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In Vitro Compatibility of *Trichoderma viride* with Some Fertilizers and Pesticides

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Abstract An *in vitro* experiment was conducted to find out the compatibility of *Trichoderma viride* with some fertilizers and pesticides. The result revealed compatibility of muriate of potash and single super phosphate with *Trichoderma viride*. Validamycin, Metalaxyl + Mancozeb, Mancozeb and Hexaconazole + Zineb were found compatible to some extent. Less growth inhibition of *Trichoderma* ranging within 9.0 to 22.8% was occurred in Rynaxypyr, Flubendiamide, Azadirachtin and Sonata. Among the herbicides, all except Propaquizafop were likely to be compatible with the test antagonist, as they performed growth inhibition within 4.5 to 14.8% only.

Keywords *Trichoderma*, Compatibility, Fertilizers, Pesticides.

Introduction

It is needed to promote bio-intensive integrated crop management practices with more farm profit and eco-friendly soil health and crop pest management. The power of *Trichoderma* as a potential bio-control agent to protect, prevent and cure some dreadful plant pathogenic fungus has already been proved in modern bio-intensive Integrated Disease Management of Plant. It has been playing a critical role as seed treating as well as soil treating bio-agent against *Fusarium* sp. [1], Pythium sp. [2], *Phytopathora* sp. [3] and *Sclerotium rolfsii* [4]. It can also stimulate the plant growth and develop resistance to plant. It is general recommendation that *Trichoderma* should not be used with chemical fertilizers and pesticides. Use of *Trichoderma* sp. is not fully reliable as antifungal bio-agent in comparison to chemical fungicides. But, repeated use of chemicals is one of the important reasons for developing resistance of some soil and seed borne plant diseases. This could be managed by integration of *Trichoderma* sp. with chemical fertilizers and pesticides, if compatibility prevails between them. The duration of active disease management can also be extended by using chemical and bio-agent together in integrated management system.

So, the present study was conducted to screen *in vitro* compatibility of *Trichoderma viride* with some fertilizers and pesticides. Accordingly, an Integrated Package of *Trichoderma* sp. with fertilizers and pesticides may be recommended that may be economic as well as better pest management options in farmers' field.

Materials and Methods

The Nucleus culture of *Trichoderma viride* was main-

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Table 1. *In vitro* compatibility of fertilizers with *Trichoderma viride*.

Treatments	Concentration (%)	Colony diameter (mm)	Inhibition (%)
Urea (46% N)	1	16.7	80.4
Urea (46% N)	2	12.0	85.9
Single super phosphate (16% P_2O_5)	1	82.3	3.1
Single super phosphate (16% P_2O_5)	2	78.0	8.2
Muriate of potash (60% K_2O)	1	87.7	– 3.1
Muriate of potash (60% K_2O)	2	88.3	– 3.9
Control		85.0	0.0
SEm±		2.63	2.89
CD ($p = 0.05$)		8.09	8.91
CV (%)		7.08	20.60

tained on Potato Dextrose Agar (PDA) medium in laboratory of KVK, West Tripura. Three fertilizers viz. Urea, Single Super Phosphate (SSP) and Muriate of Potash (MoP); eight fungicides viz. Propiconazole 25 EC (Dhan), Validamycin 3 L (Sukhiya VIP), Metalaxyl 8 WP + Mancozeb 64 WP (MATCO 8-64), Cymoxanil 8 WP + Mancozeb 64 WP (Moximate), Mancozeb 75 WP (Indofil M 45), Hexaconazole 4 WP+Zineb 68 WP (Avtar), Carbendazim 25 WS + Mancozeb 50 WS (Sprint) and Tricyclazole 75 WP (Baan); eight insecticides viz. Lambda Cyhalothrin 5 EC (Agent Plus), Azadirachtin 0.15 EC (Peak Neem), Alphamethrin 10 EC (Gem), Sonata, Propargite 57 EC (Omite), Flubendiamide 480 SC (Fame), Rynaxypyr 20 SC (Coragen ®) and Cartap Hydrochloride 50 SP (Beacon SP) and four herbicides viz. Paraquat Dichloride 24 SC (All Clear), Glyphosate 41 SL (Clean Up), Propaquizafop 10 EC (Society) and Pyrazosulfuron Ethyl 10 WP (Saathi) were selected to find out each of their compatibility with *Trichoderma viride*. The *in vitro* sensitivity of fertilizers and pesticides were examined against the beneficial test fungus using the poison food technique.

Stock solutions of fertilizers, fungicides, insecticides and herbicides were prepared by dissolving the required quantities of each into sterile distilled water. Appropriate quantities of the respective solution from stock solution were added to molten PDA medium (50 ml) and mixed thoroughly by gentle shaking to obtain the required concentrations. About 20 ml of sterilized medium was poured into 90 mm sterile petriplates. After solidification, the plates were inoculated with 5 mm disc of 4 days old actively growing culture of *Trichoderma viride*. Three replicates were used for each concentration of every compound to be tested. *Trichoderma viride* in PDA plates without any added compound served as control. The in

Table 2. *In vitro* compatibility of fungicides with *Trichoderma viride*.

Treatments	Concentration (%)	Trade name	Colony diameter (mm)	Inhibition (%)
Propiconazole 25 EC	0.1	Dhan	0.0	100
Validamycin 3 L	0.3	Sukhiya VIP	48.7	41.8
Metalaxyl 8 WP + Mancozeb 64 WP	0.3	MATCO 8–64	30.0	64.1
Cymoxanil 8 WP + Mancozeb 64 WP	0.3	Moximate	0.0	100.0
Mancozeb 75 WP	0.3	Indofil M 45	54.0	35.5
Hexaconazole 4 WP+ Zineb 68 WP	0.3	Avtar	21.7	74.1
Carbendazim 25 WS + Mancozeb 50 WS	0.2	Sprint	0.0	100.0
Tricyclazole 75 WP	0.1	Baan	0.0	100.0
Control			83.7	0.0
SEm±			2.81	3.24
CD ($p = 0.05$)			8.44	9.71
CV (%)			18.14	8.20

was found incompatible with growth inhibition of 79.5%. The compatibility was statistically at par in Pyrazosulfuron Ethyl and Glyphosate. Santoro et al. [15] recorded growth of *Trichoderma* by 12.52% positive and 27.98% negative respectively with Glyphosate and Diuron + Paraquat Dichloride which are in accordance with the present result. There was scanty previous information regarding *Trichoderma's* compatibility with new herbicides Propaquizafop and Pyrazosulfuron ethyl.

Conclusion

The present findings have paramount importance to develop *Trichoderma* combined formulations as well as its application in farmers' field. *Trichoderma viride* may be recommended to use in integration with muriate of potash, single super phosphate, Mancozeb, Validamycin, Rynaxypyr, Flubendiamide, Azadirachtin, Sonata, Pyrazosulfuron Ethyl, Propaquizafop, Glyphosate and Paraquat Dichloride after testing its efficacy as per said combination in field condition.

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Influence of Crop Geometry (*Pennisetum glaucum* (L.) R. Br.) on Relative Water Content of Pearlmillet under Dryland Conditions

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Abstract The effects of row spacing (RS) on leaf relative water content (RWC) in pearlmillet under dryland conditions were investigated during *kharif* of 2013. The experiments consisted of eight planting patterns Replicated three times in a randomized block design. At 50% flowering stage the treatment receiving 135 cm × 10 cm (91.80%) gave significantly higher relative leaf water content as compared to recommended spacing 60 cm × 10 cm (63.26%). At 20 day's after 50% flowering also 135 cm × 10.0 cm (88.33%) gave significantly higher relative leaf water content as compared to recommended spacing 60 cm × 10 cm (53%). These results indicated that this was a beneficial response for yield under the high relative water content (RWC).

Keywords Relative water content (RWC), Pearlmillet, Dryland, Row spacing.

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Introduction

Peral millet (*Pennisetum glaucum* [L.] drought tolerant cereal crop planted m and semi-arid regions of the world. Wat remains one of the challenges facing Crops face water stress at various stage and erratic rainfall in arid and semi-arid r millet belongs to family Poaceae (sectic is one of the most important among t nutritious coarse grain cereals, the crop nutrient rich food source for humans as der crop for livestock and feed for poultı is the most drought and heat tolerant a or millets and it has the highest water under drought stress, also this plan unique tolerance to high temperature stress even at flowering, seed setting ar stages. Yield of a crop depends on t density. The density depends on th percentage and the survival rate in th lishment of required plant density is maximum yield. Northern Dry Zon Karnataka is biggest zone having an ar ha, out of this 35.5 lakh. ha is under c area receives an annual rainfall of 594.3 days. The rainfall is not sufficient for production due to the problems such fall, undulating topography, poor adop moisture conservation practices by the crop management practices play an i

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