PROJECT REPORT ON

REMOVAL OF HEAVY METALS BY SALVINIA MOLESTA FROM INDUSTRIAL EFFLUENT COUPLED WITH BIOETHANOL PRODUCTION

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1 Introduction

The increase in population density with industrial development is resulting in the discharge of many synthetic chemicals in the environment. Majority of xenobiotics after deliberate or in advertent release enter in the soil and water. Such foreign molecules are either broken down to simpler forms or remain unaltered for a long time because of their persistent nature posing a great threat to the ecosystem which includes various non target species at the apex of which are the human beings. Xenobiotics are chemicals synthesized by humans that have no close natural counter parts. They include pesticides, plastics and other synthetics [10].

Global industrialization is the main cause of pollution of environment with persistent addition of organic and inorganic wastes. Pollution has become a threat to living organisms. The contaminants enter the environment either by natural processes or through human activity. The natural contamination originates from excessive withering of minerals from rocks or displacement from the groundwater or subsurface layers of the soil. Disposal of industrial effluents, sewage sludge's, deposition of air-borne industrial wastes, mining, land-fill operations, industrial solid-waste disposal and the growing use of agricultural chemicals such as pesticides and fertilizers are sources of human-assisted contamination of the environment [34].

The industrial pollution has spoilt the three wealth of life, namely water, air and soil. The effluents released by printing, tanning, chromo-plating industries are the main cause of pollution of fresh water bodies. There are many industries that may or have contributed to the contamination of water ways by discharging toxic metals into rivers and streams. Mostly the small scale cottage industries do not employ proper effluent treatment releasing the untreated effluents in the nearby areas which is the main cause of the pollution [5].

Heavy metals are metals with a specific gravity greater than about 5.0, especially one that is poisonous, such as lead (Pb), mercury (Hg), chromium (Cr), cadmium (Cd). They can damage living things at low concentrations and tend to accumulate in the food chain. Heavy metals released during industrial

activity form a major portion of the contaminants that accumulate in water bodies. Certain heavy metals have an adverse effect on human and animal life even if present in minute quantities. One of the reasons why the metals are toxic is that they can replace essential metals in pigments or enzymes disrupting their function. Heavy metals have been shown to alter the responsiveness of immune system in the laboratory animals. Heavy metals induced frequent alterations in the function of B-lymphocytes are observed after exposure of the organisms to lead and cadmium. There are also metal induced changes in the T-cells and macrophages. In addition exposure to heavy metals can be better correlated with the impaired resistance of the organisms against the infections rather than the changes in B or T cell functions [25]. The most

common heavy metals found in the industrial effluents are manganese, cadmium, chromium, copper, arsenic, zinc, iron etc. The toxicity of these metals has been known for a very long time.

Some of the main sources of heavy metal in the environment are [16]:

- Municipal and Industrial waste
- Sediment from wastewater treatment plant
- Leachate from solid waste treatment plant
- Mining waste

1.1Chromium

Chromium is a lustrous, brittle, hard metal. Its colour is silver-gray and it can be highly polished. Chromium is unstable in oxygen, it immediately produces a thin oxide layer that is impermeable to oxygen and protects the metal below. Chromium is a naturally occurring element found in rocks, animals and plants [15]. It is found in several forms such as hexavalent chromium which is extremely toxic and chromium III which is non-toxic. Chromium III is essential for breaking down sugar, fat and protein inside an animal's body, thus making it vital for good health [11].

They are potentially employed in leather processing and finishing, in the production of refractory steel, drilling, muds, electroplating cleaning agents,