# Diversity and abundance of nematodes in the sewage of Jodhpur, Rajasthan, India

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Nematodes are aquatic, semi-aquatic and terricolous organisms in nature and among the most important organisms in decomposer communities. Nematode community structure in polluted water as studied by Beier & Traunspurger (2001) revealed that nematodes can be used as bioindicators of soil health because they are ubiquitous and have diverse feeding behaviours and life strategies (Bongers & Bongers 1998; Neher 2001). Bacterial feeding nematodes have the greatest contribution to the decomposer food web. These decomposer nematode species do not feed directly on organic matter but they graze on microbes and excrete ammonia. Thus, nematodes contribute to nitrogen mineralization. Since nematodes respond rapidly to new resources and the nematode fauna can be analyzed, the structure of the nematode community offers an instrument to assess the condition of the ecosystem.

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**Material and methods:** Sediment samples were processed by sieving and decantation and a slightly modified Baermann's funnel technique. Nematodes were fixed in hot formalin. For permanent mounts, specimens were dehydrated by the slow method and mounted in anhydrous glycerin. The individual species population and the total nematode counts were taken. Measurements were made using a drawing tube mounted on a Nikon Eclipse E600 microscope and photographs were taken using a Nikon digital camera DS-Fi1.

**Results:** A total of 39 species of nematodes were identified from sewage water of various localities of Jodhpur and adjoining areas (Table 1). Five functional nematode trophic groups were identified based on morphological structures and modes of feeding such as herbivores, bacterivores, fungivores, omnivores and predators. In terms of individual abundance, bacterivores (rhabditids) were the most dominant group represented followed by predators, herbivores, omnivores and fungivores. In terms of taxonomic diversity cephalobids were the most abundant group followed by rhabditis/diplogastrids among the bacteriovores. *Mononchoides, Mesorhabditis* and *Diplogasteritus* were found the most dominant genera in the sewage water.

**Discussion:** Nematode frequency, density and diversity vary depending upon ecological and edaphic factors (Sohlenius 1979; Khatoon et al. 2001). The present study revealed a great deal of generic diversity within the nematode community. A total of 39 nematode species were identified, representing bacterivores (14 genera), predators (six genera), omnivores (three genera), herbivores (two genera) and fungivores (one genus). Fifty species of nematodes representing five trophic groups were reported in the sewage waters (Tahseen 2006). Most of the nematode species were microbe grazing which have been reported to regulate the rates of decomposition (Yeates & Coleman 1982). Increased bacterivores diversity shows the increased diversity of microbes thus reflecting the nature and quality of the environment. This present study shows a high nematode density and low species diversity in the sewage water.

**Table 1. Diversity of various trophic groups in sewage system of Jodhpur.**

| List of species | cp value | Trophic group |
|---|---|---|
| **Tylenchida** Thorne, 1949 | | |
| **Hoplolaimidae** Filipjev, 1934 | (3) | Herbivore |
| *Helicotylenchus dihystera* (Cobb, 1893) Sher, 1961 | (3) | Herbivore |
| *Helicotylenchus erythrinae* (Zimmerman, 1904) Golden, 1956 | (3) | Herbivore |
| **Criconematidae** Taylor, 1936 | | |
| *Hemicriconemoides brachyurus* (Loos, 1949) Chitwood & Birchfield, 1957 | (3) | Herbivore |
| **Aphelenchida** Siddiqi, 1980 | | |
| **Aphelenchidae** Fuchs, 1937 | | |
| *Aphelenchus avenae* Bastian, 1865 | (2) | Fungivore |
| **Dorylaimida** Pearse, 1942 | | |
| **Dorylaimidae** de Man, 1876 | | |
| *Mesodorylaimus subtiloides* (Paetzold, 1958) Andrássy, 1959 | (4) | Omnivore |
| *Mesodorylaimus kauli* Baqri & Bohra, 2001 | (4) | Omnivore |
| **Aporcelaimidae** Heyns, 1965 | | |
| *Aporcelaimellus heynsi* Baqri & Jairajpuri, 1968 | (5) | Predator |
| **Qudsianematidae** Jairajpuri, 1965 | | |
| *Ecumenicus monhystera* (De Man, 1880) Thorne, 1974 | (4) | Omnivore |
| **Nordiidae** Jairajpuri & Siddiqi, 1964 | | |
| *Kochinema farodai* Baqri & Bohra, 2001 | (4) | Omnivore |
| **Actinolaimidae** Thorne, 1939 | | |
| *Neoactinolaimus rajasthanenesis* Bohra & Sultana, 2008 | (4) | Predator |
| **Mononchida** Jairajpuri, 1969 | | |
| **Mylonchulidae** Jairajpuri, 1969 | | |
| *Mylonchulus brachyurus* (Bütschli, 1873) | (4) | Predator |
| **Rhabditida** Chitwood, 1933 | | |
| **Cephalobidae** Filipjev, 1934 | | |
| *Cephalobus cubaensis* Steiner, 1935 | (2) | Bacterivore |
| *Cephalobus quadrilineatus* Eroshenko, 1968 | (2) | Bacterivore |
| *Chiloplacus sclerovaginatus* Sumenkova & Razzhivin, 1968 | (2) | Bacterivore |
| *Heterocephalobus pulcher* (Loof, 1964) Andrássy, 1967 | (2) | Bacterivore |
| *Acrobeles chelatus* Thomas & Allen, 1965 | (2) | Bacterivore |
| *Acrobeles geraerti* (Rashid et al, 1990) Shahina & De Ley, 1997 | (2) | Bacterivore |
| *Acrobeles mariannae* Andrássy, 1968 | (2) | Bacterivore |
| *Zeldia neoacuta* Allen & Noffsinger, 1972 | (2) | Bacterivore |
| *Zeldia feria* Allen & Noffsinger, 1972 | (2) | Bacterivore |
| **Teratocephalidae** | | |
| *Teratocephalus bisexualis* Meyer & Coomans, 1977 | (1) | Bacterivore |
| **Panagrolaimidae** Thorne, 1937 | | |
| *Panagrolaimus peruensis* (Steiner, 1939) Goodey, 1963 | (1) | Bacterivore |
| *Panagrolaimus dendroctoni* (Fuchs, 1932) Rühm, 1956 | (1) | Bacterivore |
| **Rhabditidae** Örley, 1880 | | |
| *Mesorhabditis anisomorpha* (Sudhaus, 1978) Andrássy, 1983 | (1) | Bacterivore |
| *Mesorhabditis miotki* (Sudhaus, 1978) Andrássy, 1983 | (1) | Bacterivore |
| *Teratorhabditis synpapillata* Sudhaus, 1985 | (1) | Bacterivore |
| **Diploscapteridae** Micoletzky, 1922 | | |
| *Diploscapter coronatus* (Cobb, 1893) Cobb, 1913 | (1) | Bacterivore |
| **Diplogastridae** Micoletzky, 1922 | | |
| *Butlerius butleri* Goodey, 1929 | (4) | Predator |
| *Diplogasteritus nudicapitatus* (Steiner, 1914) Paramonov, 1952 | (4) | Predator |
| **Neodiplogastridae** Paramonov, 1952 | | |
| *Mononchoides longicaudatus* (Khera, 1965) Andrássy, 1984 | (4) | Predator |
| **Araeolaimida** De Coninck & Schuurmans Stekhoven, 1933 | | |
| **Leptolaimidae** Örley, 1880 | | |
| *Chronogaster daoi* Loof, 1964 | (2) | Bacterivore |
| *Chronogaster typica* (De Man. 1921) De Coninck, 1935 | (2) | Bacterivore |
| **Chromadorida** Chitwood, 1933 | | |
| **Cyatholaimidae** Filipjev, 1918 | | |
| *Achromadora micoletzkyi* (Stefanski, 1915) Van Der Linde, 1938 | (2) | Bacterivore |
| *Achromadora ruricola* (de Man, 1880) Micoletzky, 1925 | (2) | Bacterivore |
| **Monhysterida** Schuurmans Stekhoven & De Coninck, 1933 | | |
| **Monhysteridae** de Man, 1876 | | |
| *Monhystera africana* Andrássy, 1964 | (2) | Bacterivore |
| *Monhystera paludicola* de Man, 1881 | (2) | Bacterivore |
| **Enoplida** Baired, 1853 | | |
| **Prismatolaimidae** Micoletzky, 1922 | | |
| *Prismatolaimus andrassyi* Khera & Chaturvedi, 1967 | (3) | Bacterivore |
| *Prismatolaimus intermedius* (Bütschli, 1873) De Man, 1880 | (3) | Bacterivore |
| **Tripylidae** De Man, 1846 | | |
| *Tobrilus longus* (Leidy, 1852) Andrássy, 1959 | (4) | Predator |

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