

Current insights into the diversity and BCG applications of fungi

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ABSTRACT:

Fungi are a diverse and fascinating group of organisms including the seen mushrooms and unseen microorganisms. They are ecologically essential for nutrient cycling, because of their ability to degrade cellulose and lignin in wood and leaves. Fungi are bio-circular green economically (BCG) useful group of organisms with immense biotechnological potential for industrial exploitation. Fungi exhibit diverse life-styles in nature. Many species exist as symbionts with plants and promote plant growth. Plant pathogenic fungal species cause major yield losses, and are thus of considerable agricultural and quarantine importance. The estimated numbers of fungi always change, and the actual numbers are debatable and poorly understood. The recent realistic estimate of fungal numbers is between 2.2 and 3.8 million. There are nearly 150,000 accepted species of fungi and fungus-like taxa, which is between 2.6 and 4.5% of the estimated species. Currently, in 2022, 20 Phyla of fungi were reported. Possible reasons for the observed discrepancy can be due to fungi being poorly studied in many countries, regions, and hotspots. For example, the fungi of Thailand have been studied by various researchers using polyphasic approaches and many novel fungi have been inventoried, but much work remains. Scientists and researchers all over the world conduct diverse studies ranging across ecology, traditional taxonomy, phylogenetics, evolution, microbial communities and chemotaxonomy. Taxonomy is crucial to understand the diversity of life through the exploration and discovery of fungi. The taxonomy of microorganisms, especially fungi, is challenging due to their extreme diversity in terms of morphological features. Therefore, it is crucial to take advantage of integrating different aspects of fungi, in other words, a polyphasic approach including morphology, phylogeny, evolutionary relationships, and chemotaxonomy to study and identify fungi. Additionally, the improvement in technology and the economic accessibility of molecular techniques, such as next-generation sequencing, have contributed tremendously to the identification of unknown fungal diversity. The high number of fungal taxa would warrant a high number of BCG applications for future exploitation.