Research & Reviews: Journal of Biology e-ISSN: 2322-0066

Fungal Organisms and their Significance in the Field of Biology

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Commentary

Received: 28-Nov-2022, Manuscript No. JOB-22-79327; **Editor assigned:** 02-Dec -2022, Pre QC No. JOB-22-79327(PQ); **Reviewed:** 16-Dec-2022, QC No. JOB-22-79327; **Revised:** 23-Dec -2022, Manuscript No. JOB-22-79327 (R); **Published:** 30-Dec-2022, DOI: 10.4172/2322-0066.10.7.004.

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DESCRIPTION

Fungal Physiology refers to the nutrition, metabolism, growth, reproduction and death of fungal cells. It also generally refers to the interaction of fungi with biotic and abiotic surroundings, including cellular responses to environmental stress. The physiology of fungal cells impacts significantly on the environment, industrial processes, and human health. In relation to ecological aspects, the biogeochemical cycling of carbon in nature would not be possible without fungi, and this acts as primary decomposers of organic material. Furthermore in agricultural operations, fungi plays an important role as mutualistic symbionts, pathogens and saprophytes where they mobilize nutrients and affect the physiochemical environment or they can be exploited as agents of biofertilizers.

Fungal metabolism is also responsible for the detoxification of organic pollutants and for bio-remediating heavy metals and other recalcitrant chemicals in the environment. The production of many economically important industrial commodities relies on the exploitation of yeast and fungal metabolism and includes products as whole foods, food additives, enzymes, fermented beverages, antibiotics, probiotics, pigments, pharmaceuticals, biofuels, vitamins, organic and fatty acids and sterols. More negatively, fungi can cause considerable disease, spoilage and decaying of the important artefacts, related to food.

In terms of human health some yeasts and fungi represent major life threatening pathogens while others are life savers as they help in manufacturing antimicrobial and chemotherapeutic agents. In modern biotechnology several types of yeast species are being exploited as hosts for the expression of therapeutic proteins following recombinant DNA and gene editing technologies. Recently the application of gene editing usage is leading to revolution in the fungal genetic engineering. Along with this, an international synthetic biology research consortium called *Sc-2.0* has been embarked on the construction of a completely synthetic version of *Saccharomyces cerevisiae*. This would

represent the world's first synthetic eukaryotic genome. In addition to the direct industrial exploitation of yeast and fungi it is important to note that these organisms usage increasing significantly as eukaryotic cells in biological and biomedical sciences.

This is especially the case that numerous fungal genomes have been completely sequenced and the information gleaned from fungal genomic and proteomics is providing valuable insight into human genetics and heritable disorders. However, knowledge of cell physiology is essential if the functions of many of the currently unknown fungal genes including synthetic ones are to be fully elucidated. It is also apparent that fungi are important organisms for human society, health and well being and that studies of fungal physiology are very pertinent to our understanding and exploitation of this group of microorganisms.

The morphology of yeast and fungal cells are diversified. Most higher fungi are filamentous, yeast grow as unicells and some primitive fungi such as the chytridomycota grow as individual rounded cells or dichotomous branched chains of cells with root like rhizoids for attachment to a nutrient resource. Here we consider the most common growth forms, the filamentous fungi and unicellular yeasts. Yeast and fungi have relatively simple nutritional needs and most species would be able to survive quite well in aerobic conditions if supplied with glucose and ammonium salts, ions and few growth factors. Exceptions to this would include obligate symbionts such as vesicular arbuscular mycorrhizal fungi which require growth of a plant for cultivation.