J. Biol. Control, 23(1): 87-88, 2009

Research Note

Bio-intensive management of rhizome rot of ginger under field conditions

A. K. SINGH[1] and R. K. S. TOMAR[2]

[1]Indira Gandhi Agricultural University, All India Coordinated Project on Spices, Regional Agricultural Research Station, Raigarh 496001, Chhattisgarh, India.

[2]Indira Gandhi Agricultural University, Regional Agricultural Research Station, Boirdadar, Raigarh 496001, Chhattisgarh, India.

E-mail : singh_ajit8@yahoo.co.in

ABSTARCT: Use of neem cake at 1kg + 100 gm of *Trichoderma harzianum* in 3kg FYM mixed for 7 days applied to soil before planting and watering regularly gave maximum yield (13.45t ha^{-1}) and minimum disease incidence (5.5%), next best treatment was seed treatment with hot water 51°C + 100gm *T. harzianum* + 1Kg neem cake at sowing time gave disease incidence (6.75%) and yield (12.03t ha^{-1}) both of treatments are statistically at par as regards in disease incidence and yield. The results showed that these safer management tools against diseases in ginger crop gave better protection and pesticide residue free rhizome because of its use as direct consumption without any processing.

KEY WORDS: Bio-intensive, *Pythium* , rhizome rot, *Trichoderma harzianum.*

Ginger (*Zingiber officinale* Roscue) is one of the most important spice crops of India and it is grown in every state for its aroma and pungency. Many pathogens are reported to infect ginger and cause several diseases resulting in heavy crop losses. Rhizome rot of ginger caused by *Pythium* spp. (Bhardwaj *et al.,* 1988) is one of the most serious constraints in production of ginger. This disease is seed and soil borne in nature (Kumar *et al*., 1989). There have been many reports of successful use of antagonistic fungi to control soil borne pathogenic fungi. Species of *Trichoderma* have been evaluated by many workers for efficacy in the biocontrol of fungal plant pathogens (Chet *et al*., 1981; Mukhopadhyay, 1994; Shankar and Jayarajan 1996; Dubey, 2003).

A field experiment was conducted in a randomized block design (RBD) in 2005-2006 and 2006-07 at Regional Agricultural Research Station, Indira Gandhi Agricultural University, Boirdadar, Raigarh (Chaattisgarh) with eight treatments, *viz*., T_1 = control; T_2 = seed treatment with hot water at 51°C for 10min; T_3 = seed treatment with mancozeb (3g L^{-1}) for 30min; T_4 = seed treatment with *T. harzianum* talc formulation in water for 30min; T_5 = seed treatment with hot water at 51°C for 10min + T_3; T_6 = seed treatment with hot water at 51°C + 100gm *T. harzianum* talc formulation in 1kg neem cake at the time of sowing; T_7 = application of neem cake at 1kg in soil at the time of sowing; T_8 = neem cake 1kg + 100gm *T. harzianum* talc formulation in 3kg FYM mixed for 7 days before sowing and watering regularly. The trial was laid in a standard plot size of 3 x 1m^2 in ridges and furrows method and rhizomes were planted in 30 x 20cm apart. Fifty rhizomes were planted in each bed, each weighing about 25 – 30gm. Planting was done in the last week of the June in both the years with recommendeddosage of fertilizers. Total amount of phosphatic fertilizer and half dosage of potassic fertilizer were given as basal dosage. Half the dose of nitrogenous fertilizer was given at 45 days and half amount of potassic and half amount of nitrogenous fertilizers were given at 90 days after planting. Irrigation was given as and when required.

Trichoderma harzianum procured from Indira Gandhi Agricultural University, Thakur Chedi Lal Baristar College of Agriculture, Sarakanda, Bilaspur (C.G.), a local isolate available as Indira Tricho (cfu 4.3 x 10^7), was used. Data on sprouting of rhizome, tiller per pit and per cent sprouting of rhizome were calculated (Anonymous, 2004). Observation on disease incidence was made one month before digging the crop. Per plot yield was taken at the time of harvesting after the removal of roots and rootlets.

The results indicated that neem cake 1kg + 100gm of talc formulation of *T. harzianum* in 3kg FYM (mixed 7 days before planting and watering regularly (T_8) gave minimum per cent disease incidence (5.5%) and maximum yield (13.4 t ha^{-1}). The next best treatment was seed treatment with hot water 51°C + 100gm of tlalc formulation of *T. harzianum* (T_6) with 6.70% disease incidence and 12.03 t ha^{-1} yield. Both treatments were found to be statistically on par with respect to reduction of disease intensity and increase in

Table 1. Effect of biointensive management practices on disease incidence and yield of ginger

Treatments	Disease incidence (%)		Pooled Disease incidence (%)	Yield t ha^{-1}		Pooled (Yield t ha^{-1})
	2005-06	2006-07		2005-06	2006-07	
Control (T_1)	19.5	17.5	18.5	6.8	10.19	8.5
Seed treatment with hot water 51°C for 10min (T_2)	20	18	19	6.3	10.90	8.6
Seed treatment with Mancozeb (3gm L^{-1}) 30min (T_3)	20.5	18	19.25	5.8	9.0	8.4
Seed treatment with bio agent 20g L^{-1} water for 30min (T_4)	22	20.5	21.25	5.5	11.05	8.3
Seed treatment with hot water 51°C for 10min + T_3 (T_5)	16.5	14.5	15.5	7.5	11.85	9.8
Seed treatment with hot water 51°C + 100gm bio agent in 1kg neem cake at sowing time (T_6)	8	5.5	6.75	8.2	15.87	12.03
Application of neem cake 1kg in soil at the time of sowing (T_7)	14	14	14	7.1	12.46	9.7
Neem cake 1kg + 100gm bio agent in 3kg FYM Mixed 7 days before sowing and watering regularly (T_8)	6.5	4.5	5.5	9.8	17.08	13.4
CD (0.05%)	1.73	1.69	1.54	1.72	1.37	1.46

the yield. Abarzado *et al.* (1998) used *Trichoderma* spp. against rhizome rot of ginger successfully. Similar results were reported by Rajan *et al.* (2003) and Ghorpade and Ajri (1982) for the management of rhizome rot with *T. harzianum*.

REFERENCES

Abarazado, A. F., Lubao, J. A., Samoy, E. F. 1998. Biological control of ginger rhizome rot using *Trichoderma* spp. *Philippine Journal of Crop Science*, **23** (Supp. No.1). 91pp.

Anonymous, 2004. Instruction for recording disease incidence and methods of application of bio-agents and chemicals. Proceedings of the XVII workshop of All India Coordinated Research Project on Spices, Calicut, Kerala.

Bhardwaj , S. S., Gupta, P. K., Dohroo, N. P. and Shyam, K. R. 1988. Biological control of rhizome rot of ginger in storage. *Indian Journal of Plant Pathology,* **6**: 56-58.

Chet, I., Harman, G. E. and Baker, R. 1981. *Trichoderma hamatum* its hyphal interaction with *Rhizoctonia solani* and *Pythium* spp. *Microbial Biology*, **7**: 29-38 .

Dubey, S. C. 2003. Integrated management of web blight of urd bean/mung bean by bio-seed treatment. *Indian Phytopathology,* **56**: 34-38.

Ghorpade, S. A. and Ajri, D. S. 1982. Effectiveness of oilseed cakes in control of rhizome rot. *Journal of Maharashtra Agriculture University,* **7**: 272.

Kumar, R. , Pandey, J. C. and Kumar, R. 1989. Chemical control of Rhizome rot of ginger by seed and soil treatment. *Progressive Horticulture* **21**: 130-133.

Mukhopadhyay, A. N. 1994. Biocontrol of soil borne fungal plant pathogens-current status, future prospect, potential, and limitations. *Indian Phytopathology,* **47**: 119-126.

Rajan, P. P., Gupta, S. R., Sharma, Y. R. and Jakson, G. V. H. 2003. Diseases of ginger and their control with *Trichoderma harzianum. Indian Phytopathology*, **55**: 173-177.

Sankar, P. and Jayarajan, R. 1996. Seed treatment formulation of *Trichoderma* and *Gliocladium* for biological control of *Macrophomina phaseolina* in sesame. *Indian Phytopathology,* **49**: 148-151.

(Received: 08-02-2008; Revised: 09-04-2008; Accecpted: 17-09-2008)