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Trichoderma species Antagonistic potential for hostility, against *Sclerotium rolfsii*-induced Brinjal Collar Rot

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Abstract

Brinjal is affected by several bacterial, fungal and viral diseases but Collar rot disease is considered as the most common diseases in the brinjal growing areas. Collar rot of brinjal is one of the most devastating disease which cause great loss in the yield of the crop. There are different management practices for the brinjal collar rot, but since its a soil borne pathogen it were difficult to control. Biological methods were used to control the disease since chemical methods is harmful to environment . There are different biological control used but *Trichoderma* species was used since its found to be effective against *Sclerotium rolfsii*. The maximum percent inhibition was found in Tr-1 with 81.95% and least inhibition was observed in isolate no Tr-6 with 64.34% inhibition when compared over control.

Key words : Brinjal, Collar Rot, *Sclerotium rolfsii*, *Trichoderma* species, Biological method

One of the most typical, well known vegetables is the eggplant or brinjal (*Solanum melongena* L.) a plant of the family Solanaceae and genus *Solanum* are the main vegetable cultivated in India as well as other regions of the globe. One of the most significant and widespread diseases affecting eggplant in India is collar rot, which is caused by *Sclerotium rolfsii*. Collar rot causes a loss of crops. Disease is clearly present and mostly found in soil. The fungus sclerotial bodies keep their latent state in the soil.

Sclerotium rolfsii is primarily soil-borne and prefers moist environments, particularly those that are water logged. The *Sclerotium rolfsii* causes significant harm from germination until crop harvesting throughout the year. It settles soft tissues and result in the degradation of nearby tissues to mud. The pathogen targets the area of the plant. "Collar zone" is the area immediately below soil level. Death by interfering with transfer from the top down to the root zone, nutrients. The entire plant collapse as a result of collar rot e the loss of seedlings during the either when it is seedling or when it is old. As a result, collar rot turns into a very devastating illness resulting in the

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permanent loss of brinjal. This harmful fungus has been estimated to cause losses between 60 and 100 percent, making it a serious danger to the cultivation of eggplant. At the moment growing eggplant is unattainable without the use of pesticides and fungicides. In order to reduce reliance on chemical control, bio-agents have been used to control pathogen. For the preparation of the manuscript relevant literature[1-10] has been consulted.

Isolation :

At various phase of the disease's development, samples were taken from affected fields. The samples were brought into the laboratory and performed through analysis of the symptoms before identifying and describing the infection. After being washed with tap water, each sample of sick brinjal plant had its collar and roots chopped into little pieces. The bits were then placed between two sterile blotters to dry before being surface sterilised with 0.1% mercuric chloride ($HgCl_2$) solution for 45 seconds, three washes with sterile water, and stored on previously poured sterilised petri plates with PDA medium for fungal isolation. The entire isolation process was carried out in laminar flow, which was first disinfected with alcohol or formaldehyde at 27± 20° C , the plates were incubated in the BOD incubator. Four days following incubation, the plates were checked for mycelial growth coming from the infected parts. After the fungus identity was confirmed, mycelial fragments of putative *Sclerotium* species were transferred into PDA slants and kept there. By contrasting the traits relevant to morphology and microscopic examination details with normative published reports, the isolated species was identified.

Isolation of fungal antagonistic culture:

By using the soil dilution plate technique[2] and *Trichoderma* specific medium, ten *Trichoderma* spp. were isolated from various brinjal growing regions. The isolates was purified using the single hyphal tip method, and the culture was kept at 4°C for further research in testable slants. The colonies' physical and cultural traits were used to identify antagonist strains.

Efficacy of antagonistic *Trichoderma* Spp. against *Sclerotium rolfsii*:

Through the use of a dual culture technique, *Trichoderma* spp. were assessed for their in vitro antagonistic potential against the virulent *Sclerotium rolfsii* isolate[1]. On PDA plates, both pathogenic and antagonistic fungus cultures were inoculated seven days earlier. The only fungus injected in the control plates were pathogenic ones. Each treatment had three replications. Plates were incubated at 28°C. Colony growth observations were recorded. Using the formula proposed by Pandey *et al.*,[5] the colony's diameter was measured in centimetres, and the percent inhibition was computed (2000).

Percent inhibition (I)= C-T/C X 100
Where,
I= Percent inhibition in growth of test pathogen
C= Radial growth in control
T= Radial growth in treatment

Preparation of culture filtrate of Trichoderma spp. :

The five *Trichoderma* isolates that were most effective were cultured in Erlenmeyer

Table-1.

Isola-tion	Locality	Growth rate (Mm)	Colony colour	Mycelial form
Tr-1	Pochampalli	90.00	Light green to bright green	Compact colony
Tr-2	Kottur	87.00	Dark green to whitish green	Scattered
Tr-3	Shivapuri	90.00	Whitish green to dull green	Flocose
Tr-4	Vallampadugai	89.06	Pale white to dull green	Flocose
Tr-5	Periyakulam	90.00	Dark green to whitish green	Compact and cottony
Tr-6	Gingee	88.07	Light green to bright green	Arachnoid
Tr-7	Vanur	90.00	Dark green	Compact colony
Tr-8	Kaveripattinam	90.00	Whitish green to dull green	Compact and cottony
Tr-9	Papparapatti	86.02	Dark green	Flocose to Arachnoid
Tr-10	Melur	90.00	Light green to bright green	Flocose

Table-2.

Sl. No	Isolates	Radial Growth (Mm)	Percent Inhibition Over Control
1	Tr-1	16.24	81.95
2	Tr-2	23.33	74.07
3	Tr-3	28.00	68.88
4	Tr-4	15.35	82.94
5	Tr-5	20.23	77.52
6	Tr-6	32.09	64.34
7	Tr-7	29.16	67.60
8	Tr-8	25.00	72.22
9	Tr-9	16.33	81.85
10	Tr-10	22.08	75.46
11	Control	90	

flasks with 50 ml of sterile potato dextrose broth for 15 days at room temperature (28±2°C). Then, under vacuum, the cultures were filtered through a bacteriological filter, and the resulting filtrates were used for the research.

The 20 distinct collar rot infected samples were obtained through a field survey that was carried out in the main brinjal growing regions of Tamil Nadu . Pathogenicity test were carried out in pots to assess the virulence of 20 isolates. *Sclerotium rolfsii* was identified based on morphological and molecular characteristics. The culture sequenced was deposited into the gene bank of the NCBI

(National Center for Biotechnology Information) under Accession number ON630275.

Cultural characteristics of different Trichoderma spp. isolates :

The growth patterns of ten different *Trichoderma* isolates were identified by examine the colony growth and colony colour. Within five days, the *Trichoderma* spp. mycelial growth had completely filled the petri plates, and colonies could be seen on surfaces that were whitish green, dull green, light green, dark green, pale white and pale yellow in colour, with compact or floccose mycelial forms.

In vitro efficacy of Trichoderma spp. *against Sclerotium rolfsii :*

Ten *Trichoderma* isolates were obtained from various brinjal growing regions in Tamil Nadu, and they were evaluated using the Dual Culture Method against the pathogenic culture of *Sclerotium rolfsii* (Table-2). The isolate Tr-1 showed the greatest percentage of inhibition among the ten isolates at 81.95%, followed by Tr-9, which showed 81.85% and Tr-6 showed the least inhibition, at 64.34% compared to control.

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