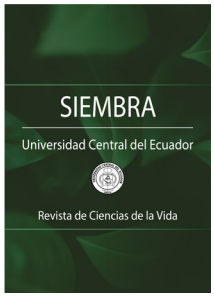
Dossier: Soil and microorganisms



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The soil plays an essential role in the many processes that occur on our planet and make life possible. Within this system there exists an incredible diversity of microscopic organisms—such as bacteria, fungi, algae, and protozoa—that actively participate in key processes. These microorganisms are involved in the decomposition and transformation of organic matter, in nutrient and water cycles, and they contribute to the formation, structure, and stability of soils and ecosystems. The importance of soil microorganisms is indisputable when it comes to fertility, carbon sequestration, and the balance of ecosystems. Their role is even more crucial in the current context, where it is urgent to promote sustainable agriculture that can improve health and food security under the pressures of the climate change crisis.

The knowledge, study, and proper use of soil microorganisms will not only enable more efficient management of natural resources but also open possibilities for restoring natural and agricultural ecosystems degraded by anthropogenic activities. In addition, they can help reduce dependence on chemical fertilizers that threaten biodiversity, while fostering more environmentally friendly agricultural practices. Overall, the soil serves as an inexhaustible source of microorganisms with potential applications in the food sector, medicine, and environmental remediation—fields that are of great importance given the current deterioration of natural resources. These microorganisms, whether through direct use or through products derived from their biological activity, offer innovative solutions to address contemporary challenges, contributing to human health, environmental sustainability, and food security.

For the *Facultad de Ciencias Agrícolas, Universidad Central del Ecuador* (Faculty of Agricultural Sciences, Central University of Ecuador) and associated institutions, it is a great honor to present, in this special edition of *Siembra*, the contributions of academics and researchers in areas related to soil microbiological resources, fully aware of their global relevance. The topics addressed in this edition include the management of the rhizosphere to optimize yield, microorganism-assisted environmental remediation, characterization of soil microbial communities, the study of microorganisms that promote plant growth and their manipulation for yield enhancement, symbiotic associations between microorganisms and plants, microorganisms from extreme habitats, and

the impact of soil microorganisms on the various challenges caused by climate change. These areas of study focus on the conservation of natural resources and biodiversity, both of which are crucial for securing a sustainable future.

The research and dissemination of advancements in this field will not only contribute to improving agricultural production but also to strengthening ecosystem resilience in the face of climate change and human-driven environmental degradation. Therefore, the study, efficient use, and protection of soil microorganisms emerge as key factors to guarantee human well-being and the long-term sustainability of our planet. It is fundamental to recognize the value of these microbial allies in advancing toward a development model that respects and preserves natural resources while offering innovative and effective solutions for food production, human health, environmental protection, and the restoration of degraded ecosystems worldwide—an endeavor that requires the commitment of all.

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Guest Editors