

SUPPLEMENTARY INFORMATION

Complex interactions between local habitat features, landscape factors and seasonality shape soil microarthropod communities in urban green areas

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Table S1 Coordinates, habitat type, percentage of green areas in a 300 m radius and soil features of the studied sites. Soil features were measured from the samples collected during the autumn sampling round (October 2024)

Site name	Latitude	Longitude	Habitat type	Green areas (% in 300 m radius)	Soil features							Total organic
					pH	EC (μS/cm)	Sand (%)	Silt (%)	Clay (%)	N (%)	C (%)	C (%)
Area Ortiva Paleotto	44.4466	11.356171	Urban farm	64.2	7.54	150.3	20.3	57.6	22.0	0.229		2.386
Cooperativa Sociale Eta Beta	44.50134	11.415461	Urban farm	17.9	7.25	200.9	31.4	44.4	24.2	0.397		4.671
Orti comunali di Via Saragozza	44.48918	11.323161	Urban farm	6.1	7.39	190.3	32.1	40.7	27.1	0.253		2.655
Orto Botanico	44.49999	11.352885	Urban farm	7.6	7.52	212.5	63.5	25.9	10.6	0.323		4.278
Orto didattico del DISTAL	44.51445	11.405239	Urban farm	26.0	7.33	267.5	29.4	50.2	20.5	0.432		4.794
Parco di Villa Ghigi	44.47706	11.327529	Urban farm	87.1	7.64	170.7	37.9	45.7	16.4	0.141		1.544
Serre dei Giardini Margherita	44.48353	11.349388	Urban farm	18.6	7.44	172.1	75.5	13.9	10.6	0.385		3.843
Villa Erbosa	44.52366	11.341613	Urban farm	17.5	7.74	120	58.3	30.4	11.3	0.193		2.532
Giardino A. Dubček	44.49014	11.353461	Urban park	5.1	7.09	436.2	52.5	34.3	13.2	0.399		3.888
Giardino della Montagnola	44.50345	11.346989	Urban park	17.0	7.54	197.5	36.8	43.3	19.9	0.266		2.631
Giardino Savioli	44.48738	11.362809	Urban park	4.8	7.31	180.9	39.4	46.2	14.5	0.138		1.409
Parco 11 Settembre 2001	44.50085	11.336976	Urban park	10.3	7.47	238.9	27.3	48.3	24.4	0.207		2.204
Parco dei Cedri	44.47088	11.398718	Urban park	51.2	7.42	208.9	53.7	41.1	5.2	0.335		3.794
Parco del Lungo Savena	44.46135	11.382686	Urban park	60.0	7.67	158	39.1	48.8	12.1	0.120		1.271
Villa Meraville	44.51644	11.393133	Urban park	58.2	7.35	202.5	35.3	45.3	19.4	0.182		2.352

Table S2 Urban Atlas category classification into new classes “Urbanization” and “Green areas”.

New class	Urban Atlas classes
Urbanization	Discontinuous low density urban fabric Other roads and associated land Isolated structures Discontinuous very low-density urban fabric Industrial, commercial, public, military and private units Discontinuous medium density urban fabric Discontinuous dense urban fabric Continuous urban fabric Sports and leisure facilities Railways and associated land Land without current use*
Green areas	Green urban areas Arable land (annual crops) Pastures Forests Land without current use* Herbaceous vegetation associations Water

*Based on field validation, in some cases land without current use has been classified as urbanization, and in others as green areas

Table S3 Overall abundance of each main microarthropod group during both sampling seasons in urban parks and urban farms. These groups do not correspond to the morphospecies and biological forms in which we classified the dataset to calculate, respectively, morphospecies richness and QBS-ar

Group	Summer		Autumn	
	Park	Farm	Park	Farm
Collembola	26	11	13	55
Diplura	0	2	2	3
Protura	0	0	3	4
Formicidae	42	17	36	13
Other Insecta	11	1	7	5
Acari	13	4	18	71
Other Arachnida	0	0	0	3
Symphyla	6	0	13	3
Other Myriapoda	1	3	1	8
Isopoda	3	1	1	1
Total	102	39	94	166

Table S4 Abundance, morphospecies richness, QBS-ar index values and OTU richness for the microarthropod communities in the studied sites. Molecular analysis was only performed on the autumn samples, expected to be more representative of the microarthropod communities; consequently, OTU richness is only available for those samples. In “Giardino A. Dubček” the molecular analysis could not detect any arthropod OTU in spite of the four individuals observed during morphospecies quantification, and thus OTU richness for that site is marked as NA

Season	Site name	Abundance	Morphospecies richness	QBS-ar	OTU richness Observed	OTU richness Asymptotic*
Summer	Area Ortiva Paleotto	18	8	107	NA	NA
Summer	Cooperativa Sociale Eta Beta	2	1	10	NA	NA
Summer	Orti comunali di Via Saragozza	3	3	27	NA	NA
Summer	Orto Botanico	2	1	10	NA	NA
Summer	Orto didattico del DISTAL	5	2	30	NA	NA
Summer	Parco di Villa Ghigi	22	7	37	NA	NA
Summer	Serre dei Giardini Margherita	3	1	10	NA	NA
Summer	Villa Erbosa	6	2	25	NA	NA
Summer	Giardino A. Dubček	5	3	16	NA	NA
Summer	Giardino della Montagnola	1	1	5	NA	NA
Summer	Giardino Savioli	9	4	45	NA	NA
Summer	Parco 11 Settembre 2001	20	4	45	NA	NA
Summer	Parco dei Cedri	0	0	0	NA	NA
Summer	Parco del Lungo Savena	33	10	47	NA	NA
Summer	Villa Meraville	12	6	35	NA	NA
Autumn	Area Ortiva Paleotto	28	11	105	8	8
Autumn	Cooperativa Sociale Eta Beta	9	3	25	11	11
Autumn	Orti comunali di Via Saragozza	18	10	55	7	7
Autumn	Orto Botanico	15	10	95	7	7
Autumn	Orto didattico del DISTAL	3	3	27	137	137
Autumn	Parco di Villa Ghigi	10	6	65	5	5
Autumn	Serre dei Giardini Margherita	80	12	100	13	13
Autumn	Villa Erbosa	13	5	65	4	4
Autumn	Giardino A. Dubček	4	4	60	NA	NA
Autumn	Giardino della Montagnola	8	4	42	20	20
Autumn	Giardino Savioli	43	8	85	10	10
Autumn	Parco 11 Settembre 2001	10	6	35	5	5
Autumn	Parco dei Cedri	2	2	20	13	13
Autumn	Parco del Lungo Savena	7	4	37	29	29
Autumn	Villa Meraville	10	5	65	74	74

Notes: *Asymptotic OTUs richness estimated with the R package iNEXT



Fig. S1 Examples of urban parks (a-b) and urban farms (c-d) sampled during the study. The depicted sites are Giardino della Montagnola (a), Parco dei Cedri (b), Orti comunali di Via Saragozza (c) and Villa Erbosa (d)

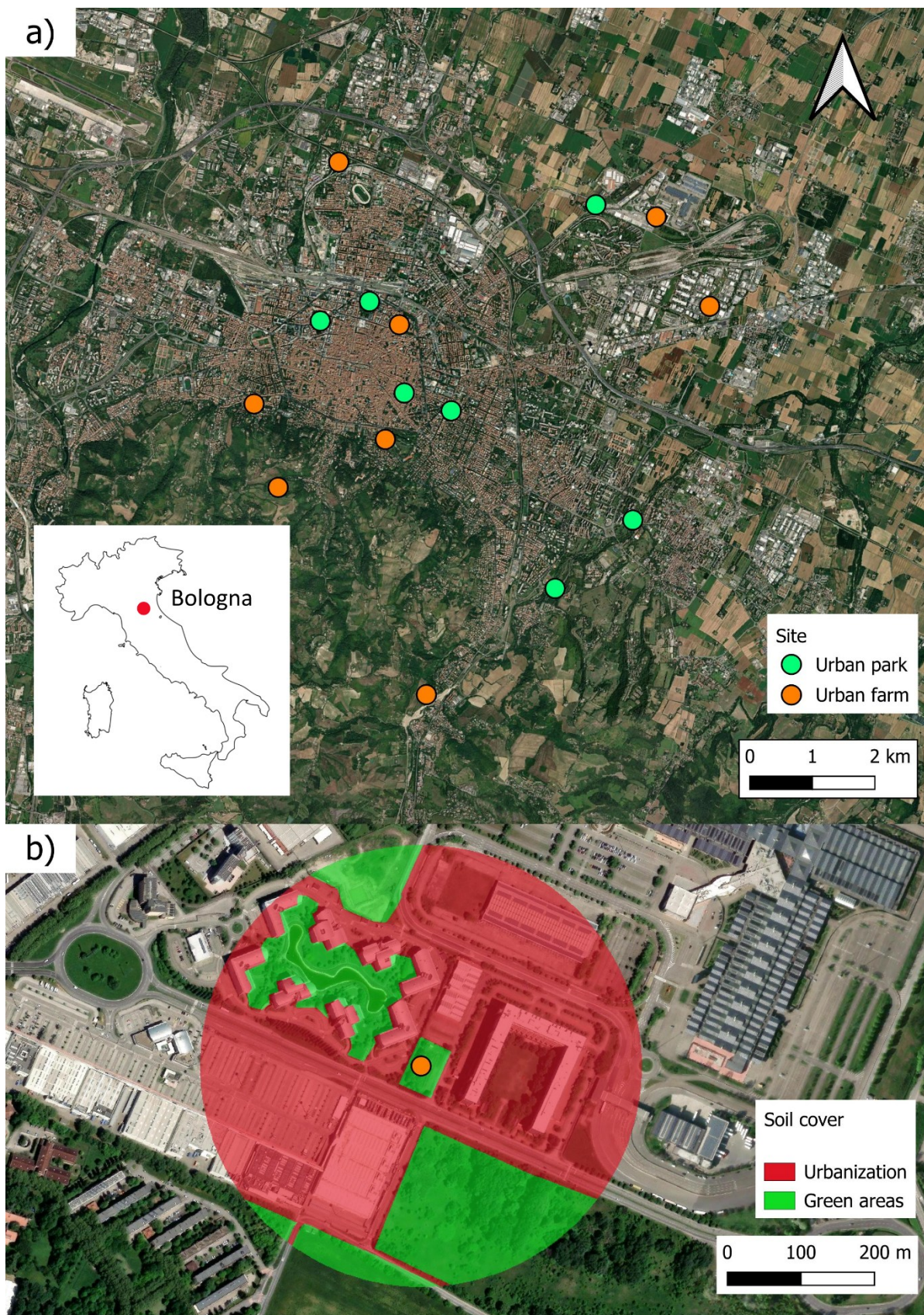


Fig. S2 Location of the studied urban farms and urban parks within the city of Bologna, in Northern Italy (a), and example of landscape characterization around one of the sites (b). Italy vector art should be attributed to Vectoro Artworks (Vecteezy.com)