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The first reaction of soil mite fauna (Acari, Mesostigmata) caused by conversion of Norway spruce stand in the Szklarska Poręba Forest District

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ABSTRACT: To observe the first reaction of Mesostigmata mites for conversion of even aged spruce stands under conversion with common beech and silver fir, four pairs of experimental plots directly neighbouring each other were examined. On the spruce stands that started to be converted into beech or fir stands a few years ago, some significant composition and quantitative changes can be observed as regards Mesostigmata order mites. The first reaction of Mesostigmata mites after starting of forest conversion was an increasing number of mite species in the plots. On the plots with relatively close occurrence of beech, increasing number of specimens was also observed in plots under conversion. The share of Parasitidae family mites was decreased on the converted plots with relatively close occurrence of beech. On the converted spruce stands the percentage share of Uropodina suborder mites was found to increase or remain high.

Keywords: Acari; Mesostigmata; mites; forest conversion; biodiversity; soil ecology

The Szklarska Poręba Forest District is located partly in the Karkonosze and Izera Mts. (Poland, SW). The mountains are old, doom-shaped with soils of low fertility. They consist mainly of acid rocks, including granite and sandstone, with low volume of calcium carbonate. The calcareous formations are to be found only as small lenses of limestone. Acid rock, such as granite and porphyry, form a basis for the poorest soils (Zaręba 1986).

In the last 150 years, the species composition of the mountains forest stands has undergone significant changes. Due to economic reasons, natural stands were converted into artificial, monocultures of Norway spruce (*Picea abies* [L.] H. Karst.) stand with minor share of silver fir (*Abies alba* Mill.), common beech (*Fagus sylvatica* L.) and sycamore maple (*Acer pseudoplatanus* L.) (Zaręba 1986). The creation of a large area of spruce monocultures, coupled with huge increase of air pollution caused by German, Czech and Polish power plants and industrial facilities, led to an ecological disaster throughout 1970s and 1980s. This contributed to numerous gradations of bark beetles (*Ips typhographus* [L.]) and damage caused by windfalls and snowbreaks (Konca et al. 1997). Today the spruce stands growing on the fertile sites (mountain forest site or mixed mountain forest site, dedicated mainly for broadleaves and fir) are being converted into beech and fir stands. The research was an attempt to observe first reactions to the conversion on the part of soil mesofauna that has been developed for many years under the influence of spruce stands. Mites (Acari) are divided into four main orders: Astigmata, Prostigmata, Oribatida and Mesostigmata. Mites from the order Mesostigmata are usually bigger than Astigmata and Prostigmata mites. The Oribatida mites (more similar in size to Mesostigmata mites) are the most common soil-inhabiting mites and saprophagous animals. Mesostigmata mites are mainly free-living predators (suborder Gamasina, with the most numerous families: Parasitidae, Veigaiaidae, Rhodacaridae, Zerconidae and Laelapidae) which are feeding on wide range of invertebrates (i.e. nematodes, other mites, springtails) or fungivorous animals (mainly from suborder Uropodina). Different species composition of Mesostigmata mites depending on different tree species stands was found in "common garden" forest experiment with fourteen tree species (Skorupski et al. 2003b).These animals have low tolerance to changes in soil environment so they are good bioindicators. Because of narrow ecological range their presence or absence in soil can be good base for describing environmental conditions and attitudes (Prusinkiewicz 1999).

MATERIAL AND METHODS

Field research was carried out in May and November 2005. To observe the first reaction for conversion, four pairs of experimental plots directly neighbouring each other were examined. A list of the experimental plots is in Table 1. Plots 1, 2, 3 and 4 were situated in relatively close distance to the stands with occurrence of beech (less than 100 m) and plots 7 and 8 were located in pure spruce stands without any amount of beech in distance over 200 m.

Plots 5 and 6 were chosen to compare species composition of Mesostigmata mites in natural regeneration of beech growing in open area and under thinned spruce and beech canopy.

Twenty soil samples were taken from each of eight plots, with 10 samples taken in spring and 10 in autumn. Each sample covered an area of 40 cm^2 with organic layer and mineral soil to the depth of 5 cm. On the plots under conversion the samples were taken at a distance of ca 50 cm from young trees, and in the old stands the samples were taken under canopy. The material was extracted in Tullgren funnels (using light and heat to dry a sample).

The analysis of the results was conducted with the aid of the AnalizaTOR 2.0 program, using typical rates: the similarity rates for the domination rates of species between microhabitats (*Mo*):

$$Mo = 2\Sigma xiyi/(\Sigma xa2 + \Sigma ya2)$$

where:
xiyi – percentage amount of number of species common for both microhabitats,
xa, *ya* – percentage amount of particular species,
i – total number of species;

domination rate (*D*):

$$D = (100s/S)$$

where:
s – number of specimens of species,
S – number of specimens of all species in this cenotic unit;

a cluster analyze of similarity rates for the domination rates of mite species between experimental plots; occurrence rate (*C*):

$$C = 100\ q/Q$$

where:
q – denotes the number of samples, in which the given species was found,
Q – denotes the number of examined species (Odum 1982).

In occurrence stability index following classes were taken: euconstants – 75% and more samples, constants – 50–74% samples, accessory species – 25–49% samples, accidents – 24% and less samples.

In domination rate following classes were taken: eudominants – more than 10% specimens, dominants – 5.1–10%, subdominants – 2.1–5.0%, recedents – 1.1–2.0%, subrecedents – less than 1.1% (Niedbała et al. 1981). The domination rates of Uropodina suborder and Parasitidae family mites were also analyzed; this selection was based on the

Table 1. A list of experimental plots (Plan Urządzenia lasu ... 1994)

Plot	Forest compartment	Tree stand	Forest site
1	169b	pure stand of 111-year-old spruce	mixed mountain forest site
2	169b	4-year-old beech stand in a thinned 111-year-old stand	mixed mountain forest site
3	169g	pure stand of 38-year-old spruce	mixed mountain forest site
4	169b	cluster of 8-year-old fir under a 112-year-old spruce stand	mixed mountain forest site
5	280d	stand of 10-year-old beech	mountain forest site
6	179k	thinned stand of dominant 116-year-old spruce mixed with beech and a natural regeneration of 8-year-old beech	mountain forest site
7	310c	pure stand of 86-year-old spruce	mixed mountain forest site
8	310b	cluster of 8-year-old fir under a 97-year-old spruce stand	mixed mountain forest site

Table 2. Species composition of Mesostigmata mites on a pair of experimental plots: plot 1 (spruce) and plot 2 (spruce with beech); number of specimens (No.), domination (D) and occurrence (C) rates are presented

Species on the plot 1	No.	C	D	Species on the plot 2	No.	C	D
Veigaia nemorensis	78	65.00	29.77	*Veigaia nemorensis*	130	100.00	25.54
Trachytes aegrota	38	45.00	14.50	*Trachytes aegrota*	102	75.00	20.04
Gamasellus montanus	29	55.00	11.07	*Polyaspinus cylindricus*	63	55.00	12.38
Leptogamasus cristulifer	25	55.00	9.54	*Pachylaelaps bellicosus*	39	45.00	7.66
Hypoaspis aculeifer	23	45.00	8.78	*Hypoaspis aculeifer*	20	40.00	3.93
Polyaspinus cylindricus	17	25.00	6.49	*Leptogamasus obesus*	15	45.00	2.95
Leptogamasus obesus	10	30.00	3.82	*Gamasellus montanus*	14	30.00	2.75
Parazercon radiatus	9	30.00	3.44	*Trachytes pauperior*	14	35.00	2.75
Paragamasus crassicornutus	5	20.00	1.91	*Paragamasus crassicornutus*	13	45.00	2.55
Uropoda misella	5	10.00	1.91	*Parazercon radiatus*	12	35.00	2.36
Vulgarogamasus kraepelini	4	15.00	1.53	*Hypoaspis procera*	12	10.00	2.36
Hypoaspis procera	3	10.00	1.15	*Leptogamasus cristulifer*	11	10.00	2.16
Pergamasus crassipes	3	10.00	1.15	*Leptogamasus* sp.	7	10.00	1.38
Pachylaelaps longisetis	3	15.00	1.15	*Urodiaspis tecta*	7	25.00	1.38
Urodiaspis tecta	2	10.00	0.76	*Pachylaelaps furcifer*	6	15.00	1.18
Holoparasitus hemisphaericus	1	5.00	0.38	*Pachylaelaps longisetis*	6	25.00	1.18
Geholaspis mandibularis	1	5.00	0.38	*Pergamasus crassipes*	5	25.00	0.98
Lasioseius lawrencei	1	5.00	0.38	*Pergamasus ruehmi*	5	25.00	0.98
Gamasina sp.	1	5.00	0.38	*Veigaia kochi*	4	20.00	0.79
Veigaia exigua	1	5.00	0.38	*Macrocheles opacus*	4	10.00	0.79
Eviphis ostrinus	1	5.00	0.38	*Holoparasitus hemisphaericus*	3	10.00	0.59
Hypoaspis praesternalis	1	5.00	0.38	*Geholaspis longispinosus*	3	10.00	0.59
Trachytes pauperior	1	5.00	0.38	*Uropoda misella*	2	10.00	0.39
				Geholaspis mandibularis	2	5.00	0.39
				Pachylaelaps sp.	2	10.00	0.39
				Paragamasus sp.	2	5.00	0.39
				Pergamasus barbarus	1	5.00	0.20
				Paragamasus holzmannae	1	5.00	0.20
				Vulgarogamasus kraepelini	1	5.00	0.20
				Veigaia cervus	1	5.00	0.20
				Macrocheles terreus	1	5.00	0.20
				Hypoaspis lasiomyrmecophilus	1	5.00	0.20
Sum	262	–	100.00	Sum	509	–	100.00

specific relations between these groups in coniferous, deciduous and mixed forest stands (Skorupski et al. 2003a,b; Skorupski 2007). The species names and mites taxonomy was taken from Błaszak and Madej (1997) and Wiśniewski (1997).

RESULTS AND DISCUSSION

From all the plots 2,822 mites specimens of 57 species were found. The eudominant species include *Veigaia nemorensis* (C. L. Koch 1839), while the

Table 3. Species composition of Mesostigmata mites on a pair of experimental plots: plot 3 (spruce) and plot 4 (spruce with fir); number of specimens (No.), domination (D) and occurrence (C) rates are presented

Species on the plot 3	No.	C	D	Species on the plot 4	No.	C	D
Veigaia nemorensis	114	70.00	33.14	*Veigaia nemorensis*	149	95.00	29.68
Leptogamasus obesus	48	65.00	13.95	*Trachytes montana*	104	90.00	20.72
Gamasellus montanus	46	60.00	13.37	*Trachytes aegrota*	34	45.00	6.77
Polyaspinus cylindricus	35	35.00	10.17	*Leptogamasus obesus*	31	65.00	6.18
Pachylaelaps longisetis	14	30.00	4.07	*Zercon gurensis*	22	40.00	4.38
Trachytes aegrota	11	25.00	3.20	*Pachylaelaps bellicosus*	20	30.00	3.98
Paragamasus crassicornutus	11	35.00	3.20	*Paragamasus crassicornutus*	16	45.00	3.19
Zercon gurensis	10	20.00	2.91	*Polyaspinus cylindricus*	14	25.00	2.79
Uropoda misella	8	15.00	2.33	*Paragamasus vagabundus*	13	30.00	2.59
Trachytes pauperior	8	20.00	2.33	*Gamasellus montanus*	10	35.00	1.99
Geholaspis pauperior	7	15.00	2.03	*Heteroparasitus tirolensis*	7	20.00	1.39
Veigaia cervus	4	20.00	1.16	*Prozercon fimbriatus*	5	5.00	1.00
Pachylaelaps furcifer	3	15.00	0.87	*Uropoda misella*	5	15.00	1.00
Pergamasus ruehmi	3	15.00	0.87	*Urodiaspis tecta*	5	15.00	1.00
Pachylaelaps sp.	3	15.00	0.87	*Prozercon kochi*	5	25.00	1.00
Vulgarogamasus kraepelini	3	15.00	0.87	*Eviphis ostrinus*	5	15.00	1.00
Parazercon radiatus	2	10.00	0.58	*Trachytes pauperior*	5	20.00	1.00
Geholaspis mandibularis	2	5.00	0.58	*Veigaia cervus*	5	20.00	1.00
Prozercon kochi	2	10.00	0.58	*Pachylaelaps furcifer*	4	15.00	0.80
Pergamasus sp.	2	5.00	0.58	*Pergamasus ruehmi*	4	15.00	0.80
Leptogamasus cristulifer	1	5.00	0.29	*Parasitidae* sp.	4	15.00	0.80
Pergamasus crassipes	1	5.00	0.29	*Paragamasus* sp.	4	10.00	0.80
Pergamasus barbarus	1	5.00	0.29	*Parazercon radiatus*	3	15.00	0.60
Gamasina sp.	1	5.00	0.29	*Geholaspis pauperior*	3	10.00	0.60
Paragamasus homopodoides	1	5.00	0.29	*Vulgarogamasus kraepelini*	3	15.00	0.60
Ameroseius sp.	1	5.00	0.29	*Geholaspis longispinosus*	3	15.00	0.60
Pergamasus mediocris	1	5.00	0.29	*Geholaspis mandibularis*	2	10.00	0.40
Macrocheles opacus	1	5.00	0.29	*Eugamasus cavernicola*	2	5.00	0.40
				Epicrius resinae	2	5.00	0.40
				Hypoaspis aculeifer	1	5.00	0.20
				Leptogamasus suecicus	1	5.00	0.20
				Dendrolaelaps sp.	1	5.00	0.20
				Pachylaelaps longisetis	1	5.00	0.20
				Pergamasus barbarus	1	5.00	0.20
				Paragamasus holzmannae	1	5.00	0.20
				Veigaia kochi	1	5.00	0.20
				Veigaia mollis	1	5.00	0.20
				Pergamasus sp.	1	5.00	0.20
				Paragamasus rostriforceps	1	5.00	0.20
				Dermanyssus gallinae	1	5.00	0.20
				Macrocheles opacus	1	5.00	0.20
				Gamasellodes bicolor	1	5.00	0.20
Sum	344	–	100.0	Sum	502	–	100.0

Table 4. Species composition of Mesostigmata mites on a pair of experimental plots: plot 5 (young beech) and plot 6 (spruce with beech); number of specimens (No.), domination (D) and occurrence (C) rates are presented

Species on the plot 5	No.	C	D	Species on the plot 6	No.	C	D
Veigaia nemorensis	77	65.00	41.62	*Veigaia nemorensis*	102	85.00	33.44
Hypoaspis aculeifer	16	30.00	8.65	*Pachylaelaps bellicosus*	36	55.00	11.80
Trachytes montana	15	30.00	8.11	*Leptogamasus obesus*	25	30.00	8.20
Leptogamasus obesus	13	30.00	7.03	*Hypoaspis aculeifer*	17	10.00	5.57
Trachytes pauperior	10	30.00	5.41	*Zercon gurensis*	13	30.00	4.26
Polyaspinus cylindricus	9	35.00	4.86	*Trachytes montana*	12	40.00	3.93
Trachytes aegrota	8	20.00	4.32	*Gamasellus montanus*	11	20.00	3.61
Pergamasus ruehmi	5	20.00	2.70	*Parazercon radiatus*	11	30.00	3.61
Uropoda misella	4	10.00	2.16	*Trachytes aegrota*	10	30.00	3.28
Vulgarogamasus kraepelini	4	20.00	2.16	*Pachylaelaps longisetis*	9	30.00	2.95
Parazercon radiatus	3	10.00	1.62	*Pergamasus ruehmi*	9	30.00	2.95
Leptogamasus cristulifer	3	5.00	1.62	*Pachylaelaps ineptus*	8	10.00	2.62
Veigaia mollis	3	10.00	1.62	*Pachylaelaps furcifer*	5	10.00	1.64
Veigaia exigua	3	15.00	1.62	*Vulgarogamasus kraepelini*	5	20.00	1.64
Gamasellus montanus	2	5.00	1.08	*Paragamasus crassicornutus*	4	20.00	1.31
Paragamasus crassicornutus	2	10.00	1.08	*Uropoda misella*	4	10.00	1.31
Geholaspis longispinosus	2	5.00	1.08	*Veigaia exigua*	4	5.00	1.31
Pachylaelaps furcifer	1	5.00	0.54	*Veigaia cervus*	4	15.00	1.31
Pachylaelaps longisetis	1	5.00	0.54	*Uropoda minima*	3	5.00	0.98
Urodiaspis tecta	1	5.00	0.54	*Geholaspis mandibularis*	2	10.00	0.66
Pergamasus barbarus	1	5.00	0.54	*Trachytes pauperior*	2	5.00	0.66
Zercon gurensis	1	5.00	0.54	*Geholaspis longispinosus*	2	5.00	0.66
Veigaia cervus	1	5.00	0.54	*Polyaspinus cylindricus*	1	5.00	0.33
				Leptogamasus cristulifer	1	5.00	0.33
				Geholaspis pauperior	1	5.00	0.33
				Veigaia kochi	1	5.00	0.33
				Gamasina sp.	1	5.00	0.33
				Paragamasus homopodoides	1	5.00	0.33
				Paragamasus sp.	1	5.00	0.33
Sum	185	–	100.00	Sum	305	–	100.00

dominant species include *Trachytes montana* Willmann 1953, *T. aegrota* (C. L. Koch 1841), *Leptogamasus obesus* (Holzmann, 1955), *Gamasellus montanus* (Willmann, 1936), *Pachylaelaps bellicosus* Berlese, 1920 and *Polyaspinus cylindricus* Berlese, 1916. There were 20.16% mites from suborder Uropodina, while 23.18% from Parasitidae family. Species composition on pairs of experimental plots, number of specimens, domination and occurrence rate are shown in Tables 2 to 5. Average number of Mesostigmata mites is 4,409 per m^2, and average number of species is 27 per plot. In other researches in surrounding mountain areas the number of collected specimens per m^2 of Mesostigmata mites was similar: in spruce stands in Karkonosze Mountains – 3,085 (Gwiazdowicz 2003) and in Izera Mountains – 3,883 (Skorupski 2005), in mixed spruce-beech stands in Karkonosze Mts. – 4,507 (Gwiazdowicz 2003), in different tree

Table 5. Species composition of Mesostigmata mites on a pair of experimental plots: plot 7 (spruce) and plot 8 (spruce with fir); number of specimens (No.), domination (D) and occurrence (C) rates are presented

Species on the plot 7	No.	C	D	Species on the plot 8	No.	C	D
Trachytes montana	82	80.00	20.55	*Pachylaelaps bellicosus*	62	70.00	19.62
Gamasellus montanus	78	70.00	19.55	*Veigaia nemorensis*	55	75.00	17.41
Veigaia nemorensis	54	70.00	13.53	*Paragamasus vagabundus*	48	60.00	15.19
Parazercon radiatus	49	65.00	12.28	*Trachytes montana*	40	65.00	12.66
Leptogamasus obesus	44	75.00	11.03	*Leptogamasus obesus*	13	45.00	4.11
Paragamasus vagabundus	12	30.00	3.01	*Parazercon radiatus*	10	5.00	3.16
Polyaspinus cylindricus	11	20.00	2.76	*Hypoaspis aculeifer*	9	25.00	2.85
Pachylaelaps longisetis	11	30.00	2.76	*Geholaspis pauperior*	9	5.00	2.85
Paragamasus crassicornutus	9	25.00	2.26	*Polyaspinus cylindricus*	8	15.00	2.53
Trachytes pauperior	9	25.00	2.26	*Pachylaelaps longisetis*	7	25.00	2.22
Pachylaelaps bellicosus	8	10.00	2.01	*Veigaia cervus*	7	20.00	2.22
Trachytes aegrota	7	15.00	1.75	*Trachytes aegrota*	6	15.00	1.90
Pachylaelaps furcifer	7	30.00	1.75	*Gamasellus montanus*	6	25.00	1.90
Pergamasus ruehmi	5	15.00	1.25	*Veigaia mollis*	6	20.00	1.90
Veigaia kochi	2	5.00	0.50	*Leptogamasus suecicus*	3	15.00	0.95
Vulgarogamasus kraepelini	2	10.00	0.50	*Arctoseius brevicheles*	3	5.00	0.95
Veigaia cervus	2	10.00	0.50	*Trachytes pauperior*	3	15.00	0.95
Geholaspis pauperior	1	5.00	0.25	*Paragamasus crassicornutus*	2	10.00	0.63
Pergamasus crassipes	1	5.00	0.25	*Hypoaspis procera*	2	10.00	0.63
Amblyseius sp.	1	5.00	0.25	*Pergamasus crassipes*	2	5.00	0.63
Veigaia exigua	1	5.00	0.25	*Paragamasus holzmannae*	2	10.00	0.63
Trichouropoda sp.	1	5.00	0.25	*Prozercon kochi*	2	5.00	0.63
Parasitidae sp.	1	5.00	0.25	*Eviphis ostrinus*	2	10.00	0.63
Paragamasus sp.	1	5.00	0.25	*Vulgarogamasus kraepelini*	2	10.00	0.63
				Uropoda misella	1	5.00	0.32
				Amblyseius sp.	1	5.00	0.32
				Pergamasus ruehmi	1	5.00	0.32
				Veigaia kochi	1	5.00	0.32
				Pergamasus sp.	1	5.00	0.32
				Gamasellodes bicolor	1	5.00	0.32
				Epicriopsis horridus	1	5.00	0.32
Sum	399	–	100.00	Sum	316	–	100.00

stands in Izera River Valley – 6,196 (Skorupski et al. 2008). The number of identified species is higher than in the studies on neighbouring mountain areas (Gwiazdowicz, Biernacik 2000; Gwiazdowicz 2002, 2003; Skorupski 2005; Skorupski et al. 2005), where under the similar conditions only 42–46 species were identified in the area between the Czech Izera Mts. and the Karkonosze Mts. and 53 species in Izera River Valley (Skorupski et al. 2008).

The first reaction of Mesostigmata mites, only a few years after starting of forest conversion was increasing number of species in the plots (Table 6). On

Table 6. Number of Mesostigmata mites species found on the plots with stands non conversed (1, 3 and 7) and with stands during conversion (2, 4 and 8)

Stands non conversed	No. of species	Stands during conversion	No. of species
Plot 1	22	plot 2	29
Plot 3	25	plot 4	39
Plot 7	22	plot 8	30

Table 7. Average density of Mesostigmata mites/m^2 found in experimental plots with stands non conversed (1, 3 and 7) and with stands during conversion (2, 4 and 8)

Stands non conversed	Average density (m^2)	Stands during conversion	Average density (m^2)
Plot 1	3,275	plot 2	6,363
Plot 3	4,300	plot 4	6,275
Plot 7	4,988	plot 8	3,950

the plots with relatively close occurrence of beech, increasing number of specimens was also observed in plots under conversion, while in the plots located in surrounding pure spruce stands the number of specimens was lower (Table 7). Each experimental plot was characterized by different species composition. Comparing the species composition with similarity rates (Table 8) the highest rates (over 68) had two pairs of experimental plots: 1 and 2 and 5 and 6 and the other pairs 3 and 4 and 7 and 8 still had a similarity rates quite high and over 50. The lowest rates (less than 40) were among plots 2 and 7, 1 and 8 and 3 and 8 (every three pairs are with plots located in different places and with different structure – stands non-converted and during conversion). When we compared pairs of plots with similar stand structure, the similarity rates were higher (usually over 50). The cluster analyze of similarity rates for the domination rates of mite species between experimental plots presented high similarity between plots in every pairs (Fig. 1). In addition, the pair of plots 7 and 8 which are located in pure spruce stands without any amount of beech in distance over 200 m had the lowest similarity rates to the other plots, which are in the stands with occurrence of beech. The dendrogram shows that any re-naturalization of soil fauna is based on previous species composition and that mite species composition in large surface monoculture spruce stands is different than in spruce stands with close distance to mixed forests.

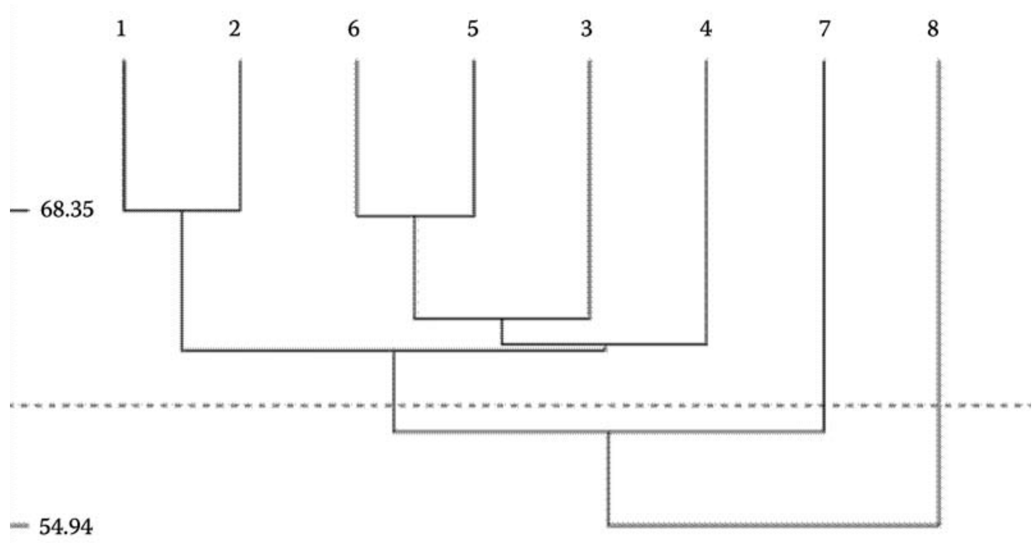

Fig. 1. The dendrogram of similarity rates for the domination rates of mite species between experimental plots (1 to 8 – respectively the numbers of experimental plots)

Table 8. The similarity rates for the domination rates of Mesostigmata mites species between experimental plots

Plots	4	2	1	8	7	6	3
5	60.788	53.927	62.103	45.160	42.804	68.133	59.952
4		54.106	51.442	54.938	58.952	62.638	58.088
2			68.346	45.129	37.364	56.859	55.627
1				38.314	40.808	56.914	62.403
8					50.845	54.122	37.880
7						46.668	53.545
6							63.753

The increasing number of mite species in stands during conversion on lowlands was already observed (Skorupski et al. 2003a,b).

Comparing domination rates of mites from Uropodina suborder and Parasitidae family (Table 9) on the pairs of experimental plots with relatively close occurrence of beech we can observe that on the converted plots the domination of Uropodina mites was increased and domination rate of Parasitidae mites was decreased. Similar results of the reaction of this group of mites to increasing amount of broadleaves in tree-stands were presented in "common-garden" forest experiment (Skorupski 2007). The reaction to conversion of selected mite species is presented in Table 10. The strongest reaction is of *Gamasellus montanus*, which has high domination rates in spruce forests, and very low in plots under conversion or with young generation of beech.

Table 9. Domination rate of mites from Uropodina suborder and Parasitidae family on experimental plots

Plot	Uropodina	Parasitidae
1	24.05	18.32
2	36.94	12.57
3	18.02	20.93
4	33.27	17.73
5	25.41	15.14
6	10.49	15.08
7	27.57	18.8
8	18.35	23.42
Average	24.26	17.75

Table 10. The example of Mesostigmata mites species which increased or decreased domination rates on the plots under conversion on the pairs plots with relatively close occurrence of beech

Species	Plot 1	Plot 2	Plot 3	Plot 4
Gamasellus montanus	11.07	2.75	13.37	1.99
Leptogamasus cristulifer	9.54	2.16	0.29	0.00
Veigaia nemorensis	29.77	25.54	33.14	29.68
Pachylaelaps bellicosus	0.00	7.66	0.00	3.98
Trachytes aegrota	14.50	20.04	3.20	6.77

CONCLUSIONS

(1) On the spruce stands that started to be converted into beech or fir stands in the course of just a few years some significant composition and quantitative changes can be observed as regards Mesostigmata order mites.
(2) The first reaction of Mesostigmata mites after starting of forest conversion was increasing number of species in the plots. On the plots with relatively close occurrence of beech, increasing number of specimens was also observed in plots under conversion.
(3) *Gamasellus montanus* quickly decreased in number on the converted plots with beech or fir, which follows from its lower share in mixed spruce-beech stands.
(4) The share of Parasitidae family mites was decreased on the converted plots with relatively close occurrence of beech.
(5) On the converted spruce stands the percentage share of Uropodina suborder mites was found to increase or remain high.

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První reakce půdní fauny – roztočů (Acari, Mesostigmata) na přeměnu porostů smrku ztepilého na lesní správě Szklarska Poręba

ABSTRAKT: Pro zjištění první reakce roztočů Mesostigmata na přeměnu stejnověkých smrkových porostů bukem lesním a jedlí bělokorou byly zkoumány čtyři páry (vzájemně přímo sousedících) výzkumných ploch. Ve smrkových porostech, kde byla před několika lety zahájena přeměna bukem nebo jedlí, byly zjištěny některé signifikantní změny v zastoupení a v množství roztočů řádu Mesostigmata. První reakce roztočů Mesostigmata po začátku přeměny porostů byla charakterizovaná zvýšením počtu druhů roztočů na plochách. Na přeměňovaných plochách s relativně omezeným výskytem buku byl také zaznamenán nárůst počtu sledovaných jedinců. Podíl roztočů čeledi Parasitidae se naopak snižoval na sledovaných přeměňovaných plochách s relativně omezeným výskytem buku. V přeměňovaných smrkových porostech bylo zaznamenáno zvýšení nebo zachování vysokého podílu roztočů podřádu Uropodina.

Klíčová slova: Acari; Mesostigmata; roztoči; přeměna lesa; biodiverzita; půdní ekologie

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