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RESEARCH ARTICLE

EVALUATION OF HEXANE CRUDE EXTRACTS (ROOT, STEM, LEAF AND FRUIT BODY) OF *ABUTILON THEOPHRASTI* MEDIK FOR ANTI FUNGAL ACTIVITY

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ABSTRACT

The investigation was aimed to carry out the antifungal activities of the hexane extract's of *Abutilon theophrasti* against four fungal species, (*Microsporum gypseum*, *Penicillium spp*, *Fusarium spp*, *Aspergillus spp)*. Disc-diffusion method was employed to carry out the antifungal activity against selected fungal species. Three concentrations (100µg/ml, 250 µg/ml, 500 µg/ml) were made to check the activity of crude extracts. Itraconazole was taken as standard reference drug, While as dimethyl sulphoxide (DMSO) served as negative control. Leaf extracts were found to show promising activity, followed by extracts of fruit body, stem and root. All crude extracts displayed their maximum inhibition against *Fusarium* species. Maximum inhibition (ZOI-11) was seen in crude extracts of leaves, followed by crude extracts of fruit body with inhibition zone of 10mm. Stem extracts displayed inhibition zone of 9mm while as root showed activity of 7mm. All inhibition activity was concentration dependent.

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INTRODUCTION

Abutilon theophrasti Medic. (Malvaceae) is widespread in China, except for the Tibetan Plateau, and cultivated in northeastern China, Vietnam, India, Japan, Europe and North America. The genus of the Malvaceae family comprises of about 150 annual or perennial herbs, shrubs or even small trees. *Abutilon theophrasti Medikus = Abutilon avicennae* Gaertn. (velvetleaf) is an annual herb native to the tropical asia, which was naturalized in the Mediterranean area and the USA. It is to 1m high and has yellow flowers to 4 cm across, petals 7-12 mm (Cullen J Cambridge University Press 1997) Allelopathy may be an important mechanism in the plant invasion process. The lack of co-evolved tolerance and resistance of resident vegetation to new allelo chemicals produced by invading weed species could have negative effect to dominant species of natural plant communities (Hierro, 2003).

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Different allelopathic activity of different parts of the same weed species also differs in its capabilities of harmful effects to germination and beginning growth of cultivated plants (Aziza *et al*., 2008; Konstantinovic *et al.,* 2012). *Abutilon theophrasti* shows high allelopathic potential due to inhibition of germination and growth of competitive plants, by which it reaches superior position. Although allelopathic interactions of *Abutilon theophrasti Med* with other crops have been known for several decades, weak attention is paid to the biochemical interactions of this weed species, (Gressel and Holm 1964), that indicates negative allelophatic effect of *Abutilon theophrasti* Med to soybean, maize and tomato crops. Along allelopathy plant has been demonstrated to have multiple pharmacological activities (FU,C.D *et al.,* 1993, GU,G.Y *et al*., 2009), such as expelling wind, detoxification and anti-inflammatory effectiveness. *Abutilon theophrasti* has been used in ethnomedicine against various ailments. Aerial parts of plant are used in folk medicine as an expectorant and emollient (Kiyamova *et al*., 2012). The drug exhibits anti-inflammatory and carminative properties and is mainly used to treat rheumatic pains, arthrosis, bruises, sprains, dysentery, otitis media, tinnitus and deafness (Dinu *et al*., 2010; Balah & Nassar 2011).

Furthermore, *A. theophrasti* is cultivated as a source of fiber and oil. It has escaped from cultivation and become an invasive species of orchards, cotton, maize, soybean and vegetable fields, causing serious damage. It is very limited and deals with the content of mucilage which hydrolyzed to inositol, glucuronic acid, glucose, fructose and xylose (Gorunovic *et al*., 1984). Although *Abutilon theophrasti* Medic has been widely used as a traditional Chinese medicine (TCM), its correlative research on chemical constituents has been rarely reported. Phenolic compounds are widely found in plants in the form of simple phenols, phenolic acids, flavonoids, coumarins, lignans, lignins and tannins, which have intense antioxidant activity and play an important therapeutic role in antimicrobial, antiallergenic and anti-inflammatory activities. Our present study focused on its antimycotic activity of different parts (Root, Stem, Leaf and Root).

MATERIALS AND METHODS

Collection and Authentication of Plant Material

Abutilon theophrasti was collected from "Lower Munda" Dist: Qazigund (Jammu and Kashmir) latitude 33.56 and longitude 75.20.Plant was identified and registered (Reg. No.2113-KASH) at Herbarium centre for Biodiversity and Taxonomy, "University of Kashmir", India.

Preparation of extracts

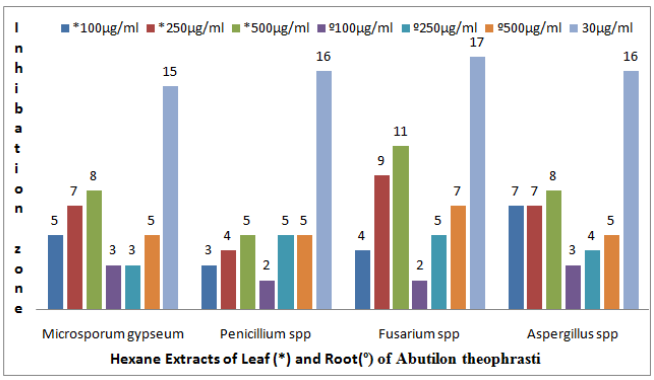
The plant material was dried under shade at room temperature for about 15 days. The dried plant samples were powdered by mechanical grinder. The powder was then sieved to fine mesh, stored in polythene bags at room temperature before extraction. Hexane was used as solvent. Extraction was done by maceration process. The extracts were concentrated to dryness using rotary evaporator and crude extracts were tested for anti-fungal activity.

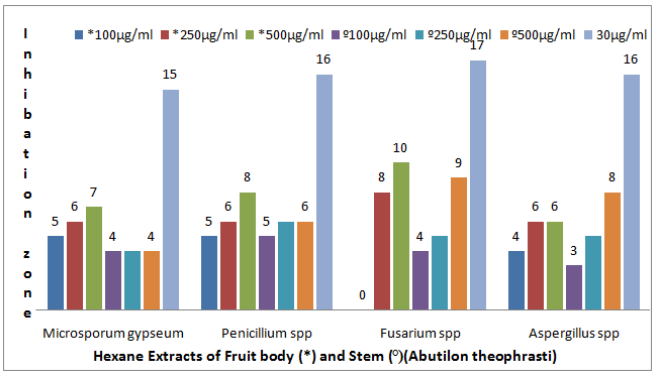
Microorganisms

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

Determination of antimicrobial activity

The disk diffusion method was used for evaluation of antifungal activity (Rios *et al*., 1988; Kim *et al*., 2012). 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 to carry crude extract. Saboured dextrose agar (SDA) was used as medium. After sterilization SDA was as poured in sterilized Petri plates and allowed to solidify. Fresh culture of fungi was used for inoculum preparations. Turbidity suspension was taken 0.5 Mc-Farland. Using a sterile cotton swab, fresh fungal cultures were swabbed on the surface of sterile agar plates. The dried plant extracts were re-suspended to 500,250,100 µg/ml in Dimethyl sulfoxide (DMSO) and sonicated to dissolve. Prepared 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 (30µg/disc) served as a control. The plates were incubated at 27°C for 24 hrs. The diameter of the inhibition zones were measured in millimeter. Three replicates were kept in each case and average values were calculated.





RESULTS AND DISCUSSION

The antifungal activities of different concentrations (100 µg/ml to 500 µg/ml) of crude extracts (Hexane) of different parts of *Abutilon theophrasti* were determined against various fungal strains and results were recorded as zone of inhibition (ZOI), measured in 'mm' with DMSO as negative control and Itraconazole as positive control. The result obtained showed that leaf crude extract inhibited all fungal species with maximum zone of inhibition (ZOI-11) against *Fusarium* species, followed by fruit body with zone of inhibition 10 mm. Stem and root also displayed maximum inhibition activity against *Fusarium* species with inhibition zone of 9 mm and 7mm respectively. Inhibition activity was concentration dependent. The activity of leaf and fruit body extracts concentration (500 µg/ml) was seen good compared to standard drug. Present study successfully evaluated the role of *Abutilon theophrasti* for antifungal activity. Malarkodi *et al*., 2013 studied the antifungal activity of *Parthenium hyterophorus* in which he observed the antifungal activity in hexane extracts as compared to other solvent extracts and standard drug, which is in harmony with our present study.

DISCUSSION

Within the large reservoir of natural fungicides that exist in plants and microorganisms, it is reasonable that examples exist that would serve as safe and effective alternatives to synthetic

fungicides. Such compounds, if properly formulated and applied, could be used directly or could serve as templates for synthetic analogs. Microbially derived natural compounds have also been proposed as alternatives to synthetic fungicides. In present study the main aim was to assess the antifungal activity of *Abutilon theophrasti* against the selected fungal strains. (*Microsporum gypseum*, *Penicillium spp*, *Fusarium spp*, *Aspergillus spp*). Leaf extracts showed good antifungal activity with zone of inhibition 11 mm followed by fruit body with inhibition zone of 10 mm. stem and root also displayed antifungal activity but were poor compared to standard drug (Itraconazole).The inhibitory activity of leaf and fruit body were more promising then stem and root. The early primary phytochemical screening revealed the presence of flavonoids glycosides, catechins, antocyanidins, sterols, triterpenes, tannins, vitamins, sugars, rubber-like substances etc. (Rezhepov 1978; Paszkowski & Kremer 1988; Matlawska & Sikorska, 2005; Balah & Nassar, 2011; Kiyamova *et al*., 2012; Tian *et al*., 2014) in *Abutilon theophrasti* plant extract. Flavonoids, alkaloids and saponins are found to be associated with antimicrobial effects in various studies using plant extracts (Nwaogu LA *et al.,* 2007). Flavonoids have been found to exhibit antimicrobial activity through various mechanisms like inhibition of nucleic acid synthesis, inhibition of cytoplasmic membrane function and energy metabolism (Cushnie *et al*., 2005).

These active principals can be attributed for antifungal activity of *Abutilon theophrasti.* Variation in the results of antifungal activity of the extracts tested in the present study may be attributed to the disparity in the targets, qualitative and quantative differences in the active principals of Leaf, Fruit body, Stem and Root.

Conclusion

This study has demonstrated that, hexane extracts of *Abutilon theophrasti* have good efficacy to inhibit fungal infection, it can be due to bio-active molecules in *Abutilon theophrasti.*

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