



ANTIMICROBIAL POTENTIAL OF ALGAE

Pratiksha Raghuvanshi, Ph. D.

Department of Botany, S V College Aligarh

Abstract

In present century more attention has been paid in the investigation of fresh water algal diversity in many parts of the world. Efforts were also made on applied aspects of algae. Antibacterial activity of algal extracts on selected bacterial strains was studied. Antifungal activity reveals that selected algae have antifungal potential. The zone of inhibition of all algal extracts against fungi ranges from 4mm to 22mm Maximum zone of inhibition was shown by toluene extract of Spirulina platensis against Aspergillus niger whereas minimum zone of inhibition was recorded by chloroform extract of Cladophora crispata against Penicillium oxalicum. Cold water and hot water algal extracts shows promising antifungal activity. Cold water extract of Cladophora crispata shows antifungal activity against Metarhizium anisopliae, Curvularia lunata and Rhizoctonia solani whereas hot water extract shows antifungal activity against Curvularia lunata and Trichoderma viride. Cold water and hot water extracts of Synechococcus aeruginosus shows antifungal activity against Curvularia lunata and Penicillium oxalicum. Algae contains antimicrobial compounds, these antimicrobial compounds have definite inhibitory effects on pathogenic microorganisms. In all selected algae Chara fragilis and Synechococcus aeruginosus extracted in different solvents shows maximum antifungal activities while Spirogyra jugalis shows minimum antifungal activity against selected fungi. As far as antimicrobial potential of selected algae are concerned from result it is found that selected algae shows maximum antifungal activities than antibacterial activities.

Keywords: *Algae, Escherichia coli, Salmonella, Potential.*



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Discussion and results

Antibacterial Potential of Algae: In order to study antibacterial activity of algae, algal extracts of selected algae Cladophora crispata, Spirogyra jugalis, Chara fragilis, Synechococcus aeruginosus and Spirulina platensis were prepared. The extracts were prepared in different solvents such as cold water, hot water, acetone, chloroform, petroleum ether, ethanol, methanol and toluene. Antibacterial effects of algal extracts were studied on selected bacterial strains such as Escherichia coli, Bacillus subtilis, Pseudomonas aeruginosa and Salmonella typhi by agar well diffusion method. Antibacterial activity of different

extracts of *Cladophora crispata* was studied against selected bacteria. Acetone, chloroform, petroleum ether and toluene extracts shows notable antibacterial activity. The zone of inhibition ranges from 4mm to 15mm. Acetone extract shows minimum inhibition zone against *Bacillus subtilis* while extract in toluene shows maximum zone of inhibition against *Escherichia coli*. Petroleum ether extract shows antibacterial activity against *Escherichia coli* (10mm) and *Salmonella typhi*. Cold water, hot water, ethanol and methanol extracts does not show any inhibitory effect against all bacteria. All algal extracts of *Cladophora crispata* does not show any antibacterial activity against *Pseudomonas aeruginosa*.

Cold water, hot water, ethanol, chloroform and toluene extracts shows antibacterial activity. The zone of inhibition ranges from 6mm to 11mm. Cold water and chloroform extracts shows 6mm zone of inhibition against *Bacillus subtilis*. Hot water extract shows 9mm zone of inhibition against *Escherichia coli* whereas toluene shows 6mm zone of inhibition against *Pseudomonas aeruginosa*. Ethanol extract shows 11mm zone of inhibition against *Escherichia coli*. Acetone, petroleum ether and methanol extracts does not show antibacterial activity. All algal extracts of *Spirogyra jugalis* does not show any antibacterial activity against *Salmonella typhi*. Antibacterial activity of different extracts of *Chara fragilis* was studied against selected bacteria. Cold water, hot water, acetone, petroleum ether and methanol extracts shows antibacterial activity. The zone of inhibition ranges from 4mm to 14mm.

Acetone and methanol extracts shows minimum and maximum zone of inhibition respectively against *Escherichia coli*. Cold water extract shows 7mm zone of inhibition against *Escherichia coli* and *Salmonella typhi*, whereas hot water extract shows 7mm and 8mm zones of inhibition against *Bacillus subtilis* and *Salmonella typhi*. 4mm and 6mm zones of inhibition is recorded against *Escherichia coli* and *Bacillus subtilis* by acetone extract. Petroleum ether extract shows 12mm zone of inhibition against *Bacillus subtilis*. Chloroform, ethanol and toluene extracts does not show any inhibitory effect against all bacteria. All algal extracts of *Chara fragilis* does not show any antibacterial activity against *Pseudomonas aeruginosa*.

Acetone, chloroform, ethanol and toluene extracts shows antibacterial activity. The zone of inhibition ranges from 1 to 12 mm. Acetone extract against *Salmonella typhi* shows 1mm zone of inhibition. 6mm and 8mm zones of inhibition were recorded against *Salmonella typhi* and *Escherichia coli* respectively in chloroform extract. Ethanol extract shows 8mm and

9mm zones of inhibition against *Bacillus subtilis* and *Salmonella typhi*. Maximum zone of inhibition 12mm was recorded in toluene extract against *Escherichia coli*. Cold water, hot water, petroleum ether and methanol extracts does not show any antibacterial activity. All algal extracts of *Synechococcus aeruginosus* does not show any antibacterial activity against *Pseudomonas aeruginosa*.

Antibacterial activity of different extracts of *Spirulina platensis* was studied against selected bacteria. All extracts except chloroform extract shows antibacterial activity. The zone of inhibition ranges from 3mm to 14mm. Minimum zone of inhibition was recorded in acetone extract against *Escherichia coli*, whereas maximum zone of inhibition recorded in toluene extract against *Salmonella typhi*. Cold water and hot water extracts shows 10mm and 5mm zones of inhibition respectively against *Bacillus subtilis*. 11mm and 12mm zones of inhibition was recorded against *Escherichia coli* in petroleum ether and ethanol extracts respectively. Methanol and toluene extracts shows 11mm and 14mm zones of inhibition against *Salmonella typhi* respectively. All algal extracts of *Spirulina platensis* does not show any antibacterial activity against *Pseudomonas aeruginosa*.

Antibacterial activity

- 1 Toluene extract of *Cladophora crispata* against *Escherichia coli*.
- 2 Petroleum ether extract of *Cladophora crispata* against *Escherichia coli*.
- 3 Hot Water extracts of *Spirogyra jugalis* against *Escherichia coli*.
- 4 Ethanol extracts of *Spirogyra jugalis* against *Escherichia coli*.
- 5 Methanol extracts of *Chara fragilis* against *Bacillus subtilis*.
- 6 Methanol extracts of *Chara fragilis* against *Escherichia coli*.
- 7 Ethanol extracts of *Synechococcus aeruginosus* against *Salmonella typhi*.
- 8 Toluene extracts of *Synechococcus aeruginosus* against *Escherichia coli*.
- 9 Ethanol extracts of *Spirulina platensis* against *Escherichia coli*.
- 10 Toluene extract of *Spirulina platensis* against *Salmonella typhi*.

Results: An overall result of antibacterial activity reveals that, selected algae have antibacterial properties. The zone of inhibition of all algal extracts against bacteria ranges from 1mm to 15mm. Maximum zone of inhibition was shown by toluene extract of *Cladophora crispata* against *Escherichia coli* which is followed by 14mm zone of inhibition of toluene extract of *Spirulina platensis* against *Salmonella typhi*. Cold water and hot water extracts of *Spirogyra jugalis* and *Chara fragilis* shows notable antibacterial activity whereas it

has not been found in *Cladophora crispata* and *Synechococcus aeruginosus* extracts. All algal extracts except toluene extract of *Spirogyra jugalis* does not show any antibacterial activity against *Pseudomonas aeruginosa*. In all selected algae *Chara fragilis* extracted in different solvents shows maximum antibacterial activities while *Cladophora crispata* shows minimum antibacterial activity against selected bacterial strains.



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