GUARD OUR FRIENDS, DESTROY ONLY OUR COMPETITORS 1)

BY

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The eelworm problem is made by Man, who cultivates crops. Certain species of nematodes specialise on these crops and become a problem for Man, competing for their food requirements with us.

However, we realise, more than ever before, that we are confronted with a highly complicated organisation of living beings, and never with one species alone. A nematode lives in equilibrium with its biotic, as well as its physico-chemical environment. Around it other living organisms compete, parasitize or live in symbiosis with our nematodes.

The study of population dynamics in soil is one of the most hazardous explorations a scientist may dare to tackle. So far Soil Zoology has paid considerable attention to the micro-organisms, especially bacteria and fungi, though the ecology of earthworms, of small arthropods and mites in soil has also been studied. But today, while we may have made much progress in the study of plant parasitic nematodes, general zoological investigations of the fluctuation of nematodes in soil are few (Stöckli, 1958; Franz, 1955). Wallace, 1961, has done excellent work on the reactions of nematodes during changing physical conditions in the soil, but the living environment of nematodes has not frequently been looked at.

The decomposition of organic material in the soil is an essential link in the cycle of organic substances in Nature and is done by the fauna and flora of the soil; even the physical structure of the soil is considerably determined by the decomposing actions of animals and plants. However, if we try to find what place nematodes play in the process, we do not find a clear picture.

At an earlier symposium, Doncaster (1962) showed us his excellent films on feeding of nematodes, and we saw how the soil particles move through the gut of Rhabditids. Thus it seems that nematodes not only suck from plant roots, eat bacteria, fungi or other nematodes, or are eaten by their parasites and predators, but that many of them are linked with the decomposition of soil litter and so may be very important and useful.

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But let us look at the “Friendly Plants and Animals” as Duddington’s booklet (1956) calls them. These show a great variety of form and vary much in capacity (Dollfus, 1946): you will remember the tardigrades and protozoa that attack nematodes, which were shown by Doncaster at the last symposium (Doncaster & Hooper, 1961); much attention has been paid to the nematode-trapping fungi (Drechsler, 1937, Duddington, 1956, and many others) and indeed under certain circumstances these can reduce nematode populations to low levels; also the cyst-invading fungi (Van der Laan, 1956) that parasitize *Heterodera*; other nematodes (Cobb, 1927) and microsporidia that frequently prey upon nematodes, and finally the giant amoeboid organism, *Theratromyxa*, that engulfs nematodes as its prey (Van der Laan, 1954).

So far, the prospects of finding a method of biological control of nematodes are spoor. It seems that the natural enemies of nematodes play no very important role in controlling nematode populations. It must be admitted, however, that our knowledge of the real importance of our friends is still small. If a nematode dies naturally in soil, its earthly remains cannot be traced. There are numerous accounts of “disappearances” of nematodes that were deliberately put into soil that could not be recovered by the present-day methods. Seinhorst (1962) is still puzzled why some potentially very dangerous nematodes frequently do not reach, even in apparently ideal circumstances for a nematode, the population level at which they cause damage. So “natural mortality” is a very difficult fact to unravel. If nematodes vanish from soil they may (1) meet their death naturally, (2) die from adverse physical conditions, or (3) be eaten by other organisms. The fraction belonging to each group cannot be discovered; the real effect of biological control cannot be detected.

Apparently the best way of control lies in methods of cultivation; crop rotation and avoiding growing susceptible crops, and so on. Other colleagues will deal with these topics.

I cannot neglect the progress chemical control has made during the past years (Taylor, 1951). It has already produced many good results and the rate with which the chemical industry progresses, makes it certain that this method is a prominent mode of control. However, chemical control always raises controversial feelings in a biologist; it is both the most detested and the most direct way of control.

From these introductory remarks, it follows that I am of the opinion that we ought to be very careful. We ought to restrict ourselves to the control of plant parasitic nematodes alone, and guard our friends among the soil organisms much more than we do now. After a chemical has been put into the soil, we have to wait and see what happens. As nematologists, we are only equipped to estimate the results of applied chemicals by extracting and counting the number of nematodes; we disregard insects, mites, other arthropods, small animals, and presumably the micro-organisms which make our soil fertile again through decomposition.

In entomology, chemical control has paid the price of irresponsible applications