

Review Article

<https://doi.org/10.20546/ijcmas.2019.812.172>

## Effect of Selected Botanicals against Leaf Spot (*Alternaria brassicae*) of Cabbage (*Brassica oleracea* var. *Capitata* L)

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### ABSTRACT

Cabbage (*Brassica oleracea* var. *Capitata* L.) is contemplated as second most important vegetable belonging to the family brassicaceae. *Alternaria* leaf spot of cabbage is prevalent in all the cabbage growing states and is one of the major biotic problems, which limits the production of cabbage and quality of produce. The experiment for management practices on leaf spot of cabbage using botanicals was conducted during Rabi season. The minimum disease intensity was recorded in foliar sprays of *Eucalyptus globulus* @ 10% (30.40 %) followed by *Azadirachta indica* @ 15% (31.4 %), *Lantana camara* @ 15% (32.40 %), *Ocimum sanctum* @ 15% (34.8 %), *Cyperus rotundus* @ 15 % (37.4 %), as compared to treated (27.5 %) and untreated (43.8 %) checks. Maximum fresh head weight was recorded in *Eucalyptus globulus* (0.80 kg ) followed by *Azadirachta indica* (0.65 kg ), *Lantana camara* (0.64 kg ), *Ocimum sanctum* (0.56 kg ), *Cyperus rotundus* (0.52 kg ), as compared to treated (1.01 kg) and untreated (0.46 kg) checks. Maximum yield was recorded in *Eucalyptus globulus* (26.72 tonnes/ha) followed by *Azadirachta indica* (24.44 tonnes/ha), *Lantana camara* (22.88 tonnes/ha), *Ocimum sanctum* (21.27 tonnes/ha), *Cyperus rotundus* (17.77 tonnes/ha), as compared to treated (33.96 tonnes/ha) and untreated (14.71 tonnes/ha) checks.

#### Keywords

Cabbage, *Alternaria brassicae*, Botanicals, Leaf spot

#### Article Info

Accepted:  
12 November 2019  
Available Online:  
10 December 2019

### Introduction

Cabbage (*Brassica oleracea* var. *capitata* L.) is contemplated as second most important vegetable belonging to the family Brassicaceae known as a leafy green or purple biennial plant. The cabbage plant, *Brassica oleracea*, is an herbaceous annual or biennial vegetable in the family Brassicaceae grown

for its edible head (Singh *et al.*, 2006). Cabbage is an superior source of vitamin K, vitamin C and vitamin B<sub>6</sub>. It is a further good source of manganese, dietary fiber, potassium, vitamin B<sub>1</sub>, folate and copper. Additionally, cabbage is a vigorous source of choline, phosphorus, vitamin B<sub>2</sub>, magnesium, calcium, selenium, iron, pantothenic acid, protein (Nilsson *et al.*, 2006;

Kusznierewicz *et al.*, 2008). It is the major source of vegetable in the world and constitutes an important part of diet. Daily per capita consumption of vegetables in the country is only 145g, which is much less than the requirement of about 285g for a balance diet (ICMAR, 1998). The cabbage crop is affected by various fungal as well as bacterial diseases like damping off, club root, downy mildew, *Sclerotinia* rot, black leg, black rot, soft rot and *Alternaria* blight or *Alternaria* leaf spot. The disease *Alternaria* leaf spot of cabbage is prevalent in all the cabbage growing states and is one of the major biotic problems, which limits its production and also quality of produce. There are two species of *Alternaria* which cause serious damage in cabbage: *Alternaria brassicae* and *Alternaria brassicicola*, they can survive saprophytically outside of the host and diseased crop debris (Yadav *et al.*, 2014). Several fungicides and botanicals belonging to various groups are recommended for the management of *Alternaria* leaf spot of cabbage. Now-a-days farmers are using only the chemical fungicides for managing the disease, but it has the negative impact on the environment and develops resistant in pathogen. So, due to these reasons use of specific chemical fungicides with recommended dosages and botanicals will not harm the environment and also were effective in controlling the disease (Yadav *et al.*, 2014).

### **Materials and Methods**

The present investigation was carried out at Central Research Field, Department of Plant Pathology, SHUATS, Prayagraj (U.P.) during *Rabi* season. The experiment was conducted in Randomized Block Design with 7 treatments. The treatments were replicated three times. Treatments were randomly arranged in each replication divided into 21 plots. The plot size was 2 x 2 m. Foliar spray of botanicals were started at onset of the

disease and repeated two sprays. The seven treatments were taken as: Mancozeb (0.2%), *Azadirachta indica* (15%), *Eucalyptus globulus* (10%), *Ocimum sanctum* (15%), *Lantana camara* (15%), *Cyperus rotundus* (15%) and control were used for management of disease. Yield, headweight data was recorded and PDI was calculated after each spray by using 0-9 disease rating scale on the basis of percentage area of foliage infected by the pathogen.

### **Isolation of the pathogen**

The pathogen was isolated from the disease infected plants and it was identified as the *Alternaria brassicae*. *Alternaria* leaf spot of cabbage infected leaves were collected from experimental field of SHUATS. The infected leaves were cut into small pieces (0.5cm<sup>2</sup>) surface sterilized with sodium hypochlorite (0.1%) for 15-30 seconds, rinsed with three changes of sterile distilled water to remove the disinfectant and blotted dry. The sterilized pieces were plated (4 pieces/dish) on potato dextrose agar (PDA) medium in Petri dishes under aseptic conditions and incubated at 25 °C for 2 weeks.

For obtaining sufficient quantity of inoculums, pure cultures were obtained by sub culturing. For this purpose, small bits of the fungus were taken at the tip of a sterilized needle and transferred aseptically to the centre of fresh PDA medium in Petri dishes. The dishes were incubated for 2 weeks at 25 °C in the dark.

### **Preparation of botanicals**

For preparation of extract 150 g leaves were taken in a clean blender and blended without water, the pulverized leaves tissue was filtered through three-fold of muslin cloth and 100% pure filtrate was used as an extract in the ratio of 1:1(w/v) of seed and solution (Table 1).

## Results and Discussion

The experimental results of the present investigation reveals that minimum per cent disease intensity was recorded in T<sub>2</sub>- *Eucalyptus globulus* @ 10% (30.40 %) followed by T<sub>1</sub>- *Azadirachta indica* @ 15% (31.4 %), T<sub>4</sub> - *Lantana camara* @ 15% (32.40 %), T<sub>3</sub> - *Ocimum sanctum* @ 15% (34.8 %), T<sub>5</sub> - *Cyperus rotundus* @15 % (37.4 %), as compared to T<sub>6</sub> - treated (27.5 %) and T<sub>0</sub> - untreated (43.8 %) checks. The maximum fresh weight of head of cabbage was observed in T<sub>2</sub>- *Eucalyptus globulus* (0.80 kg ) followed by T<sub>1</sub> - *Azadirachta indica* (0.65 kg ), T<sub>4</sub> - *Lantana camara* (0.64 kg ), T<sub>3</sub> - *Ocimum sanctum* (0.56 kg ), T<sub>5</sub> - *Cyperus rotundus* (0.52 kg ), as compared to T<sub>6</sub> - treated (1.01 kg) and T<sub>0</sub> - untreated (0.46 kg) checks. Maximum yield was recorded in T<sub>2</sub>- *Eucalyptus globulus* (26.72 tonnes/ha)

followed by T<sub>1</sub> - *Azadirachta indica* (24.44 tonnes/ha), T<sub>4</sub> - *Lantana camara* (22.88 tonnes/ha), T<sub>3</sub> - *Ocimum sanctum* (21.27 tonnes/ha), T<sub>5</sub> - *Cyperus rotundus* (17.77 tonnes/ha), as compared to T<sub>6</sub> - treated (33.96 tonnes/ha) and T<sub>0</sub> - untreated (14.71 tonnes/ha) checks. Reported yield of mustard seeds was significantly highest in *Eucalyptus* spray.

Probable reasons for such findings may be that the presence of essential oils (monoterpene  $\alpha$ -pinene, *p*-cymene and  $\gamma$ -terpinene) in *Eucalyptus* may have prevented the hyphal growth and sporulation of *Alternaria brassicae*. It may have also interrupted the nutrient uptake and induced lysis. These are also responsible for altering the fungal physiology by inducing changes in cell wall compositions, plasma membrane disruption, mitochondrial structure, membrane.

**Table.1**

S.no	Treatments	Disease intensity (%)	Head weight (kg)	Yield (t/ha)
T <sub>0</sub>	Control ( untreated check)	43.80	0.46	14.71
T <sub>1</sub>	<i>Azadirachta indica</i> @ 15%	31.40	0.65	24.44
T <sub>2</sub>	<i>Eucalyptus globulus</i> @ 10%	30.40	0.80	26.72
T <sub>3</sub>	<i>Ocimum sanctum</i> @ 15%	34.80	0.56	21.27
T <sub>4</sub>	<i>Lantana camara</i> @ 15%	32.40	0.64	22.88
T <sub>5</sub>	<i>Cyperus rotundus</i> @ 15%	37.40	0.52	17.77
T <sub>6</sub>	Mancozeb @ 0.20% (treated check)	27.50	1.01	33.96
	SEd ±	0.61	0.06	0.37
	C.D.(P=0.05)	1.89	0.18	1.1

The result allows to conclude that the contrary to the problems associated with the use of synthetic chemicals, botanicals are environmentally non pollute, indigenously available, easily accessible, non phytotoxic, systemic ephemeral, readily biodegradable, relatively cost effective and hence constitute a suitable plant protection in the strategy of biological management of disease. *Eucalyptus globulus* at 10 % concentrations were found as

best treatment to control of *Alternaria* leaf spot of cabbage and also gave higher yields as par compared with Mancozeb (Treated check). Since present day economists are advising for net return concept, *Eucalyptus globulus* can be recommended and keeping a point view of environmental safety can also recommended to the farmers for the efficient management of *Alternaria* leaf spot of cabbage.

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### How to cite this article:

Dasari Sreevarshini, Vaka Siva Kumar, Sobita Simon and Abhilasha A. Lal. 2019. Effect of Selected Botanicals against Leaf Spot (*Alternaria brassicae*) of Cabbage (*Brassicae oleracea* var. *Capitata* L). *Int.J.Curr.Microbiol.App.Sci*. 8(12): 1426-1429.  
doi: <https://doi.org/10.20546/ijcmas.2019.812.172>