Supplement

S1. Soil gravimetric moisture content after an extreme heat-stress event

Soil gravimetric moisture content was unaffected by unaffected by extreme heat-stress events, with no significant three-way interaction between soil type × treatment × temperature observed after 7-days ($F_{(12,76)} = 1.086$, $p = 0.384$). Soil gravimetric moisture content remained at 0.1-0.2 g g^{-1} regardless of soil type, treatment, or temperature.

Table S1. Statistical significance following a pairwise comparison of temperature for initial respiration rates ($^{14}CO_2$ % emitted in the first 24-hours) grouped by treatment and soil type. A Bonferroni adjustment was applied to the *p*-value, degrees of freedom = 152. ns = not significant. Significance codes: * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Treatment	Soil	Temperature (°C)	Temperature (°C)	Statistic	*p*-value	Bonferroni adjusted *p*-value	Significance
Control	Inceptisol	20	30	-2.157	0.033	0.196	ns
Control	Inceptisol	20	40	-3.899	0.000	0.001	***
Control	Inceptisol	20	50	-16.334	0.000	0.000	***
Control	Inceptisol	30	40	-1.742	0.083	0.501	ns
Control	Inceptisol	30	50	-14.177	0.000	0.000	***
Control	Inceptisol	40	50	-12.435	0.000	0.000	***
Control	Vertisol	20	30	-1.221	0.224	1.000	ns
Control	Vertisol	20	40	0.055	0.956	1.000	ns
Control	Vertisol	20	50	-10.567	0.000	0.000	***
Control	Vertisol	30	40	1.342	0.182	1.000	ns
Control	Vertisol	30	50	-9.280	0.000	0.000	***
Control	Vertisol	40	50	-11.267	0.000	0.000	***
Diammonium Phosphate	Inceptisol	20	30	-2.427	0.016	0.098	ns
Diammonium Phosphate	Inceptisol	20	40	0.216	0.829	1.000	ns
Diammonium Phosphate	Inceptisol	20	50	-12.353	0.000	0.000	***
Diammonium Phosphate	Inceptisol	30	40	2.804	0.006	0.034	*
Diammonium Phosphate	Inceptisol	30	50	-10.528	0.000	0.000	***
Diammonium Phosphate	Inceptisol	40	50	-13.331	0.000	0.000	***
Diammonium Phosphate	Vertisol	20	30	-0.366	0.715	1.000	ns
Diammonium Phosphate	Vertisol	20	40	-0.836	0.405	1.000	ns
Diammonium Phosphate	Vertisol	20	50	-11.188	0.000	0.000	***

Diammonium Phosphate	Vertisol	30	40	-0.422	0.674	1.000	ns
Diammonium Phosphate	Vertisol	30	50	-10.182	0.000	0.000	***
Diammonium Phosphate	Vertisol	40	50	-10.352	0.000	0.000	***
Olive Mill Pomace	Inceptisol	20	30	-3.225	0.002	0.009	**
Olive Mill Pomace	Inceptisol	20	40	-1.528	0.128	0.771	ns
Olive Mill Pomace	Inceptisol	20	50	-9.369	0.000	0.000	***
Olive Mill Pomace	Inceptisol	30	40	1.696	0.092	0.551	ns
Olive Mill Pomace	Inceptisol	30	50	-6.144	0.000	0.000	***
Olive Mill Pomace	Inceptisol	40	50	-7.840	0.000	0.000	***
Olive Mill Pomace	Vertisol	20	30	-0.824	0.411	1.000	ns
Olive Mill Pomace	Vertisol	20	40	0.323	0.747	1.000	ns
Olive Mill Pomace	Vertisol	20	50	-9.278	0.000	0.000	***
Olive Mill Pomace	Vertisol	30	40	1.148	0.253	1.000	ns
Olive Mill Pomace	Vertisol	30	50	-8.453	0.000	0.000	***
Olive Mill Pomace	Vertisol	40	50	-9.601	0.000	0.000	***
Biosolids	Inceptisol	20	30	-2.319	0.022	0.130	ns
Biosolids	Inceptisol	20	40	-3.651	0.000	0.002	**
Biosolids	Inceptisol	20	50	-12.782	0.000	0.000	***
Biosolids	Inceptisol	30	40	-1.465	0.145	0.869	ns
Biosolids	Inceptisol	30	50	-10.463	0.000	0.000	***
Biosolids	Inceptisol	40	50	-8.400	0.000	0.000	***
Biosolids	Vertisol	20	30	-1.909	0.058	0.349	ns
Biosolids	Vertisol	20	40	-2.088	0.038	0.231	ns
Biosolids	Vertisol	20	50	-9.703	0.000	0.000	***
Biosolids	Vertisol	30	40	-0.190	0.849	1.000	ns
Biosolids	Vertisol	30	50	-8.267	0.000	0.000	***
Biosolids	Vertisol	40	50	-8.077	0.000	0.000	***
Solid Urban Residue	Inceptisol	20	30	-2.673	0.008	0.050	ns
Solid Urban Residue	Inceptisol	20	40	-3.957	0.000	0.001	***
Solid Urban Residue	Inceptisol	20	50	-14.055	0.000	0.000	***

Solid Urban Residue	Inceptisol	30	40	-1.284	0.201	1.000	ns
Solid Urban Residue	Inceptisol	30	50	-11.534	0.000	0.000	***
Solid Urban Residue	Inceptisol	40	50	-10.324	0.000	0.000	***
Solid Urban Residue	Vertisol	20	30	-1.843	0.067	0.404	ns
Solid Urban Residue	Vertisol	20	40	-0.968	0.335	1.000	ns
Solid Urban Residue	Vertisol	20	50	-11.582	0.000	0.000	***
Solid Urban Residue	Vertisol	30	40	0.875	0.383	1.000	ns
Solid Urban Residue	Vertisol	30	50	-9.845	0.000	0.000	***
Solid Urban Residue	Vertisol	40	50	-10.670	0.000	0.000	***

Table S2. Statistical significance following a pairwise comparison of treatment for initial respiration rates ($^{14}CO_2$ % emitted in the first 24-hours) grouped by soil type and temperature. A Bonferroni adjustment was applied to the *p*-value, degrees of freedom = 152. ns = not significant. Significance codes: * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Soil	Temperature (°C)	Treatment	Treatment	Statistic	*p*-value	Bonferroni *p*-value	Significance
Inceptisol	20	Control	Diammonium Phosphate	-0.	0.864	1.000	ns
Inceptisol	20	Control	Olive Mill Pomace	1.633	0.105	1.000	ns
Inceptisol	20	Control	Biosolids	0.254	0.800	1.000	ns
Inceptisol	20	Control	Solid Urban Residue	2.227	0.027	0.274	ns
Inceptisol	20	Diammonium Phosphate	Olive Mill Pomace	1.711	0.089	0.891	ns
Inceptisol	20	Diammonium Phosphate	Biosolids	0.411	0.682	1.000	ns
Inceptisol	20	Diammonium Phosphate	Solid Urban Residue	2.272	0.025	0.245	ns
Inceptisol	20	Olive Mill Pomace	Biosolids	-1.379	0.170	1.000	ns
Inceptisol	20	Olive Mill Pomace	Solid Urban Residue	0.594	0.553	1.000	ns
Inceptisol	20	Biosolids	Solid Urban Residue	1.973	0.050	0.503	ns
Inceptisol	30	Control	Diammonium Phosphate	-0.600	0.550	1.000	ns
Inceptisol	30	Control	Olive Mill Pomace	0.565	0.573	1.000	ns
Inceptisol	30	Control	Biosolids	0.092	0.927	1.000	ns
Inceptisol	30	Control	Solid Urban Residue	1.711	0.089	0.891	ns
Inceptisol	30	Diammonium Phosphate	Olive Mill Pomace	1.165	0.246	1.000	ns
Inceptisol	30	Diammonium Phosphate	Biosolids	0.692	0.490	1.000	ns
Inceptisol	30	Diammonium Phosphate	Solid Urban Residue	2.311	0.022	0.222	ns
Inceptisol	30	Olive Mill Pomace	Biosolids	-0.473	0.637	1.000	ns
Inceptisol	30	Olive Mill Pomace	Solid Urban Residue	1.146	0.254	1.000	ns
Inceptisol	30	Biosolids	Solid Urban Residue	1.619	0.108	1.000	ns
Inceptisol	40	Control	Diammonium Phosphate	3.946	<0.001	0.001	**
Inceptisol	40	Control	Olive Mill Pomace	4.004	<0.001	0.001	***

Inceptisol	40	Control	Biosolids	0.264	0.792	1.000	ns
Inceptisol	40	Control	Solid Urban Residue	2.169	0.032	0.316	ns
Inceptisol	40	Diammonium Phosphate	Olive Mill Pomace	0.057	0.954	1.000	ns
Inceptisol	40	Diammonium Phosphate	Biosolids	-3.456	0.001	0.007	**
Inceptisol	40	Diammonium Phosphate	Solid Urban Residue	-1.777	0.078	0.776	ns
Inceptisol	40	Olive Mill Pomace	Biosolids	-3.511	0.001	0.006	**
Inceptisol	40	Olive Mill Pomace	Solid Urban Residue	-1.834	0.069	0.685	ns
Inceptisol	40	Biosolids	Solid Urban Residue	1.781	0.077	0.769	ns
Inceptisol	50	Control	Diammonium Phosphate	3.050	0.003	0.027	*
Inceptisol	50	Control	Olive Mill Pomace	8.598	<0.001	0.000	***
Inceptisol	50	Control	Biosolids	3.806	<0.001	0.002	**
Inceptisol	50	Control	Solid Urban Residue	3.445	0.001	0.007	**
Inceptisol	50	Diammonium Phosphate	Olive Mill Pomace	5.549	<0.001	0.000	***
Inceptisol	50	Diammonium Phosphate	Biosolids	0.756	0.451	1.000	ns
Inceptisol	50	Diammonium Phosphate	Solid Urban Residue	0.570	0.570	1.000	ns
Inceptisol	50	Olive Mill Pomace	Biosolids	-4.792	<0.001	0.000	***
Inceptisol	50	Olive Mill Pomace	Solid Urban Residue	-4.661	<0.001	0.000	***
Inceptisol	50	Biosolids	Solid Urban Residue	-0.143	0.886	1.000	ns
Vertisol	20	Control	Diammonium Phosphate	-1.214	0.227	1.000	ns
Vertisol	20	Control	Olive Mill Pomace	-1.552	0.123	1.000	ns
Vertisol	20	Control	Biosolids	-0.961	0.338	1.000	ns
Vertisol	20	Control	Solid Urban Residue	-2.496	0.014	0.136	ns
Vertisol	20	Diammonium Phosphate	Olive Mill Pomace	-0.359	0.720	1.000	ns
Vertisol	20	Diammonium Phosphate	Biosolids	0.201	0.841	1.000	ns
Vertisol	20	Diammonium Phosphate	Solid Urban Residue	-1.360	0.176	1.000	ns
Vertisol	20	Olive Mill Pomace	Biosolids	0.539	0.591	1.000	ns
Vertisol	20	Olive Mill Pomace	Solid Urban Residue	-1.001	0.318	1.000	ns
Vertisol	20	Biosolids	Solid Urban Residue	-1.483	0.140	1.000	ns
Vertisol	30	Control	Diammonium Phosphate	-0.278	0.781	1.000	ns
Vertisol	30	Control	Olive Mill Pomace	-1.043	0.299	1.000	ns
Vertisol	30	Control	Biosolids	-1.635	0.104	1.000	ns

Vertisol	30	Control	Solid Urban Residue	-2.947	0.004	0.037	*
Vertisol	30	Diammonium Phosphate	Olive Mill Pomace	-0.749	0.455	1.000	ns
Vertisol	30	Diammonium Phosphate	Biosolids	-1.342	0.182	1.000	ns
Vertisol	30	Diammonium Phosphate	Solid Urban Residue	-2.653	0.009	0.088	ns
Vertisol	30	Olive Mill Pomace	Biosolids	-0.629	0.530	1.000	ns
Vertisol	30	Olive Mill Pomace	Solid Urban Residue	-2.019	0.045	0.452	ns
Vertisol	30	Biosolids	Solid Urban Residue	-1.391	0.166	1.000	ns
Vertisol	40	Control	Diammonium Phosphate	-2.182	0.031	0.307	ns
Vertisol	40	Control	Olive Mill Pomace	-1.382	0.169	1.000	ns
Vertisol	40	Control	Biosolids	-3.348	0.001	0.010	*
Vertisol	40	Control	Solid Urban Residue	-3.674	<0.001	0.003	**
Vertisol	40	Diammonium Phosphate	Olive Mill Pomace	0.800	0.425	1.000	ns
Vertisol	40	Diammonium Phosphate	Biosolids	-1.166	0.245	1.000	ns
Vertisol	40	Diammonium Phosphate	Solid Urban Residue	-1.492	0.138	1.000	ns
Vertisol	40	Olive Mill Pomace	Biosolids	-1.967	0.051	0.510	ns
Vertisol	40	Olive Mill Pomace	Solid Urban Residue	-2.292	0.023	0.233	ns
Vertisol	40	Biosolids	Solid Urban Residue	-0.325	0.745	1.000	ns
Vertisol	50	Control	Diammonium Phosphate	-1.267	0.207	1.000	ns
Vertisol	50	Control	Olive Mill Pomace	0.284	0.777	1.000	ns
Vertisol	50	Control	Biosolids	-0.159	0.874	1.000	ns
Vertisol	50	Control	Solid Urban Residue	-3.511	0.001	0.006	**
Vertisol	50	Diammonium Phosphate	Olive Mill Pomace	1.552	0.123	1.000	ns
Vertisol	50	Diammonium Phosphate	Biosolids	1.109	0.269	1.000	ns
Vertisol	50	Diammonium Phosphate	Solid Urban Residue	-2.316	0.022	0.219	ns
Vertisol	50	Olive Mill Pomace	Biosolids	-0.443	0.658	1.000	ns
Vertisol	50	Olive Mill Pomace	Solid Urban Residue	-3.779	<0.001	0.002	**
Vertisol	50	Biosolids	Solid Urban Residue	-3.361	0.001	0.010	**

Table S3. Statistical significance following a pairwise comparison of treatment for microbial carbon use efficiency (CUE) grouped by treatment and soil type. A Bonferroni adjustment was applied to the *p*-value, degrees of freedom = 150. ns = not significant. significant. Significance codes: * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Treatment	Soil	Temperature (°C)	Temperature (°C)	Statistic	*p*-value	Bonferroni adjusted *p*-value	Significance
Control	Inceptisol	20	30	-0.07855	0.937	1.000	ns
Control	Inceptisol	20	40	1.649484	0.101	0.606	ns
Control	Inceptisol	20	50	7.933231	<0.001	<0.001	***
Control	Inceptisol	30	40	1.72803	0.085	0.515	ns
Control	Inceptisol	30	50	8.011778	<0.001	<0.001	***
Control	Inceptisol	40	50	6.283747	<0.001	<0.001	***
Control	Vertisol	20	30	1.099656	0.273	1.000	ns
Control	Vertisol	20	40	-0.31419	0.753	1.000	ns
Control	Vertisol	20	50	12.48895	<0.001	<0.001	***
Control	Vertisol	30	40	-1.41384	0.159	0.956	ns
Control	Vertisol	30	50	11.38929	<0.001	<0.001	***
Control	Vertisol	40	50	12.80313	<0.001	<0.001	***
Diammonium Phosphate	Inceptisol	20	30	0.549828	0.583	1.000	ns
Diammonium Phosphate	Inceptisol	20	40	-2.24015	0.026	0.158	ns
Diammonium Phosphate	Inceptisol	20	50	6.912122	<0.001	<0.001	***
Diammonium Phosphate	Inceptisol	30	40	-2.75854	0.006	0.038	*
Diammonium Phosphate	Inceptisol	30	50	6.362294	<0.001	<0.001	***
Diammonium Phosphate	Inceptisol	40	50	8.756965	<0.001	<0.001	***

Diammonium Phosphate	Vertisol	20	30	-0.54983	0.583	1.000	ns
Diammonium Phosphate	Vertisol	20	40	-0.47128	0.638	1.000	ns
Diammonium Phosphate	Vertisol	20	50	11.38929	<0.001	<0.001	***
Diammonium Phosphate	Vertisol	30	40	0.078547	0.937	1.000	ns
Diammonium Phosphate	Vertisol	30	50	11.93912	<0.001	<0.001	***
Diammonium Phosphate	Vertisol	40	50	11.86057	<0.001	<0.001	***
OliveMill Pomace	Inceptisol	20	30	0.314187	0.753	1.000	ns
OliveMill Pomace	Inceptisol	20	40	-1.41384	0.159	0.956	ns
OliveMill Pomace	Inceptisol	20	50	1.885124	0.061	0.367	ns
OliveMill Pomace	Inceptisol	30	40	-1.72803	0.085	0.515	ns
OliveMill Pomace	Inceptisol	30	50	1.570937	0.118	0.709	ns
OliveMill Pomace	Inceptisol	40	50	3.298967	0.001	0.007	**
OliveMill Pomace	Vertisol	20	30	-0.39273	0.695	1.000	ns
OliveMill Pomace	Vertisol	20	40	-1.1782	0.240	1.000	ns
OliveMill Pomace	Vertisol	20	50	6.990669	<0.001	<0.001	***
OliveMill Pomace	Vertisol	30	40	-0.78547	0.433	1.000	ns
OliveMill Pomace	Vertisol	30	50	7.383403	<0.001	<0.001	***
OliveMill Pomace	Vertisol	40	50	8.168871	<0.001	<0.001	***
Biosolids	Inceptisol	20	30	0.078547	0.937	1.000	ns
Biosolids	Inceptisol	20	40	1.649484	0.101	0.606	ns
Biosolids	Inceptisol	20	50	6.048107	<0.001	<0.001	***
Biosolids	Inceptisol	30	40	1.570937	0.118	0.709	ns
Biosolids	Inceptisol	30	50	5.96956	<0.001	<0.001	***
Biosolids	Inceptisol	40	50	4.398623	<0.001	<0.001	***
Biosolids	Vertisol	20	30	0.392734	0.695	1.000	ns
Biosolids	Vertisol	20	40	1.413843	0.159	0.956	ns

Biosolids	Vertisol	20	50	10.13254	<0.001	<0.001	***
Biosolids	Vertisol	30	40	1.021109	0.308	1.000	ns
Biosolids	Vertisol	30	50	9.739808	<0.001	<0.001	***
Biosolids	Vertisol	40	50	8.718699	<0.001	<0.001	***
Solid Urban Residue	Inceptisol	20	30	0.549828	0.583	1.000	ns
Solid Urban Residue	Inceptisol	20	40	1.021109	0.308	1.000	ns
Solid Urban Residue	Inceptisol	20	50	6.2052	<0.001	<0.001	***
Solid Urban Residue	Inceptisol	30	40	0.471281	0.638	1.000	ns
Solid Urban Residue	Inceptisol	30	50	5.655372	<0.001	<0.001	***
Solid Urban Residue	Inceptisol	40	50	5.184091	<0.001	<0.001	***
Solid Urban Residue	Vertisol	20	30	-0.07855	0.937	1.000	ns
Solid Urban Residue	Vertisol	20	40	-0.39273	0.695	1.000	ns
Solid Urban Residue	Vertisol	20	50	9.504168	<0.001	<0.001	***
Solid Urban Residue	Vertisol	30	40	-0.31419	0.753	1.000	ns
Solid Urban Residue	Vertisol	30	50	9.582714	<0.001	<0.001	***
Solid Urban Residue	Vertisol	40	50	9.896902	<0.001	<0.001	***

Table S4. Microbial carbon use efficiency (CUE) determined in soils receiving either no addition (control), diammonium phosphate, or composted olive mill pomace, biosolids or solid urban residue (n = 4-5 per soil type, treatment, and temperature). Data represents mean ± SEM (n = 5).

Treatment	**20 °C**		**30 °C**		**40 °C**		**50 °C**	
	Vertisol	Inceptisol	Vertisol	Inceptisol	Vertisol	Inceptisol	Vertisol	Inceptisol
Control	0.65 ± 0.01	0.47 ± 0.01	0.64 ± 0.00	0.47 ± 0.00	0.69 ± 0.02	0.44 ± 0.00	0.35 ± 0.01	0.27 ± 0.01
Diammonium phosphate	0.64 ± 0.01	0.48 ± 0.00	0.65 ± 0.00	0.46 ± 0.02	0.65 ± 0.02	0.54 ± 0.03 *	0.33 ± 0.01	0.29 ± 0.06 *
Olive mill pomace	0.62 ± 0.00	0.47 ± 0.01	0.63 ± 0.01	0.46 ± 0.01	0.65 ± 0.02	0.51 ± 0.02 *	0.45 ± 0.01 *	0.43 ± 0.02 *
Biosolids	0.64 ± 0.01	0.48 ± 0.01	0.63 ± 0.00	0.48 ± 0.01	0.60 ± 0.01 *	0.44 ± 0.00	0.37 ± 0.02	0.32 ± 0.02
Solid urban residue	0.59 ± 0.00 *	0.52 ± 0.01	0.59 ± 0.01	0.50 ± 0.01	0.60 ± 0.02 *	0.49 ± 0.01	0.34 ± 0.02	0.35 ± 0.05 *

** Significant difference detected (<0.05) of the obtained results between the composted bioamendments and the control as determined by the Pairwise Comparison (PWC) test.*

Supplementary Table 5. Statistical significance following a pairwise comparison of treatment for Microbial carbon use efficiency (CUE) grouped by soil type and temperature. A Bonferroni adjustment was applied to the *p*-value, degrees of freedom = 150. ns = not significant. Significance codes: * = $p < 0.05$, ** = $p < 0.01$, *** = $p < 0.001$.

Soil	Temperature (°C)	Treatment	Treatment	Statistic	*p*-value	Bonferroni *p*-value	Significance
Inceptisol	20	Control	Diammonium Phosphate	-0.09108	0.927	1.000	ns
Inceptisol	20	Control	Olive Mill Pomace	4.48E-14	1.000	1.000	ns
Inceptisol	20	Control	Biosolids	-0.18216	0.855	1.000	ns
Inceptisol	20	Control	Solid Urban Residue	-1.91265	0.057	0.576	ns
Inceptisol	20	Diammonium Phosphate	Olive Mill Pomace	0.091079	0.927	1.000	ns
Inceptisol	20	Diammonium Phosphate	Biosolids	-0.09108	0.927	1.000	ns
Inceptisol	20	Diammonium Phosphate	Solid Urban Residue	-1.82157	0.070	0.705	ns
Inceptisol	20	Olive Mill Pomace	Biosolids	-0.18216	0.855	1.000	ns
Inceptisol	20	Olive Mill Pomace	Solid Urban Residue	-1.91265	0.057	0.576	ns
Inceptisol	20	Biosolids	Solid Urban Residue	-1.73049	0.085	0.855	ns
Inceptisol	30	Control	Diammonium Phosphate	0.515218	0.607	1.000	ns
Inceptisol	30	Control	Olive Mill Pomace	0.343479	0.731	1.000	ns
Inceptisol	30	Control	Biosolids	-0.08587	0.931	1.000	ns
Inceptisol	30	Control	Solid Urban Residue	-1.20218	0.23	1.000	ns
Inceptisol	30	Diammonium Phosphate	Olive Mill Pomace	-0.18216	0.855	1.000	ns
Inceptisol	30	Diammonium Phosphate	Biosolids	-0.63755	0.524	1.000	ns
Inceptisol	30	Diammonium Phosphate	Solid Urban Residue	-1.82157	0.070	0.705	ns
Inceptisol	30	Olive Mill Pomace	Biosolids	-0.45539	0.649	1.000	ns
Inceptisol	30	Olive Mill Pomace	Solid Urban Residue	-1.63941	0.103	1.000	ns
Inceptisol	30	Biosolids	Solid Urban Residue	-1.18402	0.238	1.000	ns
Inceptisol	40	Control	Diammonium Phosphate	-3.86529	0.001	0.001	**
Inceptisol	40	Control	Olive Mill Pomace	-2.9973	0.003	0.031	*

Inceptisol	40	Control	Biosolids	-0.07888	0.937	1.000	ns
Inceptisol	40	Control	Solid Urban Residue	-2.20854	0.028	0.287	ns
Inceptisol	40	Diammonium Phosphate	Olive Mill Pomace	1.137774	0.257	1.000	ns
Inceptisol	40	Diammonium Phosphate	Biosolids	4.314954	<0.001	<0.001	***
Inceptisol	40	Diammonium Phosphate	Solid Urban Residue	1.996471	0.047	0.476	ns
Inceptisol	40	Olive Mill Pomace	Biosolids	3.369909	0.001	0.009	**
Inceptisol	40	Olive Mill Pomace	Solid Urban Residue	0.910786	0.363	1.000	ns
Inceptisol	40	Biosolids	Solid Urban Residue	-2.45912	0.015	0.150	ns
Inceptisol	50	Control	Diammonium Phosphate	-1.2751	0.204	1.000	ns
Inceptisol	50	Control	Olive Mill Pomace	-7.01305	<0.001	<0.001	***
Inceptisol	50	Control	Biosolids	-2.36804	0.019	0.191	ns
Inceptisol	50	Control	Solid Urban Residue	-1.69593	0.091	0.919	ns
Inceptisol	50	Diammonium Phosphate	Olive Mill Pomace	-5.73795	<0.001	<0.001	***
Inceptisol	50	Diammonium Phosphate	Biosolids	-1.09294	0.2761	1.000	ns
Inceptisol	50	Diammonium Phosphate	Solid Urban Residue	-0.49375	0.622	1.000	ns
Inceptisol	50	Olive Mill Pomace	Biosolids	4.645009	<0.001	<0.001	***
Inceptisol	50	Olive Mill Pomace	Solid Urban Residue	4.916042	<0.001	<0.001	***
Inceptisol	50	Biosolids	Solid Urban Residue	0.536686	0.592	1.000	ns
Vertisol	20	Control	Diammonium Phosphate	0.343479	0.731	1.000	ns
Vertisol	20	Control	Olive Mill Pomace	0.944567	0.346	1.000	ns
Vertisol	20	Control	Biosolids	0.257609	0.797	1.000	ns
Vertisol	20	Control	Solid Urban Residue	2.232613	0.027	0.270	ns
Vertisol	20	Diammonium Phosphate	Olive Mill Pomace	0.63755	0.524	1.000	ns
Vertisol	20	Diammonium Phosphate	Biosolids	-0.09108	0.927	1.000	ns
Vertisol	20	Diammonium Phosphate	Solid Urban Residue	2.003729	0.046	0.468	ns
Vertisol	20	Olive Mill Pomace	Biosolids	-0.72863	0.467	1.000	ns
Vertisol	20	Olive Mill Pomace	Solid Urban Residue	1.366179	0.173	1.000	ns
Vertisol	20	Biosolids	Solid Urban Residue	2.094808	0.037	0.378	ns
Vertisol	30	Control	Diammonium Phosphate	0.091079	0.927	1.000	ns
Vertisol	30	Control	Olive Mill Pomace	0.910786	0.363	1.000	ns

Vertisol	30	Control	Biosolids	0.709888	0.478	1.000	ns
Vertisol	30	Control	Solid Urban Residue	2.919571	0.004	0.040	*
Vertisol	30	Diammonium Phosphate	Olive Mill Pomace	0.819707	0.413	1.000	ns
Vertisol	30	Diammonium Phosphate	Biosolids	0.631011	0.528	1.000	ns
Vertisol	30	Diammonium Phosphate	Solid Urban Residue	2.833701	0.005	0.052	ns
Vertisol	30	Olive Mill Pomace	Biosolids	-0.07888	0.937	1.000	ns
Vertisol	30	Olive Mill Pomace	Solid Urban Residue	2.060874	0.041	0.410	ns
Vertisol	30	Biosolids	Solid Urban Residue	1.885506	0.061	0.612	ns
Vertisol	40	Control	Diammonium Phosphate	1.821572	0.070	0.705	ns
Vertisol	40	Control	Olive Mill Pomace	1.639415	0.103	1.000	ns
Vertisol	40	Control	Biosolids	3.91638	0.001	0.001	**
Vertisol	40	Control	Solid Urban Residue	3.91638	<0.001	0.001	**
Vertisol	40	Diammonium Phosphate	Olive Mill Pomace	-0.18216	0.855	1.000	ns
Vertisol	40	Diammonium Phosphate	Biosolids	2.094808	0.037	0.37	ns
Vertisol	40	Diammonium Phosphate	Solid Urban Residue	2.094808	0.037	0.378	ns
Vertisol	40	Olive Mill Pomace	Biosolids	2.276965	0.024	0.242	ns
Vertisol	40	Olive Mill Pomace	Solid Urban Residue	2.276965	0.024	0.242	ns
Vertisol	40	Biosolids	Solid Urban Residue	-2.9E-15	1.000	1.000	ns
Vertisol	50	Control	Diammonium Phosphate	0.728629	0.467	1.000	ns
Vertisol	50	Control	Olive Mill Pomace	-3.73422	<0.001	0.002	**
Vertisol	50	Control	Biosolids	-0.81971	0.413	1.000	ns
Vertisol	50	Control	Solid Urban Residue	1.094839	0.275	1.000	ns
Vertisol	50	Diammonium Phosphate	Olive Mill Pomace	-4.46285	<0.001	<0.001	***
Vertisol	50	Diammonium Phosphate	Biosolids	-1.54834	0.123	1.000	ns
Vertisol	50	Diammonium Phosphate	Solid Urban Residue	0.407881	0.683	1.000	ns
Vertisol	50	Olive Mill Pomace	Biosolids	2.914516	0.004	0.041	*
Vertisol	50	Olive Mill Pomace	Solid Urban Residue	4.615498	<0.001	<0.001	***
Vertisol	50	Biosolids	Solid Urban Residue	1.867667	0.063	0.637	ns

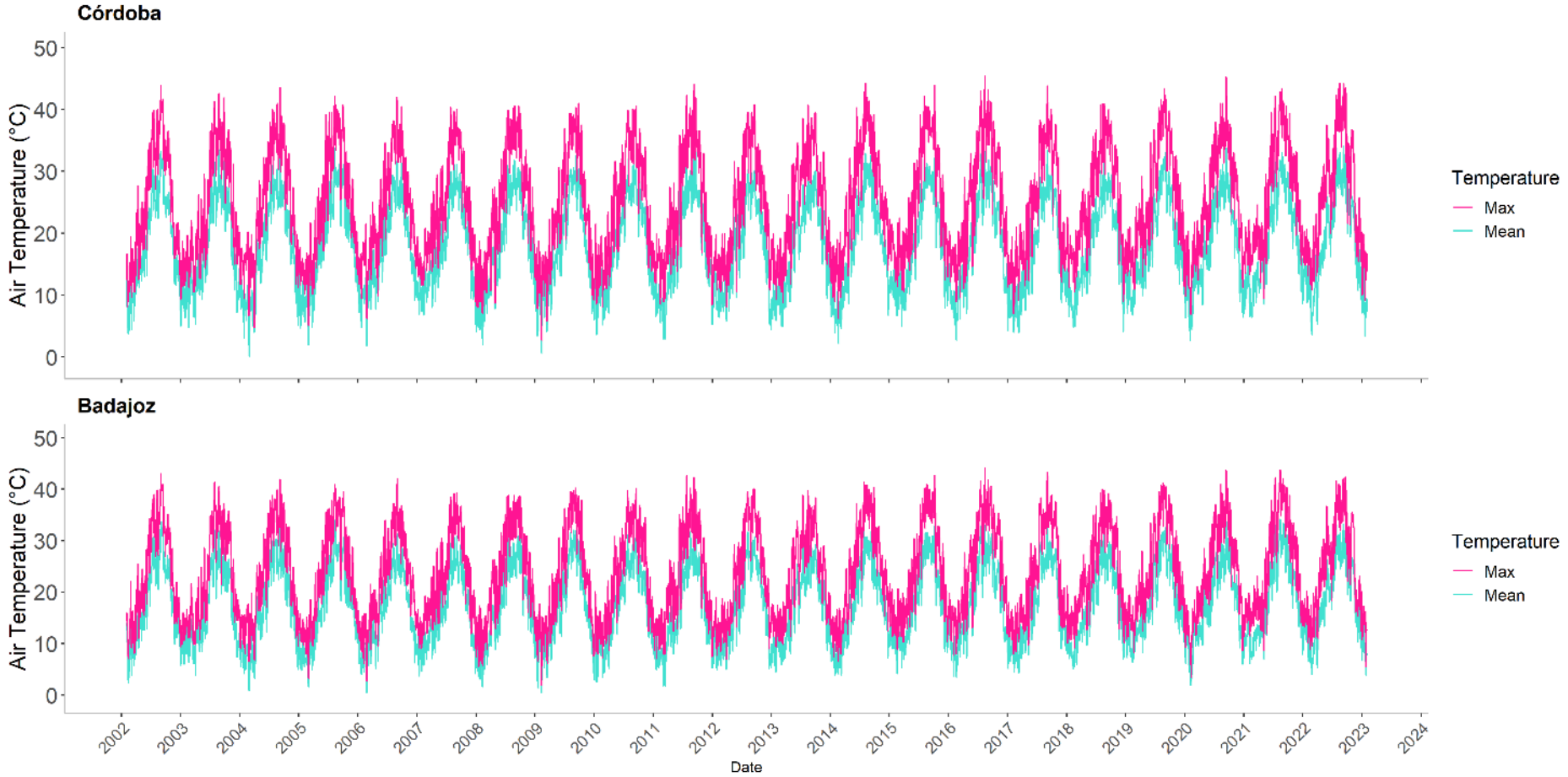
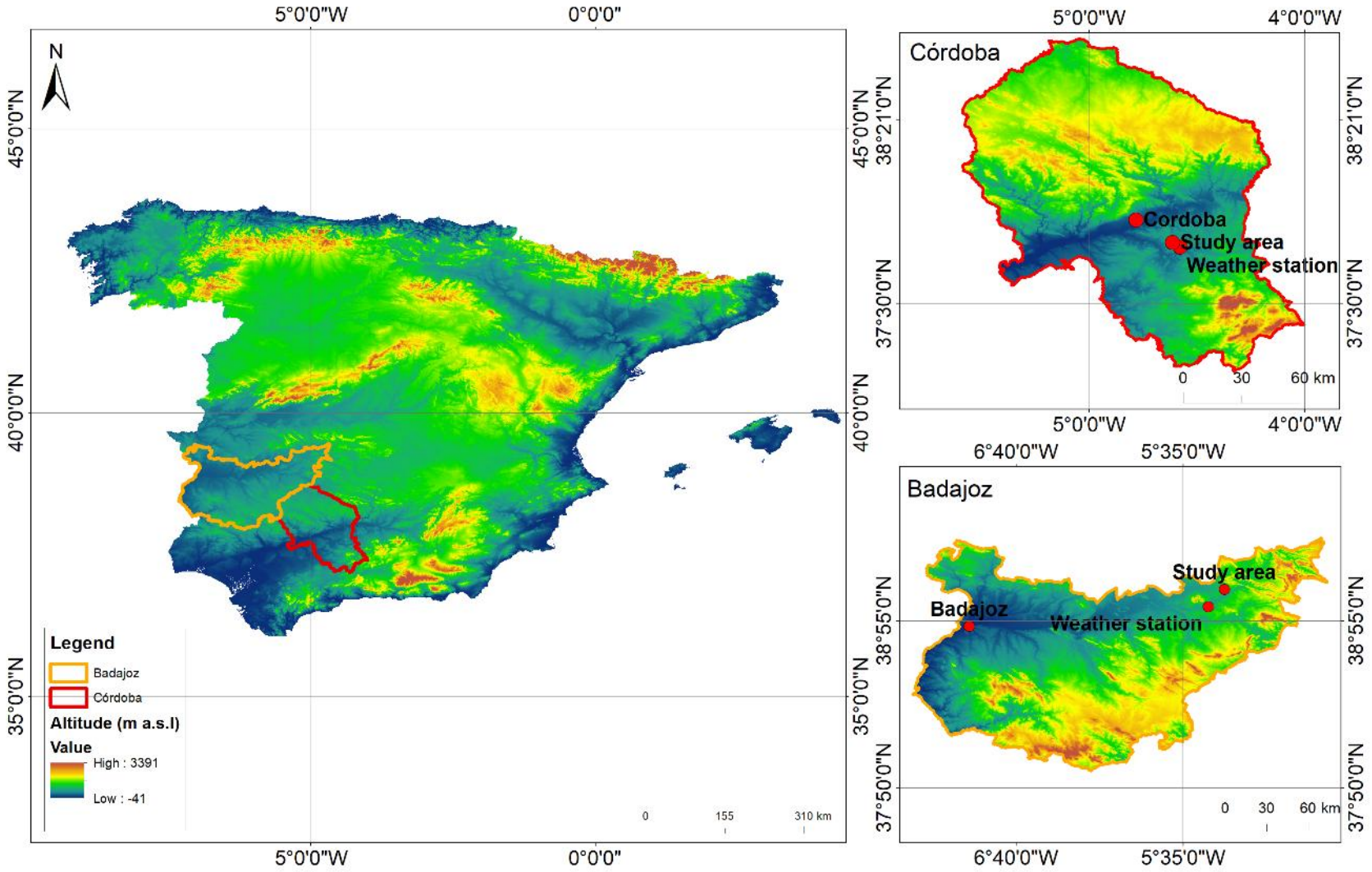
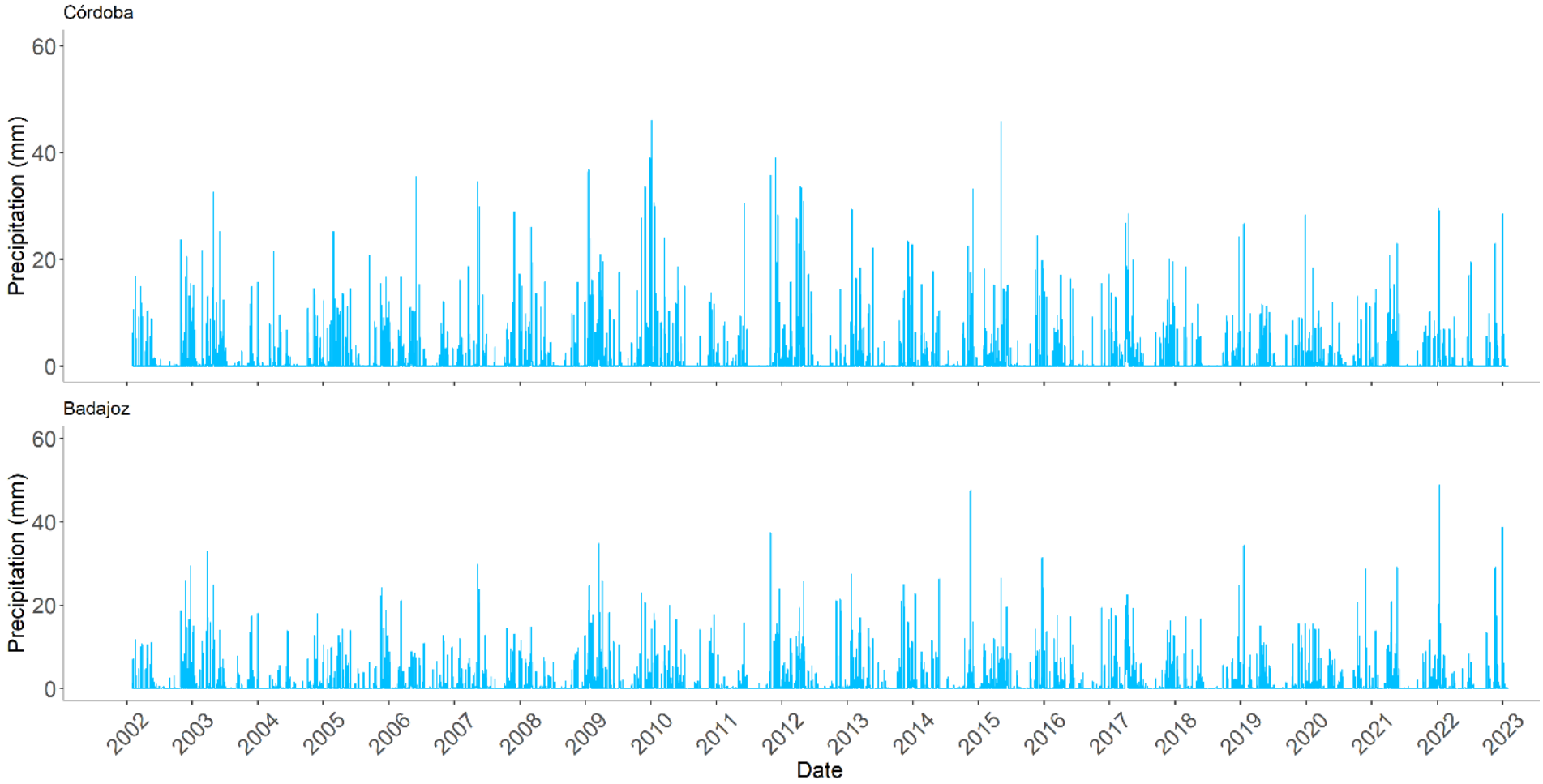


Fig. S1. Average and maximum daily air temperature (°C) measured over a 20-year period (2003-2023) for the two sampling sites obtained from the Córdoba and Badajoz meteorological stations.



51 **Fig. S2.** Geographical map detailing the elevation and location of study sample sites and their respective meteorological station in the Córdoba

52 and Badajoz regions of Spain.



53 **Fig. S3.** Daily precipitation (mm) measured over a 20-year period (2003-2023) for the two sampling sites obtained from the Córdoba and Badajoz

54 meteorological stations.

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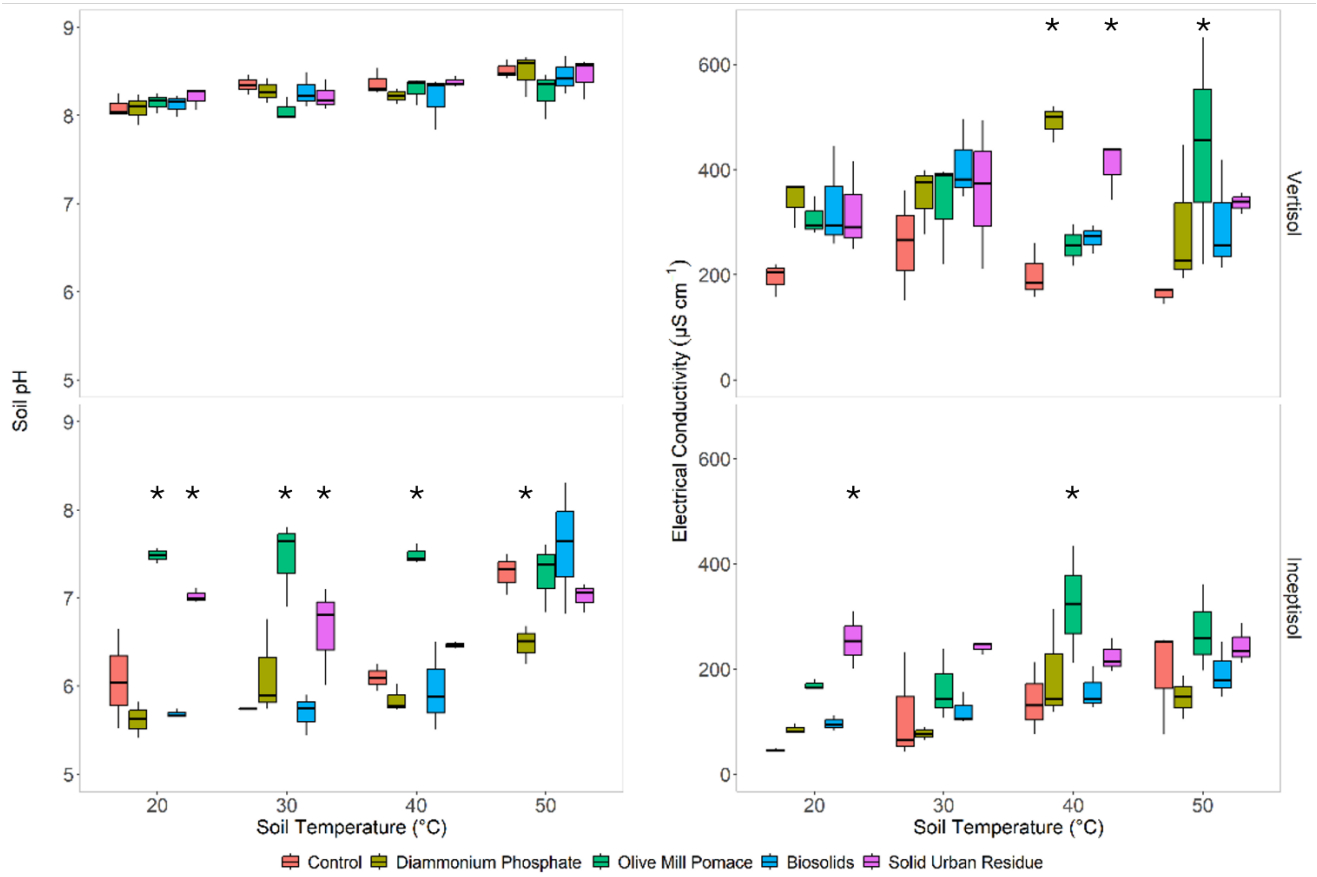

Fig. S4. Soil pH and electrical conductivity determined 9-days after heat-stressing soils receiving either no addition (control), diammonium phosphate, or composted olive mill pomace, biosolids or solid urban residue to 20, 30, 40 or 50 °C (n = 3 per soil type, temperature, and treatment). Legend applies to both panels. Boxplots display the median and interquartile range, with whiskers showing minimum and maximum values in the data.

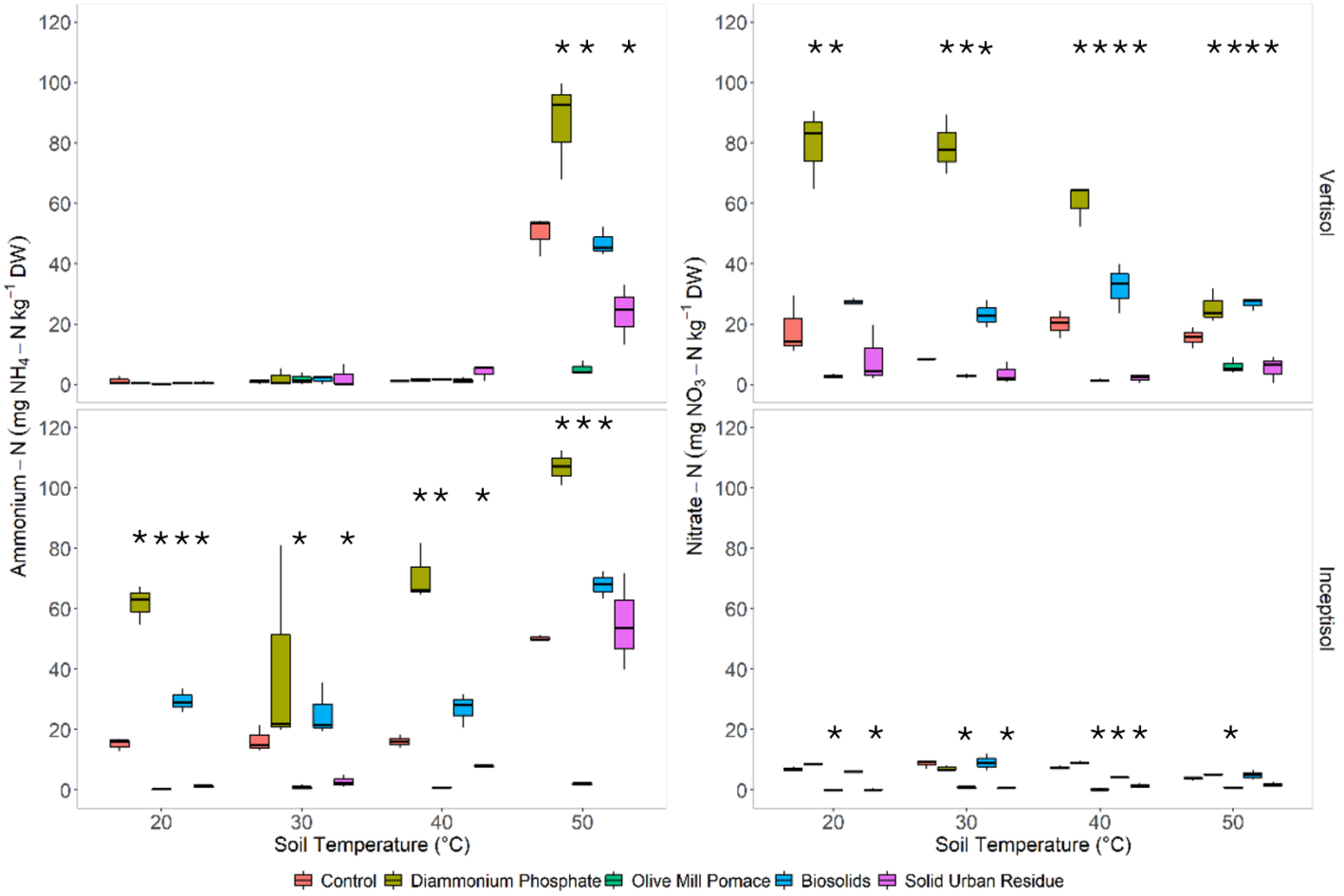

Fig. S5. Soil ammonium and nitrate determined 9-days after heat-stressing soils receiving either no addition (control), diammonium phosphate, or composted olive mill pomace, biosolids or solid urban residue to 20, 30, 40 and 50 °C (n = 3 per soil type, temperature, and treatment). Legend applies to both panels. Boxplots display the median and interquartile range, with whiskers showing minimum and maximum values in the data.

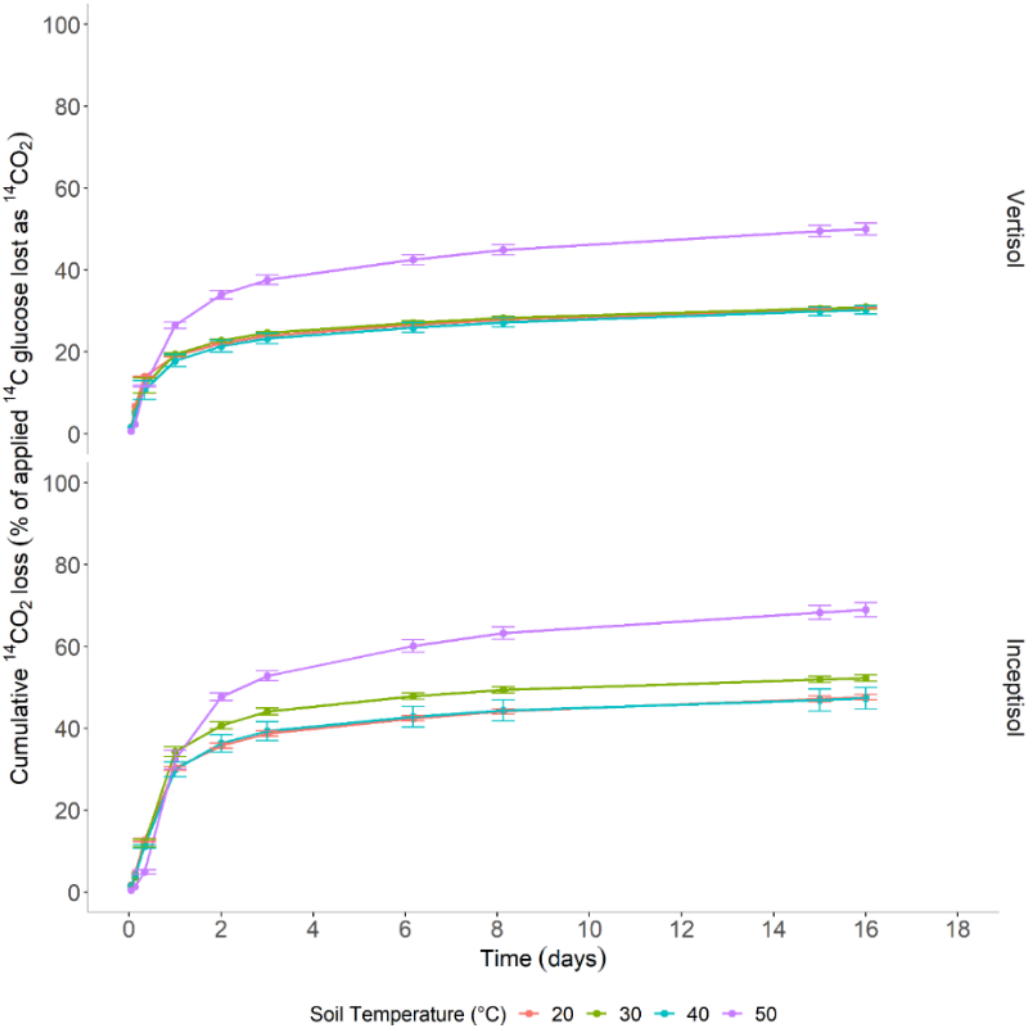

Fig. S6. Cumulative $^{14}CO_2$ loss (expressed as a % of the total applied ^{14}C-labelled glucose emitted as $^{14}CO_2$) following 1-week of heat-stress at 20, 30, 40 or 50 °C (n = 5 per soil type and temperature). Legend applies to both panels. Data represents mean ± SEM.