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The first year spider (Arachnida: Araneae) community in a burned area of Sudas bog in Latvia

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Re-establishment of spider community was investigated during the first season after the summer fire in the Sudas peat bog in Latvia. A total of 48 species was recorded in the burned place. The dominant colonisers were *Agroeca proxima* (Liocranidae) and *Alopecosa aculeata* (Lycosidae). Survival during a fire in *Sphagnum* moss is presumable for some species. Mainly the species typical of the original pine bog took part in the re-establishment of the community. The species typical of ruderal or other open areas were sparse on the burned place. Their abundance remained at the same level as in unburned bogs. The activity pattern of the spider community in the burned area was similar to that observed during the respective period in unburned peat bogs. During the first season after the fire the spider community on the burned bog was closely related to the communities investigated in undisturbed peat bogs in Lithuania one year earlier. The main causes of this similarity are the high spreading ability of most peat bog species from the surrounding bog habitats and probably the survival of some species in the moss during the fire. Six species were new to Latvian spider fauna.

Key words: spiders, peat bogs, Sphagnum, fire, recolonisation, Latvia

INTRODUCTION

Fire is an important agent keeping a number of ecosystems in the native state and preventing their overgrowing by forest. Various aspects of short- and long-term effects of fire on different ecosystems and organism groups have been studied (Collins, 1990; Koponen, 1995; Panzer, Schwartz, 2000; Punttila et al., 1994; Pyne et al., 1998; Richardson, Holliday, 1982; Schaefer, 1980a; 1980b; Schwartz, Hermann, 1997; Tamm, 1986; Zackrisson, 1977). A number of studies have dealt with spider communities in post-fire forests and open habitats (Buddle et al., 2002; Hauge, Kvamme, 1983; Huhta, 1971; Koponen, 1988, 1993; Moretti, 2000; Riechert, Reeder, 1972). Peat bogs belong to the habitats exposed to irregular fire too, but in comparison to other habitats, just a few studies were designated for studying the effects of fire on spider fauna in peat bogs or related habitats (Aitchison-Benell, 1994; Merett, 1976; Usher, Smart, 1988). Only the paper of Aitchison–Benell (1994) provides data on the re-establishment of a peat bog spider community immediately after fire in the taiga zone in Manitoba, Canada. No similar data are known from European peat bogs. This paper is also the first publication on spider fauna of Latvian peat bogs. The investigation on the epigeic community of spiders nascent soon after the late spring fire in May 2000 was carried out in the Sudas bog, Latvia. The objective of this study was to obtain data on the re-establishment of the spider community during the first season after the fire.

STUDY SITE

The Sudas bog (size 2575 ha) is situated in the southern part of the Gauja National Park, Cçsis District, Latvia. A rather insignificant area (about 6 ha, to the north of Lake Zviedru) of the bog was burnt in late May 2000. The burnt area is situated in the middle of the bog and thus is well isolated from other types of habitats. The fire lasted about a week and was extinguished by foresters. The burned area includes a pine bog ("Natura" habitat code 91D0) and an open heath-land with scattered low-grown pine trees. The moss cover was burned to different depth, down to 20–30 cm around tree trunks or down to 10 cm between trees. The sample plot was selected in the middle of the burned area (57°09'22''N, 25°00'27''E) in a pine bog. The sample plot was located close to a depression in the bog, so the soil conditions were relatively dry during the summer and resembled conditions typical of dessicating pine bogs. The herbaceous vegetation, the moss cover, the shrubs have burnt out completely while the majority of pines remained ali-

ve. The vegetation started to regenerate soon after the fire. Red cowberry *Vaccinium vitis-idaea*, bilberry *Vaccinium myrtillus*, labrador-tea *Ledum palustre*, cloudberry *Rubus chamaemorus* started to recover by root sprouts during the first year. The recovery of *Sphagnum* spp. peat mosses was limited during the first season, but the green-moss *Polytrichum commune* regenerated by protonemas and young mosses started to cover the soil. The fire-dependant plants were found scarcely, and no fire-dependant fungi were observed during the whole season of investigations. Similar unburned areas nearby were dominated by earlier mentioned shrubs, *Sphagnum* spp. mosses, *Pleurosium schreberi*, *Hylocomium spelendens*, with no distinct hummocks.

MATERIALS AND METHODS

The epigeic spider fauna on the burned area was investigated with the aid of pitfall traps. The pitfall traps were placed on 11 June, two weeks after the end of the fire. Ten pitfall traps (plastic jars (volume 250 ml, upper diameter 7.5 cm) were set in a line at a distance of three meters. The distance from an unburned pine bog forest was approximately 120 m and about 140 m from the nearest unburned heath-land. Formaldehyde solution (10%) was used as the preserving liquid. The traps were exposed from June 11 to October 15 and were emptied every two weeks. Nine series of samples were taken. All adult and subadult (if possible) specimens of spiders were identified and included into the analysis.

Due to the lack of comparative data from neighbouring unburned bog areas it is difficult to predicate about the changes that have occurred. We can state only the *a posteriori* situation observed starting from the third week after the fire. In addition, the average data collected during the same period (mid May – mid October 2000) in two unburned peat bogs in Lithuania were used for comparison (Rëlys, Dapkus, 2002; rëlys, Koponen, 2002).

The Shannon–Wiener diversity index (Hs, log base 2) was used to compare the internal complexity of community structure. More details for calculation and interpretation of this index can be obtained from Krebs (1989). The nomenclature of spiders follows Platnick (2002). The material is deposited in the collection of V. Spuògis.

RESULTS

General data

In total, 388 adult and subadult specimens belonging to 48 spider species and 13 families were collected (Table 1).

Six spider species (*Zora spinimana, Zora silvestris, Agroeca proxima, Stemonyphantes lineatus, Micrargus apertus, Oryphantes angulatus*) are new for the Latvian spider fauna.

Numerous specimens, especially those from June–July, were much darker than those observed in unburned bogs. This phenomenon occurred probably due to adaptation to the dark ground after the fire. The change in colour was most pronounced in *Ozyptila trux.*

Community structure

Liocranidae (38% of all specimens found) and Lycosidae (30%) dominated over the other spider families (Fig. 1). Both these families comprise species actively moving on ground surface. Spider species found abundantly in the burned area included *Agroeca proxima* among liocranids and *Alopecosa aculeata* among lycosids. Specimens of *Euryopis flavomaculata* and *Aulonia albimana* ranked third among trap captures (19 specimens) (Fig. 2). Despite the high numbers of species (18 species), Linyphiidae were not numerous. None of 18 Li-

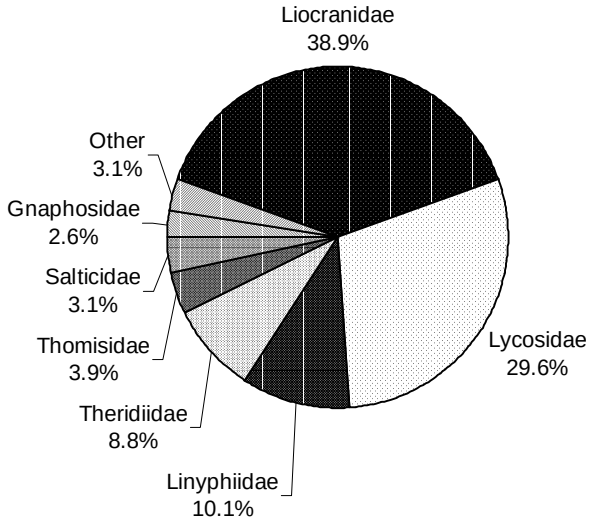

Fig. 1. Dominance of spider families in the burnt pine bog (Sudas bog, Latvia) in 2000 (percentage of all specimens found)

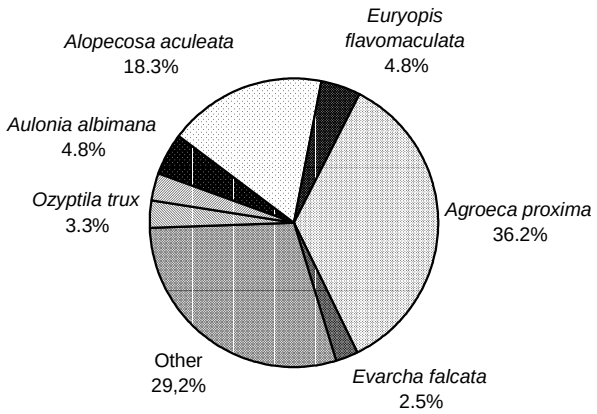

Fig. 2. The most abundant species (% of all specimens found) in a burnt pine bog (Sudas bog, Latvia) in 2000

Table 1. **Spider species and number of specimens collected during different periods in a burnt pine bog (Sudas bog, Latvia) in 2000**

Species	Sampling periods and density									Σ	%
	11.06.–25.06.	25.06.–09.07.	09.07.–23.07.	23.07.–06.08.	06.08.–20.08.	20.08.–03.09.	03.09.–17.09.	17.09.–01.10.	01.10.–15.10.		
Ero furcata (Villers, 1789)								1		**1**	0.3
Crustulina guttata (Wider, 1834)	1	1	1		2	1				**6**	1.5
Euryopis flavomaculata (C. L. Koch, 1836)	13	4	1				1			**19**	4.9
Robertus lividus (Blackwall, 1836)	3	3								**6**	1.5
Robertus scoticus (Jackson, 914)		1				2				**3**	0.8
Agyneta cauta (O. P.-Cambridge, 1902)	2									**2**	0.5
Agyneta subtilis (O. P.-Cambridge, 1863)	3		1							**4**	1.0
Centromerus arcanus (O. P.-Cambr., 1873)			1							**1**	0.3
Cnephalocotes obscurus (Blackwall, 1834)			1							**1**	0.3
Diplocentria bidentata (Eemerton, 1882)					1	1			4	**6**	1.5
Dismodicus elevatus (C.L.Koch, 1838)	1									**1**	0.3
Gonatium rubens (Blackwall, 1833)	1									**1**	0.3
Linyphia triangularis (Clerck, 1757)								1		**1**	0.3
Macrargus rufus (Wider, 1834)	1			1						**2**	0.5
Maso sundevalli (Westring, 1851)	2									**2**	0.5
Micrargus apertus (O. P.-Cambridge, 1871)	2	2								**4**	1.0
Minyriolus pusillus (Wider, 1834)			1							**1**	0.3
Oryphantes angulatus (O. P.-Cambr., 1881)									2	**2**	0.5
Porrhomma pallidum (Jackson, 1913)								1	2	**3**	0.8
Saaristoa abnormis (Blackwall, 1841)		1	2	1						**4**	1.0
Stemonyphantes lineatus (Linnaeus, 1758)								1		**1**	0.3
Tenuiphantes cristatus (Menge, 1866)			1							**1**	0.3
Walckenaeria cucullata (C. L. Koch, 1836)	1	1								**2**	0.5
Pachygnatha listeri (Sundevall, 1830)		2								**2**	0.5
Araneus diadematus (Clerck, 1757)									2	**2**	0.5
Cercidia prominens (Westring, 1851)		1								**1**	0.3

Table 1 (continued)

Species	Sampling periods and density									Σ	%
	11.06.–25.06.	25.06.–09.07.	09.07.–23.07.	23.07.–06.08.	06.08.–20.08.	20.08.–03.09.	03.09.–17.09.	17.09.–01.10.	01.10.–15.10.		
Alopecosa aculeata (Clerck, 1757)	16	3	7	11	10	8	5	8	5	**73**	18.8
Alopecosa pulverulenta (Clerck, 1757)		2		1						**3**	0.8
Aulonia albimana (Walckenaer, 1805)	7	6	2		3			1		**19**	4.9
Hygrolycosa rubrofasciata (Ohlert, 1865)				1						**1**	0.3
Pardosa lugubris (Walckenaer, 1802)	2									**2**	0.5
Pardosa riparia (C. L. Koch, 1833)	1	1		1				1		**4**	1.0
Pirata uliginosus (Thorell, 1856)								1		**1**	0.3
Trochosa ruricola (De Geer, 1778)						1			3	**4**	1.0
Trochosa spinipalpis (F. O. P.-Cambr., 1895)						1	4	3		**8**	2.1
Pisaura mirabilis (Clerck, 1757)									1	**1**	0.3
Antistea elegans (Blackwall, 1841)						1				**1**	0.3
Agroeca proxima (O. P.-Cambridge, 1871)			12	5	69	27	16	10	5	**144**	37.1
Phrurolithus festivus (C. L. Koch, 1835)	3	2	1				1			**7**	1.8
Gnaphosa bicolor (Hahn, 1833)	2									**2**	0.5
Zelotes clivicola (L. Koch, 1870)	4			2		2				**8**	2.1
Zora silvestris (Kulczynski, 1897)		1								**1**	0.3
Zora spinimana (Sundevall, 1833)		3								**3**	0.8
Ozyptila trux (Blackwall, 1846)	9	1	2					1		**13**	3.3
Xysticus cristatus (Clerck, 1757)					1					**1**	0.3
Xysticus lanio (C. L. Koch, 1835)	1									**1**	0.3
Euophrys frontalis (Walckenaer, 1802)	1					1				**2**	0.5
Evarcha falcata (Clerck, 1757)	1	2	2		3		2			**10**	2.6
Number of specimens	77	37	35	23	89	45	29	29	24	388	
Number of species	22	18	14	8	7	10	6	11	8	**48**	

nyphiidae species was presented by more than four specimens. Only two Gnaphosidae species (*Zelotes clivicola, Gnaphosa bicolor*) known mainly from other habitats than peat bogs were registered at the burned place, while not a single one of the Gnaphosidae species usually well represented in peat bogs (*Drassyllus pusillus, Gnaphosa microps, Zelotes latreillei*) were found. Of all species found in the burned area, 65% were represented by less than four specimens.

A number of species (25) found in the burned place are common in peat bogs of the Baltic States and can be considered native inhabitants of this habitat. These species accounted for approximately 65% of the adults captured. Nine of these species were among the 17 species representing 1% or more of all the specimens collected.

Only a small number of "pioneer" species invading burnt and other new areas were found during the first year. *Diplocentria bidentata* reported as a "pioneer" species on other burned areas was already present here (Koponen, 1988, 1993). The impact of the pine forest species was manifested in the occurrence of few numerous species. *Alopecosa aculeata* inhabiting light dry pine forests was one of the most abundant species. *Zelotes clivicola* was another forest species abundant in the burned area. Other forest species were represented by one or two specimens only (*Pardosa lugubris, Minyriolus pusillus*) (Rëlys, Dapkus, 2002).

The species typical of ruderal or other open areas (*Pachygnatha clercki, Xysticus cristatus, Trochosa ruricola*) were very sparse in the burned bog and their abundance remained at the same level as observed in unburned bogs (Rëlys, Koponen, 2002).

Community dynamics

A clear dynamics in the number of species and specimens was observed during the four post-fire months. It clearly corresponded with the phenology of the most abundant species. Despite the short time after the fire, the number of species in early summer (shortly after the fire) was higher than in late summer and in autumn (Fig. 3).

The highest numbers of specimens in the burned site were registered during the periods (3rd and 5th week) when most of the registered dominant species reach their maximal abundance also in undisturbed habitats. The high specimen numbers of species active in early summer (*Aulonia albimana, Euryopis flavomaculata, Ozyptila trux, Phrurolithus festivus*) were registered as soon as the 3rd and 4th weeks after the fire. The highest numbers of *Agroeca proxima* were registered in late summer (7th week after fire), as it is known from unburned peat bogs (V. Rëlys, unpubl. data).

The increase of abundance towards winter was not registered for species active in winter. Two species, *Trochosa spinipalpis* and *Oryphantes angulatus*, active at a various depth of *Sphagnum* in unburned areas and abundant in autumn, appeared in the burned area also in a late season (Koponen et al., 2004).

Table 2. **The index of diversity Hs and number of species (S) and specimens (N) of spider communities studied in natural peat bogs in Lithuania (Èepkeliai, Kertuša) and burnt Sudas peat bog in Latvia**

Peatbog	Èepkeliai (LT)	Kertuša (LT)	Sudas (LV)
Time period	11.06–26.10	13.06–25.10	11.06–15.10
No. of species (S)	42	37	48
No. of specimens (N)	955	863	388
Hs (log base 2)	2.67	2.34	3.65

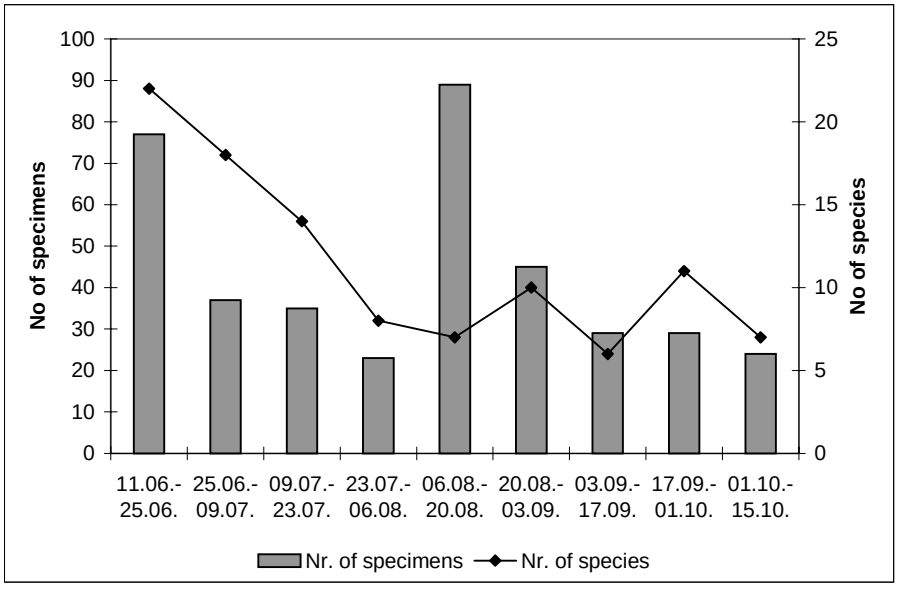

Fig. 3. Changes in the number of the spider species and abundance of specimens in a burnt pine bog (Sudas bog) during the study period in 2000

DISCUSSION

Community structure

The number of specimens (388 specimens, 10 traps) was considerably lower than the average of specimens caught (909) in unburned peat bogs in Lithuania, where only six traps of similar shape were used (Table 2). The number of species was higher in the first year after the fire (48 species) compared to the average registered in unburned peat bogs in Lithuania (40 species) (Table 2). Moreover, three specimens of two unidentified species of *Xerolycosa* sp. (Lycosidae) and *Haplodrassus* sp. (Gnaphosidae) were found among subadult specimens collected in the burned place. Thus, the number of species registered in the burned site was very close to the one (50 species) found in the burned peat bog in Manito-

ba (Canada) by C. W. Aitchison-Benell (Aitchison-Benell, 1994).

The diversity index in the burned place was higher (Hs = 3.65) than in unburned peat bogs in Lithuania (Hs = 2.67 and 2.34) (Table 2). The higher value of the diversity index indicates a more even distribution of specimens among species on the burned peat bog compared to unburned ones, despite the high dominance level of *Agroeca proxima* in the burned place.

The epigeic spider community started to re-establish itself actively immediately after the fire, despite the fact that the fire occurred in the period of the highest activity of most of the peat bog species. The number of species in burned sites was not lower than in unburned pine bogs studied in Lithuania (Table 1). It agrees with the data from Canada and Finland and contrasts with some earlier studies (Aitchison-Benell, 1994; Koponen, 1993). The first year community in the burned area resembles a community of a desiccating pine bog, which is similar to the original habitat. It is in contrast with V. Huhta's (Huhta, 1971) findings that spider communities began resembling those of the original habitats between 7 and 13 years after a prescribed burning and clear-cutting in a coniferous forest. The impact of the opportunistic species invading the burned area from the open habitats was minimal. Due to the rapid re-establishment of the community, the negative impact of the fire cannot be clearly supported by our data if the whole post-fire community is considered. We think that most of the changes in the community structure will show up in the second year, when air- spreading and spring-active species will enter the burned area. We cannot exclude that during the second year the spider community will be not as "natural" as in the first season after the fire.

As was observed in other studies (Aitchison-Benell, 1994; Koponen, 1993), spiders moving actively on the ground surface dominated over other spider families on the burned area. In contrast to the burned pine (Schaefer, 1980b) or subarctic forests (Koponen, 1993) where Lycosidae attained a high population density, here the most abundant species was *Agroeca proxima* (Liocranidae). This species is known as an inhabitant of peat bogs overgrown with pines (Koponen et al., 2001; Rëlys et al., 2002). The high dominance of this species was probably the most prominent difference from the results observed in other burned habitats. Meanwhile the *Alopecosa aculeata* is a common component to the spider communities in different burned areas (Aitchison-Benell, 1994; Collins et al., 1996; Hauge, Kvamme, 1983; Koponen, 1993). This species is not a typical inhabitant of pine bogs, but its preference to burned areas is well known (Aitchison-Benell, 1994; Koponen, 1993; Rëlys, Dapkus, 2002; Rëlys et al., 2002). As already mentioned, the abundances of species typical of other habitats were similar to those observed in unburned peat bogs (Rëlys, Dapkus, 2002; Rëlys et al., 2002). A small impact of species coming from other habitat types to peat bog spider communities has been recorded even under natural conditions (Rëlys et al., 2002).

The observed trend in a decreasing number of specimens and species during the study period cannot be influenced only by fire, but is a typical trend in annual community dynamics caused by life history of some typical peat bog species (Koponen et al., 2004). Similar activity patterns of Lycosidae were registered in burned peat bogs in Canada (Aitchison-Benell, 1994).

Survival in *Sphagnum* moss

The possible survival of spiders in the burnt area during the fire is open to discussion and controversial. We found no data to either support or completely exclude such possibility. The present data raise some questions on this topic, too.

Table 2 indicates high numbers of adult spiders caught in the 3th–7th weeks after the fire. This indicates the ability of some species either to survive the fire in the moss or to reach the burned area from surrounding habitats conquering a distance of up to 120 m during the time mentioned. The high activity of *Alopecosa aculeata* on burned areas immediately after the fire was reported from Canada (Aitchison-Benell, 1994) and is not very surprising. More exciting is the origin of 13 adult specimens of *Euryopis flavomaculata* and eight specimens of *Ozyptila trux* in the first period of investigation. Such a large number of these slow-mowing spiders probably indicates their ability to survive the fire in deep layers of the moss and to become active shortly after the fire.

Recent studies on spider activity in *Sphagnum* have revealed that species such as *Micrargus apertus, Robertus lividus, Agyneta cauta, Oryphantes angulatus* live in deep layers of moss and probably are able to survive the fire (M. Biteniekyte, unpubl. data). *Tenuipantes cristatus, Phrurolithus festivus, Alopecosa pulverulenta, Agyneta cauta* and *Hygrolycosa rubrofasciata* are active in the upper layer of *Sphagnum*, but it cannot be excluded that these species can change habitat preferences and migrate in deep layers in cases of fire. The source of the higher numbers of *Aulonia albimana* shortly after the fire remains an open question. *Aulonia albimana* is known to build retreats in *Sphagnum*, but its activity seems to be connected exclusively to the surface of moss (M. Biteniekyte, unpubl. data).

Re-establishment of the community

The bulk of spiders re-establishing the community and colonizing the burned area probably originated from two main groups: spiders that survived the fi-

re in the moss and spiders that immigrated from the surrounding areas. If the first group can be doubtful, the second is obvious.

Recolonisation from other areas can run in two main ways: by ground and by air. "Ballooning" or spreading by air is most active twice during a year (in spring and in autumn). Only the species spreading by air in autumn were able to arrive to the burned area due to late fire. That probably was the reason why such a low number of Linyphiidae was registered in summer. The abundance of Linyphiidae was much lower than that observed by other authors in the first (Aitchitson-Benell, 1994) or second season (Hauge, Kvamme, 1983; Usher, Smart, 1988) after the fire. Hauge and Kvamme (1983) point out that Linyphiidae are probably the most suffering spider group in case of fire in forest habitats. In the present case, recolonizing air-spreading Linyphiidae entered the burned area just in autumn and will have more effect during the second year. Thus, a high increase of numbers of air-spreading species including some well-known ruderal and oportunistic species can be supposed for the second year. On the other hand, a lot of "native" peat bog Linyphiidae were already present after the fire.

The main colonists in the burned area are species typical of peat bogs. In contrast to the forest species, some of these species are known to be well adapted for living under xerothermic conditions that occur in peat bogs during dry summer periods. Probably that determines the high ability of peat bog species to colonise dry burned peat bog habitats and to cause a fast re-establishment of a typical peat bog community.

Only *Alopecosa aculeata* and *Diplocentria bidentata* can be reported as typical "pioneer" species often listed for burned areas. S. Koponen noticed *Diplocentria bidentata* as an early invader to burned areas (Koponen, 1988; 1993). Other data show, that this species can also invade or live permanently in natural pine bogs, especially if they border dry pine forests (Rëlys et al., 2002). Also *Gnaphosa bicolor* and *Porrhomma pallidum* can be considered early invaders, not typical for peat bog communities.

Huhta (Huhta, 1971) showed that the spider fauna in burnt areas in Finland went through both quantitative and qualitative changes and that there is a period of pioneer species and transitory species before the community is re-established. In case of summer fires in peat bogs, the main impact of pioneer species is supposed to be clear in the second year after the period, when air-spreading species enter the burned area.

The colonisation of the burned area runs in accordance to the phenology and activity of species typical of pine bogs (*Agroeca proxima, Aulonia albimana, Trochosa spinipalpis*) and another dominant typical of light coniferous forests, *Alopecosa aculeata*. The dynamics of the colonisation was highly influenced by *Agroeca proxima*. The abundance and phenology of this species was not affected by fire and showed the same pattern as in unburned areas, implying that either early stages of this species survived fire or that very intensive immigration from surrounding habitats occurred. In general, the total activity of colonisation of the burned area was very similar to the activity pattern of spider communities in unburned peat bogs. The high spreading ability of most peat bog species from surrounding habitats and probably the survival of some species in the moss during the fire are the main reasons for the high similarity to communities known from peat bogs.

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References

1. Aitchison-Benell C. W. Responses to fire by taiga spiders. *Proc. Ent. Soc. Ontario*. 1994. No. 125. P. 29–41.
2. Buddle Ch. M., Spence J. R., Langor D. W. Succesion of boreal forest spider assemblages following wildfire and harvesting. *Ecography*. 2000. No. 23. P. 424–436.
3. Collins J. A., Jennings D. T., Forsythe H. Y., Jr. Effects of cultural practices on the spider (Araneae) fauna of lowbush blueberry fields in Washington county, Maine. *J. Arachnology*. 1996. No. 24. P. 43–57.
4. Collins S. L. Introduction: fire as a natural disturbance in tallgrass prairie ecosystems. *Fire in North American Tallgrass Prairie*. University of Oklahoma Press, Norman. Collins S. L. & Wallace L. L. (eds.). 1990. P. 3–8.
5. Hauge E., Kvamme T. Spiders from forest-fire areas in southeast Norway. *Fauna norv. Ser. B*. 1983. No. 30. P. 39–45.
6. Huhta V. Succesion in the spider communities of the forest floor after clear-cutting and prescribed burning. *Ann. Zool. Fennica*. 1971. No. 8. P. 483–542.
7. Koponen S. Effect of fire on spider fauna in subarctic birch forest, northern Finland. *11 European Arachnoides Collections*. Techn. Univ. Berlin. Document. Haupt J. (ed.). 1988. No. 38. P. 148–153.
8. Koponen S. Ground-living spiders (Araneae) one year after fire in three subarctic forest types, Quebec (Canada). *Memoirs of the Queensland Museum*. 1993. No. 33(2). P. 575–578.

9. Koponen S. Postfire succesion of soil arthropod groups in a subarctic birch forest. *Acta Zool. Fennica*. 1995. No. 196. P. 243–245.
10. Koponen S., Rëlys V., Dapkus D. Changes in structure of ground-living spider (Araneae) communities on peatbogs along a transect from Lithuania to Lapland. *Norw. J. Entomol*. 2001. No. 48. P. 167–174.
11. Koponen S., Rëlys V., Hofmann J., Weiss I. On phenology of peat bog spiders. *European Arachnology 2002*. Budapest–Szombathely. Samu F. & Szinetar C. (eds.) 2004. P. 163–170.
12. Merett P. Changes in the ground-living spider fauna after heathland fires in Dorset. *Bull. Brit. Arachnol. Soc*. 1976. No. 3. P. 214–221.
13. Moretti M. Effects of winter fire on spiders. *European Arachnology 2000*. Aarhus University Press. Aarhus. Toft S., Scharff N. (eds.). 2002. P. 183–191.
14. Panzer R., Schwartz M. Effects of management burning on prairie insect species richness within a system of small, highly fragmented reserves. *Biol. Conservation*. 2000. No. 96(3). P. 363–369.
15. Platnick N. I. *The World Spider Catalog. Version 3.0*. American Museum of Natural History. New York. 2002. Online at http://research.amnh.org/entomology/spiders/catalog81-87/index.html
16. Punttila P., Koponen S., Saaristo M. Colonization of a burned mountain-birch forest by ants (Hymenoptera, Formicidae) in subarctic Finland. *Memorabilia Zool*. 1994. No. 48. P. 193–206.
17. Pyne S. J., Andrews P. J., Laven R. D. *Introduction to Wildland Fire*. 2nd ed. John Wiley & Sons. New York 1998.
18. Rëlys V., Dapkus D. Similarities between epigeic spider communities in a peatbog and surrounding pine forest: a study from Southern Lithuania. *European Arachnology 2000*. Aarhus University Press. Aarhus. Toft S. & Scharff N. (eds.). 2002. P. 207–214.
19. Rëlys V., Koponen S., Dapkus D. Annual differences and species turnover in peat bog spider communities. *Journal of Arachnology*. 2002. No. 30. P. 416–424
20. Richardson R. J., Holliday N. J. Occurrence of carabid beetles (Coleoptera: Carabidae) in a boreal forest damaged by fire. *Can. Entomologist.* 1982. No. 114. P. 509–514.
21. Riechert S. E., Reeder W. G. Effects of fire on spiders distribution in southwestern Wisconsin prairies. *Proceedings of the Second Midwest Prairie Conference.* J. Zimmerman (ed.) Madison, Wisconsin, 1972. P. 73–90.
22. Schaefer M. Sukzession von Arthropoden in verbrannten Kieferforsten 2. Spinnen (Araneida) und Weberknechte (Opilionida). *Forstwirschaftliches Zentralblatt.* 1980a. No. 99. P. 341–356.
23. Schaefer M. Effects of an extensive fire on the fauna of spiders and harvestmen (Araneida and Opilionida) in pine forests. *Proc. of the 8th Int. Con. of Arachnology*. Vienna. 1980b. P. 103–108.
24. Schwartz M. W., Hermann S. M. Fire management: prescribing a natural process in an unnatural landscape. *Conservation in Highly Fragmented Landscapes*. Schwartz M. W. (ed.). New York: Chapman and Hall, 1997. P. 213–233.
25. Tamm J. C. Fünfjärige Collembolensukzession auf einem verbrannten Kiefernwaldboden in Niedersachsen (BRD). *Pedobiologia*. 1986. No. 29. P. 113–127.
26. Usher M. B., Smart L. M. Recolonization of burnt and cut heathland in the north York moors by arachnids. *Naturalist.* 1988. No. 113. P. 103–111.
27. Zackrisson O. Influence of forest fires on the north Swedish boreal forest. *Oikos*. 1977. No. 29. P. 22–32.

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PIRMØJØ METØ VORØ (ARACHNIDA, ARANEAE) BENDRIJA IÐDEGUSIOJE SUDAS AUKÐTAPELKËJE (LATVIJA)

Santrauka

Vorø bendrijos atsikûrimas po gaisro tirtas 2002 m. Latvijos Sudas aukðtapelkëje. Degimvietëje surastos 48 vorø rûðys. Nepaisant labai trumpo laikotarpio po gaisro (dvi savaitës), degimvietëje vyravo aukðtapelkiniams puðynams bûdingos vorø rûðys ir viena ðviesiems spygliuoèiø miðkams bûdinga rûðis. Dominantinës rûðys buvo *Agroeca proxima* (Liocranidae) ir *Alopecosa aculeata* (Lycosidae). Nustatyta tik nedaug paþeistoms ir ruderalinëms buveinëms bûdingø vorø rûðiø ir jø gausumas buvo artimas natûraliose aukðtapelkëse registruotam gausumui. Vorø bendrijos dinamika po gaisro buvo tokia pat kaip ir nepaþeistose bendrijose. Pagal daugelá parametrø vorø bendrija pirmàjá po gaisro sezonà yra labai panaði á natûraliø aukðtapelkiø bendrijas ir nepastebima stipraus neigiamo gaisro poveikio vorø bendrijai. Didelá vorø bendrijø panaðumà degimvietëje ir nepaþeistose aukðtapelkëse tikriausiai nulemia greitas bendrijos atsistatymas aktyvaus pelkiniø rûðiø plitimo ið gretimø buveiniø bei kiminø paklotëje gaisrà iðtvërusiø rûðiø dëka.