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Antimicrobial Activity of Alternanthera Sessilis (L) R. BR. Ex. DC and Alternanthera Philoxeroides (Mart). Griseb

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Abstract— **Objective: The aim of this study was to evaluate the antimicrobial activity of aqueous extracts Alternanthera sessilis and Alternanthera philoxeroides.**

Method: Aqueous extracts and extracts from solvents (ethanol, methanol, acetone, etc) of both the plants were evaluated against bacterial strains such as Bacillus pumillus, Salmonella typhi, Bacillus subtilis, Escherichia coli, Staphylococcus aureus, Pseudomonas aureginosa and fungi like Aspergillus niger, Candida albicans using well diffusion method.

Result: The result of the study revealed that some of the bacterial strains were more sensitive to Alternanthera sessilis and showed remarkable zone of inhibition than Alternanthera philoxeroides and few bacterial strains and fungi have no activity.

Conclusion: The plant extracts of Alternanthera sessilis and Alternanthera philoxeroides showed significant antimicrobial activity due to the presence of bioactive phytochemicals present in them.

Index Terms— **Alternanthera sessilis, Alternanthera philoxeroides, antibacterial, antifungal, well diffusion solvents.**

I. Introduction

Plants which are having medicinal property continue to be an important therapeutic aid for alleviating the ailment of humankind. Nature has given us a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of the country. From the ancient times, the different parts of several medicinal plants to cure specific ailments are used in India (Bhattacharijee, S.K, 1998).

Medicinal plants represent a rich source of antimicrobial agents. According to WHO (World Health Organization) about more than 80% of the world population depends on the natural product for their health due to minimal side effect and cost effective (Jagtap *et al.,* 2009). Plants are well known to produce certain bioactive molecules which can react with other organisms in the environment (Harborne & Baxter, 1995). Infectious diseases caused by microorganisms and pathogens have developed resistance to many antibiotics and this has created lot of clinical problems in the treatment of diseases. So, scientists are forced to search for new microbial substances from various sources including medicinal plants because of the less availability and high cost of new generation antibiotics (Sashikumar *et al.,* 2003).

Alternanthera sessilis (L) R. BR. Ex. DC and *Alternanthera philoxeroides* (Mart). Griseb. Plays an important role in human health. *Alternanthera sessilis* used internally against intestinal inflammation, externally to treat wounds, to treat hepatitis. tight chest, asthma bronchitis, lung trouble, to stop bleeding and as a hair tonic (Mrinmay Das, Ashok Kumar, 2014). Young shoots and leaves are eaten as vegetable in Southeast Asia (Scher, J. 2004). *Alternanthera philoxeroides* the whole plant is used as medicine and the system of medicine is folk and traditional medicine for the treatment of wound, fever and milk secretion (Theiengburanathaum W Dictionary of Thai herbs).

The aim of the present investigation is to study the antibacterial and antifungal effect of aqueous extract of *Alternanthera sessilis* and *Alternanthera philoxeroides* that could be useful for the development of new tools as antimicrobial agent for the control of infectious diseases.

II. Materials and Methods:

Plant Material:

Fresh plants of *Alternanthera sessilis* and *Alternanthera philoxeroides* were collected from Vembakkam, Ponneri Taluk, Thiruvallur District, Tamilnadu, India and were identified by Botanist, Madras Christian College, Thambaram, Chennai, Tamilnadu, India and voucher specimen were deposited in our departmental laboratory. Fresh plants were washed thoroughly 4-5 times with running tap water and then finally with sterile water and dried in shade at room temperature for 20-25 days. The dried plant material was made into coarse powder and sieved, and then used for crude extraction. Solvents like water, ethanol, methanol, acetone, ethyl acetate, chloroform and petroleum ether were used for extraction.

Extraction:

20 gm powder of each plant were soaked separately in 200ml water, ethanol, methanol acetone, ethyl acetate, chloroform, petroleum ether in conical flask and kept in shaker for 24 hours. After the extract was filtered and collected into glass vials. The process was repeated for 3 times with same material but using fresh solvents. The extracts were collected and concentrated at 40°C under reduced pressure using rotary evaporator. The extract was stored at 4°C until further use.

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Test organisms:

Bacillus pumillus, Salmonella typhi, Bacillus subtilis, Escherichia coli, Staphylococcus aureus, Pseudomonas aureginosa, were obtained from A to Z Pharmaceuticals Pvt. Ltd, Ambathur, Chennai. Fungal strains such as *Candida albicans, Aspergillus niger* were also obtained from the same A to Z Pharmaceutical Pvt.Ltd, Ambathur, Chennai.

Antimicrobial activity assessment:

The aqueous extracts of *Alternanthera sessilis* and *Alternanthera philoxeroides* were evaluated for antibacterial activity and antifungal activity using agar well diffusion method (Chung *et al.,* 1990). Muller Hinton agar medium was prepared and poured into the petri dishes by pour plate technique and then it was incubated with a swab of 24 hours bacterial culture and spread throughout the medium uniformly with a sterile cotton swab. Using a sterile cork borer (10mm dia) wells were made in the agar medium. The extracts were introduced into the well and all the plates were incubated at 37°C for 24 hours. Sensitivity of the organisms were determined by measuring the diameter of the zone of inhibition and the zones of inhibition were measured in mm. Similarly the extracts of *Alternanthera sessilis* and *Alternanthera philoxeroides* were screened for antifungal activity using agar well diffusion method (Perez *et al.,* 1990). Potato Dextrose Agar(PDA) medium was used for inoculation of fungal strains.

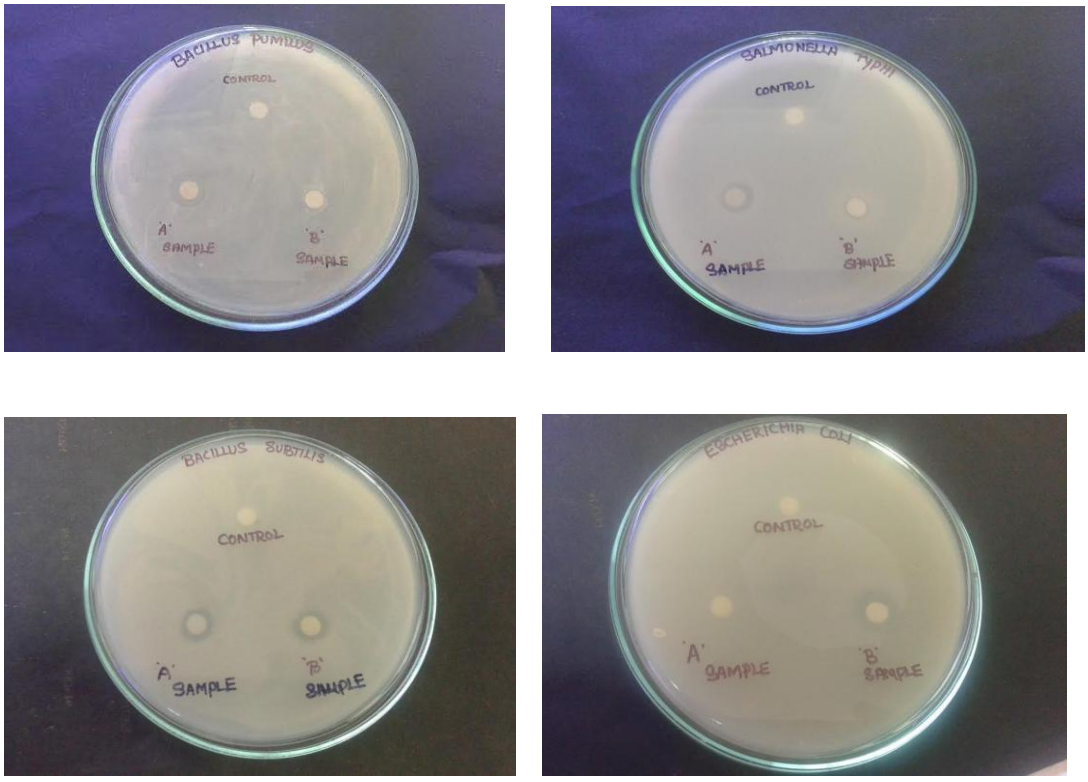
III. Results & Discussion:

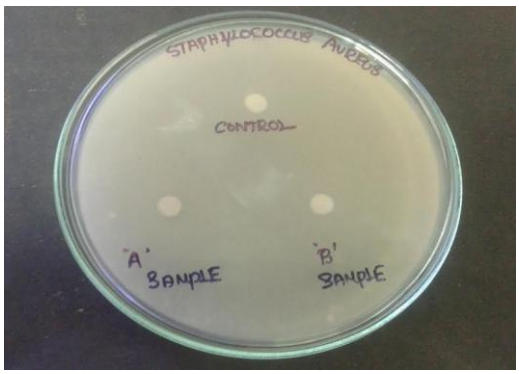
The antibacterial activity (zone of inhibition) was shown in table 1, fig 1. The aqueous extract was subjected to preliminary screening for antibacterial activity against *Bacillus pumillus, Salmonella typhi, Bacillus subtilis, Escherichia coli, Staphylococcus aureus, Pseudomonas aureginosa.*

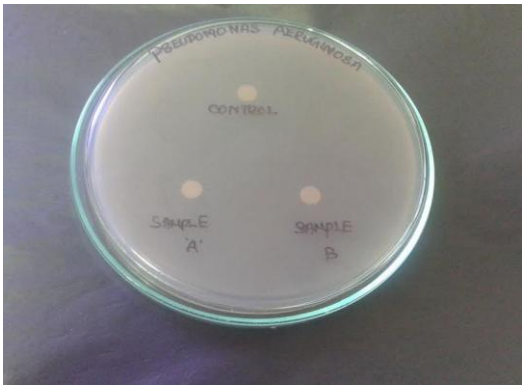
Table 1. Antibacterial activity of aqueous extract of *Alternanthera sessilis* and *Alternanthera philoxeroides*

S.No.	Organism	*Alternanthera sessilis* and *Alternanthera philoxeroides*			
		Activity	Zone of inhibition	Activity	Zone of inhibition (Dia. in mm)
1.	*Bacillus pumillus*	Positive	12	Positive	6
2.	*Salmonella typhi*	Positive	12	Positive	7
3.	*Bacillus subtilis*	Positive	10	Positive	9
4.	*Escherichia coli*	Nil	-	Positive	13
5.	*Staphylococcus aureus*	Nil	-	Nil	-
6.	*Pseudomonas aureginosa*	Nil	-	Nil	-

Fig.1





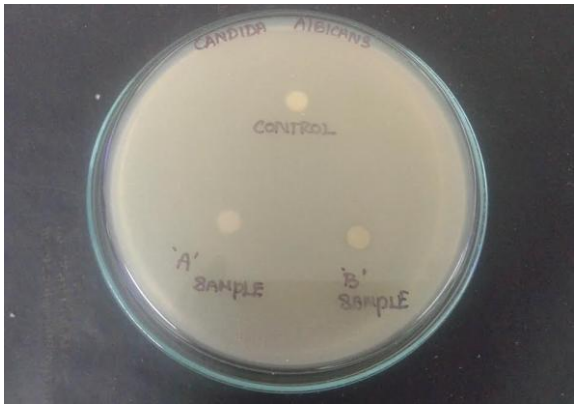


'A'-***Alternanthera sessilis*** ***'B'- Alternanthera philoxeroides***

Table 2. Antifungal activity of *Alternanthera sessilis* and *Alternanthera philoxeroides* using aqueous extract

S.No.	Organism	*Alternanthera sessilis*	*Alternanthera philoxeroides*
1.	*Aspergillus niger*	Nil	Nil
2.	*Candida albicans*	Nil	Nil

Fig.2



'A'-***Alternanthera sessilis*** ***'B'- Alternanthera philoxeroides***

From the table 1 it is very clear that the *Alternanthera sessilis* showed more inhibition than *Alternanthera philoxeroides* against *B. pumillus, S. typhi, B. subtilis. Alternanthera philoxeroides* shows activity against *E. coli,* but not shown in *Alternanthera sessilis.* Both the plant extracts shows no activity against *Staphylococcus aureus* and *Pseudomonas aureginosae*. The activity of extracts other solvents can be studied in future studies.

The antifungal activity was shown in table 2, fig 2. Table 2 showed that these is no activity in *Alternanthera sessilis* and *Alternanthera philoxeroidesc* against fungal strains such *Candida albicans & Apergillus niger*. In plants initial screening for possible antimicrobial activities begins by using crude aqueous or alcohol extraction and then it can be followed by various organic extraction methods. More or less all the identified components from the plants active against microorganisms are aromatic or saturated organic compounds, they are often obtained through initial ethanol or methanol extraction (Vilegs, J.H *et al.,* 1997). There are so many suggestions that aqueous and ethanolic extract from plants used in allopathic medicine and potential sources of antiviral, antitumoural and antimicrobial agents (Chung, T.H. *et al.,* 1995; Vlietinck, A.J. *et al.,* 1995).

Johnson, M *et al.,* 2010 reported that he antibacterial effect of leaves, inter-nodes, leaves and inter-nodal segments derived calli of *Alternanthera sessilis* was active against *Proteus vulgaris*, *Streptococcus pyogenes, Bacillus subtilis* and *Salmonella typhi*. Sivakumar, R.; Sumathi, D. (2016) reported that the leaf extract of *Alternanthera sessilis* and *Alternanthera philoxeroides* showed significant antimicrobial activity against bacteria and fungi.

CONCLUSION

The aqueous extracts *Alternanthera sessilis* and *Alternanthera philoxeroides* showed good antibacterial activity against gram positive and gram negative organisms. It suggests the usefulness of the plants against antimicrobial activity. So it is anticipated that *Alternanthera sessilis* and *Alternanthera philoxeroides* would be useful to treat

diseases. This investigation may lead to the development of natural antimicrobial agents.

REFERENCES

[1] Bhattacharjee, S.K. (1998). Handbook of medicinal plants Pointer pub. Jaipur - 03. India; Pp. 1-6.

[2] Chung, T.H., Kim, J.C., Kim, M.K., *et al*., (1995). Investigation of Korean plant extracts for potential phytotherapeutic agents against B-virus Hepatitis. Phytotherapy Res 9: 429-434.

[3] Chung, K.T., Thomason, W.R., Wu-Yuan, C.D., (1990). Growth inhibition of selected food - borne bacteria, particularly *Listeria monocytogenes*, by plant extracts. J. Appl. Bacterial., 69: 498-503.

[4] Harborne, J.B., Baxter, H. (1995). Phytochemical dictionary: A handbook of bioactive compounds from plants. Taylor & Francis Ltd., London.

[5] Jagtap, N.S., Khadabadi, S.S., Ghorpade, D.S., Banarase, N.B., Naphade, S.S. (2009). Antimicrobial and antifungal activity of *Centella asistica* (L) Urban. Umbeliferae. Res. J. Pharm Technol. 2: 328-330.

[6] Johnson, M., Wesely, E.G., Selvan, N., Kavitha, M.S (2010). *In vivo* and *in vitro* antibacterial efficacy of *Alternanthera sessilis* (Linn). IJPRD. Vol 2(10): 72-82.

[7] Mrinmay Das, Ashok Kumar, D (2014). Phyto-pharmacological review of *Alternanthera sessilis* Linn. IJIRPBS Vol 1(1): 9-15.

[8] Perez, C., Paul Bezique, P (1990). An antibiotic assay by the agar well diffusion method. Altra Biomed. Group Experiences, 15: 113.

[9] Sasikumar, J.M., Remya, M., Janardhanan, K. (2003). Antimicrobial activity of ethno medicinal plants of Nilgiri Biosphere Reserve and Western Ghats. Asian J Microbiol Biotechnol 5: 183-185.

[10] Scher, J. Federal Noxious Weed disseminules of the U.S Center for Plant Health Science and Technology, Plant protection and Quarantine, Animal and plant Health Inspection Service, U.S. Dept. of Agriculture online available http://www.incidentral.org/keys/v3/ FNW/.

[11] Sivakumar, R., Sunmathi, D (2016). Phytochemical screening and antimicrobial activity of ethanolic leaf extract of *Alternanthera sessilis* (L) R. Br. Ex. DC and *Alternanthera philoxeroides* (Mart.) Griseb. EJPMR, 3(3), 409-412.

[12] Theiengburanathum, W. Dictionary of Thai herbs. Bangkok: os. Printing house, 2531.

[13] Vilegs, J.H., De Marchi, E., Lancas, F.M. (1997). Extraction of low polarity compounds from *Milania glomerata* leaves. J phytochem Anal 8: 266-270.

[14] Vlietinck, A.J., Van Hoof, L., Totte, J. *et al.,* (1995). Screening of hundred Rwandese medicinal plants for antimicrobial and antiviral properties J. Ethnopharmacol 46: 31-47.