



## Antifungal Activity of Plant Extracts of *Alstonia scholaris*, *Argemone maxicana* and *Datura alba* to Control *Candida albicans*

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**ABSTRACT:** The present investigation was carried out to observe the antifungal activity of *Alstonia scholaris*, *Argemone maxicana* and *Datura alba*. For this purpose effect of different alcoholic extract concentration was observed on growth performances of *Candida albicans* on 5<sup>th</sup> and 7<sup>th</sup> day. Result shows that alcoholic extract concentrations inhibit radial growth of this fungus. Results also indicate that inhibition of fungal growth increase with the increase in the concentration of alcoholic extracts.

**Keywords:** Medicinal plants extracts, antifungal activity, alcoholic extract, *Candida*

### INTRODUCTION

Herbal medicines can be obtained from various plant parts like root, stem, leaves etc for little or no cost. They usually contain many biologically active ingredients and are used primarily for treating mild or chronic ailments. Herbal plant extract of *Datura metel*, *Acalypha indica* and *Phyllanthus amarus* has shown that the ethanol extract shows promising antimicrobial activity against bacterial and fungal human pathogens in comparison to acetone extract (Sekar *et al.*, 2012). Many plants produce secondary metabolites. These metabolites may serve as potent antimicrobial agents and thus may be useful for human beings. It has been estimated by the World Health Organization (WHO) that 80 percent of the population of some Asian and African countries presently use herbal medicine for some aspect of primary health care (Akerle, 1993). Lupeol and Epicatechin have been identified in the methanol extract of *Alstonia scholaris*. This extract has shown antioxidant and anticancer effect. It also showed significant antimicrobial effect against *Staphylococcus aureus* and gram negative organisms like *Escherichia coli*, *Proteus vulgaris*, *Pseudomonas auriginosa* and *Candida albicans* (Thara and Zuhra, 2013).

Many of the Pharmaceuticals like, opium, aspirin, digitalis, quinine etc. have a long history of usage as herbal remedies. It is estimated that about 25% of all modern medicines are directly or indirectly derived from higher plants (Cragg *et al.*, 1997 and Shu, 1998). Traditionally herbal medicines provide an interesting, largely unexplored source of potential new drugs (Udgirkar *et al.*, 2012).

Antifungal activity of eight medicinal plants extract (*Aloe vera*, *Ocimum sanctum*, *Cenestella asiatica*, *Piper betle*, *Calotropis gigantea*, *Vitex negundo*, *Ocimum basilicum* and *Azadirachta indica*) was assayed by agar well diffusion method on plant pathogenic fungus (red rot disease causing agent) *Colletotrichum falcatum*. The result revealed that the extract of eight medicinal plants showed significant reduction in growth of *C. falcatum* (Prince and Prabakaran, 2011). Antony *et al.*, 2012 have reported that butanolic extract of bark of the *Alstonia scholaris* have potent anti-tubercle effect and anti-*Mycobacterium tuberculosis* potential and it was concluded that it is a promise for future therapeutic interventions. The present study has been aimed to screen out the antifungal activity of three medicinal plants against *Candida albicans*.

### MATERIAL AND METHODS

#### A. Sample Collection

Samples for the following medicinal plants were collected from district Saharanpur & Shiwalik belt of Uttar Pradesh as well as from Garhwal hills of Uttarakhand, India.

1. *Alstonia scholaris*
2. *Argemone maxicana*
3. *Datura alba*

The freeze-dried pathogenic fungi *Candida albicans* was obtained from Forest Pathology Division, Forest Research Institute, Dehradun. The cultures were maintained on Sabouraud Dextrose Agar (SDA) slants and kept refrigerated until used. The SDA plate cultures were inoculated from the slants and incubated at 25 ± 1°C for 7 days.

### B. Plant Extract Preparation

For the preparation of various plant extracts 5 gm of fresh plant part was washed 2-3 times with distilled water and then treated with 0.1% HgCl<sub>2</sub> solution for sterilization. After surface sterilization plant samples were ground in mortar and pestle with 50% methanol. The homogenized liquid was filtered and centrifuged at 5000 rpm. The supernatants were used as test extract & make up into 20 ml using 50% methanol. Further, the extract was diluted into different concentrations, i.e. 10%, 25% and 50%. 20 ml of SDA (Sabouraud Dextroes Agar) culture medium with 5 ml of the above concentration of the extracts were poured in sterile petriplates and allowed to solidify. In the control same

volume of distilled water (in place of experimental material) was mixed in appropriate amounts.

### C. Fungal Inoculation

For antifungal activity mycelia discs of 5 mm diameter were cut from the periphery of 7 day old culture of the test organisms and were aseptically inoculated upside down on the surface of the SDA medium in plates. Inoculated petriplates were incubated at 25°C ± 1°C and observations were recorded at 5<sup>th</sup> and 7<sup>th</sup> day. After 5<sup>th</sup> and 7<sup>th</sup> day of incubation, observations were recorded on the basis of colony diameter (cm) on medium and percent inhibition of radial growth was calculated using following formula:

$$\% \text{ Growth Inhibition} = \frac{\text{Colony diameter in control} - \text{Colony diameter in treated sets} \times 100}{\text{Colony diameter in control}}$$

## OBSERVATIONS AND RESULT

The present investigation was carried out to observe the antifungal activity of *Alstonia scholaris*, *Argemone maxicana* and *Datura alba*. For this purpose effect of different alcoholic extracts concentrations with (10%, 25% and 50%) were observed on the growth performances of *Candida albicans* causing human skin diseases are given in Table 1.

### A. Antifungal activity of *Alstonia scholaris* on *Candida albicans*

Results in table 1 shows that the growth is inhibited by alcoholic extract concentration and this inhibition rate increases with the increase in doses of plant part extract. Thus, radial growth of these fungi in 10%, 25% and 50% root extract concentration is 83.3%, 73.3% and 53.3% of the control respectively at 7<sup>th</sup> day.

Result further shows that the growth is inhibited more in 75% shoot and seed extract concentration as compared to 10% alcoholic extract concentration. Thus, in 10% shoot and seed extract concentration the radial growth of this fungi was 85.7% and 76.6% of control respectively, at 7<sup>th</sup> day, while, these values in 50% shoot and seed concentrations are 60.7% and 46.6% of the control respectively on 7th day.

### B. Antifungal activity of *Argemone maxicana* on *Candida albicans*

Table 1 shows the effect of different concentrations of alcoholic extracts of various plant parts of *Argemone maxicana* on growth of *Candida albicans*. Result shows that the radial growth of *Candida albicans* is affected by various concentration of alcoholic extract of this plant parts.

**Table 1: Antifungal activity of *Alstonia scholaris*, *Argemone maxicana*, *Datura alba* on growth performance of *Candida albicans*.**

Days	<i>Alstonia scholaris</i>			<i>Argemone maxicana</i>			<i>Datura alba</i>		
	Root	Shoot	Seed	Root	Shoot	Seed	Root	Shoot	Seed
<b>Growth in Control 0% extract</b>									
5 <sup>th</sup>	2.0	1.6	1.9	1.6	1.5	1.8	1.3	1.2	1.4
7 <sup>th</sup>	3.0	2.8	3.0	2.0	2.2	2.0	2.0	2.0	2.2
<b>Growth in 10% alcoholic extract</b>									
5 <sup>th</sup>	1.6	1.5	1.8	1.3	1.2	1.6	1.0	1.1	1.3
7 <sup>th</sup>	2.5	2.4	2.3	1.6	1.8	1.5	1.7	1.8	2.0
<b>Growth in 25% alcoholic extract</b>									
5 <sup>th</sup>	1.5	1.5	1.6	1.0	1.0	1.2	0.9	1.0	1.0
7 <sup>th</sup>	2.2	2.1	2.0	1.3	1.4	1.1	1.5	1.6	1.8
<b>Growth in 50% alcoholic extract</b>									
5 <sup>th</sup>	1.3	1.2	1.0	0.8	0.7	1.0	0.8	0.8	0.9
7 <sup>th</sup>	1.6	1.7	1.4	1.1	1.2	1.0	1.2	1.3	1.6

Observation further shows that with the increase in concentration of this medicinal plant part the rate of inhibition of fungal growth also increases. Thus, in 10%, 25% and 50% alcoholic concentration of root the radial growth is 80.0%, 65.0% and 55.0% of the control respectively at 7<sup>th</sup> day of growth. Result further shows that like root extract, shoot and seed extract also inhibits radial growth of fungi, however, this inhibition is more in higher concentration as compared to lower concentration of various plant parts of *Argemone maxicana*.

#### *C. Antifungal activity of Datura alba on Candida albicans*

Results from Table 1 shows that the growth of *Candida albicans* also inhibited by the alcoholic extract of various parts of *Datura alba*. Thus, radial growth values of this fungus are 85.0%, 75% and 60.0% of control in 10%, 25% and 50% alcoholic root extract concentration respectively at 7<sup>th</sup> day of growth.

Result also shows that with the increase in plant extract concentration the rate of inhibition increases. Thus, in 10% alcoholic shoot extract the radial growth is 90.0% of the control whereas same growth in 50.0% shoot extract is 65.0% of the control.

### DISCUSSION AND CONCLUSION

Studies on herbal plant extracts showed that the various solvent extracts showed promising antimicrobial activity against fungal human pathogens. These extracts can be utilized for isolation and characterization of therapeutically active chemical constituents used in modern medicines. Alcoholic plant extract used here showed significant fungal activity against *Candida*. So this antifungal property provides a scientific basis for the use of this plant as suitable antifungal agent. This extract can be used against skin infection caused by *Candida*. This study also encourages that these plant should be cultivated in large scale to increase the use of these plant in traditional medicine. Results with different alcoholic extract concentration of *Alstonia scholaris*, *Argemone maxicana* and *Datura alba* on the radial growth of pathogenic fungus like *Candida albicans* clearly shows that alcoholic extract concentration inhibits radial growth of opportunistic fungi.

Result indicates that inhibition of fungal growth increase with the increase in the concentration of alcoholic extracts.

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