

Appendix

Litter decomposition driven by soil fauna, plant diversity and soil management in urban gardens

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Appendix A. Tables

Table A.1: Trait measurements of *Zea mays* leaf and stem litter used for the decomposition experiment. For each litter type ten randomised samples were measured. Differences in traits were investigated with a non-parametrical Wilcoxon rank sum test.

	Leaf	Stem	P	
N [%]	2.4 ± 0.04	0.62 ± 0.02	<0.001	***
C [%]	43 ± 0.06	44 ± 0.07	0.01	**
C to N ratio	18 ± 0.3	71 ± 3	<0.001	***
pH	6 ± 0.009	5.7 ± 0.01	<0.001	***
Labile A [$A.U.cm^{-1}$]	10 ± 0.6	11 ± 0.6	0.44	
Labile B [$A.U.cm^{-1}$]	1.6 ± 0.04	1.7 ± 0.04	0.31	
Labile C [$A.U.cm^{-1}$]	0.09 ± 0.005	0.14 ± 0.007	<0.001	***
Stable D [$A.U.cm^{-1}$]	0.31 ± 0.03	0.5 ± 0.05	0.01	*
Stable E [$A.U.cm^{-1}$]	0.6 ± 0.04	0.81 ± 0.05	0.01	*
Stable F [$A.U.cm^{-1}$]	0.47 ± 0.01	0.04 ± 0.008	<0.001	***
Stable G [$A.U.cm^{-1}$]	0.059 ± 0.003	0.16 ± 0.008	<0.001	***
Stable H [$A.U.cm^{-1}$]	0.066 ± 0.002	0.12 ± 0.004	<0.001	***
leaf tensile strength [$MegaNm^{-2}$]	1.2 ± 0.06	4.4 ± 0.3	<0.001	***

Table A.2: Soil mesofauna extraction temperature values and time for the high temperature and moisture gradient MacFadyen extractor. Best extraction time and temperature values has been reviewed from the literature [12, 13, 1].

Time [d]	1	2	3	4	5	6	7
Temperature [$^{\circ}C$]	20	25	30	35	40	50	60

Table A.3: 19 substrates used for the assessment of the Community level physiological profile (CLPP) based on the MicroResp™ technique [3]. We dissolved 18 substrates in H_2O_{deion} 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 (10 g, 20 g, 30 g and 40 g) 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 [$\mu\text{gCO}_2 - \text{Cg}^{-1}\text{h}^{-1}$] was $y = -4.67 + 2.90$ with an R^2 of 0.87.

Compound category	Substrate
Amino acid	gamma-aminobutyric acid
	alanine
	aspartic acid
	glutamine
	leucine
	cysteine
Amino sugar	glucosamine
	arabinose
	galactose
	glucose
	fructose
Carboxylic acid	ascorbic acid
	citric acid
	malic acid
	alpha-keto-glutaric acid
	protocatechuic acid
Phenolic acid	vanillic acid
Hemicellulose	xylan
Water	H_2O

Table A.4: Descriptive statistics of biodiversity components per soil fauna taxa. Species and trait list used for the calculation of the biodiversity components are shown in Table A.5. Presented values are mean values with standard errors. S = species richness, N = abundance. All gardens n=168, crops n=46, forbs n=52, grass n=70, allotment n=82, home n=86, urban warming class 1 n=34, urban warming class 2 n=114, urban warming class 3 n=20.

	S	N	S _{Earthworms}	S _{Isopods}	S _{Gastropods}	S _{Collembola}	N _{Earthworms}	N _{Isopods}	N _{Gastropods}	N _{Collembola}
All gardens	20.3±0.4	162±10	2.9±0.1	4.1±0.1	6.4±0.2	7±0.2	7.2±0.6	70.3±8.4	2.6±0.2	79.7±6.1
Land-use types										
Crops	18.6±0.7	115±14	3.3±0.3	4.2±0.2	5.0±0.3	6.1±0.4	11.2±1.6	54.1±13.3	1.5±0.2	45.3±4.5
Forbs	21.9±0.8	162±22	3.0±0.2	4.1±0.2	8.2±0.4	6.6±0.4	5.8±0.8	103.5±20.7	3.6±0.3	47.2±7.4
Grass	20.2±0.6	192±14	2.5±0.2	3.9±0.2	5.9±0.3	7.9±0.3	5.5±0.8	56.3±9.1	2.5±0.2	126.5±11
Garden types										
Allotment	20.7±0.6	147±13	3.1±0.2	4.4±0.2	6.2±0.3	7.0±0.3	8.4±0.9	55.9±11.2	2.4±0.2	77.8±8.3
Home	19.9±0.5	177±14	2.7±0.2	3.7±0.2	6.6±0.3	7.0±0.3	6.0±0.8	84.1±12.3	2.7±0.2	81.6±8.9
Urban warming classes										
Class 1	21.3±1.0	120±13	3.3±0.3	4.4±0.3	6.4±0.5	7.2±0.5	8.6±1.4	35.8±9.1	2.9±0.4	71.4±8.8
Class 2	20.3±0.5	154±10	2.8±0.2	4.2±0.1	6.1±0.3	7.1±0.3	7.1±0.8	57.2±7.0	2.3±0.2	85.3±8.1
Class 3	18.8±1.2	274±46	2.5±0.3	2.3±0.3	7.8±0.9	6.1±0.8	5.3±1.1	203.8±47.2	3.3±0.5	62±15.5

Table A.5: Species names and traits table. Species names were matched with Hinchliff et al. [9], while stars indicate that only the genus was found on the open tree of life data base [9]. Number of collembola species = 39, number of earthworm species = 18, number of gastropod species = 47 and number of ispod species = 16.

Taxa	Species	Vertical distribution	Body size [mm]	Reference
Collembola	<i>Bourletiella hortensis</i>	surface	0.18	Ellers et al. [5]
	<i>Ceratophysella bengtssoni</i>	mixed	0.13	Ellers et al. [5]
	<i>Ceratophysella denticulata</i>	mixed	0.18	Ellers et al. [5]
	<i>Choreutinula inermis</i>	mixed	0.15	Ellers et al. [5]
	<i>Cryptopygus thermophilus</i>	mixed	0.10	Ellers et al. [5]
	<i>Desoria violacea</i> *	mixed	0.24	Ellers et al. [5]
	<i>Dicyrtomina ornata</i>	surface	0.30	Ellers et al. [5]
	<i>Entomobrya marginata</i>	surface	0.20	Ellers et al. [5]
	<i>Entomobrya multifasciata</i>	surface	0.20	Ellers et al. [5]
	<i>Folsomia candida</i>	soil	0.30	Ellers et al. [5]
	<i>Folsomia quadrioculata</i>	mixed	0.25	Ellers et al. [5]
	<i>Folsomia similis</i>	soil	0.09	Hopkin [10]
	<i>Folsomia spinosa</i>	soil	0.11	Hopkin [10]
	<i>Folsomides parvulus</i>	soil	0.09	Ellers et al. [5]
	<i>Heteromurus nitidus</i>	soil	0.30	Ellers et al. [5]
	<i>Hypogastrura purpurescens</i>	mixed	0.23	Ellers et al. [5]
	<i>Isotoma viridis</i>	mixed	0.60	Ellers et al. [5]
	<i>Isotomiella minor</i>	soil	0.12	Ellers et al. [5]
	<i>Isotomurus balteatus</i>	mixed	0.13	Hopkin [10]
	<i>Isotomurus graminis</i>	mixed	0.30	Ellers et al. [5]
	<i>Isotomurus palustris</i>	mixed	0.34	Ellers et al. [5]
	<i>Kalaphorura burmeisteri</i> *	surface	0.31	Hopkin [10]
	<i>Lepidocyrtus cyaneus</i>	surface	0.15	Ellers et al. [5]
	<i>Lepidocyrtus lignorum</i>	surface	0.20	Ellers et al. [5]
	<i>Lepidocyrtus violaceus</i>	surface	0.16	Ellers et al. [5]
	<i>Megalothorax minimus</i>	soil	0.04	Ellers et al. [5]
	<i>Mesaphorura macrochaeta</i>	soil	0.07	Hopkin [10]
	<i>Metaphorura affinis</i>	soil	0.13	Ellers et al. [5]
	<i>Neanura muscorum</i>	mixed	0.35	Ellers et al. [5]
	<i>Onychiurus granulatus</i> *	soil	0.15	Ellers et al. [5]
	<i>Parisetoma notabilis</i>	mixed	0.10	Ellers et al. [5]
	<i>Pogonognathellus flavescens</i>	mixed	0.65	Ellers et al. [5]
	<i>Protaphorura pulvinata</i>	soil	0.17	Ellers et al. [5]
	<i>Pseudosinella alba</i>	soil	0.11	Ellers et al. [5]
	<i>Pseudosinella pseudopetterseni</i>	soil	0.18	Ellers et al. [5]
	<i>Schoettella ununguiculata</i>	mixed	0.17	Ellers et al. [5]
	<i>Sminthurinus aureus</i>	mixed	0.10	Ellers et al. [5]
	<i>Sphaeridia pumilis</i>	mixed	0.05	Ellers et al. [5]
	<i>Stenaphorura denisi</i>	soil	0.13	Ellers et al. [5]
Earthworms	<i>Allolobophora chlorotica</i>	soil	80.00	Blakemore [2]
	<i>Aporrectodea icterica</i>	soil	90.00	Blakemore [2]
	<i>Aporrectodea caliginosa</i>	soil	80.00	Blakemore [2]
	<i>Aporrectodea nocturna</i>	mixed	150.00	Blakemore [2]
	<i>Aporrectodea tuberculata</i>	soil	120.00	Blakemore [2]
	<i>Aporrectodea giardi</i>	mixed	250.00	Blakemore [2]
	<i>Aporrectodea longa</i>	mixed	170.00	Blakemore [2]
	<i>Aporrectodea ripicola</i> *	mixed	170.00	Blakemore [2]
	<i>Aporrectodea rosea</i>	soil	85.00	Blakemore [2]
	<i>Dendrobaena octaedra</i>	surface	60.00	Blakemore [2]
	<i>Dendrodrilus rubidus</i>	surface	60.00	Blakemore [2]
	<i>Dendrodrilus subrubicundus</i>	surface	90.00	Blakemore [2]
	<i>Lumbricus castaneus</i>	surface	60.00	Blakemore [2]
	<i>Lumbricus festivus</i>	surface	95.00	Blakemore [2]
	<i>Lumbricus rubellus</i>	surface	130.00	Blakemore [2]
	<i>Lumbricus terrestris</i>	mixed	250.00	Blakemore [2]
	<i>Octolasion cyaneum</i>	soil	140.00	Blakemore [2]
	<i>Octolasion lacteum</i>	soil	160.00	Blakemore [2]

Taxa	Species	vertical distribution	body size [mm]	Reference
Gastropoda	<i>Acicula lineata</i>	surface	3.75	Falkner et al. [6]
	<i>Aegopinella minor</i>	mixed	10.00	Falkner et al. [6]
	<i>Aegopinella nitens</i>	mixed	10.00	Falkner et al. [6]
	<i>Aegopinella pura</i>	surface	3.75	Falkner et al. [6]
	<i>Arion</i>	surface	80.00	Falkner et al. [6]
	<i>Boettgerilla pallens</i>	soil	60.00	Falkner et al. [6]
	<i>Carychium tridentatum</i>	mixed	1.25	Falkner et al. [6]
	<i>Cecilioides acicula</i>	soil	53.10	Falkner et al. [6]
	<i>Cepaea hortensis</i>	surface	22.50	Falkner et al. [6]
	<i>Cepaea nemoralis</i>	surface	22.50	Falkner et al. [6]
	<i>Cepaea</i>	surface	22.50	Falkner et al. [6]
	<i>Cochlicopa lubrica</i>	mixed	10.00	Falkner et al. [6]
	<i>Columella edentula</i>	surface	3.75	Falkner et al. [6]
	<i>Deroceras</i>	surface	30.00	Falkner et al. [6]
	<i>Discus rotundatus</i>	mixed	10.00	Falkner et al. [6]
	<i>Fruticicola fruticum</i>	surface	19.40	Falkner et al. [6]
	<i>Galba truncatula</i>	surface	2.75	Falkner et al. [6]
	<i>Helix pomatia</i>	surface	22.50	Falkner et al. [6]
	<i>Hygromia cinctella</i>	surface	10.00	Falkner et al. [6]
	<i>Laciniaria plicata</i>	mixed	10.00	Falkner et al. [6]
	<i>Limax maximus</i>	surface	150.00	Falkner et al. [6]
	<i>Macrogaster attenuata</i>	mixed	17.50	Falkner et al. [6]
	<i>Monachoides incarnatus</i>	mixed	13.10	Falkner et al. [6]
	<i>Nesovitrea hammonis</i>	mixed	3.75	Falkner et al. [6]
	<i>Oxychilus cellarius</i>	soil	10.00	Falkner et al. [6]
	<i>Oxychilus draparnaudi</i>	mixed	13.10	Falkner et al. [6]
	<i>Oxychilus *</i>	mixed	11.55	Falkner et al. [6]
	<i>Paralaoma servilis</i>	mixed	1.25	Falkner et al. [6]
	<i>Punctum pygmaeum</i>	mixed	1.25	Falkner et al. [6]
	<i>Pupilla muscorum</i>	surface	3.75	Falkner et al. [6]
	<i>Succinea putris</i>	surface	13.13	Falkner et al. [6]
	<i>Succinea oblonga</i>	mixed	10.00	Falkner et al. [6]
	<i>Tandonia budapestensis</i>	surface	35.00	Falkner et al. [6]
	<i>Trochulus clandestinus</i>	mixed	10.00	Falkner et al. [6]
	<i>Trochulus sericeus</i>	surface	10.00	Falkner et al. [6]
	<i>Trochulus</i>	mixed	10.00	Falkner et al. [6]
	<i>Vallonia costata</i>	mixed	2.50	Falkner et al. [6]
	<i>Vallonia excentrica</i>	surface	1.88	Falkner et al. [6]
	<i>Vallonia pulchella</i>	mixed	2.50	Falkner et al. [6]
	<i>Vallonia</i>	mixed	2.29	Falkner et al. [6]
	<i>Vertigo antivertigo</i>	surface	1.25	Falkner et al. [6]
	<i>Vertigo pusilla</i>	mixed	1.25	Falkner et al. [6]
	<i>Vertigo pygmaea</i>	mixed	1.25	Falkner et al. [6]
	<i>Vertigo</i>	mixed	1.25	Falkner et al. [6]
	<i>Vitrea contracta</i>	soil	2.50	Falkner et al. [6]
	<i>Vitrea crystallina</i>	mixed	3.75	Falkner et al. [6]
	<i>Vitrinobrachium breve</i>	soil	3.75	Falkner et al. [6]
Isopoda	<i>Androniscus roseus</i>	soil	0.35	Vandel [20]
	<i>Armadillidium nasatum</i>	surface	2.05	Vandel [20]
	<i>Armadillidium versicolor</i>	surface	1.75	Vandel [20]
	<i>Armadillidium vulgare</i>	surface	1.73	Vandel [20]
	<i>Cylisticus convexus</i>	soil	1.35	Vandel [20]
	<i>Haplophthalmus danicus</i>	soil	0.40	Vandel [20]
	<i>Haplophthalmus menzei</i>	soil	0.30	Vandel [20]
	<i>Hyloniscus riparius</i>	soil	0.80	Vandel [20]
	<i>Ligidium hypnorum</i>	surface	0.87	Vandel [20]
	<i>Oniscus asellus</i>	surface	1.63	Vandel [20]
	<i>Philoscia muscorum</i>	surface	1.06	Vandel [20]
	<i>Platyarthrus hoffmannseggii</i>	soil	0.30	Vandel [20]
	<i>Porcellio scaber</i>	surface	1.51	Vandel [20]
	<i>Porcellionides pruinosus</i>	mixed	1.05	Vandel [20]
	<i>Trachelipus rathkii</i>	surface	1.40	Vandel [20]
	<i>Trichoniscus pygmaeus</i>	soil	0.22	Vandel [20]

Table A.6: Management questions asked of all 85 participating urban gardeners of this study. Management intensity index was calculated as a scaled sum (divided by the number of questions) of all 26 garden management questions on a five level Likert scale. For the land-use type grass we considered nine questions: MowGrass, FstCutGrass, FertGrass, WaterGrass, CareGrass, PestGrass, FlowerIslands, Weeds, Leaves. For forbs ten questions: FertForbs, WaterForbs, PestForbs, DiggingForbs, ForkForbs, CutTrees, PestTrees, Leaves, DrySticks, Weeds and for crops eleven questions: FertCrops, WaterCrops, PestCrops, CropRotate, MixCult, Mulch, GreenFert, DiggingCrops, ForkCrops, DrySticks, Weeds. Higher factor levels indicate higher management intensity. Questions were originally asked in German.

PestGrass How often do you use pesticides, fungicides or herbicides to protect your lawn? Never (1) Less than once per year (2) 1 to 3 times per year (3) 4 to 10 times per year (4) More than 10 times per year (5)	PestForbs How often do you use pesticides, fungicides or herbicides (without slug pellets) to protect your flowers? Never (1) Less than once per year (2) 1 to 3 times per year (3) 4 to 10 times per year (4) More than 10 times per year (5)	PestCrops How often do you use pesticides, fungicides or herbicides (without slug pellets) to protect your vegetables? Never (1) Less than once per year (2) 1 to 3 times per year (3) 4 to 10 times per year (4) More than 10 times per year (5)
FertGrass How often do you use fertilisers for your lawn? Never (1) 4 to 5 times per year (2) 2 to 3 times per year (3) once a year (4) More than once a year (5)	FertCrops How often do you use fertilisers for your vegetables? Never (1) 2 to 3 times per year (2) Once a year (3) 2 to 3 times per year (4) More than three per year (5)	FertForbs How often do you use fertilisers for your flowers? Never (1) 2 to 3 times per year (2) Once a year (3) 2 to 3 times per year (4) More than three per year (5)
Weeds How often do you remove most of the weeds in your garden? Never (1) Rarely (2) Sometimes (3) Often (4) Very often (5)	PestTrees How often do you use insecticides, fungicides or herbicides to protect our trees and shrubs? Never (1) Less than once a year (2) 1 to 3 times per year (3) 4 to 10 times per year (4) More than 10 times per year (5)	Leaves How often do you remove most of the leaves in your garden? Never (1) Spring (2) Autumn (3) Every 2 to 3 weeks (4) Weekly in autumn (5)
MowGrass How often do you mow your lawn per year? 1 to 2 (1) 3 to 4 (2) 5 to 8 (3) 9 to 20 (4) over 20 (5)	MixCult Do you follow the principle of mixed cultivation (planting different varieties of vegetables and/or flowers in the same cultivation plot)? Never (5) Rarely (4) Sometimes (3) Mostly (2) Always (1)	FlowerIslands Do you leave islands of flowers when you mow your lawn? Never (5) Rarely (4) Sometimes (3) Mostly (2) Always (1)

WaterGrass

How often do you water your lawn?

- Never (1)
- When dry (2)
- once a week (3)
- twice a week (4)
- More than twice a week (5)

CareGrass

How often do you scarify your lawn (including reseeding)?

- Never (1)
- Every 6 to 10 years (2)
- Every 4 to 5 years (3)
- Every 2 to 3 years (4)
- Annually (5)

DrySticks

Do you leave withered flowers and sticks during the winter in your garden?

- Never (5)
- Rarely (4)
- Sometimes (3)
- Mostly (2)
- Always (1)

CropRotate

Do you consider changing flower beds (crop rotation) for the vegetables grown annually?

- Never (5)
- Rarely (4)
- Sometimes (3)
- Mostly (2)
- Always (1)

ForkForbs

How often do you loosening your soil with a fork without turning it around (or milling)?

- More than once per year (5)
- Once per year (4)
- Every 2 years or less (3)
- Every 3 years or less (2)
- Never (1)

WaterCrops

How often do you water your vegetable beds?

- Never (1)
- When dry (2)
- once a week (3)
- twice a week (4)
- More than twice a week (5)

DiggingForbs

How often do you till your soil in the flower beds?

- Never (1)
- Every 3 years or less (2)
- Every two years (3)
- Once per year (4)
- More than once per year (5)

FstCutGrass

When is the first time point of cutting your lawn?

- April (5)
- May (4)
- Start June (3)
- End June (2)
- After June (1)

GreenFert

Do you grow plants for green manure?

- Never (5)
- Rarely (4)
- Sometimes (3)
- Mostly (2)
- Always (1)

ForkCrops

How often do you loosening your soil with a fork without turning it around (or milling)?

- More than once per year (5)
- Once per year (4)
- Every 2 years or less (3)
- Every 3 years or less (2)
- Never (1)

WaterForbs

How often do you water your flower beds?

- Never (1)
- When dry (2)
- once a week (3)
- twice a week (4)
- More than twice a week (5)

DiggingCrops

How often do you till your soil in the vegetable beds?

- Never (1)
- Every 3 years or less (2)
- Every two years (3)
- Once per year (4)
- More than once per year (5)

Mulch

Do you use organic material (mulch) to cover your vegetable beds?

- Never (5)
- Rarely (4)
- Sometimes (3)
- Mostly (2)
- Always (1)

WeedingHerbicide

Do you use commercial herbicides?

- No (0)
- Yes (1)

CutTrees

How often do you cut most of your forbs and trees?

- More than once per year (5)
- Once a year (4)
- Every 2 years (3)
- Every 3 to 5 years (2)
- Less than every 5 years (1)

Table A.7: Model selection based on goodness of fit statistics for LMEM, the widely applicable information criterion (WAIC), a Bayesian version of the AIC [21] and explained variance of the fixed effects R^2_{Marginal} and including the random effect and the fixed effects $R^2_{\text{Conditional}}$. Model 1 included the selected biodiversity indices species richness (S), species evenness (E_{Shannon}), phylogenetic species variability (PSV), trait even distribution (TED) and the garden ID as random effect : $\text{lmer}(\log(100 - \text{response} + 1) \sim S + E_{\text{Shannon}} + \text{PSV} + \text{TED} + (1|\text{Garden_ID}), \text{REML} = F)$. Model 2 included garden land-use and garden type in addition to predictor variables of the previous model 1. For model 3 we included the multiple substrate-induced respiration rate (MSIR) as a measure for microbial activity. For model 4 we added urban warming. All fixed effects have been standardised (mean=0, standard deviation=1). R^2 based on fixed and random effects were calculated according to Nakagawa and Schielzeth [14].

Litter type	models	WAIC	R^2_{Marginal}	$R^2_{\text{Conditional}}$
Leaf 4mm	model 1	561.6 \pm 11.4	0.07	0.30
	model 2	529.8 \pm 12.2	0.20	0.53
	model 3	528.0 \pm 12.2	0.22	0.54
	model 4	523.0 \pm 13.9	0.26	0.55
Stem 4mm	model 1	-137.0 \pm 17.7	0.11	0.17
	model 2	-200.2 \pm 15.9	0.37	0.61
	model 3	-203.4 \pm 16.5	0.39	0.62
	model 4	-203.4 \pm 16.5	0.43	0.63
Leaf 1mm	model 1	365.1 \pm 27.6	0.11	0.11
	model 2	361.7 \pm 31.3	0.16	0.19
	model 3	358.1 \pm 29.6	0.19	0.24
	model 4	359.4 \pm 29.4	0.19	0.24
Stem 1mm	model 1	-86.1 \pm 26.00	0.13	0.13
	model 2	-129.8 \pm 23.6	0.35	0.54
	model 3	-129.5 \pm 24.0	0.35	0.54
	model 4	-139.2 \pm 22.8	0.41	0.56

Table A.8: Litter decomposition models for leaf and stem litter types and 1 and 4 mm mesh sizes. LMEM fixed effects were calculated using a simulated Bayesian inference posterior distribution. Bold numbers indicate significant fixed effects, with credible intervals not crossing zero. Number of observations for 4 mm litter bags $n=154$ and for 1mm litter bags $n=122$, due to missing litter bags from the garden sites. Garden ID was set as random factor. LMEM model: $\text{lmer}(\log(100 - \text{decomposition} + 1) \sim \text{MSIR} + S + E_{\text{Shannon}} + \text{PSV} + \text{TED} + \text{urban_warming} + \text{land_use_types} + \text{garden_types} + (1|\text{Garden_ID}))$. E_{Shannon} : Shannon evenness, MSIR: Multiple substrate-induced respiration of microorganisms, PSV: Phylogenetic species variability, S: Soil fauna species richness, TED: Trait even distribution.

Fixed effects	Leaf 4mm [log(g)]		Stem 4mm [log(g)]		Fixed effects	Leaf 1mm [log(g)]		Stem 1mm [log(g)]	
	50%	(97.5%; 2.5%)	50%	(97.5%; 2.5%)		50%	(97.5%; 2.5%)	50%	(97.5%; 2.5%)
MSIR	0.24	(0.48; 0.01)	0.03	(0.05; 0.01)	MSIR	0.11	(0.23;-0.01)	0.03	(0.06; 0.01)
S	0.29	(0.53; 0.04)	0.01	(0.04;-0.01)	S	-0.10	(0.03;-0.22)	0.03	(0.06; 0.01)
E_{Shannon}	0.13	(0.40;-0.14)	0.01	(0.02;-0.03)	E_{Shannon}	-0.03	(0.09;-0.15)	0.03	(0.06; 0.01)
PSV	-0.03	(0.20;-0.25)	0.01	(0.02;-0.02)	PSV	-0.11	(0.01;-0.24)	-0.02	(0.01;-0.06)
TED	-0.05	(0.17;-0.26)	-0.01	(0.01;-0.03)	TED	0.09	(0.20;-0.02)	0.01	(0.03;-0.02)
Urban warming	0.45	(0.76; 0.14)	0.04	(0.07; 0.01)	Urban warming	0.10	(0.22;-0.03)	0.06	(0.10; 0.03)
Land-use types: forbs	0.35	(0.92;-0.22)	0.06	(0.11; 0.01)	Land-use types: forbs	0.03	(0.33;-0.27)	0.08	(0.15; 0.01)
Land-use types: grass	1.10	(1.60; 0.61)	0.16	(0.21; 0.12)	Land-use types: grass	0.34	(0.64; 0.03)	0.17	(0.25; 0.09)
Garden types: home	0.00	(0.62;-0.61)	0.04	(0.09;-0.02)	Garden types: home	0.09	(0.34;-0.17)	0.01	(0.09;-0.06)

Table A.9: Litter decomposition grouped by garden land-use types, management and urban warming classes (A-D). Tea bag index (TBI) decomposition is described in Tresch et al. [18]. Question disturbance is related to the combined management answers (yes/no) of major soil disturbances ("DiggingVeg", "DiggingFlower", "CareLawn"); pesticides is related to the use of pesticides ("PestLawn", "PestVeg", "PestFlower", "PestTrees", "WeedingHerbicide"); compost is related to the use of compost ("FertLawnCompost", "FertVegCompost", "FertFlowerCompost") and water to the application of additional water ("WaterLawn", "WaterVeg", "WaterFlower"). Individual management questions can be found in Table A.6. Urbanisation intensity was investigated as urban warming classes. Decomposition [%] is given as a mean decomposition rate including standard error values. Differences were investigated with a non-parametrical Wilcoxon rank sum test and if more than two groups with a LMEM with garden ID as random effect and analysed with a Bayesian approach including means and 95 % credible intervals of the Bayesian inference posterior distributions following Kormer-Nievergelt et al. [11]. Significant values are bold printed.

A

Litter type	N	Fixed effects [log(g)]		
		Decomposition [%]	50%	97.5% 2.5%
Leaf 4mm	69	79.59±2.21		
Stem 4mm	62	37.89±0.84	-2.04	-1.82 -2.28
Leaf 1mm	90	61.15±1.95		
Stem 1mm	65	40.07±0.96	-0.63	-0.51 -0.76
Leaf 1mm	90	61.15±1.95		
Leaf 4mm	69	79.59±2.21	1.37	1.61 1.12
Stem 1mm	65	40.07±0.96		
Stem 4mm	62	37.89±0.84	-0.04	-0.01 -0.07

B Decomposition per land-use type

Land-use types	Leaf 4mm				Stem 4mm				Leaf 1mm				Stem 1mm				TBI green tea				TBI rootbas tea			
	Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]			
	N	Decomposition (%)	50%	97.5% 2.5%	N	Decomposition (%)	50%	97.5% 2.5%	N	Decomposition (%)	50%	97.5% 2.5%	N	Decomposition (%)	50%	97.5% 2.5%	N	Decomposition (%)	50%	97.5% 2.5%	N	Decomposition (%)	50%	97.5% 2.5%
crops	31	61.79±5.57	0.7	1.26 0.15	31	30.45±1.88	0.11	0.16 0.06	29	45.08±5.33	0.17	0.46 -0.12	27	39.09±1.55	0.13	0.2 0.05	39	57.86±0.67	0.01	0.06 -0.04	39	29.28±0.53	0.01	0.06 -0.04
forbs	33	80.66±3.52	1.34	1.83 0.84	34	37.89±1.20	0.19	0.24 0.15	29	56.23±3.54	0.56	0.82 0.29	31	46.00±0.96	0.25	0.31 0.18	45	58.64±0.60	0.06	0.11 0.02	45	29.54±0.54	0.034	0.024 -0.017
grass	30	90.34±1.76			36	42.82±0.88			43	69.63±2.19			31	46.00±0.96			59	60.31±0.66			59	29.48±0.45	0.034	0.024 -0.017

C Decomposition per urban warming class

Urban warming classes	Leaf 4mm				Stem 4mm				Leaf 1mm				Stem 1mm				TBI green tea				TBI rooibos tea						
			Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]				Fixed effects [log(g)]								
	N	Decomposition [%]	50%	97.5%	2.5%	N	Decomposition [%]	50%	97.5%	2.5%	N	Decomposition [%]	50%	97.5%	2.5%	N	Decomposition [%]	50%	97.5%	2.5%	N	Decomposition [%]	50%	97.5%	2.5%		
Class 1	27	70.90±5.26	0.63	1.28	-0.01	25	33.68±2.09	0.07	0.13	0.01	24	53.6±6.08	0.02	0.31	-0.26	23	34.29±2.82	0.09	0.17	0.01	29	57.33±0.70	0.05	0.1	0.01	29	28.59±0.65
Class 2	50	79.85±2.77	1.32	2.22	0.41	55	38.05±0.99	0.15	0.24	0.07	61	59.4±2.38	0.49	0.97	0.01	47	40.01±1.28	0.32	0.45	0.18	88	59.36±0.47	0.09	0.16	0.01	98	29.51±0.35
Class 3	12	91.92±2.84				15	43.71±1.52				10	73.4±3.06				9	52.15±3.25				16	60.83±1.30				16	30.50±0.81

D Decomposition per garden management

Management question		Leaf 4mm				Stem 4mm				Leaf 1mm				Stem 1mm				TBI green tea				TBI rooibos tea			
		group	N	Decomposition [%]	P	group	N	Decomposition [%]	P	group	N	Decomposition [%]	P	group	N	Decomposition [%]	P	group	N	Decomposition [%]	P	group	N	Decomposition [%]	P
disturbance	no	33	85.39±2.73	0.04	*	40	40.83±1.08	0.01	**	42	63.7±3.12	0.08	30	42.41±1.26	0.06	61	59.66±0.59	0.16	61	29.77±0.44	0.37				
	yes	48	75.56±3.18			53	35.85±1.16			53	56.13±3.00		46	37.87±1.80		82	58.71±0.51		82	29.18±0.38					
pesticides	no	44	77.92±3.12	0.54		52	37.16±1.15	0.34		58	59.34±3.00	0.60	45	39.26±1.57	0.48	81	59.05±0.54	0.74	81	29.77±0.37	0.28				
	yes	40	81.74±3.09			38	38.83±1.21			40	59.27±3.09		34	40.62±1.77		62	59.20±0.56		62	28.99±0.45					
compost	no	33	76.52±3.86	0.24		35	37.84±1.44	0.99		33	59.50±3.75	0.80	27	40.67±1.77	0.72	49	59.37±0.66	0.69	49	28.99±0.53	0.18				
	yes	52	81.21±2.70			53	37.92±1.03			59	59.22±2.72		50	39.36±1.53		94	58.98±0.48		94	29.67±0.34					
water	no	8	88.69±4.14	0.97		8	38.62±2.22	0.94		6	60.67±6.75	0.60	5	43.00±1.87	0.78	8	59.65±1.39	0.56	8	29.52±1.10	0.99				
	yes	66	79.08±2.32			62	37.85±0.87			75	59.24±2.29		58	39.61±1.24		135	59.08±0.40		135	29.43±0.30					

E Decomposition per garden land-use type and management

Management question	Land-use types	Group	Leaf 4mm			Stem 4mm			Leaf 1mm			Stem 1mm			TBI green tea			TBI rooibos tea							
			N	Decomposition [%]	P	N	Decomposition [%]	P	N	Decomposition [%]	P	N	Decomposition [%]	P	N	Decomposition [%]	P	N	Decomposition [%]	P					
disturbance	crops	no	14	68.23 ± 8.44	0.45			13	35.33 ± 2.71	0.07			13	51.54 ± 8.95	0.26	12	35.58 ± 3.68	0.09	14	57.94 ± 0.88	0.67	14	30.32 ± 0.93	0.24	
		yes	20	58.08 ± 7.33				23	27.63 ± 2.39				17	40.66 ± 6.57		17	26.16 ± 4.36		25	57.81 ± 0.94		25	28.70 ± 0.62		
	forbs	no	15	88.76 ± 3.20	0.02	*		16	63.94 ± 4.55	0.01	**		16	63.94 ± 4.55	0.05	*	14	43.19 ± 1.45	0.01	23	59.57 ± 0.79	0.10	23	29.49 ± 0.76	0.88
		yes	21	73.20 ± 5.75				21	34.50 ± 1.77				15	48.97 ± 4.85		15	35.24 ± 2.34		22	57.66 ± 0.87		22	29.52 ± 0.79		
pesticides	grass	no	13	92.88 ± 1.87	0.58			20	43.56 ± 1.59	0.33			17	71.05 ± 2.81	0.81	16	46.05 ± 0.97	0.82	24	60.74 ± 1.16	0.79	24	29.73 ± 0.67	0.62	
		yes	21	89.07 ± 2.62			30	42.36 ± 1.04			31	68.73 ± 3.13		24	45.95 ± 1.38		35	60.01 ± 0.80		35	29.32 ± 0.61				
	crops	no	18	61.48 ± 7.89	0.98			20	29.96 ± 2.46	0.52			19	42.55 ± 7.27	0.65	21	29.07 ± 3.82	0.56	23	57.84 ± 0.98	0.79	23	29.43 ± 0.71	0.94	
		yes	15	62.28 ± 7.50				14	31.22 ± 3.00			11	49.91 ± 7.12		10	31.73 ± 5.31		16	57.89 ± 0.89		16	29.07 ± 0.81			
compost	forbs	no	19	79.37 ± 4.67	0.46			21	36.87 ± 1.51	0.29			22	59.63 ± 4.57	0.06	21	39.89 ± 2.03	0.22	26	57.76 ± 0.67	0.15	26	30.17 ± 0.63	0.12	
		yes	17	82.18 ± 5.44				20	39.09 ± 1.94			10	48.40 ± 4.47		9	37.25 ± 2.07		19	59.84 ± 1.05		19	28.58 ± 0.93			
	grass	no	20	88.91 ± 2.54	0.34			27	42.69 ± 1.33	0.80			26	70.87 ± 2.63	0.73	21	45.92 ± 1.38	0.59	32	60.97 ± 0.96	0.35	32	29.69 ± 0.60	0.68	
		yes	18	92.52 ± 2.39			23	42.98 ± 1.12			23	68.08 ± 3.71		19	46.10 ± 1.34		27	59.52 ± 0.90		27	29.24 ± 0.68				
water	crops	no	5	52.00 ± 20.5	0.89			5	26.40 ± 8.32	0.56			4	39.38 ± 16.7	0.65	4	26.88 ± 10.0	0.78	5	56.27 ± 1.59	0.31	5	29.10 ± 1.39	0.79	
		yes	29	63.15 ± 5.77				27	31.01 ± 1.86			26	45.89 ± 5.71		25	30.43 ± 3.26		34	58.09 ± 0.74		34	29.31 ± 0.58			
	forbs	no	18	74.91 ± 6.10	0.17			20	37.00 ± 1.99	0.88			12	51.58 ± 6.56	0.50	10	38.54 ± 3.05	0.74	21	59.58 ± 0.97	0.11	21	29.03 ± 0.78	0.46	
		yes	19	85.94 ± 3.57	0.02	*		23	38.70 ± 1.43	0.09			19	59.25 ± 3.99	0.43	19	44.62 ± 1.17	0.23	24	57.81 ± 0.71		24	29.92 ± 0.76		
grass	crops	no	18	83.17 ± 3.85	0.02	*		20	41.02 ± 1.49	0.09			20	68.24 ± 3.68	0.43	19	44.62 ± 1.17	0.23	23	59.84 ± 1.02	0.61	23	28.93 ± 0.84	0.20	
		yes	18	95.20 ± 1.02				27	43.96 ± 1.07			29	70.52 ± 2.75		22	46.88 ± 1.38		36	60.60 ± 0.88		36	29.84 ± 0.50			
	forbs	no	0					0				0			0		0		0			0			
		yes	31	61.79 ± 5.57				31	30.45 ± 1.88				28	29.98 ± 3.06		28	29.98 ± 3.06		39	57.86 ± 0.67		39	29.28 ± 0.53		
grass	crops	no	5	92.50 ± 5.14	0.38			5	40.40 ± 2.00	0.36			3	66.83 ± 13.5	0.47	3	44.50 ± 3.33	0.21	5	61.31 ± 1.45	0.07	5	30.56 ± 1.56	0.49	
		yes	30	79.28 ± 3.84				33	37.59 ± 1.32			26	55.17 ± 3.68		25	38.55 ± 1.65		40	58.30 ± 0.64		40	29.37 ± 0.58			
	grass	no	3	82.33 ± 6.33	0.09			3	35.67 ± 5.09	0.14			3	54.50 ± 2.52	0.03	*	3	41.50 ± 2.02	0.14	3	56.88 ± 2.23	0.20	3	27.78 ± 0.89	0.34
		yes	28	90.96 ± 1.82				35	43.19 ± 0.88			41	70.52 ± 2.25		29	46.26 ± 1.00		56	60.49 ± 0.68		56	29.58 ± 0.47			

Table A.10: Estimated LMEM coefficients of different response variables and fixed effect variables (A-C). Garden ID was set as random effect in all models. Given are the mean, the 2.5% and the 97.5% quantiles of the Bayesian posterior distribution. Bold numbers indicate significant fixed effects, with credible intervals not crossing zero [11].

A			
Response variables	Fixed effects		
	Forbs vs. Crops	Grass vs. Crops	
Plant species richness	-0.28 (-4.0;3.4)	-3.57 (-6.9;-0.2)	

B			
Response variables	Fixed effects		
	C _{mic}	Bacteria	Fungi
MSIR [$\mu\text{gCO}_2\text{-Cg}^{-1}\text{h}^{-1}$]	2.3e-02 (1.5e-02;3.1e-02)	6.1e-09 (1.9e-09;1.0e-08)	-4.3e-07 (-9.4e-07;9.7e-08)

C			
Response variables	Fixed effects		
	Urban warming	Forbs vs. Crops	Grass vs. Crops
pH	0.002 (-0.04;0.04)	0.044 (-0.05;0.13)	-0.061 (-0.14;0.02)

Table A.11: Alternative SEM including the effect of soil fauna abundance, as a proxy for soil fauna biomass, on litter decomposition (leaf litter 4 mm). SEM model goodness-of-fit outputs decreased in comparison to the original SEM (Table 4), with an increased AICc and a decreased P-value: AICc=356.8, Fisher's C=175.9, P-value=0.25. Marginal R^2 based on fixed effects and conditional R^2 based on fixed and random effects. Significant paths are highlighted in bold. BD: Soil bulk density, C_{mic} : Microbial biomass carbon, $E_{Shannon}$: Shannon evenness, MSIR: Multiple substrate-induced respiration of microorganisms, N_{min} : Nitrogen mineralisation, PSV: Phylogenetic species variability, S: Soil fauna species richness, N: Soil fauna species abundance, Sb: Antimony content, TED: Trait even distribution, TON: Total organic nitrogen, WHC: Water holding capacity.

Response	$R^2_{conditional}$	$R^2_{marginal}$	Predictor	Estimate	P	
Leaf 4 mm	0.56	0.24	Land-use types: grass	0.93±0.3	0.002	**
			Urban warming	0.44±0.2	0.01	**
			MSIR	0.31±0.1	0.02	*
			S	0.31±0.1	0.02	*
			Land-use types: forbs	0.21±0.3	0.48	
			TED	-0.07±0.1	0.55	
			N	-0.089±0.2	0.58	
			$E_{Shannon}$	0.084±0.2	0.65	
			PSV	-0.031±0.1	0.80	
			Garden types: home	-0.044±0.3	0.89	
MSIR	0.41	0.39	C_{mic}	0.30 ± 0.09	0.002	**
			Bacteria	0.18 ± 0.07	0.02	*
			S plants	0.15 ± 0.07	0.04	*
			Bare soil	-0.12 ± 0.08	0.12	
			Sun hours	-0.11 ± 0.07	0.14	
			WHC	0.12 ± 0.08	0.14	
			BD	-0.11 ± 0.09	0.21	
			Management index	-0.06 ± 0.07	0.40	
			S plants	0.20 ± 0.08	0.02	*
			Sb	-0.18 ± 0.08	0.03	*
S	0.39	0.19	Bare soil	-0.15 ± 0.08	0.07	
			N_{min}	0.14 ± 0.08	0.08	
			MSIR	0.14 ± 0.08	0.09	
			Remove leaves	-0.12 ± 0.09	0.17	
			Urban warming	-0.46 ± 0.08	<0.001	***
			MSIR	-0.19 ± 0.07	0.008	**
$E_{Shannon}$	0.54	0.36	PSV	0.16 ± 0.07	0.02	*
			S	0.16 ± 0.07	0.02	*
			TED	-0.14 ± 0.07	0.04	*
			Management index	0.09 ± 0.07	0.21	
			Urban warming	-0.24 ± 0.09	0.007	**
			Fertiliser	0.21 ± 0.09	0.02	*
PSV	0.29	0.10	Land-use types: grass	-0.38 ± 0.2	0.06	
			S	0.11 ± 0.09	0.20	
			TON	0.10 ± 0.09	0.24	
			Urban warming	-0.10 ± 0.09	0.25	
			Land-use types: forbs	-0.01 ± 0.20	0.98	
TED	0.22	0.07				

Appendix B. Figures

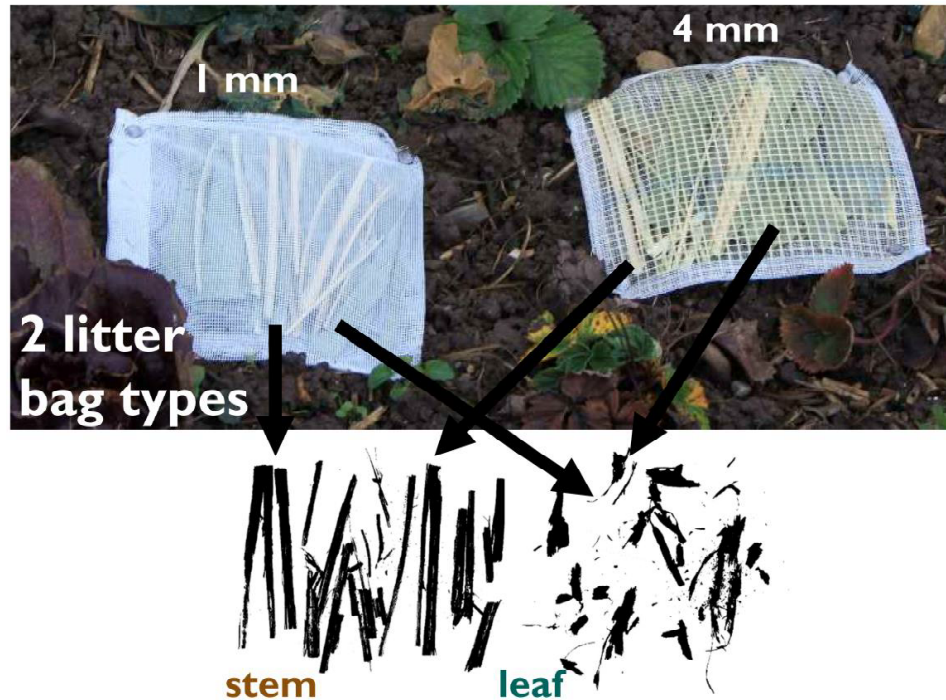
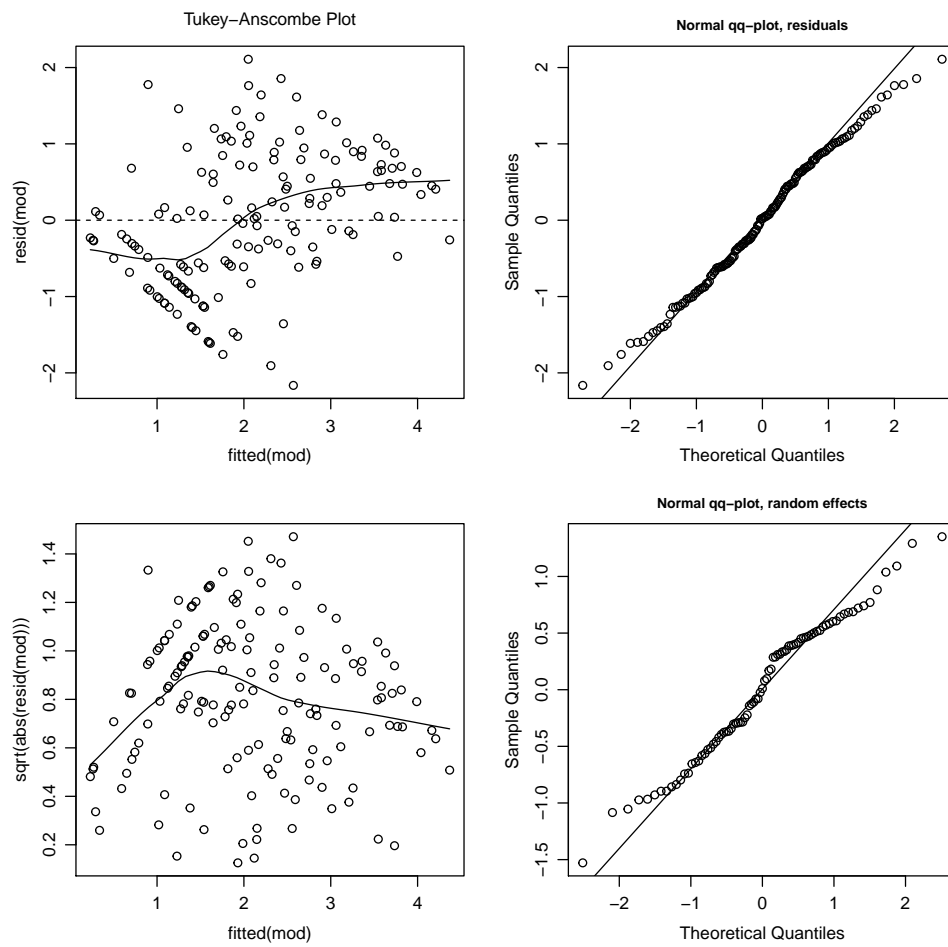


Figure B.1: Litter bag types used for the decomposition study. Litter bags (18 cm x 18 cm) were constructed in accordance with Finerty et al. [7], containing two mesh sizes of 1 mm and 4 mm, to evaluate the contribution of macrofauna decomposition. A fine mesh (1 mm) was used on the bottom for both litter bags to avoid loss of litter material. In addition, two types of litter sources were used to see effects of soil fauna on contrasting litter traits. Oven dried (40°C) leaf and stem material of *Zea mays* (only top 30 cm of the plant leaves) were used as litter materials. An amount of 2 ± 0.01 g of each leaf and stem pieces (16 ± 1 cm length) have been placed into the litter bags.

Response transformed



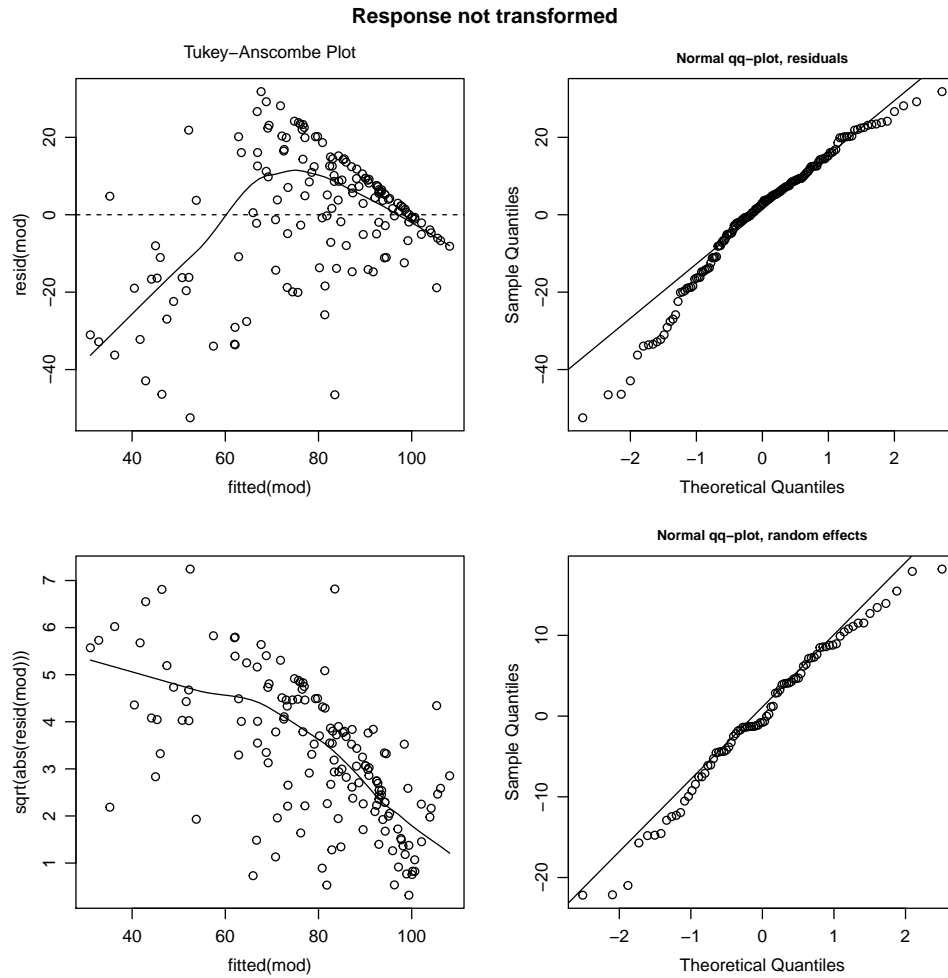


Figure B.2: Diagnostic residual and random effect plots for the assessment of model assumptions. Transformed model: $\text{lmer}(\log(100 - \text{response} + 1) \sim \text{MSIR} + S + E_{\text{Shannon}} + \text{PSV} + \text{TED} + \text{urban_warming} + \text{land_use_types} + \text{garden_types} + (1|\text{Garden_ID}), \text{REML} = F)$. Upper left: residuals versus fitted values. Upper right: Normal QQ plot of the residuals. Lower left: square-root of the absolute values of the residuals versus fitted values. Lower right: Normal QQ plot of the random effects.

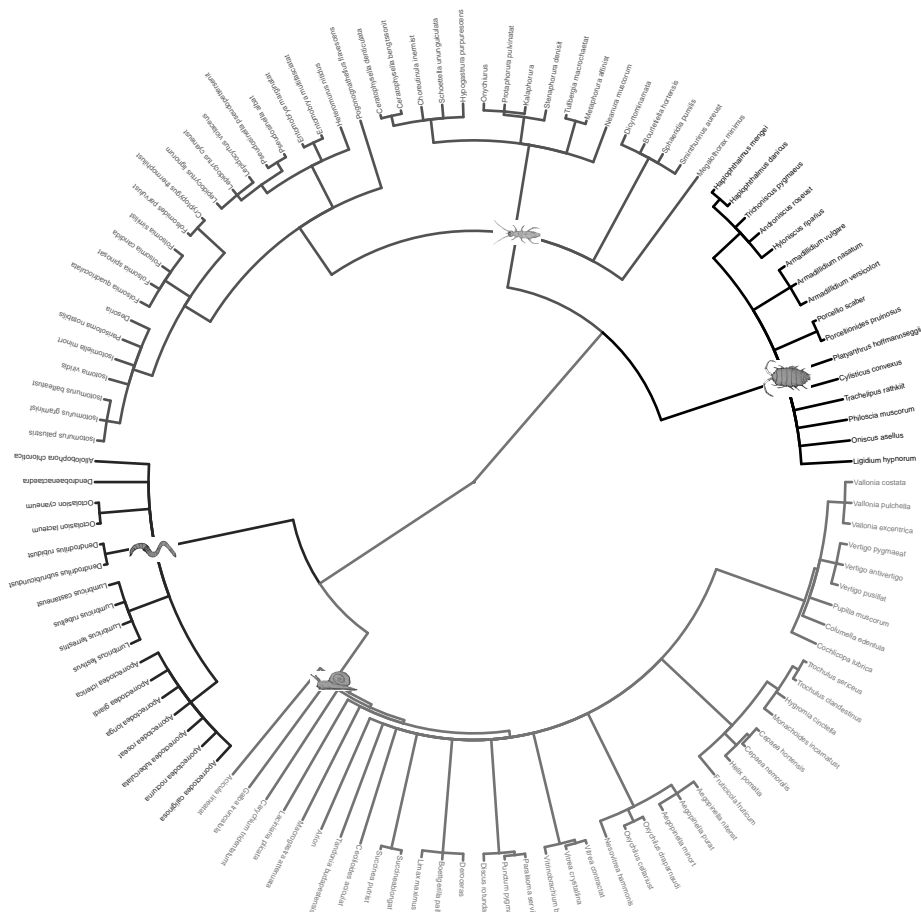


Figure B.3: Phylogenetic tree of decomposer organisms based on the open tree of life project [9]. Pictures symbolise the four broad taxonomic groups: collembola (39 species), isopods (16 species), gastropods (42 species) and earthworms (18 species), representing the decomposer fauna in this investigation.

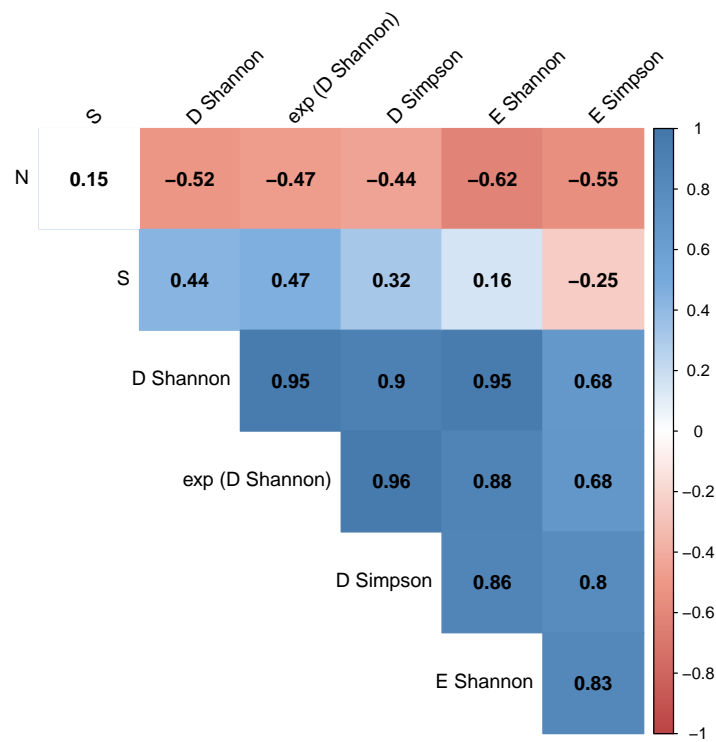


Figure B.4: Pearson's correlation coefficient matrix of taxonomic diversity indices. Non-significant correlations are left blank ($P < 0.05$) calculated with a modified version of the 'corrplot' package [22]. Species richness (S) and Shannon evenness (E Shannon) were selected to represent species richness and evenness in this study.

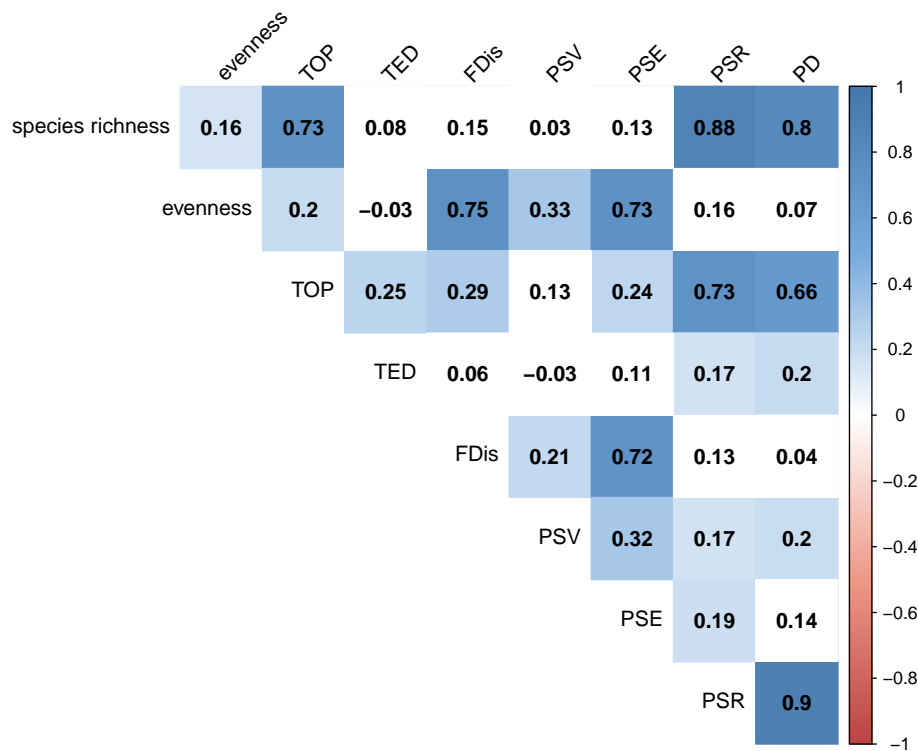


Figure B.5: Pearson's correlation coefficient matrix of taxonomic (species richness and evenness), functional (TOP, TED and FDis) and phylogenetic (PSV, PSE, PSR and PD) diversity indices. Trait even distribution (TED) and phylogenetic species variability (PSV) were selected together with species richness and evenness, due to the lowest correlation coefficient in order to avoid collinearity issues [4]. Non-significant correlations are left blank ($P < 0.05$).

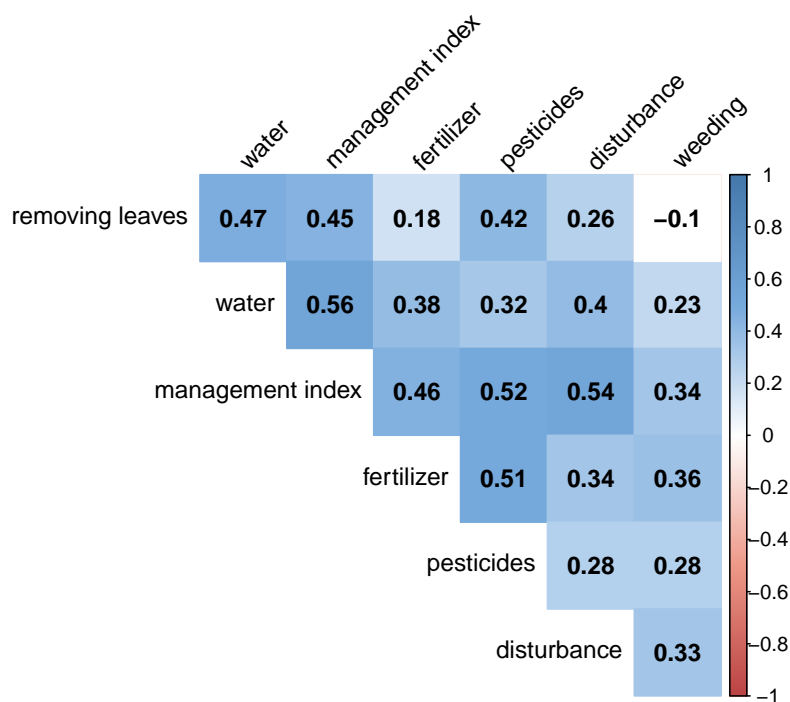


Figure B.6: Pearson's correlation coefficient matrix of garden management variables. All management questions can be seen in Table A.6. Management variables has been asked individually per land-use type. Water = frequency of applying water (WaterLawn, WaterVeg, WaterFlower), management index = sum of all management variables ordered from low to high intensity each on a five level Likert scale, fertiliser = frequency of applying fertiliser (FertLawn, FertGrass, FertVeg, FertFlower), pesticides = frequency of applying pesticides (PestLawn, PestVeg, PestFlower, PestTrees, WeedingHerbicide), disturbance = frequency of soil disturbances (DiggingVeg, DiggingFlower, CareLawn), weeding = frequency of weeding (Weeds). Non-significant correlations are left blank ($P < 0.05$).

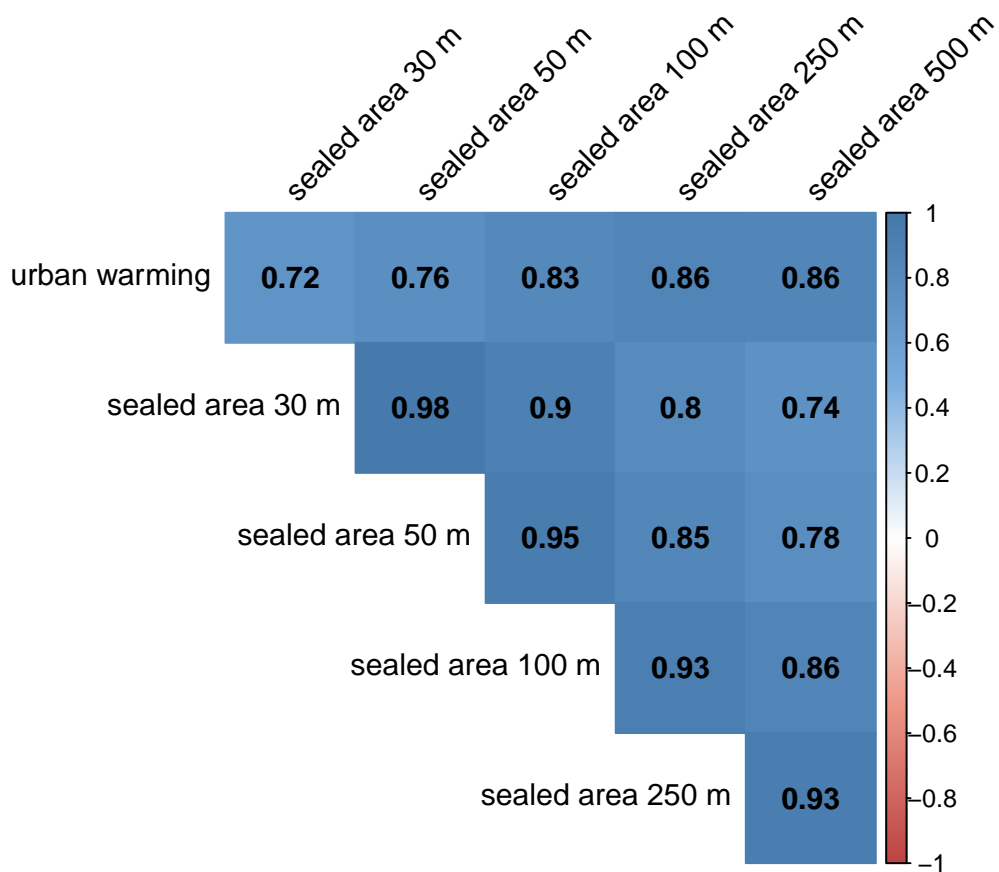


Figure B.7: Pearson's correlation coefficient matrix of urban warming and sealed area. Urban warming is a measure of the local deviation of average night temperatures near surface in the city of Zurich. It is derived from a regional climate model by Parlow et al. [16] and consists of six categories from 0 to + 6 °C. The sealed areas are the sum of sealed and built area around each garden with five radii (30, 50, 100, 250, 500 m) obtained in ArcGIS.

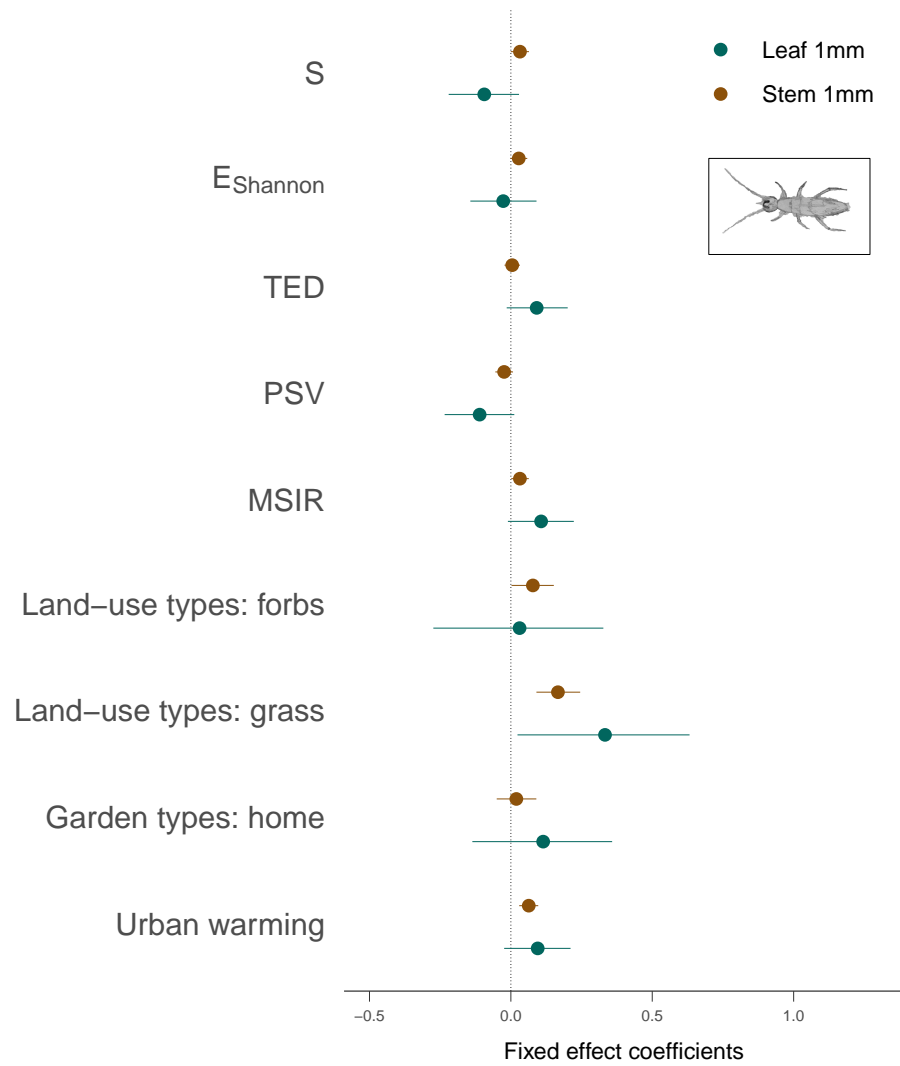


Figure B.8: Litter decomposition model fixed effect plots with 1 mm mesh size. Points indicate mean values of simulated Bayesian inference posterior distribution with the 95 % credible intervals as lines. Colours correspond to litter types.

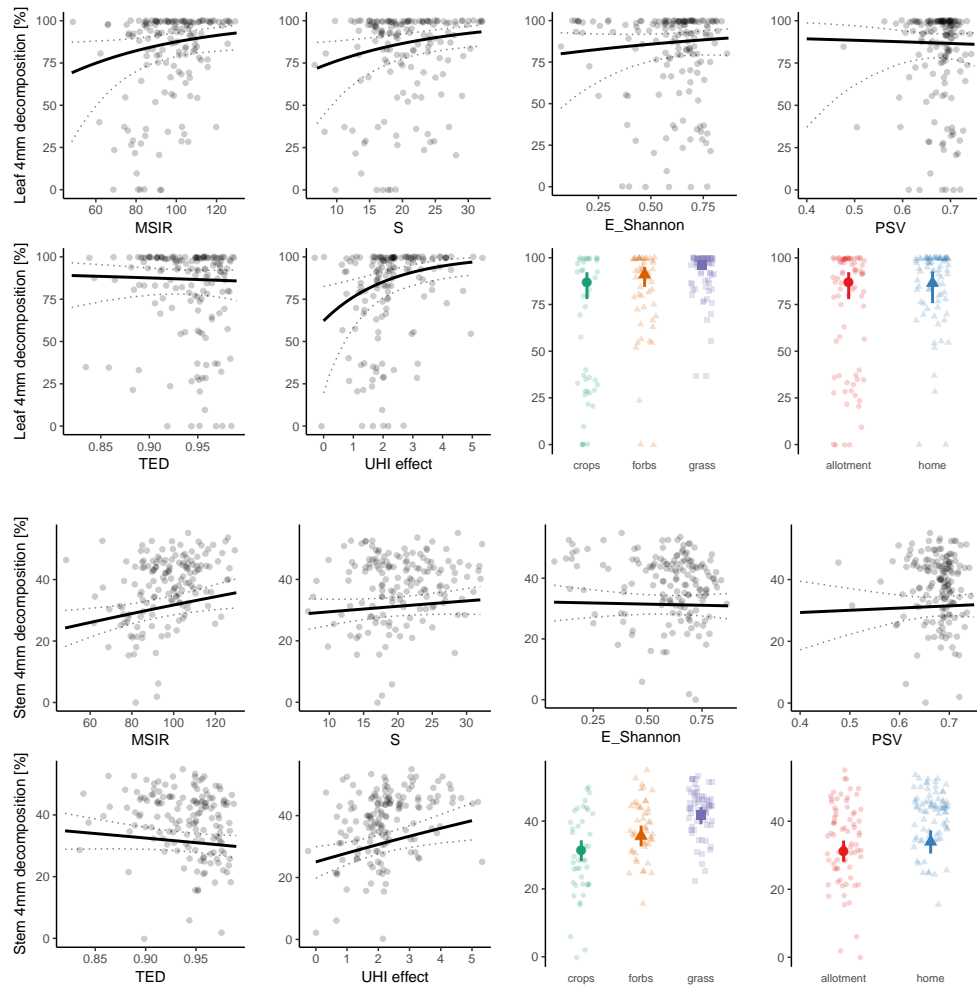


Figure B.9: Effect plots of litter decomposition model showing the fixed effects microbial activity (MSIR), soil fauna species richness (S), species evenness (E_Shannon), phylogenetic species variability (PSV), trait even distribution (TED), urban warming, garden land-use types and garden types. Solid lines or bold points are fitted values of the simulated Bayesian inference posterior distribution taking into account the random effect of garden identity with the 95% credible intervals as dotted lines.

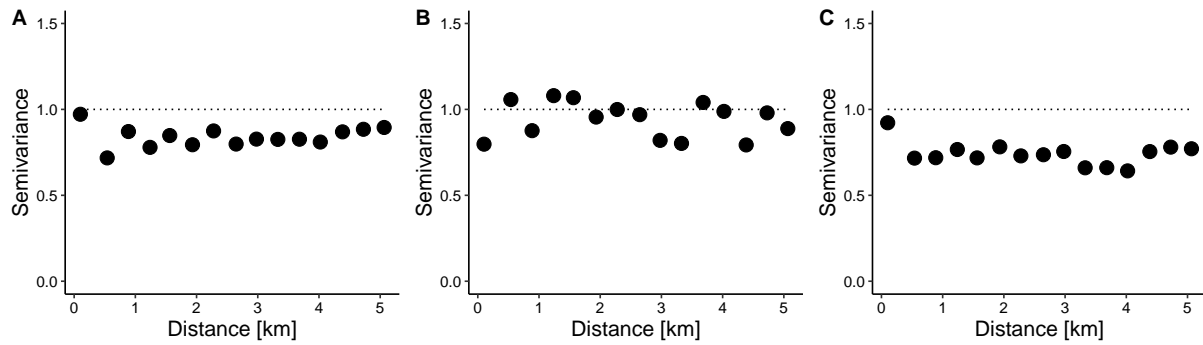


Figure B.10: Semivariograms of LMEM residuals from the response variables of the decomposition model: leaf 4 mm (A), the model with the microbial activity: MSIR (B) and the model with plant species richness (C). Semivariances (0.5 times the mean squared differences between sites) were computed with the R package ‘gstat’ [17]. In all plots values are close to 1 and show no clear increase or decrease patterns of spatial autocorrelation, indicating that the residuals are not more similar or dissimilar to each other than expected by chance [11]. In addition, the calculated Moran’s I autocorrelation index [15] for the response variable leaf 4 mm was not significant ($p=0.26$; observed= -0.01 ± 0.004 , expected= -0.007) as well as for the response variable MSIR ($p=0.09$; observed= -0.013 ± 0.004 , expected= -0.007) and the response variable plant species richness ($p=0.65$; observed= -0.008 ± 0.004 , expected= -0.007).

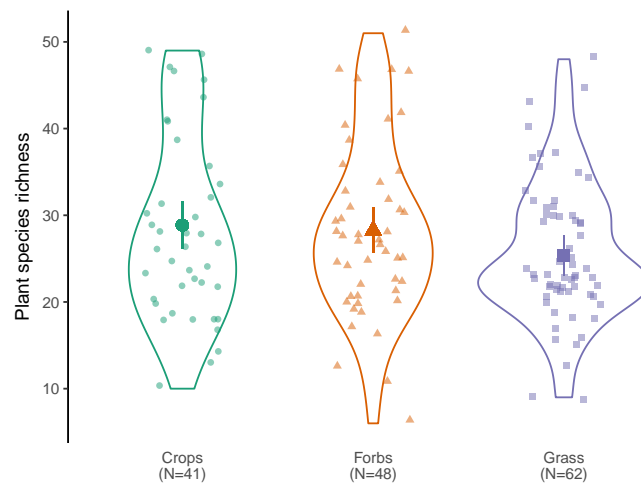


Figure B.11: Plant species richness per garden land-use type assessed as the sum of all cultivated and spontaneously growing plants per urban garden study site. Sampling and methodology of identification including the complete species list can be found in [8]. Bold points represent mean values of the simulated Bayesian inference posterior distribution [11] of the LMEM with garden ID as random factor and garden land-use types as fixed effects. Lines indicate 95 % credible intervals. Estimated LMEM coefficients of fixed effects can be found in Table A.10.

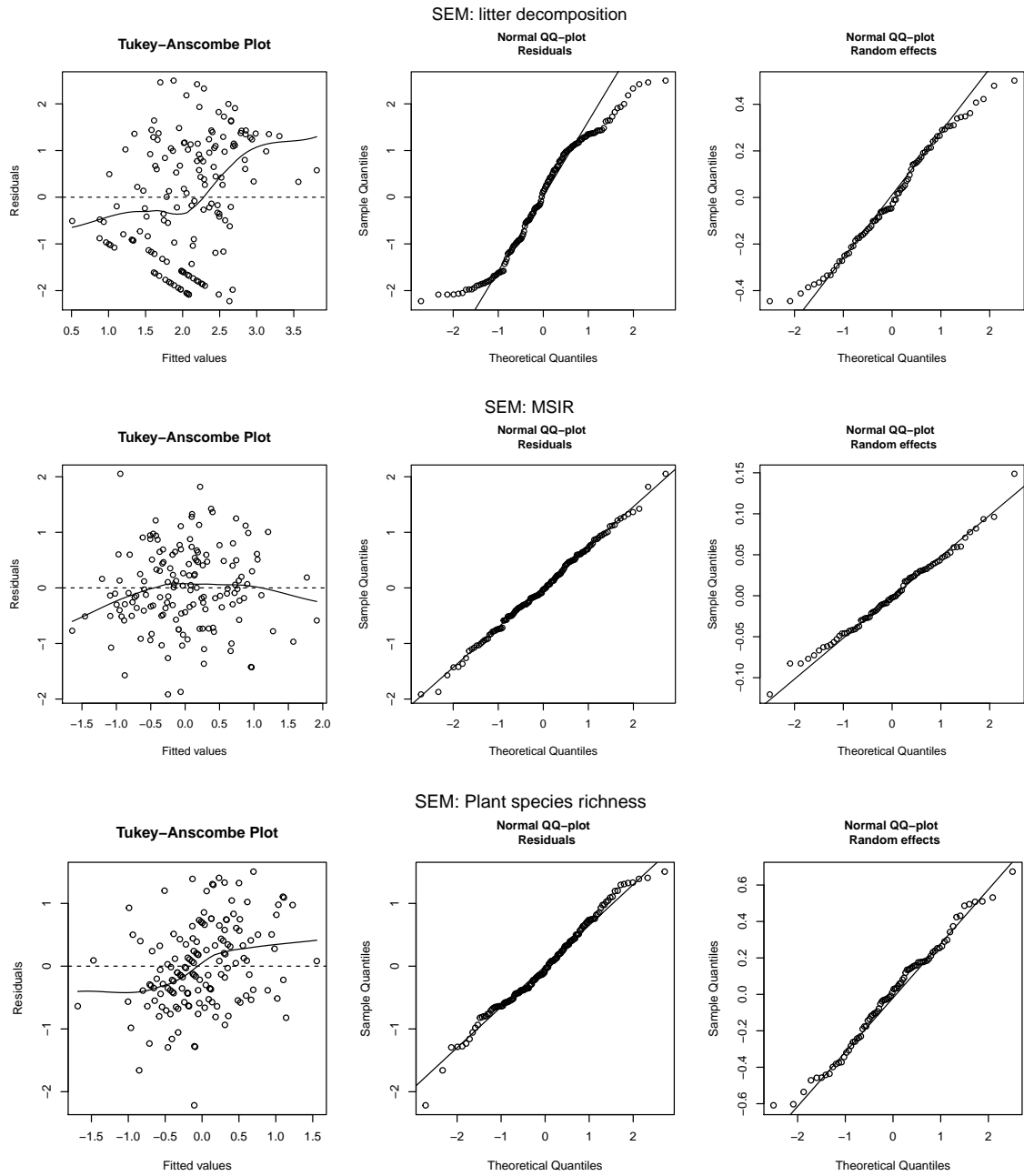


Figure B.12: Residual plots for assessing model assumptions of the LMEM used in the SEM framework. Response variables for the LMEM with leaf 4 mm, microbial activity (MSIR) and plant species richness are plotted (see Table 4 for complete model compositions). Residuals have to be independent and identically distributed, hence they should scatter around zero in the Tukey-Anscombe plots [11]. A few measurements do not fit well to the model as recognisable in the QQ-plots of the residuals, however the majority of the observations seem to fulfil the model assumptions well and since we did not assume a non-linear effect of the assessed variables with the response variables, we accept the slight lack of model assumptions. In addition, we checked the assumptions that the random effects are normally distributed, which was the case in both response values.

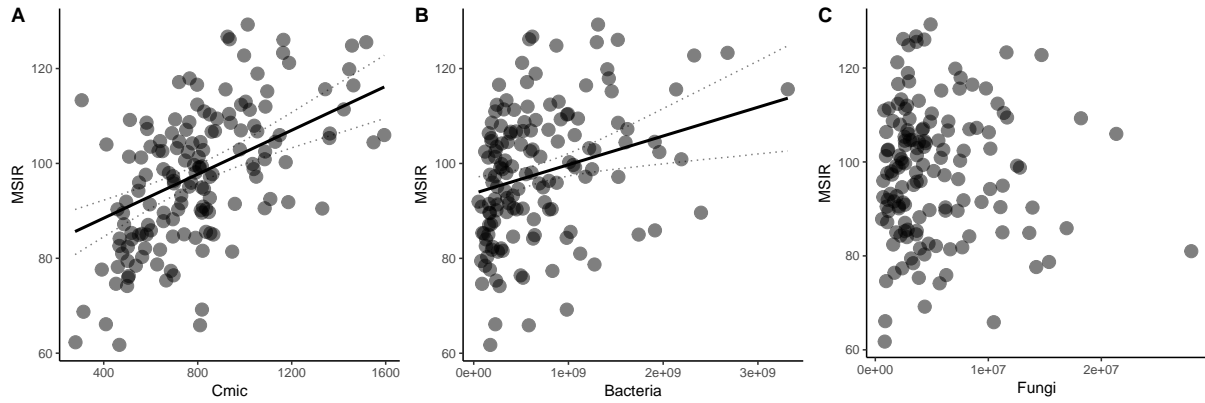


Figure B.13: LMEM effect plots of microbial activity (MSIR) as response variable and microbial biomass (C_{mic} ; A), bacterial (B) and fungal (C) qPCR gene copy numbers as fixed effects. Sampling and methodology of bacterial and fungal gene copy numbers can be found in [19]. Lines indicate fitted values of the simulated Bayesian inference posterior distribution [11] of the LMEM with garden ID as random factor. Dotted lines indicate 95 % credible intervals. Estimated LMEM coefficients of fixed effects can be found in Table A.10.

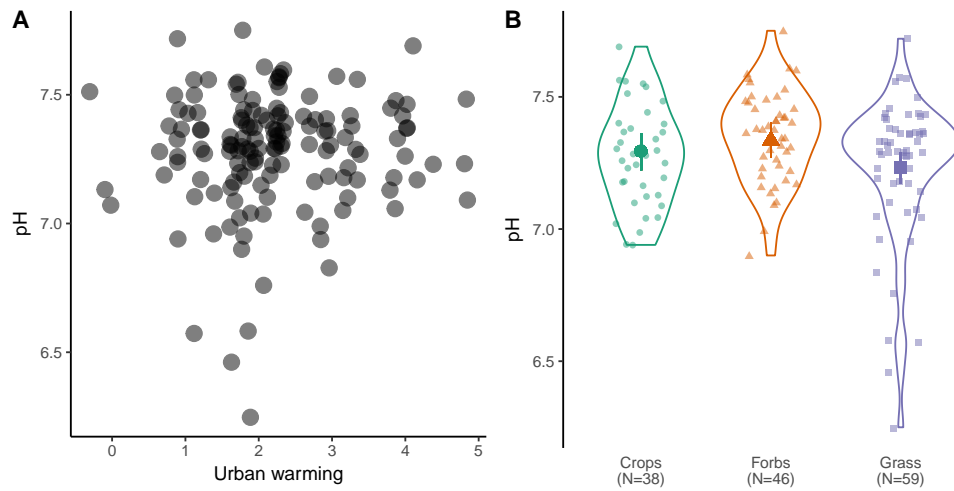


Figure B.14: LMEM effect plots of soil pH as response variable and urban warming A) and urban garden land-use types B) as fixed effects. Solid line and bold points represent fitted or mean values of the simulated Bayesian inference posterior distribution [11] of the LMEM with garden ID as random factor. Dotted lines and error bars indicate 95 % credible intervals. Estimated LMEM coefficients of fixed effects can be found in Table A.10.

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