

Antifungal Potential of *Leptadenia Pyrotechnica* Against Some Pathogenic Fungi

Rekha*¹, Krishan Kumar¹, Monika Singh¹.

¹Department of Biotechnology, Singhania University, Pacheri Bari, Raj., India.

ABSTRACT: *Leptadenia pyrotechnica* was evaluated for its antifungal activity against some pathogenic fungi. Extracts in different organic solvents were used for disc diffusion assay. Hexane and ethyl acetate extracts have showed maximum inhibition zone against *A. niger* (15mm and 12.2 mm respectively). Methanol extract showed maximum activity against *F. oxysporium* (13.0mm) and *A. flavus* (15mm) while aqueous extract showed maximum activity against *F. moniliformis* (9.6mm).

Keywords: Antifungal, *Leptadenia pyrotechnica*, *Aspergillus* spp., *Fusarium* spp., Disc diffusion.

I. INTRODUCTION

Leptadenia pyrotechnica (Forssk.) Decne (Synonym-*L.Spartinum* Wight) belonging to family Asclepiadaceae is one of such medicinal plants, locally known as Khimp or Khip (Rajasthan), Khimparlo, Thahawar, Ranser (Gujarat), Broom bush (English) is an erect, ascending, shrub up to 1.5m-3m high with green stem and pale green alternating bushy branches with watery sap. *Leptadenia pyrotechnica*(forssk) decne, is a valuable desert plant which is commonly used in traditional system of medicine for relieving pain and inflammation, as well as in a number of metabolic disorders such as diabetes and obesity. It is common throughout the state of Rajasthan and found in dry habitats particularly in desert zones. In India it is commonly found in Banswara, Palod, Dungarpur and Kota [1]. Whole plant seeds and flowers are used for different purpose. Its fiber is used as antihistaminic and expectorant [2]. Fresh juice of the plant is used for abortion [3]. Plant sap is applied to eczema and other skin disease and is also given in diabetes [4]. Whole plant is used proved to have antibacterial activity against *Staphylococcus aureus* & *Bacillus subtilis* [5,6]. The latex or the leaf paste is applied over the thorn injury for thorn removal [7]. Whole plant infusion is mixed with buttermilk and given for uterine prolapse and stomach disorders in sariska region of Rajasthan [8]. It is used to cure constipation and is considered good for health in Bikaner region of Rajasthan [9]. In the sudanodeccanian region of central Sahara it is traditionally used in fever, cough, kidney disorders, stones, urinary disease [10]. Though *Leptadenia pyrotechnica* has number of uses, and is traditionally used in the treatment of diabetes however there is no scientific data available to claim the antidiabetic activity of *Leptadenia pyrotechnica* hence the need to embark on this study become necessary. However, the last few years have seen a major increase in their use in the developed world. Several screening studies have been carried out in different parts of the world. There are several reports on the antimicrobial activity of different herbal extracts in different regions of the world [11, 12]. A number of medicinal plants are being used to cure various diseases caused by microbes. Hence the present study was undertaken to investigate the antifungal activity against selected pathogenic fungi (*Aspergillus* spp, *Fusarium* spp) using various extracts of *Leptadenia pyrotechnica*.

II. PLANT MATERIAL AND CHEMICAL EXTRACTION

The dried leaves of *Leptadenia pyrotechnica* were procured from the garden, Singhania University, Pacheri Bari, Jhunjhunu, Rajasthan. Leaves were air dried and extracted with methanol, di-ethylether, hexane, distilled water using a Soxhlet apparatus. The extracts were filtered and concentrated in vacuo.

Test organisms: Four test organisms, *Aspergillus niger*, *A. flavus*, *Fusarium oxysporium*, *F. moniliformis*, were obtained from Singhania University, Pacheri Bari, Jhunjhunu, Rajasthan and maintained on Potato Dextrose Agar (PDA).

Bioassay: Disc diffusion bioassay was employed for testing antifungal activity of plant extracts (Lindsay, 1962). The readymade PDA medium (Hi-media, 39g) was suspended in distilled water and autoclaved at pressure of 15lbs for 20min. Seven days old cultures of test organisms (0.5 ml) were seeded onto plate and uniformly spread with spreader. Paper discs measuring 6mm diameter, that absorbs about 0.1ml of the test sample and a known quantity of standard reference antibiotic (Fluconazole) were used. The inoculated plates were kept at 5°C for 45-55min and then incubated at 25- 27°C for 48hrs. The inhibition zone was measured and compared with those of the standard reference antibiotics. Three to four replicates were maintained for each treatment.

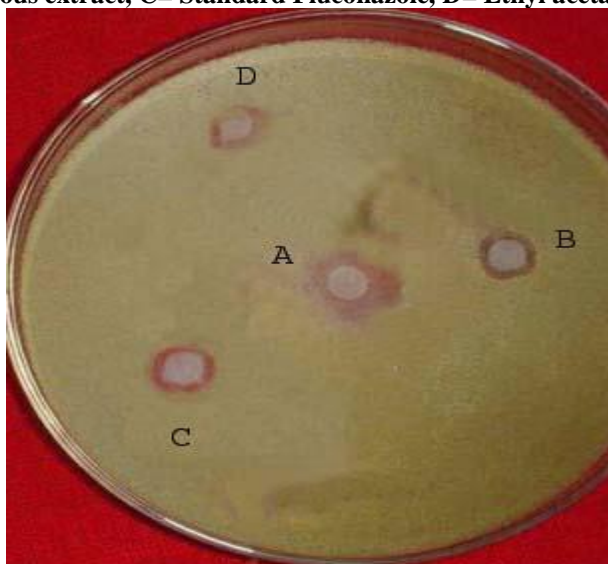
III. RESULTS AND DISCUSSION

Effect of different solvent extracts of *Leptadenia pyrotechnica* leaves were tested against four fungi (Table 1). All the tested extracts inhibited the fungal species with varying degree of sensitivity. The antifungal activity was very less found in aqueous extract. The diameter of inhibition zones ranged from 6 to 18.2mm among different fungal species. Hexane and ethyl acetate extracts have showed maximum inhibition zone against *A. niger* (16.4mm and 10.3mm respectively). Methanol extract showed maximum activity against *A. flavus* (18.2mm) while aqueous extract showed maximum activity against *F. moniliformis* (8.4mm). A similar study of screening the natural plant extracts against different fungal and bacterial pathogens was well recorded in literature [13, 14-15-16]. Since plants have co-evolved with pathogens, it is reasonable to expect a variety of such compounds with specific as well as general antifungal activity [17]. The present study has shown that the extracts of *Leptadenia pyrotechnica* possess remarkable antifungal activity against many pathogenic fungi. This activity may be due to presence of alkaloids. Thus, there is a possibility of developing this plant a source of antifungal agent and further investigations are necessary to identify the bioactive principles.

Table 1: Antifungal activity of *Leptadenia pyrotechnica* (leaves) extract on different fungi.

S. No.	Extract	Zone of Inhibition in mm			
		<i>F. oxysporium</i>	<i>F. moniliformis.</i>	<i>A. flavus</i>	<i>A. niger</i>
1.	Hexane	12.1	14.2	13.1	16.4
2.	Ethyl acetate	4.5	9.1	7.2	10.3
3.	Methanol	11.0	11.8	18.2	11.1
4.	Aqueous	6	8.4	7.4	8.2

Figure 1. Effect of different extracts of *Leptadenia pyrotechnica* (leaves) extract on *Aspergillus flavus* (A= Methanol, B= Aqueous extract, C= Standard Fluconazole, D= Ethyl acetate extract, , extract).



REFERENCES

- [1]. Shetty BV, Singh V. Flora of India (Series-II), Flora of Rajasthan. Edited by. Botanical survey of India.1991; 2:453-480.
- [2]. Al-Yahiya M A. Triterpenoid from *Leptadenia Pyrotechnica*. *Fitoterapia*. 1986; 57: 179.
- [3]. Patel RS, Kanjaria KV, Patel KC, Investigation on climber resources used by tribal inhabitants of Ambaji forest of Banaskantha district (North Gujarat). *Life science Leaflets*.2010; 10: 252-257.
- [4]. Kateva SS, Galav PK, Addition to the traditional folk herbal medicines from shekhwati region of Rajasthan. *Indian Journal of Traditional Knowledge*.2006; 5 (4): 494-500.
- [5]. Al-Fatimi M, Wurster M, Schroder G, Lindequist U. Antioxidant, antimicrobial and cytotoxic activities of selected medicinal plants from Yemen. *Journal of Ethno pharmacology*. 2007; 111: 657-666.
- [6]. Praveen, Upadhyay B, Roy S, Kumar A. Traditional use of medicinal plants among rural communities of churu district in the Thar desert. *Indian Journal of Ethnopharmacology* 2007; 113:387-399.
- [7]. Upadhyay B, Praveen, Dhaker AK, Kumar A. Ethnomedicinal and Ethnopharmaco-Statistical studies of eastern Rajasthan, India. *Journal of Ethnopharmacology*. 2010; 129: 64-86.
- [8]. Upadhyay.B, Singh KP, Kumar A. Ethno-veterinary uses and informants consensus factor of medicinal plants of Sariska region, Rajasthan, India. *Journal Ethnopharmacology*. 2011; 133:14-25.
- [9]. Goyal M, Sharma SK. Traditional wisdom and value addition prospects of arid food of desert region of North West India. *Indian Journal of Traditional Knowledge*. 2009; 8(4):581-585.

- [10]. Hammiche V, Maiza K. Traditional medicine in central Sahara: Pharmacopoeia of Tassili N'ajjer. *Journal of Ethnopharmacology*. 2006; 105: 358-367.
- [11]. Singh VP, Paney RP. *Ethnobotany of Rajasthan, In India*. Scientific Publishers, Jodhpur, India. 1998: 212.
- [12]. Kuttan G. Use of *Leptadenia pyrotechnica* dunal as an adjuvant during radiation therapy. *Indian Journal Exp. Bio.* 1996; 34(9): 854-856.
- [13]. Ahmad I, Mehmood Z, Mohammad P, Ahmed S. Antimicrobial potency and synergistic activity of five traditionally used Indian medicinal plants. *Journal of Medicinal Aromatic Plant Sciences*. 2000; 22 (4A): 173-176.
- [14]. Fabry W, Okemo PO, Ausorg R. Antibacterial activity of East African Medicinal Plants. *Journal Ethnopharmacol.* 1998; 60 (1): 19-24.
- [15]. De Boer HJ, Kool A, Broberg A et al. Antifungal and antibacterial activity of some herbal remedies from tanzania. *Journal Ethnopharmacol.* 2005; 96: 461-469.
- [16]. Nair R, Kalariya T, Chanda S. Antibacterial activity of some selected indian medicinal flora. *Turk Journal Biol.* 2005; 29: 41-47.
- [17]. Darokar MP, Mathur A, Dwivedi S, Bhalla R, Kanuja SPS, Sushi Kumar. Detection of antibacterial in the floral petals of some higher plants. *Current Science*. 1998; 75 (3): 187-189.