

## ***In-Vitro* Bioefficacy of Plant Extract and Fungicides against *Alternaria Burnsii* Causing Blight of Cumin**

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### **Abstract**

*Cumin (Cuminum cyminum L.) is one of the most important spices crop grown in India. During the survey cumin crop was found moderately to severely affected by fungal blight in Jabalpur (M.P). Looking to the seriousness of the disease, present investigation was under taken to find out suitable plant extracts and fungicides for minimizing the crop losses. In vitro screening of nine plant extracts viz., Datura metel, Azadirachta indica, Pongamia pinnata, Bougainvillea sp., Acacia nilotica, Jatropha curcas, Eucalyptus globules, Polyanthia longifolia, Lawsonia inermis and fungicides viz., Carbendazim 12% + Mancozeb 63%, Carbendazim and Chlorothalonil were evaluated against Alternaria burnsii through poisoned food technique at three different concentrations, respectively. Among plant extracts, Datura metel proved superior to all other botanicals, exhibiting (58.52%) mycelial growth inhibition of A. burnsii. This was followed by Jatropha curcas (50.74%) and Acacia nilotica (49.63%) inhibition respectively. Lawsonia inermis (26.30%) proved least effective in inhibiting the mycelial growth of the test fungus. Among the fungicides, Carbendazim 12% + Mancozeb 63% caused (73.33%) inhibition of mycelial growth.*

**Keywords:** *Alternaria burnsii, blight, cumin, plant extracts, fungicides.*

### **Introduction**

Cumin (*Cuminum cyminum L.*) popularly known as Jeera belongs to the family: Umbelliferae. It is believed to be native of Mediterranean and near Eastern regions. It is mainly grown in hot countries, especially India, North Africa, China and America. Besides India, cumin seed is cultivated in Iran, Turkey and in Syria mainly for exports. India is one of the largest producer and consumer of cumin seeds. India's annual production of cumin seed ranges between 1 lakh metric tons to 3 lakh metric tons. The cumin is exclusively cultivated in Rajasthan and Gujarat. Both the states together contribute more than 95% of total country's cumin production. Although the cultivation of cumin is scanty more ever the districts of M.P. (Neemuch, Mandsaur, Ratlam and Alirajpur) adjoining to Rajasthan and Gujarat, the cultivation of cumin is in progress.

### **Materials and Methods**

#### ***Invitro*evaluation of plant extracts**

The fresh plant samples of 100 g were washed in tap water then washed with alcohol and finally washed thrice using sterile distilled water. They were crushed in a sterile mortar and pestle by adding 100 ml of sterile distilled water. Filtrate thus obtained from the sample was used as 100 per cent stock solution. The stock solutions 5ml, 10ml and 15ml was taken separately and was mixed with 50 ml sterile molten PDA medium respectively. The PDA medium was poured into Petri plates and all plates were inoculated with 5 mm mycelia disc of *A. burnsii* and incubated at  $28 \pm 1^{\circ}\text{C}$ . The efficacy of fungicides against *Alternaria burnsii* was assessed by poison food technique. Fungicides were evaluated at 100, 500 and 1000 ppm respectively.

### Results and Discussion

It is evident from the data presented in Table 1 that all the treatments were significantly superior over control in reducing mycelia growth. *Datura metel* leaf extract amended medium showed 41.33 mm radial growth of the test fungus at 10% concentration that was minimum against maximum (90.00 mm) in control. *Acacia nilotica* and *Jatropha curcas* were significantly at par and stood second in order of efficacy, where 50.66 mm and 50.33 mm radial growth was recorded. *Bougainvillea sp.* and *Polyanthia longifolia* leaf extracts recorded 60.66 mm and 63.66 mm radial growth of test fungus

respectively. Rest of the treatments were comparatively less effective for inhibition of mycelial growth.

*Datura metel* leaf extract at 20% concentration of inhibited the mycelia growth of *A. burnsii* significantly followed by *Jatropha curcas* and *Acacia nilotica*. Radial growth of mycelium of the test fungus was 39.00 mm, 45.66 mm and 49.00 mm respectively against maximum (90.00 mm) in control. This was followed by *Bougainvillea sp.* (50.66 mm), *Eucalyptus globulus* (56.00 mm) and *Polyanthia longifolia* (60.33 mm) rest of the treatments remained significant with each other and superior over control.

**Table 1 Evaluation of botanicals on mycelial growth of *Alternaria burnsii***

Sr. No.	Plants	Mean radial growth (mm)*			Percent growth inhibition at 30% conc.
		Concentration (%)			
		10	20	30	
1	<i>Datura metel</i>	41.33	39.00	37.33	58.52
2	<i>Azadirachta indica</i>	79.00	76.66	63.33	29.63
3	<i>Pongamia pinnata</i>	82.00	78.66	74.66	17.04
4	<i>Bougainvillea sp.</i>	60.66	50.66	46.66	48.15
5	<i>Acacia nilotica</i>	50.66	49.00	45.33	49.63
6	<i>Jatropha curcas</i>	50.33	45.66	44.33	50.74
7	<i>Eucalyptus globulus</i>	70.66	56.00	48.33	46.3
8	<i>Polyanthia longifolia</i>	63.66	60.33	57.33	36.3
9	<i>Lawsonia inermis</i>	81.00	77.33	66.33	26.3
10	Control	90.00	90.00	90.00	-
	SEm ±	0.316	0.258	0.365	
	CD(P=0.05)	0.938	0.766	1.072	

\*Mean of three replications

The minimum (37.33 mm) radial growth of *A. burnsii* was noted in *Datura metel* leaf extract followed by *Jatropha curcas* (44.33 mm), *Acacia nilotica* (45.33 mm), *Bougainvillea sp.* (46.66 mm), *Eucalyptus globulus* (48.33 mm) and *Polyanthia longifolia* (57.33 mm) against maximum (90.00 mm) in control after 10

days at 30 % concentration. The efficacy of leaf extracts of *Eucalyptus globulus*, *Datura stramonium*, *Azadirachta indica* was reported earlier against *Alternaria alternate*<sup>[3]</sup>. Inhibitory effect of *Datura stramonium*, *Eucalyptus globules* and *Azadirachta indica* against *A. burnsii* was also observed<sup>[5]</sup>.

**Table 2 Efficacy of fungicides on mycelial growth of *Alternaria burnsii***

Sr. No.	Fungicides	Mean radial growth (mm)*			Percent growth inhibition at 1000 ppm
		Concentration (ppm)			
		100	500	1000	
1	Carbendazim 12% + Mancozeb 63%	40.33	26.33	24.00	73.33
2	Carbendazim	54.33	40.66	35.33	60.64
3	Chlorothalonil	43.33	33.66	28.33	68.52
4	Control	90.00	90.00	90.00	0.000
	SEm ±	0.433	0.711	0.439	
	CD(P=0.05)	1.63	2.02	1.66	

\*Mean of three replications

The data presented in Table 2 revealed that, all the fungicides significantly inhibited the growth of fungus at all the concentrations and radial growth ranged from 24.00 to 54.33 mm in treatments as compared to control (90.00 mm). Among the fungicides Carbendazim 12% + Mancozeb 63% (73.33%) was found to be most effective followed by Chlorothalonil (68.52). whereas, Carbendazim were found to be least effective and exhibited mycelial growth even at 1000 ppm concentrations. However mycelia growth decreased as the concentration increases.

Effectiveness of Carbendazim 12% + Mancozeb 63%, Tebuconazole,

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Hexaconazole has been reported against the *Alternaria alternata*<sup>[1,4]</sup>.

#### Conclusion

The extracts of plant and three fungicides were tested against *Alternaria burnsii* by poison food technique *in vitro* significantly list growth was reported in the extract of *Datura metel* showing excellent inhibitory effect on *Alternaria burnsii*. Next best in order of merit was *Jatropha curcas* and *Acacia nilotica* at 30 % concentration. Similarly in fungicides Carbendazim 12% + Mancozeb 63% showing highest percent of mycelial growth inhibition.