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# Nematode communities in three types of grassland in the Slovak Republic

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**Summary**

Nematode communities were studied and compared in three different types of grassland throughout the Slovak Republic: new meadow (established during last 3 years), permanent meadow and permanent pasture. A total of 85 nematode species from 64 genera were found. The identified nematode species belonged mainly to the orders Tylenchida (31), Dorylaimida (22), and Rhabditida (12). The most abundant species were *Helicotylenchus digonicus, Rhabditis* spp., *Filenchus filiformis* and *Enchodelus macrodorus* in new meadows, *H. digonicus* and *E. macrodorus* in permanent meadows and *H. digonicus* and *Aporcelaimellus obtusicaudatus* in permanent pastures. Plant parasitic nematodes were dominant in all investigated types of grassland, followed by bacterial feeders in new meadows and omnivores in permanent meadows and pastures. Maturity index (MI) and B/F depended with the age of grassland and thus with succession from newly established meadows to permanent meadows and permanent pastures. Nematode communities were more similar in permanent meadows and pastures than in new meadows and were also influenced by geographic condition.

Key words: nematode communities; grassland; Slovak Republic

## Introduction

Nematodes as the most abundant Metazoa with various feeding habits and life history strategies have a great capability of adapting to fluctuations in environment (Yeates, 1996) and therefore the analysis of nematodes communities structure is being used more frequently as a tool in ecological studies (Bongers, 1990). Diversity and abundance of soil nematode communities decrease with intensity of land cultivation or human interference, after approximately a decade a soil fauna is able repeatedly recover within values similar to those in natural ecosystems (Háněl, 2003). Grassland is a widespread type of ecosystem in the Slovak Republic where it takes over 33 % of agricultural areas but studies on nematode communities in grassland ecosystem in the Slovak Republic are scarce. Some information on nematode communities on grassland in the Slovak Republic were published by Šály (1983), Valocká and Sabová (1997) compare two types of grassland, Valocká *et al.* (2001) investigated nematode communities in natural permanent grass ecosystems and regularly cultivated cereal agroecosystems and Lišková and Čerevková (2005) compared nematode communities of river banks and adjacent meadows.

Investigation focused on the changes of soil nematode communities on meadows differing in age are presented in studies Wasilewska (1994), Valocká and Sabová (1997) and Háněl (2003).

The aim of this paper was to survey the occurrence and distribution of soil and plant parasitic nematodes of grassland and to compare the structures of nematode communities in three types of grassland of different age and utilisation in various regions of the Slovak Republic.

## Material and Methods

Communities of soil free living and plant parasitic nematodes were studied at four selected localities in the mountain and submontane areas where grassland is a widespread ecosystem type in the Slovak Republic. Soil samples were collected in each locality from all three types of grassland; new meadow – newly established on arable soil during last 3 years, fertilized and regularly mown with dominant species of *Dactylis glomerata* L., *Festuca rubra* L. and *Lolium perene* L. with the varied pH ($H_2O$) 7.00 – 8.21, $C_{ox}$ 3.83 – 5.22; permanent meadow, covered with indigenous multispecies vegetation irregularly mown, pH ($H_2O$) 7.06 – 7.24, $C_{ox}$ 3.42 – 6.16; and permanent pasture with indigenous vegetation regularly grazed, pH ($H_2O$)

6.95 – 7.36, $C_{ox}$ 4.35 – 4.97.

*Characteristic of localities:*
Veľký Folkmár: orographic unit Čierna hora, at altitude 640 m a.s.l., 48°51´ N, 21°10´ E, clay, loamy soil, sampling date: October 2003.
Telgárt: orographic unit Horehronské podolie, at altitude 1006 m a.s.l., 48°51´ N, 20°11´ E, loamy soil, sampling date: October 2003.
Ľubietová, Strelníky: orographic unit Zvolenská kotlina, Ľubietová at altitude 559 m a.s.l., 48°45´ N, 19°22´ E, Strelníky at altitude 739 m a.s.l., 48°43´ N, 19°23´ E, loamy, gravelled soil, sampling date: October 2004
Vrbovce: orographic unit Biele Karpaty, at altitude 360 m a.s.l., 48°47´ N, 17°28´ E, loamy, gravelled soil, sampling date: October 2004.
Nematodes were isolated from 500 g of the mixed soil using the Coob´s flotation-sieving method, fixed in FAA and studied in permanent glycerine slides. Juveniles (juvs.) were identified to genera. Nematode species and genera were allocated to the trophic groups according to Yeates *et al.* (1993) and Bongers (1990). For evaluation of diversity and ecology of nematode communities the following parameters were used: abundance of nematodes in 500 g of soil, Shannon-Weaver Index (H'spp) calculated for species (Shannon & Weaver, 1949), Maturity Index (MI) and Plant Parasitic Index (PPI) proposed by Bongers (1990), PPI/MI ratio introduced by Bongers and Korthals (1995) and B/F ratio proposed by Wasilewska (1997). All indices, as well as a number of species, total abundance of nematodes, and percentage proportion of trophic groups are calculated as the mean value with standard deviation for all types of grassland. Statistical calculations were performed using the STATISTICA (StatSoft, 2001).

## Results

A total of 85 species from 64 genera, included unidentified larvae listed as nematode sp. were found (Table 1); 62 species and 47 genera in new meadows; 62 and 49 in permanent meadows; 62 and 49 in permanent pastures among those 38 species from 33 genera were common in all three types of investigated grassland. The majority of identified nematodes species belonged to the orders Tylenchida (31), Dorylaimida (22), Rhabditida (12). The abundance of nematodes was higher on permanent pastures (mean value of 569) than under permanent meadows (mean value of 440) and new meadows (mean value of 410).
Plant parasitic nematodes were dominant trophic group in all investigated meadows (Table 2). In general, species *Helicotylenchus digonicus*, *Pratylenchus pratensis*, *Bitylenchus dubius* and the genus *Criconemoides* prevailed in new meadows. In permanent pastures plant feeders were represented by the species *H. digonicus, H. canadensis, H. pseudorobustus, Mesocriconema curvatum, Rotylenchus goodeyi* and *P. pratensis,* in permanent meadows the genus *Helicotylenchus* was dominant.
Bacterial feeders were subdominant trophic group only in new meadows (over 21 %) and the most abundant genera were *Rhabditis* and *Chiloplacus.* On the other hand, omnivores, characterized by a long life cycle, were subdominant trophic group in permanent meadows (28 %) and pastures (24 %) represented by the species *Enchodelus macrodorus, Aporcelaimellus obtusicaudatus, Mesodorylaimus bastiani,* and *Oxydirus oxycephalus.* The following trophic groups

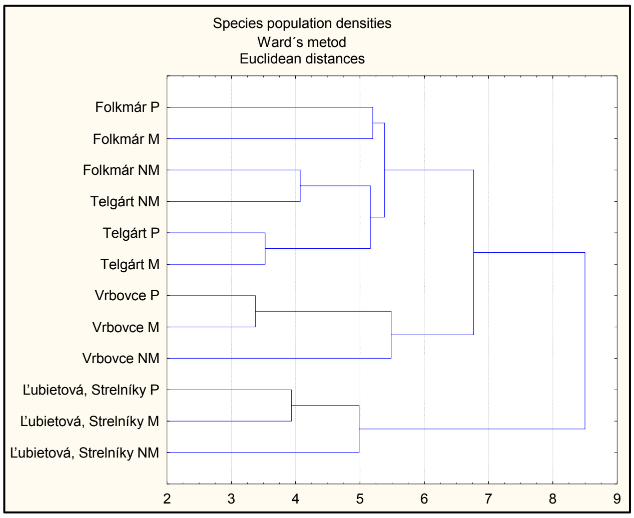


Fig. 1 Dendrogram of cluster analysis of nematode species in individual sites, data log(x+1), where x = species population density. New meadow - NM, permanent meadow – M, permanet pasture – P

was the group of fungal feeders. At one particular locality (Ľubietová) – new meadows – higher abundance of *Diphtherophora communis* was found. The proportions of predators were variable in investigated types of grassland. Species *Tripyla filicaudata* had the highest abundance in new meadows and *Anatonchus tridentatus* and *Coomanchus parvus* in permanent meadows and pastures.
The species diversity (H'spp) ranged between 2.2 – 2.5, no demonstrable differences were observed among investigated sites.
The Maturity index (MI) values were lover in new meadows (2.9) than in permanent meadows (3.4) or in permanent pastures (3.5) (Mann-Whitney *U* test, $z = -1.84$, $p < 0.05$) and depends with a higher number of omnivores and predators with higher c-p values. The PPI (Plant parasite index) values were similar in all investigated types of grassland, no apparent differences were observed. The higher proportion of bacterial feeders was reflected in the B/F ratio, which was very high in new meadows (6.3) (Mann-Whitney *U* test; $z = 2.2$ $p < 0.05$) compared to permanent meadows (3.2) and to permanent pastures (2.1).
Cluster analysis showed the similarity of the structure of nematode communities in all sites (Fig. 1), but locality Ľubietová, Strelníky standed out from the sample groups, as it was influenced by abundance and diversity of omnivores like *E. macrodorus*, *Dorylaimoides micoletzkyi, Eudorylaimus* spp. and fungivores *D. communis*. Diversity and abundance of soil nematodes is more similar in permanent meadows and pastures than in new meadows.

Table 1. Structure of nematode communities of three types of grassland in the Slovak Republic: mean abundance (individuals per 500 g soil; mean ± SD; *n* = 4) TG – trophic groups, B – bacteriovores, F – fungivores, PP – plant parasites, RFF – root-fungal feeders, O – omnivores, P – predators, IN – insect parasites

| Nematodes | TG | New meadows | Permanet meadows | Permanent pastures |
|---|---|---|---|---|
| Order: ARAEOLAIMIDA | | | | |
| 1 *Anaplectus granulosus* (Bastian, 1865) | B | 3.0 ± 4.2 | - | - |
| 2 *Plectus parietinus* Bastian, 1865 | B | 0.5 ± 0.5 | - | 2.2 ± 2.8 |
| 3 *Tylocephalus auriculatus* (Bütschli, 1873) | B | - | 0.7 ± 1.5 | 0.2 ± 0.5 |
| Order: RHABDITIDA | | | | |
| 4 *Teratocephalus terrestris* (Bütschli, 1873) | B | - | - | 1.2 ± 2.5 |
| 5 *Cephalobus persegnis* Bastian, 1865 | B | 8.0 ± 4.2 | 6.5 ± 6.4 | 9.0 ± 6.1 |
| 6 *Eucephalobus mucronatus* (Kozlowska & Roguska-Wasilevska, 1963) | B | - | 2.0 ± 4.0 | 3.7 ± 5.1 |
| 7 *Eucephalobus oxyuroides* (de Man, 1876) | B | - | 1.2 ± 1.8 | 0.5 ± 1.0 |
| 8 *Eucephalobus striatus* (Bastian, 1865) | B | 5.7 ± 7.5 | 1.2 ± 1.8 | 0.7 ± 1.5 |
| 9 *Acrobeloides nanus* (de Man, 1880) | B | 5.2.± 6.7 | 6.2 ± 5.8 | 17.5 ± 1.7 |
| 10 *Chiloplacus propinquus* (de Man, 1921) | B | 2.0 ± 2.7 | 0.2 ± 0.5 | 1.7 ± 3.5 |
| 11 *Chiloplacus symmetricus* (Thorne, 1925) | B | 12.5 ± 14.7 | 5.2 ± 6.7 | 0.7 ± 1.5 |
| 12 *Panagrolaimus rigidus* (Schneider, 1866) | B | 4.2 ± 5.3 | 0.7 ± 1.5 | 0.2 ± 0.5 |
| 13 *Protorhabditis postneri* (Körner, 1952) | B | 0.2 ± 0.5 | - | - |
| 14 *Rhabditis* spp. juvs. | B | 29.2 ± 49.9 | 13.0 ± 75.0 | 2.7 ± 4.8 |
| 15 *Heterorhabditis* sp. juvs. | IN | - | 0.2 ± 0.5 | 1.2 ± 2.5 |
| 16 *Steinernema affine* (Bovien, 1937) | IN | 0.2 ± 0.5 | 1.5 + 2.3 | 0.7 ± 0.5 |
| Order: APHELENCHIDA | | | | |
| 17 *Aphelenchus avenae* Bastian, 1865 | F | 9.7 ± 0.5 | 12.2 ± 14.1 | 8.2 ± 4.7 |
| 18 *Aphelenchoides composticola* Franklin, 1957 | F | 1.2 ± 1.8 | - | - |
| 19 *Aphelenchoides parietinus* (Bastian, 1865) | F | - | 0.2 ± 0.5 | 0.5 ± 1.0 |
| 20 *Aphelenchoides* sp. juvs. | F | 0.5 ± 0.5 | - | 0.2 ± 0.5 |
| 21 *Paraphelenchus pseudoparietinus* Micoletzky, 1922 | F | - | 3.0 ± 6.0 | - |
| Order: TYLENCHIDA | | | | |
| 22 *Basiria gracilis* (Thorne, 1949) | RFF | 15.0 ± 30.0 | 3.7 ± 5.1 | 3.2 ± 6.5 |
| 23 *Boleodorus acutus* Thorne et Malek, 1968 | RFF | 0.5 ± 1.0 | 3.2 ± 6.5 | 0.2 ± 0.5 |
| 24 *Boleodorus thylactus* Thorne, 1941 | RFF | 0.5 ± 0.5 | - | 1.0 ± 1.4 |
| 25 *Neopsilenchus magnidens* (Thorne, 1949) | RFF | - | 4.5 ± 4.6 | - |
| 26 *Filenchus filiformis* (Bütschli, 1873) | RFF | 21.2 ± 28.3 | 7.2 ± 6.3 | 9.2 ± 10.9 |
| 27 *Tylenchus davainei* Bastian, 1865 | RFF | 1.0 ± 2.0 | 0.7 ± 1.5 | - |
| 28 *Tylenchus* sp. juvs | RFF | 1.5 ± 2.3 | 1.2 ± 1.8 | 12.5 ± 17.4 |
| 29 *Malenchus bryophilus* (Steiner, 1914) | RFF | 3.0 ± 2.9 | 0.2 + 0.5 | 1.0 ± 2.0 |
| 30 *Malenchus exiguus* (Massey, 1969) | RFF | - | 0.5 ± 0.5 | 0.7 ± 1.5 |
| 31 *Aglenchus agricola* (de Man, 1884) | RFF | 6.0 ± 10.7 | 6.0 ± 6.9 | 7.2 ± 11.4 |
| 32 *Coslenchus costatus* (de Man, 1921) | RFF | 5.7 ± 10.8 | 1.5 ± 1.7 | 2.7 ± 3.7 |
| 33 *Ditylenchus intermedius* (de Man, 1880) | F | 0.2 ± 0.5 | 0.5 ± 1.0 | - |
| 34 *Nothotylenchus acris* Thorne, 1941 | F | 0.2 ± 0.5 | 1.0 ± 2.0 | 0.2 ± 0.5 |
| 35 *Bitylenchus dubius* (Bütschli, 1873) | PP | 13.5 ± 25.6 | - | - |
| 36 *Tylenchorhynchus* sp. juvs. | PP | - | 0.2 ± 0.5 | 3.0 ± 5.3 |
| 37 *Heterodera avenae* Wollenweber, 1924 | PP | 0.5 ± 1.5 | - | 0.2 ± 0.5 |
| 38 *Rotylenchus goodeyi* Loof & Oostenbrink, 1958 | PP | 4.0 ± 8.0 | 3.0 ± 2.9 | 7.2 ± 8.3 |
| 39 *Rotylenchus pumilus* (Perry, 1959) | PP | 0.7 ± 1.5 | 1.0 ± 2.0 | 0.7 ± 0.9 |
| 40 *Rotylenchus robustus* (de Man, 1876) | PP | - | 1.5 ± 3.0 | 1.2 ± 2.5 |
| 41 *Helicotylenchus canadensis* Waseem, 1961 | PP | 12.0 ± 23.3 | 14.2 ± 19.8 | 24.0 ± 27.1 |
| 42 *Helicotylenchus digonicus* Perry, 1959 | PP | 95.0 ± 33.8 | 208.5 ± 348.1 | 329.0 ± 394.7 |
| 43 *Helicotylenchus pseudorobustus* (Steiner, 1914) | PP | 1.0 ± 2.0 | 6.5 ± 11.7 | 7.7 ± 11.6 |
| 44 *Pratylenchoides crenicauda* Winslow, 1958 | PP | - | 1.5 ± 3.0 | - |
| 45 *Pratylenchus neglectus* (Rensch, 1924) | PP | 1.5 ±1.7 | - | - |
| 46 *Pratylenchus pratensis* (de Man, 1880) | PP | 17.5 ± 16.5 | 1.5 ± 1.7 | 8.6 ± 5.5 |
| 47 *Paratylenchus bukowinensis* Micoletzky, 1922 | PP | 1.2 ± 2.5 | 2.2 ± 4.5 | 1.0 ± 1.1 |
| 48 *Paratylenchus elachistus* Steiner, 1949 | PP | 0.2 ± 0.5 | 1.7 ± 2.3 | - |

| | | | | | |
|---|---|---|---|---|---|
| 49 | *Paratylenchus hamatus* Thorne & Allen, 1950 | PP | 0.2 ± 0.5 | 1.0 ± 2.0 | - |
| 50 | *Criconemoides informis* (Micoletzky, 1922) | PP | 4.0 ± 8.0 | 0.2 ± 0.5 | 0.2 ± 0.5 |
| 51 | *Criconemoides* sp. juvs. | PP | 3.2 ± 3.9 | - | - |
| 52 | *Mesocriconema curvatum* (Raski, 1952) | PP | - | - | 7.0 ± 14.0 |
| Order: ENOPLIDA | | | | | |
| 53 | *Tripyla filicaudata* de Man, 1880 | P | 2.7 ± 2.7 | 1.5 ± 2.3 | 2.5 ± 3.3 |
| 54 | *Prismatolaimus intermedius* (Bütschli, 1873) | P | - | 1.0 ± 2.0 | - |
| Order: ALAIMIDA | | | | | |
| 55 | *Alaimus primitivus* de Man, 1880 | B | 10.7 ± 13.5 | 11.2 ± 8.1 | 6.2 ± 10.0 |
| 56 | *Paramphidelus dolichurus* (de Man, 1876) | B | 1.2 ± 1.5 | 2.0 ± 2.8 | 4.5 ± 7.6 |
| Order: MONONCHIDA | | | | | |
| 57 | *Clarkus papillatus* (Bastian, 1865) | P | 0.5 ± 1.0 | - | 0.2 ± 0.5 |
| 58 | *Coomansus parvus* (de Man, 1880) | P | 1.5 ± 1.9 | 1.7 ± 1.2 | 2.5 ± 1.9 |
| 59 | *Prionchulus muscorum* (Dujardin, 1845) | P | 2.0 ± 2.8 | - | - |
| 60 | *Mylonchulus brachyuris (*Bütschli, 1873) | P | 0.5 ± 1.0 | - | - |
| 61 | *Mylonchulus sigmaturus* (Cobb, 1917) | P | 3.0 ± 6.0 | - | 0.2 ± 0.5 |
| 62 | *Anatonchus tridentatus* (de Man, 1876) | P | 1.2 ± 0.9 | 3.0 ± 4.2 | 2.0 ± 1.6 |
| 63 | *Miconchus studeri* (Steiner, 1914) | P | 0.2 ± 0.5 | - | - |
| Order: DORYLAIMIDA | | | | | |
| 64 | *Prodorylaimus brigdammensis* de Man, 1876 | O | 3.0 ± 6.0 | 2.0 ± 4.0 | - |
| 65 | *Mesodorylaimus bastiani* (Bütschli, 1873) | O | 3.2 ± 2.9 | 5.7 ± 0.5 | 17.0 ± 15.6 |
| 66 | *Mesodorylaimus bastianoides* Meyl, 1961 | O | 1.5 ± 3.0 | - | - |
| 67 | *Mesodorylaimus centrocercus* (de Man, 1880) | O | 0.2 ± 0.5 | 0.2 ± 0.5 | 0.5 ± 1.0 |
| 68 | *Aporcelaimellus obtusicaudatus* (Bastian 1865) | O | 7.2 ± 10.8 | 14.2 ± 12.5 | 22.0 ± 31.2 |
| 69 | *Paraxonchium laetificans* (Andrássy, 1956) | O | - | - | 0.2 ± 0.5 |
| 70 | *Discolaimus texanus* Cobb, 1913 | O | - | 0.7 ± 1.5 | 0.2 ± 0.5 |
| 71 | *Epidorylaimus lugdunensis* (de Man, 1880) | O | 0.5 ± 1.0 | 1.0 ± 2.0 | - |
| 72 | *Eudorylaimus carteri* (Bastian, 1865) | O | 8.0 ± 16.0 | 0.7 ± 1.5 | 1.0 ± 2.0 |
| 73 | *Eudorylaimus iners* (Bastian, 1865) | O | 1.0 ± 2.0 | - | 0.2 ± 0.5 |
| 74 | *Eudorylaimus* spp. juvs. | O | 13.0 ± 26.0 | 5.0 ± 10.0 | 1.7 ± 3.5 |
| 75 | *Microdorylaimus parvus* (de Man, 1880) | O | - | 1.7 ± 3.5 | - |
| 76 | *Thonus ettersbergensis* (de Man, 1885) | O | - | 5.5 ± 11.0 | - |
| 77 | *Enchodelus macrodorus* (de Man, 1880) | O | 20.0 ± 30.8 | 20.7 ± 19.7 | 10.0 ± 8.6 |
| 78 | *Pungentus silvestris* (de Man, 1912) | O | - | 4.0 ± 8.0 | 9.5 ± 12.7 |
| 79 | *Longidorus elongatus* (de Man, 1876) | PP | - | 3.0 ± 6.0 | - |
| 80 | *Longidorus leptocephalus* Hooper, 1961 | PP | - | 6.5 ± 13.0 | 1.2 ± 1.5 |
| 81 | *Axonchium coronatum* (de Man, 1906) | O | 0.2 ± 0.5 | 1.2 ± 2.5 | 4.7 ± 9.5 |
| 82 | *Oxydirus oxycephalus* (de Man, 1885) | O | 5.0 ± 6.0 | 11.5 ± 9.8 | 9.6 ± 13.3 |
| 83 | *Dorylaimellus mirabilis* (de Man, 1876) | O | - | - | 4.2 ± 8.5 |
| 84 | *Dorrylium zeelandicum* (de Man, 1876) | F | - | - | 0.5 ± 1.0 |
| 85 | *Tylencholaimus* sp. juvs. | F | 2.5 ± 3.3 | 0.5 ± 1.0 | 2.0 ± 2.8 |
| 86 | *Dorylaimoides micoletzkyi* (de Man, 1921) | O | 11.0 ± 22.0 | 0.75 ± 1.5 | 0.5 ± 1.0 |
| Order: TRIPLONCHIDA | | | | | |
| 87 | *Diphtherophora communis* de Man, 1880 | F | 18.7 ± 35.5 | - | 2.0 ± 2.6 |

**Discussion**

Investigated nematode communities inhabiting grassland habitats in the Slovak Republic were analyzed and compared in three different types of meadows differing in age and utilization. Obtained results indicated that numbers of species and genera were little differentiated in all investigated types of grassland. The number of genera (47) in new meadows established in arable soil was higher than presented by Valocká and Sabová (1997) (38) in young two-years ley meadow but the same as obtained by Háněl (2003) (46) in abandoned field left to natural succession. The number of genera in permanent meadows (49) and permanent pastures (49) is comparable with the results of Valocká and Sabová (1997) (43) genera in permanent pastures and Wasilewska (1995) (48) genera in permanent meadows.

Plant parasites nematodes were dominant in all three types of grassland studied. This is in concordance with the results of Yeates and Bird (1994), Valocká *et al.* (2001) and Lišková and Čerevková (2005). Plant feeders were represented mostly by the genus *Helicotylenchus* which is often

Table 2. Nematode community structure in different types of grassland in the Slovak Republic (mean ± SD; *n* = 4)

| Indices | New meadows | Permanent meadows | Permanent pastures |
|---|---|---|---|
| Total abundance (500g soil) | 410.0 ± 163.6 | 440.2 ± 451.4 | 569.0 ± 508.7 |
| Number of species | 29.0 ± 5.1 | 29.0 ± 8.1 | 30.0 ± 3.6 |
| Bacterial feeders % | 21.8 ± 11.5 | 14.2 ± 7.2 | 7.9 ± 5.0 |
| Fungal feeders % | 4.3 ± 2.9 | 4.2 ± 0.6 | 3.6 ± 1.5 |
| Plant parasites feeders % | 45.8 ± 14.9 | 41.2 ± 27.1 | 56.1 ± 30.2 |
| Root-fungal feeders % | 7.0 ± 7.8 | 8.6 ± 4.9 | 4.9 ± 4.2 |
| Omnivores % | 17.8 ± 16.1 | 28.4 ± 18.9 | 24.2 ± 23.4 |
| Predators % | 2.9 ± 2.1 | 2.3 ± 2.4 | 2.2 ± 2.0 |
| Insect parasites % | 0.1 ± 0.1 | 0.7 ± 0.8 | 0.7 ± 1.4 |
| H'spp | 2.5 ± 0.2 | 2.5 ± 0.5 | 2.2 ± 0.6 |
| MI | 2.5 ± 0.6 | 3.4 ± 0.5 | 3.5 ± 0.6 |
| PPI | 2.5 ± 0.2 | 2.6 ± 0.3 | 2.7 ± 0.1 |
| PPI/MI | 0.9 ± 0.3 | 0.7 ± 0.2 | 0.8 ± 0.2 |
| B/F | 6.3 ± 2.9 | 3.2 ± 1.3 | 2.1 ± 1.0 |

associated with permanent grassland. In new meadows higher abundance of *B. dubius* was observed often occurring in cultivated fields in the Slovak Republic (Sabová *et al.*, 1986; Renčo, 2002) was found. In contrary to our results Háněl (1996) observed the bacterial feeders and omnivores as the most abundant trophic groups of nematodes in the South Bohemia meadows.

Bacterial feeders represented mainly by *Rhabditis* and *Chiloplacus* were subdominant trophic group only in new meadows. Higher abundance of bacterial feeders in new meadows was probably caused by higher supplies of nitrogen from previous mineral fertilisation in arable soil. Wasilewska (1997) reported increase abundance of bacterial feeders is closely connected with an expansion of microbial activity, in particular in situations with supplies of nitrogen in the environment.

On the other hand, omnivores characterized by a long life cycle and low abundance especially in cultivated field (Yeates & Bird, 1994), were subdominant in permanent meadows and pastures. They were represented mostly by *E. macrodorus, A. obtusicaudatus* and *O. oxycephalus.* Predators represented only a low proportion of the nematode communities in all investigated sites, but together with omnivores as indicators of stability and naturalness of ecosystems (Wasilewska, 1997), their high proportions in the nematode community on permanent meadows and pastures are indicative of a higher stability at this ecosystems.

The nematode diversity (H'spp) were similar in all types of meadows and lover then those found by Wasilewska (1994) or Háněl (1996) but comparable to the data obtained by Háněl (1994) and Lišková and Čerevková (2005).

The comparison of three types of the grassland in the Slovak Republic showed that the MI values are higher in permanent meadows and pastures than in new meadows. A depend of the MI with the age of meadows was obtained by Wasilewska (1995) and Valocká and Sabová (1997), and with succession from new meadows to permanent meadows and pastures. The values of the PPI (Plant parasite index) were rather balanced in all investigated types of grassland. The B/F ratio reflected a higher proportion of bacterial feeders which increased in higher decomposition of organic matter; therefore these values are higher in new meadows than in permanent meadows and pastures.

Cluster analysis showed that the structure of nematode communities and diversity more dependent on geographic conditions than on meadows age and utilization.

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