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# Inhibitory Activityof *Syzygium Cumini* L. Leaf Extracts on Fungi

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**Abstract:**From Vedic era to save the crops from the attack of pests and diseases, peoples used crude chemical, animal and plant materials. Biological control is cost effective, eco-friendly and an innovative. Synthetic chemicals cause severe and long-term environmental pollution and are highly and acutely toxic and can even cause cancer in humans and wild animals. Also, pathogens may become resistant to many of these chemicals.The aim of the present work was to determine inhibitory activity of *Syzygium cumini* L. leaf extracts on fungi.The efficacy was studiedby poisoned food technique against pathogenic fungi.The leaf extract was used at various concentrations viz., 10-100%, while the five pathogenic fungi under investigation were *Fusarium incarnatum, Alternaria citri, Colletotrichum musae, Colletotrichum* sp. and *Gibberella avenaceum.* Among the fungi maximum growth inhibition was observed in case of *Gibberella avenaceum* (66.54 %),followed by *Fusarium incarnatum* (65.04 %), *Alternaria citri* (55.64 %), *Colletotrichum musae* (26.02%) and *Colletotrichum* sp. (8.96 %) at 100% concentration. The differences in percent inhibition among the fungi as well as due to various concentrations of leaf extract were statistically significant (p=0.01).

**Keywords:***Syzygium cumini* L.,*Alternaria citri, Gibberella avenaceum,Fusarium incarnatum, Colletotrichum musae.*

## 1. INTRODUCTION:

Biological control is cost effective, eco-friendly and an innovative. The fungal diseases of plants are controlled by using synthetic fungicidesand other agricultural practices such as crop rotation inter-cropping and sanitation observed by Pretty (2008). Synthetic chemicals cause severe and long-term environmental pollution and are highly and acutely toxic and can even cause cancer in humans and wild animals. Also, pathogens may become resistant to many of these chemicals. From Vedic era to save the crops from the attack of pests and diseases peoples used crude chemical, animal and plant materials (Thind, 2005). Therefore it is need to develop drugs that combine sustainability, high efficacy and restricted toxicity, safety for humans, animals, host plants and ecosystems with low production cost. Since fungicides of biological origin have been demonstrated to be specifically effective on target organisms and are also biodegradable, biological control has become popular worldwide (Barker 2006, Fatehi 2005; Ienascu, 2008;Abubakar, 2010).

Now a day plant extracts as natural products are widely used to control pests (Lale, 1999; Islam; 2004). Fungal plant diseases represent an important cause of increased annual crop losses. More than 70% of all major crop diseases are caused by fungi (Agrios, 2005). Generally, the control of plant diseases and pests is well established with synthetic fungicides and other agricultural practices such as crop rotation inter-cropping and sanitation (Pretty, 2008). However, in the recent years the farmers all over the world have reported an efficacy decrease of the treatments with traditionally used fungicides to control early blight and other plant diseases (Fairchild, 2013). Furthermore, the inappropriate use of fungicides, such as applying increased and more frequent dosage units (Genet, 2006) has resulted on the one hand in the occurrence of fungal resistance (Brent and Hollomon,1998; Mcgrath, 2001; Haouala, 2008) and on the other hand in hazardous effects in human andanimal health and on the environment resultingin ecological imbalances (Pramila and Dubey, 2004). Products based on natural components used in controlling and combating phytopathogenic agents have gained increased attention lately, in search of eco-friendly methods that can be used either for mass production or for some the

organic and bio farming niche production. Moreover, the natural fungicides are easily accessible and relatively cost effective, in the perspective of sustainable methods of plant.

Inhibitory activities of plant extracts against phytopathogenic fungi were observed by many researchers (Abdulrahman A. Aba Alkhail, 2005; H.C.Mangang, G.K.N.chhetry, 2012; Ashwani Tapwal, 2011; Inampudi Sailaja, 2014; Umesh P.Mogle, 2013; R.Raji and K.Raveendran,2013**)**. Keeping this in view, the present work was done to determine inhibitory activity of *Syzygium cumini* L. leaf extracts on fungi. The efficacy was studied by poisoned food technique against pathogenic fungi. The leaf extract was used at various concentrations viz., 10-100%, while the five pathogenic fungi under investigation were *Fusarium incarnatum, Alternaria citri, Colletotrichum musae, Colletotrichum* sp. and *Gibberella avenaceum.*

## 2. MATERIALS AND METHODS

### 2.1 ISOLATION OF PATHOGENS:

From some ornamental plants five fungal pathogens *viz. Fusarium incarnatum, Alternaria citri,Colletotrichum musae, Colletotrichum* sp.and *Gibberella avenaceum*were isolated on Potato Dextrose Agar medium.The pure cultures were maintained on PDA media and allowed to grow at 26°±1°C for one week.

**2.2 Collection of Plant Material:** Fresh and healthy leaves of *Syzygium cumini* L.were collected from Shendra MIDC Aurangabad (M.S.). The leaves were washed with running tap water and finally rinsed with distilled water. It is then blotted with filter paper. These leaves were used in the preparation of leaf extract.

**2.3 Preparation of Plant Extract:** Plant extract were obtained by grinding 100 gm of leaves with 100 ml of distilled water. It was strained through double layered muslin cloth .The extract were allowed to settle for a while and supernatant were passed through filter paper. The filterate was used for the test.

**2.4 Inhibitory Activity Assay by Poisoned Food Technique:**Potato Dextrose Agar (PDA) medium with 10 to 100%concentration of the aqueous extracts of *Syzygium cumini* L.were prepared and poured into sterile petrilpates and allowed to cool and solidify. 5 mm mycelial discs of seven days old cultures of *Fusarium incarnatum, Alternaria citri, Colletotrichum musae, Colletotrichum* sp. and *Gibberella avenaceum* were placed at the centre of the petri plates and incubated at 25±2$^0$C for seven days.The PDA medium without the aqueous extract but with the same concentration of sterile distilled water treated as a control. The colony diameter was measured in mm. These inhibitory activities were done in triplicates. The percentage inhibition of mycelia growth was calculated by using following formula (Dissanayake, M.L.M.C., 2014)

Percentage Inhibition= [(dc – dt)/ dc] × 100.

Where, dc= Average colony diameter in control

dt = Average colony diameter in treatment

**3. RESULTS AND DISCUSSIONS:**

Many agriculturally important pesticides have been banned by World Health Organization (WHO)due to their wide range of toxicity against non target organisms including humans, which are known to cause pollution problem (Barnard et al, 1997). The inhibitory activity was determined by measuring the percentage inhibition in radial growth.

The inhibitory activity of *Syzygium cumini* L. leaf extracts on fungiwas studied and the results are depicted in Table 1 (fig.1). The leaf extract was used at various concentrations viz., 10-100%, while the 5 fungi under investigation were *Fusarium incarnatum, Alternaria citri, Colletotrichum musae, Colletotrichum* sp. and *Gibberella avenaceum.* The percent inhibition of fungi significantly differed among themselves as well as due to various concentrations of leaf extract. On an average, there was 27.48 % inhibition of mycelial growth due to the treatment with 10 % leaf extract. It significantly increased to 33.59 % at 30 % concentration and then gradually

up to 44.44 % at 100 % concentration. Among the fungi maximum growth inhibition was observed in case of *Gibberella avenaceum* (66.54%),followedby *Fusarium incarnatum* (65.04 %), *Alternaria citri* (55.64%), *Colletotrichum musae* (26.02%) and *Colletotrichum* sp. (8.96 %) at 100% concentration. The differences in percent inhibition among the fungi as well as due to various concentrations of leaf extract were statistically significant (p=0.01).

Thus the application of these leaf extracts could bebest for fungal disease management as it is less expensive, easily available, non- polluting and ecofriendly. The variation in percent inhibition among the fungi was statistically significant. These results were confirmed by many authors and found that plant extracts showed inhibitory activity against plant pathogenic fungi (Guilherme, 2007;Mdee, 2009; Dissanayake, 2013; Ganie, 2013).Finally, from the result concludedthat, leaf extract of *Syzygium cumini* L.is best alternative to the harmful chemical fungicides and can be effectively used as eco-friendly fungicides against *Fusarium incarnatum,Gibberella avenaceum*and*Alternaria citri* (Fig.2) which can controlpollution caused by chemical fungicides.

**Table 1: Inhibitory activity of *Syzygium cumini* L. leaf extracts on fungi.**

| Sr. No. | Conc. of Leaf Extract (%) | Percent inhibition of the mycelial growth of pathogenic fungi | | | | | |
|---|---|---|---|---|---|---|---|
| | | ***Fusarium incarnatum*** | ***Alternaria citri*** | ***Colletotrichum musae*** | ***Colletotrichum* sp.** | ***Gibberella avenaceum*** | **Mean** |
| 1 | 10 | 46.99 | 33.33 | 18.04 | 2.23 | 36.8 | 27.48 |
| 2 | 20 | 53.38 | 46.36 | 18.43 | 4.83 | 37.92 | 32.18 |
| 3 | 30 | 54.14 | 47.89 | 19.61 | 5.58 | 40.75 | 33.59* |
| 4 | 40 | 55.64 | 48.66 | 20.78 | 5.95 | 46.48 | 35.50** |
| 5 | 50 | 56.39 | 49.04 | 23.14 | 6.32 | 50.93 | 37.16** |
| 6 | 60 | 57.89 | 49.43 | 23.53 | 7.14 | 56.49 | 38.90** |
| 7 | 70 | 60.15 | 50.19 | 24.15 | 7.43 | 60.59 | 40.50** |
| 8 | 80 | 63.16 | 53.38 | 24.81 | 7.81 | 61.71 | 42.17** |
| 9 | 90 | 63.53 | 54.14 | 25.65 | 8.55 | 64.31 | 43.24** |

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|---|---|---|---|---|---|---|---|
| 10 | 100 | 65.04 | 55.64 | 26.02 | 8.96 | 66.54 | 44.44** |
| Mean | | 57.63 | 48.81 | 22.42 | 6.48 | 52.25 | |
| F value of fungi = 309.77 (p= 0.01) | | | | F value of Conc. = 9.29 (p= 0.01) | | | |

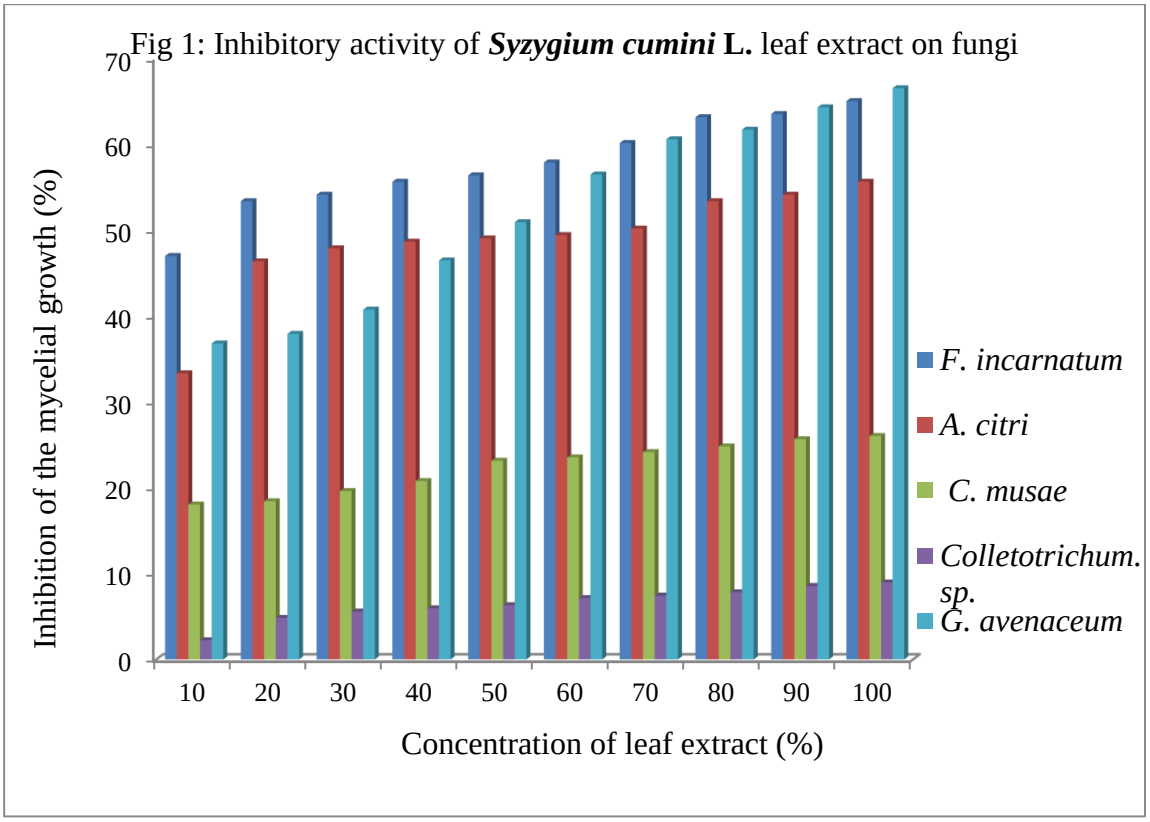


**Fig 2: Inhibitory activity of *Syzygium cumini* L. leaf extracts on fungi.**

1.*Fusarium incarnatum*2. *Alternaria citri*

3.*Colletotrichum musae* 4.*Colletotrichum* sp.

5. *Gibberella avenaceum*

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