

SUPPLEMENTARY MATERIAL

Pedological study with an attempt to combining soil taxonomy and WRB classification systems

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Table S1. Morphological description of the studied soil profiles

Physiographic unit	Profile No.	Topography	Slope	Vegetation or crop	Surface feature	Depth (cm)	Soil colour		Gravel (%)	Texture	Structure	Consistence		Pedogenic feature	Roots	Effervescence	Boundary
							dry	moist				dry	moist				
Fluvio-marine	1	flat	level	scattered <i>Salicornia</i>	-	0-30	10YR 4/3	10YR 3/3	-	SiL	m	Sh	-	salt efflorescence	VF	+	GS
						30-70	10YR 4/3	10YR 3/3	-	SiL	m	Sh	-	-	-	+	GS
						70-120	10YR 3/3	10YR 3/3	-	SiC	mB	-	F	iron spot and manganese concretions	-	+	GS
						120-150	10YR 2/2	10YR 3/2	-	C	mB	-	VF	gypsum veins and few lime concretions	-	+	-
	2	flat	level	wheat	few shells	0-30	10YR 4/3	10YR 3/3	-	SiC	SB	-	F	few lime concretions	F	+	GS
						30-60	10YR 4/3	10YR 3/3	-	C	SB	-	F	gypsum veins and few lime concretions	VF	+	CS
						60-120	2.5R3/2	2.5Y 3/1	-	C	mB	-	F	gypsum veins and few lime concretions	VF	+	-
	3	flat	level	wheat	few hummocks accumulations	0-40	10YR 4/2	10YR 3/2	-	C	SB	-	F	few lime concretions	VF	++	GS
						40-70	10YR 4/2	10YR 3/2	-	CL	SB	-	Fr	few lime concretions	VF	++	GS
						70-150	10YR 3/1	10YR 3/1	-	CL	SB	-	Fr	few lime concretions	-	++	-
	4	flat	level	-	cracked topsoil	0-40	10YR 4/2	10YR 3/2	-	SiL	m	Sh	-	salt efflorescence	-	+	CS
						40-80	10YR 4/2	10YR 3/2	-	SiCL	m	-	Fr	gypsum veins	-	+	CS
						80-120	2.5Y 3/0	2.5Y 3/0	-	SiC	mB	-	F	gypsum veins	-	+	-
	5	flat	level	-	few hummocks accumulations	0-30	10YR 4/2	10YR 3/2	-	C	SB	-	F	salt efflorescence	-	+	GS
30-70						10YR 4/2	10YR 3/2	-	C	SB	-	F	few gypsum veins	-	+	CS	
70-120						10YR 4/1	10YR 3/1	-	C	SB	-	F	few mottling	-	+	CS	
120-150						10YR 4/1	10YR 3/1	-	C	SB	-	F	com. mottling	-	+	-	
Gypsiferous	6	flat	level	-	-	0-30	10YR 5/6	10YR 4/4	-	L	m	Sh	-	many gypsum crystals	-	+++	CS
						30-50	7.5YR5/6	7.5YR4/8	-	S	m	Sh	-	many gypsum crystals	-	+	CS
						50-60	10YR 6/4	10YR 5/6	-	SL	m	Sh	-	many gypsum crystals	-	+++	-
						water table											

Physiographic unit	Profile No.	Topography	Slope	Vegetation or crop	Surface feature	Depth (cm)	Soil colour		Gravel (%)	Texture	Structure	Consistence		Pedogenic feature	Roots	Effervescence	Boundary
							dry	moist				dry	moist				
Deltaic stages of river terraces	13	almost flat	level	wheat	deseret pavement	0–30	10YR 6/4	10YR 5/6	35	S	L	L	–	few lime segregation	VF	+++	CW
						30–60	7.5YR 5/6	7.5YR 4/8	40	LS	S	S	–	common lime segregation	VF	+++	–
						from 60 to rock	–	–	–	–	–	–	–	–	–	–	–
Windblown	14	almost flat	level	on hummocks <i>Salicornia</i>	sand sheets	0–30	10YR 6/6	10YR 5/6	–	S	L	L	–	–	–	+	GS
						30–100	10YR 7/4	10YR 7/4	5	S	L	L	–	–	–	+	–
	15	almost flat	level	on hummocks <i>Salicornia</i>	sand sheets	0–25	10YR 6/6	10YR 5/6	–	S	L	L	–	–	–	+	GS
						25–100	10YR 6/6	10YR 6/8	8	S	L	L	–	–	–	+	–

Explanations:

texture: SiL = silty loam, SiC = silty clay, C = clay, CL = clay loam, SiCL = silty clay loam, L = loam, S = sand, SL = sandy loam, SCL = sandy clay loam, LS = loamy sand, SC = sandy clay; **structure:** m = massive, mB = medium blocky, SB = subangular blocky, S = structurless, L = loose; **consistence: dry:** L = loose, S = soft, Sh = slightly hard, H = hard; **moist:** VF = very friable, Fr = friable, F = firm; **boundary:** CS = clear smooth, GS = gradually smooth, AW = abrupt wavy, CW = clear wavy, GW = gradually wavy; **roots:** VF = very few, F = few.

Source: own study.

Table S2. Physical properties of the representative soil profiles

Physiographic unit	Profile No.	Genetic horizon	Depth (cm)	Particle size distribution (%)					Texture class	Gypsum	Organic matter	CaCO ₃
				sand			silt	clay				
				coarse	fine	total						
%												
Fluvio-marine	1	Azn	0–30	7.5	7.6	15.1	66.3	18.6	silt loam	0.3	0.4	0.3
		Cn	30–70	2.5	3.2	5.7	79.6	14.7	silt loam	0.4	0.2	1.7
		Cn	70–120	1.6	4.7	6.3	51.3	42.4	silty clay	1.0	0.2	1.8
		Cn	120–150	1.2	10.3	11.5	37.7	50.8	clay	1.4	0.2	2.3
	2	Ap	0–30	3.4	3.1	6.5	44.6	48.9	silty clay	0.7	2.4	4.4
		C	30–60	1.6	2.2	3.8	38.5	57.7	clay	1.9	2.0	3.9
		C	60–120	1.6	10.5	12.1	39.7	48.2	clay	2.3	0.9	2.7
	3	Ap	0–40	1.4	17.6	19.0	33.9	47.1	clay	0.9	1.8	3.8
		C	40–70	3.1	18.2	21.3	47.8	30.9	clay loam	2.1	1.0	4.7
		C	70–150	9.0	15.1	24.1	43.0	32.9	clay loam	3.0	0.8	3.5
	4	Azn	0–40	6.7	12.1	18.8	62.3	18.9	silt loam	0.9	0.4	1.0
		Cn	40–80	3.6	4.7	8.3	61.3	30.4	silty clay loam	1.8	0.3	1.4
		Cn	80–120	1.6	2.3	3.9	43.2	52.9	silty clay	2.4	0.2	0.7
	5	Azn	0–30	10.9	6.5	17.4	36.4	46.2	clay	3.7	0.6	0.3
		Cn	30–70	1.8	2.2	4.0	24.8	71.2	clay	2.9	0.5	1.2
		Cn	70–120	0.9	6.0	6.9	19.6	73.5	clay	0.8	0.5	0.7
Cgn		120–150	1.2	6.2	7.4	18.3	74.3	clay	0.5	0.3	0.2	
Gypsi-ferous	6	Azy	0–30	15.5	24.4	39.9	39.6	20.5	loam	26.4	0.1	11.8
		Cy	30–50	88.4	4.1	92.5	6.4	1.1	sand	19.2	0.1	1.2
		Cgy	50–60	20.5	42.8	63.3	27.1	9.6	sandy loam	10.6	0.1	9.5
River terrace	7	Apn	0–50	48.3	17.9	66.2	9.2	24.6	sandy clay loam	0.6	0.7	8.8
		Cn	50–150	43.9	20.2	64.1	8.4	27.5	sandy clay loam	0.2	0.4	2.9
	8	C1	0–30	41.2	38.0	79.2	14.2	9.6	sandy loam	0.2	0.3	4.1
		C2z	30–70	72.6	12.8	85.4	5.9	8.7	loamy sand	0.3	0.1	2.8
		Cz	70–110	72.0	18.9	90.9	2.1	7.0	sand	0.1	0.1	1.6
	9	Ap	0–30	58.4	20.5	78.9	9.6	11.5	sandy loam	0.4	0.7	2.0
		C1	30–60	51.9	22.1	74.0	12.2	13.8	sandy loam	0.2	0.6	4.3
		C2	60–120	70.2	10.7	80.9	6.9	12.2	loamy sand	0.2	0.1	4.0
	10	Apn	0–10	13.6	78.3	91.9	4.8	3.3	sand	0.1	0.2	0.1
		Ap	10–50	64.6	22.2	86.8	5.1	8.1	loamy sand	3.5	0.6	1.7
C		50–150	49.6	42.1	91.7	0.4	7.9	sand	4.2	0.4	0.3	
Deltaic stages of river terrace	11	Ap	0–5	27.9	40.3	68.2	12.6	19.2	sandy loam	0.2	0.8	2.9
		Ap	5–40	68.5	18.4	86.9	4.6	8.5	loamy sand	1.0	0.3	3.2
		Ck	40–80	21.9	25.6	47.5	8.8	43.7	sandy clay	8.9	0.1	16.8
	12	Ap	0–10	68.2	21.9	90.1	4.3	5.6	sand	0.2	0.5	0.4
		C	10–40	75.1	2.8	77.9	13.7	8.4	loamy sand	0.8	0.2	1.3
	13	Ap	0–30	52.6	36.9	89.5	5.2	5.3	sand	0.3	0.6	3.2
C		30–60	44.5	35.1	79.6	17.6	2.8	loamy sand	0.7	0.2	8.8	
Windblown	14	Cn	0–30	77.9	15.1	93.0	3.8	3.2	sand	0.2	0.0	1.0
		Cn	30–100	66.8	24.4	91.2	2.5	6.3	sand	0.2	0.0	1.2
	15	Cn	0–25	86.7	6.5	93.2	4.9	1.9	sand	0.3	0.1	0.8
		Cn	25–100	78.8	13.4	92.2	1.1	6.7	sand	0.2	0.1	1.3

Source: own study.

Table S3. Chemical properties of the representative soil profiles

Physiographic unit	Profile No.	Genetic horizon	Depth (cm)	pH	EC (dS·m ⁻¹)	Cations (meq·dm ⁻³)				Anions (meq·dm ⁻³)				SAR	ESP
						Ca ²⁺	Mg ²⁺	Na ⁺	K ⁺	CO ₃ ²⁻	HCO ₃ ⁻	Cl ⁻	SO ₄ ²⁻		
Fluvio-marine	1	Azn	0–30	7.3	108.4	310.0	392.2	801.4	6.1	0.0	1.3	1482.0	26.4	30.2	30.2
		Cn	30–70	7.5	36.2	36.7	31.4	311.6	2.9	0.0	2.8	356.0	23.5	53.4	43.7
		Cn	70–120	7.7	21.3	18.9	21.6	193.7	2.2	0.0	3.1	218.5	14.8	43.0	38.3
		Cn	120–150	7.6	16.1	17.2	7.1	153.2	1.9	0.0	2.9	166.6	9.9	43.9	38.8
	2	Ap	0–30	7.5	4.9	11.0	14.3	23.4	0.2	0.0	3.5	37.9	7.5	6.6	7.79
		C	30–60	7.5	7.9	10.7	20.8	48.1	0.2	0.0	3.8	56.2	19.8	12.1	14.2
		C	60–120	7.6	8.2	9.2	22.6	50.7	0.3	0.0	3.9	61.2	17.7	12.7	14.9
	3	Ap	0–40	8.6	12.8	8.0	35.5	83.1	2.5	0.2	4.7	99.3	24.9	17.8	20.0
		C	40–70	8.7	13.0	7.5	32.1	89.4	1.2	0.2	4.8	103.1	22.1	20.1	22.9
		C	70–150	8.8	12.6	3.5	39.2	82.1	1.6	0.3	4.2	102.3	19.6	17.8	20.0
	4	Azn	0–40	7.0	142.0	250.0	430.0	1625.0	12.5	0.0	1.5	1970.0	346.0	88.1	56.5
		Cn	40–80	7.2	85.2	110.0	204.0	800.0	10.0	0.0	3.0	1030.0	91.0	63.8	48.2
		Cn	80–120	7.2	63.9	63.0	117.0	570.0	9.0	0.0	3.6	680.0	75.4	60.1	46.6
	5	Azn	0–30	7.3	136.9	160.0	506.0	1640.0	25.0	0.0	5.0	1950.0	376.0	89.9	56.8
		Cn	30–70	7.1	133.2	130.0	423.0	1290.0	19.6	0.0	2.9	1960.0	99.7	77.6	53.1
		Cn	70–120	7.2	98.0	70.0	204.0	1060.0	14.0	0.0	3.4	1310.0	34.6	90.6	57.0
Cgn		120–150	7.1	98.0	74.0	217.0	1038.0	12.1	0.0	2.6	1305.0	34.5	86.1	55.7	
Gypsi-ferous	6	Azy	0–30	7.3	40.8	58.0	47.0	358.0	5.0	0.0	1.5	401.0	65.5	49.4	41.7
		Cy	30–50	7.2	6.6	26.2	7.1	39.7	1.1	0.0	1.0	49.5	23.6	9.7	11.6
		Cgy	50–60	7.2	30.9	67.4	40.3	256.0	0.6	0.0	1.5	312.2	50.6	34.9	33.4
River terrace	7	Apn	0–50	7.3	7.4	12.1	6.5	69.6	0.4	0.0	0.4	80.9	7.3	22.8	24.5
		Cn	50–150	7.1	7.0	10.3	5.1	63.5	0.3	0.0	0.3	72.4	6.5	22.9	24.5
	8	C1	0–30	7.0	28.3	146.0	39.6	184.0	2.4	0.0	1.0	330.0	41.0	19.1	21.2
		C2z	30–70	7.0	79.6	158.0	22.7	733.0	0.4	0.0	1.1	820.0	93.0	77.1	52.9
		Cz	70–110	7.2	21.4	67.3	24.1	146.0	0.7	0.0	0.6	195.0	42.5	21.6	23.4
	9	Ap	0–30	7.2	3.0	5.6	4.1	20.5	0.5	0.0	1.0	22.1	7.6	9.3	11.1
		C1	30–60	7.2	2.6	6.2	2.9	17.9	0.3	0.0	0.7	20.4	6.2	8.4	10.0
		C2	60–120	7.3	4.1	9.5	4.6	28.6	0.9	0.0	0.8	33.3	9.5	10.8	12.8
	10	Apn	0–10	7.2	4.3	6.7	1.1	38.1	0.4	0.0	0.3	35.2	10.8	19.3	21.4
		Ap	10–50	7.0	5.4	15.6	4.4	36.4	0.4	0.0	0.5	38.0	18.3	11.5	13.6
C		50–150	7.1	3.9	11.9	2.0	27.5	0.3	0.0	0.3	25.6	15.8	10.4	12.4	
Deltaic stages of river terrace	11	Ap	0–5	7.3	6.7	15.8	8.2	48.5	0.5	0.0	0.4	51.3	21.3	14.0	16.2
		Ap	5–40	7.2	5.1	11.2	4.1	41.6	0.3	0.0	0.2	43.6	13.4	15.0	18.2
		Ck	40–80	7.4	7.6	18.5	7.3	51.9	0.9	0.0	0.6	55.4	22.6	14.5	16.7
	12	Ap	0–10	7.1	2.9	7.8	3.6	18.7	0.5	0.0	0.2	20.4	10.0	7.8	9.3
		C	10–40	7.3	6.8	16.2	7.5	46.3	0.8	0.0	0.4	51.6	18.8	13.4	15.7
	13	Ap	0–30	8.1	3.9	4.6	2.5	35.5	0.4	0.0	2.8	31.1	9.1	18.8	21.0
C		30–60	7.4	5.9	8.5	3.6	50.3	0.4	0.0	1.6	48.4	12.8	20.4	22.4	
Windblown	14	Cn	0–30	7.5	20.3	31.7	17.5	173.0	0.9	0.0	1.3	162.0	59.8	34.9	33.4
		Cn	30–100	7.2	12.9	16.5	8.3	121.0	0.7	0.0	0.9	110.0	35.6	34.4	33.1
	15	Cn	0–25	7.3	25.8	52.8	24.3	198.0	1.1	0.0	0.8	187.0	88.4	31.9	31.4
		Cn	25–100	7.4	19.4	33.7	13.2	171.0	0.6	0.0	0.8	156.0	61.7	35.3	33.7

Explanations: EC = electrical conductivity, SAR = sodium adsorption ratio, ESP = exchangeable sodium percentage.

Source: own study.