Analytical tools in biogeochemistry and soil ecology.

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Introduction

Fire frequency may increase in many ecosystems that are dominated by fire around the world as a result of the effects of increasing human demand, changing land use, and global warming combined. Understanding how changes in fire frequency may affect the basic soil biogeochemical processes and the microbial community over time is critical. Here, we investigated the effects of differences in fire frequency and other fire history features on soil C and N dynamics as well as the main microbial communities in Pinus pinaster forests from central Spain using soil fatty acid profiles. The stands were chosen so that there would be variation in the number of fires (1 to 3) that occurred between 1976 and 2018, the amount of time since the last fire, and the distance between the fires.

Nickel (Ni) is a potentially harmful element that pollutes land and water, jeopardizes the security of food and water, and obstructs global sustainable development. A promising new substance for cleaning up settings contaminated with nickel is biochar. The ability of pure and functionalized biochars to immobilize/adsorb Ni in soil and water, as well as the mechanisms involved, haven't been thoroughly examined, though. In this article, we critically examine the various aspects of Ni pollution and remediation in soil and water, including its occurrence and biogeochemical behavior under various environmental conditions and ecotoxicological dangers, as well as its remediation with biochar [1].

For the health and ecological functioning of ecosystems, including managed and natural ones, the biogeochemistry of soil organic matter (SOM), a highly complex and dynamic soil characteristic, is crucial. SOM, which is primarily made of carbon (C), performs roles in the global C cycling, including C emission and sequestration (e.g. soil respiration). Due to the climate's favorable circumstances for SOM mineralization, Mediterranean agroecosystems in particular are anticipated to see increased SOM decomposition (i.e., C emission) as a result of ongoing global warming and accompanying climatic change and variability (frequent heat waves, fires and extreme water disturbances). Due to their unique physical chemistry (highly charged interface), the relatively stable (humified) SOM components, particularly in the organically-enriched topsoil layers, may play a substantial role in the biogeochemistry of charged (in)organic nutrients.

Around the world, various coffee producing systems make use of shade trees. Shade trees can affect the soil's nutrient status through, for example, litter inputs and nitrogen fixation. These effects go beyond the benefits on biodiversity conservation, climate buffering, carbon sequestration, and disease regulation. There is a potential indirect impact of shade tree species on coffee quality as well, given that soil minerals have an impact on coffee quality and taste. Despite the potential magnitude of the effects of shade tree species, quantitative information on the relationship between shade trees and I soil biogeochemistry and (ii) coffee bean quality is still lacking [3].

According to recent research, under certain soil conditions that make Pb phytoavailable, significant Pb buildup in plants is feasible. The sources and transformations of lead (Pb) in soils, the way Pb interacts with bacteria and in particular the soil microbiota, the causes and mechanisms influencing Pb uptake, translocation, and accumulation in plants, and Pb toxicity in living things are all thoroughly discussed in this review. The key factors influencing the mobility, bioavailability, and toxicity of Lead in soil are specific adsorption and post-adsorption modifications. The composition, characteristics, and environmental factors of soils have a significant impact on Pb's capacity for adsorption. Consideration is given to microbial effects on Pb mobility and bioavailability in soil as well as bacterial resistance to Pb [4].

References

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