Aims and Objectives

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Rapid industrial growth has resulted into a considerable increase in the discharge of industrial toxic waste into the environment, mainly in soil and water, which has led to the accumulation of toxic compounds into the environment, causing serious problems. The indiscriminate release of heavy metals into the soil and waters is a major health concern worldwide, as they cannot be broken down to non-toxic forms and therefore have long-lasting effects on the ecosystem and environment. Heavy metals are natural constituents of the environment, but indiscriminate use for human purposes has altered their geochemical cycles and biochemical balance. These results in excess release of heavy metals such as chromium, cadmium, copper, lead etc. into natural resources like the soil and aquatic environments. Prolonged exposure and higher accumulation of such heavy metals can have deleterious health effects on human life and aquatic biota also.

The East Kolkata Wetlands (EKW), known as Dhapa, located on the eastern fringes of Kolkata city is one of the largest assemblages open waste dumping ground having higher concentration of toxic heavy metals release from various sources and mixed with water bodies. These heavy metals are directly or indirectly causing toxic effect to environment and human beings. A high concentration of toxic Cr comes from tanneries located around this area. All these are dumped into Bheri along with the wastewater and the environment polluted day by day. In order to make healthier environment for human beings, there is a challenge to develop an eco-friendly and sustainable process to minimize the hazardous pollutant like heavy metals, nitro aromatics and synthetic dyes from water bodies to build a safer and cleaner environment.

This study attempts to identify specific heavy metal resistant microbial strain for bioremediation, to explore their resistant mechanisms and growth kinetics on metal stress environment. This study also explores the eco-friendly green process to synthesize different metallic nanoparticle and their use in biocatalytic degradation of environmental pollutants like nitroaromatics and synthetic dyes.

The main objectives of this study may be focussed as follows:

1. Isolation, identification and characterization of chromium resistant fungi from tannery effluent and optimization the growth parameters for Cr(VI) reduction.

2. To explore the growth kinetics and morphological alteration pattern of the isolated fungal strain, *Fusarium* sp. MMT1 during biotransformation of Cr (VI) to Cr(III) .

3. Green synthesis, optimization and characterization of nano-gold particle (NGPs) utilizing *Fusarium* sp. MMT1 strain.

4. Green synthesis, optimization and characterization of nano-silver particle (NSPs) utilizing *Fusarium* sp. MMT1 strain,

5. Application of biosynthesized NGPs and NSPs in recyclable biocatalytic reduction of toxic nitro-aromatics and synthetic dyes to establish a cleaner environment.