



# Exploring The Efficacy Of Biocontrol Agents Against Seed Borne Pathogens Associated With Mungbean

(*Vigna radiata* L.)

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**Abstract:** During present investigation it is observed that Biopriming a new technique that integrates biological (inoculation of seed with beneficial organism to protect seed) and physiological aspects of disease control used as an alternative method for controlling many seed and soil borne pathogens. It is an ecological approach in which selected fungal antagonists used against soil and seed borne pathogens. Biological seed treatments provide an alternative to chemical control with additional benefits of induced diseases resistance, ecofriendly nature and sustainable disease management. *Trichoderma viride*, *Trichoderma harzianum*, *Pseudomonas fluorescens* and *Bacillus subtilis* are different bio control agents frequently used for biopriming treatment in present investigation. Also it shows reduction in disease incidence, increase seed germination and seedling vigour.

**Keywords:** Biopriming antagonist, seed germination, seedling vigour, disease incidence, soil and seed borne pathogens.

## I. INTRODUCTION

Mungbean (*Vigna radiata* L.) belongs to the family Fabaceae. Green gram (*Vigna radiata* L.) is predominantly self-fertilizing and its chromosome number is  $2n=22$ . mungbean is commonly known as green gram or golden gram and it is one of the most significant short duration pulses grown in India. Mungbean is an essential crop many Asian countries. Mungbean suffers from various fungal infections, which reduce greatly its quality and quantity. Seed-borne and seed associated fungi are one of the factors of substantial damages of the mungbean.

Seed borne mycoflora associated with mung bean reported recently include *Aspergillus* sp, *Alternaria* sp, *Fusarium* sp, *Macrophomina* sp., *Penicillium* sp., *Rhizopus* sp. (Nath *et al.*, 1970) These fungi reduce the germination percentage, viability and vigour of seeds (Gupta and Sharma 2007).

## II. MATERIAL AND METHODS

Present investigation were carried out to study the effect of biopriming on mungbean in the PGI glasshouse M.P.K.V., Rahuri. The experimental seed crop was raised during kharif 2022-2023 in glasshouse conditions. Seeds of mungbean variety phule chetak was selected. The seeds were inoculated by dipping the seed in concentrated suspension of spores / active hyphae of important seed mycoflora of mungbean for 12 hours and then seeds were dried under shade for 12 hours. The biopriming of bioagents to the artificially inoculated seeds of mungbean was given in plastic vessels. Talc based formulations of the bioagents were

weighted on weighing balance as per the dose and mixed with water. Then seeds were soaked in the volume of respective concentration in each of the biopriming agents for 8 hours. After soaking the seeds were removed from the solutions and dried in shade up to original moisture content (8-10%) The inoculated and untreated seeds were served as control. (Meena 2016). A portion of seeds of each bio-priming treatments was used for pot culture.

### Biopriming agents and their Duration of soaking

Sr.No.	Treatment	Hour of soaking
1	<i>Trichoderma viride</i> @10g/kg seed	08
2	<i>Trichoderma harzianum</i> @10g/kg seed	08
3	<i>Pseudomonas fluorescens</i> @10g/kg seed	08
4	<i>T. viride</i> + <i>P. fluorescens</i> @ 5 g each/kg seed	08
5	<i>T. harzianum</i> + <i>P. fluorescens</i> @ 5 g each/kg seed	08
6	<i>Bacillus subtilis</i> @ 10 g each/kg seed	08
7	Control	-

### III. RESULT AND DISCUSSION

The result in respect of efficacy of seed biopriming with bioagents on incidence of seed borne *Fusarium oxysporum*, seed germination and seedling vigour index of artificially infected seeds of mungbean (phule chetak) are presented in Table 1. All treatments were statistically significant over control in respect of incidence of seed borne *Fusarium oxysporum*, seed germination and seedling vigour index. The bioprimed seeds with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 5 g each/kg seed was found most effective followed by *T. viride*+*P. fluorescens*. The results of present are in agreement with Mukhopadhyay (1989), Kumar and Dube (1992), Mahamune and Kakde (2011).

The result in respect of efficacy of seed biopriming with bioagents on incidence of seed borne *Aspergillus niger*, seed germination and seedling vigour index of artificially infected seeds of mungbean (phule chetak) are presented in Table 2. All treatments were statistically significant over control in respect of incidence of seed borne *Aspergillus niger*, seed germination and seedling vigour index. The seed biopriming with bioagent *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 5 g each/kg seed was found most effective followed by *T. viride* + *P. fluorescens*. The results of present study are in agreement with Pradeep *et al.*, (2000), Koche *et al.*, (2009), Mahamune and Kakde (2011), Gawade *et al.*, (2016).

The root and shoot length (cm) of randomly selected seedlings from each treatment were measured with the help of measuring scale and seedling vigour index was computed by using formula given by Abdul Baki and Anderson (1973)

$$SVI = \frac{\text{Mean root length (cm)} + \text{Mean shoot length (cm)}}{2} \times \text{Seed germination (\%)}$$

The study of percent disease incidence was recorded applying 0-9 grade disease rating scale (Mayee and Datar, 1986). The Incidence was calculated by using following formula.

$$\text{Incidence (\%)} = \frac{\text{No. of plants showing disease symptoms}}{\text{Total number of plant observed}} \times 100$$

The result in respect of efficacy of seed biopriming with bioagents on incidence of seed borne *Alternaria alternata*, seed germination and seedling vigour index of artificially infected seeds of mungbean

(phule chetak) are presented in Table 3. All treatments were statistically significant over control in respect of incidence of seed borne *Alternaria alternata*, seed germination and seedling vigour index. The seed biopriming with bioagent *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 5 g each/kg seed was found most effective, followed by *T. viride* + *P. fluorescens*@ 5 g. The results of present study, on effect of various bioagents on the incidence of seed borne fungi, seed germination and seedling vigour index are in agreement with Koche *et al.*, (2009) and Tapwal *et al.*, (2015).

#### IV. CONCLUSION

Among all the seed biopriming treatment, seed biopriming with *Trichoderma harzianum* + *Pseudomonas fluorescens* @ 5g each/kg seed recorded lowest seed mycoflora, increasing seed germination and seedling vigour index.



**Table 1. Efficacy of seed biopriming with bioagents on incidence of seed borne *Fusarium oxysporum* (Artificially inoculated to seed) and their effect on seed germination and seedling vigour index of mungbean**

Sr. No.	Treatment	Incidence of <i>F. oxysporum</i> (%)	Reduction in incidence over Control (%)	Seed germination (%)	Increase in seed germination over Control (%)	Seedling Vigour Index (SVI)	Increase in SVI over Control (%)
1	<i>Trichoderma viride</i> @ 10g/kg seed	21.03 (27.26)	65.75	70.12 (70.00)	16.66	2105.83	23.61
2	<i>Trichoderma harzianum</i> @ 10g/kg seed	18.03 (25.08)	70.49	71.12 (71.25)	18.33	2216.35	30.10
3	<i>Pseudomonas fluorescens</i> @10g/kg seed	22.04 (27.95)	63.93	69.12 (67.45)	15.00	2074.78	21.79
4	<i>Trichoderma viride</i> + <i>Pseudomonas fluorescens</i> @5g/kg seed	17.02 (24.33)	72.13	73.13 (71.86)	21.66	2313.18	35.79
5	<i>Trichoderma harzianum</i> + <i>Pseudomonas fluorescens</i> @5g/kg seed	15.05 (22.77)	75.40	74.11 (75.82)	23.33	2412.01	41.59
6	<i>Bacillus subtilis</i>	52.08 (46.12)	14.75	67.10 (53.71)	11.66	1908.18	12.03
7	Control	61.10 (51.33)		60.11 (49.58)		1703.82	
	S.E.±	0.579		1.172		35.75	

	CD at 1%	2.435		4.933		150.5	
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(Figures in parentheses indicates arc sin transformed values)



**Table 2. Efficacy of seed biopriming with bioagents on incidence of seed borne *Aspergillus niger* (Artificially inoculated to seed) and their effect on seed germination and seedling vigour index of mungbean**

Sr. No.	Treatment	Incidence of <i>A. niger</i> (%)	Reduction in incidence over Control (%)	Seed germination (%)	Increase in seed germination over Control (%)	Seedling Vigour Index (SVI)	Increase in SVI over Control (%)
1	<i>Trichoderma viride</i> @ 10 g/kg seed	20.03 (26.55)	70.14	78.13 (66.01)	20.00	2137.22	32.80
2	<i>Trichoderma harzianum</i> @ 10 g/kg seed	18.03 (25.08)	73.13	79.13 (62.71)	21.53	2152.58	33.75
3	<i>Pseudomonas fluorescens</i> @ 10 g/kg seed	21.04 (18.73)	68.66	76.12 (60.64)	16.92	1991.31	23.73
4	<i>Trichoderma viride</i> + <i>Pseudomonas fluorescens</i> @ 5 g each/kg seed	16.04 (27.26)	76.11	80.12 (63.41)	23.07	2272.11	41.18
5	<i>Trichoderma harzianum</i> + <i>Pseudomonas fluorescens</i> @ 5 g each/kg seed	15.02 (22.74)	77.61	81.14 (64.15)	24.61	2429.34	50.95
6	<i>Bacillus subtilis</i>	55.09 (47.85)	17.91	72.10 (58.03)	10.76	1800.00	12.03
7	Control	67.11 (54.91)		65.11 (53.70)		1602.67	
	S.E.±	0.612		1.286		34.988	
	CD at 1%	2.576		5.415		147.29	

(Figures in parentheses indicates arc sin transformed value)

**Table 9. Efficacy of seed bioprimering with bioagents on incidence of seed borne *Alternaria alternata* (Artificially inoculated to seed) and their effect on seed germination and seedling vigour index of mungbean**

Sr. No.	Treatment	Incidence of <i>A. alternata</i> (%)	Reduction in incidence over Control (%)	Seed germination (%)	Increase in seed germination over Control (%)	Seedling Vigour Index (SVI)	Increase in SVI over Control (%)
1	<i>Trichoderma viride</i> @ 10 g/kg seed	21.04 (27.26)	63.15	72.12 (58.02)	18.03	2265.43	30.58
2	<i>Trichoderma harzianum</i> @ 10 g/kg seed	19.03 (25.83)	66.66	73.11 (58.67)	19.67	2293.82	32.21
3	<i>Pseudomonas fluorescens</i> @ 10 g/kg seed	22.04 (27.95)	61.40	71.10 (57.39)	16.39	2227.04	28.36
4	<i>Trichoderma viride</i> + <i>Pseudomonas fluorescens</i> @ 5g/kg seed	17.03 (24.33)	70.17	74.12 (59.32)	21.31	2453.08	41.39
5	<i>Trichoderma harzianum</i> + <i>Pseudomonas fluorescens</i> @ 5g/kg seed	16.03 (23.56)	71.92	76.13 (60.64)	24.59	2576.95	48.53
6	<i>Bacillus subtilis</i>	49.08 (44.40)	14.03	68.11 (55.52)	11.47	2061.76	18.84
7	Control	58.10 (49.58)		61.10 (51.33)		1749.24	
	S.E.±	0.557		1.198		37.93	

	CD at 1%	2.346		5.046		159.7	
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(Figures in parentheses indicates arc sin transformed values)



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