Editorial

SOIL BIOLOGICAL HEALTH VIS À VIS CLIMATE CHANGE MITIGATION

Extreme weather events like severe droughts and floods have become much more often in recent years, which has an impact on both national and international staple food crop availability as well as farm output. Being an agrarian nation, India is also vulnerable to stress caused by the climate. Wide variations in the environmental conditions though encourages cultivation of a variety of crops in India, it also makes mainstays like rice and wheat more vulnerable to climate effects. Considering the projections on global temperature rise by 1.5°C to 2.0°C by 2050, it is imperative that India should implement strong climate-resilient agriculture (CRA) policies in all of its agroclimatic zones so as to reduce emissions from agriculture systems, promoting soil carbon (C) sequestration, building resilience of agro-ecosystem and adaptation of farming communities. As per reports, soil C accounts for 25% of the potential natural climate solutions (a total of 23.8 Gt of CO_2-equivalent annually), of which 60% is for replenishing depleted stocks and 40% for protecting current soil C. Forests have a 9% mitigation potential, wetlands have 72%, while it is 47% for agriculture and grasslands. Also, soil C plays a significant role in improving human as well as environmental health.

Given that microbial diversity, abundance, and activity determine the sustainable productivity of agricultural lands, soil microbes play a critical role in supporting soil C sequestration, ecosystem resilience against nutrient mining, degradation of soil and water resources, and greenhouse gas emissions, all of which have a greater impact on agriculture. Besides, interactions between microbes and plant roots in the rhizosphere promote a variety of plant growth-promoting tasks, such as fixing, mineralising, solubilising, and mobilising nutrients; producing siderophores, antagonistic substances, and antibiotics; and releasing hormones that promote plant growth, like auxin and gibberellin. Consequently, there is a growing demand for CRA intervention in order to utilize the ability of soil functional biodiversity to boost food production and maintain ecological functioning. Also, it has recently become apparent that microbial acclimation which entails physiological changes within the microbial population that ultimately alter microbial carbon use efficiency (CUE) is a key factor in predicting changes in SOC. Since organic carbon transformed into microbial biomass and necromass is essential for long-term SOC stabilization, microbial CUE is known to have significant effects on SOC storage in soils. Thus, using microbial technology for climate change adaptation and mitigation demands a thorough understanding of the microbial ecology and soil–plant–microbe interactions in a changing climate situation.

Current issue of *Harit Dhara* covers topics on various tools and techniques on soil health, soil microbes, soil carbon and climate change mitigation, and government initiatives for waste management in India.

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