

**Table S1.** Physicochemical properties of complete chernozemic profiles under study

Horizon	Depth cm	Color moist	pH H <sub>2</sub> O	CaCO <sub>3</sub> %	SOC %	N %	Ha cmol <sup>+</sup> ·kg <sup>-1</sup>	BC %	BS %	Sand %	Silt %	Clay %	Texture
<b>Profile 1</b>													
Ap	0-25	10YR 3/1	7.60	0.42	1.94	0.16	0.35	21.7	98.4	11	72	17	SiL
A2	25-40	10YR 2/1	7.88	0.21	1.64	0.12	0.43	18.9	97.8	9	75	16	SiL
A3	40-75	10YR 2/1	7.96	0.30	1.99	0.12	0.32	22.5	98.6	9	69	22	SiL
AC	75-95	10YR 4/3	8.02	0.26	1.08	0.07	0.23	17.8	98.7	8	70	22	SiL
C	95-120	10YR 5/6	8.24	0.30	0.24	-	0.01	11.7	100	10	73	17	SiL
Ck	120+	10YR 7/6	8.57	12.08	0.28	-	0	95.2	100	11	72	17	SiL
<b>Profile 2</b>													
Apk	0-35	10YR 2/2	8.10	6.36	1.44	0.13	0	85.0	100	14	71	15	SiL
ACk	35-55	10YR 4/3	8.44	18.90	0.67	0.05	0	93.5	100	15	65	20	SiL
Ck1	55-70	10YR 6/4	8.55	24.20	0.42	-	0	93.0	100	20	61	19	SiL
<b>Profile 3</b>													
Ap	0-30	10YR 4/2	8.18	16.70	1.03	0.07	0	91.6	100	18	65	17	SiL
Bwtk	30-42	10YR 5/4	8.48	19.10	0.41	-	0	91.2	100	23	57	20	SiL
BCK	42-80	10YR 6/4	8.49	26.70	0.17	-	0	90.2	100	19	65	16	SiL
<b>Profile 4</b>													
Ap	0-25	10YR 3/2	8.10	8.48	1.48	0.14	0.03	94.3	100	18	64	18	SiL
A2	25-48	10YR 3/2	8.05	9.54	1.31	0.14	0.01	93.0	100	18	65	17	SiL
A3	48-54	10YR 3/2	8.23	5.09	1.52	0.12	0.02	90.7	100	14	63	23	SiL
ABk1	54-78	10YR 2/1	8.27	1.69	2.24	0.16	0.06	57.3	100	13	57	30	SiCL
ABk2	78-115	10YR 2/1	8.20	1.06	2.23	0.14	0	42.7	100	12	56	32	SiCL
ACk	115-130	10YR 4/2	8.34	19.30	1.47	0.03	0	107	100	14	50	36	SiCL
Ck	130-150	10YR 7/4	8.58	35.40	0.77	-	0	100	100	18	54	28	SiCL
<b>Profile 5</b>													
A1	0-35	10YR 3/2	4.55	0.59	1.82	0.15	5.10	5.3	51.1	10	78	12	SiL
A2	35-65	10YR 3/1	5.14	0.51	0.83	0.06	4.31	8.5	66.2	9	68	23	SiL

A/Bw1	65-90	10YR 4/4	5.33	0.33	0.46	0.04	2.47	9.6	79.6	9	67	24	SiL
A/Bw2	90-120	10YR 5/4	6.80	0.68	0.46	0.02	0.00	16.9	100	9	71	20	SiL
Ckcg	120-170	10YR 6/3	7.94	9.13	-	-	0.00	87.9	100	11	75	14	SiL
<b>Profile 6</b>													
Ap	0-31	10YR 2/1	7.16	3.13	3.29	0.30	0.65	31.4	98.0	13	73	14	SiL
ABwg	31-55	10YR 3/2	7.86	12.34	1.15	0.11	0	52.2	100	12	71	17	SiL
BCK1	55-75	10YR 4/2	8.18	0.33	0.61	0.05	0	86.7	100	11	69	20	SiL
BCK2	75-105	10YR 5/3	8.42	13.18	0.39	0.05	0	82.1	100	10	70	20	SiL
Ckcg	105-130	10YR 6/3	8.61	10.31	0.21	0.03	0	88.1	100	9	72	19	SiL
<b>Profile 7</b>													
Ap1	0-20	10YR 2/2	7.13	0.05	1.44	0.11	0.61	12.4	95.3	36	51	13	SiL
Ap2	20-40	10YR 1/1	7.08	0.08	1.49	0.12	0.81	12.9	94.1	34	55	11	SiL
Ahk	40-65	10YR 3/2	7.18	1.08	1.04	0.07	0.64	12.5	95.1	29	55	16	SiL
A/Ck	65-90	10YR 4/2	7.81	2.70	0.78	0.06	0	67.9	100	30	54	16	SiL
Ckc	95-110	10YR 6/3	8.13	9.04	0.15	-	0	80.8	100	39	49	12	SiL
Ckcg1	110-125	2.5Y 6/3	8.22	8.45	0.16	-	0	78.1	100	29	59	12	SiL
<b>Profile 8</b>													
Ap	0-45	10YR 1/1	7.97	0.25	2.75	0.18	0	27.2	100	12	78	10	SiL
A	45-65	10YR 2/1	8.06	0.17	1.57	0.11	0	18.6	100	10	70	20	SiL
A/Cgg	65-75	5Y 7/2	8.01	3.45	0.65	0.07	0	41.3	100	10	69	21	SiL
Gk	75-85	5Y 7/2	8.06	10.4	0.44	0.05	0	80.4	100	12	71	17	SiL
Ckcg	85-150	10YR 6/8	8.10	7.27	0.22	0.02	0	77.0	100	10	72	18	SiL

Explanation: SOC – soil organic carbon; N – total nitrogen; Ha – total extractable acidity (“hydrolitic acidity”); BC – base saturation; BS – base saturation: SiL – silty loam, SiCL – silty clay loam,

**Table S2.** Composition of humic substances extracted by Tyurin and IHSS method.

Tyurin method														IHSS method					
Profile	Fractio n I	Fraction II			Fraction III			Fraction IV			HA- Ca	Fractio n V	HA/ FA	Fractio n A				Residu um	HA/ FA
		CT	HA	FA	CT	HA	FA	CT	HA	FA					CT	HA	FA		
Profile 1																			
Ap	2.58	13.4	11.9	1.55	33.5	20.6	12.9	23.7	12.9	10.8	8.7	40.2	1.4	2.19	36.6	23.9	12.6	61.2	1.9
A2	1.83	10.9	10.4	0.61	36.6	26.8	9.76	22.6	14.0	8.5	16.5	39.0	1.9	2.43	37.1	24.6	12.6	60.4	2.0
A3	1.76	9.04	6.53	2.51	37.7	26.6	11.1	29.1	16.1	13.1	20.1	31.4	1.6	1.32	53.8	35.2	18.6	44.9	1.9
Profile 2																			
Apk	3.82	15.9	14.6	1.39	26.4	18.1	8.33	22.9	9.72	13.2	3.47	46.9	1.2	3.43	43.9	25.9	18.0	52.7	1.4
Profile 3																			
Ap	3.90	18.5	10.7	7.79	27.2	11.6	15.6	25.2	10.7	14.6	0.86	43.6	0.7	3.44	37.9	14.6	23.3	58.7	0.6
Profile 4																			
Ap	4.40	12.9	12.2	0.68	39.2	24.3	14.9	20.9	8.11	12.8	12.1	39.9	1.0	4.10	42.8	23.8	19.1	53.1	1.3
A2	4.31	19.1	16.8	2.29	41.2	25.9	15.3	25.2	12.2	12.9	9.17	33.2	1.2	4.10	38.8	20.6	18.2	57.1	1.1
A3	4.86	13.1	11.2	1.97	44.1	32.2	11.8	20.4	9.21	11.2	21.1	35.1	1.5	3.70	41.5	22.3	18.1	54.9	1.3
Profile 5																			
A1	3.02	44.5	21.4	23.1	47.3	23.6	23.7	19.2	6.04	13.2	2.20	30.5	0.7	3.32	45.5	18.3	27.2	51.2	0.7
A2	3.01	37.2	19.2	17.9	48.2	19.3	28.9	27.7	10.8	16.9	0.09	21.1	0.6	4.50	42.0	15.5	26.6	53.5	0.6
Profile 6																			
Ap	2.30	14.9	12.1	2.73	38.6	29.2	9.42	20.4	10.9	9.42	17.0	38.8	1.9	1.81	39.3	27.8	11.5	58.9	2.4
Profile 7																			
Ap1	3.10	22.3	16.0	6.26	43.8	26.4	17.4	27.8	12.5	15.3	10.4	25.4	1.1	2.55	52.0	31.9	20.1	45.5	1.6
Ap2	2.70	23.5	16.1	7.39	51.7	30.9	20.8	24.2	8.72	15.4	14.8	21.4	1.1	2.63	47.1	31.0	16.0	50.3	1.9
Ahk	2.91	35.5	18.2	17.3	54.9	39.4	15.4	25.9	18.3	7.7	21.2	16.3	2.1	3.20	64.6	50.0	14.6	32.2	3.4
Profile 8																			
Ap	1.82	10.6	8.73	1.82	37.1	28.7	8.36	26.9	20.4	6.55	20.0	34.2	2.8	1.52	50.7	37.1	13.6	47.8	2.7
A	1.91	12.1	11.5	0.64	42.7	34.4	8.28	31.9	19.1	12.7	22.9	23.6	2.1	1.88	51.1	34.9	16.2	47.0	2.2