AIMS AND METHODS IN POPULATION RESEARCHES ON 
SOIL-INHABITING NEMATODES

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As a member of the staff of the Institute for biological field 
research I shall begin by explaining the work that is covered by 
the mandate of this Institute. It is our task to carry out research in 
applied biology in the broadest sense of the word in the field. By the term 
"applied" we mean that our research is aimed at obtaining a better 
understanding and mastering of nature to the ultimate advantage of 
mankind. Much of the research carried out at our institute is funda-
mental in its origin, but is all the same directed towards a practical 
end. The workprogram mentions for example research on the in-
fluence of hedges and windscreens on the yield of agricultural crops; 
on mammals and birds; on the decomposition of organic matter in the 
soil, and on the problem of regulation and stabilisation processes in 
natural communities. In this latter problem we ask ourselves what the factors or processes are which protect such natural biotopes against 
those pests that so often attack our cultivated fields. The nemato-
logical research comes under this heading. The aim is to gather data on the biotical and abiotical factors governing the soilfauna. We may then be able to understand the faunistic composition, the changes, and the regulation of population density of the nematodes in the soil. We must trace the existing relation between the nematodes themselves and their environment. To achieve this aim we often need a quantitative analysis of a biotic community.

When starting our research we assumed that a biotic community in a natural biotope is better buffered than that in a cultivated field. The term “buffered” is used in the sense that organisms affect each other in such a way that it is impossible for any species to increase to plague proportions; on the other hand the species do not prevent each other from living. It is our opinion that it is best to carry out such research in a biotope as natural as possible; we may then become acquainted with the factors and processes buffering the community. For practical reasons we prefer a biotope which remains constant
throughout the year and changes but little from one year to another. The best approximation of our ideal seems to be an old-established heath, since here, there are large areas covered exclusively by Calluna without any other plants growing under it. Moreover, its leaves are shed throughout the year and growth stops only when the heath is frozen.

It is open to questioning in how far a heath represents natural conditions but in places were it has been established for about 2000 years, it is sufficiently stable for our purposes.

A second choice was an oak forest where the yearly leafshed is decomposed within one year.

We appreciate that conditions in these two cases differ from those occurring in cultivated fields which are of course subject to disturbance by tilling, fertilization or grazing. It is however hoped that from a study of the processes in more natural biotopes it is possible to gain sufficient knowledge of the principles involved so as to be able to study further the problem in disturbed soil.

To obtain reliable quantitative data we had to develop new techniques that would overcome the difficulties encountered in analysing samples containing a high percentage of humus.

In the beginning we examined a number of techniques already described in literature, but none of them were able to satisfy us. It was most desirable to be able to extract all nematodes, including the smallest from any given sample. The method proved to be the direct counting technique described by StöcklI.

This process however is both very tiring and time consuming. We clung to its principle but subjected the samples to staining before counting. This way the nematodes contrast strongly with the soil particles and are easily extracted by hand. Using this technique many samples were examined, as well as by other methods which were tested for their reliability. In routine work the time factor is of the highest importance, and for this reason we were looking for a reliable but much quicker technique. We did find such a technique but had to accept an efficiency of 95%-99% in ascertaining the number of nematodes present in the tested sample.

This technique proved to be 8-10 times as fast. It is based on suspending the particles of a soil sample in a salt solution of high specific density, followed by a process of centrifuging.

This technique worked well on small samples of any kind of soil tested by us. Besides the examination of soil, we also examined the litter.