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Research Article

EVALUATION OF ROOT AND LEAF OF *ABUTILON THEOPHRASTI* MEDIK FOR ANTIFUNGAL ACTIVITY

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ABSTRACT

Objective: To investigate the antifungal activity of root and leaf extracts of Abutilon theophrasti against *Microsporum gypseum*, *Penicillium spp*, *Fusarium spp, Aspergillus spp*.

Methods: *Abutilon theophrasti* (velvetleaf) was collected from "Lower Munda" Dist: Qazigund (Jammu & Kashmir) India. The collected samples were dried and extracted with two different polaristic solvents (Methanol and aquous).Antifungal activity of the extract was determined by disc diffusion method against four fungal strains with soubred dextrose agar media.

Results: Methanolic extracts of *Abutilon theophrasti* showed promising antifungal activity compared to aqueous extracts against selected fungal species. Methanolic extract of leaf displayed highest activity with zone of inhibition 14mm (ZOI-14) against *Penicillium spp*, however poor antifungal activity was observed in aqueous extracts. Methanolic extracts of root displayed good antifungal activity, while as no activity was seen in aqueous extracts of root.

Conclusion: It can be concluded from present study that methanolic leaf extracts possess phytoconstituents with potent antifungal activity.

Keywords: Abutilon, Methanol, Rhizopus, Penicillium.

INTRODUCTION

Plants produce a diverse assortment of organic compounds the majority of which do not participate directly in growth and development of the plant. These substances traditionally referred as secondary metabolites; there functions many of which remains unknown. On other hand metabolites products such as phytosterols, lipids, nucleotides, amino acids, and organic acids are found in all plants and perform an essential and evident role in growth and development. The secondary metabolites are distributed among limited taxonomical groups within the plant kingdom. The complexity of the chemical structures and biosynthetic pathway, natural products have been widely perceived as biologically insignificant and receive less attention from most of the biologists. Organic chemicals are inherited in novel photochemicals and investigating their chemical properties. Abutilon (L) genus of the Malvaceae family comprises about 150 annual or perennial herbs, shrubs or even small plants widely distributed in the tropical and subtropical countries of Asia, Africa, America, and Australia [1].

China is stated to be the origin of *Abutilon theophrasti*. In china, it has been grown since around 2000 BC for its jute like fiber. It is also known by many vernacular names like "velvetleaf, China-jute, button-weed." *A. theophrasti* is a quantitative short-day herbaceous annual plant that colonizes highly different habitat such as agriculture fields and high altitude areas of work in Kashmir valley. Time of flowering is mostly rapid under short day photoperiods. Under glass house conditions, increased height, fruit weight, internode length with increasing photoperiods is seen [2]. Nurse *et al.* (2004) [3] studied the effects of varying natural photoperiods on the germinability of *A. theophrasti* seeds and seedlings vigor as measured by initial rate of radical growth. A medicinal herb contains a number of chemical compounds called secondary metabolites, whenever any plant found to be useful it is taken up for investigation, as regards to the constituents present for its biological action. On confirmation of its biological activity, the suitable phytochemicals are isolated and put into usage. Many consumers preferred to treat themselves with phytopharmaceuticals or herbal preparation, and the sale of these is increasing in mostly first world countries. All these have led to the development of new field called "Herbal Drugs Extraction." Many manufacturers are making efforts to improve yields as well as the composition of total extracts and currently also the area of investigating and isolating the herbal drugs is gaining considerable importance and leading to evaluation of green chemicals. Various species of *Abutilon* are traditionally claimed for their varied pharmacological and medicinal activities. Different parts of *Abutilon* plant contain specific phytoconstituents responsible for these activities. Kremer (1986) [4] studied antimicrobial activity of *A. theophrasti* seeds and he found significant antimicrobial activity. Saini *et al.* (2014) [5] evaluated antifungal activity of *Abutilon indicum*. Traditionally, *Abutilon* is used for the treatment of various ailments. The roots of *Abutilon* are considered useful as Demulcent, Diuretic, in chest infections and urethritis. The decoction of leaves is used in toothache and for inflammation of the bladder. The bark is used as anthelmintic, laxative, and diuretic [6]. The Ayurvedic pharmacopoeia of India indicates the use of roots in Gout, polyuria, piles, gonorrhea and hemorrhagic diseases [7]. Aerial parts of the plant are used in folk medicine as an expectorant and emollient [8]. Besides this *A. theophrasti* is also claimed to have cytotoxic and antioxidant activities.

METHODS

Collection of plant material

A. theophrasti (velvetleaf) was collected from "Lower Munda" Dist: Qazigund (Jammu and Kashmir, India). Latitude 33.56° and longitude 75.20°. The plant was identified and registered (VS-No.2113-KASH) at Herbarium center for Biodiversity and Taxonomy, "University of Kashmir" India.

Preparation of extracts

The plant material was dried in shade at room temperature for about 15 days. Dried plant samples were powdered by the mechanical grinder. The powder was then sieved to fine mesh, stored in polythene bags at

room temperature before extraction. Methanol and distilled water were used as solvents. Extraction was done by simple maceration process. The extracts were concentrated to dryness using rotary evaporator and crude extracts were tested for antifungal activity.

Microorganisms

Four fungal strains were used, (*Microsporum gypseum*, *Penicillium* spp., *Fusarium* spp., *Aspergillus* spp.).

Determination of antimicrobial activity

Disk diffusion method was used to evaluate antifungal activity [9,10]. Standard size Whatman No. 1 filter paper discs, 5.0 mm in diameter, sterilized by moist heat at 121 lb in an autoclave for 15 minutes were used. Saboured dextrose agar (SDA) medium was prepared for disc diffusion test. After sterilization, SDA was poured in sterilized Petri plates and allowed to solidify. A fresh culture of fungi was used for inoculum preparations. Turbidity suspension was taken 0.5 McFarland. Using a sterile cotton swab, fungal cultures were swabbed on the surface of sterile agar plates. The dried plant extracts were re-suspended to 500, 250, and 100 µg/ml in dimethyl sulfoxide and sonicated to dissolve. Sterile 5 mm discs were impregnated with 50 µl of extract and placed on the surface of agar plates inoculated with a microbial culture. Each extract was tested in triplicate. Itraconazole (30 µg/disc) was taken as the reference standard. The plates were incubated at 27°C for 24 hrs. The diameter of the inhibition zones was measured in millimeter. Three replicates were kept in each case and average values were calculated.

RESULTS AND DISCUSSION

The result obtained from antifungal activity assay using methanolic, and aqueous crude extracts showed that growth of all fungi was inhibited (Tables 1 and 2). Methanolic leaf extracts showed good antifungal activity while as very little activity was seen in aqueous crude extracts. Among all selected fungal species methanolic leaf extracts showed the highest activity against *Penicillium* (ZOI-14) fallowed by *M. gypseum* (ZOI-11). The present study successfully evaluated the role of *A. theophrasti* for its antifungal activity. It has been already reported that the phytochemicals have an excellent activity to get against microorganisms [11]. This could be due to active chemicals which are present in *A. theophrasti* making it a potential antifungal plant. The

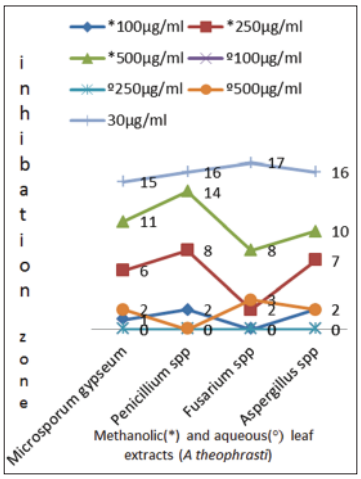

Fig. 2:

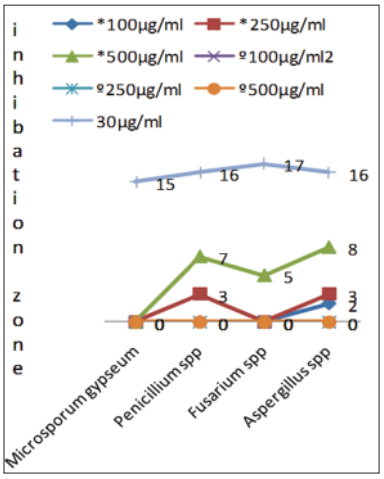

Table 1: Antifungal activity of methanolic and aqueous extracts of leaf (*A. theophrasti*)

Serial number	Fungi	Zone of inhibition (mm of diameter)						
		Concentration of methanolic leaf extracts			Concentration of aqueous leaf extracts			Itraconazole
		100 µg/ml	250 µg/ml	500 µg/ml	100 µg/ml	250 µg/ml	500 µg/ml	30 µg/ml
1	*Microsporum gypseum*	1	6	11	0	0	2	15
2	*Penicillium* spp.	2	8	14	0	0	0	16
3	*Fusarium* spp.	0	2	8	0	0	3	17
4	Aspergillus spp.	2	7	10	0	0	2	16

A. theophrasti: Abutilon theophrasti

Table 2: Antifungal activity of methanolic and aqueous extracts of root (*A. theophrasti*)

Serial number	Fungi	Zone of inhibition (mm of diameter)						
		Concentration of methanolic root extracts			Concentration of aqueous root extracts			Itraconazole
		100 µg/ml	250 µg/ml	500 µg/ml	100 µg/ml	250 µg/ml	500 µg/ml	30 µg/ml
1	*Microsporum gypseum*	0	0	0	0	0	0	15
2	*Penicillium* spp.	0	3	7	0	0	0	16
3	*Fusarium* spp.	0	0	5	0	0	0	17
4	*Aspergillus* spp.	2	3	8	0	0	0	16

A. theophrasti: Abutilon theophrasti

investigated aqueous and methanolic root extracts of *A. theophrasti* did not show strong antifungal activity, however, negative results do not mean absence of bioactive constituents. Active compounds may be present in insufficient quantities in the crude aqueous extracts to show the activity with the dose level employed. Saini *et al.* (2014) evaluated the antifungal activity of *A. indicum* in which he observed the potential antifungal activity in alcoholic extracts compared to aqueous extracts which is in harmony with the present study. Pundair and Sharma [12] have earlier reported that ethanol garlic extracts showed antimycotic activity against fungal genera such as *Aspergillus, Rhizopus, Fusarium,* and *Cladosporium* which is in accordance with our present study.

CONCLUSION

This study has demonstrated that *A. theophrasti* exhibited a potential degree of antimycotic activity. The comparable activity of different extracts can be attributed to polyphenolic compounds.

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