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ANTIBACTERIAL ACTIVITY OF EICHHORNIA CRASSIPES, BATHI LAKE, DAVANAGERE, KARNATAKA

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Abstract:

Water hyacinth (*Eichhornia crassipes*) is an aquatic weed infesting rivers, dams, lakes and irrigation channels. The plant has affected the marine environment with billions of shillings being lost yearly in controlling it and also in economic losses. The plant is causing severe hindrances to the individual nation's developmental activities. It clogs waterways making boating, fishing and all other water activities impossible. The plant spreads via the waves from the bay to bay blocking waterways and affecting aquatic life as it takes up oxygen from the water. Owing to its tremendous growth, it has threatened the diversity of local native plants alongside the physical and chemical composition of the aquatic environment. It grows very fast and spreads widely across the water body. However, despite this problem the plant has the potential to be used as a medicinal plant. The primary objective of antibacterial properties of the plant against selected strains of bacteria and determine whether it can be exploited for therapeutic purposes. The plant material for use in the study was obtained from Lake Bathi and identified at Botany Department, Sahyadri Science College, Kuvempu University, Shivamogga. The crude extract of *Eichhornia crassipes* obtained by using hot extraction method. The crude extract was then subjected to antibacterial assay against bacterial isolates such as Salmonella typhimurium, Staphylococcus aureus, and Escherichia coli. The crude extract of the plant portrayed potential antibacterial activities against some bacterial isolates. Escherichia coli showed some level of sensitivity to the crude extract of *Eichhornia crassipes*. However, there was no activity against Staphylococcus aureus and Salmonella typhimurium.

Key Words: *Eichhornia crassipes*, Aquatic Macrophytes, Bathi Lake & Antibacterial

Introduction:

Eichhornia crassipes, an aquatic plant belonging to the family Pontideraceae, is listed as one of the most productive plants on earth and is considered the world's worst aquatic weed[6]. The plant has affected the marine environment with billions of shillings being lost yearly in controlling it and also in economic losses. The plant is causing severe hindrances to the individual nation's developmental activities. It clogs waterways making boating, fishing and all other water activities impossible. Its dense mat covers lakes and rivers, blocking waterways and eventually interfering with the water transport of agriculture products, tourism activities and irrigation of the agricultural fields. The plant can grow fast consuming vast quantities of nutrients that promote its growth over other aquatic species. It has also been uncovered that when the plant dies and decomposes, it releases nutrients to water bodies leading to deterioration of water quality, becoming a threat to human health. It has been shown by the high prevalence of waterborne diseases in regions that have been affected by the plant especially Lake Bathi. It is this challenge that has led to an increased interest in determining whether the plant can be used for economic gains. The medicinal actions of plants are unique to particular plant species or groups are consistent with this concept as the combinations of secondary products in a particular plant are often taxonomically distinct [14]. The chemical components present in the plant have a positive effect on the body in the event of an infection. In this study, the antibacterial activity of *Eichhornia crassipes* obtained from Lake Bathi was determined.

Study Area and Location:

Bathi Lake is situated in the Davanagere district of Karnataka, India. Bathi Lake covers a geographical area of 26.3 Hectors. About 35 percent of lake is occupied by aquatic macrophytes.

Materials and Methods:

Sample Collection and Preparation:

Fresh water hyacinths were collected from Lake Bathi with the help of local people and the identification done at the Department of Botany, Sahyadri Science College at Shivamogga. The root portion was removed and the plant washed thoroughly to free any debris, washed several times with tap, distilled and sterilized water then air dried. The rinsed leaves were dried in an oven at a temperature of 160°C for 1 hour and shade dried. The dried leaves of each plant were ground, using a motor and pestle, to obtain a powered form. The powdered form of these plants were stored in airtight glass containers and protected from sunlight until required for analysis.

Preparation of Crude Extract:

100gms of the air dried and coarsely powdered plant material was exhaustively extracted for about 40 cycles (18 Hrs) petroleum ether in Soxhlet apparatus. The petroleum ether extract was separated and evaporated

under fan. The extracted plant material was then air dried, repacked in soxhlet apparatus and exhaustively extracted with Chloroform for about 20 hrs (40 Cycles) and the above procedure is repeated for the methanol (take 24 hrs to complete 40 cycles).

Thus, obtained extracts were collected separately in clean and dry screw capped bottles, labeled and stored. Thus obtained extract was used to carryout antibacterial assay.

Anti-Bacterial Analysis:

Solvent Used: DMSO
Std. antibiotic used: Ciprofloxacin
Concentrations screened: 50, 100, 200, 500, 1000, 2000µg/ml
Stock Sample Concentration: 20mg/ml
Name of the analysis method: Agar diffusion method

Bacteria Analyzed: *Salmonella typhi*, *Staphylococcus aureus* (MRSA), *Enterotoxigenic Escherichia coli* (ETEC).

Media Used:

Peptone-10 g, NaCl-10g and Yeast extract 5g, Agar 20g in 1000 ml of distilled water Initially, the stock cultures of bacteria were revived by inoculating in broth media and grown at 37ºC for 18 hrs. The agar plates of the above media were prepared and wells were made in the plate. Each plate was inoculated with 18 h old cultures (100 µl, 10-4 cfu) and spread evenly on the plate. After 20 min, the wells were filled with of compound at different volumes. All the plates were incubated at 37ºC for 24 h and the diameter of inhibition zone were noted in mm.

Results and Discussion:

In this study the fractions obtained from petroleum ether, chloroform and methanol extract of *Eichhornia crassipes* clearly showed Antibacterial activity only in Methanol extract against Escherichia coli.

Antibacterial activity of *Eichhornia crassipes* against Staphylococcus aureus (Gram Positive):

S.No	Extracts	Zone of Inhibition in mm						
		50 µg	**100 µg**	**200 µg**	**500 µg**	**1000 µg**	**2000 µg**	**MIC (µg)**
1	Petroleum Ether	0	0	0	0	0	0	NF
2	Chloroform	0	0	0	0	0	0	NF
3	Methanol	0	0	0	0	0	0	NF

Antibacterial activity of *Eichhornia crassipes* against Salmonella typhi (Gram Negative):

S.No	Extracts	Zone of Inhibition in mm						
		50 µg	**100 µg**	**200 µg**	**500 µg**	**1000 µg**	**2000 µg**	**MIC (µg)**
1	Petroleum Ether	0	0	0	0	0	0	NF
2	Chloroform	0	0	0	0	0	0	NF
3	Methanol	0	0	0	0	0	0	NF

Antibacterial activity of *Eichhornia crassipes* against Enterotoxigenic Escherichia coli (Gram Positive):

S.No	Extracts	Zone of Inhibition in mm						
		50 µg	**100 µg**	**200 µg**	**500 µg**	**1000 µg**	**2000 µg**	**MIC (µg)**
1	Petroleum Ether	0	0	0	0	0	0	NF
2	Chloroform	0	0	0	0	0	0	NF
3	Methanol	0	0	0	0	0	4	2000

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