

Original Research Article

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## ***In vitro* Evaluation of Botanicals against *Alternaria cyamopsidis* causing *Alternaria* blight of Clusterbean**

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### ABSTRACT

#### Keywords

*Alternaria cyamopsidis*,  
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Clusterbean [*Cyamopsis tetragonaloba* (L.) Taub], an important legume crop in India. *Alternaria spp.* is an economically important pathogen widely distributed throughout the world and cause devastating disease on field crops. A total of eight commonly available botanicals were evaluated in the form of crude extracts against the growth of *Alternaria cyamopsidis* under *in-vitro* condition. Results of the *in vitro* evaluation of various botanicals against *A. cyamopsidis* revealed that all the test botanicals significantly inhibited mycelial growth of *A. cyamopsidis*, over untreated control. *Azadirachta indica* and *Eucalyptus* were found most effective followed by *Allium cepa*, *Zingiber officinalis*, *Parthenium* and *Datura*. While, *Lantana camara* was found least effective against mycelial growth of *Alternaria cyamopsidis*. *Azadirachta indica* and *Eucalyptus* were significantly superior over all other treatments.

### Introduction

Clusterbean [*Cymopsis tetragonaloba* (L.) Taub.] has become popular not only for consumption as vegetables but also as good source of useful industrial 'Guar gum' (Reddy *et al.*, 2014). In India, guar cultivation is accounted for about 75 percent of global trade and 80 percent to total guar production in the world (Dhananjaya and Naveena, 2015). In India, clusterbean is being grown in the area of 4.2 million hectares with a production of 2.42 million tonnes of cluster bean seed with an average productivity of 567 kg/ha (Anon, 2014). It suffers from several diseases that cause quantitative and qualitative losses, among them *Alternaria spp.* is an

economically important pathogen widely distributed throughout the world and cause devastating disease on field crops. Non-judicial use of fungicides adds human and environmental hazards.

The crop like clusterbean, ecofriendly and cost effective approaches are the most important and only advisable. Thus, the present investigations were carried out by the available botanicals that may reduce the dependency on fungicides.

### Materials and Methods

The present studies were conducted in the field of College of Agriculture, Gwalior

during *kharif* season of 2016. The experiment was laid out in a complete randomized design (CRD) with eight treatments including untreated control and replicated thrice. The botanicals were evaluated through Poisoned food techniques (Nene and Thapliyal, 1979). All the plant products were collected from vicinity of College of Agriculture, Gwalior. For evaluation of plant extract, leaves crude/ rhizome/ seeds/ bulb extract, the plant parts were thoroughly washed in ordinary tap water. The leaves, rhizome and bulb were dried in air and cut into small pieces, then grinded and sieved (100 mesh) and collected into conical flask for further use of investigation. The crude extract was used @40 ml solution of the respective botanical crude extract was incorporated into 60 ml Potato sucrose agar medium and pinch of streptomycin sulphate was mixed just before pouring. 7-mm culture discs of *Alternaria* isolated from guar leaves are to be taken from seven days old colony and placed in the centre of the Petri dishes containing potato dextrose agar and appropriate percentages of plant extracts, without extract medium served as control. The radial growth of the mycelium was measured after 7 days of incubation at  $21 \pm 1^\circ\text{C}$  and per cent inhibition was calculated using the formula;

$$I = \frac{C - T}{C} \times 100$$

Where,

I= per cent inhibition

C= linear growth in control (mm)

T= linear growth in treatment (mm)

## Results and Discussion

A total of eight commonly available botanicals viz., *Azadirachta indica*, *Eucalyptus globulus*, *Allium cepa*, *Parthenium hysterophorus*, *Lantana camara*, *Datura stramonium* and *Gingiber officinalis* were evaluated in the

form of crude extracts against the growth of *Alternaria cyamopsidis* under *in-vitro* condition. The fungal growth was recorded at 3, 5 and 7 days after inoculation. The data presented in the table 1 clearly indicated that all the botanicals significantly inhibited by the growth of *A. cyamopsidis* under *in-vitro* condition. Among the tested botanicals, *A. indica* (100%) and *E. globulus* (100%) completely inhibited the growth of *A. cyamopsidis*.

The treatments, *A. cepa* (91.02%), *G. officinalis* (89.38%), *P.hysterophorus* (80.81%), *D. stramonium* (58.77%) were found significantly superior in reducing the fungal growth. Minimum inhibition (52.14%) was found in *L. camara*. While in control the mycelial growth was maximum (81.6 mm).

This study reveals that the maximum inhibition of mycelium was observed in *Azadirachta indica*. The results were supported by Govindachari *et al.*, (1998); Kumar *et al.*, (2005); Singh and majumdar (2001); Ganie *et al.*, 2013. The present findings are similar to the findings of Balai and Ahir, 2011. *Azadirachta indica*, *Allium cepa* and *A. sativum* showed antifungal property against *Alternaria alternate*.

The extracts of *Eucalyptus* sp., and *Calotropis procera* inhibited the growth of fungus (Singh and Kumar, 2011); Nandagopal and Ghewande, 2004). *Allium sativum* and *Allium cepa* brought about significant reduction in disease intensity caused by *Alternaria* leaf spot on the soybean crop (Srikanth *et al.*, 2014; Nguyen, 2013). It is evident from the results that all the botanicals were found effective.

At present, plant extracts are gaining importance in plant disease management practices. These are the cheaper and safer means of disease management which reduce not only toxicity hazards but also present eco-friendly approach in nature.

**Table.1** *In-vitro* evaluation of botanicals against *A. cyamopsidis*

| Botanicals                      | Mycelial growth (mm) and percent inhibition at |                     |                 |                     |                 |                     |
|---------------------------------|--|---------------------|-----------------|---------------------|-----------------|---------------------|
|                                 | 3DAI   |                     | 5DAI            |                     | 7DAI            |                     |
|                                 | Mycelial growth                                | Mycelial inhibition | Mycelial growth | Mycelial inhibition | Mycelial growth | Mycelial inhibition |
| <i>Azadirachta indica</i>       | 0.00   | 100.00              | 0.00            | 100.00              | 0.00            | 100.00              |
| <i>Lantana camara</i>           | 8.00   | 63.08               | 20.67           | 42.05               | 35.00           | 52.14               |
| <i>Eucalyptus globulus</i>      | 0.00   | 100.00              | 0.00            | 100.00              | 0.00            | 100.00              |
| <i>Datura stramonium</i>        | 8.67   | 59.99               | 19.00           | 46.73               | 33.67           | 58.77               |
| <i>Allium cepa</i>              | 0.00   | 100.00              | 0.00            | 100.00              | 7.33            | 91.02               |
| <i>Gingiber officinalis</i>     | 0.00   | 100.00              | 0.00            | 100.00              | 8.67            | 89.38               |
| <i>Parthenium hysterophorus</i> | 7.33   | 66.17               | 9.33            | 73.84               | 15.67           | 80.81               |
| Control                         | 21.67  | 0.00                | 35.67           | 0.00                | 81.67           | 0.00                |
| CV                              | 12.38  |                     | 11.08           |                     | 7.23            |                     |
| Se(M)±                          | 0.40   |                     | 0.67            |                     | 0.94            |                     |
| CD (0.05%)                      | 1.22   |                     | 2.03            |                     | 2.84            |                     |

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