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.
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 | allotment | home | total sites |
|----------------------|-----------|------|-------------|
| 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$_2$O$_{demin}$ and added 25 µl 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 µl 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 [µg 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         |
| Sugar               | 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               | Destilled water                | H$_2$O       |
Table S3. qCPR assays for fungal and bacterial gene copy numbers.

We extracted DNA from 135 mg of lyophilised soil using the FastDNA®-96 Soil Microbe DNA Kit (MP Bio). qPCR assays were conducted on a BioRad CFX™ Real-Time system with a C1000 Touch™ 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 60°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).

| Physical indicators | N  | Mean±SE | Median | Min | Max | Variance |
|---------------------|----|---------|--------|-----|-----|----------|
| BD [g cm⁻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±0.44 | 34.15 | 18.65| 49.15| 28       |
| WHC [%]             | 170| 81.56±0.93 | 80.36 | 54.17| 145.99| 146      |

| Chemical indicators | N  | Mean±SE | Median | Min | Max | Variance |
|---------------------|----|---------|--------|-----|-----|----------|
| Biological indicators |     |         |        |     |     |          |
| CLPP MicroResp      |     |         |        |     |     |          |
| Ala µg CO₂ - Cg⁻¹h⁻¹ | 170| 3.78±0.08 | 3.77  | 0.77| 6.32 | 1        |
| Ara µg CO₂ - Cg⁻¹h⁻¹ | 170| 4.21±0.09 | 4.30  | 1.21| 6.33 | 1        |
| Asc µg CO₂ - Cg⁻¹h⁻¹ | 170| 9.25±0.11 | 9.64  | 1.98| 11.30| 2        |
| Asp µg CO₂ - Cg⁻¹h⁻¹ | 170| 3.95±0.08 | 3.98  | 1.73| 7.02 | 1        |
| Cit µg CO₂ - Cg⁻¹h⁻¹ | 170| 10.45±0.13| 11.06 | 3.18| 12.08| 3        |
| Cys µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.56±0.08 | 2.40  | 0.62| 5.67 | 1        |
| Fruct µg CO₂ - Cg⁻¹h⁻¹ | 170| 5.42±0.10 | 5.49  | 1.27| 7.69 | 2        |
| GABA µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.69±0.08 | 2.52  | 0.77| 5.64 | 1        |
| Gal µg CO₂ - Cg⁻¹h⁻¹ | 170| 4.00±0.09 | 4.03  | 1.04| 8.31 | 1        |
| Glu µg CO₂ - Cg⁻¹h⁻¹ | 170| 4.06±0.09 | 4.14  | 0.90| 6.70 | 1        |
| Gin µg CO₂ - Cg⁻¹h⁻¹ | 170| 3.90±0.08 | 3.87  | 1.01| 6.25 | 1        |
| Gluc µg CO₂ - Cg⁻¹h⁻¹ | 170| 5.67±0.09 | 5.72  | 1.72| 8.06 | 1        |
| H₂O µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.06±0.08 | 1.78  | 0.61| 7.32 | 1        |
| KGA µg CO₂ - Cg⁻¹h⁻¹ | 170| 10.71±0.11| 11.22 | 3.23| 12.19| 2        |
| Leu µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.63±0.08 | 2.53  | 0.68| 5.89 | 1        |
| MA µg CO₂ - Cg⁻¹h⁻¹ | 170| 10.44±0.14| 11.17 | 1.94| 12.11| 3        |
| Prot µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.65±0.08 | 2.52  | 0.83| 5.40 | 1        |
| Van µg CO₂ - Cg⁻¹h⁻¹ | 170| 2.63±0.08 | 2.52  | 0.96| 8.26 | 1        |
| Xyl µg CO₂ - Cg⁻¹h⁻¹ | 170| 5.48±0.09 | 5.52  | 1.24| 7.85 | 1        |

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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 \([g/cm^3]\)       | 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 \([g/cm^3]\)       | 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 \([mg/kg]\)        | 84 | 1.59±0.07| 1.51  | 0.19 | 3.88 | 0.1      |
| Cu \([mg/kg]\)       | 84 | 39.14±4.14| 27.41 | 7.40 | 209.10| 1438     |
| EC \([\mu Scm^{-1}]\) | 84 | 175.47±4.77| 167.50| 82.20| 354.00| 1914     |
| Fe \([mg/kg]\)       | 84 | 390.44±13.94| 384.55| 154.50| 699.80| 16335    |
| K \([mg/kg]\)        | 84 | 191.9±14.41| 157.67| 47.34| 831.34| 17447    |
| Mg \([mg/kg]\)       | 84 | 519.52±20.4 | 504.15| 150.60| 1125.00| 34942    |
| Mn \([mg/kg]\)       | 84 | 297.32±14.56| 262.65| 93.27| 632.50| 17819    |
| P \([mg/kg]\)        | 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 \([mg/kg]\)        | 86 | 1.16±0.07| 0.96  | 0.14 | 3.71 | 0.1      |
| Cu \([mg/kg]\)       | 86 | 25.62±1.75| 22.49 | 3.04 | 93.00| 263      |
| EC \([\mu Scm^{-1}]\) | 86 | 193.15±3.83| 190.25| 120.50| 331.00| 1262     |
| Fe \([mg/kg]\)       | 86 | 348.64±9.31| 348.85| 190.10| 583.00| 7461     |
| K \([mg/kg]\)        | 86 | 140.36±12.29| 104.19| 43.91| 748.42| 12990    |
| Mg \([mg/kg]\)       | 86 | 513.39±16.9 | 500.70| 143.60| 1015.00| 24560    |
| Mn \([mg/kg]\)       | 86 | 295.18±8.58| 275.40| 151.60| 479.80| 6330     |
| P \([mg/kg]\)        | 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      |
### Biological indicators

| Allotment | N     | Mean±SE | Median | Min   | Max   | Variance |
|-----------|-------|---------|--------|-------|-------|----------|
| basal respiration | 84 | 0.24±0.01 | 0.22   | 0.10  | 0.72  | 0.1      |
| C_mic     | 84   | 734.96±27.3 | 705.63 | 301.62 | 1548.41 | 62612    |
| C_min     | 84   | 0.16±0.01  | 0.15   | 0.07  | 0.46  | 0.1      |
| DOC       | 84   | 164.81±7   | 149.67 | 79.63 | 435.56 | 4119     |
| DON       | 84   | 39.6±1.84  | 35.23  | 19.62 | 109.55 | 285      |
| N_mic     | 84   | 125.55±5.38 | 119.67 | 44.70 | 357.83 | 2434     |
| N_min     | 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 | 81 | 6.3e+08±5.6e+07 | 5.0e+08 | 5.1e+07 | 2.5e+09 | 2.6e+17  |
| fungal 18S | 80 | 5.5e+06±4.4e+05 | 4.3e+06 | 7.0e+05 | 2.0e+07 | 1.7e+13  |

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| Allotment | N     | Mean±SE | Median | Min   | Max   | Variance |
|-----------|-------|---------|--------|-------|-------|----------|
| basal respiration | 86 | 0.23±0.01 | 0.20   | 0.08  | 0.69  | 0.1      |
| C_mic     | 86   | 879.88±29.78 | 835.92 | 279.91 | 1593.98 | 76252    |
| C_min     | 86   | 0.14±0.01  | 0.12   | 0.06  | 0.42  | 0.1      |
| DOC       | 86   | 151.77±5.81 | 136.58 | 62.33 | 336.93 | 2903     |
| DON       | 86   | 40.39±1.79  | 38.57  | 17.23 | 113.34 | 276      |
| N_mic     | 86   | 156.25±5.71 | 153.82 | 42.31 | 305.35 | 2800     |
| N_min     | 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 | 82 | 7.3e+08±7.1e+07 | 5.1e+08 | 8.3e+07 | 3.3e+09 | 4.3e+17  |
| fungal 18S | 83 | 5.1e+06±5.4e+05 | 2.9e+06 | 6.0e+05 | 2.8e+07 | 2.5e+13  |

### Metals

| Allotment | N     | Mean±SE | Median | Min   | Max   | Variance |
|-----------|-------|---------|--------|-------|-------|----------|
| 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 [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    |

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| Allotment | N     | Mean±SE | Median | Min   | Max   | Variance |
|-----------|-------|---------|--------|-------|-------|----------|
| 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 [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    |
## CLPP MicroResp Allotment

|       | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------|----|---------|--------|------|------|----------|
| Ala   | 84 | 3.53±0.12 | 3.54   | 0.77 | 6.32 |          |
| Ara   | 84 | 3.88±0.12 | 3.97   | 1.21 | 6.08 |          |
| Asc   | 84 | 9.07±0.17 | 9.22   | 1.98 | 11.30|          |
| Asp   | 84 | 3.70±0.12 | 3.79   | 1.37 | 7.02 |          |
| Citr  | 84 | 10.29±0.2 | 11.01  | 3.18 | 12.08|          |
| Cys   | 84 | 2.42±0.11 | 2.30   | 0.62 | 5.67 |          |
| Fruct | 84 | 5.07±0.15 | 5.15   | 1.27 | 7.62 |          |
| GABA  | 84 | 2.45±0.09 | 2.41   | 0.77 | 5.14 |          |
| Gal   | 84 | 3.68±0.13 | 3.67   | 1.04 | 8.31 |          |
| Glca  | 84 | 3.57±0.14 | 3.79   | 0.90 | 6.70 |          |
| Glu   | 84 | 3.68±0.11 | 3.67   | 1.01 | 5.84 |          |
| Gluc  | 84 | 5.32±0.14 | 5.44   | 1.72 | 8.01 |          |
| H2O   | 84 | 1.87±0.11 | 1.56   | 0.61 | 7.32 |          |
| KGA   | 84 | 10.69±0.17| 11.14  | 3.23 | 11.96|          |
| Leu   | 84 | 2.44±0.10 | 2.46   | 0.68 | 5.89 |          |
| MA    | 84 | 10.35±0.21| 11.08  | 1.94 | 12.11|          |
| Prot  | 84 | 2.47±0.10 | 2.37   | 0.83 | 5.10 |          |
| Van   | 84 | 2.46±0.12 | 2.23   | 0.96 | 8.26 |          |
| Xyl   | 84 | 5.18±0.14 | 5.43   | 1.24 | 7.38 |          |

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|       | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------|----|---------|--------|------|------|----------|
| Ala   | 86 | 4.03±0.11| 4.06   | 1.77 | 6.05 |          |
| Ara   | 86 | 4.54±0.11| 4.63   | 1.96 | 6.33 |          |
| Asc   | 86 | 9.43±0.15| 9.72   | 4.55 | 11.12|          |
| Asp   | 86 | 4.20±0.10| 4.32   | 2.17 | 6.53 |          |
| Citr  | 86 | 10.61±0.15| 11.10  | 6.61 | 12.03|          |
| Cys   | 86 | 2.69±0.12| 2.48   | 0.85 | 5.59 |          |
| Fruct | 86 | 5.76±0.11| 5.79   | 3.12 | 7.69 |          |
| GABA  | 86 | 2.93±0.12| 2.77   | 1.15 | 5.64 |          |
| Gal   | 86 | 4.31±0.11| 4.31   | 2.25 | 6.67 |          |
| Glca  | 86 | 4.54±0.10| 4.66   | 1.77 | 6.20 |          |
| Glu   | 86 | 4.12±0.11| 4.07   | 1.72 | 6.25 |          |
| Gluc  | 86 | 6.00±0.11| 6.11   | 3.24 | 8.06 |          |
| H2O   | 86 | 2.25±0.12| 1.99   | 0.67 | 4.85 |          |
| KGA   | 86 | 10.72±0.14| 11.25  | 6.81 | 12.19|          |
| Leu   | 86 | 2.82±0.11| 2.76   | 1.05 | 5.28 |          |
| MA    | 86 | 10.53±0.18| 11.25  | 4.21 | 12.06|          |
| Prot  | 86 | 2.83±0.11| 2.76   | 1.04 | 5.40 |          |
| Van   | 86 | 2.79±0.11| 2.60   | 1.10 | 5.25 |          |
| Xyl   | 86 | 5.76±0.10| 5.75   | 3.65 | 7.85 |          |

## Tea bag decomposition

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|       | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------|----|---------|--------|------|------|----------|
| green tea [% decomposed] | 84 | 0.58±0.01| 0.58   | 0.49 | 0.69 | 0.01    |
| rooibos tea [% decomposed] | 84 | 0.29±0.01| 0.29   | 0.20 | 0.35 | 0.01    |

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|       | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------|----|---------|--------|------|------|----------|
| green tea [% decomposed] | 77 | 0.60±0.01| 0.59   | 0.53 | 0.75 | 0.01    |
| rooibos tea [% decomposed] | 77 | 0.30±0.01| 0.30   | 0.22 | 0.39 | 0.01    |
### Supplementary Material

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

| Physical indicators | N | Mean±SE | Median | Min | Max | Variance |
|---------------------|---|---------|--------|-----|-----|----------|
| **Vegetables**      |   |         |        |     |     |          |
| BD [g cm⁻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      |
| **Lawn**            |   |         |        |     |     |          |
| BD [g cm⁻³]         | 71| 1.12±0.02| 1.13 | 0.57 | 1.45 | 0        |
| Clay [%]            | 71| 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      |
| **Flowers & Berries** |   |         |        |     |     |          |
| BD [g cm⁻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 [mg kg⁻¹]         | 47| 1.87±0.09 | 1.78 | 0.45 | 3.71 | 0.1      |
| Cu [mg kg⁻¹]        | 47| 39.04±5.2 | 27.87 | 8.86 | 209.10 | 1269     |
| EC [µScm⁻¹]         | 47| 174.14±6.33 | 166.00 | 82.20 | 283.00 | 1880     |
| Fe [mg kg⁻¹]        | 47| 400.52±18.53 | 386.80 | 157.90 | 678.20 | 16132    |
| K [mg kg⁻¹]         | 47| 231.15±20.97 | 209.30 | 51.83 | 748.42 | 20665    |
| Mg [mg kg⁻¹]        | 47| 568.94±27.88 | 561.50 | 150.60 | 1125.00 | 36520    |
| Mn [mg kg⁻¹]        | 47| 296.2±17.41 | 264.20 | 93.27 | 602.40 | 14245    |
| P [mg kg⁻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 [mg kg⁻¹]         | 52| 1.34±0.09 | 1.23 | 0.19 | 3.70 | 0.1      |
| Cu [mg kg⁻¹]        | 52| 31.06±3.73 | 23.37 | 7.40 | 177.10 | 723      |
| EC [µScm⁻¹]         | 52| 187.84±6.44 | 178.20 | 124.20 | 354.00 | 2159     |
| Fe [mg kg⁻¹]        | 52| 364.86±13.81 | 359.90 | 210.70 | 600.10 | 9922     |
| K [mg kg⁻¹]         | 52| 155.61±15.34 | 118.75 | 47.34 | 691.92 | 12240    |
| Mg [mg kg⁻¹]        | 52| 500.59±19.65 | 486.35 | 188.70 | 868.70 | 20074    |
| Mn [mg kg⁻¹]        | 52| 282.73±12.23 | 258.20 | 124.40 | 556.00 | 7773     |
| P [mg kg⁻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 [mg kg⁻¹]         | 71| 1.06±0.07 | 0.99 | 0.14 | 3.88 | 0.1      |
| Cu [mg kg⁻¹]        | 71| 28.75±3.21 | 20.65 | 3.04 | 138.80 | 731      |
| EC [µScm⁻¹]         | 71| 188.7±3.91 | 187.80 | 117.40 | 276.00 | 1085     |
| Fe [mg kg⁻¹]        | 71| 351.87±12.26 | 335.90 | 154.50 | 699.80 | 10680    |
| K [mg kg⁻¹]         | 71| 130.06±12.64 | 107.40 | 43.91 | 831.34 | 11336    |
| Mg [mg kg⁻¹]        | 71| 493.25±20.58 | 504.40 | 143.60 | 1080.00 | 34870    |
| Mn [mg kg⁻¹]        | 71| 306.16±13.82 | 270.10 | 118.50 | 632.50 | 13558    |
| P [mg kg⁻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      |
## Supplementary Material

### Biological indicators

#### Vegetables

| Metric                  | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------------------------|----|---------|--------|------|------|----------|
| Basal respiration (μg CO₂-C g⁻¹ h⁻¹) | 47 | 0.26±0.02 | 0.22   | 0.10 | 0.69 | 0.1      |
| Cmic (mg kg⁻¹)          | 47 | 687.02±43.92 | 639.76 | 301.62 | 1362.47 | 60630    |
| Cmin (μg CO₂-C g⁻¹)     | 47 | 0.18±0.01 | 0.14   | 0.07  | 0.42 | 0.1      |
| DOC (mg kg⁻¹)           | 47 | 173.21±8.34 | 155.00 | 79.63  | 336.93 | 3270     |
| DON (mg kg⁻¹)           | 47 | 39.54±2.46 | 36.08  | 19.92  | 109.55 | 284      |
| Nmic (mg kg⁻¹)          | 47 | 114.39±6.31 | 101.25 | 44.70  | 208.64 | 1872     |
| Nmin (mg kg⁻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      |

#### Fungi

| Metric                  | N  | Mean±SE | Median | Min  | Max  | Variance |
|-------------------------|----|---------|--------|------|------|----------|
| Basal respiration (μg CO₂-C g⁻¹ h⁻¹) | 52 | 0.24±0.02 | 0.21   | 0.09  | 0.72 | 0.1      |
| Cmic (mg kg⁻¹)          | 52 | 790.84±36.5 | 781.81 | 279.91 | 1462.61 | 69262    |
| Cmin (μg CO₂-C g⁻¹)     | 52 | 0.15±0.01 | 0.13   | 0.06  | 0.46 | 0.1      |
| DOC (mg kg⁻¹)           | 52 | 160.2±8.94 | 145.94 | 62.33  | 415.26 | 4155     |
| DON (mg kg⁻¹)           | 52 | 41.7±2.74 | 35.27  | 18.95  | 113.34 | 390      |
| Nmic (mg kg⁻¹)          | 52 | 139.22±7.09 | 130.49 | 42.31  | 297.24 | 2615     |
| Nmin (mg kg⁻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      |

#### Metals

| Metric | N  | Mean±SE | Median | Min  | Max  | Variance |
|--------|----|---------|--------|------|------|----------|
| As     | 47 | 9.2±0.56 | 8.90   | 3.20  | 27.70 | 14       |
| Co     | 47 | 393.37±20.39 | 366.90 | 275.20 | 1014.90 | 19546    |
| Cu     | 47 | 31.35±0.58 | 31.50  | 21.20  | 38.50 | 16       |
| Ni     | 47 | 89.36±10.73 | 82.60  | 28.70  | 407.30 | 5408     |
| Pb     | 47 | 40.5±1.21 | 39.30  | 22.50  | 58.30 | 69       |
| Zn     | 47 | 157.45±17.81 | 120.10 | 39.30  | 528.70 | 14903    |
| Sb     | 47 | 1.31±0.22 | 0.60   | 0.40  | 9.80 | 2        |
| V      | 47 | 80.32±1.75 | 80.60  | 53.50  | 105.60 | 145      |
| Mn     | 47 | 283.33±24.6 | 236.60 | 114.10 | 966.50 | 28434    |

#### Fungi

| Metric | N  | Mean±SE | Median | Min  | Max  | Variance |
|--------|----|---------|--------|------|------|----------|
| As     | 51 | 9.01±0.51 | 8.60   | 0.50  | 21.00 | 13       |
| Ba     | 51 | 390.85±21.38 | 346.30 | 230.70 | 841.20 | 23764    |
| Co     | 51 | 31.62±0.71 | 32.70  | 21.60  | 45.40 | 27       |
| Cu     | 51 | 73.25±7.57 | 61.00  | 26.00  | 339.70 | 2981     |
| Ni     | 51 | 37.15±1.71 | 34.80  | 24.60  | 58.00 | 71       |
| Pb     | 51 | 207.27±26.27 | 119.80 | 40.50  | 709.80 | 35958    |
| Sn     | 51 | 2.17±0.66 | 0.70   | 0.40  | 33.00 | 22       |
| V      | 51 | 75.29±2.06 | 73.40  | 50.60  | 114.90 | 221      |
| Mn     | 51 | 298.07±27.35 | 225.30 | 103.90 | 999.90 | 38896    |

#### Lawn

| Metric | N  | Mean±SE | Median | Min  | Max  | Variance |
|--------|----|---------|--------|------|------|----------|
| As     | 70 | 9.82±0.33 | 10.30  | 2.60  | 16.80 | 8        |
| Ba     | 70 | 375.95±18.47 | 331.80 | 201.80 | 1062.00 | 24217    |
| Co     | 70 | 31.66±0.55 | 32.35  | 18.30  | 43.80 | 21       |
| Cu     | 70 | 68.93±6.9 | 50.20  | 15.60  | 336.20 | 3379     |
| Ni     | 70 | 40.66±1.15 | 40.15  | 20.30  | 80.10 | 94       |
| Pb     | 70 | 156.87±22.62 | 80.65  | 18.50  | 1076.00 | 36312    |
| Sb     | 70 | 1.88±0.57 | 0.70   | 0.40  | 39.10 | 23       |
| V      | 70 | 82.68±1.86 | 79.95  | 44.10  | 117.90 | 246      |
| Zn     | 70 | 237.65±20.48 | 188.50 | 58.90  | 869.40 | 29767    |
### CLPP MicroResp

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| Ala | 47 | 3.4±0.17 | 3.42 | 0.77 | 5.96 | 1 |
| Ara | 47 | 3.56±0.17 | 3.70 | 1.21 | 6.26 | 1 |
| Asc | 47 | 9.03±0.24 | 9.24 | 1.98 | 11.12 | 3 |
| Asp | 47 | 3.57±0.18 | 3.63 | 1.37 | 7.02 | 1 |
| Citr | 47 | 10.52±0.26 | 11.10 | 3.18 | 11.94 | 3 |
| Cys | 47 | 2.25±0.17 | 1.92 | 0.62 | 5.25 | 1 |
| Fruct | 47 | 4.66±0.2 | 4.62 | 1.27 | 7.58 | 2 |
| GABA | 47 | 2.42±0.15 | 2.31 | 0.77 | 5.64 | 1 |
| Gal | 47 | 3.41±0.19 | 3.48 | 1.04 | 8.31 | 2 |
| Glca | 47 | 3.36±0.16 | 3.39 | 1.41 | 5.62 | 1 |
| Gln | 47 | 3.48±0.16 | 3.57 | 1.01 | 6.15 | 1 |
| Gluc | 47 | 4.98±0.2 | 5.13 | 1.72 | 7.94 | 2 |
| HZO | 47 | 1.9±0.17 | 1.56 | 0.67 | 7.32 | 1 |
| KGA | 47 | 10.68±0.22 | 11.14 | 3.26 | 12.19 | 2 |
| Leu | 47 | 2.37±0.15 | 2.10 | 0.68 | 5.89 | 1 |
| MA | 47 | 10.48±0.27 | 11.21 | 1.94 | 12.06 | 4 |
| Prot | 47 | 2.38±0.14 | 2.16 | 0.83 | 4.70 | 1 |
| Van | 47 | 2.39±0.18 | 2.18 | 0.96 | 8.26 | 1 |
| Xyl | 47 | 4.83±0.2 | 4.78 | 1.24 | 7.85 | 2 |

### Flowers & Berries

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| Ala | 52 | 3.88±0.14 | 3.77 | 1.58 | 6.05 | 1 |
| Ara | 52 | 4.25±0.15 | 4.45 | 1.36 | 6.12 | 1 |
| Asc | 52 | 9.69±0.17 | 10.04 | 4.35 | 11.30 | 2 |
| Asp | 52 | 4.07±0.13 | 4.15 | 2.17 | 6.53 | 1 |
| Citr | 52 | 10.74±0.19 | 11.24 | 6.19 | 12.08 | 2 |
| Cys | 52 | 2.57±0.14 | 2.30 | 0.95 | 4.62 | 1 |
| Fruct | 52 | 5.6±0.17 | 5.66 | 3.12 | 7.69 | 1 |
| GABA | 52 | 2.76±0.14 | 2.58 | 0.96 | 5.07 | 1 |
| Gal | 52 | 4.08±0.15 | 4.11 | 1.62 | 5.91 | 1 |
| Glca | 52 | 4.34±0.14 | 4.59 | 1.25 | 6.20 | 1 |
| Gln | 52 | 4.07±0.15 | 4.01 | 1.72 | 6.25 | 1 |
| Gluc | 52 | 5.82±0.16 | 5.82 | 3.24 | 7.88 | 1 |
| HZO | 52 | 2.05±0.13 | 1.80 | 0.61 | 4.80 | 1 |
| KGA | 52 | 10.93±0.16 | 11.31 | 6.81 | 12.02 | 1 |
| Leu | 52 | 2.66±0.14 | 2.52 | 0.75 | 5.10 | 1 |
| MA | 52 | 10.79±0.21 | 11.40 | 4.21 | 12.11 | 2 |
| Prot | 52 | 2.68±0.14 | 2.36 | 0.97 | 5.40 | 1 |
| Van | 52 | 2.65±0.12 | 2.60 | 1.07 | 4.62 | 1 |
| Xyl | 52 | 5.61±0.13 | 5.53 | 3.68 | 7.38 | 1 |

### Lawn

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| Ala | 71 | 3.96±0.11 | 4.16 | 1.95 | 6.32 | 1 |
| Ara | 71 | 4.62±0.11 | 4.65 | 2.41 | 6.33 | 1 |
| Asc | 71 | 9.08±0.17 | 9.37 | 4.82 | 11.12 | 2 |
| Asp | 71 | 4.13±0.11 | 4.28 | 1.95 | 6.20 | 1 |
| Citr | 71 | 10.2±0.2 | 10.69 | 3.54 | 12.03 | 3 |
| Cys | 71 | 2.76±0.13 | 2.66 | 0.85 | 5.67 | 1 |
| Fruct | 71 | 5.8±0.11 | 5.74 | 2.29 | 7.56 | 1 |
| GABA | 71 | 2.82±0.11 | 2.69 | 1.29 | 5.27 | 1 |
| Gal | 71 | 4.33±0.11 | 4.21 | 2.46 | 6.67 | 1 |
| Glca | 71 | 4.31±0.14 | 4.25 | 0.90 | 6.70 | 1 |
| Glu | 71 | 4.05±0.11 | 4.05 | 2.47 | 5.84 | 1 |
| HZO | 71 | 6.01±0.12 | 6.10 | 3.84 | 8.06 | 1 |
| KGA | 71 | 10.56±0.18 | 11.01 | 3.23 | 12.10 | 2 |
| Leu | 71 | 2.79±0.11 | 2.80 | 1.16 | 5.28 | 1 |
| MA | 71 | 10.16±0.23 | 10.81 | 2.90 | 11.99 | 4 |
| Prot | 71 | 2.82±0.11 | 2.80 | 1.04 | 5.10 | 1 |
| Van | 71 | 2.77±0.12 | 2.55 | 1.10 | 6.06 | 1 |
| Xyl | 71 | 5.81±0.1 | 5.82 | 3.44 | 7.80 | 1 |

### Tea bag decomposition

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| green tea | 45 | 0.57±0.01 | 0.57 | 0.49 | 0.71 | 0.01 |
| rooibos tea | 45 | 0.29±0.01 | 0.30 | 0.20 | 0.38 | 0.01 |

### Flowers & Berries

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| green tea | 49 | 0.58±0.01 | 0.58 | 0.52 | 0.70 | 0.01 |
| rooibos tea | 49 | 0.30±0.01 | 0.30 | 0.22 | 0.38 | 0.01 |

### Lawn

| Vegetables | N | Mean±SE | Median | Min | Max | Variance |
|------------|---|---------|--------|-----|-----|----------|
| green tea | 67 | 0.60±0.01 | 0.59 | 0.53 | 0.75 | 0.01 |
| rooibos tea | 67 | 0.29±0.01 | 0.29 | 0.23 | 0.39 | 0.01 |
REFERENCES

Campbell, C. D., Chapman, S. J., Cameron, C. M., Davidson, M. S., and Potts, J. M. (2003). A rapid microtiter plate method to measure carbon dioxide evolved from carbon substrate amendments so as to determine the physiological profiles of soil microbial communities by using whole soil. *Applied and environmental microbiology* 69, 3593–3599.

Frey, D., Vega, K., Zellweger, F., Ghazoul, J., Hansen, D., and Moretti, M. (2018). Predation risk shaped by habitat and landscape complexity in urban environments. *Journal of Applied Ecology* 55, 2343–2353. doi:10.1111/1365-2664.13189

Keuskamp, J. A., Dingemans, B. J. J., Lehtinen, T., Sarneel, J. M., and Hefting, M. M. (2013). Tea Bag Index: A novel approach to collect uniform decomposition data across ecosystems. *Methods in Ecology and Evolution* 4, 1070–1075. doi:10.1111/2041-210X.12097

Liu, C. M., Aziz, M., Kachur, S., Hsueh, P.-R., Huang, Y.-T., Keim, P., et al. (2012). BactQuant: an enhanced broad-coverage bacterial quantitative real-time PCR assay. *BMC microbiology* 12, 56.

Tresch, S., Moretti, M., Le Bayon, R.-C., Mäder, P., Zanetta, A., Frey, D., et al. (2018). A Gardener’s Influence on Urban Soil Quality. *Frontiers in Environmental Science* 6. doi:10.3389/fenvs.2018.00025

Vainio, E. J. and Hantula, J. (2000). Direct analysis of wood-inhabiting fungi using denaturing gradient gel electrophoresis of amplified ribosomal DNA. *Mycological Research* 104, 927–936. doi:10.1017/S0953756200002471