

Study the Effect of Salinity Stress on Plant Growth

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Abstract: During rainy season it is found that there is lot of contamination in the water which is replicated by change in colour as well as lot of turbidity. The drinking water which is contaminated can be purified successively by using natural resource nothing but Aloe Vera Plant. In this paper, the use of Aloe vera extract to purify dirty drinking water was investigated. Analysis of the heavy metals lead and cobalt were performed before and after treatment of water with the Aloe vera extract. The results showed that Aloe vera extract was capable of absorbing the heavy metals from water samples.

Keywords: Microbiome, Plant Growth-Promoting Bacteria, etc.

I. INTRODUCTION

The botanical name of Aloe vera is *Aloe barbadensis* miller. It belongs to Asphodelaceae (Liliaceae) family, and is a shrubby or arborescent, perennial, xerophytic, succulent, pea-green color plant. The aloe plant has long (up to 20 inches long and 5 inches wide), triangular, fleshy leaves that have spikes along the edges. The fresh parenchymal gel from the center of the leaf is clear; this part is sometimes dried to form aloe vera concentrate or diluted with water to create aloe juice products.

Unsanitary drinking water is a continuing issue in the world [1]. Contaminated water remains an important problem in certain countries, as it is a cause of waterborne diseases. Although some treatments have been found to eliminate certain contaminants, this experiment focused on purifying water from contaminants. It is vital to have access to clean water to meet the basic necessities, to increase the living standard, and to avoid diseases. Fertilizers are used to increase crop production, but the use of these fertilizers has led to contamination of the drinking water [2]. Common contaminants in the water include arsenic, lead, phosphate, copper, cobalt, iron, chlorine, and nitrate [3, 4]. This study identifies aloe vera gel as a purifying agent of water and to remove cobalt and lead metals from water by adsorption.



Lead in water arises from a number of industrial and mining sources and is the most widely distributed of all toxic metals [5]. Lead in water causes serious problems such as anaemia, kidney disease and affects the nervous system [5]. Placental transfer of lead in humans affects babies and young children absorb 4–5 times as much lead as adults [6]. The lead toxicant accumulates in the skeleton and causes adverse health effects and interferes with calcium metabolism and with vitamin D metabolism [7].

However, evidence from studies in humans show adverse neurotoxic effects other than cancer occurring at very low concentrations of lead [6]. Therefore, there is need for the removal of lead from all drinking water. This paper evaluates Aloe vera extract as coagulants and reports an economical and environmentally safe method of water purification. This will show the way to improve the quality of drinking water in the rural areas.

II. EXPERIMENTAL SECTION

2.1 Application of Aloe Vera in Dirty Water Treatment

2.1.1. Aims and Objectives

- Purification of dirty/contaminated water using Aloe vera extract.
- Removal of pollutants nothing but metals such as Cobalt and heavy metals such as lead from contaminated water using aloe vera extract.

2.1.2. Materials

- Aloe Vera Extract
- Dirty/Soiled /contaminated Water
- Beakers
- Stirring Rod
- Standard solutions of lead and cobalt salt solution.
- Conical flask
- Burette with stand

2.1.3. Method

Steps involved

- Put the Dirty/Soiled /contaminated water in the beakers.
- Added a suitable varying amount of the Aloe extract to the beaker.
- Stirred the mixture for about 10 minute and leaved it to settle.
- After that dirt was settled at the bottom of the beaker, the clean water at the top.
- Clean water decanted into the second empty beaker.
- Standardization of lead and cobalt salt solution using volumetric analysis by Vogel.
- Added standard salt solution in water in the beakers.
- Added a suitable varying amount of the Aloe extract to the beaker.
- Stirred the mixture for about 10 minutes.
- After 24 hrs. and 48 hrs., water sample was pipette out in conical flask.
- Metal amount estimation carried out using volumetric analysis by Vogel.

III. RESULTS AND DISCUSSION

3.1. Application of Aloe Vera in dirty water treatment

The Aloe extract attract the dirt (soil, dust, leaves & other impurities) and separate them from water and finally it will settle at the bottom of the beaker.



Figure 1: Dirty water (rainy season) before addition of aloe vera extract

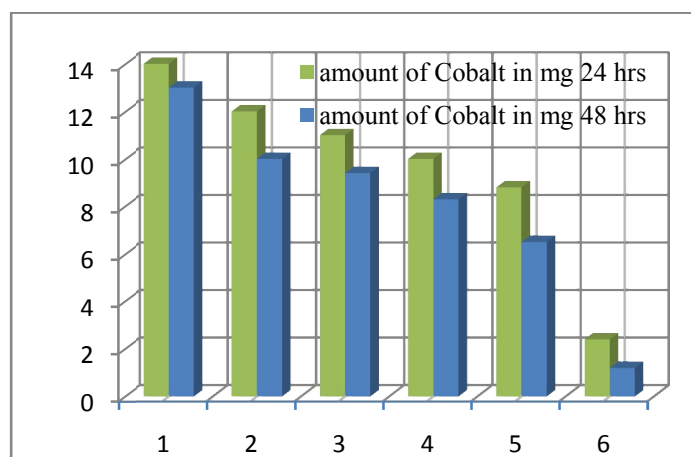
Figure 2: After addition of aloe vera extract in dirty water

3.2. Application of Aloe Vera in Removal of Pollutants

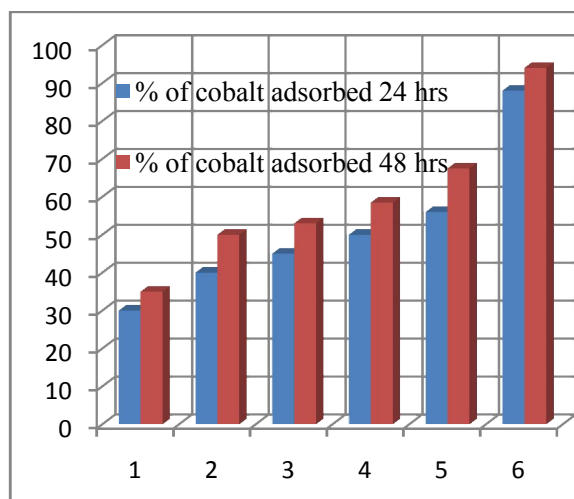
Aloe Vera extract interact with the pollutants and provide surface for adsorption that means it act as an adsorbent. It provides a simpler way to purify contaminated water with natural material.

3. 2.1. (a) Removal of Cobalt Metal

Amount of aloe vera in cm ³	Amount of Cobalt in mg		% of cobalt left		% of cobalt loss	
	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs
1	14	13	70	65	30	35
2	12	10	60	50	40	50
3	11	9.4	55	47	45	53
4	10	8.3	50	41.5	50	58.5
5	8.8	6.5	44	32.5	56	67.5
10	2.4	1.2	12	6	88	94



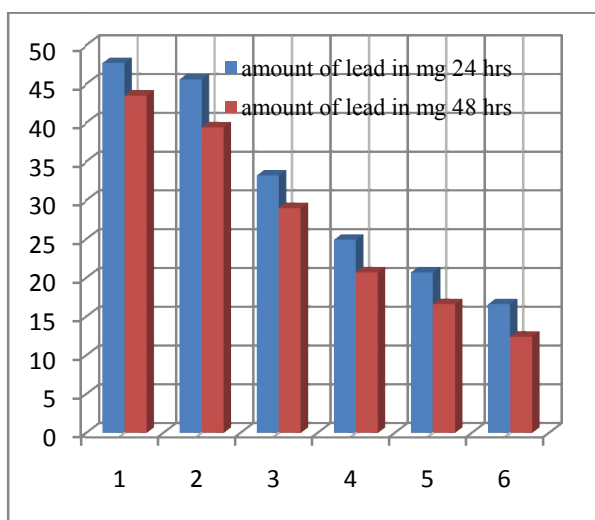
3.2.1. (b) Plot of amount of aloe vera extract against concentration of cobalt



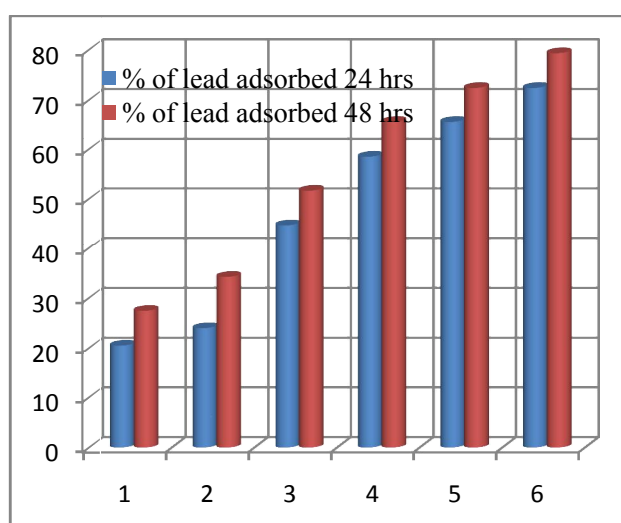
3.2.1. (c) Plot of amount of aloe vera extract against % of Cobalt adsorbed

3.2.2. (a) Removal of Lead metal

Amount of aloe vera in cm ³	Amount of lead in mg		% of lead left		% of lead loss	
	24 hrs	48 hrs	24 hrs	48 hrs	24 hrs	48 hrs
1	47.7	43.5	79.5	72.5	20.5	27.5
2	45.6	39.4	76	65.6	24	34.3
3	33.2	29	55.3	48.3	44.6	51.6
4	24.9	20.7	41.5	34.5	58.5	65.5
5	20.7	16.6	34.5	27.6	65.5	72.3
10	16.6	12.4	27.6	20.6	72.3	79.3



3.2.2. (b) Plot of amount of aloe vera extract against concentration of lead



3.2.2. (c) Plot of amount of aloe vera extract against % of Lead adsorbed

IV. CONCLUSION

- One can easily treat the dirty/soiled/contaminated water using Aloe Vera.
- Aloe vera is good dirt settling agent.
- Dirt settlement in water is independent of amount of aloe vera extract.
- Aloe vera contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids.
- This method and material are very cheap.
- The benefit of this method of cleaning dirty water is the fact that the Aloe plant grows well in dry areas where water scarcity is biting.
- One can easily grow Aloe Vera plants in their own land and use it.
- The Aloe Vera gel reduced cobalt and lead concentrations.
- Aloe Vera doesn't consist of a harmful species with respect to human being.
- Aloe Vera has so many uses in medicinal fields also.

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