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## Compatibility of *T. harzianum* (MV strain) with different fungicides used in mango disease management

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### Abstract

The laboratory experiment has been conducted for two years to check the compatibility of MV strain of *T. harzianum* with different fungicides used in mango disease management. The isolated MV strain *T. harzianum* from *phyllosphere* of mango shows good compatibility against the fungicides viz. Sulphur 55.16% SC @ 0.1%, Hexaconazole 5% SC @ 0.05%, Metalaxyl 4% + Mancozeb 64% WP @ 0.2% and Propineb 70% WP @ 0.2%. It is serious to note that the widely used fungicide Carbendazim in all their formulations was found highly toxic to *T. harzianum* (MV) strain.

**Keywords:** MV strain *T. harzianum* from *phyllosphere*, widely used fungicide

### Introduction

In India, now a days the more emphasis has been given to the organic farming. However some farmers are using both chemical fungicide as well as microbial biocontrol agent. Among the fungi, the *Trichoderma* due to their antagonistic activity has been broadly used to control different diseases of different crops (Ahed 2019) [1]. However it is well known that the local indigenous strains are very effective to control the local disease as compared to imported strain. So based on this review the local strain of *Trichoderma* has been isolated from the *phyllosphere* of mango crop. Raja *et al.* 2018 [4] who reported that the pathogen such as *Rhizoctonia solani* causing cowpea seed rot and pre emergence damping - off is control by indigenous biocontrol agents such as *Bacillus cereus* and *Bacillus subtilis*. However, it is necessary to know the adverse effect of different fungicides on locally isolated *T. harzianum*. So here the effort has been made to study the compatibility of isolated strain of *T. harzianum* against the different chemicals under laboratory condition. The present study will help the farmers to select the better fungicide along with biocontrol agent in order to avoid the adverse effect of chemicals on *T. harzianum*.

### Materials and Methods

An experiment was conducted for the two years 2020-21 and 2021-22 at four lab, Regional Fruit Research Station Vengurle Dist. Sindhudurg. Initially Mature Alphonso mango and cashew trees in a pesticide applied and unsprayed orchard at the Regional Fruit Research Station, Vengurle and farmers field were selected and samples were collected at vegetative, flowering and fruiting stage. The isolation of fungal population from branches leaves, flowers flush and fruits were attempted on PDA, by employing sample washing (DW) and serial dilution plating (PDA) method. Plant samples were cut into small pieces and submerged in a washing solution which is then shaken more or less vigorously for a known time. The resulting suspension was then serially diluted and isolated on to appropriate media. After completion of incubation period, representative of each morphologically distinct fungal colonies developed were sub-cultured and purified. Based on their cultural and morphological characters, these fungi were identified preliminary and further will be get confirmed their identity from authentic institute/source. Among the *phyllosphere* fungi isolated one most promising antagonistic fungus was selected and for further promotion evaluation work is in progress. The selected antagonistic fungus were identified as *T. harzianum* (mv) strain.

The major fungicides which were predominately used in the management of the mango were selected to study the compatibility against isolated *T. harzianum* (MV) strain. The poisoned food technique was followed to evaluate the efficacy of different systemic, non-systemic and combi-products fungicides for radial mycelial growth inhibiting of the *T. harzianum*.

Stock solutions of fungicides were prepared by dissolving the required quantities of each fungicide/insecticides separately in sterile distilled water. The fungicidal suspension was added to the PDA melted medium to obtain the required concentrations on commercial formulation basis of the fungicide. Twenty ml of poisoned medium was pour in each sterilized petri plates under aseptic condition. Suitable check was maintained without addition of fungicide. Mycelial disc of 5 mm was taken from the periphery of seven days old colony of *T. harzianum* and will be place in the centre of Petri plates and incubated at  $27 \pm 1$  °C for 12 days and three replications was maintained for each treatment with Completely Randomized Design. The observations regarding diameter of the colony will be measured in two directions and average growth will be recorded. Per cent inhibition of mycelial growth of the fungus was calculated by using the formula given by Vincent (1947) [5] as indicated below.

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

Where,

I = Per cent inhibition

C = Radial growth in control

T = Radial growth in treatment (fungicide/bio-agent)

The study was conducted to check the compatibility of MV strain of *T. harzianum* with different fungicides used in mango disease management.

## Results and Discussion

The Pooled results of the study revealed that various fungi isolated from *phyllospere* parts of mango and cashew plants includes genera of *Aspergillus*, *Cladosporium*, *Capnodium*, *Pestalotia*, *Rhizoctonia*, *Colletotrichum* and *Lasidioidiplodia* in maximum frequency. Whereas, *Trichoderma harzianum* was first time isolated from *phyllospere* part of mango. This

has been supported by Amin (2017) [2] who isolate and identified *Trichoderma harzianum* from phyllosphere in cukurova region of Turkey The antagonist *T. harzianum* was primarily identified and confirmed by sending it to ITCC, IARI, and New Delhi.

Initially, the isolated *T. harzianum* antagonist was primarily tested against two major pathogen by following dual culture technique and it was found that the isolated strain of *T. harzianum* showed excellent inhibition effect against branch dying pathogen.

The compatibility *T. harzianum* (MV) strain with various fungicides was tested for two consecutive seasons and results are presented in Table 1. The study was conducted to check the compatibility of MV strain of *T. harzianum* with different fungicides used in mango disease management. Among the fifteen fungicides tested with *T. harzianum* (MV) strain five fungicidal formulation viz. Tebuconazole 50% + Trifloxystrobin 25% @ 0.1%, Carbendazim 50% WP @ 0.1%, Carbendazim 46.27% SC @ 0.1% and Carbendazim 12% + Mancozeb 63% WP @ 0.15%, Thiophanate Methyl 70% WP @ 0.1% and Bordeaux Mixture 100% @ 1% were highly toxic to *T. harzianum* (MV) strain and inhibited cent per cent mycelial growth. It is serious to note that the widely used fungicide Carbendazim in all their formulations was found highly toxic to *T. harzianum* (MV) strain. Among the fungicides tested the fungicides viz. Sulphur 55.16% SC @ 0.1%, Hexaconazole 5% SC @ 0.05%, Metalaxyl 4% + Mancozeb 64% WP @ 0.2% and Propineb 70% WP @ 0.2% have good compatibility with only 28.15, 31.20, 33.24 and 34.25 per cent mycelial inhibition over control, respectively. The results of present investigation are in close conformity with the results obtained by Madhusudan *et al.* (2010) [3] who reported that *Trichoderma* is compatible with the fungicide such as Mancozeb However the carbendazim is not safe for *Trichoderma viride* isolates.

**Table 1:** Compatibility *T. harzianum* (MV) strain with various fungicides (Pooled).

Tr. No.	Fungicides	Conc. (%)	Mycelial growth		Pooled Mean	% inhibition over Control
			2020-21	2021-22		
T <sub>1</sub>	Sulphur 80% WDG	0.2	58.00	51.83	54.91	38.98
T <sub>2</sub>	Copper Oxchloride 50% WP	0.2	22.50	25.67	24.09	73.23
T <sub>3</sub>	Metalaxyl 4% + Mancozeb 64% WP	0.2	53.33	66.83	60.08	33.24
T <sub>4</sub>	Azoxystrobin 23% SC	0.1	38.00	62.00	50.00	44.44
T <sub>5</sub>	Tebuconazole 50% + Trifloxystrobin 25%	0.1	00.00	00.00	00.00	00.00
T <sub>6</sub>	Carbendazim 50% WP	0.1	00.00	00.00	00.00	00.00
T <sub>7</sub>	Mancozeb 75% WP	0.2	46.33	55.33	50.83	43.52
T <sub>8</sub>	Carbendazim 46.27%	0.1	00.00	00.00	00.00	00.00
T <sub>9</sub>	Hexaconazole 5% SC	0.05	62.16	61.67	61.92	31.20
T <sub>10</sub>	Carbendazim 12% + Mancozeb 63% WP	0.15	00.00	00.00	00.00	00.00
T <sub>11</sub>	Thiophanate Methyl 70% WP	0.1	00.00	00.00	00.00	00.00
T <sub>12</sub>	Chlorothalonil 75% WP	0.1	20.66	25.67	23.17	74.25
T <sub>13</sub>	Propineb 70% WP	0.2	59.50	58.83	59.17	34.25
T <sub>14</sub>	Bordeaux Mixture 100%	1.0	00.00	00.00	00.00	00.00
T <sub>15</sub>	Sulphur 55.16% SC	0.1	69.33	60.00	64.66	28.15
T <sub>16</sub>	Control	-	90.00	90.00	90.00	--
S.E. ±			0.48	1.83	2.38	
C.D.@ 1%			1.38	5.20	7.84	

## Conclusion

It is thus concluded that the fungicides viz. Sulphur 55.16% SC @ 0.1%, Hexaconazole 5% SC @ 0.05%, Metalaxyl 4% + Mancozeb 64% WP @ 0.2% and Propineb 70% WP @ 0.2%

have good compatibility with *T. harzianum* (MV) strain

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