Reference soil Spain 20: Petric Calcisol

Description

Location: on the right hand side of the road St. Ramon to Calaf, 100 m before the junction of this route with the route to Tora / Parent material: marl, siltstone and limestone / Surface characteristics: deep subsoiling has brought stone and gravel size calcrete to the surface, but no stones or rock outcrops / Mesorelief: man made stone walls, less than 1 m high and 300-500 m apart / Human influence: deep ploughing; that work has put the fragments of the petrocalcic horizon at the surface and mixed the Ap and B horizon with the calcic and petrocalcic. For further information on drainage, vegetation and land use see also remarks of profile ES019. Additional notes on profile description: Ap: few spheriodal-subrounded gravel size (0.2-6 cm) fragments of hard accumulations of calcium carbonate (parts of broken-up petrocalcic horizon), without any defined orientations and regulary distributed; Bwk: frequent tubular-subrounded gravel size (2-6 cm) fragments of broken-up petrocalcic, without any orientation and regulary distributed; disturbed by ploughing; no cementations; Ck: weakly cemented accumulations of calcium carbonate, somewhat disturbed and broken by deep ploughing; Cmk1: strongly cemented, continuous, extremely hard accumulations of calcium carbonate; Cmk2: very strongly cemented discontinuous extremely hard accumulations of calcium carbonate; Cmk3: very strongly cemented in some parts, extremely hard accumulations of calcium carbonate; R: hard strata of limestone, cracked in some places (>10 cm) with hard depositions of calcium carbonate on the cracks and in the lower part of the layers.

Classification

FAO-UNESCO-ISRIC 1988:

Orthi- Petric Calcisol

0-0 cm cambic B horizon
0-0 cm ochric A horizon
0-0 cm petrocalcic horizon

FAO-UNESCO 1974:

Calcic Cambisol petrocalcic phase

0-0 cm cambic B horizon
0-0 cm ochric A horizon
0-0 cm petrocalcic horizon

Site description

General information:

Names of person(s) who described the profile	: Boixadera J
General description of location of profile (e.g., town, province)	: Province of Lerida, La Segarra, see remerks
Climate classification according to Köppen	: Csa
Date	: October 1984
Latitude / Longitude	: N 41.725º / E 1.36111º

Physiography:

The altitude of the soil profile relative to mean sea level, specified in meters	: 700 m asl
Regional landform	: basin
Topography of the surrounding country	: undulating
Physiographic Unit in the immediate surrounding of the site	: Ebro basin, back front cuesta
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	: 2 %
The physiographic position of the site where the profile is located	: upper slope
Form of the slope surrounding the site	:

Slope Aspect of the site : south-west

Parent material:

The main parent rock/ material over which the soil has been formed (1st entry)	: interbedded sedimentary rock
Mode of Accumulation or deposition of parent material (1st entry)	: solid rock
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	: 40 cm

Hydrology and drainage:

Depth of groundwater table	: cm
Groundwater Top	: cm
Groundwater Bottom	: cm
Kind of groundwater table	: no groundwater table observed
Top Stagnating Layer	: cm
Bottom Stagnating Layer	: cm
Runoff	: medium
Flooding frequency	: never
Estimated permeablity (class) of least permeable part of the profile	: moderate
Drainage Class	: well
To Drainage Class	:
Moisture conditions of the profile: dry from -to	: cm
Moisture conditions of the profile: moist from -to	: 0-80 cm
Wet From - To	: cm

Land use / vegetation:

Current land use at the site	: arable farming
Major crops	: cereals (unspecified)
Main type of irrigation	:
Rotation scheme	:
Vegetation Type;The natural vegetation at the site	:
Status of vegetation	:
Remarks on Land Use / Vegetation	: See remarks of ES019

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	:
Microrelief Height	:
Rockiness	: none
Stoniness	: fairly stony
Average size of stones	:
Shape of stones (on average)	:
Slaking of aggregates by tillage, rainfall or frost	:
Evidence of salt	: non-saline
Evidence of alkali	: non-alkaline

Nearest climate station:

Station : No representative climate station available for this site

Profile description:

Ap 0-24 cm	:	light brown (7.5YR 6/4, dry) dark brown (7.5YR 3/4, moist), silt loam slightly gravelly, weak medium granular, hard friable slightly sticky, abrupt wavy boundary to,
Bk 24-39 cm	:	pinkish white (5YR 8/2, dry) pink (5YR 7/4, moist), clay loam gravelly, weak fine subangular blocky, hard friable slightly sticky, medium calcareous nodules, abrupt wavy boundary to,
Ck 39-52 cm	:	pink (5YR 7/3, moist), weakly coherent massive, abrupt wavy boundary to,
Ckm1 52-65 cm	:	(2.5YR 8/2, moist), strongly coherent massive, discontinuous massive strongly cemented petrocalcic pans, abrupt wavy boundary to,
Ckm2 65-70 cm	:	very pale brown (10YR 7/3, moist), strongly coherent massive, continuous massive indurated petrocalcic pans, abrupt wavy boundary to,
Ckm3 70-75 cm	:	very pale brown (10YR 7/3, moist), strongly coherent massive, continuous massive indurated petrocalcic pans, abrupt wavy boundary to,

Physical

Particle size distribution:

Depth (cm)		Gravel (%)	Very Coarse Sand (%)	Coarse Sand (%)	Medium Sand (%)	Fine Sand (%)	Very Fine Sand (%)	Total Sand (%)	Coarse Silt (%)	Fine Silt (%)	Total Silt (%)	Clay (%)
0-24	:	-	0.1	0.1	1.7	9.1	15.1	26.1	30.9	26.3	57.2	16.8
24-39	:	-	0.1	0.1	3.8	18	13.1	35.1	17.2	19.3	36.5	28.4
39-52	:	-	-	-	-	-	-	-	-	-	-	-
52-65	:	-	-	-	-	-	-	-	-	-	-	-
65-70	:	-	-	-	-	-	-	-	-	-	-	-
70-75	:	-	-	-	-	-	-	-	-	-	-	-

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 (%)
10-20	:	1.482	52.6	50.8	47.3	39.5	36.9	30.8	22.5	19	-
30-40	:	1.355	56.1	54.6	47.4	41.7	39.2	33.8	26.1	22.1	-

Other physical data

Depth (cm)		Bulk Density (kg/dm³)	Spec. Surf. Area (m2/g)	COLE (cm/cm)	Water Disp. Clay (%)	Clay (%)
0-24	:	-	-	-	-	16.8
24-39	:	-	-	-	-	28.4
39-52	:	-	-	-	-	-
52-65	:	-	-	-	-	-
65-70	:	-	-	-	-	-
70-75	:	-	-	-	-	-

Chemical characteristics:

Depth (cm)		pH H2O	pH KCl	EC 1 : 2.5 (mS/cm)	CaCO3 (%)	Org. C (%)	Org. N (%)	C / N	Exch. Acid (cmol/kg)	Exch. Al (cmol/kg)	Ca (cmol/kg)	Mg (cmol/kg)	K (cmol/kg)	Na (cmol/kg)	Sum Cations (cmol/kg)
0-24	:	7.9	7.3	0.3	35.5	1.26	-	-	-	-	32.1	0.5	0.5	0.0	33.1
24-39	:	7.9	7.7	0.38	72.1	0.83	-	-	-	-	25.4	0.3	0.3	0.0	26
39-52	:	8.2	7.9	0.29	91.3	0.55	-	-	-	-	-	-	-	-	-
52-65	:	8.5	8.3	0.24	99.7	0.32	-	-	-	-	-	-	-	-	-
65-70	:	8.1	7.8	0.3	96.5	1.11	-	-	-	-	-	-	-	-	-
70-75	:	8.2	8.0	0.27	97.2	0.83	-	-	-	-	-	-	-	-	-

Depth (cm)		CEC Soil (cmol/kg)	CEC Clay (cmol/kg)	CEC Org (cmol/kg)	ECEC (cmol/kg)	Base sat. (%)	Al sat. (%)	ESP (%)
0-24	:	17.6	105	4.4	-	188	-	-
24-39	:	6.9	24	2.9	-	-	-	-
39-52	:	-	-	1.9	-	-	-	-
52-65	:	-	-	1.1	-	-	-	-
65-70	:	-	-	3.9	-	-	-	-
70-75	:	-	-	2.9	-	-	-	-

Depth (cm)		pH NaF	P Retention (%)	OD OE	Melanic Index	Fe o (wt%)	Al o (wt%)	Si o (wt%)	Fe d (wt%)	Al d (wt%)	Fe p (wt%)	Al p (wt%)	C p (wt%)
0-24	:	-	-	-	-	0.06	0.09	0.03	0.79	0.06	0.01	0.03	-
24-39	:	-	-	-	-	0.01	0.07	0.01	0.37	0.04	0.01	0.04	-
39-52	:	-	-	-	-	0	0.02	0.01	0.22	0.02	0	0.04	-
52-65	:	-	-	-	-	0	0	0	0.02	0	0	0.01	-
65-70	:	-	-	-	-	0	0.02	0.01	0.09	0.02	0.01	0.04	-
70-75	:	-	-	-	-	0	0.01	0.01	0.04	0.02	0	0.02	-

Clay mineralogy:

Depth (cm)		Kaolinite	Mica / illite	Vermiculite	Chlorite	Smec	Halloysite	Mixed layer	Quar	Feldspar	Gibbsite	Goethite	Hematite
0-24	:	weak to medium	weak to medium	-	weak to medium	weak to medium	-	-	very weak	very weak	-	-	-
24-39	:	weak to medium	weak to medium	-	weak to medium	weak to medium	-	-	very weak	very weak	-	-	-
39-52	:	weak to medium	weak to medium	-	weak	weak to medium	-	-	very weak	very weak	-	-	-
52-65	:	weak	very weak to weak	-	-	weak	-	weak	very weak	very weak	-	-	-
65-70	:	weak	very weak to weak	-	-	weak	-	weak	very weak	very weak	-	-	-
70-75	:	weak	very weak to weak	-	-	weak to medium	-	weak	very weak	very weak	-	-	-

Source of analyzing procedures:

Laboratory	Attribute	Description	Proc. ref
ISRIC	Al d	Al; Atomic Absorption Spectrometry	12.1-1.2
ISRIC	Al o	Al; Atomic Absorption Spectrometry	12-2
ISRIC	Al p	Al; Atomic Absorption Spectrometry	12-3
ISRIC	Base sat.	Calculation; Sum of Exchangeable Cations (Na, K, Ca, Mg) / CEC soil	labmanual
ISRIC	Bulk Density	Soill density excluding mass liquid, including interparticle space	18-3

ISRIC	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	Chlorite	Chlorite; relative abundance scale 0 - 7	**16-1**
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	Fe d	Fe; Atomic Absorption Spectrometry	**12-1.2**
ISRIC	Fe o	Fe; Atomic Absorption Spectrometry	**12-2**
ISRIC	Fe p	Fe; Atomic Absorption Spectrometry	**12-3**
ISRIC	Feldspar	Feldspar; relative abundance scale 0 - 7	**16-1**
ISRIC	K	Exchangeable bases with 1 M ammonium acetate at pH 7; K by flame atomic emission spectrometry	**9-6.1**
ISRIC	Kaolinite	Kaolinite; relative abundance scale 0 - 7	**16-1**
ISRIC	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	pF 0	Moisture content of soil in a ring sample at tension of 0.1 kPa head of water	**18-3**
ISRIC	pF 1.0	Moisture content of soil in a ring sample at tension of 1 kPa head of water	**18-3**
ISRIC	pF 1.5	Moisture content of soil in a ring sample at tension of 3.2 kPa head of water	**18-3**
ISRIC	pF 2.0	Moisture content of soil in a ring sample at tension of 10 kPa head of water	**18-3**
ISRIC	pF 2.3	Moisture content of soil in a ring sample at tension of 20 kPa head of water	**18-3**
ISRIC	pF 2.7	Moisture content of soil in a ring sample at tension of 50 kPa head of water	**18-3**
ISRIC	pF 3.4	Moisture content of soil in a ring sample at tension of 250 kPa head of water	**18-3**
ISRIC	pF 4.2	Moisture content of soil in a ring sample at tension of 1.5 MPa head of water	**18-3**
ISRIC	pH H2O	pH electrode; in supernatant suspension	**4-1**
ISRIC	pH KCl	In supernatant suspension; potentiometrically	**4-1**
ISRIC	Quartz	Quartz; relative abundance scale 0 -7	**16-1**
ISRIC	Sand; 0.10 - 0.05 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.25 - 0.10 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 0.5 - 0.25 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 1.0 - 0.5 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Sand; 2.0 - 0.05 mm	Total sand fractions by sieving; after removal CaCO3 and organic matter	**3-5**
ISRIC	Sand; 2.0 - 1.0 mm	Fraction by sieving; after removal CaCO3 and organic matter	**3-4.6**
ISRIC	Si o	Si; Atomic Absorption Spectrometry	**12-2**
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-**

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

Other classification

USDA-SCS (1975) : Xerochrept fine-loamy carbonatic mesic

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