C2 _{zg}	38.0	17.0	8.2	7.9	8.1	2.7	-	0.6	0.1	0.3	8.1	3.8	12.2	2.9	3.2

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) &- pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
Ahzg	4	4		4	4			4	2				-	-	-	-	-	-	-	-		
ABzg	4	4		4	4			4					-	-	-	-	-	-	-	-		
Bzg1	4	4		4	4			4	2				-	-	-	-	-	-	-	-		
Bzg2	4	4		4	4			4	2				-	-	-	-	-	-	-	-		
BCzg	4	4		4	4			4	2				-	-	-	-	-	-	-	-		
C1zg	4	4		4	4			4	2				-	-	-	-	-	-	-	-		
C2zg	4	4		4	4			4	2				-	-	-	-	-	-	-	-		

FAO/UNESCO (1988) : H A P L I C S O L O N E T Z

DIAGNOSTIC CRITERIA : ochric A horizon, natric B horizon
soil moisture regime : ustic
soil temperature regime : thermic

LOCAL CLASSIFICATION : Estcourt Form, Nuweplaas Family, Dohne Series

LOCATION : 2 km NW of Wartburg, 8 km SSE of New Hannover, Natal Province
878 m a.s.l.

RELIEF : undulating, slope 5 %, no erosion

WATER TABLE : not observed

DRAINAGE : imperfect

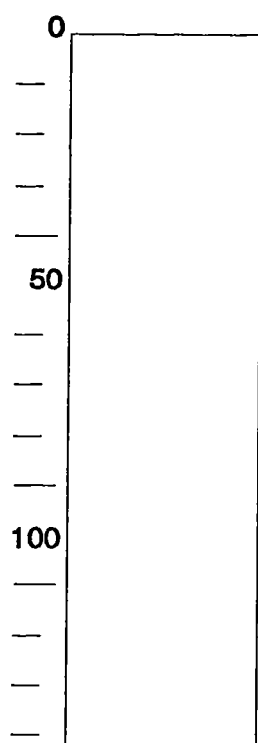
PARENT MATERIAL : colluvium derived from Table Mountain Sandstone formation

VEGETATION/ LAND USE : arable land (maize)

CLIMATE Köppen : Cw

METEO STATION : ESTCOURT 29°01' S / 29°52' E, 1180 m a.s.l., 80 NW of the site, moderately relevant

	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Frere, Popov	mm	135	108	98	70	51	28	41	60	106	123	130	141	1091
precipitation	mm	127	113	98	41	17	7	9	16	31	64	92	123	738
est.glob.rad.MJ/m ² /day		15.9	16.6	13.4	11.7	10.0	9.7	10.0	10.9	13.7	14.1	15.6	15.4	13.1
T mean	°C	21	21	20	17	14	11	11	13	16	18	19	21	16.8
T max	°C	27	27	26	24	21	19	19	21	24	25	26	27	23.8
T min	°C	15	15	14	11	6	3	2	5	8	11	13	14	9.8
windspeed(at 2m)	m/s	2.1	1.5	1.3	1.5	1.3	1.1	1.7	1.7	2.3	2.5	2.7	2.3	1.8
vapour pressure	mbar	16.6	16.7	16.1	13.0	9.5	7.0	6.5	7.8	10.1	12.5	14.2	15.8	12.2
bright sunshine	%	54	56	60	68	75	83	84	72	69	57	53	50	65



PROFILE DESCRIPTION :

Ah	0 - 12 cm	very dark brown (7.5YR 2.5/3, moist), brown (7.5YR 4/2, dry) loamy sand; structureless single grain; non sticky, non plastic, very friable, soft; few very fine roots; clear smooth boundary to
E	12 - 22 cm	very dark brown (7.5YR 1.5/2, moist), brown (7.5YR 4/2, dry) loamy sand; single grain; non sticky, non plastic, very friable, soft; few very fine roots; abrupt wavy boundary to
Btn1	22 - 50 cm	dark brown (7.5YR 3.5/2.5, moist), dark brown (7.5YR 3/2, dry) and black (10YR 1.5/1, moist and dry), sandy clay loam; strong coarse columnar, ped faces very dark grey (7.5YR 3/1, moist), brown (7.5YR 4.5/2, dry); sticky, plastic, extremely firm, extremely hard; common fine distinct clear strong brown (7.5YR 5/8) and common fine distinct clear brown (7.5YR 4/2) mottles; brownish black (7.5YR 3/1, dry) coatings at top of columns; clear wavy boundary to
Btn2	50 - 75 cm	very dark brown (10YR 2/1.5, moist) clay; weak coarse angular blocky; sticky, plastic, firm, extremely hard; common fine distinct clear brownish yellow (10YR 6/6) and common medium distinct clear greyish brown (2.5Y 5/2) mottles; gradual smooth boundary to
C	> 75 cm	yellowish brown (10YR 5/4.5, moist) clay; very weak massive; sticky, plastic, very friable, very hard; common fine faint clear greyish brown (10YR 5/2) mottles;

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (μm)												pF											
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	50	20	WDIS	BULK													
			1000	500	250	100	50	20	2	<2			CLAY	DENS	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2			
Ah	0 - 15	-	1	9	21	35	11		11	6	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
E	15 - 23	-	1	8	20	26	10		11	7	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Btn1	23 - 45	-	0	6	15	22	7		9	11	36	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Btn1/2	45 - 60	-	1	5	14	21	7		10	5	38	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Btn2	60 - 70	-	1	5	12	16	5		7	6	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C	70 - 100	-	1	5	12	17	5		7	5	48	-	-	-	-	-	-	-	-	-	-	-	-	-	-
C	100 - 110	-	1	5	12	18	5		5	5	49	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH		pH		ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. ACID.		CEC		CEC		CEC		BASE		Al		EC2.5	ESP
	H2O	KCl	CaCO3	CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC	ECEC	SAT	SAT	SAT	SAT	EC2.5	ESP		
Ah	5.6	4.5	0.0	0.0	1.4	0.08	2.7	1.3	0.2	0.1	4.3	-	-	7.0	-	-	4.3	61	-	-	-	0.06	1	-	-
E	5.9	4.6	0.0	0.0	1.0	0.07	2.5	1.3	0.1	0.3	4.2	-	-	6.1	-	-	4.2	69	-	-	-	0.07	5	-	-
Btn1	7.3	5.9	0.0	0.0	0.9	0.08	7.1	9.8	0.2	3.7	20.8	-	-	22.2	-	-	20.8	94	-	-	-	0.53	17	-	-
Btn1/2	8.0	6.4	0.0	0.0	0.5	0.04	6.9	9.8	0.1	4.4	21.2	-	-	22.2	-	-	21.2	95	-	-	-	0.83	20	-	-
Btn2	8.2	6.9	0.0	0.0	0.4	0.04	7.1	10.7	0.2	5.1	23.1	-	-	22.0	-	-	23.1	100	-	-	-	1.07	23	-	-
C	8.4	7.2	0.4	0.3	0.3	0.02	7.3	10.7	0.3	5.1	23.4	-	-	23.0	-	-	23.4	100	-	-	-	1.11	22	-	-
C	8.2	6.6	0.0	0.3	0.3	0.02	6.7	10.7	0.2	5.2	22.8	-	-	21.2	-	-	22.8	100	-	-	-	0.99	25	-	-

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. LOSS	SiO2/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/Fe2O3
Ah	95.4	1.7	1.2	0.04	0.07	0.21	-	0.34	0.01	0.02	3.0	95.2	212	65.7	2.2
E	95.1	1.4	1.1	0.04	0.08	0.16	-	0.37	0.00	0.00	2.2	115	230	76.8	2.0
Btn1	81.2	8.3	4.6	0.20	0.40	0.23	-	0.56	0.01	0.01	5.3	16.6	47.0	12.3	2.8
Btn1/2	80.9	8.6	4.5	0.18	0.45	0.23	-	0.58	0.01	0.00	4.8	16.0	47.9	12.0	3.0
Btn2	73.7	13.9	6.3	0.21	0.55	0.26	-	0.71	0.01	0.00	6.0	9.0	31.1	7.0	3.5
C	74.0	13.5	6.8	0.28	0.57	0.26	-	0.70	0.01	0.00	5.7	9.3	29.0	7.0	3.1
C	74.0	13.3	6.5	0.15	0.50	0.25	-	0.67	0.01	0.00	5.5	9.4	30.3	7.2	3.2

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION										IGN. LOSS	SiO2/			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/Fe2O3
Ah	61.5	17.4	9.2	0.4	0.4	0.6	-	2.4	0.1	0.5	8.7	6.0	18.1	4.5	3.0
E	66.1	15.1	8.2	0.1	0.5	0.5	-	2.3	0.0	0.3	7.0	7.5	21.5	5.5	2.9
Btn1	52.2	24.0	1.2	0.1	1.0	0.4	-	1.2	0.0	0.1	10.3	3.7	12.4	2.9	3.4
Btn1/2	53.9	25.1	10.1	0.1	1.1	0.4	-	1.3	0.0	0.1	10.2	3.7	14.2	2.9	3.9
Btn2	50.5	28.0	8.8	0.1	1.0	0.4	-	1.2	0.0	0.1	11.2	3.1	15.3	2.5	5.0
C	49.7	27.4	8.7	0.1	0.9	0.4	-	1.2	0.0	0.1	11.2	3.1	15.1	2.6	4.9
C	49.0	27.5	8.9	0.1	0.6	0.4	-	1.1	0.0	0.1	11.4	3.0	14.7	2.5	4.9

EXTRACTABLE Fe, Al, Si, Mn %														
by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)														
Fe(o) Al(o) Si(o) Fe(d) Al(d) Fe(p) Al(p)														
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Pret	pHNaF
Ah					4	6	6						-	-
E					4	6	6						-	-
Btn1		6	6		4								-	-
Btn1/2		6	6		4								-	-
Btn2		4	8		4	2							-	-
C		4	8		4	2							-	-
C		4	8		4	2							-	-

NL

NETHERLANDS

FAO/UNESCO (1988) : E U T R I C F L U V I S O L

DIAGNOSTIC CRITERIA : ochric A horizon, fluvic properties
 soil moisture regime : udic
 soil temperature regime : mesic

LOCAL CLASSIFICATION : Poldervaaggrond, Rn44C

LOCATION : Doodewaardse Veld
6 m a.s.l.

RELIEF : flat, 0 %

WATER TABLE : - 80 cm (groundwater) controled water level between -30 and -100 cm

DRAINAGE : poorly drained

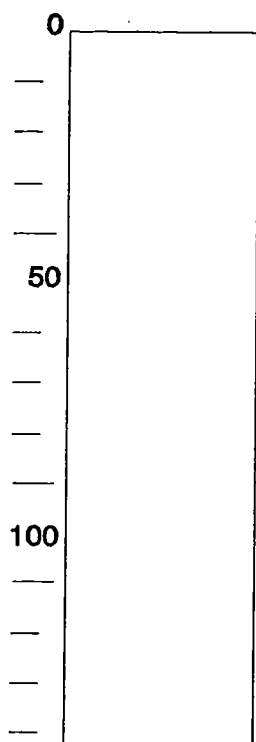
PARENT MATERIAL : Late Holocene Rhine alluvia

VEGETATION/ LAND USE : pasture and meadow, both for hay and silage

CLIMATE Köppen : Cfb

METEO STATION : DE BILT; 52°06'N / 5°11'E, 3 m a.s.l.; 35 km ESE of the site; moderately relevant

	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Thornthwaite	40	7	9	24	47	88	112	123	109	76	43	18	8	664
precipitation	mm	68	52	45	49	52	58	77	88	71	72	70	63	765
T mean	°C	1.7	2.0	5.0	8.5	12.4	15.5	17.0	16.8	14.3	10.0	5.9	3.9	9.3



PROFILE DESCRIPTION (Mitt.Deutschen.Bodenk.Gesellsch., vol 47, 1986, page 230 ff):

Ah1	0 - 7 cm	very dark greyish brown (10YR 3/3, moist) clay; weak very fine subangular blocky; sticky, plastic, friable; common fine and very fine pores; many very fine and fine roots; clear smooth boundary to
Ah2	7 - 20 cm	very dark greyish brown (10YR 3/3, moist) clay; moderate coarse prismatic into moderate fine angular blocky; sticky, plastic, friable; common fine and very fine pores; common very fine and fine roots; clear smooth boundary to
ACg	20 - 40 cm	greyish brown (10YR 4.5/2, moist) clay; weak coarse prismatic into strong fine and medium angular blocky; sticky, plastic, friable; common fine distinct, sharp, strong brown mottles around root channels; few pores; few roots; clear smooth boundary to
2Ahg	40 - 53 cm	dark grey (10YR 4/1, moist) clay; weak coarse prismatic into strong medium angular blocky; sticky, plastic, friable; few fine faint brown mottles; few pores; clear smooth boundary to
2Cg	53 - 72 cm	grey (10YR 5/1, moist) clay; strong coarse prismatic; sticky, plastic, friable; common fine distinct reddish yellow mottles; few pores; few small slickensides; abrupt smooth boundary to
3Ahg	72 - 80 cm	dark grey (10YR 4/1, moist) clay; weak medium prismatic into moderate very fine angular blocky; sticky, plastic, friable; many fine prominent strong brown and reddish yellow mottles; few pores; clear smooth boundary to
3Cg	80 - 100 cm	grey (10YR 5/1, moist) clay; weak medium prismatic into moderate very fine angular blocky; half-ripened; sticky, plastic, friable; many fine prominent strong brown mottles; abrupt smooth boundary to
4Ahg	100 - 110 cm	very dark grey (10YR 3/1, moist) clay; moderate coarse prismatic; half-ripened; sticky, plastic, friable; abrupt smooth boundary to
4Cr	> 110 cm	greyish brown (10YR5/2, moist) clay; moderate coarse prismatic; half-ripened, sticky, plastic, friable

ANALYTICAL DATA (Mitt.Deutschen.Bodenk.Gesellsch., vol 47, 1986, page 230 ff):

			PARTICLE SIZE DISTRIBUTION (µm)				WDIS		BULK		pF							
			>2000	2000-60	60-2	<2	CLAY	DENS			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Hor.	Top	Bot.																
Ah1	0 - 7			7.3	45.0	47.7												
Ah2	7 - 20			5.8	38.9	55.3												
ACg	20 - 40			3.8	36.8	59.4												
2Ahg	40 - 53			1.6	30.5	67.9												
2Cg	53 - 72			1.6	42.6	55.8												
3Ahg	72 - 80			3.5	38.1	58.4												
3Cg	80 - 100			1.4	47.2	51.4												
4Ahg	100 - 110			0.4	27.2	72.4												
4Cr	> 110			1.0	37.0	62.0												

Hor.	pH		pH		ORG.MATTER		EXCHANGEABLE CATIONS				EXCH. ACID.		CEC	CEC	CEC	BASE	Al	EC2.5	ESP
	H2O	KCl	CaCO3	CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC	ECEC		
Ah1		6.0	0.2		5.26	0.59	18.9	3.2	0.7	0.0	22.8			30.3				75	
Ah2		5.4	0.1		3.24	0.37	17.6	2.7	0.4	0.2	20.9			29.6				71	
ACg		5.5	0.1		1.19	0.16	20.7	3.2	0.5	0.0	24.4			30.3				81	
2Ahg		5.8	0.1		1.61	0.17	20.2	2.6	1.3	0.3	24.4			34.4				71	
2Cg		5.7	0.1		0.81	0.10	20.3	1.7	0.6	0.1	22.7			25.8				91	
3Ahg		6.0	0.1		1.28	0.12	17.0	0.8	1.1	0.0	18.9			33.6				56	
3Cg		5.9	0.1		0.81	0.09	23.7	2.3	1.2	0.2	27.4			25.9				100	
4Ahg		6.1	0.1		4.09	0.24	25.2	2.0	1.2	0.2	28.6			37.2				77	
4Cr		6.0	0.1		1.72	0.18	28.3	2.5	1.8	0.0	32.6			44.4				73	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Ca-LAC P2O5	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	mg/kg		
Ah1													1.3			2.7				806		
Ah2													1.4			3.0				214		
ACg													0.8			3.4				55		
2Ahg													0.4			2.1				60		
2Cg													1.0			2.6				103		
3Ahg													2.3			4.2				441		
3Cg													2.0			3.7				428		
4Ahg													0.8			1.6				215		
4Cr													0.8			1.7				235		

analytical data from Mitteilungen der Deutschen Bodenkundlichen Gesellschaft 1986, Vol 47, p 232.

FAO/UNESCO (1988) : TH I O N I C F L U V I S O L

DIAGNOSTIC CRITERIA : umbric A horizon, sulfuric horizon, sulfidic materials
 soil moisture regime : aquic
 soil temperature regime : isohyperthermic

LOCAL CLASSIFICATION : hydromorphic alluvial soil, Rangsit series (Acid sulphate soil)

LOCATION : 5 km NW of Wang Moi, Ayutthaya province
 2 m a.s.l.

RELIEF : alluvial plain, flat, 1 %

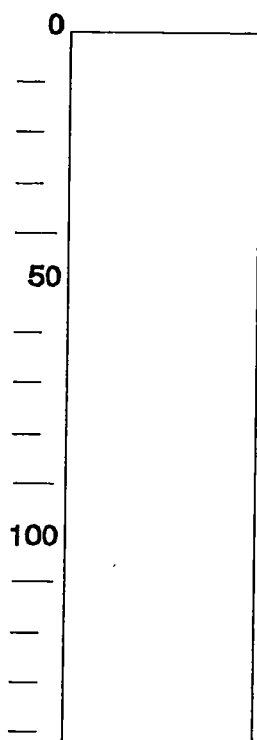
WATER TABLE : -120 cm

DRAINAGE : poor; annually flooded (river and rains)

PARENT MATERIAL : clayey tidal marsh

VEGETATION/ LAND USE : arable, broadcasted floating rice (rainy season)

CLIMATE		Köppen : Aw													
METEO STATION		: DON MUANG (WMO: 48.4560), 13°55'N / 100°36'E, 12 m a.s.l; 59 km WSW of the site, relevant													
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Frere, Popov	mm		126	131	168	169	156	141	138	137	129	128	121	109	1653
precipitation	mm	50	7	18	38	63	166	164	164	223	303	239	37	17	1439
T mean	°C		26.0	27.4	28.9	29.8	29.3	28.7	28.2	28.0	28.2	28.1	27.4	25.6	28.0



PROFILE DESCRIPTION :

Apg	0 - 27 cm	black (10 YR 2/1, moist) clay; moderate medium angular blocky and moderate coarse angular blocky; sticky, plastic, firm, hard; common fine prominent (7.5 YR 4/8) and common fine prominent yellowish red (5 YR 4/8) mottles; few very fine tubular pores and few very fine interstitial pores; common fine roots; pH(field): 4.8; clear smooth boundary to
Bg1	27 - 48 cm	brown (7.5 YR 5/2, moist) clay; moderate fine angular blocky; sticky, plastic, firm, hard; many medium prominent red (10 R 4/6), common medium distinct strong brown (7.5 YR 5/8) mottles and many coarse prominent red (10R 4/6) mottles; patchy thin slickensides, black cutans along some fine pores; few very fine to fine, tubular pores and few very fine interstitial pores; few very fine roots; very few small gypsiferous crystals and few unspecified black inclusions; pH(field): 4.0; clear smooth boundary to
Bg2	48 - 64 cm	grayish brown 8.5 YR 5/2, moist clay; weak fine angular blocky and weak medium angular blocky; sticky, plastic, firm; common medium prominent red (10 R 4/8) and many medium prominent reddish yellow (7.5 YR 6/8) mottles; unspecified cutans (part of them black) in root channels and pores; common very fine tubular pores and common very fine interstitial pores; few very fine roots; very few small gypsiferous crystal and few large unspecified black (10YR2/1) inclusions (filled-up cracks?); pH(field): 4.0; clear smooth boundary to
Bg3	64 - 93 cm	grayish brown 8.5 YR 5/2, moist clay; weak fine angular blocky and weak medium angular blocky; sticky, plastic; many medium and coarse prominent reddish yellow (7.5 YR 6/8) mottles, many prominent yellow (2.5 YR 8/6) mottles; patchy unspecified cutans (part of them black) in root channels and pores; few to many, fine to very fine, tubular pores and many very fine interstitial pores; few very fine roots; pH(field): 4.0; clear smooth boundary to
Bg4	93 - 150 cm	grayish brown 8.5 YR 4/2, moist clay; very weak medium angular blocky; sticky, plastic; few very fine tubular pores and few very fine interstitial pores; very fine roots; pH(field): 4.0;

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (µm)										pF							
		>2000	2000	200	50	20	2	WDIS	BULK										
Hor.	Top	Bot.	200	50	20	2	<2	CLAY	DENS	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2		
Apg	0	- 15	-	0	2	7	24	67	-	-	-	-	-	-	-	-	-		
Bg1	27	- 48	-	5	3	14	17	61	-	-	-	-	-	-	-	-	-		
Bg3	64	- 93	-	0	5	6	25	64	-	-	-	-	-	-	-	-	-		
Bg4	93	- 120	-	0	0	10	20	70	-	-	-	-	-	-	-	-	-		

Hor.	pH			ORG.MATTER		EXCHANGEABLE			CATIONS		EXCH.ACID.		CEC	CEC	CEC	BASE	Al	EC2.5	Gypsum	
	H2O	KCl	CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC					ECEC
Apg	4.1	3.5	-	1.8	0.17	7.8	3.7	0.2	0.2	11.9	5.1	4.2	34.6			17.0	34	12	1.17	0.13
Bg1	3.6	3.1	-	0.6	0.07	6.8	3.4	0.1	0.0	10.3	8.3	6.9	30.4			18.6	34	23	0.82	0.33
Bg3	3.6	3.1	-	0.6	0.06	5.7	3.8	0.1	0.0	9.6	8.6	7.3	30.3			18.2	32	24	0.68	0.26
Bg4	3.8	3.2	-	1.4	0.06	6.3	4.3	0.3	0.0	10.9	10.2	8.7	34.4			21.1	32	25	0.63	0.23

remark samples 1 - 4: C-Begheyn
remark sample 3: pH H2O 1:1 extr.: 3.4

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN.	SiO2/				total
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/	
Apg	60.1	20.4	5.7	0.31	0.65	1.21	-	0.94	0.02	0.06	11.6	5.0	28.1	4.2	5.6	0.1
Bg1	52.6	18.5	15.5	0.22	0.75	1.57	-	0.99	0.01	0.04	10.3	4.8	9.0	3.1	1.9	0.1
Bg3	53.4	18.3	11.8	0.18	0.55	2.30	-	0.94	0.01	0.02	12.4	5.0	12.0	3.5	2.4	1.0
Bg4	62.5	21.9	3.1	0.18	0.86	1.77	-	1.10	0.01	0.02	9.5	4.8	53.7	4.4	11.1	<0.1

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION										IGN.	SiO2/				total
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Al2O3/	
Apg	54.6	26.9	4.4	0.1	0.8	1.5	-	1.0	0.0	0.1	9.7	3.4	32.9	3.1	9.5	
Bg1	51.8	25.5	7.5	0.0	0.9	2.0	-	1.0	0.0	0.1	9.2	3.5	18.1	2.9	5.3	
Bg3	47.7	23.8	9.9	0.1	0.9	2.4	-	1.0	0.0	0.1	11.8	3.4	12.6	2.7	3.7	
Bg4	57.1	25.1	3.5	0.1	0.9	2.0	-	1.1	0.0	0.1	8.5	3.4	42.8	3.5	11.1	

EXTRACTABLE Fe, Al, Si, Mn %																
CLAY MINERALOGY (1 = very weak .. 8 = very strong)																
by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)																
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	MX	JA	Pret	pHNaF
Apg	4	2	4	6			4								-	-
Bg1	4			4	6		4								-	-
Bg3	4			4	6		4			4	4	6			-	-
Bg4	4	2	4	6			4			4	2	8			-	-

samples 3 - 4: JA = Jarosite

FAO/UNESCO (1988) : F I M I C A N T H R O S O L

DIAGNOSTIC CRITERIA : fimic A horizon, spodic B horizon
soil moisture regime : udic
soil temperature regime : mesic

LOCAL CLASSIFICATION : Zwarte enkeerdgrond (zEZ21)

LOCATION : De Ginkel, Ede, road Ede - Arnhem
27 m a.s.l.

RELIEF : gently undulating plain

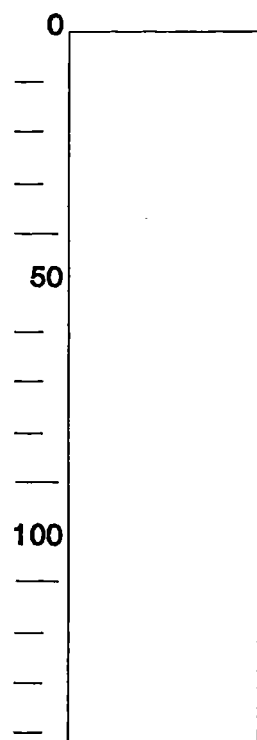
WATER TABLE : no evidence (deeper than -130 cm)

DRAINAGE : well drained

PARENT MATERIAL : cover sand on fluvio-periglacial deposits

VEGETATION/ LAND USE : pasture

CLIMATE		Köppen : Cfb													
METEO STATION		: DE BILT; 52°06'N / 5°11'E, 3 m a.s.l.; 30 km W of the site; moderately relevant													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
EP Thornthwaite	mm	40	7	9	24	47	88	112	123	109	76	43	18	8	664
precipitation	mm		68	52	45	49	52	58	77	88	71	72	70	63	765
T mean	°C		1.7	2.0	5.0	8.5	12.4	15.5	17.0	16.8	14.3	10.0	5.9	3.9	9.3



PROFILE DESCRIPTION :

Ap1	0 - 30 cm	very dark brown (10 YR 2/2, moist) loamy sand; slightly massive; friable; many fine pores and few medium channels; frequent very fine roots; charcoal, pieces of brick; abrupt smooth boundary to
Ap2	30 - 55 cm	very dark grayish brown (10 YR 3/2, moist) loamy fine sand; slightly massive; friable; common fine pores and few medium channels; common very fine roots; charcoal, pieces of brick; occasional gravel; abrupt smooth boundary to
Ap3	55 - 72 cm	black (10 YR 2/1, moist) loamy fine sand; slightly massive; very friable; common fine and very fine pores and few medium channels; very few very fine roots; charcoal, pieces of brick; occasional gravel; abrupt smooth boundary to
A/Epb	72 - 85 cm	very dark brown (10 YR 2/2, moist) sand; slightly massive; friable; common fine pores and few medium channels; few very fine roots; few fine mottles of organic material; occasional gravel; clear smooth boundary to
Bhsb1	85 - 95 cm	brown (10 YR 4/3, moist) sand; slightly massive; friable; common very fine pores; very few very fine roots; common medium iron mottles; clear smooth boundary to
Bhsb2	95 - 110/130	dark brown (10 YR 3/3, moist) fine sand; slightly massive; friable; many very fine pores; very few very fine roots; few medium iron mottles; abrupt irregular boundary to
Cgb	>110/130 cm	brownish yellow 10 YR 6/6, moist) sand; slightly massive; loose; common very fine pores; very few very fine roots; common coarse iron mottles

ANALYTICAL DATA from Mitteilungen der Deutschen Bodenkundlichen Gesellschaft 1986, vol 47.

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)						WDIS <2 CLAY	BULK DENS	pF							
			>2000	210	105	50	16	2			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ap1	0 - 30		31	43	13	6	2		4	-	-	-	-	-	-	-	-	-
Ap2	30 - 55		26	43	15	10	2		4	1.40	-	-	-	25	-	-	-	6
Ap3	55 - 72		27	40	16	11	3		3	-	-	-	-	-	-	-	-	-
A/Epb	72 - 85																	
Bhsb1	85 - 95		30	45	14	6	2		3	1.51	-	-	-	14	-	-	-	3
Bhsb2	95 - 120		31	42	13	8	3		4	-	-	-	-	-	-	-	-	-
Cgb	> 120		30	52	12	3	1		2	1.55	-	-	-	11	-	-	-	2

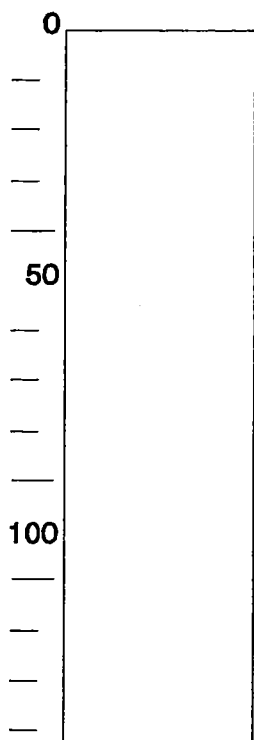
Hor.	pH H2O	pH KCl	% CaCO3	ORG. MATTER		EXCHANGEABLE CATIONS				EXCH. ACID.		CEC soil	CEC clay	CEC OrgC	BASE SAT	Al SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum	H+Al	Al						
Ap1	-	3.7		2.0	0.13	0.2	0.3	<.1	0.1	0.6	1.8	2.6				23		
Ap2	-	3.7		3.0	0.11	0.1	0.2	0.3	0.2	0.8	2.3	3.6				22		
Ap3	-	3.7		2.5	0.10	<.1	0.0	<.1	<.1	0.1	2.3	4.4				2		
A/Epb																		
Bhsb1	-	3.7		0.7	0.04	<.1	0.0	<.1	<.1	0.1	1.8	2.3				4		
Bhsb2	-	4.2		0.9	0.05	<.1	0.0	<.1	0.1	0.1	1.7	2.6				4		
Cgb	-	4.7		0.2	0.02	<.1	0.0	<.1	<.1	0.1	1.0	1.1				9		

remark: CEC Li-EDTA at pH 7.

													EXTRACTABLE ELEMENTS %										
CLAY MINERALOGY (1 = very weak .. 8 = very strong)													by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)				mg/kg						
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	P205	K20	Pret	pHNaF
Ap1													0.2			0.4				674			
Ap2													0.3			0.4				375			
Ap3													0.3			0.4				337			
A/Epb																							
Bhsb1													0.3			0.4				339			
Bhsb2													0.2			0.3				332			
Cgb													0.1			0.2				99			

remark: P205 citric acid extractable

FAO/UNESCO (1988) (1974)	: silti - C U M U L I C A N T H R O S O L (calcaric) : Calcaric Regosol
DIAGNOSTIC CRITERIA	: fimic A horizon soil moisture regime : aridic soil temperature regime : mesic
LOCAL CLASSIFICATION	: Haplic Lou soil
SOIL TAXONOMY (1992)	: Plaggept, fine-silty, mixed, mesic
LOCATION	: Shaanxi Province, Wugong, Xiang Lin : 520 m a.s.l.
RELIEF	: nearly flat (1 %), alluvial terrace of the river Wei
WATER TABLE	: no evidence (very deep, 80 m)
DRAINAGE	: well drained
PARENT MATERIAL	: Pleistocene loess, silty
LAND USE	: medium level arable farming (cereals), seasonal irrigation, continuous crop rotation
CLIMATE	Köppen : Cwa
METEO STATION	: WUGONG, 34°15'N / 108°13'E, 448 m a.s.l.; 25 km SSE of the site; very relevant
	No. of Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Annual
EP Penman	Years 22
precipitation	mm 22
T mean	°C 22
	0 0 87 117 155 183 183 171 111 87 57 0 0
	7 9 26 57 64 53 114 91 112 65 28 4 630
	-1.2 1.9 7.7 13.5 18.5 24.4 26.0 24.9 18.7 13.3 6.4 0.7 12.9



Ap1	0 - 21 cm	brown (7.5YR 4.5/4, moist), light brown (7.5YR 6/4, dry) silt loam; moderate fine to medium subangular blocky and, moderate fine to medium crumb; slightly sticky, slightly plastic, very friable, slightly hard; many very fine to medium pores; common fine roots; slightly calcareous; clear smooth boundary to
Ap2	21 - 30 cm	brown (7.5YR 4/4, moist), brown (7.5YR 5/4, dry) silt loam; moderate to strong fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, hard; common very fine to medium pores; few fine roots; slightly calcareous; clear smooth boundary to
Ap3	30 - 70 cm	brown (7.5YR 4/4, moist), brown (7.5YR 5/4, dry) silt loam; strong fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, hard; broken moderately thick clay cutans; many very fine to medium pores; few fine roots; non calcareous; clear smooth boundary to
Ap4	70 - 81 cm	dark brown (7.5YR 3/4, moist), brown (7.5YR 5/4, dry) silty clay loam; strong fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, hard; many very fine to medium pores; few fine roots; frequent calcareous pseudomycelia; non calcareous; gradual smooth boundary to
2Ab	81 - 114 cm	dark brown (7.5YR 3/3.5, moist), dark brown (7.5YR 3/3.5, dry) silty clay loam; strong fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, hard; many very fine to medium pores; few fine roots; frequent calcareous pseudomycelia; non calcareous; clear smooth boundary to
2AB	114 - 138 cm	brown (7.5YR 4/4, moist), brown (7.5YR 4/4, dry) silt loam; strong fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, hard; many very fine to medium pores; few fine roots; very frequent calcareous pseudomycelia; slightly calcareous; clear smooth boundary to
2Bk	138 - 200 cm	8.5YR 4/4, moist silt loam; weak fine to medium subangular blocky; slightly sticky, slightly plastic, very friable, slightly hard; many very fine to medium pores; few fine roots; frequent calcareous pseudomycelia and very few small hard calcareous nodules; slightly calcareous; diffuse smooth boundary to
2BC	200 - 250 cm	8.5YR 4/4, moist silt loam; weakly coherent porous massive; slightly sticky, slightly plastic, loose, soft; many very fine to medium pores; few fine roots; few calcareous soft segregations; slightly calcareous; diffuse smooth boundary to
2C	250 - 300 cm	8.5YR 4/4, moist silt loam; weakly coherent porous massive; slightly sticky, slightly plastic, loose, soft; many very fine to medium pores; few fine roots; slightly calcareous;

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (μm)																pF									
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	50		20	<2	WDIS CLAY	BULK DENS													
			1000	500	250	100	50	20	2	0.0	1.0				1.5	2.0	2.3	2.7	3.4	4.2							
Ap1-3	0 - 70	-	0	0	0	0	0	0	0	29	43	27	-	1.46	46	45	40	34	31	29	20	19					
Ap4	70 - 81	-	0	0	0	0	0	0	0	25	40	34	-	-	-	-	-	-	-	-	-	-					
2Ab	81 - 114	-	0	0	0	0	0	0	0	25	40	34	-	-	-	-	-	-	-	-	-	-					
2AB	114 - 138	-	0	0	0	0	0	1	1	30	43	26	-	-	-	-	-	-	-	-	-	-					
2Bk	138 - 200	-	0	0	0	0	0	1	1	33	42	23	-	-	-	-	-	-	-	-	-	-					
2BC	200 - 250	-	0	0	0	0	0	1	1	35	43	21	-	-	-	-	-	-	-	-	-	-					
2C	250 - 300	-	0	0	0	0	0	1	1	31	44	24	-	1.20	55	54	47	40	34	28	16	15					

Hor.	pH			ORG.MATTER		EXCHANGEABLE			CATIONS		EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
	H2O	KCl	CaCO3	C	N	Ca	Mg	K	Na	sum										
Ap1-3	8.2	7.4	2.1	0.7	0.08	49.1	2.0	0.5	0.0	51.6	-	-	11.9	44	2.3	51.6	*	-	0.40	
Ap4	8.0	7.0	0.0	0.5	0.05	28.8	2.0	0.4	0.3	31.5	-	-	17.9	52	1.7	31.5	*	-	0.44	
2Ab	8.1	7.0	0.0	0.4	0.05	29.6	1.9	0.3	0.4	32.2	-	-	16.7	49	1.5	32.2	*	-	0.29	
2AB	8.0	7.0	3.4	0.4	0.04	42.1	0.8	0.2	0.0	43.1	-	-	10.6	40	1.4	43.1	*	-	0.51	
2Bk	8.3	7.5	4.3	0.3	0.03	40.9	1.2	0.2	0.5	42.8	-	-	8.9	39	1.2	42.8	*	-	0.29	
2BC	8.2	7.5	3.6	0.3	-	36.6	1.1	0.2	0.5	38.4	-	-	9.2	43	0.9	38.4	*	-	0.38	
2C	8.3	7.5	3.0	0.3	-	48.9	1.8	0.3	0.2	51.2	-	-	9.6	40	1.1	51.2	*	-	0.36	

[illegible]

CLAY MINERALOGY (1 = very weak .. 8 = very strong)												EXTRACTABLE Fe, Al, Si, Mn by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)				citr.acid P205 mg/kg				
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)	
Ap1-3	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	1.0	0.1	-	-	2.0
Ap4	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	1.3	0.1	-	-	0.7
2Ab	-	-	-	-	-	-	-	-	-	-	-	-	0.2	0.2	0.0	1.2	0.1	-	-	1.2
2AB	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	0.9	0.8	-	-	
2Bk	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	0.8	0.1	-	-	
2BC	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	0.8	0.1	-	-	
2c	-	-	-	-	-	-	-	-	-	-	-	-	0.1	0.1	0.0	0.8	0.1	-	-	

NL

NETHERLANDS

FAO/UNESCO (1988) : URBIC ANTHROSOL

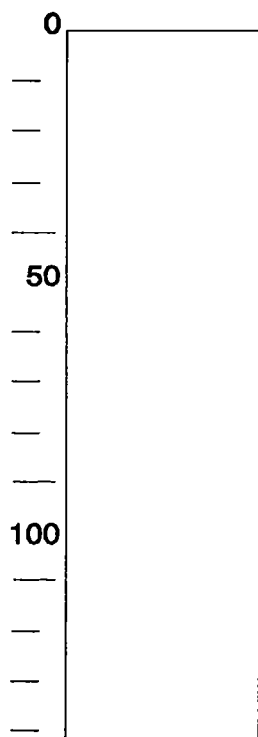
DIAGNOSTIC CRITERIA : "burial of original horizon(s) by fills"
 soil moisture regime : udic
 soil temperature regime : mesic

LOCAL CLASSIFICATION : "opgehoogd" or "opgespoten" mapsymbol ↑

LOCATION : Rotterdam
 m a.s.l.

RELIEF :
 WATER TABLE : --
 DRAINAGE :
 PARENT MATERIAL :
 VEGETATION/ LAND USE :

CLIMATE	Köppen : Cfb														
METEO STATION	: DE BILT; 52°06'N / 5°11'E, 3 m a.s.l.; 50 km ENE of the site; moderately relevant														
	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
	Years														
EP Thornthwaite	mm	7	9	24	47	88	112	123	109	76	43	18	8	664	
precipitation	mm	68	52	45	49	52	58	77	88	71	72	70	63	765	
T mean	°C	1.7	2.0	5.0	8.5	12.4	15.5	17.0	16.8	14.3	10.0	5.9	3.9	9.3	



annex

gids bij de bodemprofielen
in het International Soil reference and Information Centre, Wageningen
bodemkunde, basisdoctoraal fysische geografie

FAO/UNESCO (1988) : FIBRIC HISTOSOL ?Gelic

DIAGNOSTIC CRITERIA : H horizon > 40 cm
soil moisture regime : aquic
soil temperature regime : cryic

LOCAL CLASSIFICATION : --

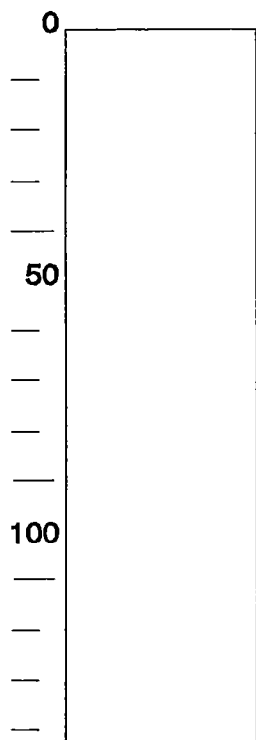
LOCATION : Angmangssalik
30 m a.s.l.
RELIEF : flat, valley bottom
WATER TABLE : unknown
DRAINAGE : very poor
PARENT MATERIAL : Sphagnum peat overlying hyperstene granite
VEGETATION/ LAND USE : tundra (Sphagnum spp., Carex rariflora, Polygonum viviparum, Salix herbacea, Campanula gieseckiana)

CLIMATE	Köppen : ET
METEO STATION	: ANGMANGSSALIK , 66° N / 37° W, 5 m a.s.l; very relevant
	No. of Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Annual
	Years
ET	mm not available
precipitation	58 82 62 53 54 44 35 62 76 90 86 68 770
T mean	°C -6.8 -7.2 -5.7 -2.7 2.1 5.8 7.4 6.6 4.2 -0.1 -3.1 -5.1 -0.4
T max abs	°C 6.6 9.0 8.5 12.2 17.9 25.3 22.9 19.9 20.2 14.9 10.2 7.2 25.3
T min abs	°C -28.7 -26.0 -22.5 -20.3 -13.7 -8.6 -3.5 -3.5 -7.1 -18.3 -18.1 -21.9 -28.7

PROFILE DESCRIPTION :

Hi 0 - 23 cm light brown (7.5 YR 6/4, moist), dark brown (7.5 YR 3/4, dry) undecomposed peat
He > 23 cm very dark brown (7.5 YR 2/3, moist) peat

NO ANALYTICAL DATA AVAILABLE



FAO/UNESCO (1988) : R E N D Z I C L E P T O S O L
 (1974) : Calcic Cambisol

DIAGNOSTIC CRITERIA : ochric A horizon, calcic horizon, calcareic
 Soil moisture regime : xeric
 Soil temperature regime : thermic

LOCAL CLASSIFICATION :

LOCATION : Badajoz province, 15 km S of Merida, 6 km West of Torremegia
 300 m a.s.l.

RELIEF : hill, upper slope, nearly flat

SLOPE PROCESSES : severely eroded (human activities)

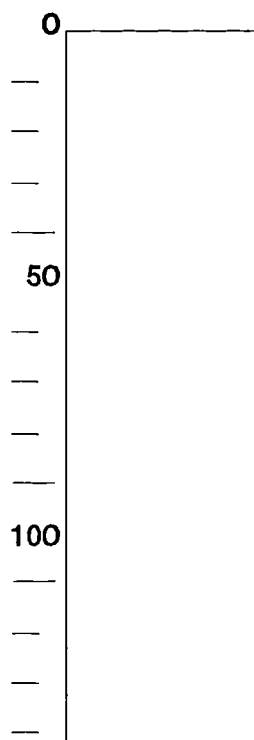
WATER TABLE : no watertable observed

DRAINAGE : somewhat excessive

PARENT MATERIAL : unconsolidated, calcareous Miocene Clay; clayey

LAND USE : arable farming (olive) Human activity for many centuries,
 resulting in truncation of the profile.

CLIMATE	Köppen : Csa													
METEO STATION	: BADAJOZ, 38°53'N / 6°58'W, 198 m a.s.l.; 30 km W of site; moderately relevant (height)													
	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Years													
EP Frere, Popov	mm	18	34	65	100	136	186	229	195	122	65	30	15	1195
precipitation	mm	27	61	50	64	46	43	18	3	5	25	52	62	491
T mean	°C	8.8	10.2	12.7	15.4	18.1	23.0	26.0	25.6	23.0	17.9	12.8	9.3	39.2



PROFILE DESCRIPTION :

Ap	0 - 6 cm	dark yellowish brown (10YR 4/6, moist) slightly gravelly clay; weak fine crumb and, moderate fine crumb; sticky, plastic, very friable, hard; very frequent calcareous fragments; strongly calcareous; pH(field): 7.9; abrupt wavy boundary to
Ck	> 6 cm	brown (7.5YR 5/3, moist) gravelly clay; structureless; friable, hard; large spherical hard argillaceous nodules; strongly calcareous throughout; pH(field): 8.4;

ANALYTICAL DATA:

		----- PARTICLE SIZE DISTRIBUTION (µm) -----										-----										
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	TOT	50	20	<2	WDIS CLAY	BULK DENS	pF-----	1.0	1.5	2.0	2.3	2.7	3.4	4.2
			1000	500	250	100	50	SAND	20	2	0.0											
Ap	0 -	6	14	-	-	-	-	-	26	11	10	53	-	-	-	-	-	-	-	-	-	-
Ck	6 -	20	34	-	-	-	-	-	6	6	8	80	-	-	-	-	-	-	-	-	-	-
Ck	20 -	40	45	-	-	-	-	-	6	5	9	80	-	-	-	-	-	-	-	-	-	-

Hor.	pH	pH	ORG.MATTER	EXCHANGEABLE CATIONS					EXCH.ACID.		CEC	CEC	CEC	BASE	Al	EC2.5	ESP		
	H2O	KCl		CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al		soil			clay	OrgC
Ap	7.9	7.1	37.0	0.9	0.07	16.7	1.3	0.9	0.0	18.9	-	-	20.0	38	3.1	18.9	94	-	0.26
Ck	8.3	7.3	56.9	0.4	0.05	12.0	1.0	0.4	0.0	13.4	-	-	14.5	18	1.5	13.4	92	-	0.28
Ck	8.5	7.3	54.7	0.2	0.02	11.0	2.1	0.2	0.0	13.3	-	-	14.1	18	0.8	13.3	94	-	0.24
remark sample 1 - 3: CEC at pH=8.2																			

Hor.	----- ELEMENTAL COMPOSITION OF TOTAL SOIL -----										----- IGN. -----		SiO2/	SiO2/	SiO2/	Al2O3/
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5	LOSS	Al2O3	Fe2O3	R2O3	Fe2O3	
Ap	42.3	6.0	1.8	21.70	1.90	0.70	-	0.30	-	0.20	22.4	12.0	62.6	10.0	5.2	
Ck	25.2	4.7	2.2	34.00	-	0.30	-	0.20	-	0.30	31.3	9.1	30.5	7.0	3.4	
Ck	27.2	5.1	2.3	32.30	-	0.30	-	0.30	-	0.30	30.0	9.1	31.5	7.0	3.5	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
Ap	8	0	0	6	2	0	4	4	0	0	0	0	-	-	-	-	-	-	-	-		
Ck	8	0	0	6	2	0	6	0	0	0	0	0	-	-	-	-	-	-	-	-		
Ck	8	0	0	6	2	0	6	0	0	0	0	0	-	-	-	-	-	-	-	-		

FAO/UNESCO (1988) : Petri - S O D I C S O L O N C H A K, phreatic phase

DIAGNOSTIC CRITERIA : ochric A horizon, salic properties, sodic properties
soil moisture regime : aridic
soil temperature regime : mesic

LOCAL CLASSIFICATION : salipanic brown desert soil

LOCATION : Turpan, Xinjiang Autonomous Region (W China)
- 80 m a.s.l.

RELIEF : flat

WATER TABLE : - 200 cm (groundwater), rarely flooded

DRAINAGE : imperfect

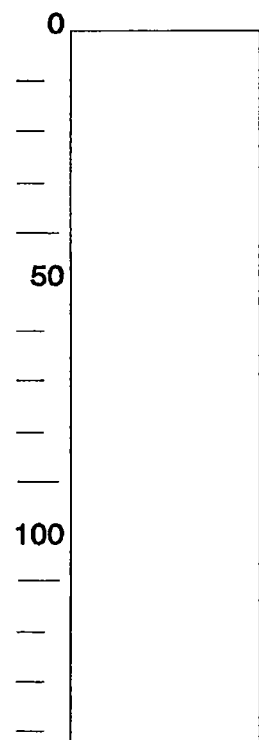
PARENT MATERIAL : colluvium

VEGETATION/ LAND USE : semi-natural grasslands, 10 - 20 % salt tolerant; mainly Alhagi and Phragmites. Incidentally grazed

CLIMATE Köppen : Bwk

METEO STATION : TURPAN, 42°56'N / 89°12'E, 35 m a.s.l.; 35 km WNW of the site (very relevant)

		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Years														
EP Penman	mm	29	0	0	93	147	2-05	231	239	211	144	81	0	0	1351
relative humidity	%	29	59	46	33	27	27	29	31	36	41	49	53	62	41
precipitation	mm	29	2	0	1	0	1	3	2	3	1	1	0	1	15
est.glob.rad.MJ/m ² /day			7.5	11.2	15.5	19.7	23.1	24.7	24.3	22.3	18.4	13.4	8.8	6.5	16.3
T mean	°C	29	-9.5	-2.1	9.3	18.9	25.7	31.0	32.7	30.4	23.3	12.6	1.8	-7.2	13.9
T max	°C	29	-3.1	5.1	16.6	26.1	33.1	38.2	39.9	38.2	32.0	21.8	9.4	-	21.4
T min	°C	29	-14.5	-8.2	2.2	11.3	17.5	22.9	25.1	22.6	15.5	5.9	-3.5	-11.7	7.1



PROFILE DESCRIPTION :

A	0 - 8 cm	pale brown (10YR 6/3, moist) sandy loam; crumb; very friable, soft; many very fine to medium, pores; common medium roots; slightly calcareous; abrupt wavy boundary to
Azm	8 - 25 cm	white, extremely hard; few medium roots in cracks; salt pan; non calcareous; abrupt smooth boundary to
Cz1	25 - 44 cm	brown (10YR 5/3, moist) sandy loam; weakly coherent porous massive; slightly sticky, slightly plastic, very friable; few very fine to fine, pores; few medium roots; slightly calcareous; clear smooth boundary to
Cz2	44 - 65 cm	brown (10YR 5/3, moist) sandy loam; weakly coherent porous massive; slightly sticky, slightly plastic, friable; few very fine to fine, pores; few medium roots; slightly calcareous; diffuse smooth boundary to
Cz3	65 - 125 cm	brown (10YR 5/3, moist) sandy loam; weakly coherent porous massive; slightly sticky, slightly plastic, friable; few very fine to fine, pores; no roots; slightly calcareous;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS	BULK	pF							
			>2000	2000	1000	500	250	100	50	20	2	<2			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
A	0 - 8	-	0	0	0	2	15	35	32	16	-	-	-	-	-	-	-	-	-	-	-	-
Azm	8 - 25	73	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cz1	25 - 44	-	0	0	0	1	14	42	34	9	-	0.99	69	63	57	45	30	23	17	15	-	-
Cz2	44 - 65	-	0	0	0	1	12	44	31	12	-	1.21	58	56	50	39	33	28	20	16	-	-
Cz3	65 - 125	-	0	0	0	3	16	36	30	15	-	-	-	-	-	-	-	-	-	-	-	-
	0 - 25	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH.	ACID.	CEC	CEC	CEC	BASE	Al	dS/m	ESP
				C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC	ECEC	SAT	SAT	EC2.5
A	8.7	8.6	2.6	1.6	0.11	101	15.2	1.8	6.8	125	-	-	8.5	-	-	125	**	-	39
Azm	8.6	8.4	1.1	0.4	0.04	59.5	16.2	0.1	61.4	137	-	-	1.3	-	-	137	**	-	59
Cz1	8.5	8.2	2.9	0.5	0.06	154	19.1	0.8	2.9	176	-	-	8.4	-	-	176	**	-	14
Cz2	8.9	8.7	3.0	0.2	0.03	170	11.6	0.9	2.1	184	-	-	8.7	-	-	184	**	-	8
Cz3	8.5	8.2	3.0	0.3	0.03	202	11.9	0.7	2.8	217	-	-	9.5	-	-	217	**	-	6
	8.4	8.0	-	1.8	-	35.1	3.7	1.1	0.9	40.8	-	-	6.7	-	-	40.8	**	-	1.06

>>> bases without pre-washing

** base saturation largely over 100 %

Hor.	WATER SOLUBLE SALTS										Sum cat.	Sum ann.	PH	EC5	ECE	SAR
	Ca	Mg	Na	K	CO3	HCO3	Cl	SO4	NO3							
A	2.9	18.8	153.1	2.3	-	-	1.4	97.6	70.8	1.0	-	8.1	-	40.0	-	
Azm	0.3	176.9	173.3	0.8	-	-	2.7	29.6	284.7	1.0	-	7.4	-	28.6	-	
Cz1	1.5	33.8	51.2	0.3	-	-	0.7	7.4	80.7	0.0	-	8.0	-	28.6	-	
Cz2	1.2	5.9	29.0	0.2	-	-	0.2	8.0	30.0	0.0	-	8.4	-	22.8	-	
Cz3	1.3	1.9	13.9	0.1	-	-	0.1	5.4	11.9	0.0	-	7.8	-	15.9	-	
	0.5	0.5	1.7	0.2	-	-	0.5	1.0	0.5	0.1	-	7.4	-	5.5	-	

remark sample 1 - 6: Water soluble salts in saturated extract ECE in stead of EC1:2.5

EXTRACTABLE Fe, Al, Si, Mn														
CLAY MINERALOGY (1 = very weak .. 8 = very strong)														
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Pret	pHNaF
A	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azm	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cz1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cz2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cz3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

FAO/UNESCO (1988) : H A P L I C A N D O S O L

DIAGNOSTIC CRITERIA : andic properties, smeary consistence
soil moisture regime : udic
soil temperature regime : isothermic

LOCAL CLASSIFICATION : Podsolik Coklat

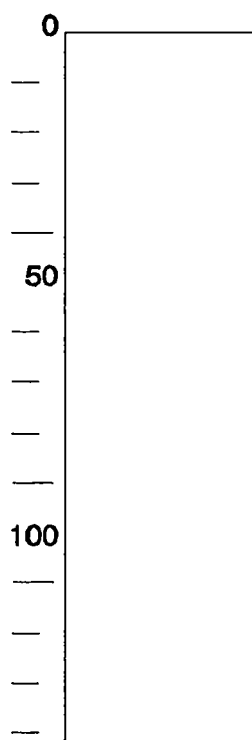
LOCATION : Sumatera, Taput, Harina Boho, 2.1 km W of Tele
1800 m a.s.l.
RELIEF : plateau, slope 1 %
WATER TABLE : not observed
DRAINAGE : moderately well
PARENT MATERIAL : volcanic ejecta, acidic tuff, sandy texture. toba tuff-liparite
VEGETATION/ LAND USE : fallow after slash and burn

CLIMATE Köppen : Af
METEO STATION : DOLOKSANGGUL, 2°16'N / 98°40'E, 1451 m a.s.l; 34 km S of the site; moderately relevant

	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
precipitation mm	23	160	109	165	208	112	52	53	76	156	206	240	177	1714

METEO STATION : MEDAN, 3°34'N / 98°41'E, 25 m a.s.l; 174 km E of the site (poor relevance due to altitude)

	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Frere, Popov		111	114	134	128	129	123	130	131	124	120	110	107	1461
precipitation mm		144	87	104	139	178	132	145	183	217	268	246	205	2048
T mean °C	17	25.6	26.1	26.7	27.2	27.2	27.0	27.0	27.0	26.7	26.1	26.1	25.8	26.5



PROFILE DESCRIPTION :

Ah	0 - 16 cm	very dark grey (5 YR 2.5/1, moist) soil; leaves, highly decomposed; non sticky, non plastic, friable; highly porous; many fine roots and many medium roots pH(field): 5.0; clear smooth boundary to
BA	16 - 35 cm	very dark grey (5 YR 2.5/1, moist) very gradually changing into dark yellowish brown (10 YR 4/6, moist) sandy clay loam; weak fine subangular blocky; slightly sticky, slightly plastic, friable; many fine random tubular pores and many medium random tubular pores; many fine roots and common medium roots pH(field): 6.0; gradual smooth boundary to
Bw1	35 - 79 cm	dark yellowish brown (10 YR 4/6, moist) clay loam; moderate fine to medium subangular blocky; slightly sticky, slightly plastic, friable; broken thin unspecified cutans on pedfaces; many fine to medium, random tubular pores and few coarse random tubular pores; common fine roots and few medium roots; pH(field): 6.0; abrupt wavy boundary to
Bw2	79 - 90 cm	red (2.5 YR 4/8, moist) sandy clay loam; moderately coherent porous massive; non sticky, non plastic, friable; common very fine random tubular pores and few fine random tubular pores; common fine roots pH(field): 6.0; abrupt wavy boundary to
BC	90 - 108 cm	weakly coherent porous massive; non sticky, non plastic, friable; common fine pores and few medium pores; few fine roots concentrated in coarse channels; pH(field): 5.0; clear wavy boundary to
C	108 - 135 cm	brownish yellow (10 YR 6/8, moist) loamy sand; weakly coherent porous massive; non sticky, non plastic, friable; common fine pores and common medium pores; few fine roots concentrated in coarse channels; pH(field): 5.0; clear wavy boundary to
Cr	135 - 160 cm	yellow (10 YR 7/6, moist) loamy sand; weakly coherent massive; non sticky, non plastic, firm; few fine pores; pH(field): 5.0;

ADDITIONAL REMARKS

From 79 to 108 cm the profile consists of a series of thin horizons which are *influenced by redox processes* (?). It has been described as Bw2 (79 - 90) and BC (90 - 108) horizons. The BC itself can be subdivided in very thin layers: ?Bg? (90-100) 10YR4/4, clay loam, ?Bh? (100- 103) 5YR2.5/2, loamy sand (buried A horizon?) and ?Bs? (103- 108) 2.5YR4/8, loamy sand. The sequence of these thin layers varies locally, ITS GENESIS IS NOT CLEAR *stratification of different ashes*?. The sand of the C horizon consists mainly of translucent fragments, probably volcanic glass.

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)																				penetro meter kg/cm2
			>2000	2000	1000	500	250	100	50	20	10	5	WDIS	BULK	pF	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah	0 - 16	-	2	2	3	6	6	15	38	28	1.6	0.35	83	81	71	67	65	61	42	33	1.6		
BA	16 - 35	-	0	1	2	4	4	6	47	36	10.5	-	-	-	-	-	-	-	-	-	-	-	1.0
Bw1	35 - 79	-	0	1	1	3	3	43	21	28	13.0	0.33	83	82	78	75	73	71	56	49	2.6		
Bw2	79 - 90	-	1	4	9	17	10	6	32	21	9.1	-	-	-	-	-	-	-	-	-	-	-	3.0-5.0
BC	90 - 108	-	9	24	19	14	6	4	13	12	10.0	-	-	-	-	-	-	-	-	-	-	-	1.8
C	108 - 135	-	7	21	18	14	5	6	13	16	9.8	-	-	-	-	-	-	-	-	-	-	-	2.0
Cr	135 - 160	-	9	23	17	13	6	4	17	11	5.8	-	-	-	-	-	-	-	-	-	-	-	>5.0

Hor.	pH			ORG.MATTER		EXCHANGEABLE CATIONS					EXCH.ACID.		CEC	CEC	CEC	ECEC	BASE		Al	EC2.5	ESP
	H2O	KCl	CaCO3	C	N	Ca	Mg	K	Na	sum	H+Al	Al	soil	clay	OrgC		SAT	SAT			
Ah	5.1	4.3	-	19.5	0.90	1.0	0.6	0.5	0.0	2.1	4.9	4.6	47.3			7.0	4	10	0.04		
BA	5.4	4.9	-	10.5	0.70	0.0	0.1	0.1	0.0	0.2	0.1	0.0	42.1			0.3	0	0	0.01		
Bw1	6.0	5.9	-	4.6	0.31	0.0	0.0	0.0	0.0	0.0	-	-	19.5			0.0	0	-	0.03		
Bw2	5.8	5.9	-	1.7	0.09	0.3	0.0	0.0	0.0	0.3	-	-	11.0			0.3	3	-	0.02		
BC	5.6	5.7	-	1.2	0.03	0.2	0.0	0.0	0.0	0.2	-	-	4.2			0.2	5	-	0.02		
C	5.4	5.4	-	0.5	0.02	0.2	0.0	0.0	0.0	0.2	-	-	6.3			0.2	3	-	0.01		
Cr	5.4	5.0	-	0.2	0.01	0.0	0.0	0.0	0.1	0.1	-	-	7.6			0.1	1	-	0.01		

remark sample 1: Also CEC values available determined at wet samples

CLAY MINERALOGY (1 = very weak .. 8 = very strong)														EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)				
Ah	-	-	-	-	-	-	-	-	-	-	-	-	4.5	4.1	0.5	5.8	2.8	4.6	2.7	100	11.2		
BA	-	-	-	-	-	-	-	-	-	-	-	-	3.1	11.6	3.6	5.1	4.7	1.4	2.2	100	11.5		
Bw1	-	-	-	-	-	-	-	-	-	-	-	-	2.3	12.8	5.1	7.9	3.7	0.0	0.7	100	11.5		
Bw2	-	-	-	-	-	-	-	-	-	-	-	-	2.9	13.6	7.1	4.8	2.8	0.0	0.5	100	11.1		
BC	-	-	-	-	-	-	-	-	-	-	-	-	0.6	5.8	2.9	1.1	1.0	0.0	0.3	100	10.9		
C	-	-	-	-	-	-	-	-	-	-	-	-	0.2	4.6	2.6	0.3	0.3	0.0	0.3	99	10.7		
Cr	-	-	-	-	-	-	-	-	-	-	-	-	0.2	4.1	2.4	0.3	0.6	0.0	0.3	97	10.7		

FAO/UNESCO (1988) : EUTRIC VERTISOL

DIAGNOSTIC CRITERIA : ochric A horizon, vertic properties
soil moisture regime : ustic
soil temperature regime : thermic

LOCAL CLASSIFICATION :

LOCATION : 30 km E of Tsumeb, farm Smithfield
1300 m a.s.l.

RELIEF : undulating, basin floor, 0 %
important cracks at the surface

WATER TABLE : --

DRAINAGE : imperfect

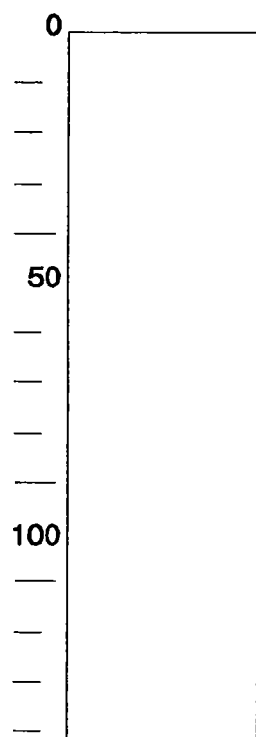
PARENT MATERIAL : lacustrine sediments derived from dolomitic limestone; clayey texture

VEGETATION/ LAND USE : arable farming

CLIMATE Köppen : Bsh

METEO STATION : TSUMEB, 19°14'S / 17°43'E, 1311 m a.s.l.; 30 km E of the site ; relevant

	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
	Years													
EP Frere, Popov	mm	15	127	99	101	79	52	33	34	53	93	130	131	1062
precipitation	mm	30	119	139	79	40	6	0	0	0	1	19	53	553
P max 24/hrs	mm	30	75	123	79	121	19	3	2	0	11	33	69	123
T mean	°C	15	24.6	23.1	22.8	21.4	18.2	15.5	15.4	18.2	22.6	25.2	25.3	21.4



PROFILE DESCRIPTION :

Ap	0 - 20 cm	2.5 Y 4/1, moist, 2.5 Y 4.5/1, dry clay; strong very fine granular; very sticky, very plastic, friable, hard; moderately porous; few fine roots; few small irregular soft calcareous nodules; calcareous (HCl); abrupt wavy boundary to
AB	20 - 40 cm	2.5 Y 3.5/1, moist, 2.5 Y 4.5/1, dry clay; weak coarse prismatic parting to medium subangular blocky; very sticky, very plastic, friable, hard; few very fine random discontinuous inped tubular pores; few fine roots; few small irregular soft calcareous nodules; strongly calcareous (HCl); gradual smooth boundary to
BA	40 - 80 cm	2.5 Y 3.5/1, moist, 2.5 Y 4.5/1, dry clay; moderate coarse prismatic parting to medium angular blocky; very sticky, very plastic, firm, very hard; patchy slickensides cutans; few random discontinuous inped tubular pores; few small irregular soft calcareous nodules; strongly calcareous (HCl); gradual smooth boundary to
B	80 - 110 cm	2.5 Y 3.5/1, moist, 2.5 Y 4.5/1, dry clay; weak coarse prismatic parting to strong wedge-shaped angular blocky; very sticky, very plastic, firm, very hard; continuous cutans; few very fine random discontinuous inped tubular pores; few small irregular soft calcareous nodules; strongly calcareous (HCl);

ANALYTICAL DATA:

		PARTICLE SIZE DISTRIBUTION (µm)																																
Hor.	Top	----->2000		2000	1000		500	250	100	50		20	WDIS		BULK	-----pF-----																		
		Bot.	1000	500	250	100	50	20	2	<2	CLAY	DENS	0.0	1.0		1.5	2.0	2.3	2.7	3.4	4.2													
Ap	0 - 20	5	2	2	3	31	10			2	22	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AB	20 - 40	7	2	1	2	27	9			2	24	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BA	40 - 60	2	2	2	1	25	8			3	25	34	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BA	60 - 80	3	2	2	2	25	9			3	24	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B	80 - 100	3	1	1	1	24	9			3	23	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
B	100 - 115	-	2	1	1	22	7			6	28	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH	pH	ORG. MATTER	EXCHANGEABLE CATIONS							EXCH.	ACID.	CEC	CEC	CEC	BASE	AL	EC2.5	ESP
	H2O	KCl		CaCO3	C	N	Ca	Mg	K	Na									
Ap	8.3	7.0	8.1	1.0	0.05	30.5	8.8	0.4	0.4	40.1	-	-	29.2		40.1	100	-	0.22	
AB	8.5	7.0	7.4	0.7	0.03	30.5	12.5	0.3	0.2	43.5	-	-	33.5		43.5	100	-	0.24	
BA	8.5	7.1	7.2	0.7	0.03	23.5	15.2	0.3	0.2	39.2	-	-	37.0		39.2	100	-	0.24	
BA	8.6	7.1	8.0	0.7	0.03	24.7	16.7	0.3	0.2	41.9	-	-	35.1		41.9	100	-	0.27	
B	8.7	7.1	5.8	0.6	0.03	23.5	18.7	0.3	0.5	43.0	-	-	38.3		43.0	100	-	0.30	
B	8.7	7.2	9.9	0.6	0.03	24.7	20.6	0.3	0.7	46.3	-	-	37.7		46.3	100	-	0.32	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)														EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)				
Ap	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-		
AB	4		3	4	4		6	2	4				-	-	-	0.3	-	-	-	-	-		
BA	4		4	4	4		6	2	4				-	-	-	0.3	-	-	-	-	-		
BA	4		4	4	4		6	2	4				-	-	-	0.3	-	-	-	-	-		
B	4		4	4	4		6	2	4				-	-	-	0.3	-	-	-	-	-		
B	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	-	-	-	-	-		

FAO/UNESCO (1988) : D Y S T R I C P L A N O S O L , inundic phase

DIAGNOSTIC CRITERIA FAO : ochric A horizon, albic E horizon, argic B horizon, abrupt textural change
soil moisture regime : aquic
soil temperature regime : thermic

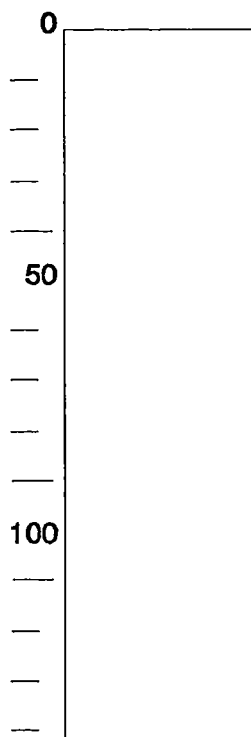
LOCAL CLASSIFICATION :

Classification remarks : colour-requirements for stagnic properties are not met.

LOCATION : Departamento Cerro Largo, 10 km SE of Rio Branco; 32°39'S / 53°16'W
10 m a.s.l.
RELIEF : flat undulating plain with many small silted-in fossil streams and small ponded spots.
MICRO RELIEF Kind : 10 - 20 cm over several meters
WATER TABLE : perched high/low level : 23 cm / 32 cm
DRAINAGE : poor
PARENT MATERIAL : unconsolidated, loamy; Middle to Late Pleistocene of the so-called Merin lagoon area
LAND USE : grasslandpasture

CLIMATE		Köppen : Cfa													
METEO STATION		: RIO BRANCO, 32°32'S / 53°28'S, ca 10 m a.s.l.													
	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
	Years														
precipitation	mm	25	90	80	100	95	90	110	85	100	100	90	65	65	1070

METEO STATION		: ST.VITORIA-DO-PALMAR (Brazil), 3331'S / 5321'W, 24 m a.s.l., 100 km S of site; mod. relevant													
	No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
	Years														
EP (PenMon)	mm	139	108	89	51	27	14	18	33	52	87	111	137	72	
precipitation	mm	29	105	120	96	74	93	102	121	108	106	87	96	83	1191
T mean	°C	30	22.5	22.1	20.4	17.3	14.1	11.9	11.5	12.1	13.6	15.7	18.2	20.7	16.7



PROFILE DESCRIPTION :

Ah	0 - 23 cm	dark greyish brown (10YR 4/2, moist), light brownish grey (10YR 6/2, dry) loam; moderately coherent massive to weak medium subangular blocky (lower part: moderate, thick platy); friable, hard; common very fine discontinuous inped vesicular pores and few fine discontinuous inped tubular pores; many very fine roots; few small spherical hard ferruginous concretion and few small spherical hard manganiferous concretions; very few weathered quartz fragments; smooth boundary to
E	23 - 32 cm	dark greyish brown (10YR 4/2, moist), light brownish grey (10YR 6/2, dry) loam; massive to weak platy; friable, hard; common fine faint diffuse dark yellowish brown (10YR 4/4) mottles; many very fine roots; very few small spherical hard ferruginous concretion and very few small spherical hard manganiferous concretions; abrupt boundary to
Btg1	32 - 48 cm	greyish brown (10YR 4.5/2, moist), light brownish grey (10YR 6/2, dry) clay loam; strong medium prismatic to angular blocky; firm, very hard; many coarse prominent diffuse strong brown (7.5YR 5/6) mottles; continuous thick clay cutans; very few fine vertical discontinuous exped tubular pores; many very fine roots; very few and very few small spherical soft ferruginous nodules; gradual boundary to
Btg2	48 - 80 cm	greyish brown (10YR 4.5/2, moist), light grey (10YR 6.5/2, dry) clay loam; strong coarse prismatic to angular blocky; very firm, very hard; common medium prominent diffuse strong brown (7.5YR 5/6) mottles; broken moderately thick cutans; very few fine vertical discontinuous inped tubular pores; common very fine roots; frequent small spherical hard ferruginous nodules and frequent large irregular soft ferruginous nodules; diffuse boundary to
3t	80 - 105 cm	greyish brown (2.5Y 5/2, moist), light brownish grey (2.5Y 6/2, dry) clay loam; strong coarse wedge-shaped angular blocky; very firm, hard; broken moderately thick cutans; very few fine random discontinuous exped and inped tubular pores and few very fine random vesicular pores; common fine roots; small spherical soft manganiferous nodules; diffuse boundary to
C	105 - 143 cm	light brownish grey (2.5Y 5.5/2, moist), light brownish grey (2.5Y 6/2, dry) clay loam; moderate medium angular blocky; hard; both broken and continuous, thin clay cutans; common very fine discontinuous exped and inped tubular pores; few fine roots; very few large spherical hard nodules and few large irregular soft nodules; very few medium hard angular gypsum nodules

ANALYTICAL DATA:

		----- PARTICLE SIZE DISTRIBUTION (µm) -----												----- pF -----									
Hor.	Top	Bot.	>2000	2000	1000	500	250	100	TOT	50	20	TOT	<2	WDIS	BULK	0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
			1000	500	250	100	50	SAND	20	2	SILT				DENS								
Ah	0 - 23	23	0	0	2	7	20	10	39	18	30	47	14	-	1.46	49	47	42	36	33	29	17	13
E	23 - 32	32	0	1	4	11	19	9	44	16	28	45	12	-	1.56	44	43	37	29	26	21	18	14
Btg1	32 - 48	48	0	1	4	8	13	7	34	15	20	34	32	-	1.45	51	50	47	43	41	38	28	25
Btg2	48 - 88	88	0	1	4	7	13	7	32	13	22	36	33	-	1.46	47	46	43	38	35	31	29	25
Bt	88 - 105	105	0	0	3	7	13	7	30	14	26	40	30	-	1.50	48	46	43	38	35	31	27	24
C	105 - 143	143	0	1	3	7	15	7	33	12	24	36	31	-	1.47	47	45	42	38	35	31	27	24

Hor.	pH			ORG. C	MATTER N	EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	AL SAT	EC2.5	ESP
	H2O	KCl	CaCO3			Ca	Mg	K	Na	sum										
Ah	5.5	4.4	-	1.3	0.09	2.2	1.6	0.6	0.0	4.4	0.3	0.0	8.3	58	4.7	4.7	53	0	0.09	
E	5.4	4.1	-	0.4	0.03	2.0	1.0	0.2	0.0	3.2	0.3	0.0	5.8	48	1.4	3.5	55	0	0.08	
Btg1	5.4	4.2	-	0.6	0.05	8.7	4.8	0.2	0.5	14.2	0.3	0.0	16.5	51	2.0	14.5	86	0	0.12	
Btg2	5.9	4.5	-	0.3	0.01	9.6	5.5	0.2	0.7	16.0	0.1	0.0	16.8	52	0.9	16.1	95	0	0.23	
Bt	5.9	4.9	-	0.1	0.01	9.1	5.2	0.2	1.0	15.5	0.1	0.0	15.0	50	0.3	15.6	100	0	0.30	
C	6.7	4.9	-	0.0	-	9.2	5.4	0.2	0.9	15.7	0.1	0.0	16.2	52	0.1	15.8	97	0	0.27	

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL										IGN. LOSS	SiO2/ Al2O3/ Fe2O3			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Fe2O3
Ah	85.2	6.6	1.1	0.30	0.10	1.80	-	0.60	0.00	0.00	3.9	21.9	206	19.8	9.4
E	87.3	6.4	0.9	0.30	0.10	1.80	-	0.60	0.00	0.00	2.1	23.2	258	21.2	11.2
Btg1	77.7	10.8	3.0	0.40	0.00	1.60	-	0.60	0.00	0.00	4.7	12.2	69.0	10.4	5.6
Btg2	77.6	11.0	2.7	0.50	0.40	1.70	-	0.60	0.00	0.00	4.0	12.0	76.5	10.4	6.4
Bt	78.2	10.3	2.6	0.60	0.40	1.90	-	0.60	0.10	0.00	3.2	12.9	80.1	11.1	6.2
C	79.1	10.4	2.5	0.50	0.50	1.90	-	0.60	0.00	0.00	3.2	12.9	84.2	11.2	6.5

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION										IGN. LOSS	SiO2/ Al2O3/ Fe2O3			
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5		Al2O3	Fe2O3	R2O3	Fe2O3
Ah	63.3	19.1	5.6	0.1	0.7	1.5	-	1.3	0.1	0.2	7.7	5.7	29.9	5.0	5.2
E	63.5	19.9	5.2	0.1	0.7	1.6	-	1.5	0.1	0.1	7.1	5.5	32.6	4.8	5.9
Btg1	54.3	24.0	8.2	0.5	1.0	1.2	-	1.1	0.1	0.0	9.7	4.0	17.6	3.2	4.5
Btg2	55.3	24.1	7.7	0.4	1.1	1.3	-	1.0	0.1	0.0	8.8	4.0	19.0	3.3	4.8
B3	58.0	21.3	7.5	0.4	1.4	1.7	-	1.0	0.1	0.0	7.8	4.7	20.5	3.9	4.3
C	57.6	22.1	7.7	0.4	1.4	1.6	-	1.0	0.1	0.0	8.1	4.5	20.0	3.7	4.4

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
Ah	0	0	0	3	3	0	3	6	2	0	0	0	0.1	0.0	0.0	0.1	0.0	-	-	-	-	
E	0	0	0	3	3	0	3	6	2	0	0	0	0.0	0.1	0.0	0.1	0.0	-	-	-	-	
Btg1	0	0	0	4	3	0	3	4	2	0	0	0	0.1	0.1	0.0	0.6	0.1	-	-	-	-	
Btg2	0	0	0	6	3	0	3	4	2	0	0	0	0.1	0.1	0.0	0.2	0.0	-	-	-	-	
Bt	0	0	0	6	3	0	3	4	2	0	0	0	0.1	0.0	0.0	0.2	0.0	-	-	-	-	
C	0	0	0	6	3	0	3	4	2	0	0	0	0.0	0.0	0.0	0.2	0.0	-	-	-	-	

FAO/UNESCO (1988) : Alumi - H A P L I C A C R I S O L

DIAGNOSTIC CRITERIA : ochric A horizon, argic B horizon
soil moisture regime : ustic
soil temperature regime : thermic

LOCAL CLASSIFICATION : Haplic red soil

LOCATION : Yujiang, Red Soil Ecological Station of Academia Sinica, Jiangxi Province
45 m a.s.l.

RELIEF : undulating, intermontane basin, crest 3 % sloping

WATER TABLE : no evidence

DRAINAGE : well drained

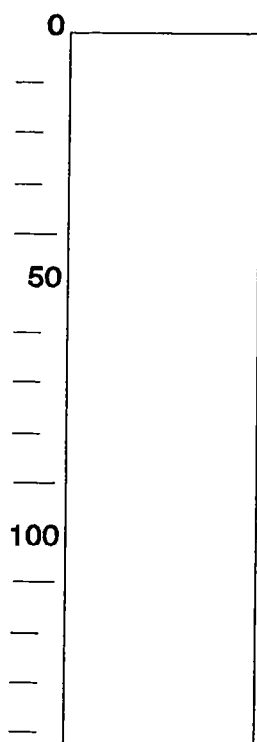
PARENT MATERIAL : Quaternary Red Clay, clayey texture

VEGETATION/ LAND USE : soil planted with Masson pine; soil not to be used for agriculture

CLIMATE Köppen : Cwa

METEO STATION : GUIXI, 48°18'N / 117°13'E, 50 m a.s.l.; 12 km W of the site; very relevant

		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
ET	mm		not available												
precipitation	mm	37	75	130	188	257	286	284	124	112	94	63	62	53	1728
T mean	°C	28	5.9	7.5	12.0	17.8	22.2	25.9	30.0	29.3	25.6	19.7	13.8	8.3	18.2



PROFILE DESCRIPTION :

A	0 - 22 cm	yellowish brown (10YR 5/8, moist), reddish yellow (7.5YR 6/8, dry) sandy clay; weakly coherent porous massive parting to weak fine to medium subangular blocky; sticky, slightly plastic, firm, very hard; many micro pores and common very fine pores; many fine roots throughout; clear smooth boundary to
AB	22 - 45 cm	red (2.5YR 4/8, moist), yellowish brown (10YR 5/8, dry) clay; weak fine to medium subangular blocky; sticky, slightly plastic, very friable, hard; many micro pores and common very fine pores; common fine roots throughout; gradual smooth boundary to
Bt1	45 - 95 cm	dark yellowish brown (10YR 4/6, moist), red (2.5YR 4/8, dry) clay; weak to moderate fine to medium subangular blocky; sticky, slightly plastic, very friable, hard; continuous moderately thick clay cutans; many micro pores and common very fine pores; few fine roots throughout; gradual smooth boundary to
Bt2	95 - 150 cm	red (2.5YR 4/6, moist) clay; moderate fine to medium subangular blocky to moderate fine to medium angular blocky; sticky, slightly plastic, friable; continuous moderately thick clay cutans; common very fine pores; few fine roots throughout; diffuse smooth boundary to
Btg1	150 - 250 cm	dark red (2.5YR 3/6, moist) clay; strong medium angular blocky; sticky, slightly plastic, firm; many medium distinct strong brown (7.5YR 5/6) mottles; clay cutans on pedfaces; few very fine pores; diffuse smooth boundary to
Btg2	220 - 450 cm	dark red (2.5YR 3/6, moist) clay; strong medium angular blocky; sticky, slightly plastic, firm; many coarse prominent light yellowish brown (10YR 6/4) mottles; continuous moderately thick clay cutans on pedfaces;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (μm)										WDIS CLAY	BULK DENS	pF						
			>2000	2000	1000	500	250	100	50	20	2	<2			0.0	1.0	1.5	2.0	2.3	2.7	3.4
A	0 - 7	-	0	1	2	7	9	13	30	38	1.7	-	-	-	-	-	-	-	-		
A	7 - 22	-	0	1	2	7	7	12	31	39	1.4	1.35	46	41	37	35	33	31	25	23	
AB	22 - 45	-	0	1	2	5	6	13	26	47	0.0	-	-	-	-	-	-	-	-		
Bt1	45 - 95	-	0	1	2	5	5	11	26	52	2.0	1.20	45	44	42	40	38	37	29	26	
Bt2	95 - 150	-	0	0	1	4	6	11	25	53	1.4	1.27	45	44	42	40	39	38	32	29	
Btg1	150 - 220	-	0	0	1	3	6	12	25	54	5.0	1.46	45	44	43	41	40	39	37	34	
Btg2	220 - 270	-	0	0	0	2	5	13	26	54	-	1.36	49	49	48	46	45	45	41	41	
Btg2	300 - 350	-	0	0	0	1	6	15	24	53	-	-	-	-	-	-	-	-	-	-	
Btg2	370 - 450	-	0	0	0	1	9	13	30	47	-	-	-	-	-	-	-	-	-	-	

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al Sat	EC2.5	Bray P
				C	N	Ca	Mg	K	Na	sum										
A	4.3	3.8	-	0.4	0.05	1.8	0.0	0.1	0.0	1.9	3.4	3.2	6.2			5.3	31	52	0.04	0.0
A	4.4	3.8	-	0.2	0.04	1.6	0.0	0.1	0.0	1.7	3.7	3.4	6.2			5.4	27	55	0.02	0.0
AB	4.5	3.8	-	0.2	0.04	1.4	0.0	0.1	0.0	1.5	4.5	4.1	7.6			6.0	20	54	0.01	0.0
Bt1	4.5	3.7	-	0.1	0.04	1.4	0.0	0.1	0.0	1.5	5.3	5.0	9.2			6.8	16	54	0.01	0.0
Bt2	4.5	3.6	-	0.1	0.04	1.2	0.0	0.1	0.0	1.3	6.2	5.9	9.9			7.5	13	60	0.01	0.0
Btg1	4.5	3.6	-	0.3	0.04	1.4	0.0	0.1	0.0	1.5	8.1	7.8	15.8			9.6	9	49	0.01	0.0
Btg2	4.4	3.6	-	0.1	0.04	1.2	0.0	0.1	0.0	1.3	10.0	9.6	13.4			11.3	10	72	0.01	0.1
Btg2	4.3	3.5	-	0.1	0.04	1.2	0.0	0.2	0.0	1.4	11.7	11.0	17.6			13.1	8	63	0.02	0.0
Btg2	4.4	3.6	-	0.0	0.03	1.2	0.0	0.3	0.0	1.5	13.2	12.8	22.2			14.7	7	58	0.02	0.0

CLAY MINERALOGY (1 = very weak .. 8 = very strong)												EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith(d) & -pyroph.(p)								Pret	pHNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)		
A	2	2		2	5		3	4				1	-	-	-	2.1	0.3	-	-	-	-
A	2	2		2	5		3	3				1	-	-	-	2.1	0.3	-	-	-	-
AB	2	2		2	5		3	3				2	-	-	-	2.7	0.3	-	-	-	-
Bt1	2	2		2	5		3	2				1	-	-	-	3.2	0.4	-	-	-	-
Bt2	3	2		2	6		3	2				2	-	-	-	3.4	0.3	-	-	-	-
Btg1	3	2		2	6		3	1				2	-	-	-	4.3	0.4	-	-	-	-
Btg2	3	2		2	6		3					2	-	-	-	6.7	0.5	-	-	-	-
Btg2	4	3		3	6		3					2	-	-	-	5.6	0.4	-	-	-	-
Btg2	4	3		3	4		3					1	-	-	-	4.0	0.3	-	-	-	-

FAO/UNESCO (1988) : Pachi - F E R R I C L I X I S O L

DIAGNOSTIC CRITERIA : ochric A horizon, argic B horizon, ferric properties
 soil moisture regime : ustic
 soil temperature regime : isohyperthermic

LOCAL CLASSIFICATION : Hoskote sandy clay loam

LOCATION : Hoskote-Devanahalli road, Bangalore district, Mysore
 1000 m a.s.l.

RELIEF : undulating, pediplain, nearly flat 1 %; slight sheet erosion

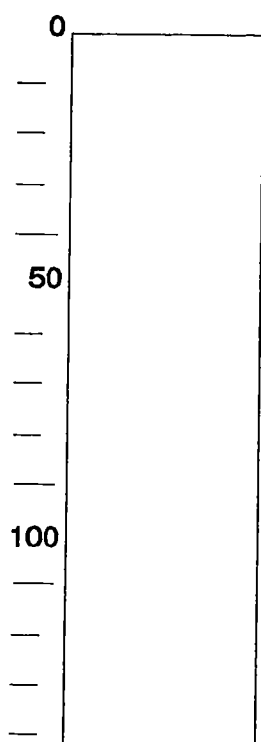
WATER TABLE : no evidence

DRAINAGE : well drained

PARENT MATERIAL : residual material derived from granite gneiss

VEGETATION/ LAND USE : arable farming: finger millet, sorghum, niger, mung beans

CLIMATE		Köppen : Aw													
METEO STATION		: BANGALORE, 12°58'N / 77°35'E, 921 m a.s.l.; 50 km NE of the site; moderately relevant													
		No. of	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
		Years													
EP	Penman	mm	115	134	172	165	164	139	128	128	122	115	102	103	1587
	precipitation	mm	5	5	10	39	114	84	105	138	169	159	58	16	902
	T mean	°C	21.6	24.1	26.8	27.8	27.1	24.3	23.0	23.3	23.4	23.3	22.1	21.1	24.0



PROFILE DESCRIPTION :

Ap	0 - 20 cm	yellowish red (5YR 4/6, moist) sandy loam; weak fine granular; non sticky, friable; many very fine pores and few coarse pores; many fine roots and medium roots; non calcareous; clear smooth boundary to
AB	20 - 36 cm	reddish brown (5YR 4/4, moist) sandy clay loam; moderate medium subangular blocky; slightly sticky, plastic, friable; many very fine pores and few coarse pores; many fine roots and medium roots; non calcareous; clear smooth boundary to
Bo1	36 - 68 cm	yellowish red (5YR 4/6, moist) clay loam; moderate medium subangular blocky; sticky, plastic, firm; common very fine pores; common fine roots; few small soft ferruginous concretions, quantity increasing with depth; non calcareous; clear smooth boundary to
Bo2	68 - 150 cm	yellowish red (5YR 4/6, moist) clay loam; moderate to strong medium subangular blocky; very sticky, very plastic, firm; common very fine pores; few fine roots; frequent small soft ferruginous concretions; non calcareous;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	10	5			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ap	0 - 20	-	1	13	25	26	7		2	6		21	-	-	-	-	-	-	-	-	-	-
AB	20 - 36	-	1	12	22	27	8		3	5		23	-	-	-	-	-	-	-	-	-	-
Bo1	36 - 68	-	1	16	23	18	5		2	5		31	-	-	-	-	-	-	-	-	-	-
Bo2	68 - 150	-	1	12	15	16	5		1	7		44	-	-	-	-	-	-	-	-	-	-

Hor.	pH	pH	CaCO3	ORG.MATTER		EXCHANGEABLE			CATIONS		EXCH.	ACID.	CEC	CEC	CEC	ECEC	BASE	Al	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum										
Ap	6.9	6.0	-	0.2	0.03	3.2	0.2	0.4	0.3	4.1	-	-	4.1			4.1	100	-	0.14	
AB	6.7	5.8	-	0.2	0.03	1.7	0.0	0.3	0.0	2.0	-	-	3.9			2.0	51	-	0.16	
Bo1	6.2	5.3	-	0.3	0.02	2.2	0.2	0.3	0.1	2.8	-	-	5.7			2.8	49	-	0.12	
Bo2	6.0	5.1	-	0.2	0.03	4.2	2.0	0.3	0.1	6.6	-	-	7.6			6.6	87	-	0.13	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)														EXTRACTABLE Fe, Al, Si, Mn %								Pret	pHNaF
	Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)									
														Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
Ap	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	0.1	-	-	-	-
AB	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.9	0.1	-	-	-	-
Bo 1	4				8				3			2	2		-	-	-	1.6	0.1	-	-	-	-
Bo 2	4				8				3			2	2		-	-	-	2.2	0.1	-	-	-	-

Hor.	SAND MINERALOGY		heavy fraction																key : QU = quartz; FE = feldspar; PL = plagioclase; RE = rest group light minerals; OP = opaque
	HEAV	LIGHT	QU	FE	PL	RE	OP	A	B	C	D	E	F	G	H	I	J	K	
Ap	-	-																	
AB	-	-																	
Boc1	-	-																	
Boc2	0.1	99.9	95	4	1	0													

FAO/UNESCO (1988) : Vetí - RHODIC FERRALSOL

DIAGNOSTIC CRITERIA : ochric A horizon, ferralic B horizon
 : soil moisture regime : ustic
 : soil temperature regime : isohyperthermic

LOCAL CLASSIFICATION : Malashi clay

LOCATION : Mpongwe Block 1, Ndola Rural east district, Copperbelt
 1200 m a.s.l.

RELIEF : plateau, almost flat, 2 %

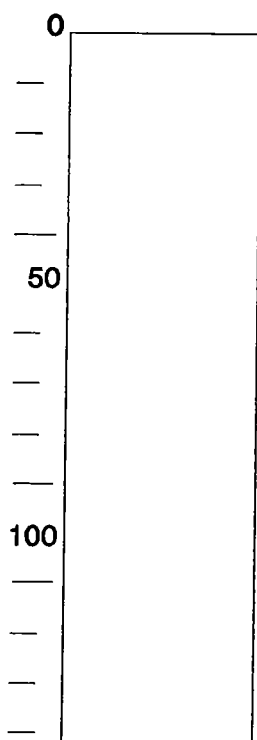
WATER TABLE : no evidence

DRAINAGE : well drained

PARENT MATERIAL : dolomitic limestone

VEGETATION/ LAND USE : Miombo woodland

CLIMATE		Köppen : Aw													
METEO STATION		: NDOLA, 13°0'S / 28°39'E, 1270 m a.s.l.; 100 km NE of the site, poor relevance													
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
ET	mm	7	115	109	166	164	172	153	172	214	251	256	183	128	2083
precipitation	mm	30	307	245	183	39	3	1	0	1	2	20	131	280	1212
no. of raindays		30	21	17	11	3	1	0	0	0	0	3	13	21	90
T mean	°C	27	20.5	20.4	20.5	20.0	17.6	15.6	15.8	18.3	21.6	23.6	22.2	20.7	19.7



PROFILE DESCRIPTION :

Ah	0 - 6 cm	dark reddish brown (2.5 YR 3/4, moist), reddish brown (2.5 YR 4/4, dry) sandy clay; weak fine subangular blocky and crumb; slightly sticky, slightly plastic, friable, slightly hard; many fine to medium, pores and few coarse pores, moderately porous; common fine roots and few medium roots; clear smooth boundary to
BA	6 - 25 cm	red (10 R 4/6, moist), 1.25YR 4/6, dry clay; moderate fine to medium subangular blocky; sticky, plastic, friable, hard; broken moderately thick clay and sesquioxide cutans; common fine pores and few medium pores, moderately porous; common fine roots and few medium roots; gradual smooth boundary to
Bt1	25 - 68 cm	red (10R 3.5/6, moist), red (10R 4.5/6, dry) clay; moderate fine to medium subangular blocky and moderate coarse subangular blocky; sticky, plastic, friable, hard; broken moderately thick clay and sesquioxide cutans; common fine pores and few medium pores, moderately porous; few fine roots and few medium roots; few weathered green schist fragments; diffuse smooth boundary to
Bt2	68 - 200 cm	red (10R 3.5/6, moist), red (10R 4.5/6, dry) clay; weak fine to medium subangular blocky and weak coarse subangular blocky; sticky, plastic, friable, hard; broken moderately thick clay and sesquioxide cutans; common fine to medium, pores, moderately porous; no roots and few fine roots; few weathered green schist fragments;

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										WDIS <2 CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	10	5			0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah	0 - 6	-	1	2	5	16	11			11	9		47	-	-	-	-	-	-	-	-	-
BA	6 - 25	-	0	2	3	10	8			7	7		62	-	-	-	-	-	-	-	-	-
Bt1	25 - 68	-	1	1	2	7	7			7	5		69	-	-	-	-	-	-	-	-	-
Bt2	68 - 100	-	1	1	2	8	8			8	6		67	-	-	-	-	-	-	-	-	-
Bt2	100 - 150	-	1	1	2	8	8			7	6		68	-	-	-	-	-	-	-	-	-
Bt2	150 - 250	-	1	1	1	6	8			9	7		68	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	ESP
				C	N	Ca	Mg	K	Na	sum										
Ah	5.2	4.2	-	1.8	0.11	0.8	0.7	0.0	0.2	1.7	1.2	0.8	9.3			2.9	18	9	0.05	
BA	5.0	4.1	-	0.8	0.07	0.2	0.7	0.0	0.1	1.0	1.5	1.2	8.6			2.5	12	14	0.04	
Bt1	5.1	4.2	-	0.4	0.04	0.4	0.3	0.0	0.0	0.7	1.1	0.3	6.7			1.8	10	4	0.01	
Bt2	5.3	4.6	-	0.3	0.04	0.6	0.7	0.0	0.0	1.3	0.4	0.0	6.7			1.7	19	0	0.01	
Bt2	5.4	4.8	-	0.2	0.03	0.8	0.7	0.0	0.1	1.6	0.2	0.0	5.4			1.8	30	0	0.01	
Bt2	5.5	5.0	-	0.2	0.03	1.0	0.7	0.0	0.0	1.7	0.2	0.0	5.8			1.9	29	0	0.01	

Hor.	ELEMENTAL COMPOSITION OF TOTAL SOIL											IGN. LOSS	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5						
Ah	60.0	17.8	10.5	0.04	0.32	0.92	-	2.13	0.07	0.18	2.6		5.7	15.2	4.2	2.7
BA	52.2	21.8	11.9	0.02	0.33	0.96	-	1.77	0.06	0.15	8.8		4.1	11.7	3.0	2.9
Bt1	50.5	24.6	13.0	0.01	0.36	1.03	-	1.64	0.06	0.12	9.1		3.5	10.3	2.6	3.0
Bt2	51.0	23.8	12.7	0.02	0.35	1.05	-	1.65	0.05	0.08	8.6		3.6	10.7	2.7	2.9
Bt2	51.2	24.4	13.2	0.03	0.36	1.09	-	1.74	0.05	0.08	8.5		3.6	10.3	2.6	2.9
Bt2	51.2	25.3	13.1	0.03	0.35	1.13	-	1.57	0.05	0.06	8.8		3.4	10.4	2.6	3.0

Hor.	ELEMENTAL COMPOSITION OF CLAY FRACTION											IGN. LOSS	SiO2/ Al2O3	SiO2/ Fe2O3	SiO2/ R2O3	Al2O3/ Fe2O3
	SiO2	Al2O3	Fe2O3	CaO	MgO	K2O	Na2O	TiO2	MnO2	P2O5						
Ah	33.8	32.9	16.6	0.0	0.5	1.4	-	1.0	0.1	0.4	11.9		1.7	5.4	1.3	3.1
BA	34.2	33.4	16.2	0.0	0.4	1.3	-	0.9	0.1	0.3	12.1		1.7	5.6	1.3	3.2
Bt1	34.5	33.5	16.2	0	0.4	1.2	-	0.9	0.1	0.2	12.3		1.8	5.7	1.3	3.2
Bt2	34.1	33.3	16.3	0	0.4	1.3	-	0.9	0.1	0.2	12.4		1.7	5.6	1.3	3.2
Bt2	34.2	33.4	16.4	0.0	0.4	1.3	-	0.9	0.1	0.2	12.3		1.7	5.6	1.3	3.2
Bt2	33.8	33.2	16.1	0	0.4	1.3	-	0.9	0.1	0.2	12.4		1.7	5.6	1.3	3.2

EXTRACTABLE Fe, Al, Si, Mn %													
by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)													
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	
									Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)
Ah	2			6	4				0.4	0.3	0.0	5.3	0.4
BA	2			6	4				0.4	0.3	0.0	6.6	0.5
Bt1	2			6	4				0.4	0.3	0.0	7.0	0.5
Bt2	2			6	4				0.4	0.2	0.0	6.8	0.4
Bt2	2			6	4				0.4	0.2	0.0	7.0	0.4
Bt2	2			6	4				0.3	0.2	0.0	7.2	0.4

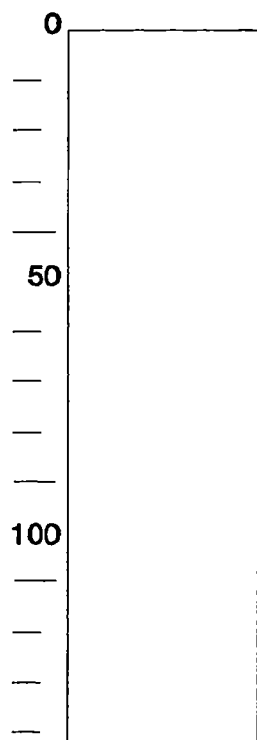
CLAY MINERALOGY (1 = very weak .. 8 = very strong)													
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	
Ah	2			6	4				4	2			
BA	2			6	4				4	2			
Bt1	2			6	4				4	2			
Bt2	2			6	4				4	2			
Bt2	2			6	4				4	2			
Bt2	2			6	4				4	2			

FAO/UNESCO (1988) : HUMIC NITISOL (limit to Humic Ferralsol)
 DIAGNOSTIC CRITERIA : umbric A horizon, strongly humic, (ferralic B horizon)
 soil moisture regime : ustic
 soil temperature regime : isothermic

LOCAL CLASSIFICATION :

LOCATION : Nairobi, National Agricultural Laboratories (NAL)
 1700 m a.s.l.
 RELIEF : gently undulating broad interfluve, middle slope 4 %
 WATER TABLE : no evidence
 DRAINAGE : well drained
 PARENT MATERIAL : fine grained igneous rock (quartz trachyte)
 VEGETATION/ LAND USE : cropping experiments (original vegetation wooded savannah grassland)

CLIMATE	Köppen : Cfs														
METEO STATIONS	: N.A.L. METEO STATION, 1°15'S / 36°41'E, 1700 m a.s.l., very relevant														
	NAIROBI (DAG. CORNER) (WMO: 63.7410), 1°18'S / 36°45'E, 1798 m a.s.l														
<i>combined data</i>	No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual	
EP Frere, Popov	mm	126	125	131	107	90	80	76	89	102	124	107	111	1268	
precipitation	mm	47	52	46	106	223	168	42	15	27	22	54	133	973	
T mean	°C	47	18.9	19.7	19.9	19.4	18.1	16.9	15.9	16.3	17.7	18.8	18.4	18.3	18.2



PROFILE DESCRIPTION :

Ah	0 - 18 cm	dark reddish brown (5 YR 3/3, moist), dark reddish brown (5 YR 3/4, dry) clay; moderate to strong fine subangular blocky and moderate to strong medium subangular blocky; sticky, plastic, firm, hard; patchy thin clay cutans; non calcareous; pH(field): 5.0; gradual smooth boundary to
AB	18 - 37 cm	dark reddish brown (2.5 YR 3/4, moist), dark reddish brown (2.5 YR 3/4, dry) clay; strong medium subangular blocky and strong coarse subangular blocky; sticky, plastic, friable, hard; broken moderately thick clay cutans; common micro, many very fine, many fine and few medium pores; non calcareous; pH(field): 5.0; gradual smooth boundary to
Bt1	37 - 66 cm	dark reddish brown (2.5 YR 3/4, moist), dark red (2.5 YR 3/6, dry) clay; strong medium subangular blocky and strong coarse subangular blocky; sticky, plastic, friable, hard; continuous thick clay cutans; many micro to fine, pores and common medium pores; non calcareous; pH(field): 5.0; diffuse smooth boundary to
Bt2	66 - 116 cm	dark reddish brown (2.5 YR 3/4, moist), dark red (2.5 YR 3/6, dry) clay; strong medium angular blocky and strong coarse angular blocky; sticky, plastic, friable, hard; broken thick clay cutans; many micro to fine, pores and common medium pores; non calcareous; pH(field): 6.0; diffuse smooth boundary to
Bt3	116 - 180 cm	dark reddish brown (2.5 YR 3/4, moist), dark red (2.5 YR 3/6, dry) clay; strong medium angular blocky and strong fine angular blocky; firm; broken thick clay cutans; many micro to fine, pores and common medium pores; non calcareous; pH(field): 5.0;

ADDITIONAL REMARKS

In a thin section taken from the Bt2 at 110-120 cm micro-cutans are observed and occasionally clay filling occur. There is also common soil fauna activity mainly by termites and millipeds, as evident from channels and aggro-tubules. Rooting is very deep, the bulk of roots is concentrated in the top 60 cm.

ANALYTICAL DATA:

Hor.	Top	Bot.	PARTICLE SIZE DISTRIBUTION (µm)										<2 CLAY	WDIS CLAY	BULK DENS	pF							
			>2000	2000	1000	500	250	100	50	20	10	5				0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2
Ah	0 - 15	-	0	1	2	2	1	7	17	70	-	-	-	-	-	-	-	-	-	-	-	-	-
AB	15 - 30	-	0	1	2	3	2	6	13	75	-	-	-	-	-	-	-	-	-	-	-	-	-
Bt1	30 - 60	-	0	0	1	2	1	5	9	82	-	-	-	-	-	-	-	-	-	-	-	-	-
Bt2	65 - 100	-	0	1	1	1	1	4	9	84	-	-	-	-	-	-	-	-	-	-	-	-	-
Bt2/3	100 - 150	-	0	0	1	2	1	2	9	85	-	-	-	-	-	-	-	-	-	-	-	-	-

Hor.	pH H2O	pH KCl	CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH. H+Al	ACID. Al	CEC soil	CEC clay	CEC OrgC	ECEC	BASE SAT	Al SAT	EC2.5	SPEC surf
				C	N	Ca	Mg	K	Na	sum										
Ah	5.8	4.9	-	2.3	-	7.9	1.9	2.1	0.0	11.9	-	-	25.7			11.9	46	-	0.15	132
AB	5.4	4.3	-	2.1	0.18	5.4	1.5	1.4	0.0	8.3	0.2	0.0	24.8			8.5	33	0	0.14	133
Bt1	5.4	4.5	-	1.0	0.16	6.5	1.6	0.9	0.0	9.0	0.1	0.2	22.7			9.1	40	1	0.08	142
Bt2	5.9	5.0	-	0.8	0.09	7.1	2.6	0.4	0.0	10.1	-	-	23.7			10.1	43	-	0.08	139
Bt2/3	6.3	5.3	-	0.7	-	6.3	3.4	0.4	0.0	10.1	-	-	18.5			10.1	55	-	0.07	162

CLAY MINERALOGY (1 = very weak .. 8 = very strong)												EXTRACTABLE Fe, Al, Si, Mn %								Pret	pMNaF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)		
Ah					4		3	2	2			2	-	-	-	7.2	0.3	-	-	-	-
Ab					4		3	2	2			2	-	-	-	7.6	0.3	-	-	-	-
Bt1	1				4		3	2	3			2	-	-	-	7.1	0.2	-	-	-	-
Bt2	1				4		3	2	3			2	-	-	-	7.2	0.3	-	-	-	-
Bt2/3	2				4		3	2	3			2	-	-	-	7.7	0.3	-	-	-	-

FAO/UNESCO (1988) : HUMIC PLINTHOSOL

DIAGNOSTIC CRITERIA : umbric A horizon, strongly humic, gleyic properties, plinthite
soil moisture regime : peraquic
soil temperature regime : isohypethermic

LOCAL CLASSIFICATION : Plintossolo Distrofico

LOCATION : Goias, Projecto de Formoso do Araguaia
200 m a.s.l.

RELIEF : floodplain, flat, basin/backswamp, 0 %

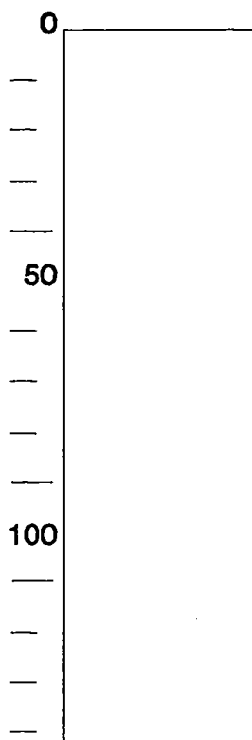
WATER TABLE : - 120 cm, groundwater, fluctuation 0 - 300 cm, yearly flooded

DRAINAGE : poor

PARENT MATERIAL : alluvium, derived fromn highly weathered materials, kaolinitic, clayey texture

VEGETATION/ LAND USE : seasonally irrigated, rice and soja

CLIMATE		Köppen : Aw, Am													
METEO STATION		: PORTO NACIONAL, 10°31's / 48°43'W, 250 m a.s.l.; 160 km NE of the site; moderately relevant													
		No. of Years	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
EP Frere, Popov	mm		120	102	111	108	107	97	105	129	134	130	117	119	1379
precipitation	mm	31	298	290	292	152	44	0	3	9	42	150	242	292	1814
T mean	°C	30	25.2	24.9	25.2	25.7	25.6	24.6	24.3	26.1	27.6	26.7	25.8	25.3	25.6



PROFILE DESCRIPTION :

Ap	0 - 12 cm	very dark grey (10 YR 2.5/1, moist) silty clay loam; weak fine to medium subangular blocky; slightly sticky, slightly plastic, very friable; many very fine pores and many fine random continuous tubular pores, highly porous; common fine roots; abrupt smooth boundary to
Ah	12 - 35 cm	very dark greyish brown (10 YR 3/2, moist) silty clay loam; moderately coherent porous massive parting to very weak medium subangular blocky; slightly sticky, slightly plastic, very friable; many fine pores and many fine random continuous tubular pores, highly porous; common fine roots; clear wavy boundary to
AE	35 - 52 cm	dark yellowish brown (10 YR 3.5/4, moist) clay loam; moderately coherent porous massive parting to very weak medium subangular blocky; slightly sticky, slightly plastic, friable; common yellowish brown (10 YR 4.5/6) mottles; many very fine pores and many fine random continuous tubular pores, highly porous; few fine roots; clear smooth boundary to
E	52 - 75 cm	yellowish brown (10 YR 4.5/4, moist) clay; moderately coherent porous massive parting to very weak medium subangular blocky; slightly sticky, slightly plastic, friable; common brownish yellow (10 YR 5.5/6) mottles; many fine pores and many medium random continuous tubular pores, highly porous; few fine roots; frequent channels; diffuse smooth boundary to
Bv1	75 - 95 cm	grey (10 YR 6/1, moist) clay; moderately coherent porous massive parting to very weak medium subangular blocky; slightly sticky, slightly plastic, friable; many medium prominent sharp brownish yellow (10 YR 5.5/6) and few fine distinct sharp (7.5 YR 2.5/0) mottles; many fine pores and many medium random continuous tubular pores, highly porous; very few medium spherical hard ferruginous concretions; frequent channels; diffuse smooth boundary to
Bv2	95 - 245 cm	light grey (10 YR 7/1, moist) clay; moderately coherent porous massive parting to very weak medium subangular blocky; slightly sticky, slightly plastic, friable; many medium prominent sharp yellowish brown (10 YR 5/8) and many medium prominent sharp red (2.5 YR 4/8) mottles; many fine pores and many medium random continuous tubular pores, highly porous; very few medium spherical hard ferruginous concretions; frequent channels;
Auger	245 - 350 cm	light grey (10 YR 7/1, moist) clay; many medium prominent sharp red (10 R 4/8) mottles;

ANALYTICAL DATA:

Hor.	Top	PARTICLE SIZE DISTRIBUTION (µm)										WDIS		BULK DENS	pF								spec. surf. m²/g
		>2000	2000	1000	500	250	100	50	20	<2	CLAY	-----											
			Bot.		1000	500	250	100	50			20	2		0.0	1.0	1.5	2.0	2.3	2.7	3.4	4.2	
Ap	0 - 12	-	1	1	1	3	3	9	30	53	19.9	0.94	61	60	57	53	50	48	44	43	-		
Ah	12 - 35	-	1	1	1	3	3	10	37	43	11.2	-	-	-	-	-	-	-	-	-	-		
AE	35 - 52	-	1	1	2	6	7	12	21	50	9.5	0.87	64	62	55	43	38	34	29	28	159		
E	52 - 75	-	0	1	4	10	11	12	12	50	4.0	-	-	-	-	-	-	-	-	-	95		
Bv1	75 - 95	-	1	1	3	8	9	9	9	60	1.0	1.41	47	46	42	39	37	34	32	31	94		
Bv2	95 - 130	-	1	1	2	7	8	10	10	61	0.4	-	-	-	-	-	-	-	-	-	104		
Bv2	130 - 230	-	1	1	2	7	8	12	15	54	0.0	-	-	-	-	-	-	-	-	-	104		
	230 - 330	-	1	1	3	6	8	11	11	59	1.0	-	-	-	-	-	-	-	-	-	98		
	330 - 430	-	1	3	9	14	13	9	6	46	1.0	-	-	-	-	-	-	-	-	-	68		

Hor.	pH		CaCO3	ORG.MATTER		EXCHANGEABLE CATIONS					EXCH.ACID.		CEC soil	CEC clay	CEC OrgC	ECEC	Base SAT	Al SAT	EC2.5	ESP
	H2O	KCl		C	N	Ca	Mg	K	Na	sum	H+Al	Al								
Ap	5.0	4.4	-	6.6	0.38	3.4	1.4	0.8	0.2	5.8	1.4	2.3	20.6			7.2	28	11	0.24	
Ah	5.8	4.7	-	3.8	0.35	0.7	0.4	0.3	0.0	1.4	0.6	1.6	14.4			2.0	10	11	0.03	
AE	5.2	4.3	-	1.5	0.13	0.7	0.3	0.1	0.0	1.1	2.0	2.0	11.9			3.1	9	17	0.03	
E	5.1	4.1	-	0.4	-	0.2	0.1	0.0	0.0	0.3	2.3	2.1	11.1			2.6	3	19	0.01	
Bv1	4.8	4.1	-	0.3	-	0.0	0.1	0.0	0.0	0.1	2.0	1.8	6.1			2.1	2	30	0.03	
Bv2	5.1	4.2	-	0.2	-	0.6	0.2	0.0	0.0	0.8	1.4	1.2	6.0			2.2	13	20	0.01	
Bv2	5.7	4.9	-	0.1	-	1.2	0.9	0.0	0.0	2.1	0.1	0.0	5.6			2.2	38	0	0.01	
	6.0	4.6	-	0.1	-	2.3	2.0	0.0	0.0	4.3	0.1	0.0	7.3			4.4	59	0	0.01	
	6.0	4.3	-	0.0	-	1.4	1.4	0.0	0.2	3.0	0.5	0.5	5.3			3.5	57	9	0.01	

CLAY MINERALOGY (1 = very weak .. 8 = very strong)													EXTRACTABLE Fe, Al, Si, Mn % by ammoniumoxal.(o), Na-dith.(d) & -pyroph.(p)								Pret	pMNAF
Hor.	MI	VE	CH	SM	KA	HA	ML	QU	FE	GI	GO	HE	Fe(o)	Al(o)	Si(o)	Fe(d)	Al(d)	Fe(p)	Al(p)			
Ap				4					1	2			0.6	2.0	0.5	3.0	1.2	-	-	-	-	
Ah				4					1	2			0.3	2.2	0.7	4.4	1.7	-	-	-	-	
AE				7			3		2	2			0.2	0.9	0.2	3.3	1.1	-	-	-	-	
E				8			3		3	2			0.1	0.3	0.0	2.0	0.4	-	-	-	-	
Bv1				8			3		3	2			0.1	0.2	0.0	1.6	0.3	-	-	-	-	
Bv2				8			3		3	2			0.0	0.2	0.0	2.4	0.4	-	-	-	-	
Bv2	2			8			3		3	2			0.0	0.2	0.0	2.9	0.6	-	-	-	-	
	2			8			3		2	2			0.0	0.1	0.0	2.9	0.4	-	-	-	-	
	2			8			3		2	2			0.0	0.1	0.0	1.6	0.2	-	-	-	-	

STERK VEREENVOUDIGDE SLEUTEL FAO-UNESCO ¹

Histosols	H of O >40 cm (sphagnum >60 cm) (vergelijk NL Veengronden).
Anthrosols	sterke invloed mens (aanwezigheid Fimic A horizon).
Leptosols	ondiep vast gesteente (<30 cm of equivalent); meestal A-R profiel.
Vertisols	≥35 % klei + cracks >1 cm op meer dan 50 cm -mv.
Fluvisols	125 cm fluvic properties (sedimentaire strata + O.M. onregelmatig); meestal A-C profiel.
Solonchaks	salic properties <30 cm (zout, hoge geleidbaarheid).
Gleysols	gleyic properties <50 cm (oxydatie-reductie fenomenen), <i>niet in sandy loam, loamy sand, sand</i> .
Andosols	andic properties ≥35 cm (bulk density, vulkanisch glas etc).
Arenosols	textuur ≥100 cm sandy loam, loamy sand, sand; meestal A-C profiel.
Regosols	ongecompakteerd materiaal, textuur fijner dan sandy loam; meestal A-C profiel.
Podzols	spodic B horizon.
Plinthosols	plinthiet.
Ferralsols	ferralic B horizon.
Planosols	E-horizon met stagnic properties, abrupt textural change E-B.
Solonetz	natric B-horizon.
Greyzems	donkere (chroma ≤2) mollic A horizon, gebleekte silt- zand + argic B horizon.
Chernozems	donkere (chroma ≤2) mollic A horizon, calcic horizon ≤125 cm -mv.
Kastanozems	mollic A horizon (chroma >2), calcic en/of gypsic horizon ≤125 cm -mv.
Phaeozems	mollic A horizon, S/T ≥50
Podzoluvisols	argic B horizon + tonguing en/of nodules; meestal A-Eg-Btg-C profiel, soms E i.p.v. Eg-horizon.
Gypsisols	(petro)gypsic <125 cm -mv, eventueel met calcic horizon.
Calcisols	(petro)calcic <125 cm -mv (zonder gypsic).
Nitisols	argic B horizon, nitic properties, geen merkbare overgang B → C-horizon.
Alisols	argic B horizon, CEC _{clay} ≥24, S/T <50; in principe A-E-Bt-C profiel.
Acrisols	argic B horizon, CEC _{clay} <24, S/T <50; in principe A-E-Bt-C profiel.
Luvisols	argic B horizon, CEC _{clay} ≥24, S/T ≥50; in principe A-E-Bt-C profiel.
Lixisols	argic B horizon, CEC _{clay} <24, S/T ≥50; in principe A-E-Bt-C profiel.
Cambisols	cambic B horizon; meestal A-Bw-C profiel.

¹ Voor de gedetailleerde key, de exacte omschrijving volgens de key differentiërende criteria alsmede de definiëring van de 28 major soil groups zie FAO-Unesco (1988), of Driessen en Dudal (1991).

analytical methods:

Particle Size Distribution: weight %

WDIS CLAY: waterdispersible clay, weight %

Bulk density: Mgm^{-3}

pF: volume %

pH H_2O , pH KCl: 1:2.5

CaCO_3 , organic C, total N: weight %

Exchangeable bases, CEC: NH_4OAc pH 7, $\text{cmol}_c\text{kg}^{-1}$

Exchangeable acidity: 1 M KCl; $\text{cmol}_c\text{kg}^{-1}$

ECEC: Effective Cation Exchange Capacity (bases + Al + H^+)

Available P (Olsen): mgkg^{-1}

P_2O_5 and K_2O AL: ammoniumlactate extraction

Pret: P retention

Clay mineralogy: MI mica/illite, VE vermiculite, CH chlorite, SM smectite, KA kaolinite,

HA halloysite, ML mixed layers, QU quartz, FE feldspar, GI gibbsite, GO goethite, HE hematite.

alle rechten behorend bij de in deze gids opgenomen bodemprofielen, alsmede ~~de~~ van de bijbehorende beschrijvingen, analytische gegevens en de klimaatsgegevens blijven, voorzover het ISRIC niet reeds op andere wijze aan privaatrechtelijke bepalingen gebonden is, eigendom van het ISRIC. dit geldt eveneens voorzover het bewerkingen van oorspronkelijke gegevens speciaal voor deze gids betreft.

overname of bewerking van de gegevens kan dan ook slechts geschieden na het verkrijgen van schriftelijke toestemming van het ISRIC