iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 11 **Issue:** XII **Month of publication:** December 2023

DOI: https://doi.org/10.22214/ijraset.2023.57239

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.538
Volume 11 Issue XII Dec 2023- Available at www.ijraset.com

Antimicrobial and Phytochemistry in Lichens

Dr. Manmohan S. Bhaisare
Department of Botany Late, Nirdhan Patil Waghaye Science Collage Lakhani

Abstract: ***The present study conducted with the antimicrobial and phytochemical properties in Lichen. Lichen product have been used in traditional medicine for accent period. Indian populated Lichen species like, Parmotrema perlatum, Cetraria Islandica, Bryoria fremontil was most widely used liken were chosen for the study. The extract present with Flavonic Glycosides, Saponins, Volatil Oil, Cummarins, Qunine and Carotenoids. The antimicrobial activity come out by agar well diffusion method. The ethyl acetate fraction of Bryoria fremontil and Cetraria Islandica was found to most effective against all bacterial pathogen and fungus phytopathogens. The extract of Cetraria and parmotrema found to be most inhibiting fungal pathogens as compared to bacterial. The Lichen extract tested antimicrobial activity which suggest their use in treatment of various disease caused by microorganism.***

Keyword: ***Antimicrobial, Phytochemical, Lichen.***

I. INTRODUCTION

Since, long period plant have provided a source of inspiration, for novel drug compound. As plant derived medicine have made large contribution to human health [1]. Parmotrema perlatum commonly known as black stone flower. It is used as spice in India. The species occur throught the Temperate, Northern and Southern Hemisphere [2]. Lichen is a symbiotic organism consisting of fungus (mycobiont) and photosynthetic partner (photobiont) which as an alga or cyanobacteria [3]. Lichen flora innumerate 678 species from India, Ceylon and Burma under 116 genera and 40 family. Out of which 447 were from India. In taxonomic revision Roccellaceae and Pertusariaceae family found in India and as Andaman, Nicobar Island [4]. The lichen are extracellular product of low molecular weight crystalized on the hyphae cell wall. Also they are insoluble in water and can be extracted into organic solvent [5]. There is an indication that intake of lichen as natural food was associated with nutritional value and health promoting properties. Lichen extract and active constituents have also been shown to have multiple health benefits [6]. Lichen synthesized a variety of secondary metabolites lichen substance mostly fungal metabolism [7]. Lichen substance include aliphatic cycloaliphatic aromatic and terpenoides component [8]. Lichen product have been used in traditional medicine for centuries and still hold considerable interest as alternative treatment in various part of world [9].

II. MATERIAL AND METHODS

The Lichen were collected from Punam super market Nagpur, the material identify various flora
Book [10, 11] and expert of department of Botany PGDT Science college Nagpur. The air material of lichen where washed under distilled water, cut into a pieces, shade dried and homogenized to fine powdered and store in airtight bottle.

A. Preparation of Crude Extract

Different solvent like Acetone, Chloroform, Hexane, Ethyl acetate, Methanol and Water were chosen for successive extraction based on polarity using soxhlet extraction apparatus and the extract of Lichen were concentrated under reduced presser using rotary evaporator [12].

B. Phytochemical Test

Solvent free extract obtained as above was then subjected to qualitative test for identification of bioactive material of each sample. Slandered phytochemical screening method were adapted to each plant extract. So as to test them for different phytochemical following technique adapted Harborne (1996), Sofowora (1984), Kokate (1994), Evans (2002).

C. Bacterial and Fungal Strain

Authentic culture of Bacteria and Fungi were obtained from NCL, Pune,India and they are used for the antimicrobial activity against the prepared Lichen material.

©IJRASET: All Rights are Reserved

D. Antimicrobial Screening

Agar well diffusion method used for antibacterial testing against the different human pathogenic bacteria [17] like Salmonella Paratypi and Typhi, Staphylococcus aureus, Klebstella pneumoniae Escherichia coli on Mullar Hinton Agar. Similarly the antifungal testing done against different pathogenic fungi like Fusarium oxysporum, F. moniliforme, F. porliferatum, in potato dextrose agar medium. Antimicrobial activity studied by measuring the inhibition zone diameter observed after incubating the media plate at 37 ^{0} c for 24 hours and 27 ^{0} c for 3-4 days for bacteria and fungi species. Results were tabulated in table [18].

Table 1. Qualitative phytochemical analysis of methanolic extract of Lichen.

Phytochemical	Lichen species studied		
	Bryoria	Cetraria Islandica	Parmotrema perlatum
Volatil Oil	+	+	+
Sterol&Triterpene	-	+	+
Saponins	+	+	+
Alkaloids	-	-	-
Glycosides	-	-	-
Flavonic glycosides	+	-	+
Carotenoids	+	+	+
Fatty acid	-	-	+
Polyoses	-	-	+
Polyphenol	-	-	-
Red compound	-	-	-
Quinones	+	+	+
Anthocynosides	-	-	-
Anthracynosides	-	-	-
Coumarins	+	+	+

III. RESULT AND DISCUSSION

From table no. 1, the phytochemical constituents like volatile oil, saponins, coumarins and quinines, present in all the lichen. flavonic glycosides was present in all lichen but absent in Cetraria Islandica and carotenoids absent in Bryoria fremontil.

Table 2. Diameter of inhibition zone of bacteria (mm) (100mg/ml^{-1}) in vitro with crude extract of different lichen.

Lichen	Solvent	S.Paratyphi	S.Typhi	S.aureus	E.coli	k.pneumoniae
Bryoria,frem	Acetone	_	5	_	_	9
	Chloform	5	10	10	5	9
	Hexane	_	_	5	_	5
	Eth.acetat	11	14	13	15	11
	Methanol	5	9	9	_	5
	aqWater	_	5	_	_	_
Cetra.Island	Acetone	_	_	5	4	4
	Chloform	_	_	5	_	_
	Hexane	_	_	_	_	_
	Eth.acetat	_	_	5	_	_
	Methanol	_	_	4	_	_
	aqWater	_	_	_	_	_
Parmo.perlatu.	Acetone	11	_	5	4	_
	Chloform	4	9	4	_	9
	Hexane	4	9	4	_	11
	Eth.acetat	9	5	9	9	9
	Methanol	_	_	_	_	_
	aqWater	_	_	_	_	_

Ethyl acetate fraction of Bryoria fremontil found to be most effective against all the bacterial pathogens. Inhibition zone of bacterial in Bryoria fremontil was 5-15mm. the extract of Parmotrema perlatum was active against all except Cetraria Islandica.

Table 3. Diameter of inhibition zone of Fungi (mm) (100mg/ml^{-1}) in vitro with crude extract of different lichen.

Lichen	Solvent	F.oxisporum	F. moniliformi	F.proliferatum
Bryoria,frem	Acetone	10	15	_
	Chloform	17	10	16
	Hexane	9	12	_
	Eth.acetat	24	15	21
	Methanol	15	12	15
	aqWater	_	_	_
Cetra.Island	Acetone	_	11	12
	Chloform	9	15	14
	Hexane	_	12	17
	Eth.acetat	_	11	9
	Methanol	_	_	_
	aqWater	_	_	11
Parmo.perlatu.	Acetone	19	18	12
	Chloform	13	16	11
	Hexane	12	11	8
	Eth.acetat	16	20	14
	Methanol	9	11	_
	aqWater	_	_	_

Bryoria fremontil are effective against the fungal pathogens as compared to other fraction. Cetraria islandica and Parmotrema perlatum inhibiting the fungal pathogens as compared to bacterial pathogens. Such that lichen show the board capacity of antibiotic potential against the bacterial and fungal strain.

IV. CONCLUSION

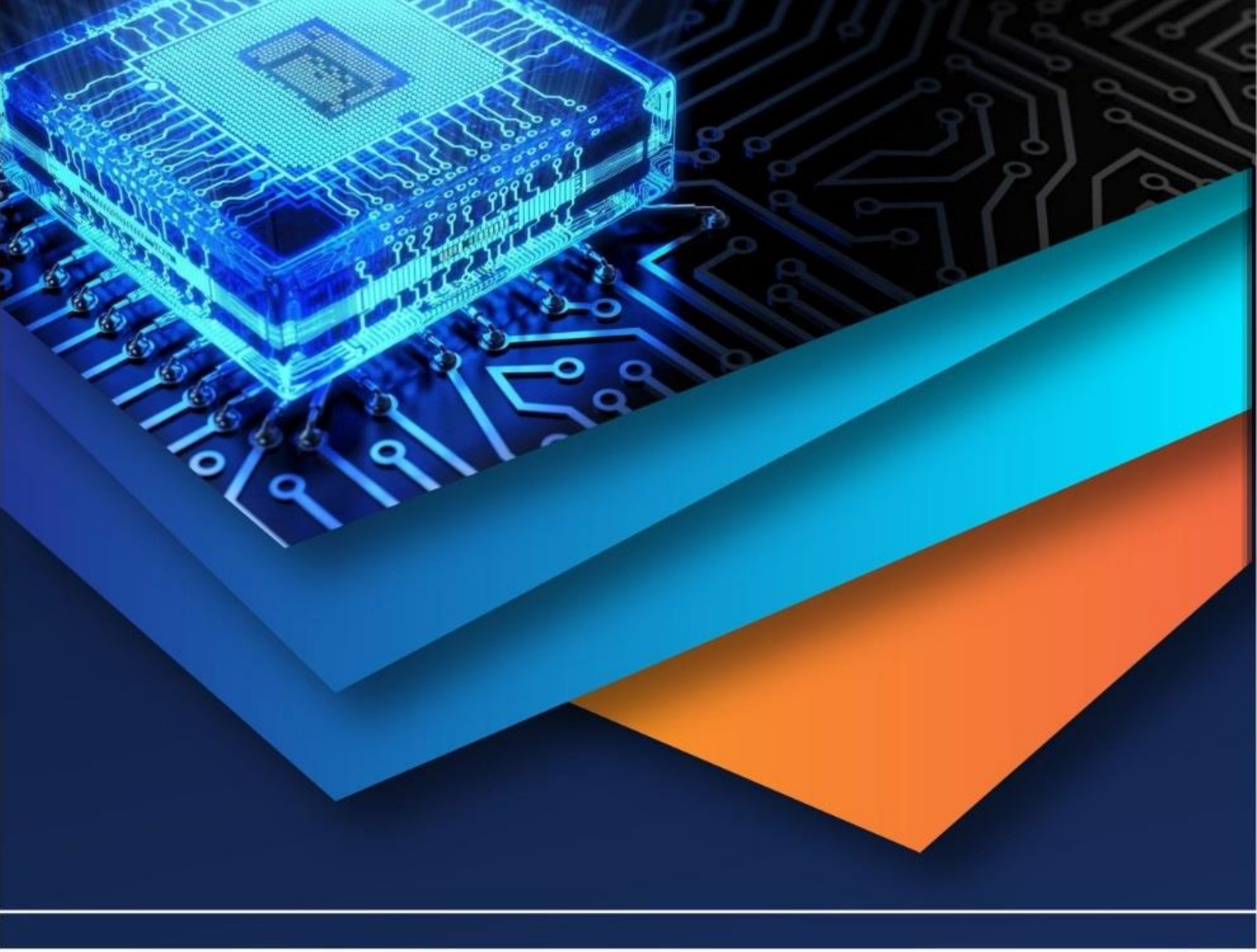
The present study revealed that ethyl acetate fraction was more effective against the pathogens. Difference sensitivity of bacteria and fungi is due to different in cell wall of lichen [19]. Flavonoids phytoconstituents in lichen is antibacterial, anti-inflammatory, analgesic, antialergic, antioxidant properties [20]. The extract of Bryoria are most active and Cetraria and Perlatum show antifungal activity least effective towered the bacterial pathogens. But lichen show significant antimicrobial activity which used to therapy of human and plant disease.

CYTETION AND REFERENCES

[1] IWU,M. 1993. Hand book African Medicinal Plant, CRC press. Bosa Ratan. FL.
[2] Hale, ME. 1961. The typification of Parmelia perlata (Huds.) Ach", Brittpnia,13(4)361-367.
[3] Ahmadian,V.1993. The Lichen symbiosis, John Wiley and sons.
[4] Biswas 1947. "The Lichen flora of India"
[5] Otzurk,S-Guvenc,S-Arican,N-Yylmez,O. 1999. Effect of usinic acid on mitotic index in root tips of allium sepa L.Lagascalia; Vol.21(1),1999.p47-52.
[6] Nayaka and Upreti 2006. http:wgbis.ces.fisc.ernet.in
[7] Brenan,J. Vaden,M. Lester,C. Crixell,S. Vattem,A.D.2009. Biological activity of some common lichen. FASEB; J. VOL.23,2009,716-10.
[8] Chand ,P. Singh,M. Rai,M. 2009. Antimicrobial activity of some Indian Lichen, J. Ecophysical. Occup. Health, vol.9, p23-29.
[9] Praveen Kumar SV. Prashith Kekuda TR. Vinayak KS. Swathi D. Mallikarjun N. Nishanth BC., 2010. Studies on proximate composition, antifungal and anthelmintic activity of a Micronlichen Ramalina hossei H. Magn and G. Aswasthi. Int. J. Biotechem, G,193-203.
[10] Dobsons ,F. 2000.Lichen; An Illustated guide .The Richmond Publishing, Co. Ltd. England.
[11] Purvis,O.W. Coppins,B. J. Hawsksworth,D.L. James,S.P.W. and Moore,D.M. 1992. The lichen flora of Great Brittan and Ireland, Natural History Museum Publication in association with the Brittish Lichen Sociaty, London. 1992, p1-710.
[12] Gunasekaran Balamurugan and Shinnaraj Selvarajan. Preliminary phytochemical screening and anthelmentic activity of Indigofera tinctoria linn. Int.j.drug dev & res, 2009; 1(1): 157-160.
[13] Harborne, J. B., Phytochemical method. London: Chapman and Hall, Ltd, 1996; 52-105. 5
[14] Kokate, C. K. Practical pharmacognosy, 4th ed.Vallabh Prakashan, Delhi, 1994; 115-17: 123, 124, & 127.

[15] Evans, C.E. Banso, A.and O. A. Samual. Efficacy of some new medicinal plantagainst Salmonella typhi: an in vitro study. J. Ethnopharmacol., 2002; 80: 21-24.
[16] Sofowora, A. Medicinal plant and traditional medicine in Africa. John Wiley and Sons, New York, 1984.
[17] Dangle,J. Red,W. W. Solomons,G.L.1953. The enzymatic degradation of pectin and other polysaccharides, application of the cup assay method to the estimation of enzyme. J. Sci. Food Agric.vol.40, p149-53.
[18] Aberkene,A. et. al. 2002. Comparative evaluation of two different method of inoculum preparation for antifungal susceptibility testing of filamentous fungi. J. Antim. Che. Vol. 50 (5), p719-722.
[19] Yang, Y. Aderson, E.J. 1999. Antimicrobial activity of a procine mycloperozidase against plant pathogenic bacteria and fungi, J. Appl. Microbiol,vol.86, p211-220.
[20] Rankovic, B. Misjic, M.Sukdplak, S. 2007. Evaluation of the antimicrobial activity of the Lichens, Lasollia pustulata, Parmelia sulcata, Umbelicaria crustulosa and Umbelicaria cylindrical, J. Mcrobol, vol.76, p723-727.

©IJRASET: All Rights are Reserved | SJ Impact Factor 7.538 | ISRA Journal Impact Factor 7.894 |



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)