Indian Journal of Plant Sciences ISSN: 2319–3824 (Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jps.htm
2015 Vol.4 (2), April-June, pp.94-98/Aparna
Research Article

BIOTECHNOLOGICAL APPROACHES TO OBTAIN ACTIVE PHYTOCONSTITUENTS FROM ETHNOMEDICINAL PLANT *FICUS INFECTORIA*

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ABSTRACT

The study was conducted for the evaluation of antibacterial, activity of *Ficus infectoria* .The path of assessing active constituents from various ethnomedicinal and aromatic plants is a very complex issue: it is influenced by a wide variety of factors, from ecological elements of the environment to threats of the modern society in present scenario, urbanization, and industrial development. Furthermore, the amount of active principles present in the plants is influenced by ecological factors, species, zoning, culture technology, the biological value of the cultivar, and processing methods, Antibacterial activity was assessed in leaf and stem explants of *Ficus infectoria* which showed the presence of phytoconstituents. The extracts contain various phytochemicals which confirm that these plants can be used for therapeutic use and indigenous system of medicine. The methanolic as well as ethanolic extracts of the plants have shown the potential to kill the tested microorganism and hence can be used as an antibiotic and potential antibacterial.

Keywords*: Antibacterial, Extracts, Phytochemicals*

INTRODUCTION

The unambiguous identification of ethhnomedicinal plants is often difficult due to changes in plant taxonomy (Bucar and Wube, 2013). Some species of medicinal plants are threatened by over-harvesting in several parts of the world. This is the case seen for instance, in Golden Root (*Rhodiola rosea* L.), commonly used in traditional medicine as a potent cure for several diseases, including anxiety or depression (Saratikov and Krasnov, 1987; Alm, 2004). *Rhodiola rosea* L. is included in the Law of Biodiversity (e.g., in Bulgaria), and its harvesting is now forbidden.

The most significant and obvious threat to wild medicinal herbs is habitat loss through increasing residential and commercial development (including urbanization, industrialization, and tourism development). The impact of agriculture has been identified as another significant threat .Even if these threats are on a rising slope; there are many countries with a very long tradition in medicinal and aromatic plants' cultivation currently developing this sector on large areas.

Plants have been mainly exploited as a natural source of medicinal compounds since ages. Human is using various plants and the plant derived products to cure from various types of illness (Georgiev *et al.*, 2009; Lim and Bowles, 2012; Wilson and Roberts, 2012). These plants also find place in traditional Chinese, Ayurveda, Siddha, Unani and Tibetan medicines. Ancient literature such as Rigveda, Yajurveda, Atharvaveda, Charak Samhita and Sushrut Samhita also finds mention of the use of plants for the treatment of various health problems. In the last five decades, these plants have been extensively studied by modern scientific techniques and are reported for various medicinal properties viz, anticancer, antibacterial, antifungal, antidiabetic, antioxidant, hepatoprotective, haemolytic, larvicidal and anti-inflammatory activity etc. Looking to the importance of ethnomedicinal plants in the cure of various health ailments in human as well as cattle an attempt has been made to assess the antimicrobial activity of *Ficus infectoria*. The details of the plant are given in Table 1.

Table 1: The details of the plant

S. No.	Name of Plant	Common Name	Family	Properties
1.	*Ficus infectoria*	White fig	Moraceae	It is used primarily n the treatment of leucorrhoea. It is applied externally A bark decoction is used as a wash on ulcers and as a gargle in salivation (Swamy and Bisht, 1996; Kumari *et al.*, 2010).

Ficus infectoria, family: Moracae) is a large and beautiful tree from Fig family with spreading crown. Bark is grey and smooth. Wood is grey-colored. The deciduous tree with aerial prop roots is grown on the roadside areas, in parks and in the premises of temple and by village huts as shadow tree. A decoction of the bark is used as an injection in the treatment of leucorrhoea.

On the basis of above properties and usefulness of these plants, an attempt has been made to assess possible antimicrobial activities of *Ficus infectoria*.

MATERIALS AND METHODS

Methodology

Plant collection and Preparation of Extract

Figure 1: Collected plant of *Ficus infectoria*

The plant was collected from the Hadoti region of Rajasthan. Plant parts viz., leaf, stem were washed, air dried and ground into powder form for the preparation of extract. Aqueous plant extract was prepared by macerating powdered plant sample with 50 ml sterile distilled water. The macerate was further filtered and filtrate was centrifuged at 8000 rpm for 15 minutes. Supernatant obtained after centrifugation process was heat sterilized at 1200 ºC for 30 minutes. Extract obtained was preserved aseptically. Solvent extracts of plant parts were prepared in 70% methanol using Soxhlet extraction for 72 hours and extract was preserved at 45 ºC in air tight bottles. They were air dried and dissolved in Dimethyl sulfoxide (DMSO) in 1mg/1ml concentration and stored in refrigerator. Antibacterial activity of the test samples was

compared with antibiotics known to be effective against the test bacteria in their established doses. The bacterial cultures of gram positive and gram negative bacteria were maintained on nutrient agar medium (agar-agar 15 g, beef extract 3 g, sodium chloride 5 g and peptone 5 g in one liter distilled water). These micro-organisms were allowed to grow at 35°C-37°C temperature. Fresh inoculums of the test microorganism in saline solution was prepared from a freshly grown agar slant before every antibacterial assay by adjusting the concentration of micro-organism in the medium using spectronic-20 colorimeter. . The antibacterial activity was tested byWhatman filter paper disc method. Stock cultures were maintained at 4°C on slopes of nutrient agar. Active cultures for experiments were prepared by transferring loopful bacterial cells from the stock cultures to Erlenmeyer flask of nutrient broth and were incubated with agitation for 24 hours at 37°C.

Test microorganisms

These test organisms were clinical isolates obtained from patients diagnosed for having bacterial infections and procured from Sawai Man Singh Hospital Jaipur.

The bacterial strains studied are *Pseudomonas aeruginosa* and *Escherichia coli*. Microorganisms were maintained at 4 °C on nutrient agar slants.

Antibacterial screening

The filter paper disc method was used for testing the extract for antibacterial activity.. The discs were placed on the surface of sterilized nutrient agar medium that had been inoculated with test bacteria (using saline solution) and air dried to remove the surface moisture. The thickness of the agar medium was kept equal in all the pertriplates and the standard disc (streptomycin) was used as a control. Before incubation, the petriplates were placed for one hour in a cold room (5°C) to allow the diffusion of the compounds from the disc into the medium. Plates were further incubated at 37°C for 20-24 hours after which the zone of inhibition or depressed growth could be easily measured.

All the experiments were done in five replicates and the activity index was calculated for each of these.

$$\text{Activity index (A.I.)} = \frac{\text{Inhibition zone of the sample}}{\text{Inhibition zone of the standard}}$$

RESULTS AND OBSERVATION

Maximum zone of inhibition was seen in stem explants in both ethanolic and methanolic extracts (Fig 2, Table 2)

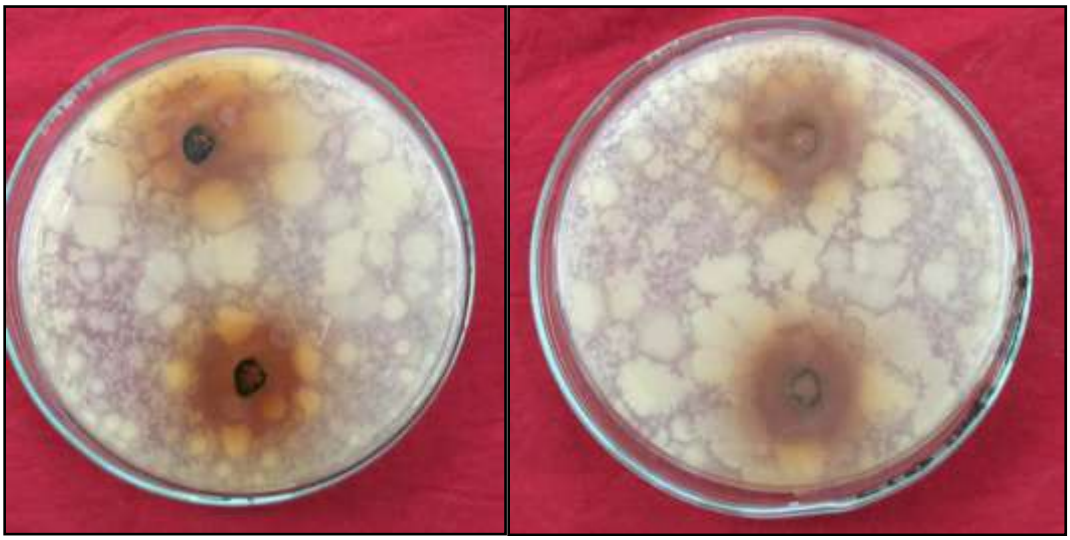

Figure 2: Inhibition zone in Ethanolic and Methanolic extract of plant species *Ficus infectoria*

Table 2: Antibacterial activity of *Ficus infectoria* in ethanol and methanol extract of stem and leaf

Bacterial species	Zone of inhibition (mm)								
	Standard Amoxycillin	Methanolic extract				Ethanolic extract			
		Leaves	AI	Stem	AI	Leaves	AI	Stem	AI
Escherichia coli	7mm	13±0.57	1.8	16±1.73	2.1	15±0.57	2.14	18±0.66	2.57
Pseudomonas aeruginosa	14mm	10.3	0.80	9±0.88	0.6	9±0.33	0.64	9±0.88	0.64

Discussion

Many plant species have been exploited as traditional medicines but it is necessary to establish the scientific basis for the therapeutic actions of traditional plant medicines as these may serve as the source for the development of more novel effective drugs in the present scenario. The secondary constituents present in ethnomedicinal plants are solely responsible for the defense mechanisms the form of phyto-chemicals (Lutterodt *et al.,* 1999; Marjorie, 1999). The present study reveals that the extracts have immense activity against bacteria explaining the strong antimicrobial activity because of the presence of broad spectrum antibiotic compounds (Srinivasan *et al.,* 2001). Different solvents have been found to have the varied capacity to extract different phytoconstituents depending on their solubility or polarity in the solvent. The aqueous extracts which are having considerably good activity against all the organisms provides the scientific basis of the solvent to be used for phytoconstituents,

CONCLUSION

The results of the present study in accordance with the earlier reports concluded that aqueous extracts of *F.infectoria* has potent antimicrobial activity against selected pathogens which is due to the high concentration of phytochemicals responsible for activity. The investigation in present scenario reveals that plants are the potential source of the novel antimicrobial compounds used in indigenous medicinal practices to ensure the valuable therapeutic knowledge with scientific evidence fortheir efficiency.

ACKNOWLEDGEMENT

AP thanks UGC, New Delhi for financial support.

REFERENCES

Alm T (2004). Ethnobotany of *Rhodiola rosea* (Crassulaceae) in Norway. *SIDA.* **21**(1) 321–344.

Bucar F, Wube A (2013). Schmid M. Natural product isolation, how to get from biological material to pure compounds. *Natural Product Reports*, **30** 525–545.

Georgiev MI, Weber J, Maciuk A (2009). Bioprocessing of plant cell cultures for mass production of targeted compounds. *Applied Microbiology and Biotechnology*, **83**, 809–823.

Kumari M, Sharma A, Jagannadham MV (2010). Decolorization of crude latex by activated charcoal, purification and physico-chemical characterization of religiosin, a milk-clotting serine protease from the latex of *Ficus religiosa*. *Journal of Agricultre Food Chemistry*, **58**, 8027-34

Lim E.-K., Bowles D (2012). Plant production systems for bioactive small molecules. *Current Opinion in Biotechnology*, **23**, 271–277.

Lutterodt GD, Ismail A, Basheer RH, Baharudin HM (1999). Antimicrobial effects of Psidium guajava extracts as one mechanism of its antidiarrhoeal action. *Malaysian Journal of Medical Science*, **6**(2) 17-20

Marjorie MC (1999). Plant products as antimicrobial agents. *Clinical Microbiology Reviews*, **12**(4), 564-582

Saratikov SA, Krasnov EA (1987). *Rhodiola rosea* is a valuable medicinal plant (Golden Root). Tomsk State University Press, Tomsk, Russia; **50**(6) 42-4.
Srinivasan D, Perumalsamy LP, Nathan S, Sures T (2001). Antimicrobial activity of certain Indian medicinal plants used in folkloric medicine. *Journal of Ethnopharmacology*, **94,** 217-222
Swami KD, Bisht NP (1996). Constituents of *Ficus religiosa* and *Ficus infectoria* and their biological activity. *Journal of Indian Chemical Society***, 73**, 631.
Wilson SA, Roberts SC (2012). Recent advances towards development and commercialization of plant cell culture processes for the synthesis of biomolecules**.** *Plant Biotechnology Journal*, **10**, 249–268.