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Effects of Climate Change Onmicrobial Diversity and its Interaction with Plants

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Abstract: Global climate change is directly affecting to every living organism onthe planet earth. It is well demonstrated that drastic change in biosphere may be due to the changing climatic conditions and influencing the alteration in plant microbe interactions and agricultural practices for sustainable development.Moreover, the global climate change also directly affectingthe agricultural crop production and thestructural dynamics of the relationships amongdiseases and crops.There are variety of physiological functions of plants that is supported by microbes likes biogeochemical cycles, phosphate solubilization, siderophore production etc. can be affected due to climate change.

INTRODUCTION

Microbes are residing in every part of the environment such as aquatic and terrestrial habitat. Soilmicroorganisms play pivotal role in regulation of biogeochemical cycling, ecosystem functions and services (Conant *et al*., 2011). Earlier researcher explored that temperature may potentially involveand influence the metabolic activity and development of various microorganisms (Bradford *et al*., 2010). Additionally environmental factor, precipitation is an important for enhancing the microbial activity when droppingover the dried soils (Austin*et al*.,2004;Li*et al*.,2018).Duetocontinuous increasing temperatureit is possible that moisture content of water is expected to decrease in some areas and consequently create drought situations in different areas of the world. The continuous changing environmentalconditions is affecting by and largethe plant andmicrobes interactions in the soil ecosystem adversely. Owing to the changing environmental condition, the physiological activities of the plant are also little bit changed. They possess inherent potential to choose different pathways in order to complete their life cycle for their better metabolic activity andsurvival. It is demonstrated that under warming condition,the plants are able to sprouting out and shows early stage of flowering in the growing season (Cleland *et al*., 2007, Wolkovich *et al*., 2012). It is assumed that change in climatic condition may alter the root phenology and plant-rhizosphere interactions (Iveresen *et al*., 2015).

The plant growth-promoting microorganisms having potential to colonize inside and nearby areas of the rhizosphere. The soil directly attached with the root surface are impacted by root exudates released by microorganisms along with population density of the microorganisms (Lugtenberg and Kamilova, 2009). It is reported that some microorganisms survive and penetrates through the rootand rhizosphere of the host plants and promote the metabolic activity as an endophyte. Plant growthpromoting arbuscular fungi such as arbuscular mycorrhizae, ectomycorrhizae, endophytic fungi and plant growth-promoting rhizobacteriaare the group of microorganisms that promotes and help in growth of crop plant for sustainable agriculture. These microbes are majorly exploited as a biocontrol agent against variety of phytopathogens, potential biofertilizers, phytostimulators in agriculture

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as well as for decontamination of contaminated environment (Lugtenberg and Kamilova,2009) These important mechanisms adopted by the microorganisms in soil microbiota is adversely affected by altered environmental conditions.

There are several greenhouse gases like CO_2 (Carbon dioxide), CH_4 (Methane), O_3 (ozone), N-O (Nitrous oxide), Chlorofluorocarbon, etc. and heavy metals such as Cd, Pb, and Hg are the factors which interfere the interaction among the plant and microbes. This chapter mainly focussed on the impact of environmental pressure on the interaction of microbes with the plant.

EFFECT OF TEMPERATURE ON PLANT-MICROBIALINTERACTION

Currently it is reported that temperature plays pivotal role in plant growth and phenological characteristics along with their distribution and presence of microbial population in specific community (Sharma *et al.*, 2022). The increase in average temperature of the planet earth may directly influences themorphology of the different crop plantsIt is estimated by earlier researches that global warming could have a direct impact on microbial respiration rates present in the roots and rhizosphere (Classen *et al.*, 2015).

The global warming may occurs due to increase influx of greenhouse gases and afterward temperatures enhancement, ozone levels also impact the structural composition of microbial communities and its functional dynamics, which directly or indirectly influence the further co-evolution of plants and their pathogens (Singh *et al.*, 2019). It is predicted that slight changes in soil moisturemay shows shiftingof fungal community from one dominant member to another whileno change in bacterial communities were observed.

CONCLUSION & FUTURE PERSPECTIVE

An organism from unicellular to multicellular residing on planet earth is directly or indirectly influencedbychangingenvironmentalconditions. Microbes having beneficial properties could be useful and can be exploited for the improvement of agricultural crop plants insustainable manner. Moreover, the variety of microbeswhich is associated with plant using indigenous mechanisms they surviveagainstbiotic and abiotic stresses. It is investigated that some of the indigenous microbial communities plays a role model for maintaining the plant health. Hence, it is vital to exploit and promotebeneficial microbial communities. It is warranted that concerted efforts in research are neededto explored the effects of climatechange on microbial communities through an experimental studies.

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