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Microhabitat effect on spider distribution in winter wheat agroecosystem (Araneae)

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Abstract: The study was carried out in Moscow Area (central European part of Russia) in a winter wheat field and its grassy margins. A total of 151 spider species from 17 families and 89 genera were collected. In croplands, the families Linyphiidae, Tetragnathidae, Araneidae and Thomisidae were dominant among hortobiontous spiders, while Lycosidae, Linyphiidae and Tetragnathidae were dominant among epigeic ones. In the margins, Linyphiidae, Tetragnathidae and Araneidae prevailed among hortobiontous spiders, while Lycosidae and Linyphiidae prevailed among herpetobiontous spiders. The abiotic (soil acidity, soil moisture, organic matter content) and biotic (wheat ear height, weed abundance, plant biomass) factors studied have a different influence on the distribution of different spider groups. Their effect is diminished in the field margins. The distribution of most hortobiont web-building spiders depended on the characteristics of crop vegetation cover, as they preferred weeds. Hortobiont hunting spiders (crab spiders) were more sensitive to microclimate and preferred dry microhabitats. Herpetobiont spiders did not respond to soil characteristics in the field. The patterns of spider aggregation should be taken into account while carrying out ecological monitoring.

Key words: agrocoenoses, spider aggregation, spatial distribution, Russia

Introduction

Spider spatial distribution depends on prey availability and other factors such as vegetation cover, micro-landscape, microclimate (Samu *et al.* 1999). In contrast to insects, spiders do not tend to be concentrated on plants of certain species (Rypstra *et al.* 1999). It is the architecture of plants, which is the most important (Gibson *et al.* 1992, Balfour, Rypstra 1998, Basedov 1998, Halaj *et al*. 1998). Microclimate often correlates with architecture of plants (Cady 1984, White, Hassel 1994), nevertheless it is an independent factor of habitat when effecting spider distribution (Clausen 1986, Canard 1990). For example, the web location of Araneidae, Tetragnathidae, and Linyphiidae depends on humidity (Enders 1977, Gillespie 1987). Studies on distribution of spiders and their preys in agroecosystems are numerous (Yeargan 1975, Coll, Bottrell 1995, Yan *et al*. 1997, Halaj *et al*. 1998). However, which biotic and abiotic factors effect spider distribution remains unclear.

The study focuses on the uneven spider distribution within an agroecosystem. The main question to be answered is what are the effects of some abiotic (soil humidity, soil acidity, organic matter content) and biotic (vegetation height and biomass, weed abundance) factors on the spider distribution in the winter wheat agroecosystem.

Material and Methods

The investigation was carried out in a 12 ha winter wheat field and its margins during the vegetation season of 1996 from thawing until harvesting (April-August). The sampling site is situated

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in Moscow Area (central European part of Russia) 20 km NE of Moscow, on the territory of the Educational and Experimental Centre for Soil Ecology of Lomonosov Moscow State University (55°59´N, 37°24´E). The area is typical for the mixed forest zone of the European part of Russia. The relief of the experimental field is rather flat with slight depressions in the central and eastern parts of the field. The field is surrounded by several types of biotopes: a lime-trees alley with a drainage trench in-between, a mixed birch-fir forest, a potato field, and an uncultivated plot with a dirt road in-between the field. A small pond is located at a distance of 10-15 m from the sampling field.

Entomological sweeping and pitfall trapping were used to collect spiders in 81 sample plots. Forty-nine plots were evenly located over the cropland and 32 were determined in the surrounding grassy margins at a distance of 2-5 m from the field border (Fig. 1). On each plot, one trap was placed and 10 single sweeps were performed. Half-liter glass jars filled one-fourth with moist soil served as pitfall traps. The traps were exposed for 4 days and for the next 4 days they were closed. Sweepings were applied every 8 days. In total, 10,560 sweeps were made; the overall time of trap exposure was 4,540 trapping days; ca. 2,000 spider specimens were collected.

To measure soil moisture, pH and organic matter content samples were taken close to the pitfall traps to a depth of 10 cm both in the field and its grassy margins. The field moisture of soil (water content at a time of sampling) was measured by a weight method (ALEXANDROVA, NAYDENOVA 1976). Soil pH was estimated in a $CaCl_2$ extract by using a pH-340 potentiometer with glass electrode (ALEXANDROVA, NAYDENOVA 1976). Organic matter content (OMC) was measured by an appropriate method (ARINUSHKINA 1961, ORLOV, GRINDEL' 1967, NIKITIN 1972). Above-ground plant biomass of winter wheat vegetation and weeds from the studied plots was evaluated by weighing of the wet material collected over an area of 1 m^2 (DOSPEHOV 1973) in the place of soil sampling. Wheat ear height was estimated by direct measuring. Abundance of weeds was estimated with

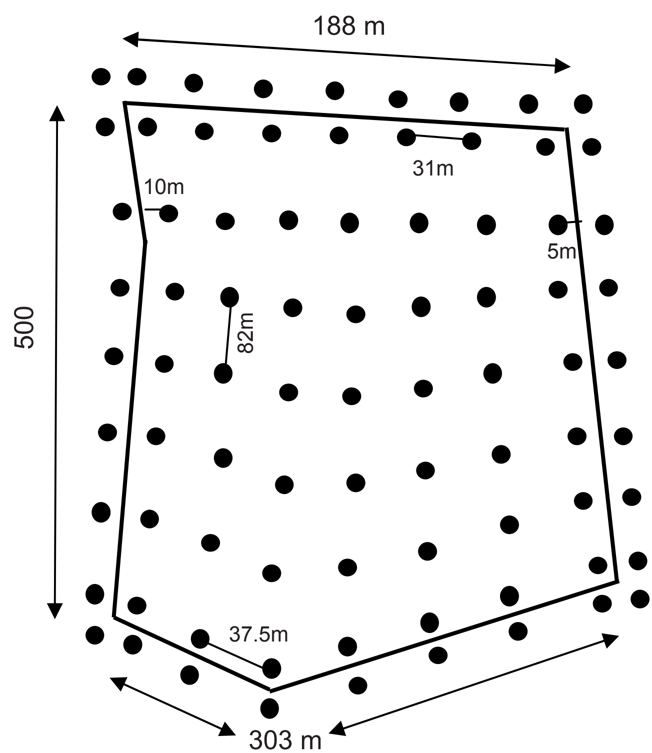

Fig. 1. Sampling plots in the studied area.

mark rating using five categories of weed-covering. Fifteen species of weeds were found within the field, 8 of which prevailed (occurred more than in 20 % of samples).

All mature spider individuals were identified to a species level. A spider family was considered dominant if it represented more than 8 % of the total catch. Statistical data analysis was performed by using MS STATISTICA 5.5. Correlation between the total year catch of the same family spiders and each sample plot (separately for sweeping and trapping) and soil characteristics (pH, organic matter content, moisture), vegetation characteristics (crop ear height, weed contents, plant biomass) on the same plots were calculated. The families encountered in more than 5 % of the total catch were used in the correlation analysis.

Results and Discussion

A total of 151 spider species from 17 families and 89 genera were collected in the winter wheat field and its grassy margins. Among them, 80 species (52 %) were found in the cropland (Table 1). The Linyphiidae had the highest species number (ca. 50 %) (Table 2). However, only a quarter of the total spider catch belongs to linyphiid spiders, hence there were many species with low abundance and single specimens among them. The other six main families (Araneidae, Dictynidae, Lycosidae, Tetragnathidae, Theridiidae, Thomisidae) accounted totally for over 30 % of the species number and 70% of the individuals' number.

The families Linyphiidae, Tetragnathidae, Araneidae, and Thomisidae dominated in the vegetation cover of cropland (Fig. 2a), while Lycosidae, Linyphiidae, and Tetragnathidae prevailed on the soil surface (Fig. 2b). Linyphiidae, Tetragnathidae, Araneidae, Lycosidae, Thomisidae, Theridiidae, and Dictynidae dominated among hortobiontous spiders in the field margins (Fig. 2c), while Lycosidae and Linyphiidae dominated among herpetobiontous ones (Fig. 2d). The correlation analysis between the studied factors and spider distribution in the field and its margins resulted as following.

Soil Moisture and OMC

These factors significantly correlate to each other within the field (Fig. 3). Within the cropland, they affected only the distribution of crab spiders, represented mainly by *Xysticus* spp. (Fig. 3). These typical for open areas spiders preferred dry microhabitats. Their correlation with OMC is probably indirect and was caused of soil moisture and OMC interdependence. In the field margins, the effect of soil humidity and of OMC on spiders has not been found (Fig. 4).

Soil pH

Within the cropland, pH varied from medium-acid to neutral (4.5-6.9), while in the margins from high-acid to neutral (3.9-7.0). Spider allocation in the cropland did not correlate with soil acidity (pH). However, in the field margins lycosid and thomisid spiders were usually found in the plots with higher acidity. The effect of pH on hortobiontous thomisids is most likely indirect, because they were more abundant in the margins adjacent to the mixed forests with higher soil acidity. Obviously, the effect has not been revealed in the cropland. The distribution of epigeic lycosids might be a result of the same factors, but on the other hand, the species dominating the cropland (*Pardosa agrestis*) and the margins (*P. fulvipes*) were different. The latter fact could be affected by soil acidity.

Weed Abundance and Wheat Ear Height

Fifteen species of weeds were found within the field, 8 of which prevailed. Some of them (especially *Agropyron repens* and *Matricaria inodora*) grew forming patches. Weed abundance and

Table 1. List of collected spiders: «+» – presence; «–» – absence.

No.	Taxon	Sampling method		Sample site	
		Sweeping	Pitfall trapping	Field	Margin
	Anyphaenidae				
1	*Anyphaena accentuata* (WALCKENAER, 1802)	+	–	–	+
	Araneidae				
2	*Araneus sturmi* (HAHN, 1831)	+	–	+	+
3	*Araniella cucurbitina* (CLERCK, 1758)	+	–	+	+
4	*Cyclosa conica* (PALLAS, 1772)	+	–	+	+
5	*Hypsosinga pygmaea* (SUNDEVALL, 1831)	+	–	+	+
6	*Larinioides cornutus* (CLERCK, 1758)	+	–	–	+
7	*L. patagiatus* (CLERCK, 1758)	+	–	+	+
8	*Neoscona adianta* (WALCKENAER, 1802)	+	–	–	+
9	*Singa hamata* (CLERCK, 1758)	+	–	–	+
10	*S. nitidula* C.L. KOCH, 1844	+	+	+	+
	Clubionidae				
11	*Cheiracanthium erraticum* (WALCKENAER, 1802)	+	–	–	+
12	*Clubiona caerulescens* L. KOCH, 1867	+	–	–	+
13	*C. reclusa* O. PICKARD-CAMBRIDGE, 1863	–	+	–	+
14	*C. stagnatilis* KULCZYŃSKI IN CHYZER ET KULCZYŃSKI, 1897	+	+	+	+
15	*C. subsultans* THORELL, 1875	+	–	–	+
	Dictynidae				
16	*Cicurina cicur* FABRICIUS, 1793	–	+	+	–
17	*Dictyna arundinacea* (LINNAEUS, 1758)	+	–	+	+
	Gnaphosidae				
1 8	*Drassylus lutetianus* (L. KOCH, 1866)	–	+	+	+
19	*D. pusillus* (C.L. KOCH, 1833)	–	+	+	+
20	*Haplodrassus umbratilis* (L. KOCH, 1866)	–	+	–	+
21	*Micaria pulicaria* (SUNDEVAL, 1831)	–	+	+	+
22	*Zelotes latreillei* (SIMON, 1878)	–	+	–	+
	Hahniidae				
23	*Cryphoeca silviciola* (C.L. KOCH, 1834)	+	–	–	+
24	*Hahnia nava* (BLACKWALL, 1841)	+	–	–	+
25	*H. pusilla* C.L. KOCH, 1841	–	+	+	+
	Linyphiidae				
26	*Agyneta rurestris* (C.L. KOCH, 1836)	+	+	+	+
27	*A. saxatilis* (BLACKWALL, 1844)	+	+	–	+
28	*A. subtilis* (O. PICKARD-CAMBRIDGE, 1863)	+	–	–	+
29	*Allomengea scopigera* (GRUBE, 1889)	–	+	–	+
30	*A. vidua* (L. KOCH, 1879)	–	+	–	+
31	*Anguliphantes angulipalpis* (WESTRING, 1851)	–	+	–	+
32	*Araeoncus humilis* (BLACKWALL, 1841)	–	+	+	+
33	*Bathyphantes approximatus* (O. PICKARD-CAMBRIDGE, 1871)	+	+	+	+
34	*B. gracilis* (BLACKWALL, 1841)	–	+	+	+
35	*B. nigrinus* (WESTRING, 1851)	–	+	+	+
36	*B. parvulus* (WESTRING, 1851)	–	+	+	+
37	*Bolyphantes alticeps* (SUNDEVALL, 1832)	–	+	–	+
38	*Centromerita bicolor* (BLACKWALL, 1833)	–	+	+	+

Table 1. Continued.

No.	Taxon	Sampling method		Sample site	
		Sweeping	Pitfall trapping	Field	Margin
39	*C. concinna* (Thorell, 1875)	–	+	–	+
40	*Centromerus sylvaticus* (Blackwall, 1841)	–	+	–	+
41	*Ceratinella brevis* (Wider, 1834)	–	+	–	+
42	*Dicymbium nigrum* (Blackwall, 1834)	–	+	+	+
43	*D. tibiale* (Blackwall, 1836)	–	+	–	+
44	*Diplocephalus cristatus* (Blackwall, 1833)	–	+	–	+
45	*D. picinus* (Blackwall, 1841)	+	+	–	+
46	*Diplostyla concolor* (Wider, 1834)	+	+	+	+
47	*Dismodicus bifrons* (Blackwall, 1841)	–	+	–	+
48	*D. elevatus* (C.L. Koch, 1838)	+	+	–	+
49	*Erigone atra* (Blackwall, 1833)	+	+	+	+
50	*E. dentipalpis* (Wider, 1834)	+	+	+	+
51	*Erigonella hiemalis* (Blackwall, 1841)	–	+	+	+
52	*E. ignobilis* (O. Pickard-Cambridge, 1871)	+	–	–	+
53	*Erigonidium graminicola* (Sundevall, 1830)	+	–	+	+
54	*Floronia bucculenta* (Clerck, 1758)	+	–	–	+
55	*Gnathonarium dentatum* (Wider, 1834)	+	+	+	+
56	*Gonatium rubellum* (Blackwall, 1841)	+	–	–	+
57	*Gongylidium rufipes* (Linnaeus, 1758)	+	–	–	+
58	*Hypomma bituberculatum* (Wider, 1834)	+	–	–	+
59	*H. cornutum* (Blackwall, 1833)	+	+	–	+
60	*Kaestneria dorsalis* (Wider, 1834)	+	–	–	+
61	*K. pullata* (O. Pickard-Cambridge, 1863)	+	+	+	+
62	*Leptorhoptrum robustum* (Westring, 1851)	–	+	–	+
63	*Linyphia triangularis* (Clerck, 1758)	+	–	–	+
64	*Micrargus herbigradus* (Blackwall, 1854)	+	–	–	+
65	*Microlinyphia pusilla* (Sundevall, 1830)	+	+	+	+
66	*Moebelia penicillata* (Westring, 1851)	+	–	+	+
67	*Neriene clathrata* (Sundevall, 1830)	–	+	–	+
68	*N. emphana* (Walckenaer, 1841)	+	+	–	+
69	*Oedothorax agrestis* (Blackwall, 1853)	–	+	–	+
70	*O. apicatus* (Blackwall, 1850)	+	+	+	+
71	*O. gibbosus* (Blackwall, 1841)	+	+	–	+
72	*O. retusus* (Westring, 1851)	–	+	+	+
73	*Palliduphantes alutacius* (Simon, 1884)	–	+	+	+
74	*Pocadicnemis pumila* (Blackwall, 1841)	–	+	–	+
75	*Porrhomma convexum* (Westring, 1851)	+	+	+	+
76	*P. pallidum* Jackson, 1913	–	+	+	+
77	*Savignya frontata* Blackwall, 1833	+	+	+	+
78	*Silometopus elegans* (O. Pickard-Cambridge, 1872)	+	–	–	+
79	*S. reussi* Jackson, 1913	–	+	+	+
80	*Tallusia experta* (O. Pickard-Cambridge, 1871)	–	+	+	+
81	*Tapinocyba biscissa* (O. Pickard-Cambridge, 1872)	–	+	+	+
82	*T. pallens* (O. Pickard-Cambridge, 1872)	+	–	+	–
83	*Tenuiphantes mengei* Kulczyński, 1887	–	+	–	+

Table 1. Continued.

No.	Taxon	Sampling method		Sample site	
		Sweeping	Pitfall trapping	Field	Margin
84	*T. nigriventris* (L. Koch, 1879)	+	+	–	+
85	*T. tenebricola* (Wider, 1834)	+	+	–	+
86	*Tiso vagans* (Blackwall, 1834)	–	+	–	+
87	*Trematocephalus cristatus* (Wider, 1834)	+	–	–	+
88	*Troxochrus scabriculus* (Westring, 1851)	–	+	+	+
89	*Walckenaeria antica* (Wider, 1834)	–	+	–	+
90	*W. atrotibialis* O. Pickard-Cambridge, 1878	–	+	–	+
91	*W. cucullata* (C.L. Koch, 1836)	–	+	–	+
92	*W. dysderoides* (Wider, 1834)	–	+	–	+
93	*W. nudipalpis* (Westring, 1851)	–	+	+	+
94	*W. unicornis* O. Pickard-Cambridge, 1861	+	+	+	+
95	*W. vigilax* (Blackwall, 1853)	+	+	+	+
	Liocranidae				
96	*Phrurolithus festivus* (C.L. Koch, 1835)	–	+	+	+
	Lycosidae				
97	*Hygrolycosa rubrofasciata* (Ohlert, 1865)	–	+	–	+
98	*Pardosa agrestis* (Westring, 1861)	–	+	+	+
99	*P. amentata* (Clerck, 1758)	+	+	+	+
100	*P. fulvipes* (Collett, 1875)	+	+	+	+
101	*P. prativaga* (L. Koch, 1870)	+	+	+	+
102	*P. lugubris* (Walckenaer, 1802)	–	+	+	+
103	*P. paludicola* (Clerck, 1758)	–	+	+	+
104	*P. palustris* (Linnaeus, 1758)	+	+	+	+
105	*P. pullata* (Clerck, 1758)	–	+	+	+
106	*Pirata hygrophilus* Thorell, 1872	–	+	+	+
107	*P. piraticus* (Clerck, 1758)	–	+	–	+
108	*Tarentula aculeata* (Clerck, 1758)	–	+	–	+
109	*Trochosa ruricola* (De Geer, 1778)	–	+	+	+
110	*T. terricola* Thorell, 1856	–	+	+	+
111	*Xerolycosa miniata* (C.L. Koch, 1834)	–	+	+	+
	Mimetidae				
112	*Ero furcata* (Villers, 1789)	+	+	–	+
	Philodromidae				
113	*Philodromus cespitum* (Walckenaer, 1802)	+	–	–	+
114	*Thanatus striatus* C.L. Koch, 1845	–	+	+	–
115	*Tibellus maritimus* (Menge, 1875)	+	–	+	+
116	*T. oblongus* (Walckenaer, 1802)	+	–	+	+
	Pisauridae				
117	*Dolomedes* sp.	+	+	+	+
	Salticidae				
118	*Dendryphantes rudis* (Sundevall, 1832)	+	–	–	+
119	*Euophrys frontalis* (Walckenaer, 1802)	–	+	–	+
120	*Evarcha arcuata* (Clerck, 1758)	+	–	–	+
121	*E. falcata* (Clerck, 1758)	+	–	–	+
122	*Heliophanus auratus* C.L. Koch, 1835	+	–	–	+

Table 1. Continued.

No.	Taxon	Sampling method		Sample site	
		Sweeping	Pitfall trapping	Field	Margin
123	*H. flavipes* (Hahn, 1832)	+	–	–	+
124	*Marpissa radiata* (Grube, 1859)	+	–	–	+
125	*Sitticus floricola* (C.L. Koch, 1837)	+	–	–	+
	Tetragnathidae				
126	*Metellina segmentata* (Clerck, 1758)	+	+	+	+
127	*Pachygnatha clercki* Sundevall, 1823	+	+	+	+
128	*P. degeeri* Sundevall, 1830	–	+	+	+
129	*P. listeri* Sundevall, 1830	–	+	–	+
130	*Tetragnatha dearmata* Thorell, 1873	+	–	+	+
131	*T. extensa* (Linnaeus, 1758)	+	–	+	+
132	*T. obtusa* C.L. Koch, 1837	+	–	+	+
133	*T. pinicola* L. Koch, 1870	+	–	+	+
	Theridiidae				
134	*Dipoena torva* (Thorell, 1875)	+	–	+	–
135	*Enoplognatha ovata* (Clerck, 1758)	+	–	+	+
136	*Robertus arundineti* (O. Pickard-Cambridge, 1863)	–	+	+	+
137	*R. lividus* (Blackwall, 1836)	–	+	+	+
138	*R. neglectus* (O. Pickard-Cambridge, 1863)	–	+	+	+
139	*Steatoda bipunctata* (Linnaeus, 1758)	+	–	+	+
140	*Theridion bimaculatum* (Linnaeus, 1767)	+	–	+	+
141	*T. pictum* (Walckenaer, 1802)	+	–	–	+
142	*T. sisyphium* (Clerck, 1758)	+	–	–	+
	Thomisidae				
143	*Misumena vatia* (Clerck, 1758)	+	–	+	+
144	*Ozyptila praticola* (C.L. Koch, 1837)	+	+	–	+
145	*O. trux* (Blackwall, 1846)	–	+	–	+
146	*Xysticus audax* (Schrank, 1803)	+	–	+	+
147	*X. kochi* Thorell, 1872	+	+	+	+
148	*X. lanio* C.L.Koch, 1845	–	+	+	–
149	*X. ulmi* (Hahn, 1831)	+	+	+	+
	Zoridae				
150	*Zora nemoralis* (Blackwall, 1861)	–	+	–	+
151	*Z. spinimana* (Sundevall, 1832)	–	+	–	+

wheat ear height correlated to each other and to soil moisture and OMC (Fig. 3). Weeds sprouted largely at moist sites with high humus content and hence the crop was undersized in these plots. Hortobiontous web-building spiders (excl. Araneidae) were positively associated with weed abundance (Fig. 3). They tended to concentrate on weed plants and were less abundant on "clear" wheat with high ears. The similar conclusion was made by Jmhasly, Nentwig (1995), discovered that weed strips as intercropping diverted the spiders from wheat crop. But generally weed intercropping increase spider density in agriculture fields and orchards (Riechert, Bishop 1990, Wyss *et al*. 1995, Feber *et al.* 1998). In this connection Samu *et al*. (1999) considered the habitat diversification interspersed throughout the crop (e.g. crop mixture or small weed patches) to be more effective than spatially segregated (e.g. weed strips).

Table 2. Number of the species and individuals in the studied agroecosystem.

Family	Number of species	%	Number of individuals	%
Anyphaenidae	1	0.7	1	0.1
Araneidae	9	6.0	211	11.0
Clubionidae	5	3.3	31	1.6
Dictynidae	2	1.3	117	6.1
Gnaphosidae	5	3.3	9	0.5
Hahniidae	3	2.0	5	0.3
Linyphiidae	70	46.4	489	25.4
Liocranidae	1	0.7	2	0.1
Lycosidae	15	9.9	397	20.6
Mimetidae	1	0.7	2	0.1
Philodromidae	4	2.6	23	1.2
Pisauridae	1	0.7	3	0.2
Salticidae	8	5.3	41	2.1
Tetragnathidae	8	5.3	285	14.8
Theridiidae	9	6.0	134	7.0
Thomisidae	7	4.6	172	8.9
Zoridae	2	1.3	4	0.2
Total	**151**	**100**	**1926**	**100**

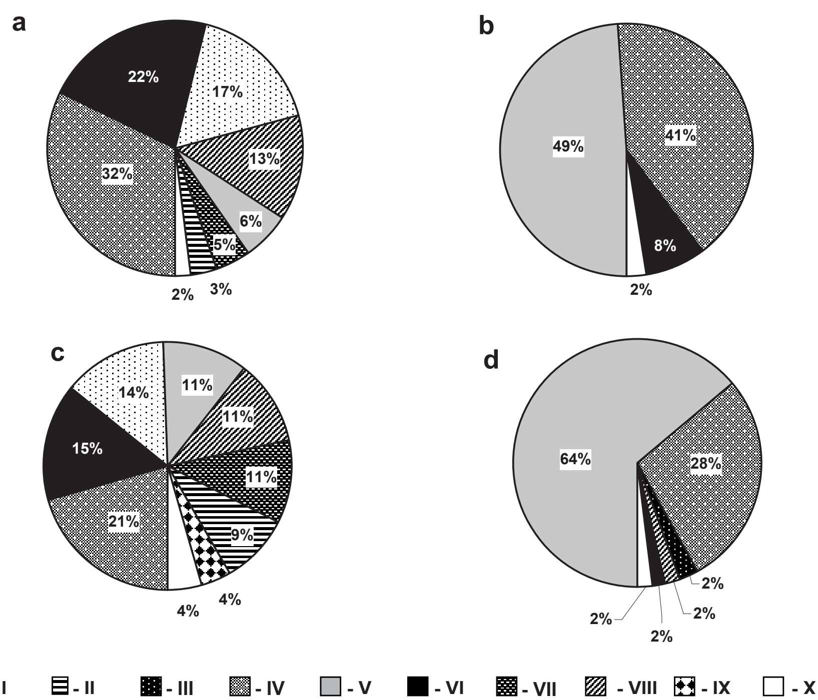

Fig. 2. Proportion of spider families in relative abundance (a, c) and in dynamic density (b, d) in the studied wheat agroecosystem: a, c - data obtained by sweeping, b, d - data obtained by pitfall traping, a, b - field centre, c, d - field margin, (I - Araneidae, II - Dictynidae, III - Gnaphosidae, IV - Linyphiidae, V - Lycosidae, VI - Tetragnathidae, VII - Theridiidae, VIII - Thomisidae, IX - Salticidae, X - other families).

In contrast, ambush crab spiders were more abundant in the plots with maximal wheat ear height and minimal weed abundance. This is likely to be accounted for by their preference for dry habitats (where crop was higher) rather than for the wheat itself. According to our data, these spiders are less numerous in crops as compared to margins (Seyfulina, Tschernyshev 2001). Thomisid spiders choose dry microhabitats only within the cropland, but their distribution in the margins is affected by other factors (Fig. 4).

Plant Biomass

In plots rich in weeds the plant biomass was lower than in the other places probably because of the low mass of weeds as compared to wheat ears. The vegetation biomass in cropland did not correlate with the spiders' abundance within the field (Fig. 3), though in the field margins some spiders (Araneidae) preferred dense vegetation cover (Fig. 4).

Distribution Interdependency of Different Spider Groups

Within the cropland, only the distribution of two families (Tetragnathidae and Linyphiidae), which prefer weedy plots was interdependent (Fig. 3). There was no correlation between these families in the field margins (Fig. 4). The correlations between the allocations of the different spider families in the margins attracted attention, i.e. the distribution of all spiders was interconnected. At the same time, the correlations between many of the families with studied factors were insignificant, which suggests the presence of other factors not yet measured, for example, the vegetation type and the features of adjacent habitats. It is well known that spiders respond to the complexity and diversity of vegetation (Balfour, Rypstra 1998, Rypstra *et al.* 1999, Sunderland, Samu 2000).

Thus, both abiotic and biotic factors studied had different impact on the distribution of different spider groups. In the field margins these factors affected the spider distribution less than in the cropland probably due to the more complexity of the vegetation cover in the margins. The distribu-

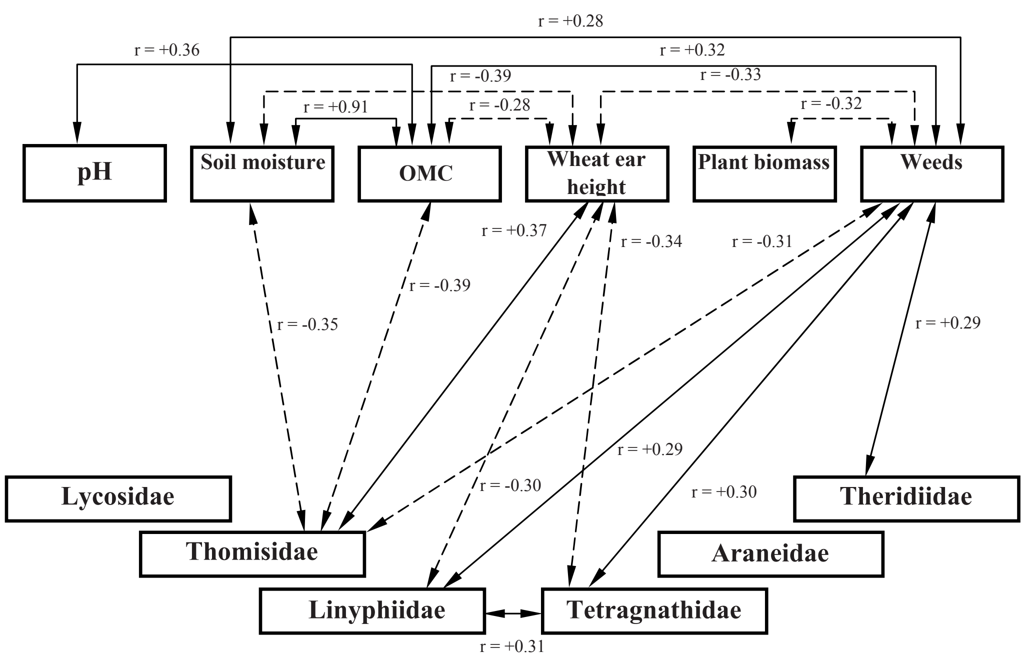

Fig. 3. Correlation between spider distribution and factors within the field: solid line represents significant positive correlation ($p < 0.05$), dashed line is significant negative correlation.

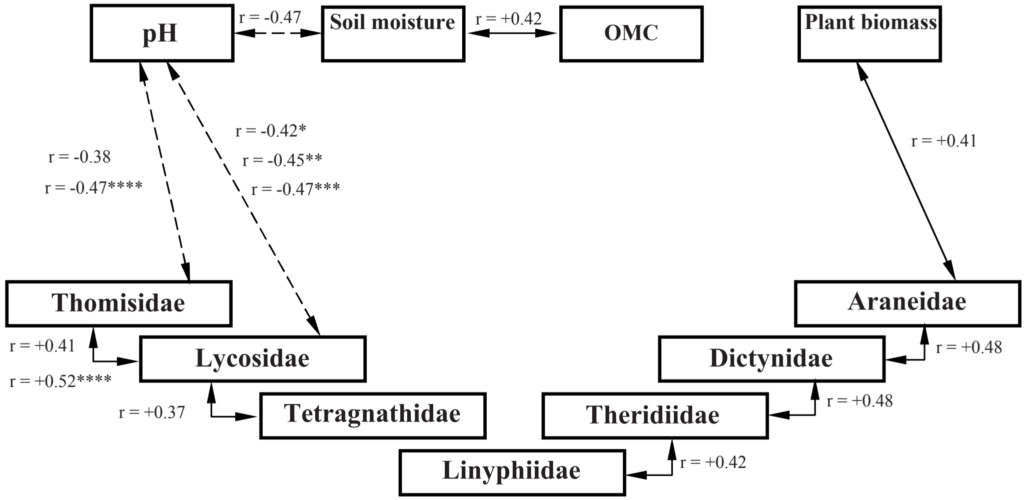

Fig. 4. Correlation between spider distribution and factors within the field margins: line notation are the same as in Fig. 3. * - data obtained by sweeping, ** - data obtained by pitfall traping, *** - *Pardosa* spp., **** - *Xysticus* spp.

tion of most hortobiont web-building spiders depended on the characteristics of crop vegetation cover, since they preferred weeds. At the same time, hortobiont hunting spiders were more sensitive to microclimate and preferred dry microhabitats. Herpetobiont spiders did not respond to soil characteristics in the field. The pattern of spider spatial distribution should be taken into account while carrying out ecological monitoring. Sampling over an entire field area is recommended to accurately estimate spider counts.

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Влияние на микрохабитатите върху разпространението на паяците в агроценоза от зимна пшеница (Araneae)

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(Резюме)

Настоящето изследване е проведено в Московска област (Русия) в насаждение от зимна пшеница със затревена периферия. Събрани са 151 вида паяци от 17 семейства и 89 рода. В границите на агроценозата сред хортобионите паяци доминират семействата Linyphiidae, Tetragnathidae, Araneidae и Thomisidae, а сред епигейните – Lycosidae, Linyphiidae и Tetragnathidae. В периферията на насаждението хортобионтите са представени най-вече от видове от семействата Linyphiidae, Tetragnathidae и Araneidae, докато Lycosidae и Linyphiidae доминират сред херпетобионтите. Абиотичните (киселинност, влага, органика) и биотичните (височината на житните класове, обилието на бурените, растителната биомаса) фактори влияят различно върху разпространението на паяците. Като цяло въздействието им намалява в периферията на насаждението. Докато разпространението на хортобионтните мрежести паяци зависи основно от характеристиката на растителната покривка (установено е, че те предпочитат бурените), то паяците-ловци (крабовите паяци) са по-чувствителни към микроклимата и предпочитат сухи микрохабитати. Херпетобионтните паяци не зависят от почвената характеристика на полето. Авторът стига до извода, че при провеждането на мониторинг в бъдеще трябва да бъде взет под внимание моделът на пространствено разпределение на паяците.