

ANTIBACTERIAL AND ANTIFUNGAL ACTIVITY OF MOUGEOTIA

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ABSTRACT :

The unicellular un-branched filamentous fresh water alga Mougeotia (C. A. Agardh) is interesting due to its vigorous and luxuriant growth in its habitat throughout the year. The present study was undertaken to investigate the antimicrobial tests to ascertain the presence of such compounds that help in widespread distribution of the alga throughout the year and its dominance over other fresh water algal organisms. Antimicrobial test shows the algal extract were more potent against bacteria viz. gram +ve bacteria *Staphylococcus aureus* and gram -ve bacteria *Escherichia coli* as compared to two human pathogenic fungi *Candida albicans* and *Aspergillus niger*.

KEY WORDS : *Mougeotia; Proteins; Antimicrobial, Phytochemical*

INTRODUCTION:

Due to higher photosynthetic efficiency as compared to terrestrial plants, algae also have high growth rates and biomass production. Tropical conditions such as those in India provide favourable environment for the luxuriant growth of these organisms in the nature (Subbaramaiah, 1972; Shrivastava & Odhwani, 1992; Thajuddin & Subramanian, 1992; Thajuddin, *et al.*, 2002; Rajakumar, 2004; Chellappa, *et al.*, 2004; Goyal, 1962, 1964; Bhatnagar and Bhatnagar, 2005; and Bhatnagar, *et al.*, 2008; Makandar and Bhatnagar 2010).

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Mougeotia is free floating filamentous green algae. Being a member of Family Zygnemataceae it shares a taxonomic position with Spirogyra and Zygnema. Mougeotia is abundantly found in the fresh water bodies of Durg region of Chhattisgarh state throughout the year. It richly flourishes in the fresh water ponds to an extent that during maximum part of the year it does not allow any other type of algae to dominate. The alga had presence of carbohydrates, proteins, lipids, alkaloids, sterols and terpenoids but absence of phenols and tannins (Meenakshi, *et al.*, 2014). The present study aimed to identify the characteristics responsible for the vigorous growth and dominance of Mougeotia species.

MATERIALS AND METHODS:

Collection and identification of algae: Mougeotia was collected from three ponds of Durg region in Chhattisgarh state. The identification of alga was done by standard books Prescott (1951), Frisch (1937).

Culture of alga: For developing monoculture the strain were isolated and kept in culture media. The Chu 10 medium with pH 7.6 maintained was found to be most suitable for growth of the algae by providing appropriate light and aeration in tissue culture rack.

Preparation of algal extract: The fresh algae obtained by culturing in synthetic media were isolated, washed thoroughly and shade dried at room temperature and then milled into coarse powder in mortar and pestle.

Antimicrobial activity: The Methanolic extracts of algae were tested for their antibacterial activity by agar well diffusion method. For antibacterial tests the media used was Nutrient agar and for fungal cultures to be tested Potato Dextrose Agar media was used. Amoxicillin was used as standard for the antibacterial tests and col-trimazole was used as standard for the antifungal tests.

RESULTS:

In this study, fresh water green algae Mougeotia extract, was isolated from Methanolic solution by the help of well diffusion method for antimicrobial test and it was analysed that algal extract were more potent against bacteria viz. gram +ve bacteria *Staphylococcus aureus* and gram -ve bacteria

Escherichia coli as compared to two human pathogenic fungi *Candida albicans* and *Asprgillus niger* (Table-1).

Table-1 Antimicrobial test against bacteria and fungi by Methanolic extract of Mougeotia.

Test Microorganisms	Diameter of Zone of inhibition (mm)			Mean value of inhibition zone	Mean value of Standard Drug inhibition zone (mm)
<i>Staphylococcus aureus</i>	11.8	12.3	11.9	12	18
<i>Escherichia coli</i>	14.3	13.8	13.9	14	20
<i>Candida albicans</i>	7.1	6.9	7	7	10
<i>Asprgillus niger</i>	9.8	10.2	10	10	18

Standard : Amoxicillin for Bacteria, Col-trimazole for Fungi

DISCUSSIONS:

The primary metabolites as carbohydrates, proteins and lipids and secondary metabolites as alkaloids, sterols and terpenoids are present in Mougeotia, as it forms an important part of the aquatic ecosystem but, due to absence of phenol and tannin in them significantly shows absence of genes lacking for their metabolism but high amount of protein simultaneously shows rich amino acids required for proteins and body building may involve in antimicrobial activity like antibacterial and antifungal (Meenakashi, et al., 2014).

Antimicrobial tests conducted by methanolic extracts of Mougeotia indicated that although it shows anti bacterial as well as antifungal properties, but by comparing the zone of inhibition formed in the bacterial and fungal infections, they prove to be more potent antibacterial agents and among bacteria they

are more effective on Gram -ve bacteria as *Escherichia coli* than Gram (+)ve bacteria as *Staphylococcus aureus*. The protein present in them may be peptidoglycolytic but, how it plays its role as microbial growth inhibitor is a matter of further work, but it is very interesting *in vivo* where it promote the growth of other algae. It may due to the fact that Mougeotia dissolves the cell wall of bacteria made up of peptidoglycans and chitinous cell wall of fungi due to presence and secretion of Lysozyme or Chitinase but do not consist of cellulase enzyme to break the wall of other neighbouring algae. So other algae shows luxuriant growth near to this organism. Thus, from the present study it can be concluded that this vigorous algae dominate over the water body due to its high potentials and antimicrobial properties.

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