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IMPACT OF CLIMATE CHANGE ON SOIL MICROBES

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Introduction

Microbes are essential to all life on Earth, exhibiting huge diversity in form and function. One inch of topsoil contains around one billion individual microscopic cells and around 10,000 different species. These organisms perform many functions and are essential to soil fertility, recycling of nutrients, detoxifying pollutants, regulating carbon storage and controlling the assembly and absorption of greenhouse gases such as methane and nitrous oxides. Soil microbial population influences the key soil functions, thereby directly affecting the value of land.

Climate change associated disturbances can significantly alter soil microbial community and functional profiles (Jansson JK and Hofmockel KS. 2020). If soil carbon and/or nitrogen cycling are affected, this can in turn affect climate change either through positive feedback to the atmosphere (e.g., greenhouse gas emissions) or negative feedback (e.g., carbon immobilization into microbial or plant biomass) (Sulman*et.al.*,2014). Better understanding of how soil microorganisms react to climate change will therefore ultimately improve climate models. However, global climate change can raise several distinct perturbations or maybe compounding disturbances, which may exert contrasting effects on the soil microbes (Jansson JK and Hofmockel KS. 2020). Given the uncertainty as to the interaction between different climate change factors, recent studies have begun to incorporate multiple factors in combination (Nguyen *et.al.*, 2019) on soil microbial diversity.

Microbes in soil ecosystem

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Microbes play a significant role by making nutrients that are intimately associated with plant growth and productivity available for uptake by cycling major nutrients such as nitrogen, potassium and phosphorus between organic matter, minerals and the environment. As a component with food webs get associated invertebrates and higher life forms. Providing balance to soil composition through adapting and purifying the chemical components and by detoxifying pollutants.

Response of microbes to climate change

Bacteria and fungi recycle carbon in soils from living and dead plants. Whilst plants are good CO_2 absorbers, it's the activity by soil microbes that determines whether the carbon is stored underground or released back to the atmosphere(Smith, 2008). Different types of microbes produce and consume major greenhouse gases. More than 3 times the maximum amount carbon is stored in soil than within the atmosphere. Temperature rises are predicted to increase bacterial respiration, leading to release of CO_2 and methane into the atmosphere and thus microbes serve as indicators of temperature variability and thus moderate the climate change process.

Climate change may be a hot topic and heating may be a big concern. Microbes are involved in many processes, including the carbon and nitrogen cycles and are liable for both using and producing greenhouse gases like CO_2 and methane(Lal R,2004). Microbes can have positive and negative responses to temperature, making them a crucial component of global climate change models. The role of microbes in global climate change can't be ignored. They play an important role as both users and producers of greenhouse gases. Both natural and human-induced fluxes of carbon dioxide, methane and nitrous oxide are dominated by microbes.

Conclusions

Microbes has the potential to greatly improve our understanding of how soil interactions affect above-ground ecosystems. Climate change exert considerate microbial influence on soil carbon storage, other greenhouse gases and the balance of carbon in relation to bioenergy crops. Hence, climate scenarios may have impact on microbial populations in soil with many potential consequences, also as loss of soil carbon; changes in soil-borne greenhouse emission levels; and alterations to the important plant-soil responses resulting in soil fertility.

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