

Table S1. Correlation values (r) resulted from the principal component analysis (PCA) between earthworm density (EW.D), earthworm biomass weight (EW.W), and physio-biochemical soil parameters under mid-term (10 years) CSA- based management practices. Where, BD- Bulk density, IR- Infiltration rate, MWD- Mean weight diameter, DHA- Dehydrogenase, ACP- Acid phosphatase, ALP- Alkaline phosphatase, SPR- Soil Penetration resistance, EC -Electrical conductivity, TOC -Total organic carbon, N- Nitrogen, P- Phosphorus, K- Potassium, and EWC- Earthworm.

	EW.D 0-15 cm	EW.W. 0-15 cm	EW-D. 15-30 cm	EW.W 15-30 cm	BD	IR	MWD	DHA- EWC	DHA- Soil	ACP- EWC	ACP- Soil	ALP- EWC	ALP- Soil	SPR	EC- EWC	EC- Soil	PH- EWC	PH- Soil	TOC- EWC	TOC- Soil	N- EWC	N- Soil	P- EWC	P- Soil	K- EWC	K- Soil
EW.D 0-15 cm	1	0.95	0.89	0.86	-0.72	0.68	0.94	0.82	-0.18	0.84	-0.32	0.78	-0.74	-0.15	0.43	0.49	0.77	-0.84	0.87	0.84	0.84	0.82	0.74	0.95	0.8	0.96
EW.W 0-15 cm	0.95	1	0.83	0.81	-0.66	0.44	0.81	0.61	-0.04	0.67	-0.31	0.57	-0.78	0.06	0.14	0.34	0.56	-0.79	0.7	0.66	0.65	0.68	0.52	0.99	0.6	0.84
EW.D 15-30 cm	0.89	0.83	1	0.99	-0.67	0.77	0.94	0.75	-0.57	0.91	0.12	0.85	-0.83	-0.14	0.53	0.18	0.85	-0.55	0.92	0.69	0.86	0.62	0.81	0.83	0.86	0.81
EW.W 15-30 cm	0.86	0.81	0.99	1	-0.57	0.76	0.93	0.73	-0.58	0.9	0.2	0.83	-0.88	-0.21	0.52	0.07	0.83	-0.54	0.9	0.66	0.83	0.62	0.8	0.82	0.84	0.76
BD	-0.72	-0.66	-0.67	-0.57	1	-0.45	-0.65	-0.54	0.33	-0.57	0.37	-0.6	0.22	-0.37	-0.29	-0.67	-0.59	0.36	-0.66	-0.54	-0.64	-0.35	-0.48	-0.59	-0.66	-0.75
IR	0.68	0.44	0.77	0.76	-0.45	1	0.88	0.94	-0.62	0.96	0.09	0.98	-0.51	-0.62	0.95	0.36	0.98	-0.52	0.94	0.86	0.96	0.76	1	0.47	0.97	0.77
MWD	0.94	0.81	0.94	0.93	-0.65	0.88	1	0.92	-0.45	0.98	-0.08	0.94	-0.75	-0.36	0.69	0.39	0.94	-0.73	0.98	0.89	0.96	0.83	0.92	0.82	0.95	0.93
DHA-EWC	0.82	0.61	0.75	0.73	-0.54	0.94	0.92	1	-0.35	0.94	-0.22	0.95	-0.52	-0.58	0.85	0.57	0.95	-0.75	0.94	0.98	0.97	0.91	0.96	0.62	0.95	0.91
DHA-Soil	-0.18	-0.04	-0.57	-0.58	0.33	-0.62	-0.45	-0.35	1	-0.58	-0.68	-0.62	0.3	0.12	-0.62	0.19	-0.62	-0.27	-0.57	-0.17	-0.52	0.01	-0.58	-0.03	-0.61	-0.18
ACP-EWC	0.84	0.67	0.91	0.9	-0.57	0.96	0.98	0.94	-0.58	1	0.05	0.99	-0.69	-0.47	0.82	0.34	0.98	-0.62	0.99	0.88	0.98	0.79	0.98	0.68	0.98	0.86
ACP-Soil	-0.32	-0.31	0.12	0.2	0.37	0.09	-0.08	-0.22	-0.68	0.05	1	0.03	-0.26	-0.14	0.12	-0.84	0.03	0.57	-0.01	-0.4	-0.1	-0.41	0.05	-0.27	-0.02	-0.44
ALP-EWC	0.78	0.57	0.85	0.83	-0.6	0.98	0.94	0.95	-0.62	0.99	0.03	1	-0.56	-0.48	0.88	0.41	1	-0.55	0.98	0.88	0.99	0.76	0.99	0.58	1	0.84
ALP-Soil	-0.74	-0.78	-0.83	-0.88	0.22	-0.51	-0.75	-0.52	0.3	-0.69	-0.26	-0.56	1	0.28	-0.25	0.22	-0.56	0.58	-0.66	-0.48	-0.57	-0.57	-0.58	-0.83	-0.55	-0.56
SPR	-0.15	0.06	-0.14	-0.21	-0.37	-0.62	-0.36	-0.58	0.12	-0.47	-0.14	-0.48	0.28	1	-0.71	0	-0.48	0.4	-0.38	-0.54	-0.45	-0.62	-0.6	-0.03	-0.42	-0.25
EC-EWC	0.43	0.14	0.53	0.52	-0.29	0.95	0.69	0.85	-0.62	0.82	0.12	0.88	-0.25	-0.71	1	0.35	0.89	-0.33	0.79	0.76	0.84	0.63	0.91	0.17	0.86	0.58
EC-Soil	0.49	0.34	0.18	0.07	-0.67	0.36	0.39	0.57	0.19	0.34	-0.84	0.41	0.22	0	0.35	1	0.41	-0.54	0.41	0.66	0.5	0.54	0.37	0.29	0.46	0.68
PH-EWC	0.77	0.56	0.85	0.83	-0.59	0.98	0.94	0.95	-0.62	0.98	0.03	1	-0.56	-0.48	0.89	0.41	1	-0.55	0.98	0.88	0.99	0.76	0.99	0.57	1	0.84
PH-Soil	-0.84	-0.79	-0.55	-0.54	0.36	-0.52	-0.73	-0.75	-0.27	-0.62	0.57	-0.55	0.58	0.4	-0.33	-0.54	-0.55	1	-0.62	-0.85	-0.65	-0.94	-0.58	-0.82	-0.56	-0.85
TOC-EWC	0.87	0.7	0.92	0.9	-0.66	0.94	0.98	0.94	-0.57	0.99	-0.01	0.98	-0.66	-0.38	0.79	0.41	0.98	-0.62	1	0.88	0.99	0.78	0.96	0.71	0.99	0.9
TOC-Soil	0.84	0.66	0.69	0.66	-0.54	0.86	0.89	0.98	-0.17	0.88	-0.4	0.88	-0.48	-0.54	0.76	0.66	0.88	-0.85	0.88	1	0.93	0.96	0.89	0.67	0.88	0.94
N-EWC	0.84	0.65	0.86	0.83	-0.64	0.96	0.96	0.97	-0.52	0.98	-0.1	0.99	-0.57	-0.45	0.84	0.5	0.99	-0.65	0.99	0.93	1	0.82	0.98	0.65	0.99	0.91
N-Soil	0.82	0.68	0.62	0.62	-0.35	0.76	0.83	0.91	0.01	0.79	-0.41	0.76	-0.57	-0.62	0.63	0.54	0.76	-0.94	0.78	0.96	0.82	1	0.8	0.72	0.75	0.88
P-EWC	0.74	0.52	0.81	0.8	-0.48	1	0.92	0.96	-0.58	0.98	0.05	0.99	-0.58	-0.6	0.91	0.37	0.99	-0.58	0.96	0.89	0.98	0.8	1	0.55	0.98	0.81
P-Soil	0.95	0.99	0.83	0.82	-0.59	0.47	0.82	0.62	-0.03	0.68	-0.27	0.58	-0.83	-0.03	0.17	0.29	0.57	-0.82	0.71	0.67	0.65	0.72	0.55	1	0.6	0.83
K-EWC	0.8	0.6	0.86	0.84	-0.66	0.97	0.95	0.95	-0.61	0.98	-0.02	1	-0.55	-0.42	0.86	0.46	1	-0.56	0.99	0.88	0.99	0.75	0.98	0.6	1	0.87
K-Soil	0.96	0.84	0.81	0.76	-0.75	0.77	0.93	0.91	-0.18	0.86	-0.44	0.84	-0.56	-0.25	0.58	0.68	0.84	-0.85	0.9	0.94	0.91	0.88	0.81	0.83	0.87	1