Plant Pathology Journal

ISSN 1812-5387

science alert

ANSInet
an open access publisher
http://ansinet.com

Pakistan Journal of Plant Pathology 2(2): 91-96, 2003
ISSN 1680-8193

Seed Treatment with Biofertilizer in Controlling Foot and Root Rot of Mungbean

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Abstract: Seed treatment with biofertilizers in controlling foot and root rot of binamoog-3 and binamoog-4 was investigated under field condition. Biofertilizer significantly increased seed germination and decreased incidence of foot and root rot of mungbean. Treatment of seeds of binamoog-3 with biofertilizer showed 5.67% increase in germination over control, but in case of binamoog-4 10.81% increase in germination over control was achieved by treating seeds with biofertilizer. Biofertilizers resulted 77.79% reduction of foot and root rot disease incidence over control in binamoog-3 and 76.78% reduction of foot and rot disease in binamoog-4. Seed treatment with biofertilizer also produced up to 20.83% higher seed yield (t ha^{-1}) over untreated control in binamoog-3 and 12.79% higher seed yield over control in binamoog-4.

Key words: Biofertilizer, seed treatment, mungbean, germination, foot rot, yield

Introduction

Mungbean (***Vigna mungo***) is the fifth major pulse crop in Bangladesh which contributes 6.65% of total pulse production in Bangladesh (BBS, 2000). Yield of mungbean in Bangladesh is 0.62 t ha^{-1} (BBS, 2000) which is very low in comparison to the world production. Among the various factors of low yield, diseases prevalence plays an important role. Mungbean is severely affected by foot and root rot. Foot and root rot of mungbean is caused by ***Fusarium oxysporum*** and ***Sclerotium rolfsii***. They are most destructive soil borne as well as seed borne phytopathogenic fungi (Fakir, 1983; Ahmed, 1985). Use of chemicals for controlling this disease resulted environmental pollution, health hazards all over the world. As an alternate means of avoiding these problems, use of biological control agents are now being used in many developed countries for combating the diseases with the aim of increasing food production. If ***Rbizobium*** could successfully be used for controlling foot and root rot of mungbean, this could help to save the currency of purchasing plant protecting chemicals as well as to reduce the environmental pollution. In addition, ***Rbizobium*** could enrich soil nitrogen levels through BNF (Biological Nitrogen Fixation). Therefor, the present research work was designed to evaluate the seed treatment with biofertilizer in controlling foot and root rot of mungbean.

Materials and Methods

Collection of seed and biofertilizers

Seed samples of two mungbean varieties viz. Binamoog-3 and binamoog-4 were collected from

Bangladesh Institute of Nuclear Agriculture (BINA), Mymensingh, Bangladesh. Two biofertilizer viz. BARI biofertilizer and BINA biofertilizer were collected from the Soil Microbiology Laboratory, Bangladesh, Agricultural Research Institute (BARI), Joydebpur, Gazipur and BINA, Mymensingh, Bangladesh, respectively.

Germination test

Germination test of the two mungbean varieties were done following blotter method of (ISTA, 1996).

Treatment of seeds with biofertilizer

Seeds were counted and packed in separate polyethylene bags as per treatment and replication. Seeds were than moistened and mixed thoroughly with the peat based biofertilizer. The treated seeds were placed in a cool and dry place under shade for few minutes for drying.

Field trial

The experiment was conducted in randomized block design with 3 replications. The size of the individual plot was 1×1 m. The space between the blocks and plots were 1 and 1m, respectively.

The seeds were sown in the afternoon as per treatment where spacing was maintained 15 cm line to line. The seeds were sown in 3-5 cm depth and then covered with soil. No plant protection measure such as insecticidal and fungicidal spray was applied for controlling the pest and disease of the crop. The experimental plots were inspected periodically for determining foot and root rot. The crop was harvested. Yield and yield attributes were determined.

Results and Discussion

Seed treatment with biofertilizer significantly enhanced germination of binamoog-3 and binamoog-4 (Table 1). Seed germination of binamoog-3 under different treatments ranged from 75.71 to 80.00%. Highest seed germination of binamoog-3 was recorded under seed treatment with BINA biofertilizer which was 5.67% higher over untreated control. Seed germination of (78.09%) was recorded under seed treatment BINA biofertilizer which was 10.81% higher over

Table 1: Effect of seed treatment with biofertilizers on germination of mungbean cultivers

Treatment	%Germination	%Increased germination over untreated control
Binamoog-3		
Control (untreated)	75.71	--
BARI biofertilizer	76.66	1.25
BINA biofertilizer	80.00	5.67
Binamoog-4		
Control (untreated)	70.47	--
BARI biofertilizer	76.66	7.78
BINA biofertilizer	78.09	10.81
LSD (p=0.05)	7.249	

binamoog-4 under different treatments ranged from 70 to 78%. Highest seed germination (78%) was recorded under seed treatment with BINA biofertilizer which was 10% higher over untreated control. Khan ***et al.*** (1998) reported that treatment of seeds of lentil with Rhizobial strains increased germination up to 46% over control, where Hossain ***et al.*** (1999) obtained 48% higher seed germination of lentil cv. Utfala over untreated control by treating seeds with biofertilizer. Hossain ***et al.*** (2000) recorded 18% higher germination of lentil seeds over control by treating seeds with biofertilizer. In another study.

The results of the present study distinctly showed that treatment of seeds with biofertilizer has a profound effect in reducing foot and root rot disease (Table 2). Highest reduction of foot and root rotted plants/plot of binamoog-3 was obtained by seed treatment with BINA biofertilizer which was 77.97% reduction over untreated control. Seed treatment of binamoog-4 with BARI biofertilizer and BINA biofertilizer resulted up to 69.63 and 76.79% reduction in foot and root rot disease, respectively. Kibria (2000) reported that seeds of binamoog-5 treated with BINA biofertilizer decrease disease severity by 70.16%. Khan ***et al.*** (1998) reported that rhizobial inoculants resulted up to 62.5 and 73.3% reduction in Fusarial and Sclerotial foot and root rot of lentil, respectively in pot experiment. Hossain ***et al.*** (1999) also reported that seed treatment of lentil cv. Utfala with *R*hizobial inoculants showed excellent effect in protecting attack of both ***Fusarium oxysporum*** and ***Sclerotium rolfsii***.

Application of Biofertilizer also resulted significant increase in length of shoot and root, weight of shoot and root and dry weight of the Mungbean cv. Binamoog-3 and Binamoog-4. Highest shoot length, root length, shoot weight, root weight and dry weight/plant of binamoog-3 was obtained by treating seeds with BINA biofertilizer (Table 3). Similar result was obtained in binamoog-4. Kibria (2000) obtained 64.38% increase in shoot length and 57.69% increase in root length over control by employing seed treatment with biofetilizer. They also reported that seed treatment with biofertilizer increased shoot and root weight significantly over control. The finding of the present study also corroborates with the findings of Hossain ***et al.*** (1999).

Seed treatment with biofertilizer showed significant variation on the formation of number of complete inhibition of nodule formation by the inoculation of Mungbean with ***Fusarium*** nodules/plant and weight of nodules/plant of the crop (Table 4). Chary ***et al.*** (1983) observed

Table 2: Effect of seed treatment with biofertilizers on incidence of foot and root rot of mungbean cultivars

Treatment	Foot and root rotted plant/plot	%Foot and root rotted plant/plot	%reduction of foot and root rot over untreated control
Binamoog-3			
Control (untreated)	36.00	32.45	--
BARI biofertilizer	8.00	7.23	77.72
BINA biofertilizer	7.67	7.15	77.97
Binamoog-4			
Control (untreated)	35.38	34.93	--
BARI biofertilizer	12.00	10.61	69.62
BINA biofertilizer	9.00	8.11	76.78
LSD (P=0.05)	13.20	11.50	

Table 3: Effect of seed treatment with biofertilizers on growth, weight of shoot and root of mungbean cultivars

Treatment	Shoot length/plant (cm) at flowering stage	Shoot length/plant (cm) at harvesting stage	Root length/ plant at flowering stage (cm)	Shoot weight/ plant at flowering stage (g)	Root weight/ plant at flowering stage (g)	Dry weight/ plant after harvest (g)
Binamoog-3						
Control (untreated)	24.80	27.37	16.38	20.00	0.64	8.09
BARI biofertilizer	36.50	39.83	16.43	26.04	1.27	8.70
BINA biofertilizer	36.60	40.43	17.57	28.04	1.28	11.35
Binamoog-4						
Control (untreated)	20.95	24.27	16.83	17.86	0.51	4.71
BARI biofertilizer	28.20	31.03	16.40	17.99	0.89	5.82
BINA biofertilizer	28.20	31.50	16.87	20.72	1.14	7.00
LSD (P=0.05)	5.872	5.80	NS	8.64	0.51	2.83

Table 4: Effect of seed treatment with biofertilizers on nodulation of mungbean cultivars

Treatment	Number of nodules/plant	Weight of nodules/ plant (g)	% nodule increase over untreated control
Binamoog-3			
Control (untreated)	5.09	0.03	--
BARI biofertilizer	7.07	0.07	133
BINA biofertilizer	7.67	0.09	200
Binamoog-4			
Control (untreated)	1.86	0.03	--
BARI biofertilizer	3.33	0.08	166
BINA biofertilizer	4.93	0.09	200
LSD (P=0.05)	4.14	0.824	

Table 5: Effect of seed treatment with biofertilizers on yield of mungbean cultivaras

Treatment	No. of pod/ plant	Length of pod/ plant (cm)	No. of seed/ plant	Wt. of seed/ plant (g)	Wt. of seed/ plot (g)	yield (t ha^{-1})	% yield increase over untreated control
Binamoog-3							
Control (untreated)	6.40	5.92	4.94	1.33	85.80	0.86	--
BARI biofertilizer	7.40	6.13	5.15	1.56	94.70	0.95	10.46
BINA biofertilizer	12.80	7.11	7.19	2.05	97.40	0.97	12.76
Binamoog-4							
Control (untreated)	7.67	4.93	2.93	0.82	71.60	0.72	--
BARI biofertilizer	8.20	5.48	3.12	0.87	78.50	0.79	9.72
BINA biofertilizer	8.33	5.57	3.78	1.22	87.40	0.87	20.83
LSD (P=0.05)	4.14	0.82	1.91	0.96	6.17	0.01	

oxysporum in sterilized soil which was improved when simultaneous inoculation was done with ***Rhizobium***. Sharma ***et al.*** (1995) obtained an increase in number of nodules and dry weight of nodules with seed bacterization of Mungbean (***Vigna radiata*** L). The result of the present study is also supported by Pal and Ghosh (1986) and Kumar ***et al.*** (1998).

Seed treatment with biofertilizer under the present study resulted an increase in number of pods/plant, length of pod/plant, number of seed/plant, weight of seeds/plants. These findings are supported by Hossain ***et al.*** (1999). They reported that seed inoculation of lentil with Rhizobial strains increased number of pods/plant. It has been recorded that biofertilizers increased number of pods/plant upto 20.1% over control, while number of seeds/plant increased by up to 45.55% over control. This study is also supported by Kibria (2000). He recorded 41.76% increase in number of pods/plant, 48.78% increase in weight of pods/plant, 64.70% increase in number of seeds/plant and 60.21% increase in weight of seeds/plant by seed treatment with biofertilizer. Moreover, treating seeds with BINA biofertilizer increased 12.79% and 20.83% seed yield of binamoog-3 and binamoog-4, respectively over untreated control (Table 5). The findings of the present study are in accordance with the finding of Haque and Haq (1994). They reported that seed inoculation of lentil with ***Rbizobium*** significantly increased yields/plant. Kibra (2000) also supported the same results.

References

Ahmed, H.U., 1985. Disease problems of pulse and oil seed crops in Bangladesh. A paper presented in the 1st National Phytopath. Conf. BARI, Joydebpur, Gazipur, pp: 18.

BBS, 2000. Year book of Agricultural Statistics of Bangladesh, 1998. Bangladesh Bureau of Statistics. Ministry of Planting, Govt. of the People's Republic of Bangladesh, Dhaka, Bangladesh, pp: 61.

Chary, M.A.S., E.J.S. Reddy and S.M. Reddy, 1993. Interaction of seed borne fungi and ***Rhizobium*** on nodulation and plant growth of Mungbean (***Vigna radiata*** L.). Indian J. Mycol. and Plant Path., 13: 223-224.

Fakir, G.A., 1983. Dal Fashalar rog tar protiker. Dept. Plant Path., BAU, Mymensingh. pp: 20.

Hoque, M.M. and M.F. Haq, 1994. ***Rhizobial*** inoculation and fertilizer of Lentil in Bangladesh. Lens Newsletter, 21: 29-30.

Hossain, I., M.A.I. Khan and A.K. Podder, 1999. Seed treatment with ***Rhizobium*** in controlling ***Fusarium oxysporum*** and ***Sclerotium rolfsii*** for Biomass and seed Production of Lentil (***Lens culinaris*** M.) Bangladesh J. Environ. Sci., 5: 61-64.

ISTA, 1996. International Rules for Seed Testing Association. In. proc. Int. Seed Test Assoc. pp: 19-41.

Hossain, I., M.A. Jalil, M.A.I. Khan and F.M. Aminuzzaman, 2000. Seed treatment with ***Rhizobium*** and NPK nutrition on disease incidence and yield of Chickpea (***Cicer arietinum*** L.). Bangladesh J. Seed Sci. and Tech, 4: 1-6.

Khan, M.A.I., I. Hossain and A.K. Podder, 1998. Biological seed treatment with ***Rhizobial*** inoculants to control Food and root rot of Lentil (***Lens culinaris*** M.). Bangladesh J. Environ. Sci., 4: 146-151.

Kibria, M.G., 2000. Efficacy of Biofetilizer and ***Rhizobial*** strains in controlling foot and root rot of Lentil, Mungbean and Chickpea. M.S. Thesis. Department of Plant Pathology, BAU, Mymensingh, Bangladesh, pp: 29-31.

Kumar, M., K. Yadab, S.K. Thakur and K. Mandal, 1998. Effect of vesicular-arbuscular mycorrhizal fungi and ***Rhizobium*** inoculation on nodulation, root colonization, nitrogen fixation and yield of Chickpea. J. Indian Soc. Soil Sci., 46: 375-378.

Pal, S.C. and G. Ghosh, 1986. Response to lentil and Chickpea to inoculation with different strain of ***Rhizobium lenguminosarum***. Environment and Ecology, 4: 630-632.

Sharma, L.C., A.K. Bhargava and Jagdesh, 1995. Seed dressing fungicides in combination with ***Rhizobium*** in Moong (***Vigna radiata*** L.) Wilczek and Their Effect on nodulation and yield. Indian J. Mycol. and Plant Pathol., 25: 42.