

Appendix

This appendix includes physical, chemical and physical–chemical soil characteristics of representative pedons from the four major soil zones (and subdivisions) defined in Table 2.2, Fig. 2.1 and the text of Chap. 2. Some abbreviations used in following tables are:

Soil property/ characteristic	Meaning
Genetic horizon	According to Soil Taxonomy system
2–0.05 (%)	Sand content
0.05–0.002 (%)	Silt content
<0.002 (%)	Clay content
OC (%)	Organic carbon content
SOM (%)	Soil organic matter
pH _{water}	Soil pH measured in water
pH _{KCl}	Soil pH measured in KCl
EC (dS m ⁻¹)	Soil electrical conductivity at 25 °C
EC _{iw} (dS m ⁻¹)	Irrigation water electrical conductivity
ESP (%)	Exchangeable sodium percent
SAR (–)	Sodium adsorption ratio
CEC (cmol _c kg ⁻¹)	Cation exchange capacity
ECEC (cmol _c kg ⁻¹)	Effective cation exchange capacity
BS (%)	Base saturation, at pH 7
Al _{ox} + ½Fe _{ox} (%)	Acid oxalate extractable aluminium and iron (%)
XRD results:	AT: anorthite, AH: anhydrite, C: calcite, CH: chlorite, G: gypsum, H: halite, K: kaolinite, M: mica, N: nitratite, Q: quartz, S: smectite, listed from highest to lowest amount

2.2.1 Soils of the Hyper-Arid to Semi-Arid Soils

2.2.1.1 Soils of the Altiplano

Skeletal soil in a site between San Pedro de Atacama and El Tatío, Region II of Chile (Luzio et al. 2010)

Depth (cm)	0–20	20–34	34–69	69–105
Genetic horizon	A	C ₁	C ₂	C ₃
Particle size (mm) distribution				
2–0.05 (%)	70.8	54.8	80.0	82.8
0.05–0.002 (%)	15.2	23.2	9.2	9.2
<0.002 (%)	14.0	22.0	10.0	8.0
OC (%)	0.29	0.41	0.05	0.06
pH _{water}	6.50	6.60	6.60	7.20
EC (dS m ⁻¹)	0.18	10.00	0.14	0.14
Extractable cations (cmol _c kg ⁻¹)				
Ca	3.6	4.7	2.2	2.7
Mg	1.2	1.8	0.8	0.9
K	0.7	1.1	0.5	1.1
Na	0.4	0.3	0.3	2.2
CEC (cmol _c kg ⁻¹)	7.0	9.2	4.5	4.9
BS (%)	–	100	–	–

Soil derived from recent volcanic materials, located between Putre and Parinacota, Region XV of Chile

Depth (cm)	0–8	8–15	15–21	21–115
Genetic horizon	A ₁₁	A ₁₂	A ₁₃	C
Particle size (mm) distribution				
2–0.05 (%)	56.0	52.0	47.2	60.0
0.05–0.002 (%)	24.0	20.0	24.8	22.0
<0.002 (%)	20.0	28.0	28.0	18.0
OC (%)	0.28	0.61	0.48	0.08
pH _{water}	7.00	7.20	7.30	7.10
EC (dS m ⁻¹)	0.32	0.24	0.31	0.31
Extractable cations (cmol _c kg ⁻¹)				
Ca	3.6	7.5	10.4	8.6

(continued)

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Mg	1.9	3.3	4.4	3.6
K	0.5	1.0	1.2	1.0
Na	0.3	0.4	0.5	0.6
CEC (cmol _c kg ⁻¹)	8.8	15.6	20.0	13.7

Chirigualla soil (Ustorthent to Haplocambid), Regio XV of Chile (Luzio et al. 2010)

Depth (cm)	0–22	22–43	43–70	70–86
Genetic horizon	A ₁	B _w	BC	C
Particle size (mm) distribution				
2–0.05 (%)	60.0	47.0	36.7	42.1
<0.05 (%)	40.0	53.0	63.3	57.9
Water retention –33 kPa (%)	17.7	30.9	31.9	35.1
Water retention –1,500 kPa (%)	10.4	17.5	19.2	21.6
OC (%)	1.3	0.4	0.2	0.1
pH _{water}	6.9	7.2	7.5	7.9
EC (dS m ⁻¹)	0.43	0.47	0.72	0.50
Extractable cations (cmol _c kg ⁻¹)				
Ca	7.0	15.2	17.7	21.8
Mg	2.8	8.4	8.7	11.7
K	1.0	1.1	1.2	1.1
Na	1.3	2.3	1.8	1.6
CEC (cmol _c kg ⁻¹)	12.9	24.2	32.9	39.7
ESP (%)	1.00	9.5	5.5	4.0
BS (%)	94	100	90	91
P retention (%)	21.7	25.3	20.4	16.2
Al _{ox} + ½ Fe _{ox} (%)	1.80	0.55	0.43	0.18
Volcanic glass: 0.02–2 mm (%)	44	48	45	39

Pedon at Surire bofedal, Region XV of Chile (Luzio et al. 2002a)

Depth (cm)	0–20	20–29	29–51	51–66	66–90
Genetic horizon	O _{ek1}	O _{ek2}	2C _{kg1}	2C _{kg2}	2C _g
Particle size (mm) distribution					
2–0.05 (%)	14.2	9.4	17.4	24.4	29.8

(continued)

(continued)

0.05–0.002 (%)	72.6	67.3	57.0	61.1	48.4
<0.002 (%)	13.2	23.3	25.7	14.5	21.2
OC (%)	8.8	13.8	4.1	2.6	2.0
pH _{water}	8.1	7.9	7.8	8.0	4.9
pH _{KCl}	7.3	7.2	7.1	7.2	4.5
EC (dS m ⁻¹)	16.0	3.9	3.0	2.6	4.0
CaCO ₃ (%)	38.5	29.6	22.6	45.8	0.0
CaSO ₄ (%)	–	–	–	–	1.2
Extractable cations (cmol _c kg ⁻¹)					
Ca	105	65.1	57.4	45.7	9.7
Mg	10.0	9.6	3.8	2.4	8.9
K	262.0	2.7	1.1	0.83	0.04
Na	59.1	18.2	4.1	2.2	2.6
CEC (cmol _c kg ⁻¹)	37.6	47.2	18.9	8.1	9.8
BS (%)	99	98	–	–	–

Pedon at Caquena bofedal, Region XV of Chile (Luzio et al. 2002a)

Depth (cm)	0–13	13–24	24–36	36–49
Genetic horizon	O _{i1}	O _{i2}	O _{e1}	O _{e2}
Particle size (mm) distribution				
2–0.05 (%)	28.3	27.3	34.3	11.1
0.05–0.002 (%)	43.7	43.6	47.0	47.1
<0.002 (%)	28.0	29.1	18.7	41.7
OC (%)	39.2	41.6	36.3	33.4
pH _{water}	8.5	7.7	7.6	6.7
pH _{KCl}	7.9	7.1	7.1	6.3
EC (dS m ⁻¹)	2.9	2.3	2.4	2.0
CaSO ₄ (%)	0.7	0.3	–	–
Extractable cations (cmol _c kg ⁻¹)				
Ca	56.0	52.4	61.3	32.6
Mg	57.2	33.6	35.2	19.8
K	150.0	2.9	2.9	2.5
Na	26.3	14.6	14.3	14.0
CEC (cmol _c kg ⁻¹)	110.0	96.7	101.0	87.2
BS (%)	99	98	–	–

2.2.1.2 Soils of the Longitudinal Central Valley

Characteristics and soil profile descriptions for three Arid-isols from the Atacama Desert (summarised from Ewing et al. 2006)

Pedon ¹	Depth (cm)	Bulk density (Mg m ⁻³)	Texture class (clay, %)	Gravel (% by vol.)	XRD <2 mm fraction	pH	Soil structure
A ₁	0–4	1.5	lfs (1)	5	Q, AT	7.9	
A ₂	4–15	1.9	lfs (1)	5	Q, AT	8.0	Moderate prisms, 10 cm
B _{wk1}	15–28	1.9	lcos (5)	2	AT, Q, C	7.8	Strong plates, 5–10 mm; strong, coarse subangular blocks, (5 %)
B _{wk2}	28–46	1.9	vgrls (2)	50	AT, Q, C	8.2	Massive (loose)
B _{km}	46–107	2.3	vgrls (2)	70	AT, Q, C	8.3	Massive (loose)
BC _{yk}	107–117	2	lvcos	50			Platey
BC _k	117–133	2	lvcos	45 2–4 mm			Massive
BC _{ky}	133–145	2	lvcos	75 2–10 cm			Small (1–2 mm) plates
BC _{ky1}	145–160	2	vcos	60 2–10 cm			Massive
BC _{ky2}	160–174	2	lvcos	50			Massive
BC _{yk}	174–184	2	lcos	10			Small (1–2 mm) plates
BC _{yk'}	184–195	2	vcos	40			Massive
BC _{ky}	195–204	2	vcos	30			Plates
C _{yk}	204–	2	vcos	25 all small			Plates
Pedon ²	Depth (cm)	Bulk density (Mg m ⁻³)	Texture class (clay, %)	Gravel (% by vol.)	XRD <2 mm fraction	pH	Soil structure
BC _y	0–3	1.4	lfs (1)	15	Q, AT	7.0	None
B _{yk}	3–13	0.8	lfs (1)	0	G, Q, AT	7.5	Massive and strong plates, 5–10 mm
B _{yk}	13–34	1.2	lfs (3)	0	G, Q, AT	7.7	Strong prisms, 30 cm wide
B _{tyknm1}	34–81	1.5	scl (21)	0	G, Q, AT	8.1	Massive with some strong prisms, 30 cm wide (10 %)
B _{tyknm2}	81–96	1.6	sl (15)	0			Massive
B _{yk}	96–101	1.6	cosl (8)	10 % slightly >2 mm			Moderate plates, 5–10 mm
B _{yk}	101–129	1.7	sl (12)	22 % large cobbles			Massive
Pedon ³	Depth (cm)	Bulk density (Mg m ⁻³)	Texture class (clay, %)	Gravel (% by vol.)	XRD <2 mm fraction	pH	Soil structure
BC _{yk}	0–2	1.4	15	17	Q, AT, S, M, CH, K,	7.7	Strong plates, 2 mm thick
B _{yk1}	2–3	0.8		1	G, AH, Q, AT	7.5	consolidated layer
B _{yk2}	3–12	0.6		12	G, Q, AT	7.1	Strong prisms, 5–10 cm; moderate plates in cracks, 5–10 mm
B _{yk3}	12–26	1.2		25	G, Q, AT	6.9	Massive
B _y	26–39	1.5	11	25	G, Q, AT, S, M, CH, K	7.3	Massive
B _{yk}	39–71	1.3		10	AH, AT, Q, AH, G, AT	7.3	Strong prisms, ~30 cm thick
B _{ynzk}	71–85	1.2		10		7.4	Massive
B _{yk}	85–102	1.2		10	Q, AH, H, G, AT, C		Massive
B _{nzyk}	102–122	1.5		0	Q, AH, H, C	7.3	Massive
B _{nzm}	122–146	1.7		0	H, Q, N	7.2	Massive; cracks contain cubic crystals of halite
C _{nzky1}	146–154	1.7	scl (27)	0			Strong plates, 1–2 mm thick
C _{nzky1}	154–180	1.7	scl (27)				Strong plates (1–2 mm) fi massive
C _{nzky2}	180–192	1.6	scl (29)	<5 %–3 mm	M, CH, K, S		moderate subangular blocks, 5–10 mm
C _{nzky3}	192–211	1.7	scl (29)	0			Weak angular blocks, 1–2 cm
C _{nzky4}	211–232	1.7	scl (27)	0			Sedimentary plates weak subangular blocks, 1–2 cm

Pedon¹ : Copiapó pedon, Slope 2 %, S27°01.2790 W70°17.6720, alluvial fan of granitic composition, sandy-skeletal, mixed, thermic, shallow Typic Petrocalcicid, 1,215 m a.s.l., MAP 20 mm, MAT 16 °C

Pedon² :Altamira pedon, Slope 1 %, 25°45.5870 W70°11.7970; stream terrace at toe of alluvial fan, sandy, gypsic, thermic, shallow Typic Petrogypsid, 1,012 m a.s.l., MAP 10 mm, MAT 16 °C

Pedon³ :Yungay pedon, Slope 1 %, S24°06.1020 W70°01.0970, Distal alluvial fan of primarily granitic origin, with occasional fine grained mafic gravels, loamy, gypsic, thermic, shallow Petrogypsic Haplosalid, 1,024 m a.s.l., MAP 0 mm, MAT 16 °C

Soil near Pica oasis, Region I of Chile, a typical example of depositional plains soils (Luzio et al. 2010)

Depth (cm)	0–20	20–31	31–105
Genetic horizon/layer	A ₁	2B	R
Particle size (mm) distribution			
2–0.05 (%)	70.6	42.6	64.6
0.05–0.002 (%)	12.8	22.8	22.8
<0.002 (%)	16.6	34.6	12.6
OC (%)	0.12	0.16	0.52
pH _{water}	8.4	8.8	8.2
EC (dS m ⁻¹)	0.6	0.7	4.0
CaCO ₃ (%)	0.0	0.0	4.51
Extractable cations (cmol _c kg ⁻¹)			
Ca	6.5	30.0	27.0
Mg	1.6	5.3	1.8
K	1.6	3.9	1.3
Na	0.9	2.4	4.0
CEC (cmol _c kg ⁻¹)	8.8	3.3	13.7

Pedon at the Pintados salar, Region I of Chile (Luzio et al. 2010)

Depth (cm)	0–30	30–50	50–78	78–85	85–117	117–130
Genetic horizon	A _{yzm}	2C ₁	2C ₂	3C _{km}	4C ₃	5C ₄
Particle size (mm) distribution						
2–0.05 (%)	32.6	38.6	17.4	21.4	67.4	13.4
0.05–0.002 (%)	60.0	27.4	36.0	58.0	22.0	53.2
<0.002 (%)	61.4	43.0	46.6	20.6	10.6	33.4
OC (%)	0.07	0.33	0.28	0.04	0.11	0.06
pH _{water}	8.6	8.8	8.9	9.5	9.1	9.6
EC (dS m ⁻¹)	54.0	150.0	150.0	64.5	18.8	25.0
CaCO ₃ (%)	1.86	1.01	0.0	9.5	0.0	0.0
Extractable cations (cmol _c kg ⁻¹)						
Ca	33.8	8.6	8.3	17.5	1.65	3.9
Mg	0.29	1.0	1.0	0.8	0.4	0.7
K	225.0	16.5	14.0	9.0	6.5	10.0
Na	575.0	63.5	65.0	30.5	12.2	21.5
CEC (cmol _c kg ⁻¹)	5.0	28.7	20.0	20.0	8.1	22.5

2.2.1.3 Soils of the Valleys

Apacheta soil series (Typic Haplocambids) at Region III of Chile (CIREN 2007)

Depth (cm)	0–11	11–48	48–60	60–80	80–91	91–120
Genetic horizon	A _p	B	2C ₁	3C ₂	4C ₃	5A _b
Particle size (mm) distribution						
2–0.05 (%)	23.0	31.0	19.0	33.0	5.0	37.0
0.05–0.002 (%)	51.0	31.0	63.0	43.0	84.0	41.0
<0.002 (%)	26.0	38.0	18.0	24.0	11.0	22.0
Water retention –33 kPa (%)	17.2	22.8	11.5	19.0	6.4	18.7
Water retention –1,500 kPa (%)	8.8	12.6	5.7	8.3	2.9	7.7
Water saturation (%)	37.4	44.5	24.7	34.9	25.9	33.4
pH _{water}	7.7	8.2	8.5	8.5	8.6	8.6
OC (%)	1.33	1.22	0.17	0.17	0.12	0.29
CaCO ₃ (%)	4.3	6.0	2.0	3.8	1.5	2.6
CaSO ₄ (%)	0.12	0.00	0.00	0.00	0.00	0.00
EC (dS m ⁻¹)	8.1	1.8	1.3	1.3	0.7	1.0
Soluble cations (mmol _c L ⁻¹)						
Ca	42.9	10.5	6.9	7.7	3.6	5.3
Mg	22.6	3.6	2.3	2.5	1.2	1.9
K	3.1	1.0	0.4	0.4	0.2	0.2
Na	38.0	4.5	3.4	3.7	2.3	2.9
SAR (–)	6.6	1.7	1.6	1.6	1.5	1.5
ESP (%)	8.8	2.4	2.3	2.3	2.1	2.1
Extractable cations (cmol _c kg ⁻¹)						
Ca	30.80	23.80	14.70	23.50	8.50	23.50
Mg	5.42	4.11	2.17	3.19	1.48	3.39
Na	2.48	0.61	0.30	0.41	0.23	0.43
K	1.35	1.31	0.43	0.52	0.24	0.49
Exchangeable cations (cmol _c kg ⁻¹)						
K	1.20	1.26	0.42	0.51	0.24	0.48
Na	1.06	0.41	0.22	0.28	0.17	0.33
CEC (cmol _c kg ⁻¹)	16.8	18.9	9.6	11.8	3.9	13.5
BS (%)	100	100	100	100	100	100
Na saturation (%)	6.3	2.2	2.2	2.4	4.4	2.5

Ramadillas soil series (Sodic Haplocambid), a edon at the lower part of the Copiapó Valley, Region III of Chile (CIREN 2007)

Depth (cm)	0–21	21–39	39–58	58–76	76–87	87–110
Genetic horizon	A _p	B ₁	B ₂	B ₃	2O ₁	3B _b
Particle size (mm) distribution						
2–0.05 (%)	68.0	35.0	59.0	44.0	69.0	55.0
0.05–0.002 (%)	6.0	5.0	19.0	16.0	21.0	15.0
<0.002 (%)	29.0	60.0	22.0	40.0	10.0	30.0

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Water retention –33 kPa (%)	37.6	39.7	38.1	41.9	41.0	38.3
Water retention –1,500 kPa (%)	20.3	23.3	22.6	26.0	22.4	22.1
pH _{water}	7.7	8.1	7.9	7.9	7.8	8.0
OC (%)	2.03	1.28	0.41	0.41	1.04	0.23
CaCO ₃ (%)	8.5	9.6	1.6	1.9	2.5	15.2
CaSO ₄ (%)	0.71	0.00	1.09	1.08	1.13	1.09
EC (dS m ⁻¹)	33.7	9.0	9.0	10.8	9.6	9.0
Soluble cations (mmol _c L ⁻¹)						
Ca	117.3	26.8	24.6	24.8	22.6	25.4
Mg	123.4	17.7	21.8	34.1	42.6	32.1
K	8.1	1.0	1.0	1.0	0.9	0.8
Na	190.1	62.5	62.9	78.9	63.1	55.2
SAR (-)	17.3	13.2	13.1	14.5	11.1	10.3
ESP (%)	19.6	15.5	15.3	16.8	13.1	12.2
Extractable cations (cmol _c kg ⁻¹)						
Ca	62.2	48.9	104.0	109.0	129.0	112.0
Mg	19.3	10.7	9.9	17.1	14.8	12.2
Na	16.1	8.78	6.78	9.65	5.91	5.83
K	6.59	1.27	0.95	1.17	0.65	0.81
Exchangeable cations (cmol _c kg ⁻¹)						
K	5.96	1.19	0.89	1.09	0.59	0.75
Na	1.43	3.73	2.64	3.63	1.44	1.79
CEC (cmol _c kg ⁻¹)	33.0	31.7	27.3	30.4	27.5	23.6
BS (%)	100	100	100	100	100	100
Na saturation (%)	4.3	11.8	9.7	11.9	5.3	7.6

Paona soil series (Aquic Torriorthents), characteristic soil profile of lower terraces in the Huasco Valley at Region III of Chile (CIREN 2007)

Depth (cm)	0–23	23–45	45–77	77–100
Genetic horizon	A _p	AC ₁	AC ₃	AC ₄
Particle size (mm) distribution				
2–0.05 (%)	50.7	7.5	74.6	65.4
0.05–0.002 (%)	32.4	16.1	18.8	28.8
<0.002 (%)	16.9	6.4	6.6	5.8
Water retention –33 kPa (%)	22.9	14.4	14.2	16.2
Water retention –1,500 kPa (%)	9.9	5.3	5.8	6.6
OC (%)	0.9	–	–	–
pH _{water}	8.2	8.1	8.2	8.2
CaCO ₃ (%)	4.7	3.9	4.8	5.4
EC (dS m ⁻¹)	16.6	9.2	8.2	7.4

(continued)

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Extractable cations (cmol _c kg ⁻¹)				
Ca	–	–	–	–
Mg	–	–	–	–
Na	0.7	0.1	0.1	0.2
K	2.4	1.0	1.1	1.5
CEC (cmol _c kg ⁻¹)	13.0	8.9	7.9	8.9
Na saturation (%)	18.5	11.2	13.9	16.8

Chanchoquín soil series (Xerollic Camborthids), characteristic soil profile of intermediate terraces in the Huasco Valley, Region III of Chile (CIREN 2007)

Depth (cm)	0–23	23–62	62–105
Genetic horizon	A _p	B ₁	B ₃
Particle size (mm) distribution			
2–0.05 (%)	33.7	39.2	29.5
0.05–0.002 (%)	39.3	39.8	52.9
<0.002 (%)	27.1	21.0	17.6
Water retention –33 kPa (%)	25.6	21.9	27.1
Water retention –1,500 kPa (%)	16.5	11.8	12.0
OC (%)	1.2	0.3	0.3
pH _{water}	8.1	8.3	8.3
CaCO ₃ (%)	14.0	17.1	13.8
EC (dS m ⁻¹)	0.6	0.5	0.5
Extractable cations (cmol _c kg ⁻¹)			
Ca	–	–	–
Mg	–	–	–
Na	0.3	0.2	0.2
K	0.5	0.5	0.5
CEC (cmol _c kg ⁻¹)	23.3	20.7	18.9
BS (%)	2	2	3

Cavanca soil series (Xerollic Haplargids), characteristic soil profile of highest terraces in the Huasco Valley, Region III of Chile (CIREN 2007)

Depth (cm)	0–22	22–33	33–54	54–72
Genetic horizon	A _p	B ₁	B ₂	B _k
Particle size (mm) distribution				
2–0.05 (%)	51.5	48.7	34.7	33.8
0.05–0.002 (%)	37.8	33.0	32.2	36.1
<0.002 (%)	21.2	18.3	33.1	30.1
Water retention –33 kPa (%)	18.9	17.3	22.7	27.1
Water retention –1,500 kPa (%)	9.1	9.5	15.3	–

(continued)

(continued)

OC (%)	1.0	0.4	0.2	0.2
pH _{water}	8.3	8.2	8.2	8.3
CaCO ₃ (%)	1.2	0.5	0.4	22.0
EC (dS m ⁻¹)	1.9	1.1	1.0	1.2
Extractable cations (cmol _c kg ⁻¹)				
Ca	1.2	1.1	1.0	1.2
Mg	–	–	–	–
Na	–	–	–	–
K	1.3	1.3	1.3	0.5
CEC (cmol _c kg ⁻¹)	13.8	11.6	17.7	10.3

Puclaro soil series (Typic Torrifluvent), a characteristic poorly developed pedon on the terraces of the Elqui River, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–39	39–100
Genetic horizon	A	C
Particle size (mm) distribution		
2–0.05 (%)	73.1	86.1
0.05–0.002 (%)	18.4	10.8
<0.002 (%)	8.5	3.1
Bulk density (Mg m ⁻³)	1.3	–
Water retention –33 kPa (%)	11.4	4.1
Water retention –1,500 kPa (%)	6.9	1.7
OC (%)	0.9	0.2
pH _{water}	7.9	7.9
CaCO ₃ (%)	1.4	0.0
EC (dS m ⁻¹)	1.1	0.5
Extractable cations (cmol _c kg ⁻¹)		
Ca	–	6.3
Mg	–	0.6
K	0.5	0.1
Na	0.2	0.2
CEC (cmol _c kg ⁻¹)	13.4	7.2
BS (%)	–	100

Altovalsol soil series (Typic Haplocambid), a more developed pedon on the terraces of the Elqui River, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–19	19–36	36–62
Genetic horizon	A _p	B ₁	B ₂
Particle size (mm) distribution			

(continued)

(continued)

2–0.05 (%)	49.9	48.8	54.3
0.05–0.002 (%)	27.6	29.2	14.3
<0.002 (%)	22.5	22.0	31.4
Bulk density (Mg m ⁻³)	1.6	1.6	1.5
Water retention –33 kPa (%)	25.6	25.2	27.3
Water retention –1,500 kPa (%)	15.5	18.3	17.7
OC (%)	1.5	0.7	0.4
pH _{water}	8.1	7.8	8.1
EC (dS m ⁻¹)	0.9	0.6	0.6
CaCO ₃ (%)	0.0	0.0	0.6
Extractable cations (cmol _c kg ⁻¹)			
Ca	14.8	18.3	–
Mg	2.9	4.3	–
K	0.7	0.4	0.4
Na	0.6	0.8	1.2
CEC (cmol _c kg ⁻¹)	19.1	24.2	20.8
BS (%)	99	98	–

Huatulame soil series (Typic Torriorthent) at the Limari Valley, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–16	16–59
Genetic horizon	Ap	C1
Particle size (mm) distribution		
2–0.05 (%)	52.2	57.9
0.05–0.002 (%)	39.6	27.8
<0.002 (%)	8.1	14.3
Bulk density (Mg m ⁻³)	1.66	–
Water retention –33 kPa (%)	13.2	15.9
Water retention –1,500 kPa (%)	6.2	7.4
OC (%)	1.16	0.35
pH _{water}	7.35	7.62
EC (dS m ⁻¹)	1.2	0.3
CaCO ₃ (%)	0.0	0.0
Extractable cations (cmol _c kg ⁻¹)		
Ca	8.8	2.2
Mg	2.0	0.5
K	1.8	1.2
Na	0.4	0.3
CEC (cmol _c kg ⁻¹)	13.0	4.2
BS (%)	87	84

Huamalata soil series (Typic Haplocambid) at the Limarí Valley, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–13	13–27	27–40	40–63
Genetic horizon	A _p	B _w	BC	C ₁
Particle size (mm) distribution				
2–0.05 (%)	55.4	52.8	66.2	67.7
0.05–0.002 (%)	29.4	32.2	25.3	25.5
<0.002 (%)	14.8	15.1	8.6	6.7
Bulk density (Mg m ⁻³)	1.78	1.65	1.57	–
Water retention –33 kPa (%)	13.8	13.0	9.5	8.2
Water retention –1,500 kPa (%)	9.2	8.2	5.9	5.2
OC (%)	1.57	1.10	0.64	0.46
pH _{water}	7.20	7.63	7.81	8.03
EC (dS m ⁻¹)	4.9	1.0	0.6	0.5
Soluble cations (mmol _c L ⁻¹)				
Ca	42.0	5.4	3.1	2.1
Mg	14.7	1.7	1.0	0.6
K	1.5	0.2	0.1	0.0
Na	10.3	2.9	2.3	2.1
HCO ₃ (mmol _c L ⁻¹)	6.0	3.8	1.2	2.0
Cl (mmol _c L ⁻¹)	13.2	1.5	0.5	0.4
SO ₄ (mmol _c L ⁻¹)	41.0	4.8	5.0	2.2
SAR	1.9	1.6	1.6	1.8
Extractable cations (cmol _c kg ⁻¹)				
Ca	15.9	13.5	11.0	9.8
Mg	3.31	2.68	2.32	2.04
K	0.70	0.31	0.14	0.10
Na	0.64	0.35	0.32	0.32
CEC (cmol _c kg ⁻¹)	19.6	18.7	16.0	14.3
BS (%)	100	90	86	85

Serón soil serie (Typic Haplargid), a representative pedon of developed soils in the Limarí Valley, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–23	23–60	60–90
Genetic horizon	A _p	B ₁	B _t
Particle size (mm) distribution (%)			
2–0.05 (%)	60.8	63.3	50.4
0.05–0.002 (%)	26.0	25.9	22.1
<0.002 (%)	13.2	10.8	27.5
Bulk density (Mg m ⁻³)	1.66	1.95	1.97
Water retention –33 kPa (%)	16.8	12.5	23.8
Water retention –1,500 kPa (%)	9.6	7.7	15.1
OC (%)	1.22	0.35	0.23
pH _{water}	8.02	8.44	8.27
EC (dS m ⁻¹)	0.6	0.3	0.2
Soluble cations (mmol _c L ⁻¹)			

(continued)

(continued)

Ca	5.0	1.5	1.2
Mg	0.9	0.3	0.36
K	0.08	0.03	0.02
Na	1.0	0.7	0.6
HCO ₃ (mmol _c L ⁻¹)	4.8	2.0	1.5
Cl (mmol _c L ⁻¹)	0.4	0.1	0.1
SO ₄ (mmol _c L ⁻¹)	0.9	0.4	0.7
Extractable cations (cmol _c kg ⁻¹)			
Ca	17.8	16.0	23.2
Mg	2.6	2.33	6.41
K	0.25	0.13	0.11
Na	0.21	0.23	0.35
CEC (cmol _c kg ⁻¹)	14.0	17.0	21.3
BS (%)	100	100	100

Tuquí soil series (Petrocalcic Calcitorrert) at the Limarí Valley, Region IV of Chile (CIREN 2005a).

Depth (cm)	0–18	18–69	69–85
Genetic horizon	A _p	B _{ss}	BC
Particle size (mm) distribution			
2–0.05 (%)	37.7	24.0	18.8
0.05–0.002 (%)	23.0	20.7	22.4
<0.002 (%)	39.3	55.2	58.7
Bulk density (Mg m ⁻³)	1.75	1.93	1.91
Water retention –33 kPa (%)	22.4	29.4	32.8
Water retention –1,500 kPa (%)	14.0	16.4	17.9
OC (%)	1.80	0.35	0.23
pH _{water}	7.74	8.00	8.07
EC (dS m ⁻¹)	0.9	1.1	1.3
CaCO ₃ (%)	0.7	11.9	10.7
Soluble cations (mmol _c L ⁻¹)			
Ca	7.0	4.7	3.7
Mg	1.8	2.3	2.9
K	0.8	0.1	0.1
Na	1.0	5.3	8.0
CO ₃ (mmol _c L ⁻¹)	0.0	0.0	0.0
HCO ₃ (mmol _c L ⁻¹)	5.4	1.8	1.6
Cl (mmol _c L ⁻¹)	0.7	1.7	1.0
SO ₄ (mmol _c L ⁻¹)	4.1	9.0	11.0
Extractable cations (cmol _c kg ⁻¹)			
Ca	27.9	30.9	29.9
Mg	4.57	9.35	13.6
K	1.83	0.52	0.65
Na	0.20	1.14	1.83

(continued)

(continued)

CEC (cmol _c kg ⁻¹)	30.2	26.7	29.7
BS (%)	100	100	100

Tahuinco soil series (Typic Paleargid), a colluvial soil at Choapa Valley, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–12	12–30	30–58
Genetic horizon	A _p	B	B _t
Particle size (mm) distribution			
2–0.05 (%)	58.3	65.4	46.4
0.05–0.002 (%)	23.4	19.7	20.4
<0.002 (%)	18.3	15.0	33.2
Bulk density (Mg m ⁻³)	1.50	1.58	1.91
Water retention –33 kPa (%)	17.5	11.5	14.5
Water retention –1,500 kPa (%)	10.8	6.8	9.5
OC (%)	2.5	1.0	0.4
Soluble cations (mmol _c L ⁻¹)			
Ca	5.5	2.60	2.90
Mg	2.62	0.84	0.99
K	0.23	0.05	0.05
Na	1.84	1.32	2.13
pH _{water}	8.05	8.19	8.58
EC (dS m ⁻¹)	0.9	0.4	0.5
Extractable cations (cmol _c kg ⁻¹)			
Ca	16.7	11.1	19.5
Mg	3.8	2.5	5.5
K	0.4	0.2	0.3
Na	0.3	0.2	0.5
CO ₃ (mmol _c L ⁻¹)	0.0	0.0	0.0
HCO ₃ (mmol _c L ⁻¹)	5.6	3.6	3.8
Cl (mmol _c L ⁻¹)	0.4	0.3	0.5
SO ₄ (mmol _c L ⁻¹)	3.4	0.8	1.1
CEC (cmol _c kg ⁻¹)	19.9	16.3	19.9
BS (%)	100	86	100

Hualcapo soil series (Fluventic Haploxeroll) on recent terraces of the Aconcagua Valley, Region V of Chile (CIREN 1997a)

Depth (cm)	0–20	20–42	42–72	72–94
Genetic horizon	A ₁	B ₁	B ₂	B ₃
Particle size (mm) distribution (%)				
2–0.05 (%)	67.3	67.4	54.7	61.8

(continued)

(continued)

0.05–0.002 (%)	24.3	24.2	34.1	29.2
<0.002 (%)	8.4	8.4	11.2	9.0
Water retention –33 kPa (%)	16.0	15.0	19.0	17.0
Water retention –1,500 kPa (%)	9.0	9.0	10.0	8.0
OC (%)	1.3	0.9	1.0	0.6
pH _{water}	7.6	7.5	7.8	7.8
EC (dS m ⁻¹)	1.6	1.0	0.6	1.2
Extractable cations (cmol _c kg ⁻¹)				
Ca	9.2	8.7	11.9	9.8
Mg	1.6	1.5	2.0	1.9
K	0.5	0.4	0.3	0.2
Na	0.2	0.2	0.4	0.4
CEC (cmol _c kg ⁻¹)	10.6	10.0	13.3	10.9
BS (%)	100	100	100	100

Pocuro soil series (Fluventic Haploxeroll) at remnant terraces of the Aconcagua Valley, Region V of Chile (CIREN 1997a)

Depth (cm)	0–18	18–48	48–82	82–110	110–130
Genetic horizon	A ₁	A ₂	B ₁	B ₂	B ₃
Particle size (mm) distribution					
2–0.05 (%)	40.8	30.9	28.6	17.0	17.0
0.05–0.002 (%)	41.2	47.8	51.2	59.4	51.7
<0.002 (%)	18.0	21.3	20.2	23.6	31.3
Water retention –33 kPa (%)	23.0	24.0	24.0	29.0	29.0
Water retention –1,500 kPa (%)	13.0	14.0	14.0	15.0	16.0
OC (%)	1.2	1.0	0.6	0.6	0.5
pH _{water}	6.6	6.7	6.8	6.8	6.8
Extractable cations (cmol _c kg ⁻¹)					
Ca	12.1	13.9	14.2	17.1	18.1
Mg	2.1	2.1	1.9	2.2	2.1
K	0.3	0.1	0.1	0.1	0.2
Na	0.3	0.4	0.4	0.4	0.5
CEC (cmol _c kg ⁻¹)	15.6	21.3	19.4	21.9	25.4
BS (%)	95	77	86	90	82

Ocoa soil series (Typic Xerochrept), a colluvial soil at piedmont positions in the Aconcagua Valley, Region V of Chile (CIREN 1997a)

Depth (cm)	0–21	21–45	45–63	63–100
Genetic horizon	A ₁	B ₁	B ₂	B ₃
Particle size (mm) distribution				
2–0.05 (%)	35.6	41.9	37.2	35.5
0.05–0.002 (%)	42.8	37.7	43.1	44.5
<0.002 (%)	21.6	20.4	19.7	20.0
Water retention –33 kPa (%)	29.0	24.0	21.0	20.0
Water retention –1,500 kPa (%)	22.0	18.0	14.0	13.0
OC (%)	2.6	2.0	1.4	0.5
pH _{water}	7.3	7.5	7.8	7.7
EC (dS m ⁻¹)	1.4	0.6	0.4	0.5
Extractable cations (cmol _c kg ⁻¹)				
Ca	17.2	16.3	13.9	11.2
Mg	3.5	3.2	2.6	2.2
K	0.4	0.4	0.4	0.3
Na	0.4	0.3	0.3	0.3
CEC (cmol _c kg ⁻¹)	22.7	21.5	18.1	15.6
BS (%)	95	94	95	90

Palomar soil series (Typic Medihemist), situated in depressed landscape in the Aconcagua Valley, Region V of Chile (CIREN 1997a)

Depth (cm)	0–18	18–44	44–72
Genetic horizon	A ₁	A ₂	B
Particle size (mm) distribution			
2–0.05 (%)	7.0	8.2	21.0
0.05–0.002 (%)	51.6	49.2	51.9
<0.002 (%)	41.4	42.6	27.1
Water retention –33 kPa (%)	76.0	70.0	55.0
Water retention –1,500 kPa (%)	40.0	38.0	28.0
OC (%)	20.7	17.1	8.2
pH _{water}	7.8	7.9	7.4
EC (dS m ⁻¹)	2.8	2.0	2.0
CaCO ₃ (%)	29.0	35.4	0.5
Extractable cations (cmol _c kg ⁻¹)			
Ca	–	–	–
Mg	–	–	–
K	0.6	0.1	0.2
Na	1.4	1.5	1.0

2.2.1.4 Soils of the Coastal Range

A pedon near Taltal (25°S, Region II of Chile) in the northern Coastal Range (Luzio et al. 2010)

Depth (cm)	0–5	5–36	36–100
Genetic horizon	A	C ₁	C ₂
Particle size (mm) distribution (%)			
2–0.05 (%)	63.4	64.4	70.4
0.05–0.002 (%)	22.6	18.6	13.6
<0.002 (%)	14.0	17.0	16.0
OC (%)	5.1	0.9	1.0
pH _{water}	8.8	8.4	8.4
EC (dS m ⁻¹)	54.0	150.0	150.0
CaCO ₃ (%)	1.1	0.2	0.2
Exchangeable cations (cmol _c kg ⁻¹)			
Ca	25.9	4.2	8.1
Mg	8.9	4.6	2.8
K	1.6	1.6	0.6
Na	4.1	3.0	2.1
CEC (cmol _c kg ⁻¹)	14.9	10.9	7.8

Mincha soil series (Typic Haplocambid) at the Coastal Range, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–8	8–28	28–50	50–70
Genetic horizon	A ₁	B ₁	B ₂	B ₃
Particle size (mm) distribution				
2–0.05 (%)	46.6	48.6	22.6	16.6
0.05–0.002 (%)	36.0	34.0	14.0	14.0
<0.002 (%)	17.4	17.4	63.4	69.4
Bulk density (Mg m ⁻³)	1.43	1.40	1.51	1.54
Water retention –33 kPa (%)	11.00	11.00	32.50	36.40
Water retention –1,500 kPa (%)	8.25	6.43	22.50	24.70
OC (%)	0.79	0.52	0.42	–
pH _{water}	7.8	7.0	6.6	6.4
EC (dS m ⁻¹)	0.33	0.31	1.17	1.98
CaCO ₃ (%)	0.50	0.00	0.00	0.00
Soluble cations (mmol _c L ⁻¹)				
Ca	1.39	1.31	1.25	1.28
Mg	0.77	0.70	0.75	1.12

(continued)

(continued)

K	0.37	0.24	0.31	0.40
Na	3.63	2.66	10.10	12.80
HCO ₃ (mmol _c L ⁻¹)	3.50	1.75	0.50	0.25
Cl (mmol _c L ⁻¹)	1.96	2.59	9.45	13.30
SO ₄ (mmol _c L ⁻¹)	1.12	1.06	3.41	10.50
SAR	3.49	2.65	10.10	11.68
Extractable cations (cmol _c kg ⁻¹)				
Ca	3.70	3.20	7.10	8.70
Mg	1.70	1.60	8.90	9.00
K	0.78	0.66	1.54	1.94
Na	0.25	0.23	3.23	4.48
CEC (cmol _c kg ⁻¹)	9.24	8.73	24.60	23.90

2.2.1.5 Soils of the Coastal Plains

La Compañía soil serie (Typic Torripsamment). Stabilised dune with certain pedogenic development, near to La Serena city, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–12	12–30	30–50	50–80	80–105	105–120
Genetic horizon	A _p	C ₁	C ₂	C ₃	C ₄	C ₅
Particle size (mm) distribution						
2–0.05 (%)	85.7	91.5	89.2	92.1	93.8	84.2
0.05–0.002 (%)	10.3	5.4	7.4	5.3	3.6	4.1
<0.002 (%)	4.0	3.1	3.4	2.6	2.6	11.7
Bulk density (Mg m ⁻³)	1.63	1.69	1.59	1.75	1.83	1.96
Water retention – 33 kPa (%)	4.0	3.2	2.9	2.9	9.2	9.5
Water retention – 1,500 kPa (%)	2.1	2.0	2.0	2.2	6.8	6.3
OC (%)	0.2	0.2	0.1	0.0	0.0	0.0
pH _{water}	6.3	6.7	6.6	6.9	6.9	7.2
EC (dS m ⁻¹)	0.8	0.4	0.5	0.5	0.5	0.5
Extractable cations (cmol _c kg ⁻¹)						
Ca	1.1	0.8	0.8	0.6	1.7	1.6
Mg	0.6	0.8	0.8	0.9	3.7	3.7
K	0.5	0.4	0.4	0.2	0.5	0.5
Na	0.2	0.1	0.1	0.2	0.7	0.6
CEC (cmol _c kg ⁻¹)	4.4	3.8	3.6	2.6	8.2	8.9
BS (%)	55	55	58	73	80	72

Indurate soils on marine terraces (Calcid Petrocalcid), Region IV of Chile (CIREN 2005a)

Depth (cm)	0–15	15–32	32–55
Genetic horizon	A _p	B _{k1}	B _{k2}
Particle size (mm) distribution			
2–0.05 (%)	50.4	51.4	43.8
0.05–0.002 (%)	30.8	32.2	34.5
<0.002 (%)	18.8	16.4	21.7
Bulk density (Mg m ⁻³)	1.39	1.42	–
Water retention –33 kPa (%)	23.0	23.0	25.5
Water retention –1,500 kPa (%)	18.3	14.7	19.5
OC (%)	1.5	0.9	0.5
pH _{water}	8.1	8.1	8.0
EC (dS m ⁻¹)	0.9	0.9	0.9
CaCO ₃ (%)	13.0	15.6	32.5
Extractable cations (cmol _c kg ⁻¹)			
Ca	–	–	–
Mg	–	–	–
K	2.8	1.7	0.6
Na	0.5	0.6	0.7
CEC (cmol _c kg ⁻¹)	23.2	19.2	16.1

Huentelauquén soil series (Typic Natrargid) on marine terraces at Region IV of Chile (CIREN 2005a)

Depth (cm)	0–7	7–25	25–52	52–81	81–123
Genetic horizon	A ₁	A ₂	B _{t1}	B _{t2}	B _{t3}
Particle size (mm) distribution					
2–0.05 (%)	26.0	24.0	12.0	24.0	14.0
0.05–0.002 (%)	60.0	60.0	22.0	18.0	22.0
<0.002 (%)	14.0	16.0	66.0	58.0	64.0
Bulk density (Mg m ⁻³)	1.20	1.35	1.42	1.48	1.50
Water retention –33 kPa (%)	11.00	10.80	33.20	30.00	29.30
Water retention –1,500 kPa (%)	6.43	6.08	24.40	22.30	20.00
OC (%)	0.75	0.60	0.28	–	–
pH _{water}	7.5	7.5	8.4	8.3	8.4
EC (dS m ⁻¹)	3.08	3.03	5.29	6.45	5.28
CaCO ₃ (%)	0.5	0.5	2.4	15.5	20.9
Soluble cations (mmol _c L ⁻¹)					
Ca	6.35	4.43	2.74	3.06	2.18

(continued)

(continued)

Mg	4.39	3.60	3.95	5.21	3.44
K	1.45	0.45	0.56	0.68	0.54
Na	18.70	20.90	46.50	58.30	46.30
HCO ₃ (mmol _c L ⁻¹)	1.00	1.25	4.00	4.25	3.75
Cl (mmol _c L ⁻¹)	27.10	28.20	46.30	55.80	47.00
SO ₄ (mmol _c L ⁻¹)	3.04	2.04	6.64	8.82	8.40
Extractable cations (cmol _c kg ⁻¹)					
Ca	2.30	2.40	5.60	20.00	19.50
Mg	0.92	1.50	10.20	9.90	9.00
K	0.97	0.66	2.41	1.99	1.75
Na	1.19	1.55	9.77	10.00	9.56
SAR	8.07	10.43	25.42	28.67	27.62
CEC (cmol _c kg ⁻¹)	7.64	7.83	22.9	21.8	20.9
BS (%)	70	78	100	100	100

Tabolango soil series (Typic Palexeralf) on marine terraces at Region V of Chile (CIREN 1997a)

Depth (cm)	0–17	17–44	44–59
Genetic horizon	A	B ₁₁	B ₁₂
Particle size (mm) distribution			
2–0.05 (%)	58.5	24.6	17.7
0.05–0.002 (%)	31.7	19.9	28.3
<0.002 (%)	9.8	55.5	54.0
Water retention –33 kPa (%)	16.0	36.0	43.0
Water retention –1,500 kPa (%)	6.0	29.0	29.0
OC (%)	0.6	0.5	0.2
pH _{water}	5.6	6.3	8.0
EC (dS m ⁻¹)	–	–	4.7
Extractable cations (cmol _c kg ⁻¹)			
Ca	0.9	12.5	–
Mg	0.7	10.6	–
K	0.4	0.4	0.4
Na	0.2	4.1	8.6
CEC (cmol _c kg ⁻¹)	6.8	32.2	32.7
Na saturation (%)			6.0
BS (%)	32	86	–

2.2.1.6 Soils of the serranías

El Tambo soil series (Typic Haplocambid) at the *serranías*, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–11	11–21	21–32	32–80
Genetic horizon	A _p	B ₁	B ₂	BC
Particle size (mm) distribution				
2–0.05 (%)	55.8	52.8	66.1	67.7
0.05–0.002 (%)	29.4	32.2	25.33	25.5
<0.002 (%)	14.8	15.1	8.6	6.7
Bulk density (Mg m ⁻³)	1.26	1.30	1.15	1.20
Water retention –33 kPa (%)	22.7	20.6	11.8	9.1
Water retention –1,500 kPa (%)	12.6	11.4	6.5	5.0
Water saturation (%)	43	41	36	36
OC (%)	1.67	1.10	0.64	0.46
pH _{water}	7.20	7.63	7.81	8.03
EC (dS m ⁻¹)	4.9	1.0	0.6	0.5
Soluble cations (mmol _c L ⁻¹)				
Ca	42.0	5.4	3.1	2.1
Mg	14.7	1.7	1.0	0.6
K	1.5	0.2	0.1	0.0
Na	10.3	2.9	2.3	2.1
CO ₃ (mmol _c L ⁻¹)	0.0	0.0	0.0	0.0
HCO ₃ (mmol _c L ⁻¹)	6.0	3.8	1.2	2.0
Cl (mmol _c L ⁻¹)	13.2	1.5	0.5	0.4
SO ₄ (mmol _c L ⁻¹)	21.0	1.8	2.2	1.4
Extractable cations (cmol _c kg ⁻¹)				
Ca	15.9	13.5	11.0	9.8
Mg	3.31	2.68	2.32	2.04
K	0.70	0.31	0.14	0.10
Na	0.64	0.35	0.32	0.32
CEC (cmol _c kg ⁻¹)	19.6	18.7	16.0	14.3
BS (%)	100	90	86	85

Combarbalá soil series (Typic Haplargid), inner sector in the Region IV of Chile (CIREN 2005a)

Depth (cm)	0–25	25–45	45–90
Genetic horizon	A _p	B ₁₁	B ₁₂
Particle size (mm) distribution			
2–0.05 (%)	32.6	23.9	18.0
0.05–0.002 (%)	24.0	25.0	25.3
<0.002 (%)	43.4	51.1	56.7

(continued)

(continued)

Bulk density (Mg m^{-3})	1.76	1.95	1.95
Water retention -33 kPa (%)	33.1	37.1	40.2
Water retention $-1,500$ kPa (%)	17.9	26.8	26.5
Water saturation (%)	68	77	78
OC (%)	1.51	0.75	0.46
pH_{water}	7.51	7.93	8.09
EC (dS m^{-1})	1.1	0.4	0.5
CaCO_3 (%)	0.9	1.8	3.3
Soluble cations ($\text{mmol}_c\text{L}^{-1}$)			
Ca	8.7	2.7	1.7
Mg	1.7	0.6	0.5
K	0.5	0.1	0.1
Na	1.4	1.5	3.3
CO_3 ($\text{mmol}_c\text{L}^{-1}$)	0.0	0.0	0.0
HCO_3 ($\text{mmol}_c\text{L}^{-1}$)	5.6	2.0	2.0
Cl ($\text{mmol}_c\text{L}^{-1}$)	3.0	0.1	0.3
SO_4 ($\text{mmol}_c\text{L}^{-1}$)	2.3	1.9	2.8
Extractable cations ($\text{cmol}_c\text{kg}^{-1}$)			
Ca	32.9	42.4	26.0
Mg	5.11	7.71	4.61
K	1.32	0.85	0.31
Na	0.30	0.53	0.74
CEC ($\text{cmol}_c\text{kg}^{-1}$)	38.7	43.0	47.0
BS (%)	100	100	67

Marquesa soil series (Typic Haplocalcid), soil over calcareous materials in the *serranías*, Region IV of Chile (CIREN 2005a)

Depth (cm)	0–32	32–100
Genetic horizon	A ₁	C _k
Particle size (mm) distribution		
2–0.05 (%)	31.6	24.3
0.05–0.002 (%)	54.1	46.4
<0.002 (%)	14.3	29.3
Water retention -33 kPa (%)	26.7	19.7
Water retention $-1,500$ kPa (%)	15.5	11.5
OC (%)	0.8	0.2
pH_{water}	8.0	8.3
EC (dS m^{-1})	1.1	2.4
CaCO_3 (%)	0.9	33.5
Extractable cations ($\text{cmol}_c\text{kg}^{-1}$)		
Ca	–	–
Mg	–	–
K	0.2	0.1
Na	0.6	1.7
CEC ($\text{cmol}_c\text{kg}^{-1}$)	15.2	14.8

2.2.2 Soils of the Mediterranean Zone

2.2.2.1 Soils of the Andean Mountains

Los Nevados soil association profile (Acrudoxic Hapludand), Region IX of Chile (CIREN 2002)

Depth (cm)	0–20	20–42	42–80	>80
Genetic horizon	A ₁	AC ₁	AC ₂	C
Particle size (mm) distribution				
2–0.05 (%)	62.1	56.6	71.6	84.3
0.05–0.002 (%)	25.2	36.0	21.0	15.0
<0.002 (%)	12.6	7.3	7.4	0.7
Water retention -33 kPa (%)	34.6	30.6	24.8	18.2
Water retention $-1,500$ kPa (%)	31.2	21.6	16.3	8.5
OC (%)	9.28	4.19	1.55	0.30
pH_{water}	5.9	6.1	6.1	6.1
Exchangeable cations ($\text{cmol}_c\text{kg}^{-1}$)				
Ca	0.65	0.29	0.24	0.24
Mg	0.25	0.10	0.06	0.05
Na	0.11	0.03	0.01	0.01
K	0.08	0.04	0.02	0.02
CEC ($\text{cmol}_c\text{kg}^{-1}$)	26.9	22.1	10.2	6.2
ECEC ($\text{cmol}_c\text{kg}^{-1}$)	1.51	0.46	0.33	0.32
P retention (%)	97	100	97	81
$\text{Al}_{\text{ox}} + \frac{1}{2}\text{Fe}_{\text{ox}}$ (%)	2.31	4.11	3.31	2.60
BS (%)	4	2	3	5

Los Riscos soil series (Typic Hydrudand), Region XIV of Chile (CIREN 2003)

Depth (cm)	0–9	9–22	22–40	40–65	65–100
Genetic horizon	A ₁	A ₂	B ₁	B ₂	BC
Particle size (mm) distribution					
2–0.05 (%)	83.2	79.2	93.2	93.2	89.2
0.05–0.002 (%)	7.3	9.3	1.3	1.3	3.3
<0.002 (%)	9.5	11.5	5.5	5.5	7.5
Bulk density (Mg m^{-3})	0.53	0.86	0.48	0.41	0.44
Water retention -33 kPa (%)	56.4	32.2	31.9	24.8	35.1
Water retention $-1,500$ kPa (%)	56.2	26.3	28.8	24.0	30.4
OC (%)	12.6	6.0	4.2	3.7	2.7
pH_{water}	5.6	5.9	6.1	6.2	6.3
Exchangeable cations ($\text{cmol}_c\text{kg}^{-1}$)					
Ca	2.41	0.39	0.47	0.71	1.00

(continued)

(continued)

Mg	0.90	0.16	0.20	0.25	0.32
Na	0.22	0.09	0.10	0.06	0.05
K	0.26	0.06	0.03	0.03	0.03
Al	0.10	0.03	0.01	0.01	0.00
CEC (cmol _c kg ⁻¹)	77.0	53.1	50.7	49.1	47.5
ECEC (cmol _c kg ⁻¹)	3.89	0.73	0.81	1.06	1.40
P retention (%)	99	99	99	99	99
Al _{ox} + 1/2Fe _{ox} (%)	5.76	7.29	8.86	7.97	9.32
BS (%)	5	1	2	2	3

2.2.2.2 Soils of the Pre-Andean Mountains

Challay soil association (Lithic Haploxeroll), Metropolitan Region of Chile (CIREN 1997a, Valle 2012)

Depth (cm)	0–16	16–42
Genetic horizon	A ₁	B ₁
Particle size (mm) distribution		
2–0.05 (%)	43.7	36.3
0.05–0.002 (%)	38.1	37.4
<0.002 (%)	18.2	26.3
Bulk density (Mg m ⁻³)	1.40	1.44
Water retention –33 kPa (%)	23.6	25.1
Water retention –1,500 kPa (%)	11.1	12.5
OC (%)	1.79	0.77
pH _{water}	5.68	5.76
Exchangeable cations (cmol _c kg ⁻¹)		
Ca	8.62	17.47
Mg	1.46	3.22
Na	0.15	0.37
K	0.17	0.11
Al	0.46	0.79
CEC (cmol _c kg ⁻¹)	16.17	22.68
BS (%)	64	93

Bramadero soil series (Humic Haploxerand), Region VIII of Chile (CIREN 1997b, Stolpe et al. 2008)

Depth (cm)	0–17	17–48	48–82	82–120
Genetic horizon	A ₁	A ₂	AB	B
Particle size (mm) distribution				
2–0.05 (%)	40.8	48.2	41.6	42.3
0.05–0.002 (%)	34.5	29.5	36.9	32.3
<0.002 (%)	24.7	22.3	21.5	25.4
Bulk density (Mg m ⁻³)	0.95	0.99	1.01	1.08

(continued)

(continued)

Water retention –33 kPa (%)	35.0	35.0	34.0	46.0
Water retention –1,500 kPa (%)	18.0	17.0	20.0	30.0
OC (%)	5.2	3.1	1.9	1.1
pH _{water}	6.0	6.2	6.1	6.0
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	10.2	7.9	5.4	–
Mg	1.1	1.2	2.0	–
Na	0.1	0.1	0.3	–
K	1.5	1.2	1.0	–
CEC (cmol _c kg ⁻¹)	31.1	25.8	28.0	–
P retention (%)	90.0	92.0	93.0	85.0
Al _{ox} + 1/2Fe _{ox} (%)	1.73	2.45	2.65	–
BS (%)	41	40	31	–

Choshuenco soil series (Andic Dystrudept), Region X of Chile (CIREN 2003)

Depth (cm)	0–29	29–54	54–86
Genetic horizon	A ₁	B _{w1}	B _{w2}
Particle size (mm) distribution			
2–0.05 (%)	73.0	66.4	62.8
0.05–0.002 (%)	18.8	22.3	21.4
<0.002 (%)	8.2	11.3	15.8
Bulk density (Mg m ⁻³)	0.93	0.91	0.89
Water retention –33 kPa (%)	23.9	27.4	32.6
Water retention –1,500 kPa (%)	16.1	16.0	17.8
OC (%)	4.38	3.44	4.12
pH _{water}	5.6	5.7	5.6
Exchangeable cations (cmol _c kg ⁻¹)			
Ca	2.39	1.43	1.22
Mg	0.45	0.47	0.39
Na	0.10	0.06	0.06
K	0.10	0.07	0.05
Al	0.16	0.07	0.05
CEC (cmol _c kg ⁻¹)	25.0	26.9	29.2
ECEC (cmol _c kg ⁻¹)	3.20	2.10	1.77
P retention (%)	63.0	87.0	92.0
Al _{ox} + 1/2Fe _{ox} (%)	1.07	1.98	2.41
BS (%)	12	8	6

Cunco soil series (Acudoxic Hapludand), Region IX of Chile (CIREN 2002)

Depth (cm)	0–19	19–30	30–59	59–86	86–100
Genetic horizon	A _p	2B _{w1}	3B _{w2}	3B _{w3}	3BC
Particle size (mm) distribution					
2–0.05 (%)	52.7	32.0	33.9	40.4	23.1
0.05–0.002 (%)	31.6	43.6	39.9	39.1	44.6
<0.002 (%)	15.7	24.4	26.2	20.5	32.3
Bulk density (Mg m ⁻³)	1.05	0.81	0.73	0.78	0.67
Water retention – 33 kPa (%)	26.5	41.0	50.8	47.2	56.3
Water retention – 1,500 kPa (%)	12.4	28.4	28.5	27.1	43.8
OC (%)	3.29	3.26	5.86	5.78	2.67
pH _{water}	6.0	6.3	5.4	5.9	6.0
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	3.96	1.70	0.90	0.93	0.56
Mg	1.52	1.23	0.25	0.32	0.26
Na	0.09	0.06	0.07	0.08	0.06
K	0.08	0.04	0.04	0.02	0.01
CEC (cmol _c kg ⁻¹)	21.5	41.8	42.9	37.0	39.7
ECEC (cmol _c kg ⁻¹)	5.65	3.03	1.31	1.38	0.89
P retention (%)	76.0	99.0	98.0	96.0	99.0
Al _{ox} + ½Fe _{ox} (%)	2.27	4.28	3.82	3.27	3.53
BS (%)	26	7	3	4	2

Antuco soil series (Humic Vitrixerand), Region VIII of Chile (CIREN 1999)

Depth (cm)	0–15	15–35	35–45	45–75
Genetic horizon	A ₁	A ₂	AC	C ₁
Particle size (mm) distribution				
2–0.05 (%)	69.7	91.8	98.0	98.9
0.05–0.002 (%)	27.7	8.0	1.8	1.0
<0.002 (%)	2.6	0.2	0.2	0.1
Bulk density (Mg m ⁻³)	1.38	1.59	1.67	1.62
Water retention – 33 kPa (%)	11.9	8.8	5.8	5.8
Water retention – 1,500 kPa (%)	5.8	4.7	2.3	2.3
OC (%)	2.47	0.88	0.32	0.16
pH _{water}	5.8	6.0	6.3	6.3

(continued)

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Exchangeable cations (cmol _c kg ⁻¹)				
Ca	1.28	0.61	0.64	0.49
Mg	0.15	0.11	0.11	0.09
Na	0.03	0.01	0.00	0.01
K	0.13	0.06	0.03	0.03
Al	0.03	0.07	0.00	0.00
CEC (cmol _c kg ⁻¹)	7.75	3.17	3.45	1.49
ECEC (cmol _c kg ⁻¹)	1.62	0.86	0.78	0.61
Glass fraction (0.02–2 mm, %)	68.0	40.0	34.0	32.0
P retention (%)	35	43	22	18
Al _{ox} + ½Fe _{ox} (%)	0.80	1.06	0.62	0.56
BS (%)	21	25	23	41

2.2.2.3 Soils of the Longitudinal Central Valley Maipo soil series (Fluventic Haploxeroll) at Metropolitan Region of Chile (CIREN 1996a)

Depth (cm)	0–16	16–33	33–50	50–74	74–92	92–120
Genetic horizon	A	A ₂	B ₁	B ₂	C ₁	C ₂
Particle size (mm) distribution						
2–0.5 (%)	42.0	38.0	25.8	33.3	40.3	45.8
0.5–0.002 (%)	31.7	39.7	40.6	34.9	31.9	31.6
<0.002 (%)	27.3	22.3	33.6	31.8	27.8	22.6
Bulk density (Mg m ⁻³)	1.5	1.6	1.7	1.9	1.9	1.8
Water retention – 33 kPa (%)	21.0	22.0	24.0	23.0	27.0	22.0
Water retention – 1,500 kPa (%)	13.0	14.0	16.0	16.0	18.0	13.0
OC (%)	1.5	1.2	1.2	0.8	0.4	0.3
CaCO ₃ (%)	2.7	2.3	0.0	0.0	0.0	0.0
EC (dS m ⁻¹)	0.7	0.5	0.4	0.4	0.5	0.8
pH _{water}	8.0	8.0	7.8	7.7	7.7	7.6
Exchangeable cations (cmol _c kg ⁻¹)						
Ca	–	–	21.3	19.5	19.0	20.0
Mg	–	–	2.3	2.1	2.2	2.1
Na	0.2	0.3	0.5	0.7	0.8	0.9
K	2.2	0.5	0.6	0.6	0.5	0.5
CEC (cmol _c kg ⁻¹)	17.9	18.1	30.5	28.7	26.4	26.3
BS (%)	–	–	81	80	85	89

Agua del Gato soil series (Petrocalcic Calciaquoll) at Metropolitan Region of Chile (CIREN 1996a)

Depth (cm)	0–19	19–46	46–70	70–85
Genetic horizon	A _p	A ₂	AC	2C _{km}
Particle size (mm) distribution				
2–0.05 (%)	14.1	11.1	17.1	35.6
0.05–0.002 (%)	55.4	49.9	46.9	41.9
<0.002 (%)	30.5	39.0	36.0	22.5
Bulk density (Mg m ⁻³)	1.30	0.77	0.98	1.61
Water retention –33 kPa (%)	35.0	38.0	36.0	26.0
Water retention –1,500 kPa (%)	26.0	30.0	28.0	18.0
OC (%)	3.3	2.6	1.1	0.4
pH _{water}	7.8	7.5	7.5	8.0
EC (dS m ⁻¹)	0.8	1.3	1.4	1.7
CaCO ₃ (%)	1.4	0.2	0.3	36.9
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	–	–	–	–
Mg	–	–	–	–
Na	1.5	2.5	1.6	1.5
K	0.8	0.7	0.7	0.2
CEC (cmol _c kg ⁻¹)	42.0	50.9	40.9	20.5

Quillayes soil series (Aquic Haploxerept), Region VII of Chile (CIREN 1997b)

Depth (cm)	0–12	12–23	23–29	29–45
Genetic horizon	A ₁	A ₂	B ₁	B ₂
Particle size (mm) distribution				
2–0.05 (%)	59.3	50.9	45.1	46.7
0.05–0.002 (%)	28.0	29.1	28.7	25.7
<0.002 (%)	12.7	20.0	26.2	27.6
Water retention –33 kPa (%)	13.0	17.0	21.0	23.0
Water retention –1,500 kPa (%)	5.0	9.0	12.0	14.0
OC (%)	0.6	0.6	0.4	0.4
pH _{water}	6.2	6.3	6.4	6.2
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	1.7	3.0	4.0	4.2
Mg	0.5	1.1	1.8	2.0
Na	0.1	0.1	0.2	0.2
K	0.2	0.1	0.2	0.3
CEC (cmol _c kg ⁻¹)	3.9	6.4	9.6	11.0
BS (%)	64	67	65	61

Talca soil series (Ultic Haploxeralf) at Region VII of Chile (CIREN 1997b)

Depth (cm)	0–16	16–70	70–100
Genetic horizon	A _p	B _t	B ₂
Particle size (mm) distribution			
2–0.05 (%)	36.7	34.1	55.6
0.05–0.002 (%)	37.4	21.7	23.2
<0.002 (%)	25.9	45.2	21.2
Bulk density (Mg m ⁻³)	1.7	1.5	1.6
Water retention –33 kPa (%)	20.0	25.0	22.0
Water retention –1,500 kPa (%)	11.0	20.0	15.0
OC (%)	1.2	0.3	0.2
pH _{water}	5.8	6.4	6.6
Exchangeable cations (cmol _c kg ⁻¹)			
Ca	4.0	5.2	5.0
Mg	1.1	2.3	2.3
Na	0.1	0.2	0.3
K	0.4	0.2	0.2
CEC (cmol _c kg ⁻¹)	10.4	16.3	14.4
BS (%)	55	48	53

Metrenco soil series (Typic Paleudult), Region IX of Chile (CIREN 2002)

Depth (cm)	0–13	13–43	43–66	66–85	85–120
Genetic horizon	A ₁	B _{t1}	B _{t2}	B _{t3}	B _{t4}
Particle size (mm) distribution					
2–0.05 (%)	11.9	11.5	14.2	13.7	16.3
0.05–0.002 (%)	58.0	35.1	37.8	35.9	38.2
<0.002 (%)	30.1	53.4	48.0	50.3	45.5
Bulk density (Mg m ⁻³)	0.98	1.07	0.96	1.11	1.13
Water retention –33 kPa (%)	29.4	33.5	34.7	34.5	32.7
Water retention –1,500 kPa (%)	22.8	26.2	26.6	26.1	25.1
OC (%)	1.94	0.45	0.28	0.36	0.33
pH _{water}	5.3	5.4	5.6	5.4	5.5
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	3.73	4.62	4.07	4.06	3.89
Mg	1.77	2.48	2.59	2.62	2.50
Na	0.49	0.16	0.05	0.07	0.08
K	0.06	0.09	0.12	0.11	0.09
CEC (cmol _c kg ⁻¹)	18.3	15.8	17.3	13.1	16.7

(continued)

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ECEC (cmol _c kg ⁻¹)	6.30	7.35	6.85	6.91	6.60
P retention (%)	57.0	55.0	55.0	53.0	53.0
Al _{ox} + ½Fe _{ox} (%)	0.79	0.74	0.67	0.59	0.58
BS (%)	33	46	40	52	35

Nueva Imperial soil series (Typic Paleudult), Region IX of Chile (CIREN 2002)

Depth (cm)	0–11	11–25	25–55
Genetic horizon	A _p	B ₁	B ₂
Particle size (mm) distribution			
2–0.05 (%)	11.1	8.7	14.7
0.05–0.002 (%)	45.3	34.3	31.6
<0.002 (%)	43.6	57.1	53.7
Bulk density (Mg m ⁻³)	1.03	1.11	1.02
Water retention –33 kPa (%)	38.0	35.9	39.0
Water retention –1,500 kPa (%)	29.4	29.9	32.0
OC (%)	4.71	2.61	1.79
pH _{water}	5.7	6.4	6.6
Exchangeable cations (cmol _c kg ⁻¹)			
Ca	8.06	9.95	11.07
Mg	2.12	2.48	3.05
Na	0.22	0.37	0.64
K	0.09	0.04	0.04
CEC (cmol _c kg ⁻¹)	33.0	34.7	30.0
ECEC (cmol _c kg ⁻¹)	10.66	12.90	14.81
Al _{ox} + ½Fe _{ox} (%)	1.66	1.41	1.12
BS (%)	32	37	49

Toltén soil series (Acridoxic Hapludand), Region IX of Chile (CIREN 2002)

Depth (cm)	0–20	20–40	40–70	70–100	100–120
Genetic horizon	A ₁	B ₁	B ₂	B ₃	B ₄
Particle size (mm) distribution					
2–0.05 (%)	18.7	13.9	9.7	15.0	20.4
0.05–0.002 (%)	50.0	58.4	48.4	56.4	54.5
<0.002 (%)	31.2	27.8	41.9	28.5	25.0
Bulk density (Mg m ⁻³)	0.61	0.65	0.93	0.86	0.90
Water retention –33 kPa (%)	57.3	52.4	42.4	40.3	44.4

(continued)

Water retention –1,500 kPa (%)	36.0	36.6	31.7	33.5	33.1
OC (%)	10.73	3.62	2.31	1.88	1.80
pH _{water}	5.8	6.2	5.9	5.9	5.9
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	2.68	0.34	0.23	0.28	0.20
Mg	1.10	0.21	0.21	0.25	0.18
Na	0.15	0.10	0.06	0.07	0.10
K	0.14	0.09	0.13	0.11	0.09
CEC (cmol _c kg ⁻¹)	40.5	28.7	23.7	26.9	24.5
ECEC (cmol _c kg ⁻¹)	4.29	0.74	0.64	0.73	0.60
P retention (%)	98	100	100	100	100
Al _{ox} + ½Fe _{ox} (%)	2.99	3.97	3.27	3.99	3.92
BS (%)	10	3	3	3	2

Corte Alto soil series (Typic Hapludand), Region X of Chile (CIREN 2003)

Depth (cm)	0–18	18–47	47–77	77–122	122–170	170–194
Genetic horizon	A	B _{w1}	B _{w2}	2C ₁	2C ₂	3C ₃
Particle size (mm) distribution						
2–0.05 (%)	20.4	29.1	49.5	80.2	68.9	53.5
0.05–0.002 (%)	33.8	41.5	38.6	18.1	30.6	31.0
<0.002 (%)	45.8	29.4	11.9	1.7	0.5	15.5
Bulk density (Mg m ⁻³)	0.86	0.88	0.93	0.85	0.66	0.76
Water retention –33 kPa (%)	41.7	42.7	45.7	55.3	75.6	61.1
Water retention –1,500 kPa (%)	28.7	24.4	24.6	22.3	32.5	26.8
OC (%)	6.76	1.26	0.84	0.88	0.43	0.50
pH _{water}	5.6	5.3	5.8	6.2	6.2	6.3
Exchangeable cations (cmol _c kg ⁻¹)						
Ca	9.4	3.1	4.8	2.0	1.7	6.0
Mg	2.4	1.0	1.2	0.4	0.2	1.6
Na	0.1	0.2	0.7	0.3	0.2	1.8
K	1.6	1.2	0.1	0.1	0.2	0.2
Al	0.7	1.1	0.2	0.1	0.1	0.2
CEC (cmol _c kg ⁻¹)	46.8	34.2	32.9	29.5	33.7	30.9
ECEC (cmol _c kg ⁻¹)	14.2	6.6	7.0	2.9	2.4	9.8
P retention (%)	89.0	96.0	99.0	99.0	99.0	91.0
Al _{ox} + ½Fe _{ox} (%)	1.9	2.2	2.15	5.3	7.0	2.1
BS (%)	34	24	32	14	11	37

Mauñín soil series (Hydric Endoaquand), Region X of Chile (CIREN 2003)

Depth (cm)	0–13	13–30	30–52	52–90	90–112
Genetic horizon	A ₁	A ₂	BA	B _t	B _{qs}
Particle size (mm) distribution					
2–0.05 (%)	78.9	84.8	88.9	73.2	81.2
0.05–0.002 (%)	10.4	4.4	4.4	17.3	9.3
<0.002 (%)	10.8	10.8	6.8	9.5	9.5
Bulk density (Mg m ⁻³)	0.54	0.60	0.57	0.52	1.06
Water retention – 33 kPa (%)	60.5	34.4	38.8	27.5	26.8
Water retention – 1,500 kPa (%)	47.9	31.1	34.1	19.5	21.0
OC (%)	18.9	13.3	8.0	3.0	5.3
pH _{water}	4.9	5.3	5.4	5.5	5.5
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	0.40	0.19	0.12	0.10	0.17
Mg	0.26	0.13	0.10	0.03	0.05
Na	0.17	0.10	0.10	0.07	0.10
K	0.26	0.15	0.08	0.03	0.02
CEC (cmol _c kg ⁻¹)	59.5	53.1	62.9	38.7	41.0
ECEC (cmol _c kg ⁻¹)	3.30	1.40	0.56	0.24	0.35
P retention (%)	97.0	99.0	99.0	99.0	99.0
Al _{ox} + ½Fe _{ox} (%)	1.54	2.77	6.48	4.44	6.80
BS (%)	2	1	1	1	1

Arenales soil series (Dystric Xeropsamment), Region VIII of Chile (CIREN 1999)

Depth (cm)	0–17	17–36	36–56	56–80	80–100	100–150
Genetic horizon	A ₁	C ₁	C ₂	C ₃	C ₄	C ₅
Particle size (mm) distribution						
2–0.05 (%)	95.6	100.0	99.6	99.4	99.3	98.6
0.05–0.002 (%)	4.4	0.0	0.4	0.6	0.7	1.4
<0.002 (%)	0.0	0.0	0.0	0.0	0.0	0.0
Bulk density (Mg m ⁻³)	1.53	1.53	1.51	1.52	1.62	1.69
Water retention – 33 kPa (%)	6.8	4.1	3.7	2.9	3.5	3.4
Water retention – 1,500 kPa (%)	2.9	2.1	2.1	2.6	2.6	2.3

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OC (%)	0.99	0.11	0.16	0.24	0.11	0.07
pH _{water}	6.2	6.4	6.4	6.3	6.4	6.4
Exchangeable cations (cmol _c kg ⁻¹)						
Ca	1.84	0.85	0.76	0.93	1.18	1.15
Mg	0.35	0.15	0.26	0.38	0.56	0.87
Na	0.03	0.03	0.02	0.03	0.04	0.04
K	0.13	0.05	0.10	0.14	0.17	0.15
CEC (cmol _c kg ⁻¹)	3.98	3.3	2.3	1.91	4.56	2.6
ECEC (cmol _c kg ⁻¹)	2.35	1.08	1.15	1.48	1.95	2.21
P retention (%)	14	13	12	12	18	5
BS (%)	59	33	50	78	43	85

2.2.2.4 Soils of the Coastal Range

Lo Vásquez soil series (Ultic Haploxeralf), Region V of Chile (CIREN 1997a)

Depth (cm)	0–18	18–32	32–43	43–57	57–78
Genetic horizon	A ₁	B _{t1}	B _{t2}	B _{t3}	B ₄
Particle size (mm) distribution					
2–0.05 (%)	55.8	46.9	48.1	56.8	55.3
0.05–0.002 (%)	29.4	24.7	21.1	14.0	27.5
<0.002 (%)	14.8	28.4	30.8	29.2	17.2
Bulk density (Mg m ⁻³)	1.6	1.8	1.8	1.8	1.8
Water retention – 33 kPa (%)	21.0	24.0	22.0	22.0	20.0
Water retention – 1,500 kPa (%)	9.0	9.0	12.0	12.0	11.0
OC (%)	1.1	0.5	0.4	0.2	0.2
pH _{water}	6.6	6.7	6.7	6.7	6.7
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	8.5	11.9	10.6	13.8	14.8
Mg	2.3	3.4	3.3	4.9	5.3
Na	0.1	0.2	0.3	0.3	0.4
K	0.1	0.2	0.2	0.2	0.1
CEC (cmol _c kg ⁻¹)	13.8	21.6	22.4	23.9	24.8
BS (%)	80	73	64	80	83

Correltúe soil series (Andic Haplohumult), Region IX of Chile (CIREN 2002)

Depth (cm)	0–7	7–28	28–64	64–98	98–130
Genetic horizon	A ₁	A ₂	B ₁₁	B ₁₂	B ₁₃
Particle size (mm) distribution					
2–0.05 (%)	18.7	19.5	10.8	9.9	12.2
0.05–0.002 (%)	37.2	42.8	40.7	44.0	40.9
<0.002 (%)	44.1	37.6	48.5	46.1	47.0
Bulk density (Mg m ⁻³)	0.67	0.84	0.69	0.71	0.79
Water retention –33 kPa (%)	56.9	62.0	47.9	41.2	37.7
Water retention –1,500 kPa (%)	38.9	39.8	34.4	28.7	27.2
OC (%)	11.99	8.30	1.86	1.32	1.12
pH _{water}	5.6	4.9	5.2	5.4	5.2
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	1.60	0.14	0.13	0.21	0.33
Mg	0.53	0.05	0.03	0.03	0.05
Na	0.16	0.10	0.05	0.07	0.08
K	0.15	0.07	0.03	0.03	0.02
Al	0.70	0.48	0.01	0.01	0.00
CEC (cmol _c kg ⁻¹)	36.6	32.2	13.3	18.2	17.2
ECEC (cmol _c kg ⁻¹)	3.14	0.84	0.25	0.35	0.48
P retention (%)	96.0	97.0	92.0	94.0	89.0
Al _{ox} + ½Fe _{ox} (%)	1.96	2.31	1.40	1.46	1.17
BS (%)	7	1	2	2	3

Los Copihues soil series (Oxiaquic Dystrudept), Region IX of Chile (CIREN 2002)

Depth (cm)	0–19	19–48	48–84	84–120
Genetic horizon	A _p	B ₁	B ₂	B ₃
Particle size (mm) distribution				
2–0.05 (%)	37.5	29.6	26.6	28.3
0.05–0.002 (%)	35.3	27.3	22.8	26.5
<0.002 (%)	27.3	43.1	50.7	45.2
Bulk density (Mg m ⁻³)	1.44	1.36	1.31	1.36
Water retention –33 kPa (%)	24.5	21.4	23.5	24.9
Water retention –1,500 kPa (%)	11.3	13.3	15.6	16.0
OC (%)	2.34	0.83	0.59	0.46

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	5.5	5.7	5.9	5.8
pH _{water}				
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	2.19	1.53	1.87	2.04
Mg	1.18	0.98	1.21	1.24
Na	0.11	0.10	0.10	0.11
K	0.32	0.19	0.15	0.12
CEC (cmol _c kg ⁻¹)	15.3	13.9	12.0	17.6
ECEC (cmol _c kg ⁻¹)	4.06	3.63	3.69	3.66
P retention (%)	47.0	50.0	52.0	50.0
Al _{ox} + ½Fe _{ox} (%)	0.51	0.40	0.36	0.32
BS (%)	25	20	28	20

Hueñi soil series (Andic Dystrudept), Region X of Chile (CIREN 2003)

Depth (cm)	0–14	14–34	34–72	72–120
Genetic horizon	A ₁	B	2C ₁	2C ₂
Particle size (mm) distribution				
2–0.05 (%)	56.9	62.9	74.9	74.9
0.05–0.002 (%)	23.6	19.6	13.6	13.6
<0.002 (%)	19.4	17.4	11.4	11.4
Bulk density (Mg m ⁻³)	0.88	0.96	1.31	1.36
Water retention –33 kPa (%)	30.5	25.9	12.7	11.1
Water retention –1,500 kPa (%)	22.5	21.3	8.1	6.4
OC (%)	6.16	3.60	0.93	0.47
pH _{water}	5.27	5.36	5.27	5.23
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	0.24	0.11	0.12	0.13
Mg	0.23	0.10	0.05	0.05
Na	0.22	0.20	0.11	0.09
K	0.17	0.08	0.04	0.05
CEC (cmol _c kg ⁻¹)	39.9	40.0	12.5	9.1
ECEC (cmol _c kg ⁻¹)	2.48	1.74	1.40	1.25
P retention (%)	87.0	87.0	45.0	34.0
Al _{ox} + ½Fe _{ox} (%)	1.37	1.66	0.52	0.36
BS (%)	2	1	3	4

2.2.3 Soils of the Rainy and Patagonian zone

2.2.3.1 Soils of the West of North Patagonia

Matanzas soil series (Oxic Haplustoll), Region VI of Chile (CIREN 1996b)

Depth (cm)	0–20	20–64	64–95
Genetic horizon	A ₁	B ₁	B ₂
Particle size (mm) distribution			
2–0.05 (%)	47.4	39.5	37.5
0.05–0.002 (%)	37.4	43.0	44.4
<0.002 (%)	15.2	17.5	18.1
OC (%)	2.2	1.5	0.4
pH _{water}	5.8	6.4	6.8
Exchangeable cations (cmol _c kg ⁻¹)			
Ca	7.85	9.06	5.16
Mg	4.30	3.90	4.38
Na	0.40	0.38	0.85
K	1.23	0.69	0.31
CEC (cmol _c kg ⁻¹)	17.40	16.89	12.58
Na saturation (%)	2.3	2.2	6.8
BS (%)	79	83	85

Pollux soil series (Typic Hapludand), Region XI of Chile (CIREN 2005b)

Depth (cm)	0–23	23–37	37–61	61–77	77–95	95–120
Genetic horizon	A ₁	A ₂	B	2C	3A _b	3B _b
Particle size (mm) distribution						
2–0.05 (%)	50.4	55.9	56.3	51.2	48.2	42.1
0.05–0.002 (%)	39.3	36.8	36.5	41.9	43.5	48.4
<0.002 (%)	10.3	7.3	7.2	6.9	8.3	9.5
Bulk density (Mg m ⁻³)	0.70	0.77	0.78	0.72	0.70	0.69
Water retention –33 kPa (%)	43.1	31.9	31.6	24.7	40.8	46.9
Water retention –1,500 kPa (%)	38.1	22.0	20.0	10.8	20.2	26.6
OC (%)	7.66	4.52	2.96	0.93	1.57	2.26
pH _{water}	6.21	6.42	6.56	6.51	6.66	6.38

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Exchangeable cations (cmol _c kg ⁻¹)						
Ca	17.72	13.37	10.96	4.39	7.05	8.16
Mg	3.48	2.20	2.07	1.11	2.20	2.83
Na	0.07	0.15	0.13	0.07	0.13	0.23
K	0.94	0.43	0.35	0.15	0.23	0.38
CEC (cmol _c kg ⁻¹)	52.2	43.2	37.3	18.1	36.5	44.3
ECEC (cmol _c kg ⁻¹)	22.2	16.2	13.5	5.7	9.6	11.6
P retention (%)	81	88	87	59	90	96
Al _{ox} + ½Fe _{ox} (%)	2.01	2.61	3.18	1.54	3.66	4.57
BS (%)	43	37	36	32	26	26

Coyhaique soil series (Andic Distrudept) on alluvial terraces, Region XI of Chile (CIREN 2005b).

Depth (cm)	0–23	23–37	37–61	61–77	77–95	95–120
Genetic horizon	A ₁	A ₂	B	2B _b	3B ₁	3B ₂
Particle size (mm) distribution						
2–0.05 (%)	60.5	60.4	54.2	43.0	22.1	32.7
0.05–0.002 (%)	27.4	26.6	35.2	40.9	40.7	36.0
<0.002 (%)	12.2	13.0	10.6	16.1	27.2	31.3
Bulk density (Mg m ⁻³)	0.90	0.90	0.83	0.77	0.85	0.95
Water retention –33 kPa (%)	24.2	23.8	37.7	36.9	34.7	28.0
Water retention –1,500 kPa (%)	12.1	10.8	15.0	15.5	16.6	16.1
OC (%)	2.73	2.38	2.55	1.80	1.33	0.81
pH _{water}	6.51	6.34	6.68	6.87	6.84	7.01
Exchangeable cations (cmol _c kg ⁻¹)						
Ca	6.26	5.91	9.32	7.91	8.41	8.29
Mg	2.19	1.91	2.47	2.89	3.86	3.69
Na	1.25	0.87	0.85	1.38	1.74	1.09
K	0.27	0.08	0.14	0.13	0.24	0.36
CEC (cmol _c kg ⁻¹)	18.5	18.7	26.0	24.8	26.8	22.0
ECEC (cmol _c kg ⁻¹)	10.0	8.8	12.8	12.3	14.3	13.4
P retention (%)	37	43	70	66	58	49
Al _{ox} + ½Fe _{ox} (%)	1.00	1.17	2.10	2.06	1.56	1.00
BS (%)	54	47	49	50	53	61
Optical density	0.15	0.16	0.27	0.16	0.12	0.08
Melanic index	1.92	2.03	1.64	1.77	1.87	2.02

2.2.3.2 Soils of the East of North Patagonia

Chile Chico soil series (Oxyaquic Haploxeroll), Region XI of Chile (CIREN 2005b)

Depth (cm)	0–13	13–32	32–56	56–70	70–90
Genetic horizon	A _p	B _{w1}	B _{w2}	BC	C
Particle size (mm) distribution					
2–0.05 (%)	38.8	16.3	32.6	38.1	63.0
0.05–0.002 (%)	30.2	34.9	31.7	31.6	22.3
<0.002 (%)	31.0	48.8	35.7	30.3	14.7
Bulk density (Mg m ⁻³)	0.90	1.00	1.01	1.05	1.03
Water retention –33 kPa (%)	30.0	36.5	26.9	24.0	13.7
Water retention –1,500 kPa (%)	19.4	24.3	14.4	12.3	7.1
OC (%)	3.60	1.97	1.04	0.87	0.35
pH _{water}	6.88	6.99	7.03	7.11	7.08
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	22.96	29.53	24.69	21.36	12.70
Mg	4.40	6.11	5.54	4.96	3.20
K	1.40	0.80	0.48	0.35	0.29
Na	0.20	0.22	0.26	0.26	0.18
CEC (cmol _c kg ⁻¹)	31.2	42.4	38.2	33.8	18.9
ECEC (cmol _c kg ⁻¹)	29.0	36.7	31.0	26.9	16.4
P retention (%)	12	21	18	17	8
Al _{ox} + ½Fe _{ox} (%)	0.26	0.33	0.38	0.30	0.18
BS (%)	93	86	81	80	87
Optical density	0.07	0.08	0.06	0.05	0.02
Melanic index	3.42	4.07	3.30	3.00	4.00

Cochrane soil series (Andic Oxyaquic Dystrudept), Region XI of Chile (CIREN 2005b)

Depth (cm)	0–9	9–40	40–80
Genetic horizon	A	B	2B
Particle size (mm) distribution			
2–0.05 (%)	39.0	39.4	61.1
0.05–0.002 (%)	49.5	41.8	9.6
<0.002 (%)	11.5	18.8	29.3
Bulk density (Mg m ⁻³)	0.80	0.75	0.95
Water retention –33 kPa (%)	29.9	36.9	34.5
Water retention –1,500 kPa (%)	18.4	13.8	7.6
OC (%)	0.58	2.09	0.58
pH _{water}	6.45	5.25	5.86

(continued)

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Exchangeable cations (cmol _c kg ⁻¹)			
Ca	10.55	0.40	0.80
Mg	2.68	0.23	0.35
K	1.31	0.46	0.20
Na	0.04	0.07	0.09
CEC (cmol _c kg ⁻¹)	27.9	18.9	9.8
ECEC (cmol _c kg ⁻¹)	14.6	2.6	3.3
P retention (%)	39	60	27
Al _{ox} + ½Fe _{ox} (%)	1.03	1.27	0.43
BS (%)	52	6	15
Optical density	0.25	0.23	0.03
Melanic index	2.07	2.02	1.93

2.2.3.3 Soils of South Patagonia (Magallanes)

Las Chinas soil series, Region XII of Chile (CNR 1997)

Depth (cm)	0–20	20–50
Genetic horizon	A	B
pH _{water}	9.25	9.39
EC (dS m ⁻¹)	7.8	10.8
CaCO ₃ (%)	3.4	2.7
Soluble cations (cmol _c kg ⁻¹)		
Ca	3.2	3.5
Mg	1.4	1.7
Na	89.1	123.2
K	0.2	0.2
Soluble anions (cmol _c kg ⁻¹)		
CO ₃	0.0	0.0
HCO ₃	4.8	4.0
Cl	34.0	51.8
SO ₄	53.0	74.0
SAR (-)	59.1	76.8

Podzolic soil near Punta Arenas city, Region XII of Chile (Díaz et al. 1959–1960)

Depth (cm)	0–2	2–6	6–10	10–15	>15
Genetic horizon	A _o	A ₂	B ₂	C ₁	C ₂
Particle size (mm) distribution					
2–0.05 (%)	–	44.7	39.3	64.7	62.6
0.05–0.002 (%)	–	47.0	38.5	31.2	30.3
<0.002 (%)	–	8.3	22.2	4.1	7.1

(continued)

(continued)

OC (%)	–	0.73	4.45	0.97	0.44
pH _{water}	5.8	4.9	4.6	5.0	5.2
Exchangeable cations (cmol _c kg ⁻¹)					
Ca	8.6	1.7	2.1	0.3	0.5
Mg	2.5	0.6	1.1	0.1	0.2
Na	0.3	0.2	0.4	0.2	0.1
K	1.0	0.2	0.3	0.2	0.2
CEC (cmol _c kg ⁻¹)	33.6	9.3	47.5	21.0	15.9
BS (%)	37	29	8	4	6

2.2.4 Soils of the Insular (Easter-Juan Fernández) and Antarctic Zone

Hotu-Matua soil, Easter Island at Region V of Chile (Díaz 1949)

Depth (cm)	0–50	50–100	100–150
pH _{water}	5.84	6.15	6.34
N–NO ₃ (%)	0.004	0.004	0.0006
P–P ₂ O ₅ (%)	0.014	0.031	0.014
K–K ₂ O (%)	0.028	0.008	0.015
Ca (cmol _c kg ⁻¹)	8.13	5.86	6.86
Mg (cmol _c kg ⁻¹)	4.48	2.78	4.21
CEC (cmol _c kg ⁻¹)	36.91	30.70	60.66

Orito soil series, Easter Island at Region V of Chile (Alcayaga and Narbona 1969)

Depth (cm)	0–16	16–37	37–62	62–76
Particle size (mm) distribution				
2–0.05 (%)	14.08	9.68	24.97	–
0.05–0.002 (%)	24.85	41.96	38.40	–
<0.002 (%)	60.37	43.39	35.96	–
Water retention –33 kPa (%)	51.9	49.8	68.0	70.2
Water retention –1,500 kPa (%)	34.3	32.0	39.5	37.2
pH _{water}	6.3	6.4	6.4	6.0
OC (%)	4.25	3.08	1.71	1.47
Exchangeable cations (cmol _c kg ⁻¹)				
Ca	3.5	3.87	3.75	2.01
Mg	5.96	6.72	5.72	4.00
K	0.77	0.91	0.18	0.17

(continued)

(continued)

Na	1.08	1.38	2.23	1.98
CEC (cmol _c kg ⁻¹)	51.15	47.68	48.96	44.62

Yunque soil series, Juan Fernández Archipelago at Region V of Chile (IREN 1982)

Depth (cm)	0–7	7–18	18–50
Water retention –33 kPa (%)	63.7	60.9	53.8
Water retention –1,500 kPa (%)	50.5	47.1	44.4
OC (%)	14.62	11.02	9.92
pH _{water}	6.0	6.2	6.8
EC (dS m ⁻¹)	0.26	0.20	0.22
Extractable cations (cmol _c kg ⁻¹)			
Ca	29.75	31.75	36.00
Mg	17.48	15.62	16.45
K	0.52	0.65	0.73
Na	2.55	2.31	2.76
CEC (cmol _c kg ⁻¹)	75.62	79.37	71.25
BS (%)	66	63	78

Puerto Inglés soil series, Juan Fernández Archipelago at Region V of Chile (IREN (1982)

Depth (cm)	0–3	3–14	14–58	58–87	87–120
Water retention –33 kPa (%)	51.1	44.4	38.8	35.1	40.1
Water retention –1,500 kPa (%)	41.7	32.6	25.4	22.7	23.7
OC (%)	9.74	1.51	2.36	1.68	0.75
pH _{water}	5.5	5.8	5.75	5.6	5.3
EC (dS m ⁻¹)	0.40	0.14	0.03	0.01	0.08
Extractable cations (cmol _c kg ⁻¹)					
Ca	16.94	12.95	9.57	10.80	5.00
Mg	18.04	16.34	12.49	12.03	13.16
K	0.86	0.72	0.87	0.97	1.90
Na	1.43	1.27	0.56	0.17	0.12
CEC (cmol _c kg ⁻¹)	59.37	47.50	43.75	40.62	37.50
BS (%)	63	66	54	59	54

Pedon at Robert Island, Antarctic Chilean territory (Haberland 1992)

Soil depth (cm)	0–3	3–8	8–18
Genetic horizon	A	AC	C
Textural class	Sandy loam	Loamy sand	Sandy loam
Water retention –33 kPa (%)	18.3	16.0	26.2
Water retention – 1,500 kPa (%)	12.2	11.7	16.5
OC (%)	1.7	1.1	0.3
pH	5.2	4.8	6.1
Sum of bases (cmol _c kg ⁻¹)	32.9	24.5	67.3
CEC (cmol _c kg ⁻¹)	34.0	33.5	51.5

Pedon at Robert Island, Antarctic Chilean territory (Álvarez 1993)

Soil depth (cm)	0–8	8–30	30–47
Genetic horizon /layer	A	C	R
Textural class	Sandy loam	Sandy loam	Loamy sand
Water retention –33 kPa (%)	26.4	25.5	22.2
Water retention – 1,500 kPa (%)	15.5	14.6	14.8
OC (%)	0.29	0.13	0.12
pH	7.0	7.55	7.65
Sum of bases (cmol _c kg ⁻¹)	57.7	60.8	61.7
CEC (cmol _c kg ⁻¹)	49.3	52.0	56.0

Pedon at Livingstone Island, Antarctic Chilean territory (Henríquez 1994)

Soil depth (cm)	0–8	8–14	14–33	33–70
Genetic horizon	A ₁	2A ₂	3C ₁	3C ₂
Textural class	Sandy loam	Sandy loam	Sandy loam	Sandy loam
Water retention – 33 kPa (%)	16.2	21.4	18.9	18.7
Water retention – 1,500 kPa (%)	11.5	12.6	13.4	13.5
OC (%)	0.39	0.17	0.15	0.15
pH	6.3	7.2	7.4	7.6
Sum of bases (cmol _c kg ⁻¹)	19.5	25.1	15.3	14.2
CEC (cmol _c kg ⁻¹)	22.9	21.5	19.4	18.2

Some soil properties of a Lithic Fibristel at Antarctic territory (Michel et al. 2006)

Depth (cm)	0–10	10–20	20–30	30–40	40–50
Particle size (mm) distribution					
2–0.05 (%)	53	57	64	52	51
0.05–0.002 (%)	27	27	24	31	34
<0.002 (%)	20	16	12	17	15
pH _{water}	5.0	4.8	4.6	4.6	4.3
pH _{KCl}	3.9	3.4	3.4	3.4	3.3
N (%)	0.17	0.10	0.15	0.17	0.13
K (mg dm ⁻³)	144	196	198	182	196
Na (mg dm ⁻³)	184	162	204	146	174
P (mg dm ⁻³)	933	562	696	658	950
Al ³⁺ (cmol _c dm ⁻³)	1.8	3.8	4.6	3.8	6.2
H ⁺ +Al ³⁺ (cmol _c dm ⁻³)	18.8	24.4	23.8	29.4	38.9
Ca ²⁺ (cmol _c dm ⁻³)	3.32	3.70	3.85	3.31	3.69
Mg ²⁺ (cmol _c dm ⁻³)	1.39	1.34	1.52	1.11	1.21
CEC (cmol _c dm ⁻³)	7.68	10.04	11.37	9.32	12.36

Authors' Biographies

Manuel Casanova obtained a degree in Agricultural Engineering (1991) at the University of Chile. He received his post-graduate education at the Department of Soil and Environment, Swedish University of Agricultural Sciences (SLU), Sweden, where he obtained a Master of Science degree majoring in Soil Conservation (1998). Nowadays, he is an Associate Professor and head of the Department of Soil and Engineering, Faculty of Agronomic Sciences, University of Chile, where he teaches and conducts research, mainly on soil and water conservation.

Oscar Seguel obtained a degree in Agricultural Engineering (1997) at the University of Chile. He received his post-graduate education at the Institute of Agrarian Engineering and Soil, Austral University, Chile, where he obtained a PhD degree in the subject of Soil Sciences (2005). Nowadays, he is an Assistant Professor at the Department of Soil and Engineering, University of Chile, Faculty of Agronomic Sciences, where he teaches and conducts research, mainly on soil physics.

Oswaldo Salazar obtained a degree in Agricultural Engineering (2004) at the University of Chile. He received

his post-graduate education at the Department of Soil and Environment, Swedish University of Agricultural Sciences (SLU), Sweden, where he obtained a Master of Science degree majoring in Soil Sciences (2003) and a PhD degree in Soil Science specialising in hydrotechnics (2009). He held a post-doc position at the Basic Science and Environment Department, University of Copenhagen, Denmark (2010). Nowadays, he is an Assistant Professor at the Department of Soil and Engineering, Faculty of Agronomic Sciences, University of Chile, where he teaches and conducts research, mainly on soil fertility.

Walter Luzio obtained a degree in Agricultural Engineering (1963) at the University of Chile. He received his post-graduate education at the University of Ghent, Belgium, where he obtained a Master of Science degree majoring in Soil Surveys (1971). He was a Professor at the Department of Soil and Engineering, University of Chile, until his retirement in 2010. He taught and conducted research on pedology, soil classification and soil cartography for the past 40 years.

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