Journal of Bioremediation and Biodegradation
ISSN: 2155-6199
Li, J Bioremediat Biodegrad 2021, 12:7
Commentary Article
Open Access

A Brief Note on Mycoremediation

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Received: December 08, 2021; **Accepted**: December 22, 2021; **Published**: December 29, 2021

Citation: Li Z (2021) A Brief Note on Mycoremediation. J Bioremediat Biodegrad Open Vol 12:490.

Description

Mycoremediation is a type of bioremediation in which the environment is decontaminated using fungi-based remediation procedures. Fungi have been shown to be a cost-effective, ecologically friendly method of eliminating a wide range of toxins from contaminated surroundings or wastewater. In land, fresh water, and marine ecosystems, these contaminants include heavy metals, organic pollutants, textile dyes, leather tanning chemicals and wastewater, petroleum fuels, polycyclic aromatic hydrocarbons, medicines and personal care products, pesticides, and herbicides. By-products of the remediation process, such as enzymes, edible or medicinal mushrooms, can be valuable resources, making the remediation process even more profitable. Some fungus can help with the biodegradation of pollutants in extremely cold or radioactive situations, when typical clean-up procedures are either too expensive or impossible to utilise owing to the severe circumstances.

With the encapsulation approach, Mycoremediation may potentially be utilised for fire management. Fungal spores coated with agarose in a pellet form are used in this procedure. This pellet is placed on a charred forest substrate, where it breaks down toxins in the environment while also encouraging development.

Pollutants

Fungi may break down a wide range of substances, including medications and perfumes that are generally resistant to bacterial breakdown, such as paracetamol, due to their non-specific enzymes. Products that are hazardous in typical water treatment, such as phenols and colours in wine distillery effluent, X-ray contrast agents, and chemicals in personal care products, can be broken down in a non-toxic fashion utilising Mucor Hiemalis.

Metals

Metal pollution is prevalent because metals are employed in a variety of industrial processes such as electroplating, textiles, paint, and leather. Because the effluent from these enterprises is frequently utilised for agricultural reasons, the metals can infiltrate far away species and people through the food chain, causing rapid damage to the ecosystem. One of the cheapest, most effective, and environmentally benign solutions to this problem is Mycoremediation.

Because many fungi are hyperaccumulators, they can concentrate poisons in their fruiting bodies to be removed later. This is most common among people who have been exposed to toxins for a long period and have built a high tolerance for them.

Organic pollutants

Fungi are among the most important saprotrophic species in an environment because they are effective decomposers. Extracellular enzymes and acids are secreted by wood-decay fungi, particularly white rot, which break down lignin and cellulose, the two major building components of plant fibre. These are organic (carbon-based) molecules with lengthy chains that are structurally comparable to numerous organic contaminants. They do this by utilising a variety of enzymes. Fungi, in addition to marine conditions, are especially successful in the case of Polycyclic Aromatic Hydrocarbons (PAHs), complex organic molecules with fused, very persistent polycyclic aromatic rings. Lignin peroxidase, versatile peroxidase, manganese peroxidase, general lipase, laccase, and occasionally intracellular enzymes, particularly cytochrome P450, are among the ligninolytic enzymes involved in this breakdown.

Pesticides

Pesticide contamination can last for a long time and have a big influence on decomposition and nutrient cycling. As a result, degrading them might be costly and complex. White rot fungi are the most widely employed fungus for assisting in the decomposition of such chemicals, since they include extracellular ligninolytic enzymes including laccase and manganese peroxidase that can destroy large amounts of such components. Endosulfan, imazalil, thiophanate methyl, ortho-phenylphenol, diphenylamine, chlorpyrifos in wastewater, and atrazine in clay-loamy soils are just a few examples.