

Supplementary data

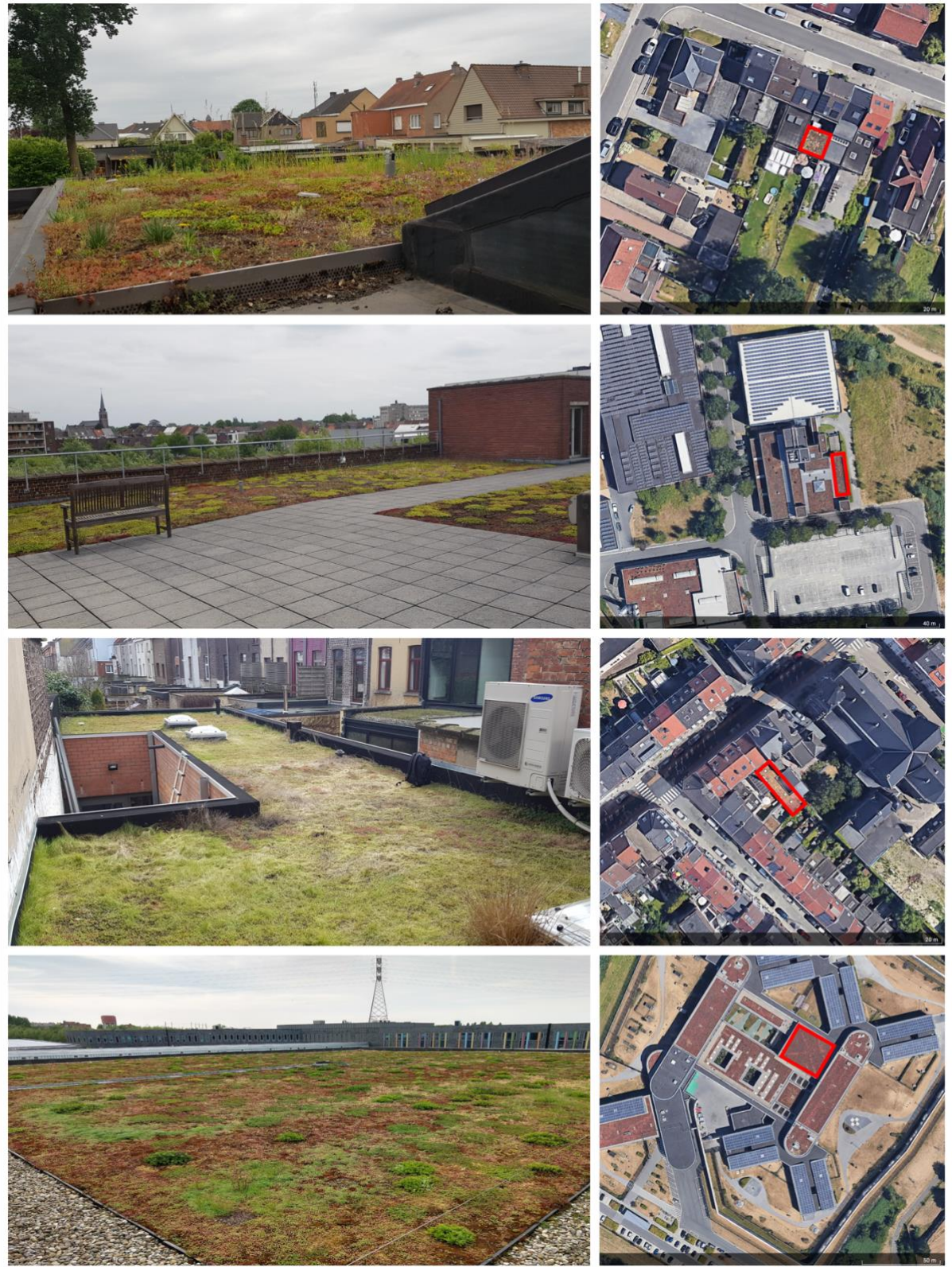


Fig. S1 The investigated extensive green roofs in Ghent (left), and its Google Earth locations (right). From top to bottom: R1 (biodiverse; March 2019), R2 (conventional; March 2019), R3 (biodiverse; February 2019), R4 (conventional; May 2020).

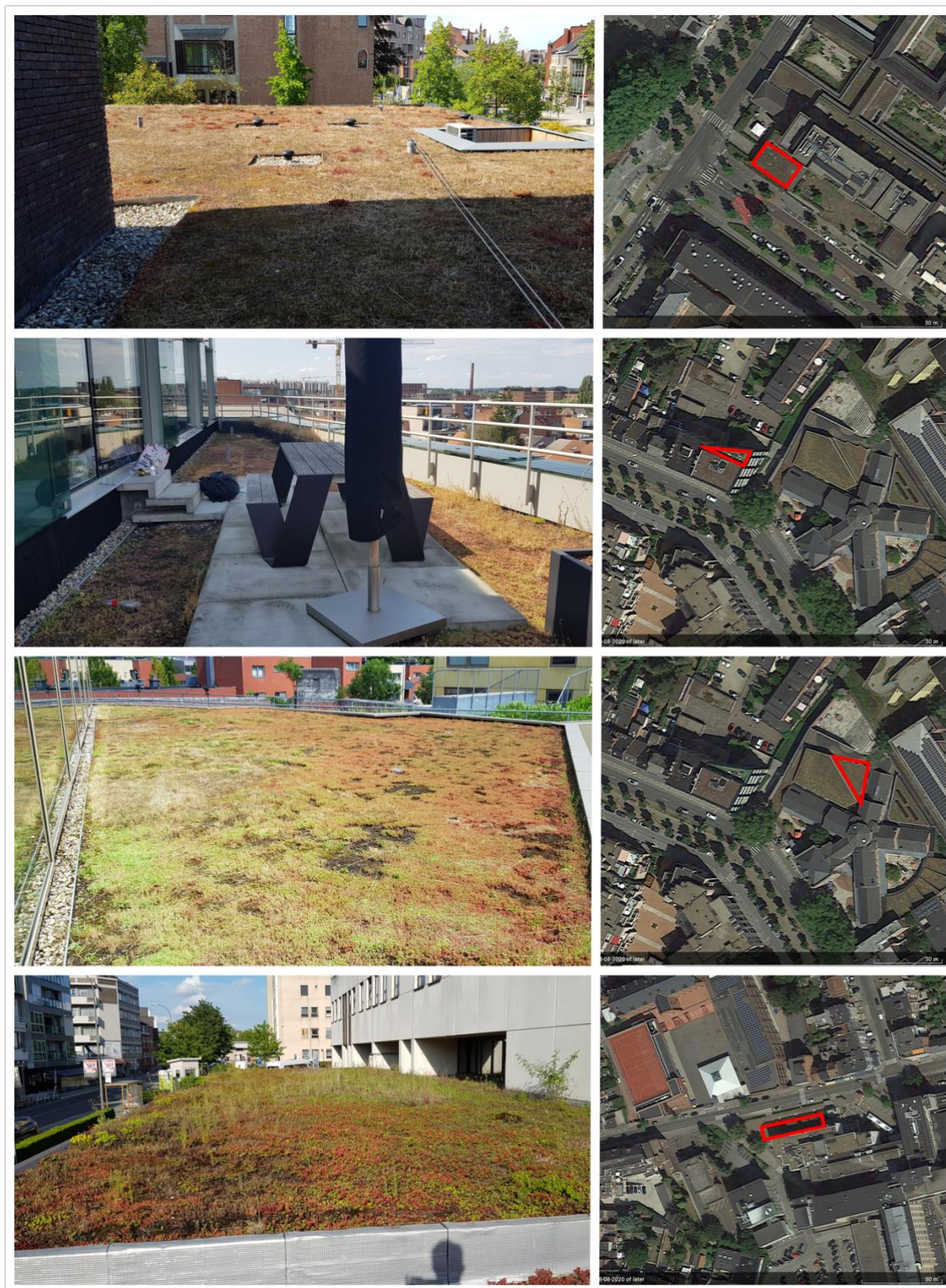


Fig. S2 The investigated extensive green roofs in Hasselt (left), and its Google Earth locations (right). From top to bottom: R5 (biodiverse; July 2019), R6 (conventional; July 2019), R7 (conventional; June 2019), R8 (biodiverse; June 2019).



Fig. S3 The investigated extensive green roofs in Antwerp (left), and its Google Earth locations (right). From top to bottom: R9 (conventional; July 2019), R10 (conventional; June 2019), R11 (biodiverse; June 2019), R12 (biodiverse; June 2019).

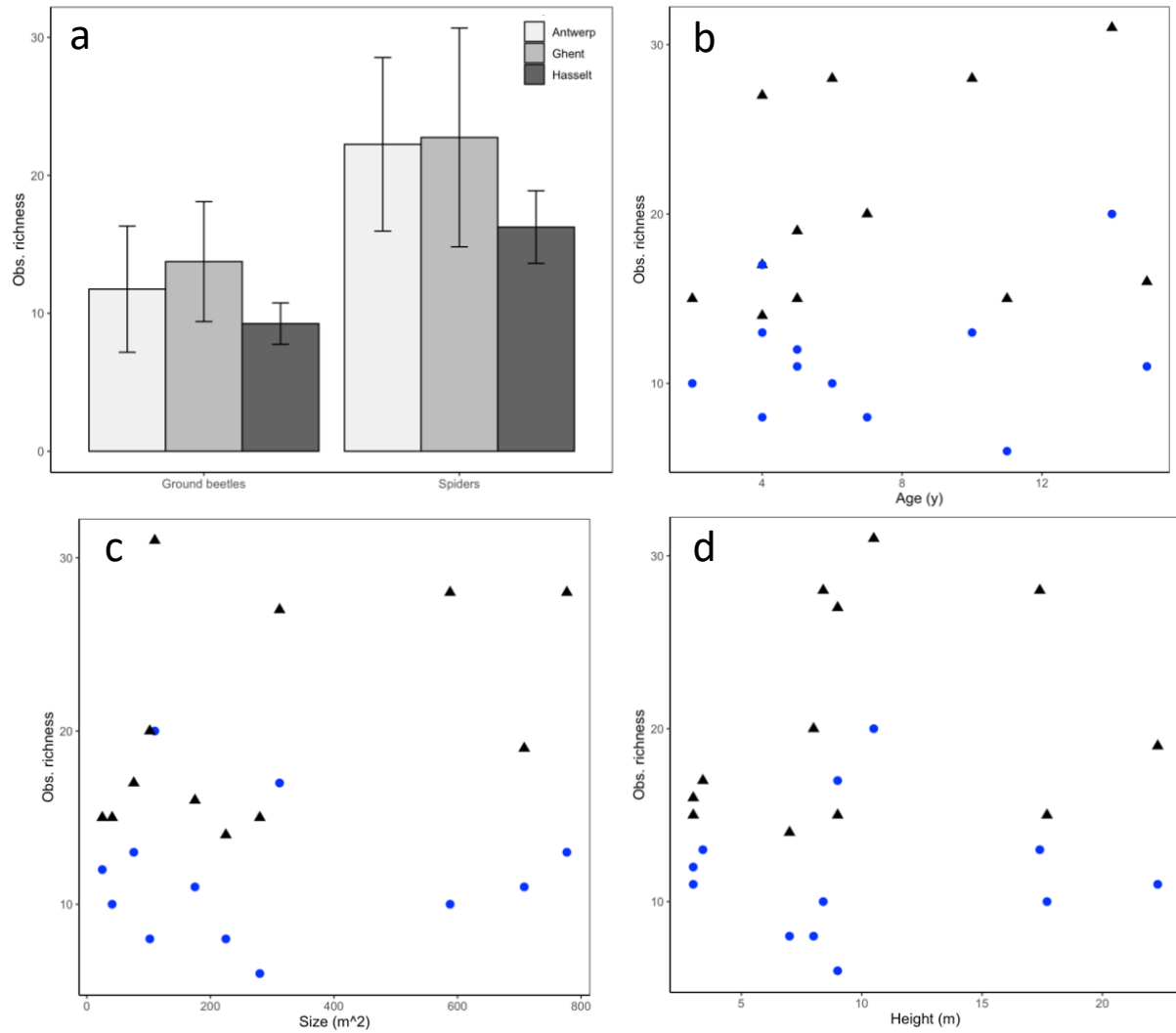


Fig. S4 The effect of a) city, b) roof age, c) size and d) height on spider (black) and carabid (blue) species richness. We observed no effect of roof age, size or height, nor city on species richness of both taxa ($p = 0.30$ and 0.19 ; Kruskal-Wallis).

Table S1 Summary of green roof characteristics. Substrate depth was measured 15 times per roof. Forbs+grasses richness is the sum of all identified plants during four occasions in the growth season.

ID	City	Coordinates	Type	Size (m ²)	Year of construction	Height (m)	Substrate depth (cm; mean $\pm$ s.d.)	Forbs+grasses richness
R1	Ghent	51.0239°N, 3.7665°E	biodiverse	25	2014	3.2	7.2 $\pm$ 1.0	31
R2	Ghent	51.0457°N, 3.7509°E	conventional	110	2005	10.5	5.8 $\pm$ 1.4	15
R3	Ghent	51.0479°N, 3.7419°E	biodiverse	76	2015	3.4	8.3 $\pm$ 1.5	34
R4	Ghent	51.0766°N, 3.7211°E	conventional	588	2013	8.4	5.2 $\pm$ 0.8	17
R5	Hasselt	50.9285°N, 5.3430°E	biodiverse	225	2015	7.0	12.1 $\pm$ 2.9	36
R6	Hasselt	50.9338°N, 5.3415°E	conventional	41	2017	17.7	5.2 $\pm$ 0.6	<i>na</i>
R7	Hasselt	50.9338°N, 5.3423°E	conventional	102	2012	8.0	5.2 $\pm$ 0.6	13
R8	Hasselt	50.9263°N, 5.3410°E	biodiverse	175	2004	3.0	7.9 $\pm$ 2.5	27
R9	Antwerp	51.1927°N, 4.4163°E	conventional	708	2014	22.3	5.8 $\pm$ 1.0	11
R10	Antwerp	51.1693°N, 4.3941°E	conventional	280	2008	9.0	4.5 $\pm$ 0.8	11
R11	Antwerp	51.2507°N, 4.4190°E	biodiverse	777	2009	17.4	8.5 $\pm$ 2.4	22
R12	Antwerp	51.2302°N, 4.4165°E	biodiverse	312	2015	9.0	8.5 $\pm$ 1.5	22

Table S2 Presence-absence of the plants species that were growing on the twelve investigated extensive green roofs during the study. Plants were identified during four occasions in the growth season.

Family	Species	R1	R2	R3	R4	R5	R7	R8	R9	R10	R11	R12
Alliaceae	<i>Allium schoenoprasum</i>	x					x	x				x
Alliaceae	<i>Allium sphaerocephalon</i>											x
Amaranthaceae	<i>Chenopodium album</i>					x					x	
Amaranthaceae	<i>Chenopodium polyspermum</i>			x								
Apiaceae	<i>Daucus carota</i>										x	
Asteraceae	<i>Anthemis tinctoria</i>	x		x								
Asteraceae	<i>Calendula arvensis</i>	x										
Asteraceae	<i>Cirsium dissectum</i>			x								
Asteraceae	<i>Conyza sumatrensis</i>			x								
Asteraceae	<i>Crepis capillaris</i>		x					x				
Asteraceae	<i>Erigeron canadensis</i>	x	x	x	x	x	x	x	x	x	x	x
Asteraceae	<i>Galinsoga quadriradiata</i>	x				x						
Asteraceae	<i>Gnaphalium luteoalbum</i>	x										x
Asteraceae	<i>Hypochaeris radicata</i>	x		x	x	x	x	x	x	x		
Asteraceae	<i>Jacobaea vulgaris</i>											x
Asteraceae	<i>Lactuca serriola</i>			x								x
Asteraceae	<i>Mycelis muralis</i>							x		x		
Asteraceae	<i>Picris hieracioides</i>		x									
Asteraceae	<i>Pilosella officinarum</i>	x		x		x						
Asteraceae	<i>Senecio inaequidens</i>		x		x		x	x	x	x	x	x
Asteraceae	<i>Senecio vulgaris</i>	x		x	x	x	x	x	x	x	x	x
Asteraceae	<i>Sonchus asper</i>					x		x	x			x
Asteraceae	<i>Sonchus oleraceus</i>	x	x	x	x	x	x	x	x	x	x	x
Asteraceae	<i>Taraxacum palustre</i>		x									
Asteraceae	<i>Tragopogon dubius</i>										x	
Boraginaceae	<i>Anchusa officinalis</i>			x								
Boraginaceae	<i>Echium vulgare</i>					x		x		x		
Boraginaceae	<i>Myosotis arvensis</i>	x										
Brassicaceae	<i>Alyssum alyssoides</i>	x				x						
Brassicaceae	<i>Barbarea vulgaris</i>	x	x									
Brassicaceae	<i>Capsella bursa-pastoris</i>										x	
Caryophyllaceae	<i>Arenaria serpyllifolia</i>	x						x			x	
Caryophyllaceae	<i>Cerastium glomeratum</i>								x	x		
Caryophyllaceae	<i>Dianthus armeria</i>	x		x								
Caryophyllaceae	<i>Dianthus carthusianorum</i>	x						x				x

Caryophyllaceae	<i>Dianthus deltoides</i>					x						
Caryophyllaceae	<i>Petrorhagia prolifera</i>	x		x		x					x	
Caryophyllaceae	<i>Silene vulgaris</i>	x		x		x						
Caryophyllaceae	<i>Stellaria media</i>					x						
Crassulaceae	<i>Sedum acre</i>	x				x			x	x		
Crassulaceae	<i>Sedum album</i>	x	x		x	x	x	x	x	x	x	x
Crassulaceae	<i>Sedum forsterianum</i>											x
Crassulaceae	<i>Sedum hispanicum</i>	x	x	x	x	x	x			x	x	x
Crassulaceae	<i>Sedum hybridum</i>	x	x	x	x	x	x	x	x			x
Crassulaceae	<i>Sedum kamtschaticum</i>	x	x		x		x	x				x
Crassulaceae	<i>Sedum oregonense</i>											x
Crassulaceae	<i>Sedum rupestre</i>	x	x	x		x		x	x		x	
Crassulaceae	<i>Sedum sexangulare</i>	x	x	x		x	x	x	x	x	x	x
Crassulaceae	<i>Sedum spurium</i>	x	x	x	x	x	x	x	x	x	x	x
Euphorbiaceae	<i>Euphorbia cyparissias</i>	x		x								
Euphorbiaceae	<i>Euphorbia peplus</i>			x	x	x						
Fabaceae	<i>Lupinus polyphyllus</i>	x										
Fabaceae	<i>Medicago minima</i>	x										
Fabaceae	<i>Melilotus albus</i>				x			x				
Fabaceae	<i>Trifolium arvense</i>		x	x	x					x	x	
Fabaceae	<i>Trifolium dubium</i>		x	x	x	x	x	x			x	
Fabaceae	<i>Trifolium repens</i>				x							
Geraniaceae	<i>Erodium cicutarium</i>	x		x	x							x
Geraniaceae	<i>Geranium molle</i>				x	x			x		x	x
Geraniaceae	<i>Geranium purpureum</i>	x				x		x			x	
Geraniaceae	<i>Geranium pusillum</i>					x		x				x
Geraniaceae	<i>Geranium robertianum</i>			x	x							
Hypericaceae	<i>Hypericum perforatum</i>		x					x				
Juncaceae	<i>Juncus effusus</i>			x								
Lamiaceae	<i>Clinopodium acinos</i>					x						
Lamiaceae	<i>Origanum vulgare</i>	x		x		x						
Lamiaceae	<i>Prunella vulgaris</i>			x								
Lamiaceae	<i>Thymus pulegioides</i>			x		x						
Lamiaceae	<i>Thymus serpyllum</i>			x								
Lamiaceae	<i>Thymus vulgaris</i>							x				
Leguminosae	<i>Vicia hirsuta</i>				x	x	x	x	x		x	
Leguminosae	<i>Vicia sativa</i>										x	
Leguminosae	<i>Vicia tetrasperma</i>							x				

[illegible]

Table S3 Summary of all spider species that were caught during December 2018 and December 2019 on twelve extensive green roofs in Flanders (Belgium).

Family	Species	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	Σ individuals	Σ roofs
Agelenidae															
	<i>Textrix denticulata</i> (Olivier, 1789)					1	2					1		4	3
Clubionidae															
	<i>Clubiona brevipes</i> (Blackwall, 1841)												1	1	1
Dictynidae															
	<i>Argenna subnigra</i> (Cambridge, 1861)												1	1	1
Gnaphosidae															
	<i>Drassodes cupreus</i> (Blackwall, 1834)	2	3											5	2
	<i>Drassyllus pusillus</i> (Koch, 1833)		1										1	2	2
	<i>Haplodrassus signifer</i> (Koch, 1839)				2					1		4		7	3
	<i>Micaria micans</i> (Blackwall, 1858)		1											1	1
	<i>Trachyzelotes pedestris</i> (Koch, 1837)		1											1	1
Linyphiidae															
	<i>Agyneta mollis</i> (Cambridge, 1871)				2			1	2					5	3
	<i>Agyneta rurestris</i> (Koch, 1836)	71	83	161	124	209	152	287	88	566	202	301	287	2531	12
	<i>Araeoncus humilis</i> (Blackwall, 1841)				1			18	2		1	5	1	28	6
	<i>Bathyphantes gracilis</i> (Blackwall, 1841)		5		2		13	1	5			2	1	29	7
	<i>Centromerita bicolor</i> (Blackwall, 1833)		2		1				1				8	12	4
	<i>Diplostyla concolor</i> (Wider, 1834)		1											1	1
	<i>Diplocephalus graecus</i> (Cambridge, 1873)	1			1					1				3	3

<i>Erigone atra</i> (Blackwall, 1833)	12	31	34	37	6	68	42	3	38	28	20	15	334	12
<i>Erigone dentipalpis</i> (Wider, 1834)	116	54	66	158	99	217	289	79	171	139	56	49	1493	12
<i>Gongyliellum vivum</i> (Cambridge, 1875)											1	4	5	2
<i>Maso sundevalli</i> (Westring, 1851)								1					1	1
<i>Mermessus trilobatus</i> (Emerton, 1882)		3	2	3	2	4	3	5	3	2	3	6	36	11
<i>Oedothorax fuscus</i> (Blackwall, 1834)	2	2		1		3	1		2	1	1		13	8
<i>Ostearius melanopygius</i> (Cambridge, 1880)							1					1	2	2
<i>Pelecopsis parallela</i> (Wider, 1834)	289	8		16					253	2	3		571	6
<i>Prinerigone vagans</i> (Audouin, 1826)	2	1	2	3	0	15			7	3	1		34	8
<i>Tenuiphantes mengei</i> (Kulczyński, 1887)				2				1					3	2
<i>Tenuiphantes tenuis</i> (Blackwall, 1852)	3	24	25	22	13	26	44	43	33	9	38	17	297	12
<i>Tiso vagans</i> (Blackwall, 1834)					1		1	63		1		11	77	5
Lycosidae														
<i>Alopecosa cuneata</i> (Clerck, 1757)				7							7		14	2
<i>Alopecosa pulverulenta</i> (Clerck, 1757)		3										1	4	2
<i>Arctosa leopardus</i> (Sundevall, 1833)			1									1	2	2
<i>Pardosa nigriceps</i> (Thorell, 1856)		3											3	1
<i>Pardosa palustris</i> (Linnaeus, 1758)		6		4			1		7	1	3	1	23	7
<i>Pardosa prativaga</i> (Koch, 1870)							1		1			6	8	3
<i>Pardosa pullata</i> (Clerck, 1757)		9											9	1
<i>Pardosa tenuipes</i> (Koch, 1882)		11	13	6		3	4			1	1	10	49	8
<i>Piratula latitans</i> (Blackwall, 1841)				1					1				2	2

<i>Trochosa terricola</i> (Thorell, 1856)	1									1					2	2
Philodromidae																
<i>Philodromus cespitum</i> (Walckenaer, 1802)	1														1	1
<i>Philodromus dispar</i> (Walckenaer, 1826)								1							1	1
<i>Philodromus praedatus</i> (Cambridge, 1871)			1												1	1
<i>Thanatus striatus</i> (Koch, 1845)										7					7	1
Salticidae																
<i>Attulus pubescens</i> (Fabricius, 1775)	1														1	1
<i>Euophrys frontalis</i> (Walckenaer, 1802)				4				7							11	2
<i>Heliophanus flavipes</i> (Hahn, 1832)	2	5	1	4			1		2		1	1			17	8
<i>Phlegra fasciata</i> (Hahn, 1826)		4		8							22	2			36	4
<i>Pseudeuophrys lanigera</i> (Simon, 1871)	7	9	3	4	13		1	3	3	5	2	4			54	11
<i>Salticus scenicus</i> (Clerck, 1757)			1												1	1
<i>Talavera aequipes</i> (Cambridge, 1871)	2			7							2				11	3
Scytodidae																
<i>Scytodes thoracica</i> (Latreille, 1802)							1								1	1
Tetragnathidae																
<i>Pachygnatha clercki</i> (Sundevall, 1823)							1	1			1				3	3
<i>Pachygnatha degeeri</i> (Sundevall, 1830)			1												1	1
Theridiidae																
<i>Asagena phalerata</i> (Panzer, 1801)					14		10		6		91	29			150	5
<i>Enoplognatha caricis</i> (Fickert, 1876)											5				5	1

<i>Enoplognatha thoracica</i> (Hahn, 1833)									2		2	3	7	3
<i>Robertus lividus</i> (Blackwall, 1836)												1	1	1
<i>Steatoda grossa</i> (Koch, 1838)			1										1	1
Thomisidae														
<i>Ozyptila praticola</i> (Koch, 1837)					1								1	1
<i>Ozyptila sanctuaria</i> (Cambridge, 1871)	30	8	6	1	4	3	1						53	7
<i>Ozyptila simplex</i> (Cambridge, 1862)	1	2								1			4	3
<i>Ozyptila trux</i> (Blackwall, 1846)					1								1	1
<i>Xysticus acerbus</i> (Thorell, 1872)					1								1	1
<i>Xysticus cristatus</i> (Clerck, 1757)	1	15	3	13	1	1			19	2	28	19	102	10
<i>Xysticus kochi</i> (Thorell, 1872)	2	19	7	29	35	1	3		36	20	92	41	285	11
Σ individuals	541	319	328	464	400	510	711	305	1152	417	701	522	6370	
Σ species	15	31	17	28	14	15	20	16	19	15	28	27		
Σ singletons	3	8	6	7	6	4	11	5	4	5	8	11		

Table S4 Summary of all carabid species that were caught during December 2018 and December 2019 on twelve extensive green roofs in Flanders (Belgium).

Species	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	Σ individuals	Σ roofs
<i>Acupalpus brunnipes</i> (Sturm, 1825)	1												1	1
<i>Acupalpus dubius</i> (Schilsky, 1888)				1								4	5	2
<i>Amara aenea</i> (De Geer, 1774)	3	39	16	1	5	57	5		2	2	73	9	212	11
<i>Amara bifrons</i> (Gyllenhal, 1810)											2		2	1
<i>Amara communis</i> (Panzer, 1797)					1								1	1
<i>Amara familiaris</i> (Duftschmid, 1812)		3						1			2		6	3
<i>Amara lucida</i> (Duftschmid, 1812)		1											1	1
<i>Amara lunicollis</i> (Schjødt, 1837)							1						1	1
<i>Amara similata</i> (Gyllenhal, 1810)	1								1				2	2
<i>Amara tibialis</i> (Paykull, 1798)											13	1	14	2
<i>Bembidion femoratum</i> (Sturm, 1825)	1		4	3									8	3
<i>Bembidion lampros</i> (Herbst, 1784)		1											1	1
<i>Bembidion lunulatum</i> (Fourcroy, 1785)						1							1	1
<i>Bembidion obtusum</i> (Audinet-Serville, 1821)		1						9					10	2
<i>Bembidion properans</i> (Stephens, 1828)	1	4	1	1			5		3	1		2	18	8
<i>Bembidion quadrimaculatum</i> (Linnaeus, 1761)			2	4	3	1	2	2		2	1	2	19	9
<i>Bradycellus csikii</i> (Laczo, 1912)	1												1	1
<i>Bradycellus harpalinus</i> (Audinet-Serville, 1821)			1								7	10	18	3
<i>Bradycellus verbasci</i> (Duftschmid, 1812)			2						1		2	1	6	4

<i>Calathus cinctus</i> (Motschulsky, 1850)	2	8	1	97	1		1				1		111	7
<i>Calathus melanocephalus</i> (Linnaeus, 1758)								1					1	1
<i>Clivina collaris</i> (Herbst, 1784)	1												1	1
<i>Harpalus attenuatus</i> (Stephens, 1828)		5	1	1					1	9			17	5
<i>Harpalus rubripes</i> (Duftschmid, 1812)										1	9		10	2
<i>Harpalus rufipalpis</i> (Sturm, 1818)		2								1	2		5	3
<i>Harpalus rufipes</i> (De Geer, 1774)							1		1				2	2
<i>Harpalus smaragdinus</i> (Duftschmid, 1812)		2									2		4	2
<i>Harpalus tardus</i> (Panzer, 1797)		1											1	1
<i>Microlestes minutulus</i> (Goeze, 1777)	1	7	2	7	7		5		1	2		8	40	9
<i>Nebria salina</i> (Fairmaire & Laboulbene, 1854)		1											1	1
<i>Notiophilus biguttatus</i> (Fabricius, 1779)								1	1				2	2
<i>Notiophilus quadripunctatus</i> (Dejean, 1826)			1				3		1				5	3
<i>Notiophilus substriatus</i> (Waterhouse, 1833)		2					1				1	5	9	4
<i>Poecilus cupreus</i> (Linnaeus, 1758)				1								1	2	2
<i>Poecilus versicolor</i> (Sturm, 1824)		1											1	1
<i>Pterostichus minor</i> (Gyllenhal, 1827)								1					1	1
<i>Pterostichus strenuus</i> (Panzer, 1796)											1		1	1
<i>Pterostichus vernalis</i> (Panzer, 1796)							3		1				4	2
<i>Stenolophus mixtus</i> (Herbst, 1784)		1											1	1
<i>Stenolophus teutonius</i> (Schränk, 1781)			4										4	1
<i>Syntomus foveatus</i> (Fourcroy, 1785)	10	50	6	10	5		1	4	2	2	65	1	156	11

<i>Syntomus truncatellus</i> (Linnaeus, 1761)					1			3					4	2
<i>Tachys bistriatus</i> (Duftschmid, 1812)						4		0					4	1
<i>Tachys micros</i> (Fischer Von Waldheim, 1828)	6	22				12		11	1			1	53	6
<i>Tachys parvulus</i> (Dejean, 1831)	1							2					3	2
<i>Trechus obtusus</i> (Erichson, 1837)		1	1			1		90				1	94	5
<i>Trechus quadristriatus</i> (Schränk, 1781)		1			1	1							3	3
Σ individuals	29	153	42	126	24	84	21	125	15	10	178	60	867	
Σ species	12	20	13	10	8	10	8	11	11	6	13	17		
Σ singletons	8	9	6	5	4	5	4	5	8	2	5	7		

Table S5 Summary of all ant species [worker ants (gynes)] that were caught during December 2018 and December 2019 on twelve extensive green roofs in Flanders (Belgium).

Species	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	Σ roofs
<i>Anergates atratulus</i> (Schenck, 1852)					(1)								(1)
<i>Formica cunicularia</i> (Latreille, 1798)											6		1
<i>Hypoponera eduardi</i> (Forel, 1894)										3			1
<i>Lasius brunneus</i> (Latreille, 1798)	42 (2)	(1)	14 (1)				3		(2)				3 (4)
<i>Lasius flavus</i> (Fabricius, 1782)		(1)	1 (2)		(1)		(1)						1 (4)
<i>Lasius fuliginosus</i> (Latreille, 1798)		(1)				(2)							(2)
<i>Lasius mixtus</i> (Nylander, 1846)					(1)								(1)
<i>Lasius niger</i> (Linnaeus, 1758)	1995 (12)	280 (8)	1193 (5)	2 (80)	187 (90)	6928 (1)	848 (16)	245 (63)	1 (1)	1857 (4)	395 (2)	2 (8)	12 (12)
<i>Lasius platythorax</i> (Seifert, 1991)	2	78								80	50		4
<i>Lasius umbratus</i> (Nylander, 1846)	(1)				(3)	(3)	(10)			(3)	(1)	(1)	(7)
<i>Leptothorax acervorum</i> (Fabricius, 1793)						(1)							(1)
<i>Myrmecina graminicola</i> (Latreille, 1802)			(1)	(1)	(1)			1		(1)	(1)		1 (5)
<i>Myrmica gallienii</i> (Bondroit, 1920)	(1)												(1)
<i>Myrmica rubra</i> (Linnaeus, 1758)						(1)			(3)				(2)
<i>Myrmica rugulosa</i> (Nylander, 1849)	(2)	(2)	2 (2)		(1)			(1)		(6)			1 (6)
<i>Myrmica sabuleti</i> (Meinert, 1861)	(1)	(1)										(1)	(3)
<i>Myrmica scabrinodis</i> (Nylander, 1846)	(2)	(3)	1				(2)	80 (1)		(4)		10	3 (5)
<i>Ponera coarctata</i> (Latreille, 1802)						(1)		(1)					(2)
<i>Stenamma debile</i> (Förster, 1850)										(1)			(1)
<i>Temnothorax nylanderi</i> (Förster, 1850)					(1)								(1)
<i>Tetramorium caespitum</i> (Linnaeus, 1758)					1143 (1)						219		3 (1)
Σ individuals	2039 (21)	358 (17)	1211 (11)	2 (81)	1330 (100)	6928 (9)	851 (29)	326 (66)	1 (6)	1940 (19)	670 (4)	12 (10)	
Σ species	3 (7)	2 (7)	5 (5)	1 (2)	2 (9)	1 (6)	2 (4)	3 (4)	1 (3)	3 (6)	4 (3)	2 (3)	