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Comparative Antimicrobial Studies of Aerial parts and Roots of *Abutilon bidentatum*

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ABSTRACT: The present study deals with the antimicrobial study of methanolic extract of aerial parts and roots of *A. bidentatum*. Both the extracts were tested against test bacteria *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella aerogenes*, *Proctus vulgaris* and *Salmonella paratyphi* B. *E. coli* and *S. aureus* and test fungi *Aspergillus flavus*, *Aspergillus niger*, *Fusarium moniliforme* and *Rhizoctonia bataticola*. In case of bactericidal activity methanolic extract of aerial parts exhibited trace activity against *S.aureus* while root extract showed some activity against this test bacteria. In case of fungicidal efficacy, both the extracts showed significant efficacy against all the test fungi except *R. bataticola*. Out of selected fungi, maximum activity was observed against *F. moniliforme* by both the extracts. Roots of *A. bidentatum* were more active (IZ=20 mm at 1000 µg/disc, IZ=15 mm at 500 µg/disc) than aerial parts of this plant (IZ=17 mm at 1000µg/disc, IZ=14 mm at 500 µg/disc)

KEYWORDS: *A. bidentatum*, Metahnolic extract, Antimicrobial, Aerial parts, Roots.

I. INTRODUCTION

Since the beginning of mankind, plants have been used for both, food and medicine. The medicinal importance of plant(s), attracted the attention of chemists to study the natural products. Plant products are being increasingly tried upon and utilized for various purposes in the field of pharmaceuticals. It is believed that the extracts and products of plants being natural, are harmless to human beings and their environment.

Abutilon is the extensive genus belongs to family Malvaceae. Around 150 species of annual or perennial herbs, shrubs, and small trees are known under this family. The species of *Abutilon* genus have been used to cure specific health issues including: rheumatoid arthritis, diuretic and demulcent due to the occurrence of high mucilage content [1]. Different parts of *A.bidentatum* have been utilized to treat several ailments in ethno-medicine, especially its leaves are used to cure infections. Root powder is used in folk-traditional medicine to treat dysentery, colitis, and diarrhea [2]. Only three studies could be traced concerning the chemical constituents and pharmacological activities till date. These studies reported the antibacterial, antioxidant and hepatoprotective potential of aerial parts of *A. bidentatum* [3-6]. However, a single study with respect to its chemical constituents, reporting the isolation of cholestane derivative from the *A. bidentatum* has been reported in the literature [7].

II. MATERIALS AND METHODS

Plant Material: The plant material of *A. bidentatum* Hochst. was collected from the campus university of Rajasthan, Jaipur and was identified for authenticity in the department of botany, University of Rajasthan, Jaipur (Herbarium sheet No. RUBL 824).

Plant Extract: Powdered roots and aerial parts of *A. bidentatum* were extracted with methanol for 36 hrs, later both the extracts were filtered, residues were re-extracted for complete exhaustion. Both the extracts were dried under vacuum and stored separately.

Test Microbes: The methanolic extract of aerial parts and roots of *A. bidentatum* were screened for antibacterial activity against test bacteria *Escherichia coli*, *Staphylococcus aureus*, *Klebsiella aerogenes*, *Proctus vulgaris* and *Salmonella paratyphi* B. *E. coli* and *S. aureus* which cause frequent urinary tract infections, are the most common organisms used by other workers [8]. *S. paratyphi* B cause paratyphoid fever and food poisoning. *K. aerogenes* and *P. vulgaris* were chosen as the test organisms because of their high resistance to the antibacterial agents. Thus, any plant which could exhibit pronounced activity against either of these two organisms might yield an important antibiotic. Antifungal activity of methanolic extracts of aerial parts and roots of *A. bidentatum* were tasted against *Aspergillus flavus*, *Aspergillus niger*, *Fusarium moniliforme* and *Rhizoctonia bataticola*.

Bactericidal and fungicidal assay: For both, bactericidal and fungicidal assays. Disc diffusion method was adopted, because of re-productivity and precision [9]. The different test organisms were preceded separately using a

sterile swab over previously sterilized culture medium plates and the zone of inhibitions were measured around sterilized dried discs of What man No:1 paper (6 mm in diameter), which were containing 500 µg and 1000 µg of the test extracts and control amikacin (10 µg/ml for bacteria) and nystatin (100 units/ml for fungi) as reference drugs separately. Such treated discs were air-dried at room temperature, to remove any residual solvent which might interfere with the determination, sterilized and inoculated. Before incubation, these plates were placed at low temperature for 1 hr, so as to allow maximum diffusion of the compound from the test discs into the agar plate and later, incubated at 37°C for 24 hrs in case of bacteria and 48 hrs for fungi, after which the zones of inhibition could be easily observed. Three replicates of each test extract were examined and the mean values were then referred.

III. RESULTS AND DISCUSSION

In case of bactericidal activity methanolic extract of aerial parts and roots were failed to demonstrate any significant activity against any test bacteria except *S.aureus*.

Table 1. Bactericidal activity

Plant Part	Dose µg/disc	<i>E. coli</i>	<i>S.aureus</i>	<i>K. aerogenes</i>	<i>P. vulgaris</i>	<i>S. paratyphi B.</i>
		IZ* AI*	IZ* AI*	IZ* AI*	IZ* AI*	IZ* AI*
Aerial Part	100		± -			± -
	500		± -			- -
Roots	1000		11 0.45			± -
	500		07 0.29			± -

IZ: inhibition zone (in mm) including the diameter of disc (6mm)

AI :

activity index=(inhibition zone of sample/inhibition zone of standard

Standard: Amikacin = 10 µg/ml

(±) Trace activity: (-) No activity

Aerial parts exhibited trace activity against *S.aureus* while root extract showed some activity against this test bacteria (IZ=11 mm at 1000 µg/disc, IZ=07 mm at 500 µg/disc). (Table 1)

In case of fungicidal efficacy, both the extracts showed significant efficacy against all the test fungi except *R. bataticola*. Maximum activity was exhibited against *F. moniliforme* by both the extracts.

Table 2: Fungicidal Activity

Plant Part	Dose µg/disc	<i>A.flavus</i>	<i>A. niger</i>	<i>F. moniliforme</i>	<i>R. bataticola</i>
		IZ* AI*	IZ* AI*	IZ* AI*	IZ* AI*
Aerial Part	100	11 0.55	12 0.53	17 0.77	-
	500	06 0.30	09 0.39	14 0.63	-
Roots	1000	15 0.75	12 0.53	20 0.91	±
	500	09 0.45	10 0.44	15 0.68	±

IZ: inhibition zone (in mm) including the diameter of disc (6mm)

AI : activity index=(inhibition zone of sample/inhibition zone of standard

Standard: Mycostatin = 100 unit/disc

(±) Trace activity: (-) No activity

In comparison, roots of *A. bidentatum* were more active (IZ=20 mm at 1000 µg/disc, IZ=15 mm at 500 µg/disc) than aerial parts of this plant (IZ=17 mm at 1000µg/disc, IZ=14 mm at 500 µg/disc) against this test fungi. Methanolic extract of roots of *A. bidentatum* showed trace activity against *R. bataticola*. (Table 2)

IV. CONCLUSION

Table 1 indicated that methanolic extract of aerial parts and roots both showed only trace bactericidal efficacy against *S. aureus*. A comparative study showed that both the extracts exhibited fungicidal activity against all the test fungi except *R. bataticola* but the maximum efficacy was seen against *F. moniliforme*. In comparison, methanolic extract of roots of *A. bidentatum* exhibited more significant activity against test fungi than extract of aerial parts.



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