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# *In-vitro* Studies of Plant Extracts against *Alternaria brassicae* (berk.) Sacc. of Indian Mustard (*Brassica juncea* (L.) Czern. & coss)

**MAHESH SINGH*AND HK SINGH**

*Dr. K.N. Modi University, Newai, Tonk, Rajasthan, India*

*Narendra Deva University of Agriculture & Technology, Kumarganj, Faizabad, U.P. India*

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## ABSTRACT

Six plant extract *viz.*, Datura (*Daturastramonium)*, Eucalyptus (*Eucalyptus globulous*), Karang (*Pongamiaglabra*),Neem (*Azadirachtaindica*), Madar (*Calotropis gigantean)* and Wild sage (*Lantana camara)* were evaluated *in-vitro* by poison food technique @ 3, 6, 9 and 12% concentrations against *Alternariabrassicae*causing blight of mustard. The results revealed that all the plant extracts inhibited the percent growth inhibition against test fungus as compared to control. However *A.indica* was found most efficacious with growth inhibition of (38.7%) followed by *E. globulus* (36.7%). Some extract such as *P. glabra* and *D. stramonium* showed moderate inhibition over control (30.9 and 21.6 respectively). Among all plant extract, *C. gigantean* showed least (15.3%) inhibition over control against *A. brassicae*. These plant extracts can possibly be used as management of seed-borne pathogenic fungi in an eco-friendly way.

**Keywords:** Efficacy, *Alternariabrassicae*, Plant extract.

## INTRODUCTION

Indian mustard (*Brassica juncea* (L.) Czern & Coss.) is one of the major oilseed crops cultivated in India and all over the world. The crop is affected by many fungal diseases. Among these Alternaria blight caused by *Alternariabrassicae* (Berk.) Sacc.havebeen reported to be most wide spread and destructive fungal diseases of Indian mustard throughout the world (Kolte 1985 andSaharan, 1992).The characteristic symptom is the development of circular spots on leaves and pods with concentric ring. Later on spots coalesce and ultimately the leaves become blighted. Alternaria blight can cause a yield loss of 10 to 71% (Chattopadhyay, 2008) and 32.57% (Shrestha *et al.*, 2005).The disease may cause 25% yield reduction at severe condition of infection.

Synthetic chemicals used to control plant diseases not only pollute the environment, but they are also harmful to human health, other mammals and microbes. With the growing awareness of harmful effects of pesticides, using different forms of botanicals with different combinations as seed treatment and foliar spray against Alternaria blight diseases in Indian mustard to find out effective and economical control (Singh and Singh, 2014).Thus the present study was undertaken to determine, some commonly available plant extracts (leaves) were evaluated under laboratory conditions against *A. brassicae*.

## MATERIALS AND METHODS

### Preparation of pathogenic isolate of the Pathogen

*Alternariabrassicae* (Berk.)Sacc.was isolated from a diseased leaf of *Brassica juncea* cultivar '*Varuna*' at Student Instructional Farm (SIF) NDUAT, KumarganjFaizabad, India. Samples were cultured on potato dextrose agar (PDA) and incubated at 25-27° C. After proper growth, colonies were purified by single spore method and according to morphological characteristics their identification was done with the help of standard key (Singh *et al*, 2014).

### Preparation of plant extracts

Plant parts were washed with sterilized distilled water and air dried. Matured leaves or young flowering shoots of Datura (*Daturastramonium)*, Eucalyptus (*Eucalyptus globulous*), Karang (*Pongamiaglabra*),Neem (*Azadirachtaindica*), Madar (*Calotropis gigantean)* and Wild sage (*Lantana camara)*were thoroughly washed in running water and kept in shade to dry. Weighed plant materials were ground in pestle and mortar using 1:1 w/v. The materials were homogenized for 5 min, filtered through double layered muslin cloth followed by Whatman's filter paper No. 41 and filtrates were considered as standard extract (100%) (Kamlesh and Gurjar, 2002; Prasad and Barnwal, 1994).

The standard leaf extract solution (100%) and Potato Dextrose Agar (PDA) medium was mixed at required quantities to get 3%, 6%, 9% and 12% concentrations.

### Inhibitory tests on mycelial growth

All the sixbotanicals were tested against *A. brassicae*following poisoned food technique. 5-mm culture discs of *A. brassicae*were taken from ten days old colony and placed in the center of the Petri dishes containing potato dextrose agar with plant extracts and without extract medium Petri dishes used as control. Plates were incubatedat 25 ± 1°C for 7 days and there after the smallest and largest diameters of mycelial growthof the pathogen of plates were measured and recorded. The per cent inhibition was calculated by using the formula (Eq.1);

$$\text{Per cent inhibition} = \frac{\text{Growth in check-growth in treatment}}{\text{Growth in check}} x\ 100 \quad \text{[Eq.1]}$$

* Corresponding author email:doctorsingh14@gmail.com

## RESULTS AND DISCUSSION

Six plant extracts *viz.*,Datura (*Daturastramonium)*, Eucalyptus (*Eucalyptus globulous*), Karang (*Pongamiaglabra*) ,Neem (*Azadirachtaindica*), Madar (*Calotropis gigantean)* and Wild sage (*Lantana camara)*were evaluated using poisoned food technique to check the efficacy of botanicals against *Alternariabrassicae.* Inhibition of mycelial growth varied significantly with different botanicals at different concentrations *viz.*, 3.0 per cent, 6.0 per cent, 9.0 per cent and 12 per cent (Table 1).

The data revealed that at 3 per cent concentration, maximum inhibition in mycelial growth (31.8%) was recorded in Neem followed by Eucalyptus (29.2%), while minimum inhibition in mycelial growth (7.4%) was recorded in Madar, followed by Lantana (10.0%). Mycelial growth (35.5%) at 6 per cent in Neem was recorded maximum followed by Eucalyptus (33.3%), while minimum inhibition in mycelial growth (12.6%) was recorded in Madar, followed by Lantana (17.4%). At 9 per cent maximum (41.4%) mycelial growth was recorded Neemfollowed by Eucalyptus (39.6%), minimum inhibition in mycelial growth (20.0%) was recorded in Madar, followed Lantana (20.3%) and Datura (24.4%). Mycelial growth inhibition was maximum (46.4%) at 12 per cent in Neem, followed Eucalyptus (44.8%), minimum inhibition in mycelial growth (20.3%) was recorded in Lantana, followed by Madar (21.4%) and Datura (26.3%)(Table 2).

The results of the present study clearly reveal that the use of botanical fungicides may be a standard for the control of Alternaria blight of mustard.Neem was found effective fungicide against *A.brassicae* by Ganie*et al*., 2013 and Singh, *et al*., 2013, Eucalyptus also showed good inhibition (Patni*et al*., 2005) were reported earlier.

**Table 1:**Effect of botanicals in radial growth of *Alternaria brassicae*

| Botanicals | Radial growth of mycelium (mm) | | | | |
|---|---|---|---|---|---|
| | Concentration | | | | Mean |
| | 3(%) | 6(%) | 9(%) | 12(%) | |
| Datura | 75.33 | 72.33 | 68.00 | 66.33 | 70.50 |
| Neem | 61.33 | 58.00 | 52.66 | 48.33 | 55.08 |
| Eucalyptus | 63.66 | 60.00 | 54.33 | 49.66 | 56.91 |
| Karanj | 69.00 | 64.66 | 59.33 | 55.33 | 62.08 |
| Lantana | 81.00 | 78.33 | 71.66 | 69.66 | 75.16 |
| Madar | 83.33 | 78.66 | 72.00 | 70.66 | 76.16 |
| Check | 90.00 | 90.00 | 90.00 | 90.00 | 90.00 |

**Table 2:**Effect of botanicals on per cent inhibition in radial growth of *Alternaria brassicae*

| Botanicals | Per cent inhibition in radial growth of mycelium | | | | |
|---|---|---|---|---|---|
| | Concentration | | | | Mean |
| | 3(%) | 6(%) | 9(%) | 12 (%) | |
| Datura | 16.3 | 19.6 | 24.4 | 26.3 | 21.6 |
| Neem | 31.8 | 35.5 | 41.4 | 46.3 | 38.7 |
| Eucalyptus | 29.2 | 33.3 | 39.6 | 44.8 | 36.7 |
| Karanj | 23.3 | 28.1 | 34.0 | 38.5 | 30.9 |
| Lantana | 10.0 | 17.4 | 20.3 | 20.3 | 17.0 |
| Madar | 7.4 | 12.6 | 20.0 | 21.4 | 15.3 |

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