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Evaluation of Efficacy of Various Fungicides against *Phomopsis vexans* the Incident of Fruit Rot of Brinjal (*Solanum melongena* L.)

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A B S T R A C T

Phomopsis vexans is one of the most cataclysmic pathogens inciting substantial losses in eggplant. The pathogen causes over 50 per cent loss in production and productivity in various parts of the world. The present investigation was carried out to evaluate the performance of various fungicides like Carbendazim 0.2%, Mancozeb 0.1%, Carbendazim + Mancozeb 0.1%, Thiophanate methyl 0.15%, Chlorothalonil 0.1%, Copper oxychloride 0.3%, Carboxin0.1%, Propineb 0.2%, Tricyclazole 0.1%, Tebuconazole 0.1%, Hexaconazole 0.1%, Difenoconazole 0.2%, Azoxystrobin 0.1%, Tebuconazole + Azoxystrobin 0.1% and Metalaxyl + Mancozeb 0.1% against *Phomopsis vexans* by poison food technique in PDA medium. All the fungicides significantly reduced the growth of fungus included under investigation. Among all Carbendazim exhibited maximum growth reduction of 94.29% followed by Carbendazim + Mancozeb with an inhibition of 94.21%, Metalaxyl + Mancozeb displayed least inhibition of about 71.28%. Tebuconazole exhibited third best control over the growth of the fungus with an inhibition per cent of 93.98%.

Introduction

Brinjal is a principal solanaceous crop of the subtropics and tropics. Brinjal is grown extensively in various parts of the world including India, Bangladesh, Pakistan, China and Philippines. Brinjal is famous as aubergine in Egypt, France, Italy and United States. Though it's a versatile crop but hardly ever has it adapted to the higher altitudes. In India brinjal is grown almost in every agroclimatic zones except for the cooler regions. Brinjal is mainly grown in the states like West Bengal, Odisha, Bihar, Gujurat, Maharastra, Andhra Pradesh and Karnataka with an area of 7.22 lakn hectare with a production of 135.58 metric tones and productivity of 19.10 tonnes per ha (Anon., 2014) The diverse use of aubergine in the households has earned it a befitting title, "King of vegetables". The eggplant displays a wide range of variety in shapes, sizes and colours of fruits. Brinjal has been cultivated in our country for a very long time. Although it is often thought of as a Mediterranean or mid-Eastern vegetable, the origin of brinjal can be traced back to the Indian subcontinent where it not only originated but also flourished as a

dominant species among the available flora. The centre of origin of any plant also acts as a hub of a plethora of disease causing microorganisms. Unfortunately Brinjal is no exception; it's inflicted by various diseases in the subcontinent. Phomopsis fruit rot caused by *Phomopsis vexans* is one of the principal diseases of eggplant. It has been reported that this disease diminishes the yield and marketable value of the fruit by nearly 20-30% (Jain *et al.,* 1980). Akhtar *et al.,* (2008) recorded that the pathogen caused over 50 per cent loss in production and productivity in various parts of the world. In general, the crop loss due to this disease ranges from 15-20% (Hossain *et al.,* 2013, Jakatimath *et al.,* 2017). Keeping in view the above constraints in the brinjal cultivation the current study was undertaken in the laboratory so as to evaluate the efficacy of various fungicides against this formidable pathogen.

Materials and Methods

The infected brinjal leaves and fruits collected from All India Coordinated Research Project on vegetables, OUAT, Bhubaneswar. These infected samples were cut into smaller parts and then transferred to the PDA slants. These PDA slants were then incubated at 28± 1^0C.The pure culture so obtained was maintained on PDA slants at 4+ 1^0C.

The comparative toxicity of fungicides on the growth of the fungus under *in vitro* condition was evaluated by poisoned food technique. The fungicides like Carbendazim 0.2%, Mancozeb, Carbendazim+ Mancozeb 0.1%, Thiophanate methyl 0.15%, Chlorothalonil 0.1%, Copper oxychloride 0.3%, Carboxin 0.1%, Propineb 0.2%, Tricyclazole 0.1%, Tebuconazole 0.1%, Hexaconazole 0.1%, Difenoconazole 0.2%, Azoxystrobin 0.1%, Tebuconazole+ Azoxystrobin 0.1% and Metalaxyl+ Mancozeb 0.1% were used for in vitro assay. The PDA medium prepared was first sterilized in the autoclave at 15psi for 15-20 min. the recommended doses of fungicides were taken and then fungicides were incorporated into the sterilized PDA medium. Later, 20ml of the poisoned media was poured into sterized Petriplates. The sterilized petriplates containing amended medium were inoculated with freshly prepared culture of 7 days. The test fungus was incubated at 28± 1^0C. The petriplate containing PDA without any fungicide served as control. Three replications were maintained for each treatment. The radial growth was measured when the fungus attained maximum growth in control petriplates. The efficacy of the fungicides was expressed as percent of radial growth over control. The per cent inhibition of mycelia growth over control was calculated by using the formula of Vincent (1927).

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

Where,

I= Percent inhibition over control
C= Radial growth in control
T= Radial growth in treatments.

Results and Discussion

It is clearly perceptible from table 1 that all the fungicides remarkably minimized the mycelial growth of *Phompsis vexans*. Among all, Carbendazim exhibited maximum growth reduction of 94.29% followed by Carbendazim+ Mancozeb with an inhibition of 94.21%. The fungicide Metalaxyl+ Mancozeb displayed least inhibition of the test fungus 71.28%. Tebuconazole exhibited third best control over the growth of the fungus with an inhibition per cent of 93.98%. Difenoconazole was found to have an inhibition per cent of 93.7% and Hexaconazole was also did not lag behind in controlling the growth of the fungus with an inhibition per cent of 93.60%. Thus it

can be inferred from the study that Carbendazim is the best in controlling the mycelial growth of *Phomopsis vexans in vitro.* though the chemicals like Carbendazim+ Mancozeb, Metalaxyl+ Mancozeb, Tebuconazole, Difenoconazole and Hexaconazole also have a fair amount of control over the mycelia growth of the fungus. Das *et al.,* in (2014) reported that Carbendazim at 0.1% showed complete inhibition of the mycelial growth of the Phomopsis pathogen which is in compliance with the current findings.

Hossain *et al.,* in 2013 also opined that Bavistin 50 WP (0.1%) proved to be effective arresting the spore germination and mycelia growth of *Phomopsis vexans* assayed in *in vitro* test which also is in agreement with the present findings.

Table.1 Mycelial growth along with inhibition per cent of *Phomopsis vexans* as influenced by different treatments

Sl.no.	TREATMENT	MEAN MYCELIAL GROWTH(mm)	INHIBITION PER CENT
1	Carbendazim 50%WP	4.96	94.29
2	Mancozeb 75% WP	6.03	93.06
3	Carbendazim 12%+ Mancozeb 63% WP	5.03	94.21
4	Thiophenate methyl 70% WP	6.067	93.02
5	Chlorothalonil 75% WP	19.86	77.16
6	Copper Oxychloride 50% WP	15.04	82.71
7	Carboxin 37.5%+Thiram 37.5% WS	11.48	82.79
8	Propineb 70% WP	18.50	78.72
9	Tricyclazole 75% WP	6.06	93.02
10	Tebuconazole 75% WG	5.23	93.98
11	Hexaconazole 5% EC	5.6	93.6
12	Difenoconazole 25% EC	5.5	93.7
13	Azoxystrobin 23% SC	19.66	77.3
14	Tebuconazole 18.3%+ Azoxystrobin 11% SC	18.97	78.19
15	Metalaxyl+Mancozeb 68% WP	24.98	71.28
26	Control	86.99	0.00
	CD(0.05)	4.94	
	SE(m)±	1.70	
	CV (%)	19.10	

Ekka *et al.,* (2018) observed that Saaf (Carbendazim 12% + Mancozeb 63% WP) @0.25% and Nativo (Tebuconazole 50% + Trifloxystorbin 25%) @ 0.2% completely inhibited the mycelial growth of the pathogen *in vitro.* The findings of Ekka *et al.,* (2008) are also in concurrence with the current findings.

Sabalpara *et al.,* (2009) also found that Carbendazim at recommended dose displayed complete inhibition of the test fungus *in vitro.*

The results are also in agreement with present study. Beura *et al.,* (2008) recorded maximum per cent disease control and cost benefit ratio 1: 12.85 with four sprays of Carbendazim followed by Tebuconazole which recorded 62.67 per cent control of fruit rot and 59.52 per cent increase in fruit yield over the check plot with corresponding cost benefit ratio of 1: 9.45. The findings are also in compliance with the current results.

The chemicals proved effective against *Phomopsis vexans in vitro* conditions may be explored under field condition in replicated trials to draw the conclusion.

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