



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(8): 2249-2251
© 2022 TPI

www.thepharmajournal.com

Received: 22-05-2022

Accepted: 27-07-2022

MB Dalvi

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

YR Govekar

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

PD Patil

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

AY Munj

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

RA Raut

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

SS Bhure

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

Corresponding Author:

YR Govekar

Regional Fruit Research Station,
Vengurle, Dr. Balasaheb Sawant
Konkan Krishi Vidyapeeth,
Dapoli, District Ratnagiri,
Maharashtra, India

Compatibility of different insecticides and fungicides with *Trichoderma harzianum* under *in vitro* condition

MB Dalvi, YR Govekar, PD Patil, AY Munj, RA Raut and SS Bhure

Abstract

The laboratory experiment has been conducted for three years to do the Comparative study of two strain of *Trichoderma harzianum* viz (MV) strain and (PP) strain with well-known fungicides and insecticides used against major diseases and pests of mango and cashew in Konkani region. The e fungicide Carbendazim in all its formulation *i.e.* Carbendazim 50% WP @ 0.2%, Carbendazim 46.27% SC @ 0.1% and Carbendazim 12% + Mancozeb 63% WP @ 0.2% and Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.1% were highly toxic to *T. harzianum* and inhibited its cent per cent mycelial growth. Among the insecticides Thiamethoxam 25% WG @ 0.005%, Imidacloprid 17.8 EC @ 0.005%, Monocrotophos 36% EC @ 0.05% and Deltamethrin 2.8% EC @ 0.0025% were found compatible with PP and MV strain of *T. harzianum*. The MV strain of *T. harzianum* showed better compatibility than PP strain with various pesticide.

Keywords: *Trichoderma harzianum*, (MV) strain and (PP) strain

Introduction

In India, now a days the more emphasis has been given to the organic farming. However some farmers are using fungicide, insect ides as well as microbial bio control agent. Among the fungi, the *Trichoderma* has been broadly used to control different diseases of different crops. (Ahed 2019) ^[1] However it is well known that the local indigenous strain are very effective to control the local disease as compared to imported strain or any microbial formulation. So based on this review the two local stain of *Trichoderma* has been isolated from the phyllosphere of mango crop. Raja *et al.* 2018 ^[6] who reported that the pathogen such as *Rhizoctonia solani* causing cowpea seed rot and pre emergence damping - off is control by indigenous bio control agents such as *Bacillus cereus* and *Bacilius subtilis* However, it is also necessary to know the adverse effect of different fungicides and insecticides on locally isolated two isolates of *T harzianum*. Simultaneously it is also necessary to know the better isolate as per their compatibility. So here the effort has been made to study the compatibility of these isolates of *T. harzianum* against the different fungicide and insecticides under laboratory condition. The present study will also help to select the best compatible isolate of *T. harzianum* tested against fungicides and insecticides and can be used as bio control agent against different diseases.

Materials and Methods

A experiment was conducted for the three years 2019-20 to 2021-22 at Four lab, Regional Fruit Research Station Vengurle Dist. Sindhudurg. The major fungicides as well as insecticides which were predominately used in the management of the mango and cashew diseases and pests were selected to study the compatibility against *T. Harzianum*. The PP and MV strain of this station were evaluated for their compatibility.

The poisoned food technique was followed to evaluate the efficacy of different systemic, non-systemic and combi-products fungicides as well as insecticides 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. herzianum* and will be place in the centre of Petri plates and incubated at 27±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

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

Where, s

I = Per cent inhibition

C = Radial growth in control

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

Results and Discussion

The laboratory study (MV strain) and (PP strain) was conducted for two and three consecutive seasons and the results are presented in Table 1 and 2. The compatibility of *T. harzianum* (PP Strains) with different fungicides and insecticides used in mango and cashew pest/disease management was tested. The results revealed that among the ten fungicides tested against *T. harzianum* PP strain most of the fungicides showed incompatibility reaction except the treatment of Metalaxyl 4% + Mancozeb 64% WP @ 0.2%, Azoxystrobin 23% SC @ 0.1% with 74.78 mm, 50.67 mm mycelial growth. The treatment of Metalaxyl 4% + Mancozeb 64% WP @ 0.2% was found significantly compatible than rest of the fungicides with only 16.91% inhibition over control. This was followed by the treatment of Azoxystrobin 23% SC @ 0.1% with 43.70% inhibition over control. It is serious to note that the fungicide Carbendazim in all its formulation *i.e.* Carbendazim 50% WP @ 0.2%, Carbendazim 46.2% SC @ 0.1% and Carbendazim 12% + Mancozeb 63% WP @ 0% were highly toxic to PP strain of *T. harzianum* antagonist and inhibited cent per cent mycelial growth. Similar result was observed in Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.1%. Whereas, the MV strain of

T. harzianum showed better compatibility than PP strain with Metalaxyl 4% + Mancozeb 64% WP @ 0.2% (79.58 mm), Azoxystrobin 23% SC @ 0.1% (68.75 mm), Mancozeb 75% WP @ 0.2% (55.00 mm), Hexaconazole 5% EC @ 0.05% (49.92 mm) and Sulphur 80% WDG @ 0.2% (48.83 mm).

Out of six insecticides tested none of the treatment showed 100% growth of *T. harzianum* at tested concentration. However, Thiamethoxam 25% WG @ 0.005%, Imidacloprid 17.8 EC @ 0.005%, Monocrotophos 36% EC @ 0.05% and Deltamethrin 2.8% EC @ 0.0025% were found compatible with PP and MV strain of *T. harzianum*. For PP strain the insecticides Thiamethoxam 25% WG @ 0.005% was found significantly superior over rest of the insecticides. This was followed by Imidacloprid 17.8 EC @ 0.005%. Whereas, the MV strain of *T. harzianum* showed better compatibility than PP strain with Imidacloprid 17.8 EC @ 0.005% (70.42 mm) Deltamethrin 2.8% EC @ 0.0025% (69.92 mm), Monocrotophos 36% EC @ 0.05% (69.09 mm), and Thiamethoxam 25% WG @ 0.005% (67.84 mm) and were equally compatible.

None of the pesticide supported 100% growth of PP and MV strain of *T. harzianum* at their tested concentration. The results of present investigation are in close conformity with the results obtained by Madhusudan *et al.* (2010) [2] who reported that *Trichoderma* is compatible with the fungicide such as Mancozeb whereas the Carbendazim is not safe for *Trichoderma viride* isolates. The Shashikumar (2019) [4] also reported that among the systemic fungicide Azoxystrobin was found highly compatible with *T. harzianum* and *T. viride* followed by Matalaxyl. The highest inhibition was recorded in Carbendazim. In case of insecticide the Vinit Pratap Singh *et al.* (2012) [5] reported that some insecticides such as Deltamethrin 30EC, s Monocrotophos 36% SL and Imidacloprid 17.8% are compatible insecticide with *Trichoderma* whereas some insecticide like Quinalphos 25% EC, Carbosulfan 25% EC, Profenofos 40%, Cypermethrin 4% inhibit the growth of *Trichoderma sp.*

Table 1: Studies on Compatibility of *T. harzianum* (PP strain) with fungicides and insecticides (Pooled)

Tr. No.	Fungicides	Conc. (%)	Mycelial growth (mm)			Pooled Mean (mm)	Per cent inhibition over control
			2019-20	2020-21	2021-22		
T ₁	Sulphur 80% WDG	0.2	36.17	25.83	30.00	30.67	65.92
T ₂	Copper oxychloride 50% WP	0.2	58.33	11.00	17.50	28.94	67.84
T ₃	Metalaxyl 4% + Mancozeb 64% WP	0.2	83.17	70.00	71.17	74.78	16.91
T ₄	Azoxystrobin 23% SC	0.1	45.67	54.83	51.50	50.67	43.70
T ₅	Tebuconazole 50% + Trifloxystrobin 25% WG	0.1	0.00	0.00	0.00	0.00	100.00
T ₆	Carbendazim 50% WP	0.1	0.00	0.00	0.00	0.00	100.00
T ₇	Mancozeb 75% WP	0.2	32.83	45.67	40.17	39.56	56.04
T ₈	Carbendazim 46.27% SC	0.1	0.00	0.00	0.00	0.00	100.00
T ₉	Hexaconazole 5% EC	0.05	32.83	24.17	30.67	29.22	67.53
T ₁₀	Carbendazim 12% + Mancozeb 63% WP	0.2	0.00	0.00	0.00	0.00	100.00
T ₁₁	Monocrotophos 36% EC	0.05	68.50	51.50	58.67	59.56	33.82
T ₁₂	Profenophos 50% EC	0.05	19.00	36.00	31.00	28.67	68.14
T ₁₃	Lambda cyhalothrin 5% EC	0.003	42.67	52.67	46.33	47.22	47.53
T ₁₄	Imidacloprid 17.8 EC	0.005	70.83	54.50	67.33	64.22	28.64
T ₁₅	Thiamethoxam 25% WG	0.005	84.33	66.50	77.33	76.06	15.59
T ₁₆	Deltamethrin 2.8% EC	0.0025	47.33	68.83	60.00	58.72	34.75
T ₁₇	Control	-	90.00	90.00	90.00	90.00	-
	S.E. ±		1.72	2.54	1.69	2.54	
	C.D. @ 5%		6.67	7.22	4.79	7.76	

Table 2: Studies on Compatibility of *T. harzianum* (MV strain) with fungicides and Insecticides. (Pooled)

Tr. No.	Fungicides	Conc. (%)	Mycelial growth (mm)		Pooled Mean	PDR over Control
			2020-21	2021-22		
T ₁	Sulphur 80% WDG	0.2	48.33	49.33	48.83	45.74
T ₂	Copper oxychloride 50% WP	0.2	21.50	22.67	22.09	75.46
T ₃	Metalaxyl 4% + Mancozeb 64% WP	0.2	79.83	79.33	79.58	11.58
T ₄	Azoxystrobin 23% SC	0.1	68.00	69.50	68.75	23.61
T ₅	Tebuconazole 50% + Trifloxystrobin 25% WG	0.1	00.00	00.00	00.00	00.00
T ₆	Carbendazim 50% WP	0.1	00.00	00.00	00.00	00.00
T ₇	Mancozeb 75% WP	0.2	54.50	55.50	55.00	38.89
T ₈	Carbendazim 46.27% SC	0.1	00.00	00.00	00.00	00.00
T ₉	Hexaconazole 5% EC	0.05	50.17	49.67	49.92	44.53
T ₁₀	Carbendazim 12%+ Mancozeb 63% WP	0.2	00.00	00.00	00.00	00.00
T ₁₁	Monocrotophos 36% EC	0.05	69.00	69.17	69.09	23.23
T ₁₂	Profenophos 50% EC	0.05	44.00	43.50	43.75	51.39
T ₁₃	Lambda cyhalothrin 5% EC	0.003	66.67	65.33	66.00	26.69
T ₁₄	Imidacloprid 17.8 EC	0.005	70.83	70.00	70.42	21.75
T ₁₅	Thiamethoxam 25s% WG	0.005	68.67	67.00	67.84	24.62
T ₁₆	Deltamethrin 2.8% EC	0.0025	70.33	69.50	69.92	22.31
T ₁₇	Control	-	90.00	90.00	90.00	
S.E. ±			1.69	1.20	1.30	
C.D.@ 5%			4.79	3.40	3.94	

Conclusion

It is thus concluded that the fungicide Carbendazim in all its formulation *i.e.* Carbendazim 50% WP @ 0.2%, Carbendazim 46.27% SC @ 0.1% and Carbendazim 12% + Mancozeb 63% WP @ 0.2% and Tebuconazole 50% + Trifloxystrobin 25% WG @ 0.1% were highly toxic to *T. harzianum* and inhibited its cent per cent mycelial growth. Among the insecticides Thiamethoxam 25% WG @ 0.005%, Imidacloprid 17.8 EC @ 0.005%, Monocrotophos 36% EC @ 0.05% and Deltamethrin 2.8% EC @ 0.0025% were found compatible with PP and MV strain of *T. harzianum*. The MV strain of *T. harzianum* showed better compatibility than PP strain with various pesticide 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.

Acknowledgement

Authors are thankful to the four lab Regional Fruit Research Station, Vengurle Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Maharashtra, India for providing necessary facilities.

References

- Ahed A. Efficiency of *Trichoderma spp.* against of some pathogenic fungi causing of broad bean root rot disease. International science conference. 2019;(2):1-10.
- Madhusudan P, Gopal Harita V, Sangle UR, Rao SV. Journal of Plant Disease Science. 2010;5(1):23-26.
- Abdulmoohsin RG, Lahuf AA, Husain YN, Hameed ZL. Bio efficiency of some indigenous bio control agents against *Rhizoctonia solani* causing cowpea seed rot and pre-emergence damping-off. In IOP Conference Series: Earth and Environmental Science. 2019 Nov 1;388:1-012011. IOP Publishing.
- Shashikumar HM, Sumangala K, Navyashree SE. Compatibility of *Trichoderma viride* and *Trichoderma harzianum* with fungicide against soil borne disease of Tomato and Cabbage. International Journal of Current Microbiology and Applied Sciences. 2019;8(4):1920-

1928.

- Vinit PS, Seweta S, Swapnil KS, Singh HB. Compatibility of different insecticides with *Trichoderma harzianum* under *in vitro* condition. Plant Pathology Journal. 2012;11(2):73-76.
- Raja R, Nagasubramani PC. Impact of modern technology in education. Journal of Applied and Advanced Research. 2018 May 10;3(1):33-5.