Microbiological assessment of drinking water by low cost bioadsorbent derived from wild weed Lantana camara

Dharmendra Singh¹, Surendra Bhati²

¹ Department of Biotechnology, Center for Microbiology & Biotechnology Research institute, Bhopal, MP, India-462003
² Surendra Bhati, Department of Chemistry, HEG, Bhopal, MP, India
Email: dharmendrasingh036@gmail.com, Phone: +91 9098793083

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Abstract
Drinking water quality assessment of kolar dam has always been crucial with reference to public health importance because it supply drinking water many areas of Bhopal. The study was conducted to evaluate the quality of drinking water of kolar dam by bioadsorbant. The samples were analyzed for microbiological parameters and treated with bioadsorbent. After treatment it reduced greatly no. of microbial colony of Ecoli, Pseudomonas and total plate count. The present study shows that the natural Lantana camara powder, an important low cost material, can be used as bioadsorbent for the inhibition of microbial growth. These results indicate a great inhibitory capacity of bioadsorbent and suggest another possible use of this bioadsorbent in water treatment for drinking purpose in industries and many mineral water plants.

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Key words: Bioadsorbent, Lantana camara, water treatment

1. INTRODUCTION
The significance of environmental factors to the health and well-being of human populations is increasingly apparent [1]. Environment pollution is a worldwide problem and its potential to influence the health of human populations is great [2]. Pollution reaches its most serious proportions in the densely settled urban-industrial centers of the more developed countries [3]. The water pollution is major problem of whole world. This is the biggest problems that affect the health of human, animals and plants. In poor countries of the world more than 80% polluted water have been used for irrigation with only 70-80% food and living security in industrial urban and semi urban areas[4]. In all known forms of life continuation, water is an essential substance of the natural sources. The spoilages of the water quality and water’s natural balance in its environment are known as water pollution [5]. The aquatic ecosystem consists of several components which are directly or indirectly affected by pollution [6]. The pollution of a particular water body can always be linked to an industry, sewage or agricultural runoff[7]. Before operating the water refinement facilities in some developed or developing countries, many rivers are being used as a place to discharge urban wastewater. Wastewater is a source of serious public health problems because it contains pathogenic bacteria and toxic substances [8].

Drinking water quality has always been a major issue in many countries, especially in developing countries [9]. The World Health Organization in its “Guidelines for drinking water quality” publication highlighted at least seventeen different and major genus of bacteria that may be found in tap water which are capable of seriously affecting human health [10]. The proportion of waterborne disease outbreaks associated with the distribution system failures has been increasing over the years [11]. Disease-causing organisms (pathogens) transmitted via drinking water are predominantly of fecal origin (and therefore known as enteric pathogens). Since the pioneering epidemiology in the 1850’s, whereby the English physician John Snow established that cholera was waterborne, we have amassed a sound understanding of the transmission of various pathogens that cause diarrhea and other diseases via drinking water [12].

Lantana camara is a significant weed of which there are some 650 varieties in over 60 countries or island groups. L.
*Lantana camara* is a low erect or subscandent, vigorous shrub with stout recurved prickles and a strong odour of black currents; *L. camara* has several uses, mainly as a herbal medicine and in some areas as firewood and mulch [13]. Therefore, this study aims to detect the potential of bioadsorbent derived from the *Lantana camara* a wild weed for the inhibition of Microbial growth in water samples. This study also analyzes the efficiency of bioadsorbent for water treatment.

2. MATERIAL & METHOD

2.1 Sample Collection

Water samples from Kolar dam Bhopal were collected and transported by standard methods as mentioned in APHA, 1998. Random sampling was adopted for the study. Microbiological analysis of water samples was conducted in Center for Microbiology & Biotechnology Research and Training Institute, Bhopal.

2.2 Microbiological analysis

The total plate count was conducted by pour plate technique on plate count agar (PCA) and counting the colonies developed after the incubation at 37°C for 24 hours [14]. The total coli forms and E coli were enumerated by the membrane filtration (MF) technique as described by APHA, 1998. Analysis of sulphate reducing microbes and presence of pseudomonas conducted on differential rein forced agar and asparagine prolien agar medium. Analysis of yeast & mould were done on chloramphenicol glucose yeast agar medium.

2.3 Preparation of Adsorbent

*Lantana camara* leaves were collected from local area of Bhopal. *L. camara* leaves were washed with distilled water to remove impurities dried at low temperature (<120°C) for 48 hrs to remove moisture content. After drying process, *L. camara* leaves were ground to fine Powder and sieved through 600 μ sizes. The adsorbents used in the present research work prepared by treating *L. camara* leaves with concentrated H₂SO₄ followed by heat treatment at 150°C in an oven for 30 hours. The treated leaves wash with distilled water to remove acid and dried at 80°C for 10 hrs [15].

2.4 Batch Experiment

In this experiment 50 ml water sample was stirrer with bioadsorbent on magnetic stirrer at room temperature for 3 hrs. After the treatment microbial analysis of water was done and observed the microbial growth and growth inhibition potential of bioadsorbent. Batch experiment represent in figure 1.

3. RESULT & DISCUSSION

Graph 1and 2 shows that the bioadsorbent derived from the *L. camara* have a great potential for the treatment of water born pathogenic microbes. It shows great inhibitory ability against microbial contaminant of water. It inhibits the growth of fecal microbes like E coli, coli form also. It reduced the no. of microbial colonies from water and make It useful for drinking and many other purpose. To prove the applicability of the bioadsorbent, the data obtained from the bioadsorbent filtration method were analyzed. In treated drinking water, bacteria are exposed to bioadsorbent, and a large proportion...
of the bacterial population became treated. Treated bacteria found in water were unable to form colonies on agar plates.

4. CONCLUSION
Our results demonstrated that the bioadsorbent derived from Lantana camara had the highest inhibitory effect against water-born pathogenic microbes. The present study shows that the natural Lantana camara powder, an important low cost material, can be used as bioadsorbent for the inhibition of microbial growth and water treatment. These results indicate a great inhibitory capacity of bioadsorbent and suggest another possible use of this bioadsorbent in water treatment for drinking purpose in industries.

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6. REFERENCES

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