GOLD NUGGET

Acid Rain And Nutrient Overloading Part 2

In non-agricultural soils, excess nutrient additions can, over time, lead to significant shifts in plant community composition. Nutrient additions can also lead to changes in soil pH and, in some cases, nutrient toxicity if addition rates are sufficiently high. Moreover, nutrient additions can lead to significant shifts in below ground carbon dynamics, due to changes in the amounts and types of plant-derived organic carbon entering the soil and changes in the rates at which litter and soil organic matter pools are mineralised to carbon dioxide (CO_2) via microbial activities.

Nutrient overloading has perhaps the strongest effects on aquatic ecosystems when the soil cannot retain all of the added N and P. The excess nutrients end up in surface and groundwaters, leading to the effect known as eutrophication, which is the excessive growth of algae resulting from high nutrient concentrations.

Given the myriad interactions between plants and below ground biota, one of the primary mechanisms through which nutrient amendments influence soil microbial and faunal taxa is by changing plant production and plant community types.

Similarly, mycorrhizal fungal taxa (a group of organisms) typically become less abundant when soils are amended with nitrogen or phosphorus. The growth of cyanobacterial taxa which produce toxins that can affect various parts of the body.. These are often found on the soil surface in many ecosystems can be inhibited by nutrient overloading due to the increased shading that often accompanies the increased rates of plant growth. Other, more direct effects of nutrient overloading on soil biota include reductions in nitrogen-fixing bacteria and increases in the relative abundances of those taxa that carry out denitrification or nitrification processes.

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Changes in soil biodiversity and the functional abilities of these communities that result from elevated inputs of nutrients can have dramatic impacts on the soil carbon cycle.

Decreases in the quality or quantity of plant carbon inputs could contribute to the observed reductions in below ground CO_2 production and microbial biomass with nutrient additions. There also seem to be more direct effects of nutrient additions on microbial communities, whereby nutrient additions decrease microbial decomposition of more recalcitrant carbon pools through the direct inhibition of extracellular enzyme activities or shifts from a more oligotrophic community to one dominated by more faster growing taxa. Regardless of the mechanism involved, an improved understanding of how nutrients affect the activities of below ground communities is important given that microbial mineralisation of soil organic matter pools is a key component of the global carbon cycle and a key determinant of soil fertility over longer time scales.

Soil Lovers say:* *Adding NPK Nutrients Can Have Widespread Effects On The Ecology

Ref: **A Global Atlas of Soil Biodiversity p121**