

Supplementary Table 1. Soil biochemical characteristics of Pumice Soil after 0, 2 and 4 years irrigation with secondary treated municipal wastewater compared to non-irrigated cores and baseline samples

n.d. = Not determined

Pumice	Irrigation treatment	Horizon	Anaerobic Mineralisable Nitrogen kgN/ha	Basal Respiration kgC/ha/h	DEA kgN/ha/h	Soil enzyme activity (pmol/g.s)			Microbial Biomass kgC/ha	Nitrification Potential kgN/ha/h
						Phosphatase	Sulphatase	Urease		
Year 0	Baseline	A	45	0.77	0.01	4482	323	5900	428	0.05
		Bw	6	0.16	0.00	496	47	301	106	0.03
		Bc	2	0.12	0.00	n.d.	n.d.	n.d.	74	0.02
		C	0	0.06	0.01	n.d.	n.d.	n.d.	34	0.00
Year 2	Non-irrigated	A	63	1.37	0.01	4492	297	4546	855	0.00
		Bw	6	0.16	0.00	768	59	488	147	0.00
		Bc	0	0.18	0.01	n.d.	n.d.	n.d.	92	0.00
		C	1	0.45	0.00	n.d.	n.d.	n.d.	98	0.00
	Irrigated	A	63	2.34	0.04	3272	575	4130	570	0.02
		Bw	9	0.06	0.00	587	42	398	161	0.01
		Bc	2	0.29	0.01	n.d.	n.d.	n.d.	65	0.00
		C	1	0.00	0.00	n.d.	n.d.	n.d.	39	0.00
Year 4	Non-irrigated	A	34	1.09	0.00	2892	278	4548	567	0.00
		Bw	9	0.41	0.00	649	63	619	255	0.03
		Bc	2	0.01	0.00	n.d.	n.d.	n.d.	191	0.01
		C	0	0.00	0.00	n.d.	n.d.	n.d.	46	0.00
	Irrigated	A	60	1.23	0.01	1936	452	2791	430	0.98
		Bw	13	0.55	0.00	510	53	259	138	0.03
		Bc	3	0.15	0.00	n.d.	n.d.	n.d.	45	0.00
		C	0	0.03	0.01	n.d.	n.d.	n.d.	16	0.01
SED and degrees of freedom for comparisons between treatments, years and horizons		SED	4.1	0.27	0.006	355	42	789	56.1	0.54
		d.f.	58.0	60.0	57.7	28.1	29.4	29.3	46.7	48.7

Supplementary Table 2. Soil biochemical characteristics of Gley Soil after 0, 2 and 4 years irrigation with secondary treated municipal wastewater compared to non-irrigated cores and baseline samples

n.d. = Not determined

Gley	Irrigation treatment	Horizon	Anaerobic Min-N kgN/ha	Basal Respiration kgC/ha/h	DEA kgN/ha/h	Soil enzyme activity (pmol/g.s)			Microbial Biomass kgC/ha	Nitrification Potential kgN/ha/h
						Phosphatase	Sulphatase	Urease		
Year 0	Baseline	Ap	208	2.00	1.02	8641	635	1142	3220	1.21
		Bg1	39	0.39	0.01	2424	156	167	729	0.12
		Bg2	22	0.20	0.03				270	0.00
Year 2	Non-irrigated	Ap	76	3.55	0.13	7562	518	943	1830	1.09
		Bg1	40	2.37	0.01	4261	325	164	1084	0.15
		Bg2	16	1.15	0.00				431	0.00
	Irrigated	Ap	83	4.31	0.45	7457	621	1410	2163	0.70
		Bg1	50	1.98	0.01	2571	150	157	1125	0.17
		Bg2	21	1.72	0.02				470	0.01
Year 4	Non-irrigated	Ap	139	1.56	0.44	6468	686	884	2070	1.51
		Bg1	42	0.60	0.03	2561	235	182	1102	0.28
		Bg2	16	0.34	0.01				355	0.02
	Irrigated	Ap	122	1.94	0.08	5629	743	841	1690	0.50
		Bg1	106	1.36	0.01	1984	184	134	937	0.16
		Bg2	61	0.44	0.01				477	0.04
SED and degrees of freedom for comparisons between treatments, years and horizons		SED	24.4	0.62	0.14	420	47.5	218	222	0.17
		d.f.	34.6	44.9	44.9	24.3	29.6	29.8	38.3	44.8

Supplementary Table 3. Soil biochemical characteristics of Allophanic Soil after 0, 2 and 4 years irrigation with secondary treated municipal wastewater compared to non-irrigated cores and baseline samples

Allophanic	Irrigation treatment	Horizon	Anaerobic Mineralisable Nitrogen kgN/ha	Basal Respiration kgC/ha/h	DEA kgN/ha/h	Soil enzyme activity (pmol/g.s)			Microbial Biomass kgC/ha	Nitrification Potential kgN/ha/h
						Phosphatase	Sulphatase	Urease		
Year 0	Baseline	A	134	1.83	0.58	n.d.	n.d.	n.d.	2124	3.17
		Bw1	1	0.09	0.00	n.d.	n.d.	n.d.	265	0.04
		Bw2	0	0.03	0.00	n.d.	n.d.	n.d.	122	0.01
		Bw3	0	0.15	0.00	n.d.	n.d.	n.d.	426	0.01
Year 2	Non-irrigated	A	140	1.82	0.19	3726	532	2410	1235	2.07
		Bw1	14	0.44	0.01	1756	42	593	189	0.01
		Bw2	7	0.33	0.00	n.d.	n.d.	n.d.	77	0.00
		Bw3	22	1.18	0.00	n.d.	n.d.	n.d.	151	0.00
	Irrigated	A	128	1.50	0.32	3559	616	2413	1147	2.38
		Bw1	13	0.66	0.02	1942	38	902	167	0.03
		Bw2	7	0.42	0.00	n.d.	n.d.	n.d.	95	0.00
		Bw3	13	1.08	0.01	n.d.	n.d.	n.d.	166	0.00
Year 4	Non-irrigated	A	94	1.54	0.12	3058	576	1808	775	1.19
		Bw1	4	0.26	0.00	1669	49	298	193	0.00
		Bw2	2	0.28	0.00	n.d.	n.d.	n.d.	36	0.00
		Bw3	3	1.09	0.00	n.d.	n.d.	n.d.	117	0.00
	Irrigated	A	92	1.49	0.26	3598	722	2466	951	2.55
		Bw1	10	0.49	0.00	1659	65	480	147	0.04
		Bw2	2	0.61	0.00	n.d.	n.d.	n.d.	36	0.00
		Bw3	4	1.53	0.01	n.d.	n.d.	n.d.	102	0.00
SED and degrees of freedom for comparisons between treatments, years and horizons		SED	5.26	0.20	0.034	371	63	431	114	0.26
		d.f.	58.6	59.1	59.9	15.5	23.9	19.4	59.9	59.9

n.d. = Not determined.

Supplementary Table 4. Soil biochemical characteristics of Recent Soil after 0, 2 and 4 years irrigation with secondary treated municipal wastewater compared to non-irrigated cores and baseline samples

Recent	Irrigation treatment	Horizon	Anaerobic Min-N kgN/ha	Basal Respiration kgC/ha/h	DEA kgN/ha/h	Soil enzyme activity (pmol/g.s)			Microbial Biomass kgC/ha	Nitrification Potential kgN/ha/h
						Phosphatase	Sulphatase	Urease		
Year 0	Baseline	A	91	1.25	0.04	n.d.	n.d.	n.d.	726	0.53
		B	0	0.11	0.00	n.d.	n.d.	n.d.	127	0.03
		Bc	0	0.17	0.00	n.d.	n.d.	n.d.	184	0.03
		C	0	0.09	0.00	n.d.	n.d.	n.d.	65	0.01
Year 2	Non-irrigated	A	73	1.33	0.03	3336	152	370	418	0.07
		B	4	0.56	0.01	659	14	128	40	0.00
		Bc	0	1.69	0.02	n.d.	n.d.	n.d.	266	0.00
		C	0	0.82	0.01	n.d.	n.d.	n.d.	127	0.06
	Irrigated	A	35	0.98	0.04	2142	136	598	268	0.06
		B	4	0.34	0.00	342	12	182	54	0.00
		Bc	4	1.05	0.01	n.d.	n.d.	n.d.	226	0.00
		C	0	0.50	0.01	n.d.	n.d.	n.d.	115	0.13
Year 4	Non-irrigated	A	44	0.52	0.03	3302	126	886	442	0.07
		B	3	0.10	0.00	591	18	150	120	0.02
		Bc	4	0.41	0.00	n.d.	n.d.	n.d.	358	0.04
		C	4	0.19	0.00	n.d.	n.d.	n.d.	121	0.02
	Irrigated	A	38	3.15	0.25	1194	159	353	248	0.23
		B	9	1.41	0.01	529	32	176	49	0.03
		Bc	17	2.23	0.00	n.d.	n.d.	n.d.	64	0.01
		C	3	1.34	0.00	n.d.	n.d.	n.d.	17	0.01
SED and degrees of freedom for comparisons between treatments, years and horizons		SED	8.3	1.04	0.07	417	29.8	152	76.0	0.069
		d.f.	45.0	28.2	59.9	23.9	23.9	23.9	56.6	59.4

n.d. = not determined.