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Editorial
Microbial Diversity-Sustaining Earth and Industry

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Microorganisms are responsible for diverse metabolic functions that affect soil and plant health. Nutrient cycling, organic matter formation and decomposition, soil structure formation, and plant growth promotion are among the beneficial functions that bacteria perform. Deleterious effects include plant disease promotion. Bacterial functioning is critical to soil and plant health. Microbial diversity is an addition sum of the studies on genetic, taxonomic commercial, and ecosystem aspects of living systems. All the living individuals of a species contain a distinct combination of genes, and the intrinsic interaction among the gene pool influences evolution, survival, and phenotypic/genotypic changes of the part of the biodiversity, that is, community. The amount of genetic diversity within population varies tremendously, and much of modern conservation biology is concerned with the maintenance of genetic diversity within the population of plants, animals, and microbes. Germplasm, obtained with the vast biodiversity, provides a major source of biological material for the development of medicines, vaccines, pharmaceutical products, improved crop, and animal varieties and for other environmental applications. Industrialized nations, who have the technology and resources to patent and develop commercial biological products, are having the benefits of biodiversity through the collected and conserved germplasm flowing through the international research centers. In fact, a particular genetic contribution usually represents only a small percentage of the total value of the eventual products.

This special issue contains seven papers, where two papers are related to pyrene mineralization and bioremediation and two papers cover the microbial role in root colonization and seed germination. These papers are regarding photosynthetic biofilms, microbial dynamics, and endospores forming bacteria in industrial food processing.

In the first paper entitled "*Effects on Glomus mosseae root colonization by Paenibacillus polymyxa and Paenibacillus brasiliensis strains as related to soil P-availability in Winter wheat,*" V. Arthurson et al. present plant growth promoting rhizobacteria (PGPR) of the genus *Paenibacillus* under phosphate P-limited soil conditions in the presence or absence of the arbuscular mycorrhizal fungus (AMF) *Glomus mosseae*. Mycorrhizal root colonization, plant growth, and plant uptake of phosphorus were analyzed. Bacterial phosphate solubilization was examined separately *in vitro*, AMF root colonization levels and total plant uptake of P were much stimulated by the addition of most of *P. polymyxa* strains.

In the second paper, "*Isolation and identification of pyrene mineralizing mycobacterium spp. from contaminated and uncontaminated sources,*" C. W. M. lease et al. present *Mycobacterium* isolates obtained from PAH-contaminated and -uncontaminated matrices which were evaluated for their ability to degrade three-, four-, and five-ring PAHs. PAH enrichment studies were prepared using pyrene and inocula obtained from manufacturing gas plant (MGP) soil, uncontaminated agricultural soil, and faeces from *Macropus fuliginosus* (Western Grey Kangaroo). This paper demonstrated the ubiquity of *Mycobacteria* spp. in soil environments with the ability to degrade PAH. This observation points to the broad exposure of organisms to aromatic compounds such as lignin and tannins as a plentiful carbon source in a diverse range of soil systems.

In the third paper, "*Growth of photosynthetic biofilms and Fe, Pb, Cu, and Zn speciation in unsaturated columns with calcareous mine tailings from arid zones,*" J. V. García-Meza et al.

present photosynthetic biofilms that may act as a physical barrier against oxygen diffusion. The presence of biofilms may provide chemical gradients and physical conditions that shift the proportion of Fe, Cu, and Zn originally associated with oxides to carbonates and organic matter/sulfide fractions. Consequently, the photosynthetic biofilms represent an excellent opportunity for mine tailing remediation and stabilization of mine tailings by applying ecological succession theories, that is, colonization through autotrophic pioneers, which also could be applied to the pollution and remediation of alkaline soil.

In the fourth paper, "*Comparative bioremediation of crude oil-amended tropical soil microcosms by natural attenuation, bioaugmentation, or bioenrichment*," V. M. Alvarez et al. present that bioremediation is an efficient strategy for cleaning up sites contaminated with organic pollutants and evaluated the effectiveness of monitored natural attenuation, bioenrichment, and bioaugmentation using a consortium of three actinomycetes strains in remediating two distinct typical Brazilian soils from the Atlantic Forest and Cerrado biomes that were contaminated with crude oil, with or without the addition of NaCl. They also proposed that monitored natural attenuation was considered the most cost-effective approach for bioremediation of the tropical soils when an oil spill occurs.

In the fifth paper, "*Relationships among contrasting measurements of microbial dynamics in pasture and organic farm soils*," S. L. Edenborn et al. present that soil bacteria exhibit short-term variations in community structure, providing an indication of anthropogenic disturbances. Microbial biomass carbon (MBC), potentially mineralizable nitrogen (PMN), community level physiological profiling (CLPP), and culture-dependent DGGE (CD DGGE) fingerprinting of the 16S rRNA gene were used to compare microbial communities in organic farm and pasture soils subjected to differing agronomic treatments. All measures separated soil types but varied in their ability to distinguish among treatments within a soil type. Overall, MBC, PMN, and CLPP were most responsive to compost and manure amendments, while CD DGGE resolved differences in legume cropping and inorganic fertilization. They also proposed hypothesis that culturable soil bacteria are a responsive fraction of the total microbial community, sensitive to agronomic perturbations and amenable to further studies aimed at linking community structure with soil functions.

In the sixth paper, "*Mycoflora in exhumed seeds of Opuntia tomentosa and its possible role in seed germination*," M. E. Sánchez-Coronado et al. present that the funicular cover of the *Opuntia tomentosa* seed limits imbibitions; germination occurs only when the funicle is weakened or the funicular valve is removed. The mycoflora present on disinfected and nondisinfected exhumed seeds suggests that the fungal colonization occurred in the soil and differed between the burial sites. Exhumed seeds with and without a valve germinated in high percentages, whereas only the control seeds without a valve germinated.

In the seventh paper which is a review article on "*The im- portance of endospore-forming bacteria originating from soil for contamination of industrial food processing*", M. Heyndrickx presents that specific endospore formers have become important contaminants in industrial food processing. The direct or indirect soil route of contamination or dispersal is the start of events or processes in the agro-food chain that eventually leads to important problems or concerns for food safety and/or quality. Three important food sectors are discussed in this paper: in the dairy sector, fruit juice industry and in the ready-to-eat food sector, with respect of endospore-forming bacteria and its contamination.

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