

Studies on antagonistic effects of Trichoderma viride BMFC-10 against sooty mold disease causing fungi

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Abstract

Butea monosperma, a significant therapeutic plant, has a number of fungi attacking it, including those that cause sootymold disease. At every sampling site mentioned in the article, a significant incidence of sootymold was noted. *Trichoderma viride* BMFC-10, one of the 17 fungi that were identified, exerted the greatest growth suppression on all other fungi in the sootymold complex. On the in vitro growth of sooty mould fungi, *Trichoderma viride* BMFC-10 culture filtrate toxicity was found to be considerable. *Trichoderma viride* BMFC-10 was the antagonist that had the greatest success in combating the test sootymold fungus. keywords : *Butea monosperma*, fungi, leaf, *Trichoderma viride* BMFC-10.

Key words: *Butea monosperma*, . *Trichoderma viride* BMFC-10, sootymold, fungi etc.

INTRODUCTION

One of the significant forest plants with considerable economic values is *Butea monosperma*, also referred to as palash. It is regarded as the residence of various Gods. In tribal areas, nearly every part of the plant is utilized as a medicinal, a pesticide, or a dye. They are employed in the manufacture of inexpensive leaf plates and cups for country feasts. Furthermore, leaves are used to wrap tobacco in biddies. The plant is severely afflicted by a number of severe diseases, such as Sooty mold, which completely covers the leaves and growth tips. Despite the plant's extreme importance, pathologists have not yet made any significant attempts to control this disease. Many fungal diseases, notably Sootmold, damage the plant. The name Sootmold is self-explanatory because it refers to a black, powdery covering on leaves, branches, and fruit that is a result of fungal growth rather than a disease. On the outside of leaves, twigs, and fruit, a fungal coating that resembles a black velvety coating is developed. Sootymold is made up of a variety of fungi that thrive on sweet honey dew produced by aphids, whitefly scales, and other

insects that feed on the sap of their host plants. These are fungi that exclusively grow on the surface of leaves and are saprophytic. It is typically regarded as a cosmetic or aesthetic issue. Despite the plant's extreme importance, pathologists have not yet made any significant attempts to control this disease. Unfortunately, the Sootymold disease impairs the photosynthetic regions of the leaves as well as the economic worth of the plants. The illness primarily affects plants in January and has a negative economic impact. (Rivera et al 2002 and Redecker et al., 2006)

MATERIAL & METHOD

Survey & Collection of Plant samples:

Thorough systematic and periodical survey will be at in and near around of Raipur forest. Diseased samples of the target plant were collected different location of Chhattisgarh (Palaud, Uperwara, Dhamni, Aarang) and brought to the laboratory for further processing.

Preservation of Samples:

Diseased plant samples that were gathered during the survey were placed between two sheets of blotting paper, placed on a flat surface, and maintained compressed with light weight material paper. This process was repeated routinely every 24 hours until the samples were completely dried.

Recovery of the fungal pathogens:

The field samples were subsequently examined to determine whether fungi could be isolated. The "Pour plate" approach was used for quantitative quantification and comparison of the fungal flora of various sick samples (Walksman, 1922; Brierly et al., 1927). The samples were serially diluted before being produced. Each sample weighed 10g, which was then over-dried and ground in a vortex mixer. These samples were put into a 125 ml Erlenmeyer flask with 100 ml of sterile, deionized water. A rotary shaker (Yorko's) was used to thoroughly shake the flask containing the suspension for 30 minutes at medium speed and room temperature. This was kept undisturbed for one hour and then 10ml. of clear suspension was transferred to another flask containing 90ml of sterile distilled water. It was repeated to obtain further dilutions (Stevens, 1981 ; Tuite, 1969; Agrawal and Hasija, 1986). Each dilution, 1ml. of suspension was transferred

aseptically into pre-sterilized petriplates and approximately 10 - 15ml. of potato - dextrose - agar medium (Agrawal and Hasija, 1986; Martin, 1950).

Identification of Fungi: The identification was done after studying the morphological and cultural characteristics with the help of manuals, monographs and paper of various workers (Mano harachary et al., 2004).

Distribution of Fungi : Study the distribution of fungi isolated earlier from the various samples the percentage frequency and the abundance of various species were detected. Frequency as introduced Raunkier (1934) indicates the number of sampling units in which a given species occurred and thus expresses the distribution or dispersion of various species in a community. From this, percentage frequency is calculated as follows.

$$\text{Percentage frequency} = \frac{\text{Number of sampling units in which the species occurred frequency}}{\text{Total number of units studied}} \times 100$$

***In vitro* Colony interaction:**

In petri dishes holding autoclaved solidified PDA medium, the test isolate's pure culture was grown before being inoculated with two target microorganisms and oppositional. Test pathogens with young mycelial growth and antagonist (*Trichoderma viride* BMFC-10) strains were positioned next to one another, 3-5 centimeters apart. The majority of the tests were run in duplicate. The inoculums was placed in order to provide the two test fungi with equal growth possibilities. (Johnson and Curl, 1972). As a control, a different set that contained only the test pathogen was retained. The dishes were incubated for 7 days at 28 ± 2 °C in the BOD incubator. Percent inhibition in growth (colony diameter) was calculated by the formula suggested by Vincent (1974).

$$\text{Percent inhibition} = \frac{r_1 - r_2}{r_1} \times 100$$

Where r_1 = diameter of pathogen (in control).

r_2 = diameter of pathogen from point of inoculation toward interacting site of antagonists.

RESULTS

Distribution of fungi:

During survey of the field at in and around forest area of Raipur, it was noticed that sootymold disease were more prevelant during November to January in palash trees. A servere incidence of sootymold was recorded at all the sampling sites. A total of 17 fungi were recorded from different location of Raipur forest viz., *Alternaria alternate* BMFC-01, *Cephalosporium sp.* BMFC-02, *Aspergillus fumigates* BMFC-03, *Aspergillus niger* BMFC-04, *Capnodendron trichomericola* BMFC-05, *Aspergillus nidulns* BMFC-06, *Phoma sp.* BMFC-07, *Chaetomium globosum* BMFC-08, *Fusarium oxysporum* BMFC-09, *Trichoderma viride* BMFC-10, *Penicillium sp.* BMFC-11, *Curvularia lunata* BMFC-12, *Curvularia sp.* BMFC-13, *Rhizopus stolnifer* BMFC-14, *Phoma herbarum* BMFC-15, *Alternaria sp.* BMFC-16 and *Mucor sp.* BMFC-17.

Aspergillus niger BMFC-04 showed maximum frequency in all the selected sampling sites and *Cephalosporium sp.* BMFC-02 showed minimum frequency in selected sites. Similar observation regarding variation in composition sootymold disease have also been reported by (Cooke, 1976). Occurrence of very high fungal populations in samples might be because of availability of nutrients and required elements

Table (1). Distribution of fungi associated with sootymold of *Butea monosperma*

S. No	Name of the fungi	Culture number	Frequency (%)
01	<i>Alternaria alternate</i>	BMFC-01	20.4
02	<i>Cephalosporium sp.</i>	BMFC-02	08.3
03	<i>Aspergillus fumigates</i>	BMFC-03	85.3
04	<i>Aspergillus niger</i>	BMFC-04	92.1
05	<i>Capnodendron trichomericola</i>	BMFC-05	11.3
06	<i>Aspergillus nidulns</i>	BMFC-06	89.4
07	<i>Phoma sp.</i>	BMFC-07	43.4
08	<i>Chaetomium globosum</i>	BMFC-08	19.3
09	<i>Fusarium oxysporum</i>	BMFC-09	65.3
10	<i>Trichoderma viride</i>	BMFC-10	34.1

11	<i>Penicillium sp.</i>	BMFC-11	28.3
12	<i>Curvularia lunata</i>	BMFC-12	70.2
13	<i>Curvularia sp.</i>	BMFC-13	80.1
14	<i>Rhizopus stolnifer</i>	BMFC-14	22.2
15	<i>Phoma herbarum</i>	BMFC-15	19.2
16	<i>Alternaria sp.</i>	BMFC-16	18.3
17	<i>Mucor sp.</i>	BMFC-17	16.3

Screening of antagonistic fungi:

As shown in Table 2, indigenous isolates of *Trichoderma viride* BMFC-10 were tested for their antifungal activity against a few plant pathogens. For the test fungi, *Aspergillus niger* BMFC-04, *Phoma herbarum* BMFC-15, and *Fusarium oxysporium* BMFC-09 showed the greatest inhibition in the colony diameter. Only a few spp. continue to develop unaffected, and their growth was markedly inhibited by *Trichoderma viride* BMFC-10, which was also discovered to be the most effective hyperparasite.

According to preliminary data based on experimental evidence, *Trichoderma viride* BMFC-10 are hopeful sources of antibiotics and hyperparasitism and have significant promise as bio-control agents. Therefore, these organisms must be thoroughly assessed and developed as bio-control agents for the management of soil-borne plant diseases, bearing in mind the hazardous impact of agrochemicals on the ecosystem.

Many previous researchers have also documented similar observations. According to Singh 2014, the concentration of the culture filtrate used determines how much development is inhibited. The anti-fungal metabolite's production may. In the culture filtrates to be the primary inhibitory agent. (Mishra,2013). They made similar findings while studying various fungi and recorded them.

Table 2: Percentage Inhibition of various test pathogen by *Trichoderma viride* BMFC-10 strain

S. No	Name of the fungi	Culture number	Frequency (%)
01	<i>Alternaria alternate</i>	BMFC-01	60.4
02	<i>Cephalosporium sp.</i>	BMFC-02	57.2
03	<i>Aspergillus fumigates</i>	BMFC-03	75.3
04	<i>Aspergillus niger</i>	BMFC-04	85.4
05	<i>Capnodendron trichomericola</i>	BMFC-05	61.3
06	<i>Aspergillus nidulns</i>	BMFC-06	80.4
07	<i>Phoma sp.</i>	BMFC-07	65.3
08	<i>Chaetomium globosum</i>	BMFC-08	59.3
09	<i>Fusarium oxysporum</i>	BMFC-09	70.3
10	<i>Penicillium sp.</i>	BMFC-11	58.1
11	<i>Curvularia lunata</i>	BMFC-12	60.3
12	<i>Curvularia sp.</i>	BMFC-13	62.1
13	<i>Rhizopus stolnifer</i>	BMFC-14	53.2
14	<i>Phoma herbarum</i>	BMFC-15	69.2
15	<i>Alternaria sp.</i>	BMFC-16	58.3
16	<i>Mucor sp.</i>	BMFC-17	66.3

Conclusion: On the basis of above observations it can be concluded that the strain *Trichoderma viride* BMFC-10 have been very high bio-potential against the sootymold disease of Palash (*Butea monosperma*). We can be developed for the management of this disease through.

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