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Efficacy of Botanicals and Bio-agents against Web blight in Mungbean (*Vigna radiata* L. Wilczek)

Vikas Kumar Singh[1]*, Sunil Zacharia[1], C.K. Singh[1], R.K. Singh[2], Dharmendra Singh[3] and R.K. Pandey[2]

[1]Department of Plant Pathology, Sam Higginbottom Institute of Agriculture and Technology & Sciences, Allahabad - 211007, (UP), India
[2]Department of Extension Education, N. D. U. A. & T, Kumarganj, Faizabad-224229 (UP), India
[3]Department of Plant pathology, NDUAT Kumarganj Faizabad 224229 U.P, India
**Corresponding author*

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A B S T R A C T

Three botanicals viz. Neem (*Azadirachta indica*), Garlic (*Allium sativum*), Onion (*Allium cepa*) and a chemicals carbendazim(treated) were used in vivo (in field) at 10 per cent and 0.1% concentration. To check the disease intensity of web blight in mungbean. The minimum disease intensity and maximum disease control were recorded in garlic(value) followed by neem, onion, *Trichoderma viride, T. harzianum* as compared to treated and untreated check. The yield (value) and 100-seed weight were also recorded maximum in garlic (value) followed by neem, onion, *Trichoderma viride, T. harzianum* as compared to treated and untreated check. The avoidable loss in yield was recorded maximum in garlic followed by neem, onion, *Trichoderma viride, T. harzianum* as compared to treated and untreated check. The bio-agents *Trichoderma harzianum* and *Trichoderma viride* have been evaluated in field (0.5 % concentration spray) also.

Introduction

Pulses are the essential component in the human diet. These crops are wonderful gift of nature. They are often referred to as "Poor man's meat", since they are cheaper than meat and yet a source of high quality protein, carbohydrates and other essential micro-nutrients. Besides being rich in protein, they also play an important role in sustainable agriculture by enriching the soil through biological nitrogen fixation.

Mungbean (*Vigna radiata* L. Wilczek) also known as green gram or golden gram is an important pulse crop of India and grown in Kharif, spring and summer seasons. Several factors viz., insect pests and diseases are mostly responsible for its low production mentain losses and losses caused by web blight. Among disease, web blight caused by *Rhizoctonia solani* Kuhn is one of the most important disease of mungbean. The web blight appears every year at varying intensity and causes heavy losses in yield. The disease has been successfully managed through use of fungicides but due to its high cost and detrimental effect on environment, soil and

also by kills of non targeted organism(s), its use should be discouraged. Hence, for minimizing the losses caused by web blight need an inexpensive and environmentally safe management practices. Studies were conducted on the disease management with botanicals and bio-agents against R. solani Kuhn in different crops including web blight of mungbean.

Materials and Methods

A Field trial was conducted during Kharif, 2015 crop season in Randomized Block Design with three replications using samart a highly susceptible cultivar to web blight in vivo.

Three different botanicals viz., leaf extracts of Neem, bulb extracts of Garlic and Onion and one chemicals carbendazim and two bio-agents *Trichoderma harzianum* and *Trichoderma viride* were used and data were record.

Botanicals (Neem, Garlic, Onion and) 10%, chemicals (carbendazim) 0.1% and bio-agents (*T. harzianum* and *T. viride*) 0.5% were sprayed four times at 7 days interval starting from first appearance of disease. Control plots were sprayed with same volume of water.

Per cent disease intensity (PDI) was recorded using 1-9 rating scale (Stonehouse, 1994) starting from first appearance of disease at seven days interval calculated as follows:

$$PDI = \frac{\text{Sum of all numerical rating}}{\text{Total number of leaves examined x maximum grade}} \text{ x } 100$$

Yield (q/ha), 100 seed weight (g) and per cent avoidable loss were also recorded. The per cent disease control (PDC) and the per cent avoidable losses were calculated as follows:

$$PDC = \frac{\text{PDI in unprotected plot - PDI in protected plot}}{\text{PDI in unprotected plot}} \text{ x } 100$$

$$\text{Per cent avoidable loss} = \frac{\text{Yield in protected plot - Yield in unprotected plot}}{\text{Yield in protected plot}} \text{ x } 100$$

Results and Discussion

Effect of botanicals and bio-agents on disease intensity and grain yield of mungbean

The effect of foliar spray with botanicals (Neem, Garlic, and Onion), chemicals (treated) and bioagents (*T. harzianum* and *T. viride*) on disease intensity and grain yield of mungbean were evaluated during Kharif, 2015.

Effect on disease intensity

The results of foliar spray on disease intensity were ranging from 32.39-76.73 per cent. All of the treatments were superior over to control (water spray) 79.98 per cent. The minimum disease intensity was recorded in treatment T_2 Garlic (32.39) followed by T_1 Neem (46.68), T_3 Onion (52.39), T_5 *Trichoderma viride* (76.16), T_4 *T. harzianum* (76.73), as compared to treated (30.28) and untreated check (79.98). (table 4.1)

However, the treatments ($T_{0,}T_{4,}$), ($T_{0,}T_{4,}T_5$), ($T_{2,}T_6$) were non significant and statistically at par with each other.

Effect on per cent disease control (PDC)

The maximum disease control was recorded in treatment T_2 (Garlic) (59.50) followed by T_1 (Neem) (41.64),T_3 (Onion) (34.50), T_5(*T. viride*) (4.78), T_4(*T. harzianum*) (4.06) as compared to treated (62.14) and untreated check (0.00) (table 4.1).

However, the treatments ($T_{6,}T_{2,}$)and ($T_{5,}T_{4,}$) were non significant and statistically at par with each other.

Effect on yield

Maximum yield was recorded in treatment T_2 (garlic) (9.00 q/ha) followed by T_1(neem) (7.80q/ha), T_3(onion) (7.10q/ha), T_5 (*Trichoderma viride*) (6.00 q/ha), T_4 (*Trichoderma harzianum*) (6.00 q/ha) as compared to treated (10.2 q/ha) and untreated check (4.95 q/ha). Thus, there was no any effect of *T. viride* and *T. harzianum*on yield (Table 4.1).

Table.4.1 Efficacy of botanicals (10%) and bio-agents (0.5%) against R. solani on disease intensity and yield of mungbean during Kharif, 2015

Treatment	Per cent disease intensity	Per cent disease control	100-seed weight (g)	Yield (q/ha)	Per cent avoidable loss
T_1 (Neem)	46.68	41.64	3.02	7.8	36.54
T_2 (Garlic)	32.39	59.50	3.45	9.0	45.12
T_3 (Onion)	52.39	34.50	2.72	7.1	29.89
T_4 (*Trichoderma harzianum*)	76.73	4.06	2.26	6.0	16.95
T_5 (*Trichoderma viride*)	76.16	4.78	2.28	6.0	17.77
T_6Carbendazim (treated)	30.28	62.14	3.75	10.2	51.23
T_0Control (untreated)	79.98	0.00	2.25	4.95	0.00
F- test	S	S	S	S	S
S. Ed. (±)	1.852	2.303	0.137	0.152	2.600
C. D. (P = 0.05)	3.925	4.881	0.291	0.323	5.513

However, the treatments ($T_6T_{2,}$), ($T_1T_{3,}$) and ($T_{5,}$ $T_{4,}T_0$) were non significant and statistically at par with each other.

Effect on 100-seed weight

The 100-seed weight was recorded maximum in treatment T_2 (garlic) (3.45)) followed by T_1(neem) (3.02),T_3(onion) (2.72), T_4 (*Trichoderma harzianum*) (2.26), T_5 (*Trichoderma viride*) (2.28)) as compared to treated (3.75)) and untreated check (2.25). The 100-seed weight of treatment T_6 significantly superior to rest of the treatments. Thus, there was no any effect on 100 seed weight in *T. viride* and *T. harzianum* sprayed plots (table 4.1). However, the treatments ($T_4T_{5,}$) were non significant and statistically at par with each other.

Effect on avoidable loss

Maximum avoidable loss in yield was recorded in treatment (T_2) garlic (45.12) followed by (T_1) neem (36.54), (T_3) onion (29.89), (T_5) *Trichoderma viride* (17.77), (T_4) *Trichoderma harzianum* (16.95) as compared to treated (51.23) and untreated check (0.00). (table 4.1)

However, the treatments ($T_5T_{4,}$) were non significant and statistically at par with each other.

The similar results were also reported by Verma (2011) in pot sown crop of mungbean. This supports the present findings.

Meena *et al*. (2003) found that bulb extract of Garlic was effective in reducing disease caused by *Rhizoctonia solani* f. sp. *sasakii* in maize banded leaf and sheath blight. Ray and Kumar (2008) reported that out of 6 plant extract, Garlic was most effective in managing the aerial blight of soybean caused by *Rhizoctonia solani* in field. Kansal *et al*. (2008) found Neem extract was effective against R. solani causing web blight in french bean. These are in support of present findings.

Bio-agents did not show any effect on yield when applied as foliar spray. This might be due to that the conditions were not favorable for increasing the population of bio-agents on the plants. As the bio-agents are mostly soil inhabitants and grow saprophytically in presence of high organic matter in soil and increase their population very fast.

In most of the cases bio-agents have been used either as seed treatments or in soil for suppressing the soil borne pathogen and reducing the disease incidence, through hyperparasitism, antibiosis and competition (Yadav *et al*., 2005 and Pandey and Upadhyay, 2000).

In present study Garlic, Neem, Onion and Tulsi found effective on disease intensity, per cent disease control, yield and 100-seed weight but bio-agents did not show any effect.

In conclusion, foliar spray of Garlic (Allium sativum) was found most effective in reducing web blight, recorded minimum disease intensity, maximum disease control and maximum 100 –seed weight and increased the grain yield as compared to treated and untreated. The present study was limited to one seasons only, therefore to substantiate the present findings more trials over a period of seasons is needed to come out with sound recommendations.

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