

## Supplementary Material

**Table S1.** Unmodified soil physical parameter values sourced by APSIM from the SLGA for the Shallow Site.

Depth (cm)	BD (g/cc)	Air dry (mm/mm)	LL15 (mm/mm)	DUL (mm/mm)	SAT (mm/mm)	KS (mm/day)	SWCON (/d)
0–15	1.41	0.05	0.16	0.27	0.41	39.5	0.460
15–30	1.45	0.06	0.17	0.26	0.41	15.4	0.330
30–45	1.44	0.07	0.20	0.29	0.42	5.7	0.206
45–60	1.43	0.07	0.22	0.31	0.43	3.4	0.154
60–80	1.44	0.07	0.22	0.31	0.42	3.1	0.117
80–100	1.45	0.07	0.22	0.31	0.42	3.4	0.126

**Table S2.** Modified soil physical parameter values as used in simulations for the Shallow Site, including measured values and additional depths.

Depth (cm)	BD (g/cc)	Air dry (mm/mm)	LL15 (mm/mm)	DUL (mm/mm)	SAT (mm/mm)	KS (mm/day)	SWCON (/d)
0–15	1.41	0.05	0.16	0.27	0.41	39.5	0.460
15–30	1.45	0.06	0.17	0.26	0.41	15.4	0.330
30–45	1.44	0.07	0.2	0.29	0.42	5.7	0.206
45–60	1.43	0.07	0.22	0.31	0.43	3.4	0.154
60–80	1.44	0.07	0.22	0.31	0.42	3.1	0.117
80–100	1.45	0.07	0.22	0.31	0.42	3.4	0.126
100–120	1.45	0.07	0.22	0.31	0.42	3.4	0.126
120–200	1.45	0.07	0.22	0.31	0.42	3.4	0.126
200–300	1.45	0.07	0.22	0.31	0.42	3.4	0.000
300–500	1.45	0.07	0.22	0.31	0.42	3.4	0.000
500– 1000	1.45	0.07	0.22	0.31	0.42	3.4	0.000

**Table S3.** Unmodified soil chemical parameter values sourced by APSIM from the SLGA for the Shallow Site.

Depth (cm)	pH	OC (%)	Soil C:N ratio (g/g)	FBiom (0-1)	Flert (0-1)	Fresh organic matter (kg/ha)
0–15	5.39	2.47	32.02	0.040	0.174	475.5
15–30	6.49	0.83	12.07	0.031	0.442	303.2
30–45	6.85	0.41	12.07	0.014	0.849	193.3
45–60	7.19	0.37	12.07	0.010	0.932	123.3
60–80	7.43	0.35	12.07	0.010	0.982	67.6
80–100	7.61	0.31	12.07	0.010	1.000	37.1

**Table S4.** Modified soil chemical parameter values as used in simulations for the Shallow Site, including measured values and additional depths.

Depth (cm)	pH	OC (%)	Soil C:N ratio (g/g)	FBiom (0-1)	Flert (0-1)	Fresh organic matter (kg/ha)
0–15	5.90	1.93	12.48	0.040	0.174	475.5
15–30	6.10	0.78	12.48	0.031	0.442	303.2
30–45	6.40	0.38	12.48	0.014	0.849	193.3
45–60	6.70	0.00	12.48	0.010	0.932	123.3
60–80	7.00	0.33	12.48	0.010	0.982	67.6
80–100	7.10	0.29	12.48	0.010	1.000	37.1
100–120	7.10	0.29	12.48	0.010	1.000	37.1
120–200	7.10	0.29	12.48	0.010	1.000	37.1
200–300	7.10	0.29	12.48	0.010	1.000	37.1
300–500	7.10	0.29	12.48	0.010	1.000	37.1
500–1000	7.10	0.29	12.48	0.010	1.000	37.1

**Table S5.** Unmodified soil physical parameter values sourced by APSIM from the SLGA for the Deep Site.

Depth (cm)	BD (g/cc)	Air dry (mm/mm)	LL15 (mm/mm)	DUL (mm/mm)	SAT (mm/mm)	KS (mm/day)	SWCON (/d)
0–15	1.48	0.02	0.07	0.14	0.37	189.6	0.605
15–30	1.50	0.02	0.07	0.13	0.37	154.0	0.588
30–45	1.50	0.02	0.07	0.13	0.37	111.2	0.553
45–60	1.50	0.03	0.08	0.13	0.37	92.6	0.530
60–80	1.51	0.03	0.08	0.14	0.37	84.7	0.473
80–100	1.53	0.03	0.08	0.14	0.36	81.5	0.470
100–120	1.53	0.03	0.09	0.14	0.36	79.4	0.468

**Table S6.** Modified soil physical parameter values as used in simulations for the Deep Site, including measured values and additional depths.

Depth (cm)	BD (g/cc)	Air dry (mm/mm)	LL15 (mm/mm)	DUL (mm/mm)	SAT (mm/mm)	KS (mm/day)	SWCON (/d)
0–15	1.48	0.02	0.07	0.14	0.37	189.6	0.605
15–30	1.50	0.02	0.07	0.13	0.37	154.0	0.588
30–45	1.50	0.02	0.07	0.13	0.37	111.2	0.553
45–60	1.50	0.03	0.08	0.13	0.37	92.6	0.530
60–80	1.51	0.03	0.08	0.14	0.37	84.7	0.473
80–100	1.53	0.03	0.08	0.14	0.36	81.5	0.470
100–120	1.53	0.03	0.09	0.14	0.36	79.4	0.468
120–200	1.53	0.03	0.09	0.14	0.36	79.4	0.468
200–2250	1.53	0.03	0.09	0.14	0.36	79.4	0.468
2250–2300	1.53	0.03	0.09	0.14	0.36	79.4	0.468
2300–3000	1.53	0.03	0.09	0.14	0.36	79.4	0.000

**Table S7.** Unmodified soil chemical parameter values sourced by APSIM from the SLGA for the Deep Site.

Depth (cm)	pH	OC (%)	Soil C:N ra- tio (g/g)	FBiom (0-1)	Finert (0-1)	Fresh or- ganic matter (kg/ha)
0–15	4.95	4.96	39.20	0.04	0.09	417.7
15–30	5.72	0.65	10.00	0.03	0.17	287.1
30–45	5.80	0.26	10.00	0.01	0.43	197.3
45–60	5.89	0.12	10.00	0.01	0.90	135.6
60–80	5.97	0.16	10.00	0.01	0.73	82.2
80–100	6.04	0.25	10.00	0.01	0.44	49.9
100–120	6.10	0.28	10.00	0.01	0.38	30.3

**Table S8.** Modified soil chemical parameter values as used in simulations for the Deep Site, including measured values and additional depths.

Depth (cm)	pH	OC (%)	Soil C:N ratio (g/g)	FBiom (0-1)	Finert (0-1)	Fresh organic matter (kg/ha)
0–15	6.10	1.20	29.00	0.04	0.08	417.7
15–30	5.50	0.50	28.00	0.03	0.10	287.1
30–45	5.80	0.30	28.00	0.01	0.10	197.3
45–60	5.90	0.40	28.00	0.01	0.20	135.6
60–80	6.00	0.40	28.00	0.01	0.30	82.2
80–100	6.00	0.40	28.00	0.01	0.40	49.9
100–120	6.10	0.40	28.00	0.01	0.50	30.3
120–200	6.10	0.40	42.10	0.01	1.00	30.3
200–2250	6.10	0.40	42.10	0.01	1.00	30.3
2250–2300	6.10	0.40	42.10	0.01	1.00	30.3
2300–3000	6.10	42.10	0.01	1.00	30.30	30.3