



*Distribution Patterns –
Distribution Of Soil Organisms
Part 2*

Soil fungal distribution

The kingdom Fungi is one of the most diverse groups of organisms on Earth regulating carbon cycling, plant nutrition and pathology. Fungi are widely distributed in all terrestrial ecosystems. A study published in 2014 determined the main drivers of fungal diversity and community composition globally. Researchers used DNA extracted from hundreds of globally distributed soil samples. The strongest drivers on the diversity of fungi are proximity to the Equator and mean annual precipitation. Higher levels of diversity were found in tropical ecosystems. However, ectomycorrhizal fungi were most diverse in temperate or boreal ecosystems. Precipitation and temperature, followed by pH, calcium or phosphorus availability, are the most significant drivers of soil fungal diversity and community composition at the global scale. Strong links found among distant continents reflect their relatively efficient long-distance dispersal through wind and water.

Another study investigated the intensity at a global scale of the colonisation of plant roots by the two main types of mycorrhizal fungi: arbuscular and ectomycorrhizal fungi. The intensity of plant root colonisation by arbuscular mycorrhizal fungi strongly relates to warm-season temperatures, frost periods and the soil carbon-to-nitrogen ratio, and is highest at sites featuring continental climates with mild summers and a high availability of soil nitrogen. By contrast, the intensity of ectomycorrhizal infection in plant roots is related to soil acidity, the soil carbon-to-nitrogen ratio and the seasonality of precipitation, and is highest in sites with acidic soils and relatively constant precipitation levels.

Nematode distribution

Nematodes have successfully established themselves in all ecosystem types, including soil, marine and freshwaters, as well as in harsh environments such as the hottest and coldest deserts on Earth. Soil nematodes are among the most abundant multicellular animals on Earth (estimated at more than 10¹⁹ individuals globally and up to millions of individuals per square metre of soil) On a global scale, nematode diversity appears to be high across most latitudes, decreasing only in the polar regions. Even at small scales (millimetres to centimetres), nematode species diversity can be high. eg. a single soil core (approx. 100 cubic centimetres) from a Cameroon forest contained 89 nematode species.

Globally, nematode species distributions show distinct biogeographies, largely determined by climate, soil chemistry and plant community structure. Plant parasitic nematodes (PPNs) are codistributed globally with their hosts. The vast majority of PPNs have fairly narrow host ranges, while the most agriculturally damaging species tend to be more virulent and have broader host ranges.

Nematodes that are not parasites or pathogens are the most diverse, and typically the most abundant, forms. Other members of this group include those that feed on cyanobacteria, algae and protists and can be found wherever there is suitable habitat. At small spatial scales, nematode distributions are often highly heterogeneous. Fungal-feeding nematodes distribute as a function of soil moisture, plant species or other soil characteristics. Information on the factors determining the distribution of nematodes is critical for economic reasons. For example, plant parasitic nematodes can cause tremendous crop damage, entomopathogenic nematodes can provide effective control of insect pests, and nonparasitic species play crucial roles in nutrient cycling support for higher trophic levels.

Farming Secrets says: Fungi And Nematodes Are Vital For Soil Health

Ref: A Global Atlas of Soil Biodiversity p70