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Antifungal Activity of Crude Extract of *Butea Monosperma*

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Abstract

Crude extracts of different parts (flowers and roots) of *Butea monosperma* were examined for their antifungal activity against three fungi viz. *Alternaria*, *Fusarium* and *Aspergillus flavus*. Antifungal activity of different plant parts in terms of Minimal Fungicidal Concentration [MFC] (µg/mL) ranged between 200-1000 µg/mL. The extracts performed as good as or even better than the standard drugs like Nystatin and Greseofulvin. Highest antifungal activity is observed for flower extract. The flower extract is found to be the most effective against *Aspergillus flavus* and root extract is recorded against *Alternaria*.

Keywords - *Butea monosperma*; flower extracts; root extract; antifungal activity; MFC; Nystatin; Greseofulvin

1. Introduction

The importance of medicinal plants to the health of individuals and communities is known since antiquity. The medicinal value of these plants lies in some chemical substances that produce a definite physiological effect on the human body. *Butea monosperma*; family-Fabaceae Synonym: *Butea frondosa* Varnacular name: English-Flame of the forest Hindi- Dhak, Palas and found throughout in India **[1]**.It has been used in the indigenous system of medicine since long time. The methanol extract of *Butea monosperma* seeds, tested *in-vitro*, showed significant anthelmintic activity, anticonvulsive, hepatoprotective, antiestrogenic potential, antifertility activity, anti-diarrhoeal activity and antifungal activity**[2-7]**. Bright colour of the flowers is attributed to the presence of chalcones and aurones. It gives superb antimicrobial activity especially butrin and isobutrin, which used to make eye Brightsite eye drops, which can be useful over many eye diseases like lens cataract, glaucoma etc **[1].**

2. Experimental

2.1. Chemicals and Reagents

Three flavonoids were purchased from M/s Sigma–Aldrich Chemical (India) Limited, which are 99% pure. One phenolic acid was purchased from M/s Himedia Chemicals (India), which is 98% pure and one phenolic acid was purchased from M/s Spectrochem (India) Pvt. Ltd., which is 99% pure. Thesestandards were used without further purification. All otherchemicals and reagents used were of analytical gradepurchased from SD Fine Chemicals India, E-Merck (India) Limited. Gradient grade solvents were also procured from E-Merck (India) Limited and M/s Spectrochem (India) Pvt. Ltd. as and when required.

2.2. Plant Material

Roots and flower of B. monosperma, were collected from the campus of the Junagadh Agricultural University, India. B. monosperma is a species of Butea native to tropical southern Asia especially from India, Pakistan, Bangladesh, Nepal, Sri Lanka, Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, and western Indonesia. It may be found throughout in India up to a height of 1250 m, except in the arid zones. H. coronarium was collected from its native place Amrkantank (Chhattisgarh, India). Both plants were collected under the supervision of botanical experts and kept in passive conditions.

2.3. Extraction Procedure

The sample was extracted in 34 mL Accelerated Solvent Extraction (ASE) cell with sample size of 4 g. Plant material, can contain a degree of moisture and it requires pre-treatment to yield a fine and dry sample. The plant material was loaded into an ASE cell. Moisture from samples was removed using a dispersing agent (Ottawa Sand). This dispersing agent prevents the sample from compaction in the extraction cell and increased the surface area, which improved solvent penetration into the sample matrix. Therefore, extraction efficiency and precision were increased in comparison to the conventional method. The ASE method for this extraction was employed at a temperature between 60 and 90˚ C. The time and temperature based changes were made for the optimum conditions to yield more active ingredients from the plant material.

Table 1 Antifungal activity of crude extract of *Butea monosperma* against standard drugs

No.	**Samples**	**Minimal Fungicidal Concentration (MFC) (µg/mL)**		
		Alternaria (MTCC 149)	*Fusarium* (MTCC 2099)	*Aspergillus flavus* (MTCC 277)
1	Nystatin	200	150	100
2	Greseofulvin	500	250	100
3	*Butea monosperma* Flowers extract	10	150	50
4	*Butea monosperma* Roots extract	50	180	300

3. Antifungal Activity

The methanol extracts of flowers and roots of *Butea monosperma* were screened against three fungal strains. The test fungal strains were *Alternaria (*MTCC 149), *Fusarium* (MTCC 2099), *Aspergillus flavus* (MTCC 277).

Sabauroud's Dextrose broth was prepared and inoculated with the test strains (105 cfu/mL). The test compounds were dissolved in DMSO (Dimethyl sulfoxide) and serial dilutions were

made. The tubes were incubated at 28 ± 2° C and the Minimal Fungal Concentration (MFC) at µg/mL was recorded after 72-96 h.

Concentration of the test compound in the last tube with no apparent growth of the test fungus was determined as MFC of the test compound for that particular test fungus.

Sets of suitable controls (for growth, broth, standard drugs Nystatin and Greseofulvin, solvent and extracts) were also prepared and maintained under identical conditions.

4. Results and Discussion

Crude extracts of different parts viz. flowers, and roots were tested for their antifungal activity against three fungi *Alternaria*, *Fusarium* and *Aspergillus flavus*. The solvent vehicle (DMSO) was also studied. As expected it did not exhibit antifungal activity against any of the test fungi. Antifungal activity of the test extracts were compared with Nystatin and Greseofulvin. MFC of Nystatin and Greseofulvin for all test fungi in between 100-500 µg/mL. Against *Alternaria* it was found 500 µg/ml for Greseofulvin and 200 µg/ml for Nystatin, while against *fusarium* 250 µg/mL and 150 µg/mL and 100 µg/mL against test *Aspergillus flavus*.

Antifungal activity of different plant parts in terms of MFC (µg/mL) ranged between 10-250 in case of flowers and 50-500 in case of extracts of roots respectively (Table 1).

Flower extracts were found most potential among all. MFC of flower extract was 10 µg/mL against *Alternaria*, which is just 5% MFC of Nystatin and only 2% of Greseofulvin, against *Aspergillus flavus* it was 50 µg/mL 50% of both standard drugs and for *fusarium* it was found 150 µg/mL equal to Nystatin and 50% that of Greseofulvin.

Roots exhibited promising antifungal activity. Like the flower extract, here, there was a remarkable difference in activity against test *Alternaria*, MFC of root extract for test *Alternaria* was 50 µg/mL, which is equal to the standard drug Greseofulvin. MFC of root extracts for *fusarium* was 180 µg/mL just like Nystatin and too much less than Greseofulvin. *Against Aspergillus flavus it* was not found as good as flower extract it was 300 µg/mL.

Thus, extracts of all test plant parts exhibited antifungal activity. With only exception of root extracts where activity against test *aspergillus flavus* was not so good, the extracts proved as good as or even better than the standard drugs Nystatin and Greseo-fulvin. Difference in the activity of different plant parts could be due to the content of antimicrobial agents present in the extracts and their mode of action on different test organisms (Barbour et al., 2004). Here, it is noteworthy that all the tests were in crude form; their further purification may even lead to more promising results.

5. Conclusion

Among extracts from different parts of *Butea monosperma*, i e. flowers & roots. Flowers exhibited highest antifungal activity. Among the three test fungi *Alternaira* is found to be the most sensitive. And this fungi is responsible for most common skin disorder, This study paves the way for further attention and research to identify the active compounds responsible for the plant biological activity. Further studies should be undertaken to elucidate the exact mechanism of action by which extracts exert their antimicrobial effect.

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