197 BIOGEOGRAPHY OF NEMATODES

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Biogeography is the study of distributions of organisms, plus an attempt to explain the distributions. Two approaches to explanation of biogeographic patterns may be termed ecological biogeography and historical biogeography. Most nematologists have taken the ecological approach, with a goal of determining why a particular species is restricted to certain areas, and not present in other nearby areas. Historical biogeography is based on the premise that present-day patterns of taxa result largely from the history of the taxa and of the areas of the earth in which they have lived. Nematologists generally adhere to the classic view of dispersal in which a center of origin is postulated and long-range dispersal over barriers is invoked. The dispersal mechanism is often assumed to be man himself. Challenges to this approach exist in the form of methods which infer the biogeographic history from phylogeny. Vicariance biogeographers postulate fragmentation of widespread ancestral biotas, resulting from geological, climatic or other disjunctions, and further allopatric speciation among descendant biotas. Distributions amenable to general explanation can be distinguished from those which require unique dispersal events. Biogeography of soil nematodes is hampered by present limitations in systematics, including our inability to determine species limits with certainty.

198 ECOLOGY OF SOIL NEMATODES

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Understanding the ecological role of the total soil nematode community depends on an evaluation of the integrated influences of the nematode trophic groups, plant roots and microflora, and their interrelationships with the abiotic factors of the environment. The nematode fauna appear to be responsible for less than 2% of the total soil respiration, thus their effect on soil ecosystem metabolism is insignificant. However, their indirect role in decomposition processes are of major importance. Herbivorous nematodes, usually in multi-species populations, decrease plant productivity and/or quality, thus resulting in economic crop loss. The nematoda of the detritus food web, although not involved in primary decomposition, enhance decomposition rates by consumption of microflora. These nematoda are also responsible for controlling nutrient release and therefore the actual primary production of terrestrial ecosystems.

199 MIGRATIONS OF PLANT-PARASITIC NEMATODES IN SOIL

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Phytoparasitic nematodes are attracted towards host plant roots. The roots produce stimulus (i) which attract the nematodes. These nematodes possess sense organ(s) which allow them to orient their movements over gradients of chemicals in which the highest concentration is only 10^{-3} M/l, CO_2 with a concentration difference of 0.08 % per cm and temperature of 0.033 per cm. Migrations over large distances have been observed with nematodes belonging to various genera. Soil texture, pore size, clay components, temperature moisture and photoperiod influence movement, migration and attraction. Nematode attraction to host roots and high sense organs sensitivity open a new possible method of control using chemicals which stop migration activity of nematodes. Carbofuran, phenamiphos and aldicarb are known to affect nematode'movement and attraction. In the same way, natural polycyclic lactones (chaparrinone, klaineanone and glaucarubolone) prevent invasion of tomato roots by stopping movement of Meloidogyne javanica juveniles when they are in concentration of 5 ppm. in the soil water.

200 ECOLOGY OF THE MYCOPHAGOUS NEMATODE APHELENCHUS AVENAE IN PINE FOREST AND WHEAT-FIELD SOILS

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The relationship between abundance of mycophagous nematodes and their food resources was studied by comparing the nematode and fungal flora of two distinct habitats - wheat-field and forest soils. The forest soil supported a higher total population of nematodes than wheat-field soil yet *Aphelenchus* was rare (comprising 0.25% of total extractable nematodes compared with over 10% in wheat-field soil). *Aphelenchus* was also in forest litter while other fungus-feeders - *Aphelenchoides* spp. - were more abundant in both litter and soil. Total propagule counts on dilution plates were over four times greater in forest soil compared with wheat-field soil, however, the composition of the fungal flora differed markedly between soils. *Penicillium* spp. dominated the flora of the forest soil (comprising 90% of total propagules extracted as against 33% in wheat-field soil) while the wheat-field soil yielded greater diversity of fungi. Propagules of Aspergilli, Fusaria, Mucorales and fungi which remained sterile in culture were extracted in significantly higher numbers from wheat-field soil than in forest soil and many genera commonly found in wheat soil, such as *Broomella*, *Cladosporium*, *Myrothecium* and *Trichonium* were not recorded from pine forest soil. Feeding trials with mycophagous nematodes and fungi isolated from these soils are being used to study these differences.

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ABSTRACTS OF PAPERS

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