



ISSN 2278 – 0211 (Online)

## A Study of Heavy Metals in *Mimosa Pudica* Leafs by *Pseudomonas* Fluorescence Degradation of Heavy Metals

**Dhanya K. G.**

Research Scholar, Department of Microbiology,  
Research and Development Centre, Bharathiar University, Tamil Nadu, India

**Dr. M. Thangavel**

Research Supervisor, Department of Microbiology,  
SreeNarayana Guru College, Coimbatore, Bharathiar University, Tamil Nadu, India

### **Abstract:**

Heavy metals are significant to human because some of them are most important trace elements and metals are present in air, water and soil etc. some of them are most important trace elements required co-factor in various metabolic enzymes and constituents of cells. But metal compounds that have the potential to harm human health when absorbed or inhaled, since analytical techniques have made it possible to detect them in even in very small traces by Atomic adsorption spectrophotometry. In this study an attempt has been made to degrade heavy metals using *Pseudomonas* fluorescence. The present study was collecting the leaf samples. The organism *Pseudomonas* fluorescence was isolated and identified from the leaf samples of *mimosa pudica*. The growth of microorganisms in nature as well as in laboratory is greatly influenced by temperature pH, moisture content, available and as well as in the character of other organisms present.

**Keywords:** Heavy metals, *Mimosa pudica*, *Pseudomonas* fluorescence

### **1. Introduction**

*Mimosa pudica* belongs to the family Mimosaceae. *Mimosa pudica* is a creeping annual or perennial herb often grown for its curiosity value, as the compound leaves fold inward and droop when touches and reopen within a minutes. It mainly contains tannins, steroids, triterpenes, alkaloids, glycosides, flavonoids, c-glycoside. An extract of the leaves of *Mimosa pudica* Linn possesses aphrodisiac, antipyretic, antispasmodic, anticancer and diuretic actions sore gum and is used as blood purifier. Roots are used in the treatment of Urinary tract infections, piles and fistula. And pinkish flowers are used as anticancer. In Ayurvedic and Unani system of medicine, this plant has been used in disease arising from corrupted blood, bile, fever, piles, jaundice, leprosy, ulcers, and small pox (White *et al.*, 2002).

Some of them are most important trace elements required co-factor in various metabolic enzymes and constituents of cells. Lead, copper and cadmium form important component of cell. In humans cause problems in the synthesis of hemoglobin, effects in kidney and chronic damage to the nervous system. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO.

#### *1.1. Importance of Soil*

A soil fairly rich in organic matter status will retain most of the residual nutrients and in due course inherent fertility of the soil will be built up appreciably. Although organic manures contain the plant nutrients in small amounts as compared to the fertilizers, the presence of growth promoting principles like enzymes and hormones besides plant nutrients make them essential for improving soil fertility and increasing crop yields. In recent times, the use of organic manures in crop production due to their low availability. The physical and chemical properties of soil & leaf have a predominant role to play on microorganisms. Soil & leaf has so many composed of major components like mineral matter, water, air, organic matter and living population.

#### *1.2. Characteristics of Pseudomonas Fluorescence*

*Pseudomonas* is large group of organisms that are aerobic, non sporing, non-capsulated gram negative bacilli and motile by polar flagella. They are ubiquitous, mostly saprophytic being found in water, soil and other most environments, some of them are pathogenic to plants, insects and reptiles. A few cause human infection, typically opportunistic. Some of them produce water soluble

pigments which diffuse through the culture medium. They are oxidase and catalase positive and produce diffusible or insoluble pigments. *Pseudomonas fluorescence* had drawn a worldwide attention because of production of secondary metabolites such as phytohormones. These had been implicated in reduction of plant pathogenic and harmful rhizo bacteria. Besides these it is also involved in process of nitrogen fixation, phosphate solubilization, inhibition of weeds and production of volatile growth stimulants ethylene (Hassanenin *et al.*, 2009). *Pseudomonas* isolated from soil which can degrade in liquid media (Goessel *et al.*, 1994). *Pseudomonas fluorescence* bacteria indirectly influence the plant health by preventing deleterious effects through production of antibiotics, cell wall degrading enzymes (chitinase, protease) and also degrade heavy metals.

## 2. Materials and Methods

### 2.1. Collection of Samples

Leaf samples were collected from mimosa pudica field located in Agricultural University, Thrissur Kerala.

### 2.2. Isolation

Following steps were involved in isolation of the *Pseudomonas fluorescence*.

### 2.3. Enrichment of Culture

Leaf samples of mimosa pudica were collected from Kerala. A loopful of colonies observed after serial dilution was streaked on to a sterile nutrient agar plate and on the *Pseudomonas* agar media. The plates were then incubated at 37°C for 24 hours. After the incubation; the plates were observed for the growth and colony morphology was studied. The isolated organisms were subjected to gram staining, motility test, biochemical reactions and sugar fermentation tests.

### 2.4. Heavy Metal Detection in Soil

The 0.2g of soil samples was taken in a beaker, 20 ml of Nitric acid (HNO<sub>3</sub>) is added and 5ml of distill water is added and boiled. The white fumes are observed after few minutes 10 ml of perchloric acid was added then boil well and sediments will become white color. After cooling the soil sample, distill water was added then the soil sample was filtered then make up to 50ml then it was calibrated and heavy metal was detected by AAS method.

### 2.5. Degradation of Heavy Metals

The heavy metals copper & lead was detected in leaf samples and 1ppm, 2ppm and 3ppm extracts of leaf extracts of mimosa pudica was degraded by the *Pseudomonas fluorescence*. The results were determined by using the atomic adsorption spectrophotometer (AAS).

## 3. Result and Discussion

The present study was collecting the leaf samples. The organism *Pseudomonas fluorescence* was isolated and identified from the soil samples of *Mimosa pudica*. The growth of microorganisms in nature as well as in laboratory is greatly influenced by temperature p H, moisture content, available and as well as in the character of other organisms present (Burton 1998). Growth of *Pseudomonas* occurs at a wide range of temperature (5 – 42°C) the optimum being 37°C (Ananthanarayanan *et al.*, 1990) *Pseudomonas* sp. grow optimally or near to neutrality. *Pseudomonas* are large group of organisms that are aerobic, non sporing, non-capsulated gram negative bacilli and motile by polar flagella. They are ubiquitous, mostly saprophytic being found in leaf, water and moist environments. A few cause human infection, typically opportunistic.

## 4. Detection of Heavy Metals in Green Gram Leaf Extract

### 4.1. Copper

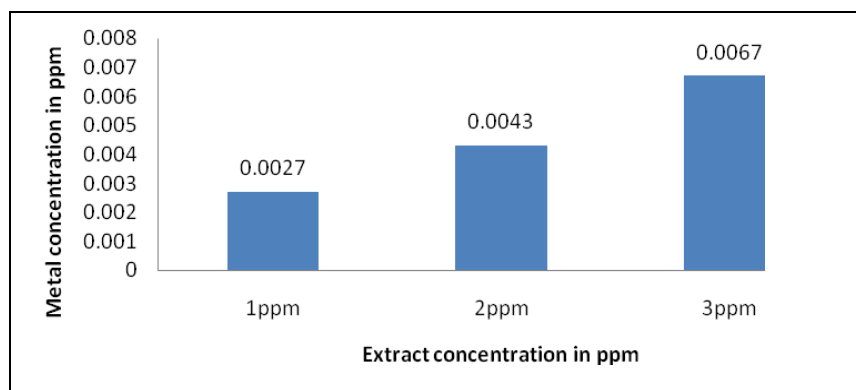


Figure 1

4.2. Lead

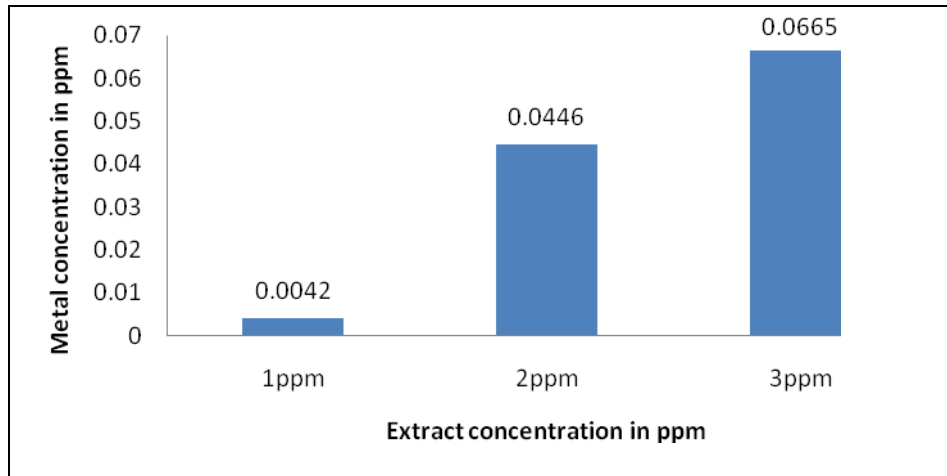


Figure 2

5. Degradation by Pseudomonas Fluorescence in Mimosa Pudica Leaf Extract Sample

5.1. Copper

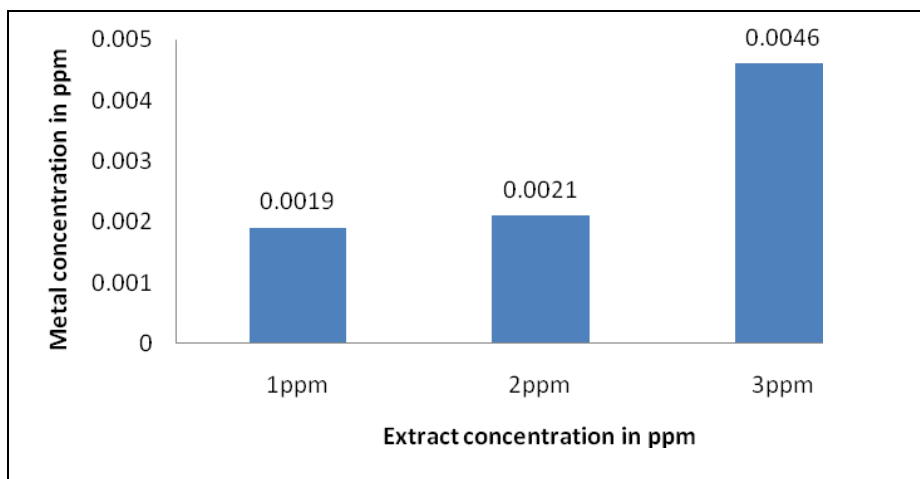


Figure 3

5.2. Lead

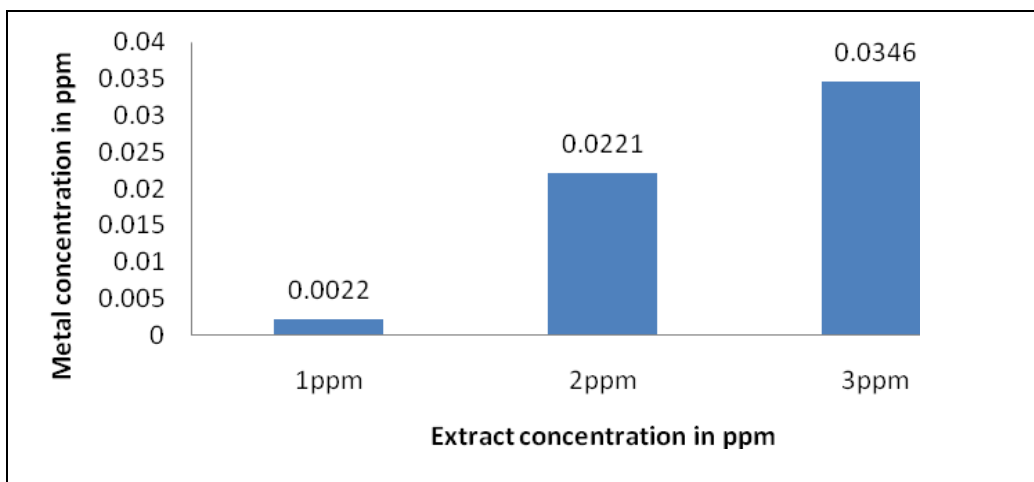


Figure 4

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