

Publication

Soil biota in a megadiverse country: Current knowledge and future research directions in South Africa

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Soils are integral to agricultural productivity, biodiversity, and the maintenance of ecosystem services. However, soil ecosystem research depends on foundational biological knowledge that is often missing. In this review, we present a comprehensive, cross-taxa overview of the soil biota of South Africa. We discuss the literature and sampling methods used to assess soil biota, the available taxonomic expertise and main collections within South Africa, the availability of identification guides and online resources, and the status and distribution of described species. We include species lists for all South African soil biota and, for groups with sufficient distribution records, species richness maps. Despite South Africa being only 0.8% of the earth's terrestrial area, it contains nearly 1.8% of the world's described soil species (mean per taxon 3.64%, range 0.17–15%; $n = 36$ groups), with nematodes and earthworms showing a remarkable (6.4 and 7.7%) proportion of globally described diversity. Endemism is high for most groups, ranging from 33–92%. However, major knowledge gaps exist for most soil biota groups. While sampling has been relatively comprehensive in some areas for a few groups (particularly those with direct socioeconomic impacts), the Nama-Karoo, Northern Cape and Eastern Cape are poorly sampled. Natural soils in biodiversity hotspots, such as the Fynbos Biome, are also understudied. We argue that a more integrative approach to acquiring foundational knowledge in soil biodiversity is needed if applied soil research is to be effective in ensuring sustainable soil health. Considerable investment will be required to bring our understanding of the soil biodiversity in this megadiverse region to a level where the Millennium Development Goals can be reached.

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