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Faunistics and ecology of the spider fauna (Araneae) of different woodland, heathland and grassland sites at 'Vloetemveld' (Zedelgem, West Flanders, Belgium)

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Summary

The araneofauna of the 'Vloetemveld' area in West Flanders (Belgium) is discussed. 140 spider species were collected in eighth different habitat types. The faunistical interest of these catches for some rare spider species is mentioned.

By studying the correlation between the numbers of individual caught and some abiotic characteristics of the sampled habitats, some data on the habitat requirements of the most abundant species are obtained. In general, three species groups were thus separated.

The importance of this area from the araneological and entomological point of view is further discussed and stressed, as well as the urgent need for organized nature conservational management.

Introduction

Since the end of the 18th century, woodland and heathland are very scarce in West Flanders. These habitat types are mainly scattered as small patches in the central sandy area of this province. Only very few larger woodland or heathland complexes still occur such as the provincial domain "Lippensgoed-Bulskampveld" (Beernem), "Wijnendalebos" (Torhout-Ichtegem), "Houthulstbos" (Houthulst) and "Vloetemveld" (Zedelgem). The latter area, Vloetemveld, is situated on the boundary of the sandy and the light sand loamy region in West Flanders (Belgium) (Fig.1). Originally known as a vast moorland and heathland during the 12th and 13th century, nowadays coniferous and deciduous stands dominate the landscape. In the centre of this area, the ammunition dump "Vloetemveld" is situated. It is completely surrounded by woodland, but comprises, itself, a great diversity of interesting sites. They range from different kinds of woodland types over heathlike grasslands and heathland to very humid fenland with large ponds.

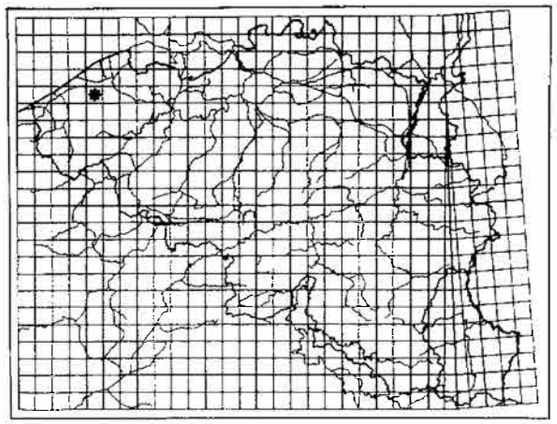

Fig. 1. Location of the investigated area "Vloetemveld" (Zedelgem) in Belgium.

Although the knowledge of the invertebrate fauna from West Flanders increased remarkably during the last decade, due to extensive and large scale sampling efforts, many interesting sites still remain to be explored. Apart from reports by BOSMANS & POLLET (1986), POLLET & HUBLÉ (1987), SEGERS & POLLET (1988) and ALDERWEIRELDT et al. (1989), very few papers deal with the spider communities of woodland and heathland habitats in this region. During 1985 and 1986, two sampling campaigns were performed at Vloetemveld. Both were carried out mainly by means of pitfall traps. The 1985 campaign focused on several woodland types, bordering the military depot, whereas during 1986, very diverse sites within the depot were investigated. Priorly, POLLET et al. (1987) presented the results for the carabid beetle fauna (Coleoptera, Carabidae) of the entire area, while SEGERS & POLLET (1988) gave a list of the woodland-inhabiting spider fauna, collected during 1985. In the present paper, the results of the spider fauna and relationship between its occurrence and several environmental conditions is discussed.

Material and methods

During 1986, eight different habitat types were selected for sampling. Table 1 summarizes some information on the sites with an indication of the dominant plant species and the numbers of the pitfall traps installed. Arthropods were mainly sampled by means of pitfall traps, however, net sweeping provided additional data in particular on spiders and flies. The pitfall traps used consisted of glass jam jars (inner diameter: 9 cm, depth: 9 cm). They were filled with a 10% formalin solution and emptied at approximately monthly intervals during the period 24.V.-29.XI.1986 (traps 10-12: 12.VII.-29.XI.1986). From the pitfall catches, spiders (Araneae), Carabidae (Coleoptera) and Dolichopodidae (Diptera) were sorted out and preserved in 70% alcohol solution at the Institute of Ecology of the State University Ghent (Belgium). Spiders were identified mainly by means of

LOCKET & MILLIDGE (1951, 1953), LOCKET et al. (1974), ROBERTS (1985, 1987) and WIEHLE (1956, 1960).

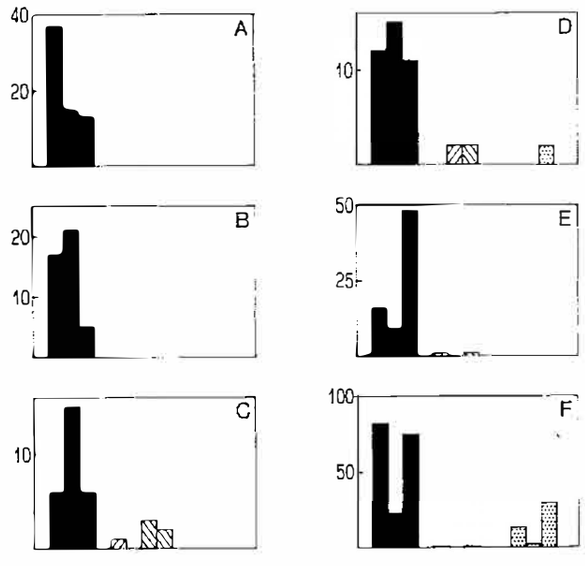

Fig. 2. Absolute numbers per pitfall for (A) Diplocephalus picinus, (B) Pachygnatha listeri, (C) Micrargus herbigradus, (D) Lepthyphantes zimmermanni, (E) Lepthyphantes flavipes, (F) Pirata hygrophilus. Woodland sites (pitfall 1-3): solid. Grassland sites (pitfalls 4, 5 and 10): diagonal (//) and (pitfalls 6, 7 and 11): diagonal (\\). Erica-heathland sites (pitfalls 8, 9 and 12): speckled. Detailed explanation of the pitfall numbers, see Table 1.

Furthermore, on 12.VII.1986 the following abiotic factors were recorded: soil humidity (one soil sample per pitfall trap), light intensity (8 measurements per pitfall trap) and litter layer development (10 measurements per pitfall trap). Table 2 gives an overview of the results.

In order to investigate the effects of these environmental factors on the occurrences of spider species, the factor values were compared with the abundances of the most numerously captured species by means of two correlation coefficients: the Spearman rank (SIEGEL, 1956) and the Pearson correlation coefficient (SOKAL & ROHLF, 1981) (see Results and Discussion).

Results and discussion

1. Faunistics

Table 3 summarizes the total catches per pitfall and per species over the complete sampling period. A total number of 135 species were collected by pitfall trapping, divided over 76 genera. No doubt, this high number is due to the large variety of the sampled sites. By effectuating a sweep net catch on 21.VI.1986, the

following species could be added to the list: *Araniella cucurbitina* (CLERCK, 1757), *Alea triguttata* (FABRICIUS, 1757), *Tetragnatha extensa* (LINNAEUS, 1758), *Theridion pallens* BLACKWALL, 1834 and *Theridion pictum* (WALCKENAER, 1802).

The following species are worth mentioning from the faunistical point of view, because they are rare in Belgium: *Agyneta ramosa* JACKSON, 1912, *Agyneta subtilis* (O. P.-CAMBRIDGE, 1863), *Euophrys aequipes* (O. P.-CAMBRIDGE, 1872) (cf. JANSSEN & BAERT, 1987), *Euophrys petrensis* C.L. KOCH, 1837 (cf. JANSSEN & BAERT, 1987), *Helophora insignis* (BLACKWALL, 1841), *Oxyptila sanctuaria* (O. P.-CAMBRIDGE, 1871), *Peponocranium ludicrum* (O. P.-CAMBRIDGE, 1861), *Robertus neglectus* (O. P.-CAMBRIDGE, 1871) and *Walckenaeria dysderoides* (WIDER, 1834). Besides these, the catches of *Atypus affinis* EICHWALD, 1830 (cf. RANSY & BAERT, 1987), *Clubiona germanica* THORELL, 1872, *Pardosa hortensis* (THORELL, 1872) (cf. ALDERWEIRELDT & MAELFAIT, in press) and *Walckenaeria cuspidata* (BLACKWALL, 1833) are very special for West Flanders.

2. Habitat choice of the most abundant species

In Fig. 2, 3 and 4, the total numbers per pitfall are plotted for the most abundant species. Yields of pitfall traps 10, 11 and 12 were also added to these figures, although they are not completely comparable to the other stations (shorter sampling period, cf. Material and Methods).

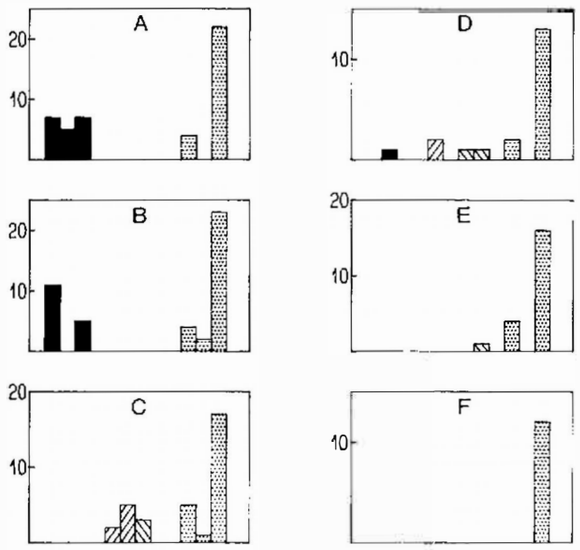

Fig. 3. Absolute numbers per pitfall for (A) Walckenaeria atrotibialis, (B) Walckenaeria cuspidata, (C) Agroeca proxima, (D) Gongylidiellum latebricola, (E) Pardosa nigriceps, (F) Peponocranium ludicrum. Woodland sites (pitfall 1-3): solid. Grassland sites (pitfalls 4, 5 and 10): diagonal (//) and (pitfalls 6, 7 and 11): diagonal (\\). Erica-heathland sites (pitfalls 8, 9 and 12): speckled. Detailed explanation of the pitfall numbers, see Table 1.

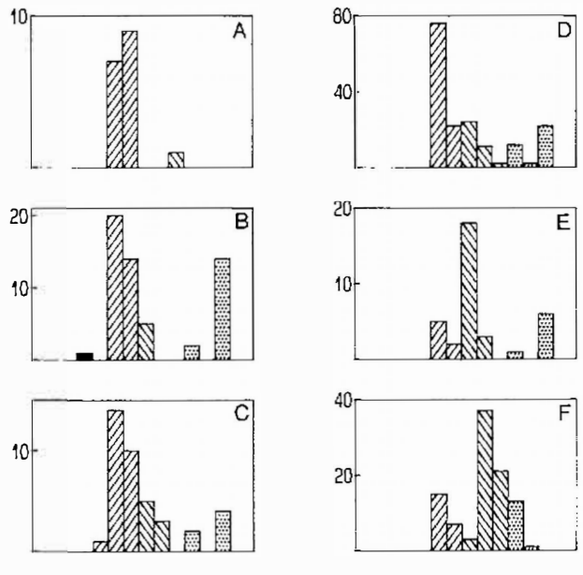

Fig. 4. Absolute numbers per pitfall for (A) Oxyptila sanctuaria, (B) Lepthyphantes ericaeus, (C) Alopecosa pulverulenta, (D) Pardosa pullata, (E) Pocadicnemis juncea, (F) Centromerita concinna. Woodland sites (pitfall 1-3): solid. Grassland sites (pitfalls 4, 5 and 10): diagonal (//) and (pitfalls 6, 7 and 11): diagonal (\\). Erica-heathland sites (pitfalls 8, 9 and 12): speckled. Detailed explanation of the pitfall numbers, see Table 1.

Three species groups can be deduced from this figure. Species almost exclusively caught in the woodland areas (sites 1-3) are e.g. *Diplocephalus picinus* (BLACKWALL, 1841), *Lepthyphantes zimmermanni* BERTKAU, 1890, *Lepthyphantes flavipes* (BLACKWALL, 1854), *Micrargus herbigradus* (BLACKWALL, 1854) and *Pachygnatha listeri* SUNDEVALL, 1830 (Fig. 2). A second group consists of species with a preference for the heathland area, often mainly for the wet heathland along a fen (station 8, Table 2): *Agroeca proxima* (O. P.-CAMBRIDGE, 1871), *Gongylidiellum latebricola* (O. P.-CAMBRIDGE, 1871), *Pardosa nigriceps* (THORELL, 1856), *Peponocranium ludicrum*, *Walckenaeria atrotibialis* (O. P.-CAMBRIDGE, 1878) and *Walckenaeria cuspidata* (Fig. 3). Species with a striking preference for the dry grassland and heathland areas are *Alopecosa pulverulenta* (CLERCK, 1757), *Lepthyphantes ericaeus* (BLACKWALL, 1853), *Centromerita concinna* (THORELL, 1875), *Oxyptila sanctuaria*, *Pardosa pullata* and *Pocadicnemis juncea* LOCKET & MILLIDGE, 1953 (Fig. 4). Many of these species are known to occur in many types of grasslands, even in intensively grazed pastures (DE KEER & MAELFAIT, 1988).

For the 28 most abundant species, the Pearson correlation coefficient (cf. SOKAL & ROHLF, 1981) was calculated between the numbers caught and the three abiotic factors recorded (Table 2). Catches of pitfall traps 10, 11 and 12 were not taken into consideration for these calculations. A species of which more than 20 individuals were caught in station 1 - 9, was called 'abundant'. The obtained

Pearson correlation coefficients are tabled in table 4, with indication of their statistical significance.

Spearman rank coefficients (cf. SIEGEL, 1956) were calculated between the numbers caught and some combinations of abiotic variables, namely (i) light intensity and thickness of the litter layer, (ii) light intensity and humidity, (iii) thickness of the litter layer and humidity. These results are summarized in Table 5.

Many species, such as *Diplocephalus picinus*, *Lepthyphantes zimmermanni*, *Micrargus herbigradus*, *Pachygnatha listeri* and *Saaristoa abnormis* (BLACKWALL, 1841) are highly significant negatively correlated with light intensity (Table 4). Low light intensities are especially encountered in woodland areas and this observed preference is clearly illustrated in Fig. 2. These results are in agreement with several literature data (e.g. BROEN & MORITZ, 1964; DUMPERT & PLATEN, 1985; LOCKET & MILLIDGE, 1951, 1953; ROBERTS, 1985; TURNBULL, 1960; WIEHLE, 1956, 1960). In particular *Diplocephalus picinus*, *Lepthyphantes zimmermanni* and *Pachygnatha listeri* are often called typical woodland species.

On the other hand, *Agroeca proxima*, *Gonatium rubens* (BLACKWALL, 1833), *Gongylidiellum latebricola*, *Pardosa nigriceps*, *Trochosa terricola* THORELL, 1856 and *Xysticus cristatus* (CLERCK, 1757) show a clear preference for the well-lit places (Table 4). They are positively correlated with light intensity. These species were, as a consequence, seldomly found in the three sampled woodland areas (Fig. 3). For the lycosid species *Pardosa nigriceps* and *Trochosa terricola*, light intensity seems not the only important factor. Although these two species are known to be fairly eurytopic (ALDERWEIRELDT & MAELFAIT, in press), they certainly do need some humidity. Their numbers are significantly, positively correlated with the combination of light intensity and humidity (Table 5).

The occurrence of a third group, consisting of *Diplocephalus picinus*, *Helophora insignis* and *Pirata hygrophilus* THORELL, 1872, is clearly correlated with a high humidity (Table 4). For *Pirata hygrophilus*, this is in agreement with literature data (cf. ALDERWEIRELDT & MAELFAIT, in press). For this species, the combination of high humidity and a well developed litter layer seems important. These environmental demands are often fulfilled in woodlands (Fig. 2). The species is indeed less abundant in the dry woodland station 2 (Fig. 2).

The habitat choice of *Peponocranium ludicrum* is not very clear in Belgium. The species was only captured in station 8, which, at least, indicates a preference for very humid places (Fig. 3).

Conclusion

From the entomological and araneological point of view, the area "Vloetemveld" clearly proves to be very valuable. This is illustrated by both the species richness and the high number of species of special faunistic interest. As mentioned before, this and similar heathland areas are often used as ammunition dumps by the Belgian army. Consequently, they are mostly inaccessable for unauthorized people, which undoubtedly protects them to some extent from pollution, eutrophication and fragmentation. However, this implies by no means that all sites are safeguarded against destruction activities. The lack of knowledge about their vulnerability often

causes a deterioration of very rare habitats such as small fens and *Erica*-heathland. In this respect, recently site no. 8 (see Table 1) was completely destroyed by the construction of a large pond for fire control. It is not very unlikely that along with the destruction of their habitat, populations of stenotopic insect and spider species have suffered severely and possibly may disappear in short term. Therefore, an improved cooperation between the military management section and scientists of the nature conservancy council is urgently needed.

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Table 1. Summary of the sampled sites of "Vloetemveld" (Zedelgem, Belgium) with indication of the pitfall trap numbers and the dominant plant species.

	Characterization of the site	pitfall	Dominant plant species
(1)	humid deciduous woodland	no.1	Quercus robur Betula pendula Betula pubescens (no herb layer)
(2)	dry deciduous woodland	no.2	Quercus robur Betula pendula Betula pubescens (no herb layer)
(3)	humid deciduous woodland (border of pond)	no.3	Quercus robur Rubus sp. Lemna trisulca
(4)	sandy dirtroad	no.4	Agrostis capillaris Luzula campestris
(5)	heath-like grassland	no.5,10	Anthoxantum odoratum Potentilla erecta Agrostis vinealis Molinia caerulea
(6)	ditch	no.6	Nasturtium offinicale Phalaris arundinacea
(7)	very dry heathland	no.7,11	Phalaris arundinacea Calluna vulgaris Agrostis vinealis Molinia caerulea Luzula campestris Polytrichum juniperum Anthoxantum odoratum
(8)	Erica-heath at border of small fen	no.8,9,12	Erica tetralix Drosera rotundifolia Molinia caerulea Polytrichum commune Potentilla erecta

Table 2: Abiotic characteristics of the first nine pitfalls (Pf) (details see Table 1). Hu = soil humidity (in %), Lt = thickness of the litter layer (in cm), Li = light intensity (in lux), R = rank.

Pf	Hu	R	Lt	R	Li	R
1	32.32	1	0.75	6	780	8
2	12.64	4	2.85	1	912	7
3	16.58	3	0.30	7	768	9
4	2.35	9	1.15	4	8466	6
5	9.25	6	2.40	2	11020	5
6	8.79	7			12350	4
7	5.14	8	0.95	5	21280	2
8	19.73	2			17100	3
9	10.47	5	1.30	3	23370	1

Table 3: Absolute numbers per pitfall of the spiders captured during the complete sampling period, in alfabetical order. Nomenclature according to BOSMANS & MAELFAIT (1986). Detailed explanation of the pitfall numbers, see Table 1.

(males/females)	1	2	3	4	5	10	6	7	11	8	12	9
Agelena labyrinthica										1/0		
Agroeca brunnea		1/0			0/1							
Agroeca proxima					1/1	2/3	0/3			2/3	0/1	13/4
Agyneta ramosa	1/0											
Agyneta subtilis			0/1									
Alopecosa accentuata				1/0	0/1			1/7	2/2			
Alopecosa pulverulenta				0/1	0/14	0/10	4/1	2/1		1/1		4/0
Antistea elegans							3/0				18/1	0/1
Arctosa leopardus							1/0			1/1	1/0	0/1
Arctosa perita										5/2		
Atypus affinis											1/0	2/0
Bathyphantes gracilis	1/2				1/0	1/0	1/0		1/0	1/4	2/1	6/2
Bathyphantes nigrinus	0/1	0/1	1/0									
Bathyphantes parvulus	0/1				0/1							
Centromerita bicolor					1/0	3/0						
Centromerita concinna					12/3	7/0	1/2	35/2	19/2	9/4	1/0	
Centromerus dilutus										1/0		
Centromerus sylvaticus	2/1	0/1	2/0		4/0	5/0	6/3	1/1		1/0		1/0
Ceratinella brevis			0/1		1/0		1/1	0/1		0/1		
Ceratinella scabrosa			2/0									
Cercidia prominens												2/1
Cheiracantium erraticum					0/1			1/1			0/2	0/1
Cicurina cicur					1/0	1/0	2/0			1/0	0/1	1/0
Clubiona diversa					1/0			0/2				
Clubiona germanica						1/0						
Clubiona lutescens	2/0	1/0	2/1									
Clubiona neglecta								0/1				
Clubiona reclusa					2/0		1/1					
Clubiona terrestris	1/0	4/1	2/0									
Cnephalocotes obscurus							1/0					
Coelotes terrestris			1/0									0/1
Dyctina arundinacea												1/0
Dicymbium brevisetosum	0/4		0/1		0/13	1/3	0/2			0/2		
Dicymbium nigrum						1/0						0/1
Diplocephalus cristatus			0/1									
Diplocephalus picinus	31/6	9/6	11/2									
Diplostyla concolor	1/4											
Dismodicus bifrons								0/1				
Drapetisca socialis	1/0	1/0	4/8									
Drassodes lapidosus				1/0	4/1		0/1	0/1		1/0	0/1	
Drassodes pubescens					2/0	0/2		1/1				
Drasyllus pusillus					1/2			2/1	0/1			
Enoplognatha ovata	1/0											
Enoplognatha thoracica					3/1							
Erigone atra	12/2	1/0	22/0	2/0		1/0		0/2	1/1	4/2	12/3	2/0
Erigone dentipalpis			1/0	5/0		1/0	0/2	3/0	1/1		1/0	
Erigone vagans			1/0							7/0	41/1	
Ero furcata							1/0					3/1
Euophrys aequipes												1/0
Euophrys frontalis								0/2				
Euophrys petrensis								1/0				
Floronia bucculenta											1/0	2/1
Gnathonarium dentatum		0/1										
Gonatium rubellum	3/1	3/1	2/0						1/0			
Gonatium rubens					1/0		9/0			2/10		9/11

Gongylidiellum latebricola		1/0			2/0		1/0	1/0		2/0		13/0
Gongylidiellum vivum					3/0		1/0					9/1
Gongylidium rufipes			1/2									
Hahnia montana	1/0	1/0		5/0		5/0	1/0			1/0		
Haplodrassus signifer					3/0			2/2				
Helophora insignis	13/3		4/1									
Hylyphantes graminicola	0/1		0/1	2/0								
Lepthyphantes cristatus	0/1											
Lepthyphantes ericaeus			0/1		15/5	10/4	4/1			2/0		11/3
Lepthyphantes flavipes	14/2	5/4	44/4		1/0		1/0					
Lepthyphantes mengei		4/1	1/1		4/0	5/3	15/2			3/0		3/0
Lepthyphantes minutus	2/0	1/0										
Lepthyphantes pallidus	3/0		7/1	1/0	9/1	1/2	3/0	6/1	1/0			1/0
Lepthyphantes tenuis			2/2		1/0	1/0	2/0		0/1	3/1	1/0	5/1
Lepthyphantes zimmermanni	11/1	11/4	10/1			0/2	1/1					1/1
Linyphia clathrata	1/0	0/1	1/0									
Linyphia hortensis		1/0										
Linyphia triangularis	2/1	1/0	2/0									
Macrargus rufus	0/3	0/4										
Maso sundevalli		2/0	3/0									
Meioneta rurestris					1/0		1/0	2/0				1/0
Meioneta saxatilis												2/0
Metellina mengei	1/0											
Metellina segmentata	1/0		0/2				0/1					
Micrargus herbigradus	6/0	15/0	6/0		1/0		3/0	0/2				
Micrargus subaequalis			1/0	0/2	2/0		1/0	3/0	0/1			
Microneta viaria	2/1	1/3	4/0									
Monocephalus fuscipes			1/0									
Nesticus cellulanus		0/1			1/0							
Oedothorax fuscus			0/1								3/5	16/9	0/1
Oedothorax retusus				1/0									1/0
Oxyptila atomaria											1/1		
Oxyptila praticola				1/0									
Oxyptila sanctuaria					5/2	6/3			1/0			
Oxyptila trux		4/2	1/0		1/0							5/0
Pachygnatha clercki	0/1		1/0		0/1		1/1			0/1	0/1	
Pachygnatha degeeri	0/1	1/0		1/0	10/3	9/13	3/1	1/0		1/1		0/2
Pachygnatha listeri	8/9	12/9	3/2									
Pardosa amentata			0/1	0/1			0/1			1/1		
Pardosa hortensis										1/0		
Pardosa lugubris		3/2	1/0									
Pardosa nigriceps								0/1		2/2		4/12
Pardosa palustris				1/0								
Pardosa pullata					45/31	7/15	18/6	4/7	0/2	7/5	0/2	13/9
Pelecopsis parallela				4/3				1/0				
Peponocranium ludicrum												5/7
Philodromus collinus											1/0	
Phlegra fasciata					1/0		2/0					
Phrurolithus festivus			1/0	1/0			0/1	0/1		1/0		
Pirata hygrophilus	56/26	20/2	71/4		0/1		0/1			10/3	0/2	12/17
Pirata latitans						0/1						1/0
Pirata piraticus										3/2	26/7	
Pocadicnemis juncea					5/0	0/2	8/10	3/0		0/1		6/0
Porrhomma oblitum	4/1		1/1									
Robertus lividus	3/0	3/1		1/0	2/0		0/1	0/2	2/0			0/2
Robertus neglectus		2/0										
Saaristoa abnormis	4/0	6/1	4/0	1/0	2/0		2/0	1/0				1/0
Stemonyphantes lineatus							1/0			1/1		
Tapinocyba praecox					3/0			4/0	2/1			
Tapinopa longidens	3/0	4/0									1/0	2/0

Tegenaria agrestis				3/3			0/1					
Tegenaria picta		0/1		1/0			0/1					1/1
Tegenaria silvestris		1/0		2/0			1/0	0/1				
Tetragnatha montana			0/1									
Tiso vagans				1/5	6/4			1/15	0/2			
Trachyzelotes pedestris				0/1								
Trochosa ruricola						1/0	1/0					
Trochosa terricola		1/0		0/1	1/2	0/1	1/1	1/4	0/1	4/6	1/0	1/4
Walckenaeria acuminata	0/2	0/3			2/1	2/1	2/0					
Walckenaeria atrotibialis	6/1	0/5	6/1							1/3		6/16
Walckenaeria cuculata	0/1		0/1									
Walckenaeria cuspidata	2/9		0/5							1/3	0/2	6/17
Walckenaeria dysderoides	2/0		2/0		0/1		1/0					
Walckenaeria nudipalpis	2/7		0/1									1/7
Walckenaeria obtusa		1/0										1/0
Xerolycosa nemoralis				3/0			3/2	1/0	3/1			
Xysticus cristatus					10/1	6/0		4/1	1/1	7/2	1/1	33/3
Zelotes latreillei				1/0	0/2	2/0	2/1	0/1			1/0	1/1
Zelotes subterraneus							1/0					
Zora spinimana			1/0									0/3

Table 4: Pearson correlation coefficients between the numbers of the 28 most abundant species with three abiotic parameters, with indication of the statistical significance (* = $p<0.05$, ** = $p<0.01$).

SPECIES	LIGHT	HUMIDITY	LITTER
Agroeca proxima	0.68 *	-0.08	-0.05
Alopecosa pulverulenta	0.37	-0.33	0.33
Centromerita concinna	0.46	-0.30	-0.02
Centromerus sylvaticus	-0.12	-0.002	-0.29
Dicymbium brevisetosum	-0.07	0.12	0.32
Diplocephalus picinus	-0.75 **	0.86 **	0.04
Erigone atra	-0.56	0.63 *	-0.43
Gonatium rubens	0.80 **	-0.09	-0.39
Gongylidiellum latebricola	0.67 *	-0.14	0.12
Helophora insignis	-0.57	0.84 **	-0.21
Lepthyphantes ericaeus	0.44	-0.22	0.36
Lepthyphantes flavipes	-0.66 *	0.41	-0.21
Lepthyphantes mengei	-0.04	-0.18	-0.20
Lepthyphantes pallidus	-0.08	-0.12	0.07
Lepthyphantes zimmermanni	-0.84 **	0.57	0.25
Micrargus herbigradus	-0.75 **	0.28	0.46
Pachygnatha degeeri	0.17	-0.20	0.39
Pachygnatha listeri	-0.76 **	0.57	0.42
Pardosa nigriceps	0.68 *	-0.06	-0.02
Pardosa pullata	0.34	-0.26	0.33
Pirata hygrophilus	-0.60	0.80 **	-0.21
Pocadicnemis juncea	0.28	-0.30	-0.28
Saaristoa abnormis	-0.82 **	0.32	0.49
Tiso vagans	0.39	-0.54	0.25
Trochosa terricola	0.70 *	-0.07	-0.26
Walckenaeria atrotibialis	0.33	0.35	-0.11
Walckenaeria cuspidata	0.27	0.25	0.03
Xysticus cristatus	0.74 **	-0.13	0.13

Table 5: Spearman rank correlation coefficients between the numbers of the 28 most abundant species and some combinations of abiotic factors, with indication of the statistical significance (* = $p<0.05$). Li = light intensity, Lt = thickness of the litter layer, Hu = humidity.

SPECIES	Li X Lt	Li X Hu	Lt X Hu
Agroeca proxima	0.339	0.576	-0.138
Alopecosa pulverulenta	0.553	0.172	-0.410
Centromerita concinna	0.321	0.260	-0.433
Centromerus sylvaticus	-0.767 *	0.000	0.159
Dicymbium brevisetosum	-0.391	0.160	0.207
Diplocephalus picinus	-0.517	-0.081	0.709 *
Erigone atra	-0.526	0.190	0.219
Gonatium rubens	0.339	0.567	-0.138
Gongylidiellum latebricola	0.709 *	0.608 *	0.048
Helophora insignis	-0.616 *	-0.121	0.649 *
Lepthyphantes ericaeus	0.275	0.212	-0.061
Lepthyphantes flavipes	-0.599	-0.336	0.540
Lepthyphantes mengei	0.120	0.009	-0.013
Lepthyphantes pallidus	-0.093	-0.335	-0.077
Lepthyphantes zimmermanni	-0.386	-0.053	0.600
Micrargus herbigradus	-0.462	-0.268	0.386
Pachygnatha degeeri	0.417	0.329	-0.145
Pachygnatha listeri	-0.437	-0.141	0.689 *
Pardosa nigriceps	0.522	0.765 *	-0.100
Pardosa pullata	0.454	0.319	-0.268
Pirata hygrophilus	-0.414	0.299	0.733 *
Pocadicnemis juncea	0.463	0.336	-0.391
Saaristoa abnormis	-0.382	-0.409	0.547
Tiso vagans	0.497	-0.262	-0.315
Trochosa terricola	0.594	0.710 *	-0.215
Walckenaeria atrotibialis	-0.140	0.374	0.666 *
Walckenaeria cuspidata	-0.183	0.520	0.479
Xysticus cristatus	0.733 *	0.594	0.092