

Supplementary Material:

Urban soil quality assessment - A comprehensive case study dataset of urban garden soils

1 SUPPLEMENTARY TABLES AND FIGURES

1.1 Figures

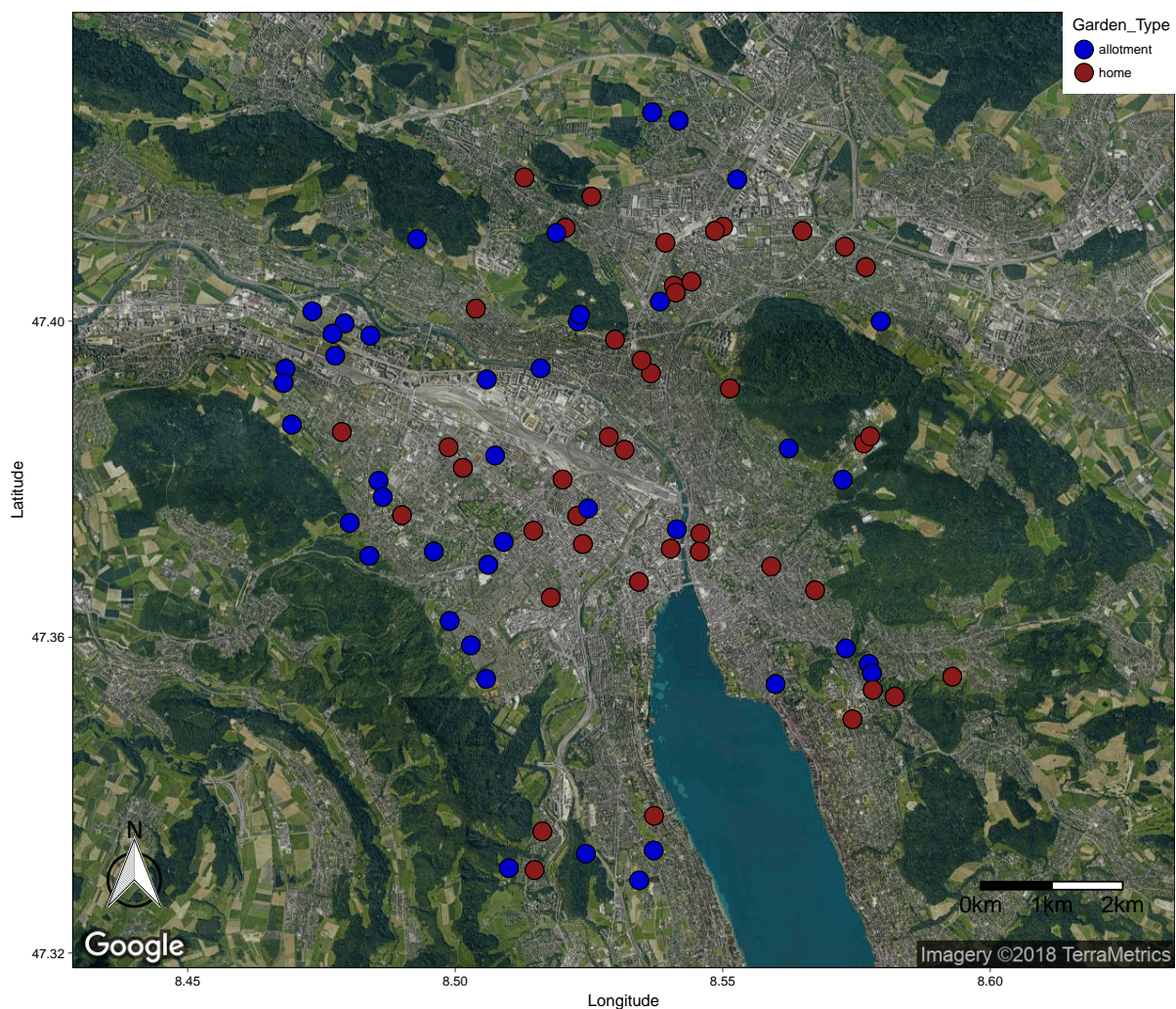


Figure S1: Spatial map of selected urban garden sites (N=85) within the city of Zurich, Switzerland. In total, 42 allotment gardens (blue) and 43 home gardens (red) were analyzed.

1.2 Tables

Table S1. Urban garden sites measured in the city of Zurich, Switzerland. In total 85 urban gardens were selected, 42 allotment and 43 home gardens according to a systematic nested design of garden management intensity and degree of urbanization, for more information see [Frey et al. \(2018\)](#). Within each urban garden two distinct measurement plots (2 m x 2 m) were selected, corresponding to a typical garden habitat type ([Tresch et al., 2018](#)).

garden habitat types	garden types		total sites
	allotment	home	
lawn	29	42	71
flowers & berries	19	33	52
vegetables	36	11	47
total sites	84	86	170

Table S2. 19 substrates used for the assessment of the Community level physiological profile (CLPP) based on the MicroResp™ technique ([Campbell et al., 2003](#)). We dissolved 18 substrates in H_2O_{demin} and added 25 μ l aliquots to deliver 30 mg of C-substrate per g of soil water for each well. Each substrate was measured in five technical replicates. The absorbance of the detection plate is measured at 570 nm after 5 hours of incubation at 20°C in the dark. The detection plate contains a pH sensitive dye (Cresol Red) which is dissolved in a solution with 150 mM potassium chloride (KCl) and 2.5 mM sodium bicarbonate ($NaHCO_3$) in a matrix of 1% agarose gel. For the calibration equations 44 samples from five different soils together with four different quantities (10g, 20g, 30g and 40g) were amended with 0, 0.5, 2, 3, 5 and 10 mg of glucose or α -keto-glutaric acid per g soil. The substrates were dissolved in water so that 62.5 μ l per g soil was added to each sample. Samples without substrates received the same amount of water. The calibration was obtained in 100ml Schott bottles containing 4 wells of breakable microstrips filled with the detection gel. These microstrips were measured immediately before and after the incubation on a plate reader (MRX II TC, Dynex, USA) at 570 nm. The bottles were sealed and CO_2 evolution was measured on a gas chromatograph (7890A, Agilent Technologies, USA). The difference in absorbance between the first and the second measurement is then plotted against the log of CO_2 evolution measured by the gas chromatograph. The linear fit between measured $\log(CO_2)$ concentrations [$\mu g CO_2 - C g^{-1} h^{-1}$] was $y = -4.67 + 2.90$ with an R^2 of 0.87.

Compound category	Substrate	Abbreviation
Amino acid	Gamma-aminobutyric acid	GABA
	Alanine	Ala
	Aspartic acid	Asc
	Glutamine	Gln
	Leucine	Leu
	Cysteine	Cys
Amino sugar	Glucosamine	Glca
	Arabinose	Ara
	Galactose	Gal
	Glucose	Gluc
	Fructose	Fruct
Carboxylic acid	Ascorbic acid	Asc
	Citric acid	Citr
	Malic acid	MA
	Alpha-keto-glutaric acid	KGA
Phenolic acid	Protocatechuic acid	Prot
	Vanillic acid	Van
Hemicellulose	Xylan	Xyl
Water	Distilled water	H_2O

Table S3. qPCR assays for fungal and bacterial gene copy numbers.

We extracted DNA from 135 mg of lyophilised soil using the FastDNATM-96 Soil Microbe DNA Kit (MP Bio). qPCR assays were conducted on a BioRad CFXTM Real-Time system with a C1000 TouchTM Thermal Cycler (BioRad Laboratories). qPCR assays were performed to estimate the gene copy number of bacterial 16S rDNA and fungal 18S rDNA. All reactions were performed in 15 µl volume containing 7.5 µl KAPA SYBR FAST universal qPCR Master Mix (2x) (KAPA Biosystems), 1.5 µl DNA sample. qPCR reactions for the estimation of the bacterial copy number contained 1.8 µl of each primer (BactQuant, [Liu et al. \(2012\)](#)) and 2.4 µl H₂O. qPCR reactions for the estimation of fungal copy number contained 0.75 µl of each primer (FR1/FF390, [Vainio and Hantula \(2000\)](#)) and 4.5 µl H₂O. The assays were run in duplicates with an appropriate standard dilution series containing the target region in triplicate. For the 16S assay the PCR conditions were 3 minutes at 95°C followed by 40 cycles of 15 seconds at 95°C, 15 seconds at 62°C and 30 seconds at 72°C. For the 18S assay the PCR conditions were 3 minutes at 95°C followed by 36 cycles of 15 seconds at 95°C, 15 seconds at 50°C and 30 seconds at 72°C with a final elongation step of 10 minutes at 72°C. After each assay melting curve analysis was performed to make sure fluorescence signals originated from specific PCR products instead of primer dimers.

Table S4. Descriptive statistics of soil quality indicators in urban gardens of Zurich, Switzerland. Aggregated values per garden type can be found in Table S5 and by habitat types in Table S6, while the functions and R packages used for the data management can be found in the R-project folder in the Data Sheet 2. SE represents standard errors. Tea bag decomposition values were assessed according to [Keuskamp et al. \(2013\)](#).

	N	Mean±SE	Median	Min	Max	Variance
Physical indicators						
BD [gcm^{-3}]	170	1.08±0.01	1.08	0.57	1.45	0.03
Clay [%]	170	23.79±0.43	22.98	9.40	39.25	31
Penetration resistance [MPa]	168	1.42±0.04	1.36	0.36	3.28	0.3
PV [%]	170	40.86±0.56	41.27	1.47	54.96	54
SA [%]	170	82.22±0.83	85.57	46.64	95.69	118
Sand [%]	170	42.06±0.72	41.75	13.75	71.95	87
Silt [%]	170	34.15±0.4	34.15	18.65	49.15	28
WHC [%]	170	81.56±0.93	80.36	54.17	145.99	146
Chemical indicators						
B [$mgkg^{-1}$]	170	1.37±0.05	1.29	0.14	3.88	0.5
Cu [$mgkg^{-1}$]	170	32.30±2.28	23.67	3.04	209.10	885
EC [$\mu S cm^{-1}$]	170	184.41±3.12	181.95	82.20	354.00	1653
Fe [$mgkg^{-1}$]	170	369.29±8.48	360.00	154.50	699.80	12214
K [$mgkg^{-1}$]	170	165.82±9.63	122.14	43.91	831.34	15770
Mg [$mgkg^{-1}$]	170	516.42±13.18	502.90	143.60	1125.00	29523
Mn [$mgkg^{-1}$]	170	296.24±8.38	265.95	93.27	632.50	11936
P [$mgkg^{-1}$]	170	189.60±9.31	171.38	5.19	465.19	14735
pH	170	7.27±0.02	7.30	6.25	7.75	0.06
Biological indicators						
basal respiration [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	0.24±0.01	0.21	0.08	0.72	0.01
C _{mic} [$mgkg^{-1}$]	170	808.27±20.92	787.59	279.91	1593.98	74383
C _{min} [$gCO_2 - Ckg^{-1}$]	170	0.15±0.01	0.13	0.06	0.46	0.01
DOC [$mgkg^{-1}$]	170	158.21±4.55	144.98	62.33	435.56	3526
DON [$mgkg^{-1}$]	170	40.00±1.28	36.50	17.23	113.34	279
N _{mic} [$mgkg^{-1}$]	170	141.08±4.09	132.50	42.31	357.83	2841
N _{min} [$mgkg^{-1}$]	170	1.70±0.09	1.58	0.01	5.85	1
TOC [%]	170	4.65±0.12	4.43	1.63	9.89	2
TON [%]	170	0.33±0.01	0.31	0.10	0.82	0.01
bacterial 16S [<i>gene copies</i>]	164	6.8e+08±4.5e+07	5.0e+08	5.1e+07	3.3e+09	1.6e+17
fungal 18S [<i>gene copies</i>]	164	5.3e+06±3.5e+05	3.7e+06	6.0e+05	2.7e+07	2.1e+13
Metals						
As [$mgkg^{-1}$]	168	9.40±0.26	9.60	0.50	27.70	11
Ba [$mgkg^{-1}$]	168	385.35±11.52	344.50	201.80	1062.00	22569
Co [$mgkg^{-1}$]	168	31.56±0.35	32.15	18.30	45.40	21
Cu.m [$mgkg^{-1}$]	168	75.96±4.76	57.30	15.60	407.30	3852
Ni [$mgkg^{-1}$]	168	39.55±0.69	38.65	20.30	80.10	82
Pb [$mgkg^{-1}$]	168	172.33±13.37	106.60	18.50	1076.00	30391
Sb [$mgkg^{-1}$]	168	1.81±0.32	0.70	0.40	39.10	17
V [$mgkg^{-1}$]	168	79.78±1.13	77.75	44.10	117.90	217
Zn [$mgkg^{-1}$]	168	268.77±13.83	215.80	58.90	999.90	32505
CLPP MicroResp						
Ala [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	3.78±0.08	3.77	0.77	6.32	1
Ara [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	4.21±0.09	4.30	1.21	6.33	1
Asc [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	9.25±0.11	9.64	1.98	11.30	2
Asp [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	3.95±0.08	3.98	1.37	7.02	1
Citr [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	10.45±0.13	11.06	3.18	12.08	3
Cys [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.56±0.08	2.40	0.62	5.67	1
Fruct [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	5.42±0.10	5.49	1.27	7.69	2
GABA [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.69±0.08	2.52	0.77	5.64	1
Gal [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	4.00±0.09	4.03	1.04	8.31	1
Glca [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	4.06±0.09	4.14	0.90	6.70	1
Gln [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	3.90±0.08	3.87	1.01	6.25	1
Gluc [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	5.67±0.09	5.72	1.72	8.06	1
H2O [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.06±0.08	1.78	0.61	7.32	1
KGA [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	10.71±0.11	11.22	3.23	12.19	2
Leu [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.63±0.08	2.53	0.68	5.89	1
MA [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	10.44±0.14	11.17	1.94	12.11	3
Prot [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.65±0.08	2.52	0.83	5.40	1
Van [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	2.63±0.08	2.52	0.96	8.26	1
Xyl [$\mu gCO_2 - Cg^{-1}h^{-1}$]	170	5.48±0.09	5.52	1.24	7.85	1
Tea bag decomposition						
green tea [% decomposed]	161	0.59±0.01	0.58	0.49	0.75	0.01
rooibos tea [% decomposed]	161	0.29±0.01	0.30	0.20	0.39	0.01

Table S5. Descriptive statistics of soil quality indicators in urban gardens of Zurich, CH. Data is aggregated by garden type.

		N	Mean±SE	Median	Min	Max	Variance
Physical indicators							
Allotment							
BD	[gcm^{-3}]	84	1.1±0.02	1.12	0.57	1.42	0.1
Clay	[%]	84	24.31±0.63	24.60	9.40	38.50	33
penetration resistance	[MPa]	84	1.23±0.06	1.15	0.39	2.55	0.1
PV	[%]	84	41.05±0.95	42.56	1.47	54.12	76
SA	[%]	84	79.38±1.28	81.90	46.64	94.61	137
Sand	[%]	84	41.3±1.11	40.23	13.75	71.95	104
Silt	[%]	84	34.39±0.62	34.50	18.65	49.15	32
WHC	[%]	84	82.84±1.45	80.45	66.03	145.99	177
Home							
BD	[gcm^{-3}]	86	1.06±0.02	1.05	0.80	1.45	0.1
Clay	[%]	86	23.29±0.58	22.50	10.90	39.25	29
penetration resistance	[MPa]	84	1.62±0.06	1.69	0.36	3.28	0.1
PV	[%]	86	40.68±0.61	40.39	28.83	54.96	32
SA	[%]	86	84.99±1	88.52	56.83	95.69	86
Sand	[%]	86	42.81±0.91	43.15	19.30	65.85	71
Silt	[%]	86	33.91±0.52	33.90	20.75	47.90	24
WHC	[%]	86	80.31±1.15	79.93	54.17	105.26	114
Chemical indicators							
Allotment							
B	[$mgkg^{-1}$]	84	1.59±0.07	1.51	0.19	3.88	0.1
Cu	[$mgkg^{-1}$]	84	39.14±4.14	27.41	7.40	209.10	1438
EC	[$\mu S cm^{-1}$]	84	175.47±4.77	167.50	82.20	354.00	1914
Fe	[$mgkg^{-1}$]	84	390.44±13.94	384.55	154.50	699.80	16335
K	[$mgkg^{-1}$]	84	191.9±14.41	157.67	47.34	831.34	17447
Mg	[$mgkg^{-1}$]	84	519.52±20.4	504.15	150.60	1125.00	34942
Mn	[$mgkg^{-1}$]	84	297.32±14.56	262.65	93.27	632.50	17819
P	[$mgkg^{-1}$]	84	229.92±12.92	214.66	21.35	460.44	14017
pH		84	7.2±0.03	7.25	6.45	7.56	0.1
Home							
B	[$mgkg^{-1}$]	86	1.16±0.07	0.96	0.14	3.71	0.1
Cu	[$mgkg^{-1}$]	86	25.62±1.75	22.49	3.04	93.00	263
EC	[$\mu S cm^{-1}$]	86	193.15±3.83	190.25	120.50	331.00	1262
Fe	[$mgkg^{-1}$]	86	348.64±9.31	348.85	190.10	583.00	7461
K	[$mgkg^{-1}$]	86	140.36±12.29	104.19	43.91	748.42	12990
Mg	[$mgkg^{-1}$]	86	513.39±16.9	500.70	143.60	1015.00	24560
Mn	[$mgkg^{-1}$]	86	295.18±8.58	275.40	151.60	479.80	6330
P	[$mgkg^{-1}$]	86	150.21±12.02	120.57	5.19	465.19	12435
pH		86	7.33±0.02	7.36	6.25	7.75	0.1

		N	Mean±SE	Median	Min	Max	Variance
Biological indicators							
Allotment							
basal respiration	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	0.24±0.01	0.22	0.10	0.72	0.1
C _{mic}	$[mgkg^{-1}]$	84	734.96±27.3	705.63	301.62	1548.41	62612
C _{min}	$[gCO_2 - Ckg^{-1}]$	84	0.16±0.01	0.15	0.07	0.46	0.1
DOC	$[mgkg^{-1}]$	84	164.81±7	149.67	79.63	435.56	4119
DON	$[mgkg^{-1}]$	84	39.6±1.84	35.23	19.62	109.55	285
N _{mic}	$[mgkg^{-1}]$	84	125.55±5.38	119.67	44.70	357.83	2434
N _{min}	$[mgkg^{-1}]$	84	1.77±0.14	1.55	0.00	5.56	2
TOC	[%]	84	4.85±0.19	4.42	1.82	9.89	3
TON	[%]	84	0.35±0.01	0.32	0.16	0.82	0.1
bacterial 16S	$[gene\ copies]$	81	6.3e+08±5.6e+07	5.0e+08	5.1e+07	2.5e+09	2.6e+17
fungal 18S	$[gene\ copies]$	80	5.5e+06±4.4e+05	4.3e+06	7.0e+05	2.0e+07	1.7e+13
Home							
basal respiration	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	0.23±0.01	0.20	0.08	0.69	0.1
C _{mic}	$[mgkg^{-1}]$	86	879.88±29.78	835.92	279.91	1593.98	76252
C _{min}	$[gCO_2 - Ckg^{-1}]$	86	0.14±0.01	0.12	0.06	0.42	0.1
DOC	$[mgkg^{-1}]$	86	151.77±5.81	136.58	62.33	336.93	2903
DON	$[mgkg^{-1}]$	86	40.39±1.79	38.57	17.23	113.34	276
N _{mic}	$[mgkg^{-1}]$	86	156.25±5.71	153.82	42.31	305.35	2800
N _{min}	$[mgkg^{-1}]$	86	1.64±0.11	1.65	0.00	5.85	1
TOC	[%]	86	4.45±0.15	4.45	1.63	8.94	2
TON	[%]	86	0.31±0.01	0.31	0.10	0.61	0.1
bacterial 16S	$[gene\ copies]$	82	7.3e+08±7.1e+07	5.1e+08	8.3e+07	3.3e+09	4.3e+17
fungal 18S	$[gene\ copies]$	83	5.1e+06±5.4e+05	2.9e+06	6.0e+05	2.8e+07	2.5e+13
Metals							
Allotment							
As	$[mgkg^{-1}]$	82	9.41±0.4	9.45	2.60	27.70	14
Ba	$[mgkg^{-1}]$	82	383.3±17.34	330.75	230.70	1062.00	25270
Co	$[mgkg^{-1}]$	82	31.44±0.53	32.45	18.30	43.80	24
Cu.m	$[mgkg^{-1}]$	82	88.72±8.5	59.95	27.40	407.30	6063
Ni	$[mgkg^{-1}]$	82	40.23±1.08	39.35	22.10	80.10	98
Pb	$[mgkg^{-1}]$	82	143.79±16.43	88.15	34.00	1076.00	22672
Sb	$[mgkg^{-1}]$	82	1.68±0.5	0.60	0.40	39.10	21
V	$[mgkg^{-1}]$	82	81.68±1.63	79.05	50.60	117.90	224
Zn	$[mgkg^{-1}]$	82	270.97±19.39	215.80	102.00	966.50	31577
Home							
As	$[mgkg^{-1}]$	86	9.39±0.33	9.85	0.50	19.40	9
Ba	$[mgkg^{-1}]$	86	387.3±15.35	352.20	201.80	841.20	20253
Co	$[mgkg^{-1}]$	86	31.68±0.46	31.90	21.40	45.40	19
Cu.m	$[mgkg^{-1}]$	86	63.79±4.15	51.70	15.60	208.80	1483
Ni	$[mgkg^{-1}]$	86	38.9±0.88	38.00	20.30	65.30	66
Pb	$[mgkg^{-1}]$	86	199.55±20.62	117.50	18.50	919.20	36568
Sb	$[mgkg^{-1}]$	86	1.93±0.4	1.00	0.40	33.00	14
V	$[mgkg^{-1}]$	86	77.97±1.55	77.15	44.10	112.20	207
Zn	$[mgkg^{-1}]$	86	266.67±19.81	215.85	58.90	999.90	33762

		N	Mean±SE	Median	Min	Max	Variance
CLPP MicroResp							
Allotment							
Ala	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.53±0.12	3.54	0.77	6.32	1
Ara	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.88±0.12	3.97	1.21	6.08	1
Asc	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	9.07±0.17	9.22	1.98	11.30	2
Asp	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.70±0.12	3.79	1.37	7.02	1
Citr	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	10.29±0.2	11.01	3.18	12.08	3
Cys	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	2.42±0.11	2.30	0.62	5.67	1
Fruct	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	5.07±0.15	5.15	1.27	7.62	2
GABA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	2.45±0.09	2.41	0.77	5.14	1
Gal	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.68±0.13	3.67	1.04	8.31	1
Glca	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.57±0.14	3.79	0.90	6.70	2
Gln	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	3.68±0.11	3.67	1.01	5.84	1
Gluc	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	5.32±0.14	5.44	1.72	8.01	2
H2O	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	1.87±0.11	1.56	0.61	7.32	1
KGA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	10.69±0.17	11.14	3.23	11.96	2
Leu	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	2.44±0.10	2.46	0.68	5.89	1
MA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	10.35±0.21	11.08	1.94	12.11	4
Prot	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	2.47±0.10	2.37	0.83	5.10	1
Van	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	2.46±0.12	2.23	0.96	8.26	1
Xyl	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	84	5.18±0.14	5.43	1.24	7.38	2
Home							
Ala	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.03±0.11	4.06	1.77	6.05	1
Ara	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.54±0.11	4.63	1.96	6.33	1
Asc	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	9.43±0.15	9.72	4.55	11.12	2
Asp	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.20±0.10	4.32	2.17	6.53	1
Citr	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	10.61±0.15	11.10	6.61	12.03	2
Cys	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.69±0.12	2.48	0.85	5.59	1
Fruct	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	5.76±0.11	5.79	3.12	7.69	1
GABA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.93±0.12	2.77	1.15	5.64	1
Gal	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.31±0.11	4.31	2.25	6.67	1
Glca	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.54±0.10	4.66	1.77	6.20	1
Gln	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	4.12±0.11	4.07	1.72	6.25	1
Gluc	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	6.00±0.11	6.11	3.24	8.06	1
H2O	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.25±0.12	1.99	0.67	4.85	1
KGA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	10.72±0.14	11.25	6.81	12.19	2
Leu	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.82±0.11	2.76	1.05	5.28	1
MA	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	10.53±0.18	11.25	4.21	12.06	3
Prot	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.83±0.11	2.76	1.04	5.40	1
Van	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	2.79±0.11	2.60	1.10	5.25	1
Xyl	$[\mu gCO_2 - Cg^{-1}h^{-1}]$	86	5.76±0.10	5.75	3.65	7.85	1
Tea bag decomposition							
Home							
green tea	$[\% \text{ decomposed}]$	84	0.58±0.01	0.58	0.49	0.69	0.01
rooibos tea	$[\% \text{ decomposed}]$	84	0.29±0.01	0.29	0.20	0.35	0.01
Home							
green tea	$[\% \text{ decomposed}]$	77	0.60±0.01	0.59	0.53	0.75	0.01
rooibos tea	$[\% \text{ decomposed}]$	77	0.30±0.01	0.30	0.22	0.39	0.01

Table S6. Descriptive statistics of soil quality indicators in urban gardens of Zurich, CH. Data is aggregated by garden habitat type.

		N	Mean±SE	Median	Min	Max	Variance
Physical indicators							
Vegetables							
BD	[gcm^{-3}]	47	1.15±0.02	1.16	0.80	1.42	0.1
Clay	[%]	47	24.55±0.69	25.10	16.65	37.65	22
penetration resistance	[MPa]	47	0.96±0.06	0.90	0.39	1.95	0.1
PV	[%]	47	42.68±1.46	44.27	1.47	54.12	100
SA	[%]	47	76.22±1.71	79.28	46.64	92.77	138
Sand	[%]	47	40.9±1.14	41.10	27.25	56.20	62
Silt	[%]	47	34.55±0.7	34.50	26.10	45.25	23
WHC	[%]	47	82.4±1.81	79.98	66.03	140.14	154
Flowers & Berries							
BD	[gcm^{-3}]	52	1.12±0.02	1.13	0.57	1.45	0
Clay	[%]	52	22.55±0.75	21.60	10.90	38.85	30
penetration resistance	[MPa]	51	1.47±0.08	1.29	0.36	2.72	0
PV	[%]	52	42.94±0.88	43.98	24.28	54.96	40
SA	[%]	52	81.08±1.48	83.67	56.83	95.69	114
Sand	[%]	52	43.97±1.24	44.58	19.30	65.85	79
Silt	[%]	52	33.49±0.73	33.05	23.25	49.15	28
WHC	[%]	52	80.33±1.77	77.83	54.17	139.16	162
Lawn							
BD	[gcm^{-3}]	71	1±0.02	0.98	0.78	1.32	0
Clay	[%]	71	24.2±0.72	23.70	9.40	39.25	37
penetration resistance	[MPa]	70	1.7±0.06	1.72	0.58	3.28	0
PV	[%]	71	38.14±0.55	38.14	28.83	49.86	21
SA	[%]	71	87.03±0.95	90.00	61.70	95.28	64
Sand	[%]	71	41.43±1.23	39.80	13.75	71.95	108
Silt	[%]	71	34.36±0.66	34.55	18.65	47.75	31
WHC	[%]	71	81.9±1.36	81.08	54.20	145.99	131
Chemical indicators							
Vegetables							
B	[$mgkg^{-1}$]	47	1.87±0.09	1.78	0.45	3.71	0.1
Cu	[$mgkg^{-1}$]	47	39.04±5.2	27.87	8.86	209.10	1269
EC	[$\mu S cm^{-1}$]	47	174.14±6.33	166.00	82.20	283.00	1880
Fe	[$mgkg^{-1}$]	47	400.52±18.53	386.80	157.90	678.20	16132
K	[$mgkg^{-1}$]	47	231.15±20.97	209.30	51.83	748.42	20665
Mg	[$mgkg^{-1}$]	47	568.94±27.88	561.50	150.60	1125.00	36520
Mn	[$mgkg^{-1}$]	47	296.2±17.41	264.20	93.27	602.40	14245
P	[$mgkg^{-1}$]	47	273.22±16.98	244.12	63.36	465.19	13555
pH		47	7.25±0.03	7.26	6.45	7.69	0.1
Flowers & Berries							
B	[$mgkg^{-1}$]	52	1.34±0.09	1.23	0.19	3.70	0.1
Cu	[$mgkg^{-1}$]	52	31.06±3.73	23.37	7.40	177.10	723
EC	[$\mu S cm^{-1}$]	52	187.84±6.44	178.20	124.20	354.00	2159
Fe	[$mgkg^{-1}$]	52	364.86±13.81	359.90	210.70	600.10	9922
K	[$mgkg^{-1}$]	52	155.61±15.34	118.75	47.34	691.92	12240
Mg	[$mgkg^{-1}$]	52	500.59±19.65	486.35	188.70	868.70	20074
Mn	[$mgkg^{-1}$]	52	282.73±12.23	258.20	124.40	556.00	7773
P	[$mgkg^{-1}$]	52	178.95±15.51	150.31	10.17	418.20	12506
pH		52	7.32±0.03	7.36	6.52	7.75	0.1
Lawn							
B	[$mgkg^{-1}$]	71	1.06±0.07	0.99	0.14	3.88	0.1
Cu	[$mgkg^{-1}$]	71	28.75±3.21	20.65	3.04	138.80	731
EC	[$\mu S cm^{-1}$]	71	188.7±3.91	187.80	117.40	276.00	1085
Fe	[$mgkg^{-1}$]	71	351.87±12.26	335.90	154.50	699.80	10680
K	[$mgkg^{-1}$]	71	130.06±12.64	107.40	43.91	831.34	11336
Mg	[$mgkg^{-1}$]	71	493.25±20.58	504.40	143.60	1080.00	30070
Mn	[$mgkg^{-1}$]	71	306.16±13.82	270.10	118.50	632.50	13558
P	[$mgkg^{-1}$]	71	142.04±12.15	116.16	5.19	427.74	10483
pH		71	7.24±0.03	7.29	6.25	7.72	0.1

		N	Mean±SE	Median	Min	Max	Variance
Biological indicators							
Vegetables							
basal respiration	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	0.26±0.02	0.22	0.10	0.69	0.1
C _{mic}	$[\text{mgkg}^{-1}]$	47	687.02±35.92	639.76	301.62	1362.47	60630
C _{min}	$[\text{gCO}_2 - \text{Ckg}^{-1}]$	47	0.18±0.01	0.14	0.07	0.42	0.1
DOC	$[\text{mgkg}^{-1}]$	47	173.21±8.34	155.00	79.63	336.93	3270
DON	$[\text{mgkg}^{-1}]$	47	39.54±2.46	36.08	19.92	109.55	284
N _{mic}	$[\text{mgkg}^{-1}]$	47	114.39±6.31	101.25	44.70	208.64	1872
N _{min}	$[\text{mgkg}^{-1}]$	47	1.61±0.15	1.55	0.00	4.10	1
TOC	[%]	47	5.09±0.25	4.61	1.82	9.68	3
TON	[%]	47	0.36±0.02	0.34	0.16	0.71	0.1
bacterial 16S	$[\text{gene copies}]$	45	5.3e+08±7.8e+07	3.7e+08	5.1e+07	2.7e+09	2.8e+17
fungal 18S	$[\text{gene copies}]$	45	6.4e+06±7.3e+05	4.6e+06	8.3e+05	2.1e+07	2.5e+13
Flowers & Berries							
basal respiration	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	0.24±0.02	0.21	0.09	0.72	0.1
C _{mic}	$[\text{mgkg}^{-1}]$	52	790.84±36.5	781.81	279.91	1462.61	69262
C _{min}	$[\text{gCO}_2 - \text{Ckg}^{-1}]$	52	0.15±0.01	0.13	0.06	0.46	0.1
DOC	$[\text{mgkg}^{-1}]$	52	160.2±8.94	145.94	62.33	415.26	4155
DON	$[\text{mgkg}^{-1}]$	52	41.1±2.74	35.27	18.95	113.34	390
N _{mic}	$[\text{mgkg}^{-1}]$	52	139.22±7.09	130.49	42.31	297.24	2615
N _{min}	$[\text{mgkg}^{-1}]$	52	1.78±0.17	1.71	0.00	5.34	2
TOC	[%]	52	4.63±0.22	4.62	1.63	9.53	2
TON	[%]	52	0.32±0.02	0.31	0.13	0.78	0.1
bacterial 16S	$[\text{gene copies}]$	50	7.2e+08±8.4e+07	5.9e+08	8.8e+07	3.3e+09	3.7e+17
fungal 18S	$[\text{gene copies}]$	50	5.5e+06±7.0e+05	3.9e+06	8.0e+05	2.8e+07	2.5e+13
Lawn							
basal respiration	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	0.22±0.01	0.20	0.08	0.39	0.1
C _{mic}	$[\text{mgkg}^{-1}]$	71	901.3±31.49	822.41	459.93	1593.98	70400
C _{min}	$[\text{gCO}_2 - \text{Ckg}^{-1}]$	71	0.14±0.01	0.13	0.07	0.25	0.1
DOC	$[\text{mgkg}^{-1}]$	71	146.83±6.55	136.44	85.03	435.56	3051
DON	$[\text{mgkg}^{-1}]$	71	39.5±1.68	36.60	17.23	95.54	201
N _{mic}	$[\text{mgkg}^{-1}]$	71	160.11±6.36	154.56	80.47	357.83	2874
N _{min}	$[\text{mgkg}^{-1}]$	71	1.7±0.14	1.58	0.00	5.85	1
TOC	[%]	71	4.37±0.18	4.22	2.24	9.89	2
TON	[%]	71	0.32±0.01	0.31	0.10	0.82	0.1
bacterial 16S	$[\text{gene copies}]$	68	7.4e+08±7.2e+07	5.2e+08	8.3e+07	2.5e+09	3.7e+17
fungal 18S	$[\text{gene copies}]$	68	4.4e+06±4.3e+05	3.0e+06	6.0e+05	1.8e+07	1.3e+13
Metals							
Vegetables							
As	$[\text{mgkg}^{-1}]$	47	9.2±0.56	8.90	3.20	27.70	14
Ba	$[\text{mgkg}^{-1}]$	47	393.37±20.39	366.90	275.20	1014.00	19546
Co	$[\text{mgkg}^{-1}]$	47	31.35±0.58	31.50	21.20	38.50	16
Cu.m	$[\text{mgkg}^{-1}]$	47	89.36±10.73	62.60	28.70	407.30	5408
Ni	$[\text{mgkg}^{-1}]$	47	40.5±1.21	39.30	22.50	58.30	69
Pb	$[\text{mgkg}^{-1}]$	47	157.45±17.81	120.10	39.30	528.70	14903
Sb	$[\text{mgkg}^{-1}]$	47	1.31±0.22	0.60	0.40	9.80	2
V	$[\text{mgkg}^{-1}]$	47	80.32±1.75	80.60	53.50	105.60	145
Zn	$[\text{mgkg}^{-1}]$	47	283.33±24.6	236.60	114.10	966.50	28434
Flowers & Berries							
As	$[\text{mgkg}^{-1}]$	51	9.01±0.51	8.60	0.50	21.00	13
Ba	$[\text{mgkg}^{-1}]$	51	390.85±21.38	346.30	230.70	841.20	23764
Co	$[\text{mgkg}^{-1}]$	51	31.62±0.71	32.60	21.60	45.40	27
Cu.m	$[\text{mgkg}^{-1}]$	51	73.25±7.57	61.00	26.00	339.70	2981
Ni	$[\text{mgkg}^{-1}]$	51	37.15±1.17	34.80	24.60	58.00	71
Pb	$[\text{mgkg}^{-1}]$	51	207.27±26.27	119.80	40.50	709.80	35895
Sb	$[\text{mgkg}^{-1}]$	51	2.17±0.66	0.70	0.40	33.00	22
V	$[\text{mgkg}^{-1}]$	51	75.29±2.06	73.40	50.60	114.90	221
Zn	$[\text{mgkg}^{-1}]$	51	298.07±27.35	225.30	103.90	999.90	38896
Lawn							
As	$[\text{mgkg}^{-1}]$	70	9.82±0.33	10.30	2.60	16.80	8
Ba	$[\text{mgkg}^{-1}]$	70	375.95±18.47	331.80	201.80	1062.00	24217
Co	$[\text{mgkg}^{-1}]$	70	31.66±0.55	32.35	18.30	43.80	21
Cu.m	$[\text{mgkg}^{-1}]$	70	68.93±6.9	50.20	15.60	336.20	3379
Ni	$[\text{mgkg}^{-1}]$	70	40.66±1.15	40.15	20.30	80.10	94
Pb	$[\text{mgkg}^{-1}]$	70	156.87±22.62	80.65	18.50	1076.00	36312
Sb	$[\text{mgkg}^{-1}]$	70	1.88±0.57	0.70	0.40	39.10	23
V	$[\text{mgkg}^{-1}]$	70	82.68±1.86	79.95	44.10	117.90	246
Zn	$[\text{mgkg}^{-1}]$	70	237.65±20.48	188.50	58.90	869.40	29767

		N	Mean±SE	Median	Min	Max	Variance
CLPP MicroResp							
Vegetables							
Ala	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.4±0.17	3.42	0.77	5.96	1
Ara	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.56±0.17	3.70	1.21	6.26	1
Asc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	9.03±0.24	9.24	1.98	11.12	3
Asp	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.57±0.18	3.63	1.37	7.02	1
Citr	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	10.52±0.26	11.10	3.18	11.94	3
Cys	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	2.25±0.17	1.92	0.62	5.25	1
Fruct	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	4.66±0.2	4.62	1.27	7.58	2
GABA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	2.42±0.15	2.31	0.77	5.64	1
Gal	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.41±0.19	3.48	1.04	8.31	2
Glca	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.36±0.16	3.39	1.41	5.62	1
Gln	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	3.48±0.16	3.57	1.01	6.15	1
Gluc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	4.98±0.2	5.13	1.72	7.94	2
H2O	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	1.9±0.17	1.56	0.67	7.32	1
KGA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	10.68±0.22	11.14	3.26	12.19	2
Leu	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	2.37±0.15	2.10	0.68	5.89	1
MA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	10.48±0.27	11.21	1.94	12.06	4
Prot	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	2.38±0.14	2.16	0.83	4.70	1
Van	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	2.39±0.18	2.18	0.96	8.26	1
Xyl	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	47	4.83±0.2	4.78	1.24	7.85	2
Flowers & Berries							
Ala	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	3.88±0.14	3.77	1.58	6.05	1
Ara	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	4.25±0.15	4.45	1.36	6.12	1
Asc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	9.69±0.17	10.04	4.55	11.30	2
Asp	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	4.07±0.13	4.15	2.17	6.53	1
Citr	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	10.74±0.19	11.24	6.19	12.08	2
Cys	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.57±0.14	2.30	0.95	4.62	1
Fruct	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	5.6±0.17	5.66	3.12	7.69	1
GABA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.76±0.14	2.58	0.96	5.07	1
Gal	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	4.08±0.15	4.11	1.62	5.91	1
Glca	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	4.34±0.14	4.59	1.25	6.20	1
Gln	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	4.07±0.15	4.01	1.72	6.25	1
Gluc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	5.82±0.16	5.82	3.24	7.88	1
H2O	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.05±0.13	1.80	0.61	4.80	1
KGA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	10.93±0.16	11.31	6.81	12.02	1
Leu	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.66±0.14	2.52	0.75	5.10	1
MA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	10.79±0.21	11.40	4.21	12.11	2
Prot	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.68±0.14	2.36	0.97	5.40	1
Van	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	2.65±0.12	2.60	1.07	4.62	1
Xyl	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	52	5.61±0.13	5.53	3.68	7.38	1
Lawn							
Ala	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	3.96±0.11	4.16	1.95	6.32	1
Ara	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	4.62±0.11	4.65	2.41	6.33	1
Asc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	9.08±0.17	9.37	4.82	11.12	2
Asp	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	4.13±0.11	4.28	1.95	6.20	1
Citr	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	10.2±0.2	10.69	3.54	12.03	3
Cys	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.76±0.13	2.66	0.85	5.67	1
Fruct	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	5.8±0.11	5.74	2.29	7.56	1
GABA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.82±0.11	2.69	1.29	5.27	1
Gal	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	4.33±0.11	4.21	2.46	6.67	1
Glca	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	4.31±0.14	4.25	0.90	6.70	1
Gln	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	4.05±0.11	4.05	2.47	5.84	1
Gluc	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	6.01±0.12	6.10	3.84	8.06	1
H2O	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.18±0.13	1.92	0.62	4.85	1
KGA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	10.56±0.18	11.01	3.23	12.10	2
Leu	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.79±0.11	2.80	1.16	5.28	1
MA	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	10.16±0.23	10.81	2.90	11.99	4
Prot	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.82±0.11	2.80	1.04	5.10	1
Van	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	2.77±0.12	2.55	1.10	6.06	1
Xyl	$[\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}]$	71	5.81±0.1	5.82	3.44	7.80	1
Tea bag decomposition							
Vegetables							
green tea	$[\% \text{ decomposed}]$	45	0.57±0.01	0.57	0.49	0.71	0.01
rooibos tea	$[\% \text{ decomposed}]$	45	0.29±0.01	0.30	0.20	0.38	0.01
Flowers & Berries							
green tea	$[\% \text{ decomposed}]$	49	0.58±0.01	0.58	0.52	0.70	0.01
rooibos tea	$[\% \text{ decomposed}]$	49	0.30±0.01	0.30	0.22	0.38	0.01
Lawn							
green tea	$[\% \text{ decomposed}]$	67	0.60±0.01	0.59	0.53	0.75	0.01
rooibos tea	$[\% \text{ decomposed}]$	67	0.29±0.01	0.29	0.23	0.39	0.01

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