GOLD NUGGET

Distribution Patterns –
Soil Biodiversity Over Time – Part 3

However, soil organisms themselves can also influence vegetation succession.
They do this via a process called plant-soil feedback, which is driven by root-associated symbionts and root pathogens, which become more abundant and diverse as succession proceeds.
As an example, arbuscular mycorrhizal fungi can increase plant species diversity in early successional communities, because they promote herbaceous species over dominant grasses, and increase transfers of nutrients among plants via hyphal networks. This in turn results in nutrients being more evenly distributed among the plant community, thereby limiting the dominance of certain plant species.
The build-up of root pathogens during succession can also exert a powerful influence on vegetation change. For example, the build-up of both root pathogens and root-feeding nematodes in the root zone of Marram grass (Ammophila arenaria) decreases in the abundance of this plant and causes its replacement by Festuca rubra (red fescue), that is not susceptible to these pathogens. Similarly, the build-up of insect root herbivores that feed selectively on early successional plant species enables late successional species to become established, thereby causing vegetation change.

Millennia

Over timescales of millennia, ecosystems that have not been subject to catastrophic disturbance enter a 'decline phase' characterised by a reduction in tree biomass. This decline has been linked to long-term reductions in the availability of soil phosphorus, caused by thousands or millions of years of soil weathering, and the leaching and occlusion of phosphorus into non-biologically available forms. As a result, soil organic matter also becomes increasingly limited in phosphorus relative to other nutrients, such as nitrogen which is made available by biological nitrogen fixation. A consequence of this is reduced substrate quality for decomposers, which contributes to reductions in the biomass of decomposer microbes and shifts in the composition of microbial communities toward increasing fungal dominance, which together act to curtail rates of litter decomposition and mineralisation of nutrients.
In other words, as ecosystems age and become increasingly limited in phosphorus, a negative feedback is set in motion whereby low foliar and litter nutrient status reduces decomposer activity, which further intensifies nutrient limitation, thereby leading to ecosystem decline.
The entire soil food web is affected by these dynamics. However, effects on soil organisms other than microorganisms have been poorly studied. In New Zealand, it has been observed that the densities of microbial-feeding nematodes and enchytraeids decrease when an ecosystem begins to decline, whereas the density of omnivorous nematodes initially increases, before also decreasing subsequently. The temporal distribution of microarthropods has also been studied, showing contrasting patterns. For instance, in a boreal forest in north-eastern Canada, mites showed a significant decline in density and diversity during the decline phase, while no changes were found among collembolans.
In conclusion, the very long-term dynamics of the whole soil biodiversity would need further investigation in order to better understand the role of all soil organisms in ecosystem development.

Farming Secrets says: ***By Encouraging Plant Diversity And Using Animals, Plants Take Up Atmospheric Elements And Deposit Them In The Soil By The Process Of Symbiosis Thus Increasing Soil Fertility***

Ref: **A Global Atlas of Soil Biodiversity p75**