In vitro evaluation of fungicides and two species of Trichoderma against Phomopsis vexans causing fruit rot of brinjal (Solanum melongena L.).

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***Abstract*-** Fruit rot of brinjal caused by *Phomopsis vexans* is an important disease of eggplant inflicting heavy losses. The present investigation was carried out to test the efficacy of fungicides and two species of *Trichoderma* inhibiting the pathogen *in vitro*. Fungicides viz. Carbendazim (Bavistin 50% wp), Captaf (Captan-50 wp), Copperoxychloride (Blitox -50wp), Mancozeb (Dithane-75) and Ridomil MZ -72 were tested by poisoned food technique against brinjal fruit pathogen (*Phomopsis vexans*) in PDA medium. All the fungicides were significantly proved effective. Among them, Carbendazim at 0.1% showed complete inhibition of the mycelial growth of the pathogen. Among the two species of *Trichoderma* tested, *T. viride* was found to be most effective with 84% inhibition followed by *T.harzianum* 78.22 % inhibition respectively over control after 7th days of incubation.

***Index Terms*-** Brinjal, Phomopsis vexans, Fungicide, Trichoderma.

I. INTRODUCTION

Eggplant or brinjal (*Solanum melongena* L.) is one of the most important solanaceous vegetable crops and is grown worldwide. India is considered to be the centre of origin of cultivated brinjal [1] from where it spreads to other parts of the world [2]. The brinjal fruit contains carbohydrates, protein, moisture etc and minerals like calcium, magnesium and iron. In India, brinjal is cultivated throughout the year in all the parts except high altitudes as a summer crop and occupied 0.56 m ha with 9.3 MT productions [3]. In Assam, brinjal is cultivated in 16,480 ha area and the production was 26,0054 MT in the year 2012-2013. The low productivity is due to the many biotic and abiotic stresses, insect and diseases attack play an important role in reducing the yield throughout the world.

This crop is suffered by many diseases caused by various microbes. Among them, *Phomopsis* fruit rot of eggplant caused by the fungus *Phomopsis vexans* (Sacc. Syd.) 'Harter' is a serious disease which attacks all above ground parts of the plant [4]. It is mentionable damaging to the crop and is a threat particularly in kharif season and late crop in winter season. It has been reported that *Phomopsis vexans* reduces yield and marketable value of the crop nearly 20-30% [5, 6]. Certain protective fungicides although hazardous to environment are still used for the control of fungal diseases [7, 8]. Therefore, the experiment was undertaken to find out the effective fungicides and with two species of *Trichoderma* in controlling *Phomopsis* fruit rot of eggplant.

II. MATERIALS AND METHODS

The fungus *Phomopsis vexans* was isolated from the infected brinjal fruits collected from different fields of Goalpara district (Assam) following tissue segmentation method. The pure culture was maintained on potato dextrose agar slants at 4±1^{0}C. Five fungicides and with two species of *Trichoderma* were evaluated for their inhibiting efficacy against *Phomopsis vexans* under *in vitro* condition.

In vitro effect of different fungicides

The comparative toxicity of fungicides on the growth of the fungus under *in vitro* condition was evaluated by poisoned food technique [9]. Fungicides like Carbendazim (Bavistin 50 wp), Captaf (Captan -50 wp), Copper oxychloride (Blitox-50 wp), Mancozeb (Dithane M-45), and Ridomil MZ-72 at different concentration (0.1, 0.15 and 0.2 percent) were used for *in vitro* assay. The fungicides were incorporated into the sterilized PDA medium. The sterilized petriplates containing amended medium were inoculated with 7 mm disc of freshly prepared culture of the test fungus and incubated at 28± 1°C for 7 days. The efficacy of fungicides was expressed as percent of radial growth over control, which was calculated by using the formula [10].

$$I = \frac{C-T}{C} \times 100$$

Where,

I= Percent inhibition over control

C= Radial growth in control

T= Radial growth in treatments.

In vitro antagonism of the two species of *Trichoderma*

In vitro antagonism of the two species of *Trichoderma* against *Phomopsis vexans* was tested by dual culture technique on PDA medium [11]. Control was maintained without pathogen. All the plates were incubated at room temperature (28±1°C). Each experiment was replicated three times. Observation on mycelial growth of the pathogen was recorded after 7 days of incubation. The percent inhibition over control was calculated.

III. RESULTS AND DISCUSSION

The results revealed (table 1) that all the fungicides having different concentration significantly inhibited the mycelial growth of *Phomopsis vexans*. It was observed that fungicides tested, Carbendazim was found most effective at the lower concentration. It caused complete reduction of mycelial growth

i.e. 100 percent (@ 0.1%); while Captan at higher concentration (@ 0.2%) caused highest reduction of mycelial growth 85.2 percent followed by Copper oxychloride 84 percent, Mancozeb 70.4 percent and Ridomil 67.1 percent at the same concentration over control. The findings of the present investigation are well supported by the findings of [12, 13, 14] who reported that Bavistin (Carbendazim) at lowest concentrations completely inhibited the mycelial growth of *Phomopsis vexans*. Islam *et al*. [15] also reported Bavistin as effective fungicide against *P.vexans.*

Table 1: *In vitro* evaluation of fungicides against *Phomopsis vexans.*

SL. No.	Fungicides	Percent inhibition of mycelia growth			
		Concentration (%)			Mean
		0.10	*0.15*	*0.20*	
1.	Carbendazim	100	100	100	100
2.	Captan	83.4	85	85.2	84.5
3.	Copper oxychloride	81.1	82	84	82.3
4.	Mancozeb	60.3	69.3	70.4	66.7
5.	Ridomil	53.4	59.4	67.1	59.9

Effect of two species of *Trichoderma* on mycelial growth of *Phomopsis vexans*.

Antagonistic fungi viz. *Trichoderma harzianum* and *T.viride* were isolated from the soil samples of brinjal rhizosphere. The identification was confirmed according to the identification key [16] based on the branching of conidiophores, shape of phialides, emergence and shape of phialospores. The two fungal cultures isolated from soil were found to have inhibitory effect on the mycelial growth of the pathogen (table 2) and data showed that degree of inhibition was maximum with *T. viride* (84%) followed by *T.harzianum* (78.22 %) after 7th days of incubation. *T.viride* was found highly effective in comparison to *T.harzianum*. The present findings are found in agreement with the works of Jadeja [17].

Table 2: Effect of two species of Trichoderma on mycelia growth of Phomopsis vexan.

SL. No.	Treatments	% inhibition of mycelial growth
1.	*Trichoderma viride*	84 %
2.	*T. harzianum*	78.22 %

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