

IOCBI

2026
Conference

The 1st International Online Conference on Biology

10–12 February 2026 | Online



Program and Abstract Book

sciforum-156600: Fungal Diversity and Community Structure in Soils of High-Altitude Ecosystems of Sathyamangalam, India

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The Sathyamangalam region, straddling the transitional zone between India's Western and Eastern Ghats, represents a unique, high-altitude (above 4000 feet MASL) biogeographic area critical for biodiversity. Fungi, as key drivers of decomposition, nutrient cycling, and plant health, are integral to this ecosystem's function. This study aimed to characterize the soil fungal communities across different habitats and elevations within this ecologically significant landscape. Environmental DNA (eDNA) was analyzed using fungal ITS metabarcoding, sequenced in Illumina 250 bp paired-end chemistry and the QIIME2 pipeline, with taxonomic assignments based on the robust UNITE database. Sequencing yielded a total of 417,612 quality-filtered reads across six samples studied, resulting in a high observed diversity ranging from 1,047 to 1,460 Operational Taxonomic Units (OTUs) per sample (Total OTUs: 7495). The communities were rich in key functional groups, including dominant saprotrophic (*Penicillium*, *Aspergillus* and *Mortierella*) and the mycorrhiza of both ectomycorrhizal and arbuscular mycorrhizal fungi. The identified species sequences are publicly available via NCBI GenBank Accession Numbers (PQ523512-PQ527698). Crucially, taxonomic annotation indicated the potential presence of new species records for India, and a notable fraction of reads identified only at the Phylum level suggests significant novel fungal diversity new to science. Many of the sequences are simply identified as they belong to Kingdom Fungi stating their distribution as Dark Taxa. Community composition varied significantly, reflecting differences between the distinct Western and Eastern Ghats ecosystems. This high-resolution inventory provides a vital baseline for the high-altitude soil mycobiota of Sathyamangalam. The observed species richness and identification of potential novel fungal diversity underscore the ecological complexity of this transitional zone and highlight its importance for fungal biogeography and conservation.



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