



## IN VITRO EVALUATION OF SOME PLANT EXTRACTS AGAINST *Alternaria alternata* CAUSING LEAF SPOT OF *Aloe vera*

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### ABSTRACT

*Aloe Vera* (L.) Burn f. is a perennial succulent plant grown worldwide mainly for medicinal and cosmetic uses. During a routine survey a leaf spot disease of *Aloe vera* having infected plants with large necrotic, sunken, circular to oval, dark brown spots present on both surface of leaves was observed at SHIATS and neighboring areas. Microscopical examination revealed the presence of *Alternaria alternata* in the infected areas. Pathogen was isolated and cultured on Potato Dextrose Agar medium. Leaf extracts of six plants viz, *Jatropha curcas*, *Datura strumarium*, *Azadirachata indica*, *Moringa oleifera*, *Calotropis gigantean* and *Morus Alba* @ 50% were evaluated *In vitro* by food poison techniques against the fungus. The results revealed that all plant extracts @ 50% significantly inhibited the mycelial growth of pathogen. However leaf extract of *J. curcas* demonstrated maximum mycelial growth inhibition of *A. alternata* (62.9%) followed by *D. strumarium* leaf extract (55.6%) and was significantly superior to all other tested extracts. *A. indica* extract (51.9%) also inhibited its mycelial growth followed by *M. oleifera* (46.9%), *C. gigantea* extract (23.45%) and *M. Alba* (13.6%) as compared to control.

**Keywords:** *alternaria alternata*, *aloe vera*, plant extracts, poison food technique.

### INTRODUCTION

*Aloe-vera* is cultivated commercially for its medicinal and therapeutic uses. It has been used in preparation of various cosmetic products. The cosmetic and alternative medicine industries regularly make claims regarding the soothing, moisturizing, and healing properties of *Aloe vera*, commercially advertised mainly for skin conditions such as sunburns, cold sores and frostbite. It has also been suggested that biofuels could be obtained from *Aloe vera* seeds. *Aloe* is also used as a food substance, possibly for its gelling properties ([http://en.wikipedia.org/wiki/Aloe\\_vera](http://en.wikipedia.org/wiki/Aloe_vera)). It has been reported that leaf spot of *Aloe vera* was incited by *Alternaria alternata* that can cause economic losses in the cultivation of the *Aloe Vera*. (Rukhsana *et al.*, 2010).

The most important method of protecting the plants against the fungal attack is the use of fungicides. However, many fungicidal agents available in the market are toxic and have undesirable effects on other organisms present in the environment. Some synthetic fungicides are non-biodegradable, and hence can accumulate in the soil, plants and water, and consequently affect the humans through the food chain. The development of resistance of pathogenic fungi towards the synthetic fungicides is of great concern. Therefore, it is desirable to use some eco-friendly measures for the management of diseases (Tapwal Ashwani *et al.*, 2011).

Natural products seem to be a viable solution to the environmental problems caused by the synthetic pesticides and many researchers are trying to identify the effective natural products to replace the synthetic pesticides (Kim *et al.*, 2005). The presence of antifungal compounds in higher plants has long been recognized as an important factor in disease resistance (Mahadevan, 1982). Such compounds, being biodegradable and selective in their toxicity, are considered valuable for

controlling some plant diseases (Singh and Dwivedi., 1987).

So the aim of present study is to find the cheaper and eco friendly bio- compounds for the management of leaf spot of *Aloe vera* using extracts from different plants.

### MATERIALS AND METHODS

#### Isolation of pathogens from diseased plant tissues

*Aloe vera* stem infected with disease found during the routine survey at research field of Department of plant protection, SHIATS were brought at the pathology lab. Surface disinfestations of tissues selected for isolation work was done by 1 % sodium hypochlorite. The stems infected with disease were cut into small pieces and placed directly on acidified PDA (Mehrota R.S. and Aggarwal Ashok., 2003). After a day, colonies of fungi are visible which was further subjected for the identification of pathogen.

Microscopical examination of the pathogen revealed the pale brown to light brown conidia produced in long chain of 5, obclavate, short conical beak at the tip, smooth surface with several vertical and 8 tranverse septa which was confirmed as *Alternaria alternata* ([http://en.wikipedia.org/wiki/Alternaria\\_alternata](http://en.wikipedia.org/wiki/Alternaria_alternata)) Eariler Rukhsana *et al* (2010) has also reported the *Alternaria alternata* causing leaf spot of *Aloe vera* in Pakistan.

#### Preparation of plant extracts

Selected plants were collected from the surrounding areas of SHIATS, Campus, Allahabad and washed thoroughly with tap water and air dried. One hundred grams of plant tissue was grind using pestle and mortar by adding equal amount (100 ml) of sterilized distilled water (1: 1, w/v). The pulverized mass was



squeezed through the cheese cloth and the extracts were centrifuged at 10000 rpm for 5 - 10 minutes. The supernatant was filtered through Millipore filters (45µm) using vacuum pump assembly under aseptic conditions. A requisite amount of the filtrate was mixed in PDA just before pouring to get the desired concentrations of 50% and gently shaken for thorough mixing of the extract. The PDA plates containing the plant extracts were inoculated aseptically with the pathogen by transferring five mm diameter agar disc from the fresh cultures. Three replications were maintained for each treatment. The medium (PDA) without any phytoextract served as the control. All the inoculated Petri dishes were incubated at 25±1°C. The radial growth of the test fungus was measured in all the treatments after three days and compared with the control (Tapwal Ashwani., *et al*, 2011). The per cent inhibition of fungal growth was estimated by using following formula  $\frac{C - T}{C} \times 100$  (Vincet, 1927).

The data was recorded in triplicates and subjected to statistical analysis and conclusions were drawn on the basis of analysis of variance. The calculated value of F was compared with the tabulated values at 5% level of significance for an appropriate degree of freedom (Tapwal Ashwani *et al.*, 2011).

## RESULTS

Extracts of all six botanicals significantly inhibited mycelial growth of *A. alternata* at the tested concentrations (Table-1). Data revealed that extract of *J. curcas* demonstrated maximum mycelial growth inhibition of *A. alternata* (62.9%) followed by *D. strumarium* extract (55.6%) and were significantly superior to all other tested extracts. *A. indica* extract (51.9%) also inhibited its mycelial growth followed by *M. oleifera* (46.9%), *C. gigantea* extract (23.45%) and *M. alba* (13.6%) as compared to control.

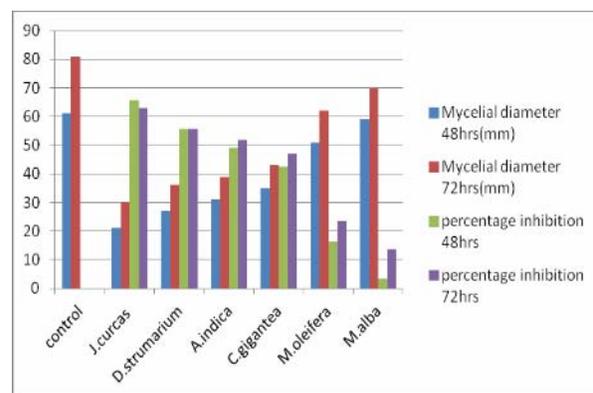
**Table-1.** *In vitro* efficacy of plant extracts on inhibition of *Alternaria alternata* against mycelial growth at different days of interval.

Treatments	Radial mycelial growth (mean) after 48 hrs in mm	Inhibition percentage after 48	Radial mycelial growth (mean) after 72 hrs in mm	Inhibition percentage after 72 hrs
Control	60.80 <sup>a</sup>		80.60 <sup>a</sup>	
<i>Jatropa curcas</i>	21.40 <sup>f</sup>	65.6	30.00 <sup>f</sup>	62.9
<i>Datura strumarium</i>	26.80 <sup>e</sup>	55.7	36.20 <sup>e</sup>	55.6
<i>Azadirachar indica</i>	31.40 <sup>d</sup>	49.2	39.00 <sup>e</sup>	51.9
<i>Moringa oleifera</i>	35.40 <sup>c</sup>	42.6	43.40 <sup>d</sup>	46.9
<i>Calotropis gigantean</i>	51.20 <sup>b</sup>	16.4	61.60 <sup>c</sup>	23.45
<i>Morus alba</i>	58.60 <sup>a</sup>	3.3	70.40 <sup>b</sup>	13.6
Grand mean	40.80		51.60	
C.V (%)	6.7		5.7	
S.E (d)	1.737		1.863	
LSD (5%)	3.58**		3.84**	

\*\* Significant at p < 0.01 level of significance

Botanical extracts with antifungal activity are being explored in order to make available the pesticides, which are easily biodegradable, selective, cheap and can be locally produced, especially for the farmers who cannot afford expensive synthetic pesticides. The results revealed that all of the tested plant extracts at given concentration inhibited the growth of pathogens (Table-1).

Similar results on the efficacy of plant extracts against *Alternaria* sp. have been reported by Shivpuri *et al.* (1998), Fawzi *et al.* (2009), Taskeen *et al.* (2010), Baraka *et al.* (2011), Nashwa and Abo-Elyour (2012), Al-Askar (2012), Mishra and Gupta (2012), and Ravikumar and Garampalli (2013). These are the evidences from the earlier work that plants possess the pesticidal activity that can play a pivotal role in the management of the plant disease which are cheap, locally available, and biodegradable and environment friendly.



**Figure-1.** *In vitro* efficacy of plant extracts against *Alternaria alternata*.

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