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# Compatibility study of *Chaetomium globosum* with the fungicides (Ridomil, Blue Copper and Score)

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**Abstract:** The ascomycete *Chaetomium globosum* fungus has been reported to be a potential antagonist of various plant pathogens, most of which are soil borne and seed borne. Its been found to possess potent antifungal activity against tomato late blight *(Phytophthora infestans*). The present study was undertaken to screen the compatibility of *Chaetomium globosum* with Score, Blue Copper and Ridomil (Fungicides). The mother culture of *C. globosum* was subcultured in the Potato Dextrose Agar (PDA) slants and petri plates. The active culture of *C. globosum* were inoculated into the PDA medium containing the fungicide at recommended amount used for field application and incubated for 5-6 days. A control plate was prepared to measure the growth of *C. globosum* in respective chemical medium and to tabulate the % of inhibition. It was observed that Blue copper at 100 ppm and has shown the lowest % of inhibition. Ridomil gave an inhibition % of 5.8 at 100 ppm which rose to 13.9% at 200 ppm n then abruptly dipped to 2.27% at 300 ppm.
**Keywords:** *Chaetomium globosum*, Ridomil, Blue Copper, Score, % of inhibition.

## Introduction

Considerable losses are due to plant diseases caused by soil borne pathogenic fungi. In recent years, biological control of soil-borne pathogens has received increasing attention as a promising supplement or alternative to chemical control. To improve efficacy of biological control, however, improved understanding of mechanism of action, nutrition, and ecology of bio-control agent is needed.

*Chaetomium* is a genus belonging to the class *Pyrenomycetes (Ascomycotina)*, order *Sordariales* and family *Chaetomiaceae*. It is found extensively on various agricultural commodities. The genus can produce an Acremonium-like state (imperfect stage) on culture media and is characterized by superficial flask-shaped perithecia, which are surrounded by dark and stiff hair [1-5]. *C. globosum* is one of the commonest species growing saprophytically in the rhizosphere and phyllosphere. It is a common colonizer of soil and cellulose-containing substrates and has been reported to be a potential bio-control agent [6-8].

*C. globosum* has been reported effective in minimizing damage caused by seed rot and damping off, due to several seed-borne and soil-borne plant pathogens like *Pythium ultimum, Alternaria raphani, A. brassicol* and *Fusarium* species. [9]. The seedling blight caused by *Rhizoctonia solani* has been successfully controlled by seed treatment with *Chaetomium* species [10].

*C. globosum* has also shown an antagonistic effect against rice blast (*Pyricularia oryzae*) [11]. Our recent studies have indicated its bioefficacy in controlling spot blotch of wheat caused by *Cochliobolus sativus*

[12]. *C. globosum* has a great potential as a biocontrol agent and has been classified based on morphological descriptions of colony growth and perithecia [13-14].

In the present study, compatibility studies of *Chaetomium globosum* with different chemical fungicides like Ridomil, Blue copper and Score was determined by measuring the % of inhibition.

## Materials and Methods

### 1. *Preparation of Potato Dextrose Agar(PDA Media) and Culturing of C. globosum:*

250 grams of potato were weighed, peeled and grated. It was boiled in 1L of Reverse Osmosis (RO) water to get the extract. The extract was measured and volume was made up to the required quantity by adding Reverse Osmosis (RO) water. To this 20g of dextrose and 22g of Agar were added and heated until the agar mixed properly. The media was transferred to conical flasks, test tubes for slants and these were autoclaved.

The spontaneous *C. globosum* strain was isolated during the early phases of study and mother culture was maintained. The mother culture of *C. globosum* were inoculated into different PDA slants, and PD broth and kept for incubation for 5-6 days.

Active cultures showing enhanced production of aerial mycelium were taken and sub cultured into petri plates through cork borer method. These plates are the kept for incubation for 5-6 days.

### 2. *Test for Compatibility of C. globosum with Chemical Fungicides:*

According to the recommended concentration for the commercial field application, respective amounts of fungicides [Score (Difenoconazole), Ridomil (Metalaxyl + Mancozeb) and Blue Copper (Copper oxychloride)] were weighed. These were made to dissolve in 100 mL of PDA media in conical flasks. These chemically treated medium is poured into the each petri plates which served as the culture medium for *C. globosum.*

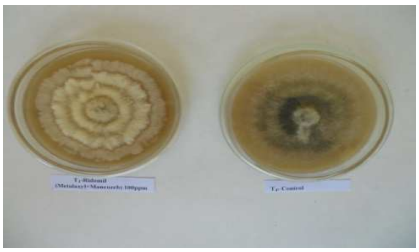
*C. globosum* from the actively growing culture were used as inoculants for sub-culturing into the petri plates with the chemically treated medium. A control plate was prepared which had *C. globosum* growing PDA media with no chemical fungicides added. All these culture plates were incubated for 4-5 days and later the growth of the *C. globosum*in each plate was measured and tabulated. The compatibility of the *C. globosum* with various fungicides at different concentrations was determined by comparing the growth of *C. globosum* in chemically treated medium with that of control plate.

## Results and Discussion

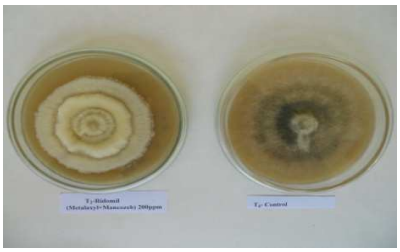
Table 1 will give the measurements of the growth of *Chaetomium globosum* when grown along with Ridomil, Blue copper and Score at different concentration. The values of % of inhibition in each case were also determined by comparing the test plate with the control plate. Figure 1-6 shows the results of growth of *Chaetomium globosum*at the end of 4 days in the media containing the chemical fungicides at different concentrations.

**Table 1:** Measurement of the growth of *Chaetomium globosum*when grown along with Ridomil, Blue Copper and Score

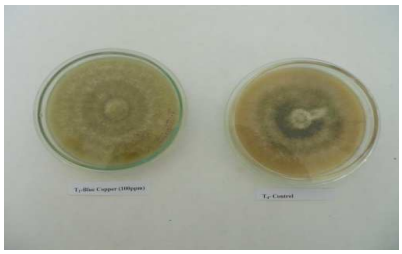
| Chemicals | $T_1$ 100 ppm | | | % Of inhibition | $T_2$ 200 ppm | | | % of inhibition | $T_3$ 300 ppm | | | % of inhibition |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | $R_1$ (cm) | $R_2$ (cm) | Avg. (cm) | | $R_1$ (cm) | $R_2$ (cm) | Avg. (cm) | | $R_1$ (cm) | $R_2$ (cm) | Avg. (cm) | |
| Ridomil | 4.5 | 4 | 4.25 | 5.8% | 3.9 | 4 | 3.95 | 13.9% | 4.4 | 4.4 | 4.4 | 2.27% |
| Blue copper | 4.5 | 4.5 | 4.5 | 0% | 3.5 | 2 | 2.75 | 63.6% | 2.5 | 2.6 | 2.55 | 76.4% |
| Score | 1.7 | 0.8 | 1.25 | 260% | 1.4 | 0.8 | 1.1 | 309% | 1 | 0.8 | 0.9 | 400% |



RIDOMIL 100ppm & CONTROL

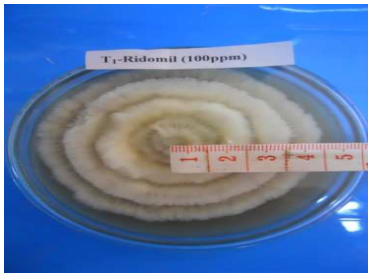


RIDOMIL 200ppm & CONTROL

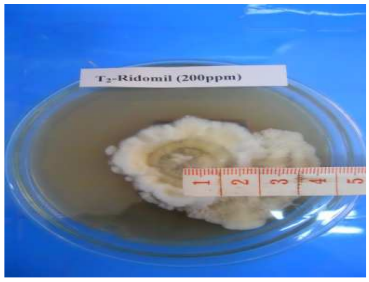


RIDOMIL 300 ppm & CONTROL

**Fig. 1:** Compatibility of *C. globosum* with Ridomil



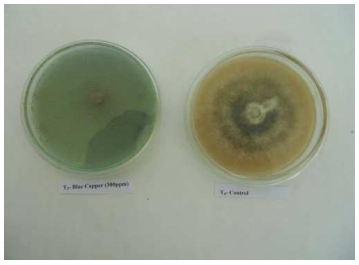

4.2 cm



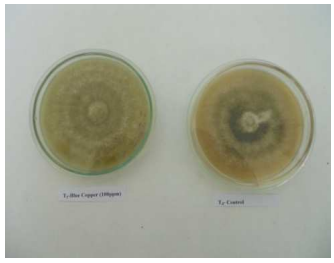

3.95cm


4.4cm

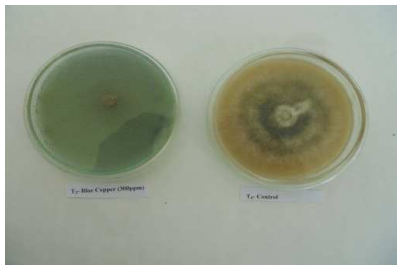
**Fig. 2:** Growth measuremnt of *C.globosum*



BLUE COPPER 100ppm & CONTROL

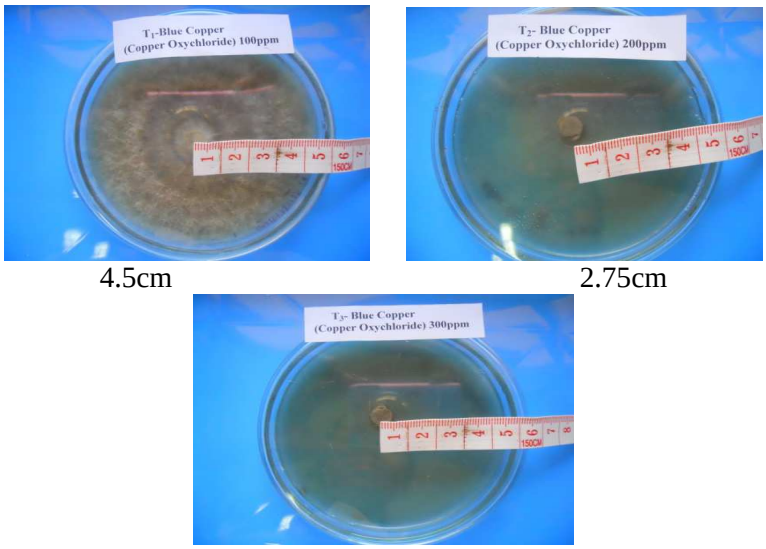


BLUE COPPER 200ppm & CONTROL



BLUE COPPER 300ppm & CONTROL

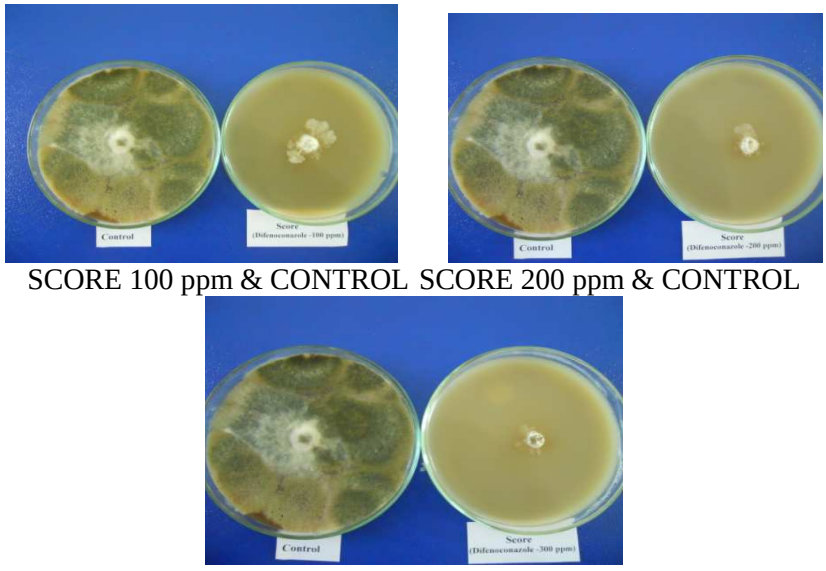
**Fig. 3:** Compatibility of *C. globosum* with Blue Copper




4.5cm 2.75cm

2.55cm

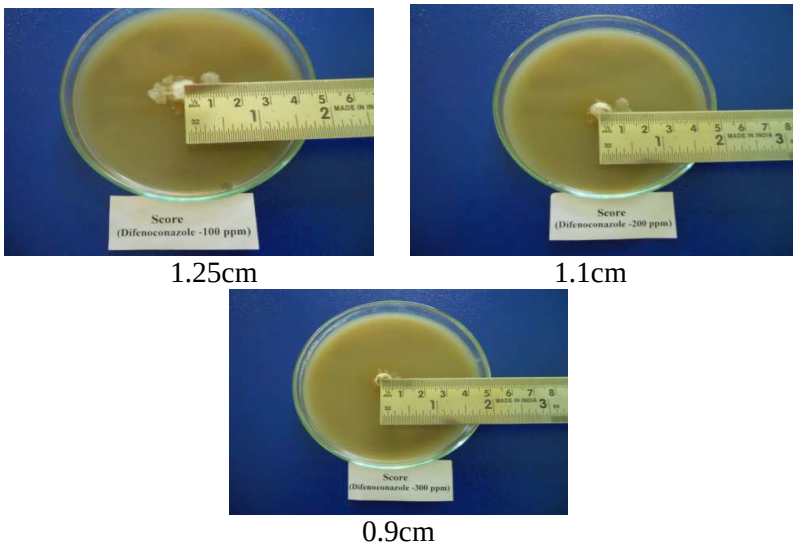
**Fig. 4:** Growth measurement of *C. globosum*




SCORE 100 ppm & CONTROL SCORE 200 ppm & CONTROL

SCORE 300 ppm & CONTROL

**Fig. 5:** Compatibility of *C. globosum* with Score




1.25cm 1.1cm

0.9cm

**Fig. 6:** Growth measurement of *C. globosum*

The inhibition of the mycelial growth of *C.globosum* in the culture medium containing the respective fungicides (Ridomil, Blue Copper and Score) varied at different concentration of these chemicals. Lesser the percentage of inhibition, greater is the compatibility. Compatibility of *C. globosum* was checked with the commercially recommended dosages of the chemicals under consideration.

It was observed that Blue Copper gave the best result of 0% inhibition at 100 ppm proving to be the most compatible dose for the growth of *Chaetomium globosum*. Ridomil too showed comparatively lesser percentage of inhibition at all three concentrations of 100 ppm, 200ppm and 300 ppm. However, it showed the least inhibition at 300 ppm with 2.27% of inhibition.

The least compatible chemical was found to be Score which gave 260 %, 309 % and 400% of inhibition at all three concentrations.

In case of Blue Copper and Score, there has been a steady increase in the % of inhibition with increasing concentrations. However, in case of Ridomil, fluctuation in this pattern has been observed. Ridomil gave the % of inhibition of 5.8 at 100 ppm which rose to 13.9% at 200 ppm and then abruptly dipped to 2.27% at 300 ppm.

## Conclusion

Blue Copper gave the best results of 0% inhibition at 100ppm proving to be the most compatible to *Chaetomium globosum*. Ridomil too showed comparatively lesser percentage of inhibition at all 3 concentrations of 100ppm,200 ppm and 300 ppm, showing the least inhibition at 300 ppm with 2.27 % of inhibition. The least compatible chemical was found to be Score which gave 260 %, 309 % and 400% of inhibition at all three concentrations.

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