

Research Article

Phytochemical Screening and Antimicrobial Activity of Chlorophytum Species Leaves of Melghat Region

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ABSTRACT

Aqueous extract of Chlorophytum species leaves of eight plants were screened for in vitro antimicrobial activity using the agar diffusion method. The antimicrobial activity of aqueous extract of leaves of the Chlorophytum species plant was studied against bacteria *E. coli*, *S. aureus*, *P. vulgaris*, *B. subtilis* and fungi *A. niger*, *C. albican*. Leaves of *C. tuberosum* show excellent antimicrobial activity against bacteria and fungi tested. Aqueous extract of *C. borivilianum*, *C. arundinaceum*, *C. nimmoni* and *C. kolhapurens* exhibits good activity against all tested microorganisms while other plants *C. breviscapum*, *C. bharuchae*, and *C. glaucum* showed moderate antimicrobial activity. A zone of inhibition of antibacterial activity compared with standard ampicillin and antifungal with griseofulvin. The preliminary phytochemical screening of leaves reveals the presence of starch, proteins, sugars, tannins, flavonoids, alkaloids and mucilage. Microscopy and Microscopy of transverse section of leaves of Chlorophytum species show characters similarities with the same species

Key words: Antibacterial, antifungal, Chlorophytum species, agar diffusion method.

INTRODUCTION

The numbers of microorganism are becoming drug resistant to various antibiotics. This lead to increased use of broad spectrum antibiotics, immunosuppressive agent, intravenous catheters organ transplantation and ongoing epidemics of HIV infection and other diseases.^{1,2,3} In addition, in developing countries, synthetic drug are not only expensive and inadequate for the treatment of disease but also often with adulteration and side effects. Therefore, there is a need to search new safe infection fighting strategies to control microbial infection⁴. India, well known for richest plant flora, has wide variety of phytochemicals and some of them have the ability to inhibit the growth of microorganisms. Thus, plants can be investigated for antimicrobial agents as they safer, alarmist, rational for using as medicine in modern times⁵. The aim of present study is to evaluate the phytochemical and antimicrobial activity of plants from Chlorophytum species. Species of Chlorophytum are sold in the market as safed musli due to its white tuberous roots. Chlorophytum species plants are found in India, Nepal and Myanmar. In India they are found wild in natural forest and Hilly areas Rajasthan, Gujarat, Madhya Pradesh, Bihar Orissa and West Bengal⁶. Chlorophytum species plants belonging to family Liliaceae are small perennial herbs and are considered to be valuable nerve and general tonic for strength and vigor. Leaves of Chlorophytum species are edible and use as a vegetable^{7,8,9}.

In the present work, an attempt has been made to evaluate the phytochemical and the antimicrobial potential of the leaves of Chlorophytum species.

MATERIALS AND METHODS

Plant material: The leaves of plants were collected in rainy season from Melghat region of Amravati District. Plants were authenticated by the Botanist, Dr P.A. Gawande, Sant Gadge Baba Amravati University, Amravati.

Microscopic and Macroscopic evaluation: These fresh leaves were used for morphological characters by microscopic and macroscopic methods as studied in Trease and Evans⁹. Thin hand transverse section of fresh leaves of plants were cut and stained with different stunning regents and observed under microscope at 45 X objective.

Preparation of plant extracts: The leaves of different plants were collected and dried in shed separately. Leaves are macerated in water for 24 hours and dried by evaporation in vacuum to obtain aqueous extracts. Dried extracts are stored at 4OC air tight containers for further study. Aqueous extracts were subjected to chemical test in order to detect the presence of different phytochemicals. These tests were carried out by standard methods of Harbone¹⁰ and Trease and Evans⁹.

Micro-organisms: *S. aureus*, *E. coli*, *B. subtilis*, *P. vulgaris* and fungi *A. niger*, *C. albicans* were obtained from Microbial collection laboratory, NCL Pune and used for antimicrobial activity. Fresh cultures of microorganisms are prepared in nutrient broth and are incubated for 24 hours at 37oC.

Antibacterial activity of extracts was tested by well diffusion plate method¹¹. Fresh culture suspension of bacteria was spread uniformly on solidified Hiller and Menton agar (Hi media) in the Petri plates. The concentration of culture was 5 X 10⁵ CFU/ml. Bore the

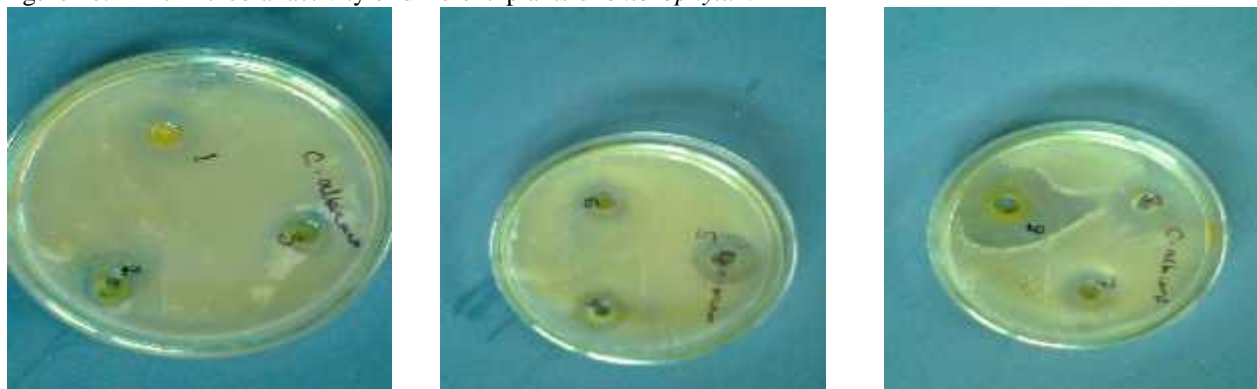
Table no 1: Macroscopic evaluation of leaves of chlorophytum species

Sr.no	Name of the species	Description of morphological characters of leaves				
		No of leaves	L length	L width	L margin	Appearance
1	<i>C. borivilianum</i>	8-11	23-28 cm	2-3 cm	plane	Shining
2	<i>C. breviscapum</i>	6- 9	19-25 cm	1.8-2.5 cm	undulate	Shining
3	<i>C. bharuchae</i>	8-10	15-55 cm	1-3 cm	Wavy, hyaline	Glabrous
4	<i>C. glaucum</i>	6 - 9	20-35 cm	2.8-4.5 cm	wavy	Glabrous
5	<i>C. tuberosum</i>	8-10	26-29 cm	2-3.5 cm	undulated	Glabrous
6	<i>C. arundinaceum</i>	10-14	15-20 cm	2-3 cm	wavy	Shining
7	<i>C. nimmoni</i>	5-10	30-60cm	1.5-10cm	undulated	Glabrous
8	<i>C. kolhapurens</i>	8-12	25-35 cm	1.5-10cm	undulated	Membranous

Table no: 2 Phytochemical studies of different plants of *Chlorophytum*

Sr.no	Compound	Test	1	2	3	4	5	6	7	8
1	Carbohydrates	Molish test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
2	Reducing sugar	Benedicts test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
3	Starch	Iodine test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
4	Protein	Biuret test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
5	Tannins	Lead acetate test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
6	Mucilage	Ruthenium test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
7	Flavonoids	Lead acetate test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
8	Alkoloids	Mayer's test	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve	+ ve
9	Saponins	Foam test	+ve	+ve	+ve	+ve	+ve	+ve	+ve	+ve

1= *C. borivilianum* 2= *C. breviscapum* 3= *C. bharuchae* 4= *C. glaucum* 5=*C. tuberosum* 6= *C. arundinaceum*

Figure no.1 Antimicrobial activity of different plants of *chlorophytum*

1= *C. borivilianum* 2= *C. breviscapum* 3= *C. bharuchae* 4= *C. glaucum* 5=*C. tuberosum* 6= *C. arundinaceum*
7=*C. nimmoni* and 8=*C. kolhapurens*

agar with borer of 1cm diameter and place 0.2 ml plant aqueous extracts (dissolve in water) and standard ampicillin in the agar wells. Keep these plates in freeze for 1 hour for diffusion and incubate for 24 hours at 37oC. For antifungal activity repeated the same extracts and standard griseofulvin with Sabouraud dextrose agar (Hi media) media using fungi culture, plates were kept for 24 hours at 25OC. Clear zones of inhibition were measured including the diameter of wells 1 cm.

RESULT

Macroscopic and Macroscopic evaluation: All plants leaves are green, grass like, oblong lanceolate, narrow and all arising from the base. These plants of Chlorophytum Species leaves has similar morphological and microscopic characters with some differences in leaf length, leaf margin, perianth and number of vascular bundle, number and arrangement of xylem strand. The details of microscopic evaluation is mentioned in the Table no 1 and illustrated in figure 1 to figure 8

in Table No 3 and chart No 1. The aqueous extract leaves

Table no:3 Antimicrobial activity of aqueous extract of different species of *Chlorophytum*

Sr. no	Name of Microorganism	Zone of inhibition in cm								Std
		1	2	3	4	5	6	7	8	
1	<i>S.aureus</i>	1.57	1.43	1.20	1.07	2.2	1.3	1.23	1.8	2.7
2	<i>B.sustilis</i>	1.37	1.23	1.27	1.40	1.57	1.7	1.13	1.37	2.33
3	<i>E.coli</i>	1.20	1.77	1.17	1.17	2.0	1.43	1.20	1.3	2.57
4	<i>P.vulgaris</i>	1.9	1.23	1.0	1.40	1.80	1.23	1.4	1.8	2.33
5	<i>C.albicans</i>	1.43	1.33	1.30	1.33	2.43	1.8	2.27	2.43	3.37
6	<i>A.niger</i>	1.83	1.43	1.10	1.17	1.87	1.8	2.23	1.0	2.6

1= *C. borivilianum* 2= *C. breviscapum* 3= *C. bharuchae* 4= *C. glaucum* 5= *C. tuberosum* 6= *C. arundinaceum* 7= *C. nimmoni* and 8= *C. kolhapurens* Standard ampicillin for bacteria and griseofulvin for fungi

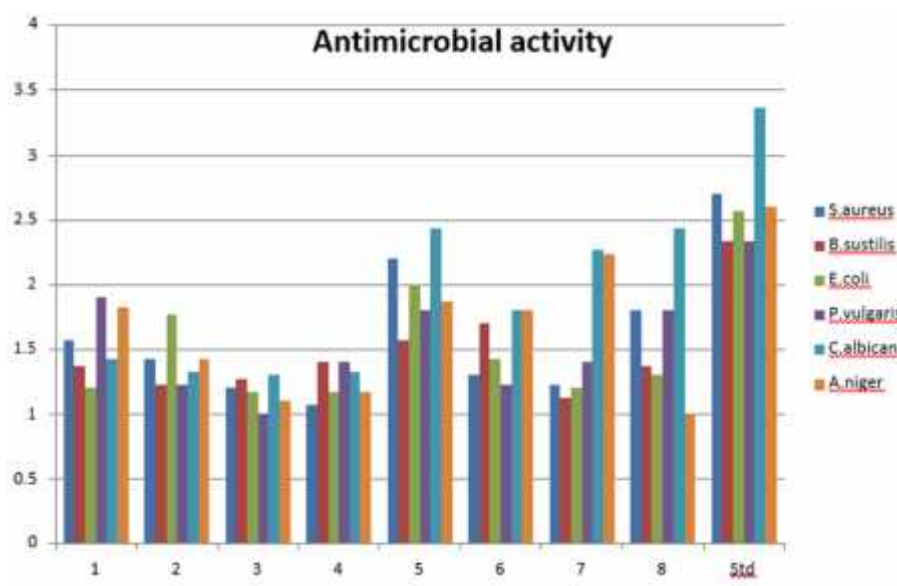
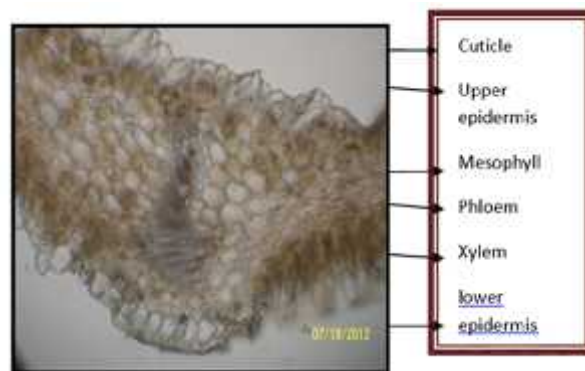
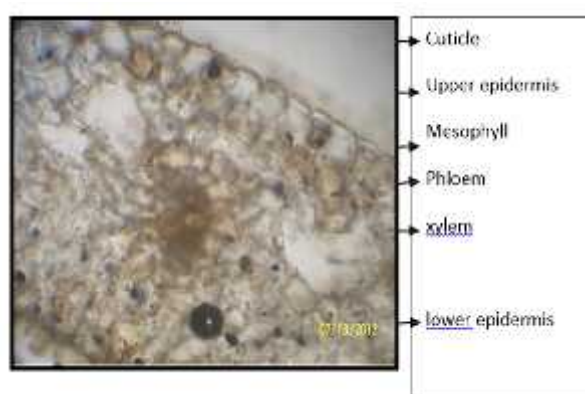


Chart No: 1 Comparison of antimicrobial activity *Chlorophytum* species



1: T.S of *C. borivilianum* leaves

Phytochemical and Antimicrobial activity

In the present investigation, aqueous extract of *Chlorophytum* species leaves were evaluated for their antimicrobial potential against four bacteria and two fungi using the well diffusion method. *Chlorophytum* species shows antimicrobial activity against *S.aureus*, *E.coli*, *P.vulgaris*, *B.substilis*, *A.niger* and *C.albicans* as mention

2: T.S of *C. brevisum* leaves

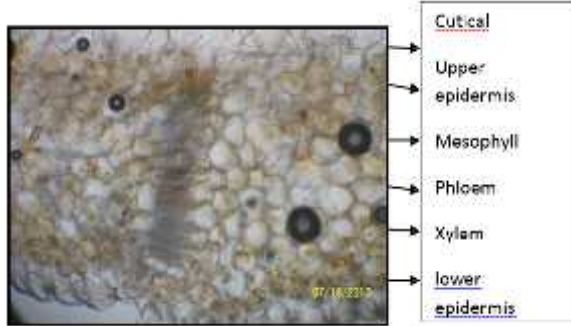
of *Chlorophytum tuberosum* show excellent activity against bacteria as well as fungi. *C. borivilianum*, *C. arundinaceum* and *C. kolhapurens* shows good activity against bacteria and fungi. *C. nimmoni* shows excellent antifungal activity than against bacteria.

Phytochemical screening of aqueous extracts of Chlorophytum species leaves shows presence of starch, reducing sugars, alkaloids, mucilage, flavonoids, proteins.

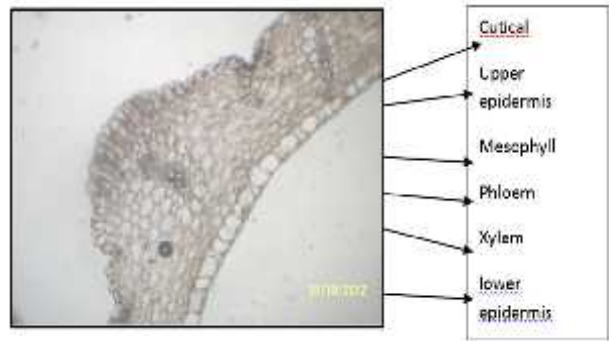
CONCLUSION

The nature of aqueous extract of all plants of Chlorophytum reported potent antimicrobial potential suggest active

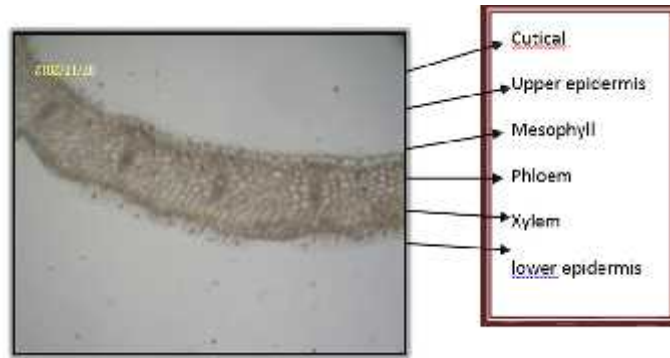
antimicrobial principle against infection caused by susceptible organisms. Variation in antimicrobial potential within species and related microorganism is due to intrinsic properties of the species. Chlorophytum species are effective antimicrobial agents. The main aim of our work on the antimicrobial potential of herbs which we plan further study with the ultimate objective of providing



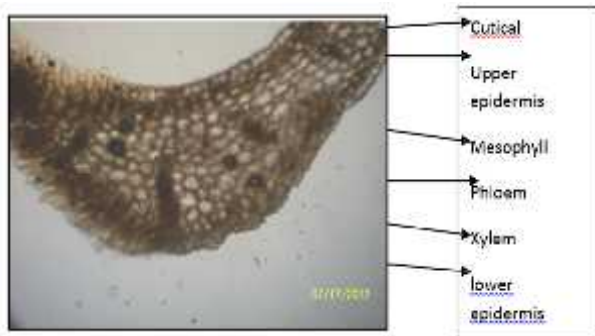
3: T.S. of *C. bharuchi* leaves



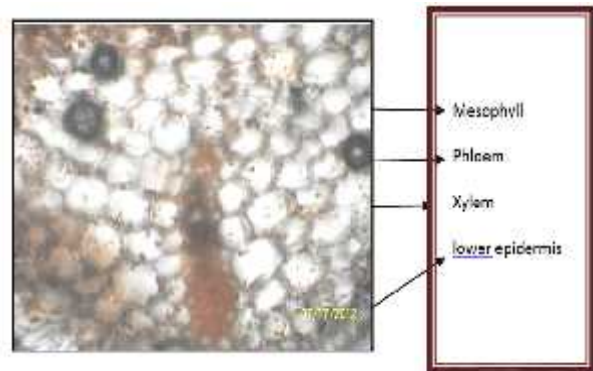
4: T.S. of *C. glaucum* leaves



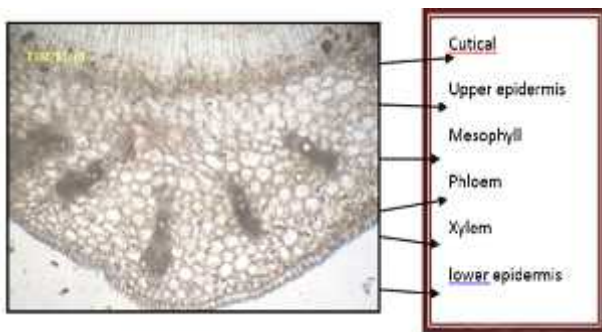
5: *C. tuberosum* leaves



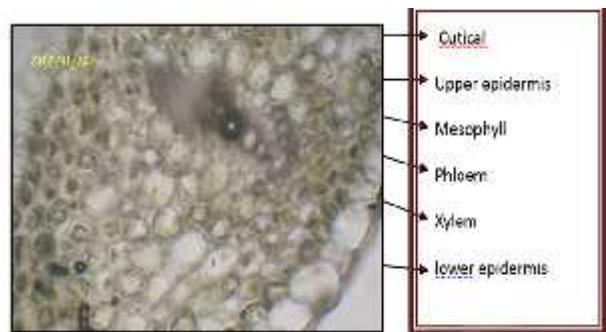
6: *C. aurendiancium* leaves



6: *C. aurendiancium* leaves



7: *C. nimmorni* leaves



8: *C. kolhapurens*

scientifically validated herbal remedies against various diseases. Further study is required to identify the compounds responsible for antimicrobial activity.

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