

Keynote Speech

The Remarkable Potential of Fungi

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Abstract

Fungi are a relatively understudied group yet an essential, charming, and valuable group of organisms with an implausible biotechnological potential for industrial applications. Because of fungi's cosmopolitan habitats and the need to compete against various other fungi, bacteria, and animals, various survival mechanisms have been developed in fungi. Fungi have various potential uses, but their potential application research is poorly supported overall. On the other hand, many of the studies carried out in academic fields are fundamental, even in biotechnology and applied mycology. Despite the obvious benefits to ecosystems, it has been found to be one of the reasonable answers to alleviate the world's food hunger by providing various nutritional and medicinal benefits. Today, secondary metabolites extracted from fungi are used as vital drugs, however, there is a huge gap in the research field. The fungi have significant potential to give countless medicinal values, and could be the place to find answers to many incurable diseases. Nevertheless, fungi are at great risk all over the world, due to human colonization and other interconnected effects, thus efforts should also be made to protect this gifted kingdom.

Keywords: Anticancer agents; Antimycotic drugs; Endophytic fungi; IUCN red list; Mushrooms; Nutrient cycling

Tremendous diversity

Fungi are known to be among the most diverse group of organisms, including microscopic, single-celled yeasts, and aquatic chytrids to macroscopic multicellular mushrooms and lichenized fungi (Devkota *et al.*, 2023). The presence of fungi is universal; even they can be habited in harsh environments such as in Antarctic glaciers, deserts, the bottom of the deep ocean, and inside the gut of animals (Naranjo-Ortiz, & Gabaldón, 2019). The diversity of fungi is unbelievable, and their presence in an ecosystem is closely linked to the levels of animal and plant diversity (Buckley, 2008). Signifying more, in a forest often fungal diversity far exceeds that of tree diversity (Tedersoo *et al.*, 2016). Recent molecular-based understanding revealed much more on fungi diversity, helping to resolve taxonomic confusion, thus it is now expected that the distribution of 11.7–13.2 million species of fungi worldwide, which is up to fivefold from the previously predicted number of 2.2–3.8 million (Antonelli *et al.*, 2020; Hawksworth & Lücking, 2017). Nevertheless, the findings of those magnificent organisms are far behind; as of 2023, around 155,000 species only have been recorded (Index Fungorum 2020, 2023) and described by taxonomists (Antonelli *et al.*, 2020).

Fungi as service providers

Why we should pay attention to those organisms is a worthy question to ask. Fungi, particularly those that affect soil-based processes, have the ability to affect almost every aspect of ecosystem function. The decomposition of organic matter is one of the foremost services that they do, on the one hand, it