INTERNATIONAL JOURNAL OF PLANT PROTECTION
VOLUME 9 | ISSUE 1 | APRIL, 2016 | 279-282

● e ISSN-0976-6855 | Visit us : *www.researchjournal.co.in*

IJPP

A CASE STUDY

DOI : 10.15740/HAS/IJPP/9.1/279-282

Efficacy of biocontrol agents and organic amendments against root rot disease in blackgram

■ SOWMYA TETALI*, P. LAKSHMANAN AND P. BHARAT CHANDRA[1]

Department of Plant Pathology, Adhiparasakthi Agricultural College (T.N.A.U.), KALAVAI (T.N.) INDIA
[1]Department of Plant Pathology, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, AKOLA (M.S.) INDIA

ARITCLE INFO

Received : 25.01.2016
Accepted : 20.03.2016

KEY WORDS :
Trichoderma viride, Macrophomina phaseolina, Organic amendments

***Corresponding author:**
Email: sowmyatetali@gmail.com

ABSTRACT

Trichoderma viride, the plant growth promoting fungi and increasing the soil fertility significantly controlled root rot disease caused by *Macrophomina phaseolina*. Use of *Trichoderma viride* along with neem cake produced the higher germination percentage and shoot length, respectively as compared to their separate use. Soil amendment with neem cake and seed treatment with TNAU isolate of *T. viride* significantly reduced the per cent disease incidence. Among the treatments, pots received with antagonist and organic amendments recorded lesser disease incidence than control.

How to view point the article : Tetali, Sowmya, Lakshmanan, P. and Chandra, P. Bharat (2016). Efficacy of biocontrol agents and organic amendments against root rot disease in blackgram. *Internat. J. Plant Protec.*, **9**(1) : 279-282.

INTRODUCTION

Blackgram (*Vigna mungo* L.) also known as urdbean, mash and blackmaple is widely consumed edible legume grown throughout India, both as a pure and as inter-mixed crop. Blackgram ranks fourth in production and acreage. In India it covers an area of about 3,011,300 hectares with the annual production of 1,295,400 tonnes. It is infected by number of diseases caused by fungi, bacteria and viruses. Among the fungus, the root rot caused by *Macrophomina phaseolina* (Tassi.) Goid. is a major barricade that leads to severe crop loss (Indra and Gayathri, 2003).

Macrophomina phaseolina a soil-inhabiting fungus is an important root pathogen and causes dry root rot, stem canker, stalk rot and charcoal rot diseases. The *M. phaseolina* is a high temperature loving fungus and reported to produce dry root rot/charcoal rot of over 500 species of plants (Sinclair and Backman, 1986; Mirza and Qureshi, 1978 and Shahzad *et al.*, 1988). The sclerotia of the fungus served as a primary means of survival .

MATERIAL AND METHODS

A pot culture experiment (II) was laid out using *T. viride i*solate of Department of Pulses, TNAU and manures *viz.*, FYM, poultry manure, neem cake, mushroom spent compost, and vermicompost. Fungicide carbendazim was used as comparative check. Each treatment was replicated three times in Completely Randomized Block Design. Potting soil (red soil: sand:

FYM at 1:1:1 w /w/w) was sterilized at 121° C at 15 lb. pressure for two consecutive days and filled in uniform (30 x 20 cm) earthen pots. The antagonist *T. viride* developed as talc based formulation and was incorporated into the potting soil three days defore the application of pathogen. The pathogen multiplied in sand maize medium was incorporated three days before sowing of seeds @ five g per pot. Seeds were sown after the application of treatment as given below. In each pot six plants were maintained uniformly after thinning on 15 DAS. Pot inoculated with pathogen only served as control.

Treatments :

T_1- Soil application of FYM @ 12.5 t/ ha

T_2- Soil application of poultry manure@ 12.5 t / ha

T_3- Soil application of vermicompost @ 2.5 t / ha

T_4- Soil application of neem cake @ 8 t / ha

T_5- Soil application of Mushroom spent compost @ 12.5 t / ha

T_6- Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ ha +FYM @ 12.5 / ha

T_7- Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ ha + poultry manure @12.5 t/ha

T_8- Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + vermicompost@ 2.5 t /ha

T_9- Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + neem cake@ 8 t /ha

T_{10}- Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + mushroom spent compost@12.5 t/ha

T_{11}- Soil application with TNAU isolate of *T. viride* @ 2.5 kg /ha

T_{12}- Seed treatment with TNAU isolate of *T. viride* @4g/kg

T_{13}- Seed treatment with carbendazim 2g/kg

T_{14}- Soil application of FYM @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @4g/kg

T_{15}- Soil application of poultry manure @ 12.5 t/ha + Seed treatment with TNAU isolate of *T.viride*@4g/ kg

T_{16}- Soil application of vermicompost@ 2.5 t /ha +

Table A : Effect of biocontrol agents and organic amendments against root rot incidence of blackgram

Tr. No.	Treatments	Disease incidence(%)*	
		45 DAS	60 DAS
T_1	Soil application of FYM @ 12.5 t/ha	22.17^{cde} (28.09)	44.40^{cdef} (41.78)
T_2	Soil application of poultry manure @ 12.5 t/ha	27.77^{bcd} (31.80)	49.96^{bcde} (44.97)
T_3	Soil application of vermicompost @ 2.5 t/ha	27.73^{bcd} (31.77)	55.53^{bcd} (48.17)
T_4	Soil application of neem cake @ 8 t/ha	38.82^{abc} (38.54)	61.60^{bc} (51.70)
T_5	Soil application of Mushroom spent compost @ 12.5 t/ha	35.53^{bc} (36.59)	44.43^{cdef} (41.80)
T_6	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + FYM @ 12.5 t/ha	16.63^{de} (24.06)	44.40^{cdef} (41.78)
T_7	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + poultry manure @ 12.5 t/ha	16.63^{de} (24.06)	61.10^{bc} (51.41)
T_8	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + vermicompost @ 2.5 t/ha	27.73^{bcd} (31.77)	44.43^{cdef} (41.80)
T_9	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + neem cake @ 8 t/ha	22.80^{cd} (28.52)	72.20^{ab} (58.14)
T_{10}	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + mushroom spent compost @ 12.5 t/ha	22.17^{acde} (28.09)	44.44^{cdef} (41.80)
T_{11}	Soil application with TNAU isolate of *T. viride* @ 2.5 kg/ha	16.63^{de} (24.06)	38.86^{cdef} (38.56)
T_{12}	Seed treatment with TNAU isolate of *T.viride* @ 4g/kg	38.90^{de} (38.58)	38.86^{cdef} (38.56)
T_{13}	Seed treatment with carbendazim 2g/kg	21.73^{cde} (27.78)	55.50^{bcd} (48.15)
T_{14}	Soil application of FYM @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	16.60^{de} (24.04)	22.17^{f} (28.09)
T_{15}	Soil application of poultry manure @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	27.73^{bcd} (31.77)	33.30^{bcde} (35.24)
T_{16}	Soil application of vermicompost @ 2.5 t /ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	33.20^{cde} (35.18)	55.53^{bcde} (48.17)
T_{17}	Soil application of neem cake @ 8 t/ha + Seed treatment with TNAU isolate of *T. viride*	11.60^{de} (19.61)	27.73^{ef} (31.77)
T_{18}	Soil application of mushroom spent compost @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	33.30^{de} (35.24)	39.30^{def} (38.82)
T_{19}	Control	49.96^{ab} (44.97)	88.86^{a} (70.50)

*Mean of three replications.

Values in parentheses are arcsine transformed values

Means in a column followed by same superscript are not significantly different by Ducan's Multiple Range Test at $P < 0.05$

Seed treatment with TNAU isolate of *T.viride*@4g/kg

T_{17}-Soil application of neem cake@ 8 t /ha + Seed treatment with TNAU isolate of *T. viride* @4g/kg

T_{18}- Soil application of mushroom spent compost@ 12.5 t /ha + Seed treatment with TNAU isolate of *T. viride* @4g/kg

T_{19}- control (no treatment) (Table A).

RESULTS AND DISCUSSION

The results revealed that the application of bio control agents and organic amendments was more effective in suppressing the root rot of blackgram caused by *M. phaseolina* under shade net condition. Among the 19 treatments, soil application with neem cake + seed treatment with TNAU isolate of *T. viride* (T_{17}) significantly reduced per cent disease incidence of 11.60 which accounted 76.78 per cent reduction over control followed by T_{14}- soil application of FYM and seed treatment with TNAU isolate of *T. viride* (16.60 %). The highest disease incidence was recorded in T_{12}- seed treatment with TNAU isolate of *T. viride* (38.90 per cent). The result is in accordance with the report of earlier workers. Neem cake and neem leaves reduced the charcoal rot of soyabean significantly (Narsimhalu and Bhaskaran, 1987). Elad *et al*. (1982) showed that the seed treatment and soil application of *T. harzianum* recorded low incidence of disease. Singh and Singh (2007) observed maximum disease reduction in pyrite treatment followed by neem cake.

Basu and Maiti (2006) demonstrated that stem rot of potato was reduced by the amendments of NPK+FYM. Deshmukh and Raut (1992) demonstrated that *T. harzianum* and *T. viride* were effective in reducing the disease incidence in pot experiment. Rajani and Parakhia (2009) reported the least root rot disease incidence in castor with treatments of neem cake and *T. harzianum*, which also gave the maximum castor seed yield. Mustard cake and *T. harzianum*, castor cake and *T. harzianum* were the next best treatments. Similarly, all the treatments have increased seed yield over control. The combination of soil amendments with bio agent was superior over sole treatment of soil amendments. Neem

Table 1 : Effect of biocontrol agents and organic amendments against black gram growth parameters

Tr. No.	Treatments	Germination percentage*	Shoot length in (cm)*
T_1	Soil application of FYM @ 12.5 t/ha	68.3^{bc} (55.73)	13.16^{hi}
T_2	Soil application of poultry manure @ 12.5 t/ha	71.6^{abcd} (57.79)	14.03^{fgh}
T_3	Soil application of vermicompost @ 2.5 t/ha	66.6^{bc} (54.69)	16.76^{c}
T_4	Soil application of neem cake @ 8 t/ha	75.0^{abc} (60.00)	16.70^{c}
T_5	Soil application of Mushroom spent compost @ 12.5 t/ha	76.6^{abc} (61.07)	15.43^{d}
T_6	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + FYM @ 12.5 t/ha	61.6^{cd} (51.70)	12.53^{j}
T_7	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + poultry manure @ 12.5 t/ha	50.0^{de} (45.00)	14.83^{def}
T_8	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + vermicompost @ 2.5 t/ha	75.0^{abc} (60.00)	13.80^{fghi}
T_9	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + neem cake @ 8 t/ha	78.3^{ab} (62.23)	13.86^{fgh}
T_{10}	Soil application of TNAU isolate of *T. viride* @ 2.5 kg/ha + mushroom spent compost @ 12.5 t/ha	71.6^{abc} (57.79)	12.70^{i}
T_{11}	Soil application with TNAU isolate of *T. viride* @ 2.5 kg/ha	75.0^{abc} (60.00)	14.46^{defg}
T_{12}	Seed treatment with TNAU isolate of *T.viride* @ 4g/kg	78.3^{ab} (62.23)	15.26^{d}
T_{13}	Seed treatment with carbendazim 2g/kg	68.3^{bc} (55.73)	13.40^{ghi}
T_{14}	Soil application of FYM @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	70.0^{bc} (68.52)	21.06^{b}
T_{15}	Soil application of poultry manure @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	66.6^{bc} (54.69)	17.70^{c}
T_{16}	Soil application of vermicompost@ 2.5 t /ha + Seed treatment with v *T. viride* @ 4g/kg	71.6^{abc} (57.79)	15.20^{de}
T_{17}	Soil application of neem cake @ 8 t/ha + Seed treatment with TNAU isolate of T,*virie*	86.6^{abc} (56.79)	24.33^{a}
T_{18}	Soil application of mushroom spent compost @ 12.5 t/ha + Seed treatment with TNAU isolate of *T. viride* @ 4g/kg	78.3^{abc} (62.23)	14.13^{efgh}
T_{19}	Control	40.00^{e} (39.23)	10.86^{j}

*Mean of three replications.
Values in parentheses are arcsine transformed values.
Means in a column followed by same superscript are not significantly different by Ducan's Multiple Range Test at $P < 0.05$

contains a variety of chemical constituents such as nimolicinol, isolimolicinolide, azadirachtin, azadirachtol, nimocin etc with fungicidal properties that might be acted on the pathogen and reduced the disease incidence (Dubey and Kumar, 2001).

REFERENCES

Basu, A. and Maiti, M.K. (2006). Role of host nutrition and varieties on the development of stem rot of potato. *Ann. Plant Protec. Sci.,* **14** : 479-480.

Deshmukh, P.P. and Raut, J.G. (1992). Antagonism by *Trichoderma sp.* on the five plant pathogenic fungi. *New Agriculturist.*, **3** : 127-130.

Dubey, R.C., Kumar, H. and Pandey, R.R. (2009). Fungitoxic effect of neem extracts on growth and sclerotial survival of *Macrophomina phaseolina in vitro*. *J. American Sci.,* **5** (5): 17-24.

Elad, Y., Chet, T. and Kajan, J. (1982). *Trichoderma harzianum*: A bio control agents effective against *Sclerotium rolfsii* and *Rhizoctonia solani*. *Phytopathol.*,**72** : 119-121.

Indra. N. and Gayathri, S. (2003). Management of black gram root rot caused by *Macrophomina phaseolina* by antagonistic microorganisms. *Madras Agric J.,* **90** : 490-494.

Mirza, J.H. and Qureshi, M.S.A. (1978). *Fungi of Pakistan.* Department of Plant Pathology, University of Agriculture Faisalabad, 311 pp.

Narasimhalu, G. and Bhaskaran, R. (1987). Effect of organic amendments on root rot of soybean caused by *Macrophomina phaseolina*. In: Workshop, Biological control of plant diseases, 10-12 Mar, 1987, TNAU, Coimbatore. p-3.

Rajani, V.V. and Parakhia, A.M. (2009). Management of root rot disease [*Macrophomina phaseolina* (Tassi.) Goid.6 of castor [*Ricinus communis* (L.) Moench.] with soil amendments and biocontrol agents. *J. Mycol. Pl. Pathol.,* **39** : 20-30.

Shahzad, S., Sattar, A. and Ghaffar, A. (1988). Additions to the hosts of *Macrophomina phaseolina*. *Pak. J. Bot.,* **20**: 151-152.

Sinclair, J.B. and Backman, P.A. (1986). Compendium of soybean diseases. 3rd Ed. : *The American Phytopathological Society,* 30 -33.

Singh, R. and Singh, L.B. (2007). Evaluation of different soil amendments against *Sclerotinia* blight of brinjal. *Ann. Plant Protec. Sci.,* **15** : 265-266.