

Manipulation of soil biodiversity to investigate soil ecosystem functioning

Nematodes live in almost every habitat, are very abundant and comprise many trophic groups such as bacterial feeders, fungal feeders, plant feeders, predators, and omnivores (Figure 1). To differentiate these functional groups is compared to identification of the species relatively simple as they have very distinct mouth morphologies (Figure 1).

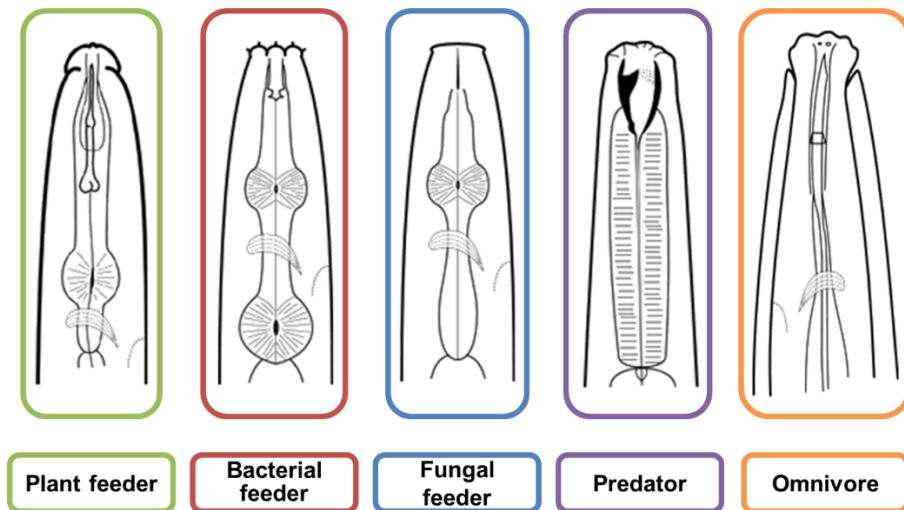


Figure 1 Examples for typical trophic groups and their characteristic mouth part morphology.

It is therefore possible to investigate a more or less complete food web by focusing on nematodes. In addition, nematodes vary in the sensitivity to stress. Bongers 1990 created the so called Maturity index and divided nematodes into 5 levels, from 1 to 5, the so-called cp-scale. The c stands for

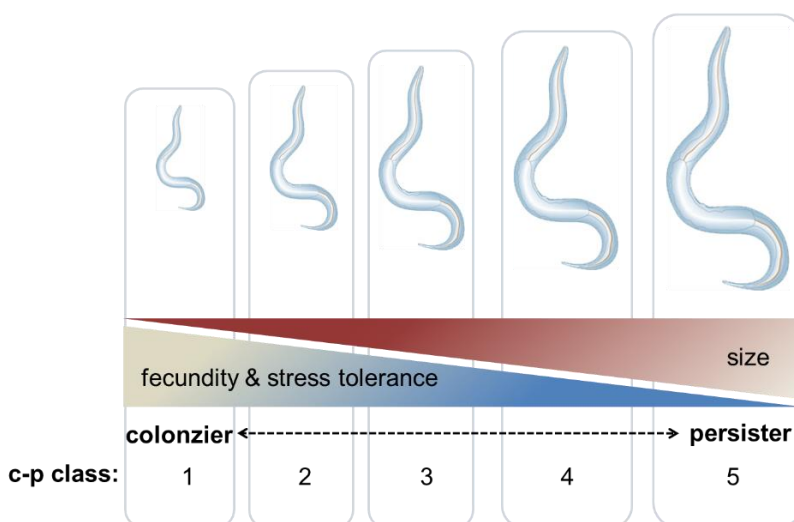


Figure 2 Nematode cp-classes and the relationship to size, fecundity, and stress tolerance.

German Centre for Integrative
Biodiversity Research (iDiv)
Halle-Jena-Leipzig
Puschstr. 4
04103 Leipzig, Germany

info@idiv.de
www.idiv.de

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colonizers and comprise nematodes that are very stress tolerant, that can form dauer-larvae, are relatively small, and have a high fecundity (cp-1). The p stands for persisters and thereby comprise the other end of the scale, the so-called cp-5 nematodes. These nematodes are relatively sensitive to disturbance, are large, and have a low fecundity (Figure 2). Thereby, not all combinations of trophic groups and cp-classes exist (Figure 3). Bacterial feeders are the only cp-1 group, whereas predators and omnivores (but also plant feeders that are ignored here for specific reasons) rather belong to higher cp-classes (Figure 3).

Functional guild

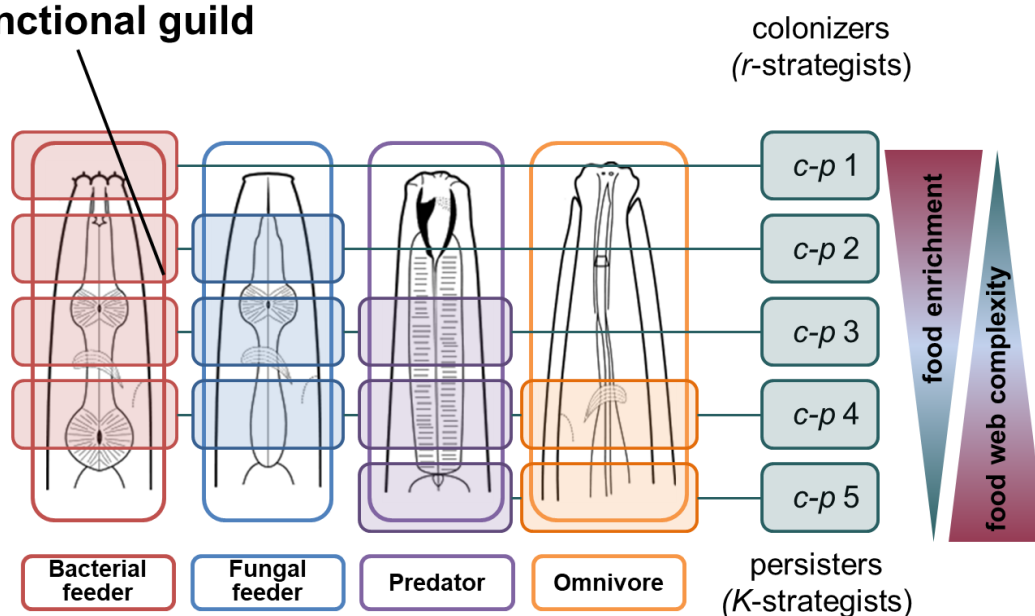


Figure 3 Possible matching of the five cp-classes and four trophic groups.

Although differing in size ($\sim 250 \mu\text{m}$ to $\sim 5000 \mu\text{m}$) nematodes are still very small and not easy to culture or picking from soil when aiming for a high number of species. In this thesis the student will use sieves with different mesh sizes to obtain different nematode communities. Theoretically, we will have simple and species poor nematode communities at smaller mesh sizes and more complex and species rich communities when using a larger mesh size. To test this, nematodes will be counted and the biomass will be calculated by measuring body length and width. In addition, trophic groups will be identified.

In a second step we will apply these different nematode communities to small pots to answer the question if simpler/species-poor nematode communities lead to a lower soil functioning measured as soil basal respiration and biomass and decomposition.

Interested students contact simone.cesarz@idiv.de. The thesis can be written in German or English.