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Efficacy of tolerance of bio-agents and plant pathogenic fungi to fungicides by food poison technique

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Abstract:

*An experiment was carried out in laboratory of soil department, college of agriculture, university of diyala during the year 2013-2014 to evaluate tolerance of bio-agents fungi such as Trichoderma harzanium, Trichoderma viride and Paecilomyces lilacinus and plant pathogenic fungi such as Rizoctonia solani and Macrophomina phaseolina to poisons of fungicides such as Goldazim , Premise ,Raxil and Dividend. Trichoderma harzanium was significantly superior in tolerance of toxicity of Goldazim **3.5** cm to all concentrations as compared with other bio-agents and plant pathogenic fungi whereas the radial growth of Rizoctonia solani and Macrophomina phaseolina was 1.5 cm, Rizoctonia solani and Trichoderma harzanium were more tolerance to toxicity of Premise 5.6 and 5.5 cm respectively followed by Macrophomina phaseolina 3.9 cm, Trichoderma harzanium was significantly superior in tolerance to toxicity of Raxil 3.7 cm to all concentrations followed by Rizoctonia solani and Macrophomina phaseolina 2.9 and 1.6 cm respectively, Paecilomyces lilacinus was superior in tolerance to toxicity of Dividend fungicide 4.3 cm to all concentrations followed by Rizoctonia solani and Macrophomina phaseolina 4.1 and 2.9 cm respectively.*

Key words: Trichoderma harzanium, Trichoderma viride, Paecilomyces lilacinus, Rizoctonia solani, Macrophomina phaseolina, Goldazim, Premise, Raxil and Dividend.

Introduction

Soil-borne diseases are the cause of severe losses of economically important crops. Chemical pesticides have been widely used for several decades to control soil-borne pathogens, but in recent years, prohibitions or severe restrictions to many commonly used pesticides and fumigants, methyl bromide among others, were taken for health and environmental concerns **(Gullino *et al.* 2005).**

Controlling such diseases mainly depend on fungicides treatments **(Rauf, B.A., 2000; El-Mougy *et al.*, 2004).** However, fungicidal applications cause hazards to human health and increase environmental pollution. Therefore, alternatives, eco-friendly approach treatments for control of plant diseases are needed **(Abd-El-Kareem, 2007; Rojo *et al.*, 2007; Mandal *et al.*, 2009).** Biological control agents (BCAs) for plant disease are currently being examined as alternatives to the synthetic pesticides due to their perceived increased level of safety and minimal environmental impacts **[Cotxarrera *et al.*, 2002; Brimner and Boland, 2003).**

T. harizanum and *T. viridae* are the species that most often used biological control of pathogens. *Trichoderma* produced in late years, have been developed into several commercial biological control products to prevent development of several soil pathogenic fungi. (*T. viridae*) and (*T. harzianum*) are marketed in India and Europe, respectively, for control of various plant soil borne pathogens on field and green house crops and vegetables **(Koch, 1999).**

Paecilomyces lilacinus, a common soil hyphomycete is well known as an egg parasite of plant parasitic nematodes

(**Jatala *et al.*, 1979**; **Morgan *et al.*, 1984**) and is currently developed as biocontrol agent (**Gunasekera *et al.*, 2000)** .*Paecilomyces marquandii* (Massee) has been reported to produce deferent forms of paecilotoxins (**Radics *et al.*, 1987**), which have been found to be identical with paecilotoxins produced by *P. lilacinus* (**Mikami *et al.*, 1989**).

Use of some strains of *Trichoderma harzianum* tolerant to fungicides has been reported for the integrated control of plant diseases **(Papavizas *et al*, 1982)**. *T. harzianum* and *T. viride* cannot be integrated with carbendazim even at a concentration of 10 μg/ml while thiram can be used up to 50 μg/ml **(Pandey and Upadhyay 1998).**

The present investigation was carried out to find out the efficacy of tolerance of *T. harzianum*, *T.viridae* and *P. lilacinus* as compared with *R. solani* and *M. phaseolina* in the poisoned medium of fungicides for use in integrated disease management programme.

Materials and Methods

Bio-agents and plant pathogenic fungi

Rizoctonia solani and *Macrophomina phaseolina* were isolated from infected okra plants and Broad bean plants respectively, *T. harzianum* was isolated from biopesticide (biocont), *T.viridae* and *P. lilacinus* were got from toxins laboratory, department of plant protection, college of Agriculture, university of Baghdad.

Fungicides

Fungicides such as Goldazim ,Premise ,Raxil and Dividend were got from general authority for plant protection, Baghdad.

Effect of different fungicides on mycelial growth of bio-agents and plant pathogenic fungi

Four fungicides viz., Goldazim ,Premise ,Raxil and Dividend were tested by food poisoning method at 5, 10, 25, 50 and100 ppm by adding at the time of pouring to 100 ml from PDA medium. PDA medium without any fungicide served as control. Before pouring of sterilized medium in Petri dishes streptomycin sulphate at 1ml L^{-1} medium and penicillin at 1000,000 units L^{-1} were used as antibiotic to avoid bacterial contamination. After solidifying of the medium, 0.5 cm disc of pure culture of test fungi were placed in the center of Petri dishes and incubated at 25^{o}C. There were five replications of each treatment. Radial mycelia growth of the tested fungi was recorded in cm till the upper surface in control treatment was fully covered with the mycelial growth of the fungi.

Results and discussion

Effect of Goldazim fungicide on mycelial growth of tested fungi

The results shown significantly superior in the radial growth of *T. harzanium* (3.5 cm) to all concentrations as compared with other tested fungi in Fig 1, the radial growth of *P. lilacinus* and *T.viridae* were (2.9 and 2.3 cm) respectively in all concentrations, the radial growth of two pathogenic fungi were (1.5 cm) in all concentrations. *T. harzanium* and *P. lilacinus* showed significantly increased in all concentrations, *T.viridae* was without growth in the fourth and fifth concentrations and also two pathogenic fungi were without growth in all concentrations.

The radial growth of *T. harzanium* and P. Lilacinus was significantly increased in all concentrations, while T.viride without growth in the fourth and fifth concentrations. R.solani and M. phaseolina without growth in food poisoned to all concentrations.

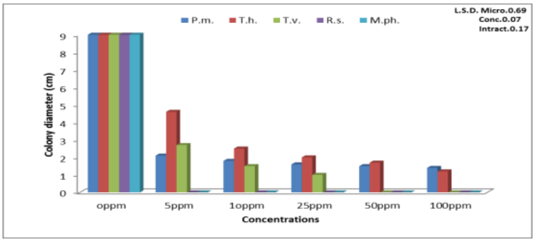

Fig 1. Effect of different concentrations of Goldazim fungicide on mycelial growth of *T. harzanium, P. lilacinus* , *T.viridae* , *R. solani* and *M. phaseolina* in the poisoned medium

Effect of Premis fungicide on mycelial growth of tested fungi

The results indicates that *R. solani* was more tolerant of toxicity of Premis fungicide from other fungi (5.6 cm) in Fig 2 followed by *T. harzanium* and *T.viridae* (5.5 and 5.1 cm) respectively whereas *M. phaseolina* and *P. lilacinus* (3.9 and 3.8 cm) respectively, mycelial growth of *R. solani* and *T.viridae* appeared in all concentrations whereas other fungi without growth in the sixth concentration.

The radial growth of *R. solani* and *T.viridae* was significantly superior in all concentrations, whereas other fungi without growth in sixth concentration.

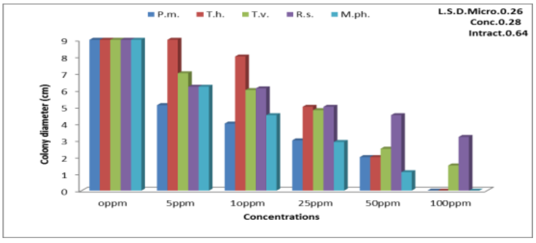

Fig 2. Effect of different concentrations of Premis fungicide on mycelial growth of *T. harzanium, P. lilacinus* , *T.viridae* , *R. solani* and *M. phaseolina* in the poisoned medium

Effect of Raxil fungicide on mycelial growth of tested fungi

The results revealed that *T. harzanium* had high tolerance of toxicity of Raxil fungicide as compared with other fungi in fig 3, mycelial growth of *T. harzanium* was significantly superior (3.7 cm) from other fungi followed by *P. lilacinus* (3cm) in all concentrations, whereas radial growth of *R. solani*, *T.viridae* and *M. phaseolina* were (2.9, 2.4 and 1.6 cm) respectively in all concentrations.

The radial growth of *T. harzianum* and *R. solani* was observed in all concentrations, whereas growth of *P.lilacinus* and *T.viride* did not observed in sixth concentration and *M.phaseolina* in third, fourth, fifth and sixth concentrations.

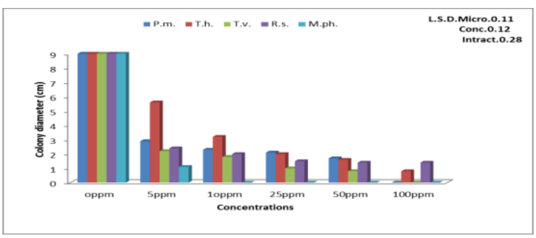

Fig 3. Effect of different concentrations of Raxil fungicide on mycelial growth of *T. harzanium, P. lilacinus*, *T.viridae*, *R. solani* and *M. phaseolina* in poisoned medium

Effect of Dividend fungicide on mycelial growth of tested fungi

The results showed that *P. lilacinus* was significantly superior in high tolerance to toxicity of fungicides (4.3 cm) as compared with other fungi followed by *R. solani* (4.1 cm), *T. harzanium* (3.8 cm) *M. phaseolina (*2.9 cm) and *T.viridae* (2.9 cm). Mycelial growth of all fungi were observed in all concentrations whereas *M. phaseolina* without mycelial growth in the fifth and sixth concentrations. The radial growth of all fungi was appeared in all concentrations except *M.phaseolina* without growth in fifth and sixth concentrations in fig 4.

The ability of tolerance of bio-agents fungi to toxicity of different fungicides as compared with plant pathogenic fungi may be due to the ability of cellular system for bio-agents fungi to destroy the fungicides or to reduce amount of fungicides that absorbed by the biological fungi. It also may be due to high susceptibility of pathogenic fungi to these fungicides or specialization of these fungicides on this group of fungi.

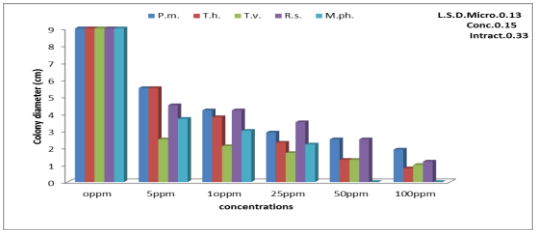

Fig 4. Effect of different concentrations of Dividend fungicide on mycelial growth of *T. harzanium, P. lilacinus* , *T.viridae* , *R. solani* and *M. phaseolina* in poisoned medium

References

Gullino, M.L., C. Clini, A. Garibaldi, 2005: Life without methyl bromide:the Italian experience in replacing the fumigation. Commun. Agric. Appl. Biol. Sci. 70, 13-25.

Rauf, B.A., (2000). Seed-borne disease problems of legume crops in Pakistan. Pak. J. Sci. and Industrial Res., 43: 249-254.

El-Mougy, N.S., F. Abd-El-Karem, N.G. El-Gamal and Y.O. Fotouh, (2004). Application offungicides alternatives for controlling cowpea root rot diseases under greenhouse and field conditions. Egypt. J. Phytopathol., 32: 23-35.

Abd-El-Kareem, F., (2007). Induced Resistance in Bean Plants Against Root Rot and Alternaria Leaf Spot Diseases Using Biotic and Abiotic Inducers under Field Conditions. Research Journal of Agriculture and Biological Sciences, 3(6): 767-774.

Rojo, F.G., M.M. Reynoso, M.F. Sofia and A.M. Torres, (2007). Biological control by Trichoderma species of Fusarium solani causing peanut brown root rot under field conditions. Crop protection. 26: 549-555.

Mandal, S., N. Mallick and A. Mitra, (2009). Salicylic acid-induced resistance to Fusarium oxysporum f.sp.lycopersici in tomato. Plant Physiology and Biochemistry, 47: 642-649.

Cotxarrera, L., M.I. Trillas-Gay, C. Steinberg and C. Alabouvette, (2002). Use of sewage sludge compost and Trichoderma asperellum isolates to suppress Fusarium wilt of tomato. Soil Biology and Biochemistry, 34: 467–476.

Brimner, T.A. and G.J. Boland, (2003). A review of the non-target effect of fungi used to biologically control plant diseases. Agriculture, Ecosystem and environment100. 3-16.

Koch E (1999). Evaluation of commercial products for microbial control of soil borne plant disease, Crop Prod. 18: 119-125.

Jatala, P., Kaltenback, R. and Bocangel, M. (1979) Biological control of Meloidogyne incognita acrita and Globodera pallida on potatoes. J. Nematol. 11, 303 (Abstr).

Morgan-Jones, G., White, J.F. and Rodriguez-Kabana, R. (1984) Phytonematode pathology: Ultrastructural studies II. Parasitism of Meloidogyne arenaria eggs and larvae by Paecilomyces lilacinus. Nematropica 14, 57^71.

Gunasekera, T.S., Holland, R.J., Gillings, M.R., Briscoe, D.A., Neethling, D.C., Williams, K.L. and Nevalainen, K.M.H. (2000) Phenotypic and genetic characterization of Paecilomyces lilacinus strains with biocontrol activity against root-knot nematodes. Can. J. Microbiol. 46, 775^783.

Mikami, Y., Yazawa, K., Fukushima, K., Arai, T., Udagawa, S. and Samon, R.A. (1989) Paecilotoxin production in clinical or terrestrial isolates of Paecilomyces lilacinus strains. Mycopathologia 108, 195^ 199.

Radics, L., Kajatar-Peredy, M., Gasinovi, C.G., Rossi, C., Ricc, M. and Tuttobello, L. (1987) Leucinostatin H and K, two novel peptide antibiotics with tertiary amine-oxide terminal group form Paecilomyces marquandii. Isolation, structure and biological activity. J. Antibiot. 40, 714^716.