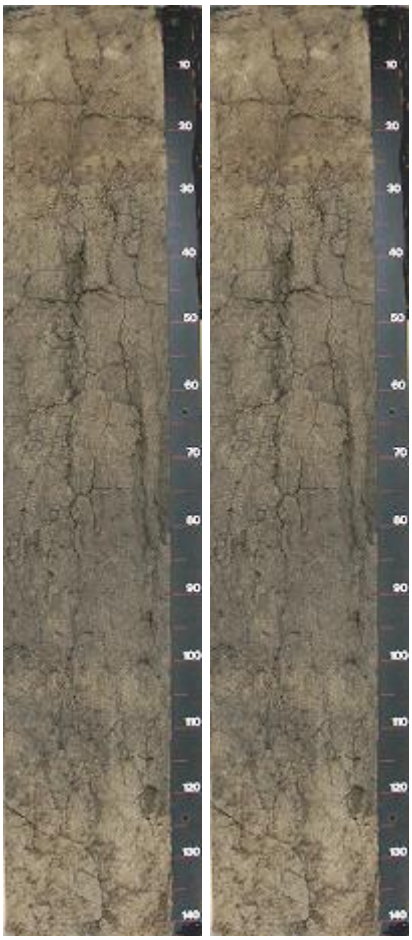
Reference soil China, mainland 35: Phaeozem

Description

PROFILE DESCRIPTION : Deep, well drained, very dark grayish brown clay loam overlying a strongly mottled, slightly altered subsoil. The soil is derived from alluvial deposits and has a fluctuating groundwater level which reached to about 120 cm below the surface. The general structure is crumb, however, angular blocky structures dominate on the surface horizons. A plough pan has formed below the arable surface layer. The soil has a medium content in organic matter and a neutral reaction. CLIMATE: climatic data regarding sunshine hours per month: J 187.2 F 192.3 M 233.4 A 236.3 M 244.9 J 251.2 J 208.5 A 227.9 S 236.1 O 208.5 N 180.2 D 174.3 Year 2570.0



Classification

WRB 2006:

Haplic Phaeozem (Pachic Siltic)

0-120 cm mollic horizon

WRB 1998:

Silti- Pachic Phaeozem

0-120 cm mollic horizon

FAO-UNESCO-ISRIC 1988:

Silti- Haplic Phaeozem phreatic phase

0-0 cm mollic A horizon

0-120 cm mollic A horizon

FAO-UNESCO 1974:

Haplic Phaeozem phreatic phase

0-120 cm mollic A horizon

Site description

General information:

Names of person(s) who described the profile	: Boerma JAK
General description of	: Liaoning Province, Daoshuzi, 3km

Physiography:

The altitude of the soil profile relative to mean sea level, specified in meters	: 50 m asl

location of profile (e.g., town, province)	W of Xinchengzi
Climate classification according to Köppen	: Dwx
Date	: June 1993
Latitude / Longitude	: N 42.0166666º / E 123.483º

Regional landform	: alluvial plain
Topography of the surrounding country	: flat or almost flat
Physiographic Unit in the immediate surrounding of the site	: higher part of alluvial plain
The slope refers to the inclination of the land immediately surrounding the site. The measured or estimated slope angle is specified to the nearest per cent	: 1 %
The physiographic position of the site where the profile is located	: flat
Form of the slope surrounding the site	: straight
Slope Aspect of the site	:

Parent material:

The main parent rock/ material over which the soil has been formed (1st entry)	: sediment, unconsolidated
Mode of Accumulation or deposition of parent material (1st entry)	: fluvial
Texture of parent material (1st entry)	:
Depth1 of lithological boundary	: cm
The main parent rock/ material over which the soil has been formed (2nd entry)	:
Resistance against weathering (solid rock) (2nd entry)	:
Soil Depth; depth to which roots can easily penetrate throughout the year	: 120 cm

Hydrology and drainage:

Depth of groundwater table	: 155 cm
Groundwater Top	: 120 cm
Groundwater Bottom	: 0 cm
Kind of groundwater table	: perched
Top Stagnating Layer	: cm
Bottom Stagnating Layer	: cm
Runoff	: medium
Flooding frequency	: irregular
Nature of floodwater	: fresh
Estimated permeablity (class) of least permeable part of the profile	: slow
Drainage Class	: well
To Drainage Class	:
Moisture conditions of the profile: dry from -to	: cm
Moisture conditions of the profile: moist from -to	: 0-120 cm
Wet From - To	: cm

Land use / vegetation:

Current land use at the site	: medium level arable farming
Major crops	: maize
Main type of irrigation	: no irrigation
Rotation scheme	: continuous crop rotation
Vegetation Type;The natural vegetation at the site	:
Status of vegetation	:
Remarks on Land Use / Vegetation	: VEGETATION: see additional remarks

Erosion and aggredation:

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

Surface characteristics:

Microrelief type: small-scale differences in relief in the direct vicinity of the site	: level
Microrelief Height	:
Rockiness	: none
Stoniness	: none
Average size of stones	:
Shape of stones (on average)	:
Cracks	: small cracks (width less than 1 cm, or depth less than 50 cm)
Slaking of aggregates by tillage, rainfall or frost	: surface partly slaked, round smooth aggregates
Evidence of salt	: non-saline
Evidence of alkali	: non-alkaline

Nearest climate station:

Station	: Xinchengzi
Country	: China, mainland
WMO Code	: 9999
Distance	: 3 km E (good)
Latitude / Longitude	: N 42º1 / E 123º31

Climate data*:

dataType(Station)	: nrecord	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Precipitation (mm)(Xinchengzi)	: 24	5	8	10	36	56	91	181	139	62	45	13	6	652
Mean temperature (°C)(Xinchengzi)	: 24	-13.2	-9.7	-0.6	8.6	16.6	21.2	24	22.5	16.5	8.4	-1	-9.7	7
Minimum temperature (°C)(Xinchengzi)	: -	-17	-15	-7	3	11	16	20	18	10	3	-7	-14	1.8
Relative humidity (%)(Xinchengzi)	: 24	62	58	56	58	58	70	82	80	72	68	66	62	66
Act. Evapotranspiration (mm)(Xinchengzi)	: 24	30	50	100	190	310	240	160	150	145	110	50	30	1565
Bright sunshine (hours/day)(Xinchengzi)	: -	187	192	233	236	245	251	209	228	236	209	180	174	215
Precipitation (mm)(Shenyang)	: 20	4	6	17	28	65	92	170	157	75	41	22	8	685
Number of rain days(Shenyang)	: -	4	3	6	6	10	12	15	13	9	7	5	4	94
Mean temperature (°C)(Shenyang)	: 20	-12.8	-9.1	-0.8	8.8	16.2	21.6	24.9	23.6	17	9.4	-0.9	-9.8	7.3
Maximum temperature (°C)(Shenyang)	: 20	-6.6	-2.3	6	15.5	22.7	27.8	29.8	28.6	23.3	15.8	4.6	-5	13.4
Minimum temperature (°C)(Shenyang)	: 20	-19.4	-15.9	-6.6	2.1	9.8	15.4	19.9	18.6	10.7	3	-6.4	-14.6	1.4
Relative humidity (%)(Shenyang)	: -	68	64	57	54	58	66	76	78	73	70	65	67	66.3
Pot. evapotranspiration (mm)(Shenyang)	: 20	1.4	1.8	3.2	6.1	10.7	17	23.9	22.7	14.1	8.3	3.7	1.8	9.6
Epot. - Penman (mm)(Shenyang)	: -	0	0	0	37	92	133	164	143	81	34	0	0	684
Epot. - Frere, Popov (mm)(Shenyang)	: -	6	15	44	86	122	134	128	109	74	39	15	6	778
Act. Evapotranspiration	: 29	21	36	87.3	181.5	254.8	210.5	179.2	154.8	132.8	98.9	49.9	25	1431.7

(mm)(Shenyang)														
Bright sunshine (%)(Shenyang)	: 20	65	67	65	61	53	57	50	54	62	65	61	62	60.2
Bright sunshine (hours/day)(Shenyang)	: -	190	200	238	245	238	257	230	232	235	224	180	173	220.2
Total global radiation (MJ/m^2)(Shenyang)	: 30	217.8	291.2	455.7	549.6	641.7	600.1	555.1	521.5	469.9	363.4	235.1	190	424.3
Estimated global radiation (MJ/m^2)(Shenyang)	: -	7.7	10.8	14.5	17.8	18.7	20.7	18.6	17.5	15.6	12.1	8.2	6.6	14.1
Windspeed (m/s, at 2m height)(Shenyang)	: 20	1.6	1.8	2.3	2.6	2.4	2	1.7	1.4	1.5	1.8	1.9	1.8	1.9

*Data are considered representative for site

Profile description:

Ap1 0-25 cm : dark brown (7.5YR 3/2, moist), loam, weakly coherent porous massive and moderate very fine and fine angular blocky, slightly hard very friable sticky plastic, no cutans, many very fine interstitial pores and many tubular pores, no inclusions, no fragments, non-cemented pans, abrupt smooth boundary to,

Ap2 25-35 cm : very dark greyish brown (10YR 3/2, moist), clay loam, moderate medium crumb and moderate fine angular blocky, friable slightly sticky plastic, no cutans, many very fine interstitial pores and many tubular pores, no inclusions, no fragments, discontinuous non-cemented plough pan pans, clear smooth boundary to,

Ah1 35-72 cm : very dark greyish brown (10YR 3/2, moist), clay loam, weakly coherent porous massive parting to weak medium crumb, friable slightly sticky plastic, many very fine fine interstitial pores and many fine tubular pores moderately porous (40-60 vol%), diffuse smooth boundary to,

Ah2 72-120 cm : very dark greyish brown (10YR 3/2, moist), clay loam, weakly coherent porous massive parting to weak medium crumb, friable slightly sticky plastic, many very fine fine interstitial pores and few medium continuous exped and inped tubular vertical pores moderately porous (40-60 vol%), gradual smooth boundary to,

Cg 120-150 cm : yellowish brown (10YR 5/6, moist), clay loam, weak to moderate porous massive parting to moderate fine angular blocky, very friable slightly sticky slightly plastic, many coarse faint clear mottles (2.5Y 3/3) and common medium faint mottles (2.5Y 5/8), no cutans, many very fine fine tubular pores,

Physical

Particle size distribution:

Depth (cm)		Gravel (%)	Very Coarse Sand (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Very Fine Sand (%)	Total Sand (%)	Coarse Silt (%)	Fine Silt (%)	Total Silt (%)	Clay (%)
5-20	:	-	0.3	0.3	0.3	0.4	6.7	8	29.2	32.7	61.9	30.0
25-35	:	-	0.2	0.1	0.1	0.1	3.7	4.2	23.5	31.1	54.6	41.4
40-65	:	-	0.1	0.1	0.2	0.4	9.0	9.8	31.9	25.6	57.5	32.7
80-100	:	-	0.1	0.1	0.1	0.2	7.2	7.7	28.2	25.7	53.9	38.5
125-140	:	-	0.1	0.1	0.0	0.4	10.8	11.4	29.8	24.7	54.5	33.9

Water retention characteristics

Depth (cm)		Bulk Density (kg/dm³)	pF 0 (% w/v)	pF 1.0 (% w/v)	pF 1.5 (% w/v)	pF 2.0 (% w/v)	pF 2.3 (% w/v)	pF 2.7 (% w/v)	pF 3.4 (% w/v)	pF 4.2 (% w/v)	pF 2.5 (%)
15-20	:	1.288	47.0	43.5	38.7	34.5	34.1	30.7	28.7	20.7	-
50-55	:	1.351	45.4	44.6	42.0	39.2	38.8	35.5	29.4	19.3	-
80-85	:	1.279	47.2	46.0	42.6	40.1	39.7	36.4	31.0	22.3	-

Other physical data

Depth (cm)		Bulk Density (kg/dm³)	Spec. Surf. Area (m2/g)	COLE (cm/cm)	Water Disp. Clay (%)	Clay (%)
5-20	:	-	-	-	-	30.0
25-35	:	-	-	-	-	41.4
40-65	:	-	-	-	-	32.7
80-100	:	-	-	-	-	38.5
125-140	:	-	-	-	-	33.9

Chemical characteristics:

Depth (cm)		pH H2O	pH KCl	EC 1 : 2.5 (mS/cm)	CaCO3 (%)	Org. C (%)	Org. N (%)	C / N	Exch. Acid (cmol/kg)	Exch. Al (cmol/kg)	Ca (cmol/kg)	Mg (cmol/kg)	K (cmol/kg)	Na (cmol/kg)	Sum Cations (cmol/kg)
5-20	:	6.3	5.4	0.21	-	1.19	0.14	8	-	-	19.1	4.5	0.6	0.2	24.4
25-35	:	6.8	5.5	0.08	1.2	1.14	0.12	10	-	-	22.2	6.0	0.6	0.1	28.9
40-65	:	7.0	5.7	0.07	1.1	1.14	0.10	11	-	-	20.7	5.6	0.4	0.1	26.8
80-100	:	7.0	5.8	0.09	1.2	1.07	0.10	11	-	-	24.6	7.4	0.5	0.2	32.7
125-140	:	7.0	5.4	0.07	1.2	0.29	0.04	7	-	-	18.6	5.9	0.4	0.2	25.1

Depth (cm)		CEC Soil (cmol/kg)	CEC Clay (cmol/kg)	CEC Org (cmol/kg)	ECEC (cmol/kg)	Base sat. (%)	Al sat. (%)	ESP (%)
5-20	:	24.1	80	4.2	-	101	-	1
25-35	:	27.4	66	4.0	-	105	-	0
40-65	:	24.7	76	4.0	-	109	-	0
80-100	:	29.8	77	3.7	-	110	-	1
125-140	:	23.8	70	1.0	-	105	-	1

Depth (cm)		P Olsen (mg/kg)	P Bray (mg/kg)	pH CaCl2	CaSO4.2H2O (%)
5-20	:	44.5	-	-	-
25-35	:	4.6	-	-	-
40-65	:	9.1	-	-	-
80-100	:	16.2	-	-	-
125-140	:	19.0	-	-	-

Clay mineralogy:

Depth (cm)		Kaolinite	Mica / illite	Vermiculite	Chlorite	Smec	Halloysite	Mixed layer	Quar	Feldspar	Gibbsite	Goethite	Hematite
5-20	:	weak	weak	weak	-	medium to strong	-	weak	weak	-	-	-	-
25-35	:	weak	weak	weak	-	medium to strong	-	weak	weak	-	-	-	-
40-65	:	weak	weak	weak	-	medium to strong	-	weak	weak	-	-	-	-
80-100	:	weak	weak	weak	-	medium to strong	-	weak	weak	-	-	-	-
125-140	:	weak	weak	weak	-	medium to strong	-	weak	weak	-	-	-	-

Source of analyzing procedures:

Laboratory	Attribute	Description	Proc. ref
ISRIC	Base sat.	Calculation; Sum of Exchangeable Cations (Na, K, Ca, Mg) / CEC soil	**labmanual**
ISRIC	Bulk Density	Soill density excluding mass liquid, including interparticle space	**18-3**
ISRIC	C / N	Calculation; Organic Carbon / Organic Nitrogen	**labmanual**
ISRIC	Ca	Exchangeable bases with 1 M ammonium acetate at pH 7; Ca by atomic absorption spectrometry	**9-4 and 9-5.3**
ISRIC	CaCO3 eq.	Carbonates are dissolved with dilute HCl. Residual acid is titrated. Carbonates expressed as CaCO3	**7**
ISRIC	CEC Clay	Calculation; ((CEC soil - CEC org.m.)/ clay %)*100	**9-6.3**
ISRIC	CEC Org	CEC organic matter; expert estimate for charge per unit C	**9-6.3**
ISRIC	CEC Soil	CEC; with index cation in buffered solution pH7	**9-4 and 9-5.3.3**
ISRIC	Clay; < 0.002 mm	Fraction by Pipette analysis; after removal CaCO3 and organic matter, dispersion and sedimentation	**3-4.7**
ISRIC	EC 1 : 2.5	Electro Conductivity of a soil / water (1:2.5) suspension	**4-1.4 and 13-4**
ISRIC	ESP	Calculation; (Exchangeable Na / CEC soil) * 100	**9-6.3**
ISRIC	K	Exchangeable bases with 1 M ammonium acetate at pH 7; K by flame atomic emission spectrometry	**9-6.1**
ISRIC	Kaolinite	Kaolinite; relative abundance scale 0 - 7	**16-1**
ISRIC	Mg	Exchangeable bases with 1 M ammonium acetate at pH 7; Mg by atomic absorption spectrometry	**9-4 and 9-5.3**
ISRIC	Mica / Illite	Mica / ilitele; relative abundance scale 0 - 7	**16-1**
ISRIC	Mixed-layer	Mixed layer minerals; relative abundance scale 0 - 7	**16-1**
ISRIC	Na	Exchangeable bases with 1 M ammonium acetate at pH 7; Na by flame atomic emission spectrometry	**9-4 and 9-5.3**
ISRIC	Organic Carbon	Wet combustion of organic matter by potassium dichromate and sulphuric acid at about 125 degrees Celcius. Residual dichromate is back titrated against ferrous sulphate. To compensate for incomplete destruction an emprical correction factor of 1.3 is applied	**5**
ISRIC	Organic Nitrogen	Organic Matter is digested in sulphuric acid (and hydrogen peroxide) with selenium as catalyst. Nitrogen is converted to ammonium sulphate. The solution is made alkaline and ammonia is distilled off. The evolved ammonia is trapped in boric acid and titrated with standardized acid solution	**6**
ISRIC	P Olsen	Phosphate in 0.5 M NaHCO3 extract (Olsen); Colorimetry	**14-2**
ISRIC	pF 0	Moisture content of soil in a ring sample at tension of 0.1 kPa head of	**18-3**

		water	
ISRIC	pF 1.0	Moisture content of soil in a ring sample at tension of 1 kPa head of water	**18-3**
ISRIC	pF 1.5	Moisture content of soil in a ring sample at tension of 3.2 kPa head of water	**18-3**
ISRIC	pF 2.0	Moisture content of soil in a ring sample at tension of 10 kPa head of water	**18-3**
ISRIC	pF 2.3	Moisture content of soil in a ring sample at tension of 20 kPa head of water	**18-3**
ISRIC	pF 2.7	Moisture content of soil in a ring sample at tension of 50 kPa head of water	**18-3**
ISRIC	pF 3.4	Moisture content of soil in a ring sample at tension of 250 kPa head of water	**18-3**
ISRIC	pF 4.2	Moisture content of soil in a ring sample at tension of 1.5 MPa head of water	**18-3**
ISRIC	pH H2O	pH electrode; in supernatant suspension	**4-1**
ISRIC	pH KCl	In supernatant suspension; potentiometrically	**4-1**
ISRIC	Quartz	Quartz; relative abundance scale 0 -7	**16-1**
ISRIC	Sand; 0.10 - 0.05 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.25 - 0.10 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.5 - 0.25 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 1.0 - 0.5 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 2.0 - 0.05 mm	Total sand fractions by sieving; after removal CaCO3 and organic matter	**3-5**
ISRIC	Sand; 2.0 - 1.0 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Silt; 0.02 - 0.002 mm	Fraction by Pipette analysis ; after removal CaCO3 and organic matter, dispersion and sedimentation	**3-4.7**
ISRIC	Silt; 0.05 - 0.002 mm	Calculation; Sum fractions Silt 0.05 - 0.02 mm	**3-4.7**
ISRIC	Silt; 0.05 - 0.02 mm	Fraction by Pipette analysis ; after removal CaCO3 and organic matter, dispersion and sedimentation	**3-4.7**
ISRIC	Smectite	Smectite; relative abundance scale 0 - 7	**16-1**
ISRIC	Sum cations	Sum of Exchangeable Cations (Ca, Mg, Na, K) with 1 M ammonium acetate at pH 7	**9-**
ISRIC	Vermiculite	Vermiculite; relative abundance scale 0 - 7	**16-1**

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

Other classification

USDA-NRCS (1999) : Cumulic Hapludoll

USDA-SCS (1975) : Cumulic Hapludoll fine mixed mesic

Classification (other) :

Haplic thermo-black soil; Hapli-Udic Isohumosol

USDA/SCS (1975, 1992): soil moisture regime is considered to be udic rather than ustic, because the profile is assumed to be moist for a longer periodperiod than the atmospheric data suggest (presence of a perched water table).

Black earth

Please report suggestions for improvement to the **webmaster**