



EFFICACY OF SOME BOTANICALS AGAINST LEAF SPOT OF MUNG BEAN (*VIGNA RADIATA* L.) CAUSED BY *CERCOSPORA CANESCENS*

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ABSTRACT

Mung bean is an important pulses crop worldwide and one of the most important pulses in India. It is known to suffer from many types of diseases, *Cercospora* leaf spot is one of them. *Cercospora* leaf spot causes *Cercospora canescens* much damage to the production of mung bean. To manage the disease an investigation at research laboratory in the Department of Plant Pathology, SHIATS-DU, Allahabad was carried out to evaluate the efficacy of plant extracts viz. Neem leaf extract, Dhatura leaf extract, Garlic clove extract, Arjun leaf extract, Aswagandha leaf extract and Alovera leaf extract @ 10% against *Cercospora canescens*. *In-situ* (field) experiments were also carried out in randomized block design with six treatments and three replications. Neem leaf was found to be the most effective treatment and recorded minimum disease intensity (25.69 %), Maximum No of pod per plant, maximum weight of pod (g) and yield (q/ha) followed by Arjun leaf extract, Alovera leaf extract, Aswagandha leaf extract, Dhatura leaf extract and Garlic clove extract.

KEY WORDS: *Cercospora canescens*, botanical products, mungbean.

INTRODUCTION

Mungbean (*Vigna radiata* L.), belongs to the family leguminosae and sub family Papilionaceae. Pulses are major sources of proteins among the vegetarians in India, and complement the staple cereals in the diets with proteins, essential amino acids, vitamins and minerals. They contain 22-24% protein, which is almost twice the protein in wheat and thrice that of rice. Pulses provide significant nutritional and health benefits, and are known to reduce several non-communicable diseases such as colon cancer and cardio-vascular diseases. Production followed by pigeon pea (18-20%), mungbean (11%), urdbean (10-12%), lentil (8-9%) and other legumes (20%) (Laxmipathi *et al.*, 2013). Presently, the per capita share of pulses in nutrition supply in India with respect to energy, protein and fat is 117.4 K cal, 6.9 g and 1.0 g per day respectively. An adult male and female requires 80 and 70 g per capita per day, respectively for balanced diet (Anonymus, 2004). The crop is generally grown during *kharif* as rainfed crop. It has the yield potential of 11 to 12 q ha⁻¹ (Anonymus, 2004), as against the national average of 4.17 q ha⁻¹. Among various factors responsible for low yields, biotic and abiotic stresses take a heavy toll of the crop, out of which diseases cause an estimated yield loss of 21.93 to 68.77% (Sharma *et al.*, 2008). Mung bean crop covers a total world area of 5 m ha with a total production of 3 m ton (John, 1991). India's contributing 23% global pulses in world production from an area of about 12.08% (Anonymous, 2012). Mung bean suffers from many diseases caused by fungi, bacteria, viruses, nematodes and also abiotic stresses. In green gram, considerable losses in the production occur as a result of *cercospora* leaf spot

(*Cercospora canescens*), anthracnose (*Colletotrichum lindemuthianum*), powdery mildew (*Erysiphe polygoni*), bacterial blight (*Xanthomonas phaseoli*), rust (*Uromyces appendiculatus*), leaf crinkle and yellow mosaic virus. Among these, *cercospora* leaf spot is a serious problem in all the areas having rice based cropping systems of the country (Abbaiah, 1993). Grain yield losses have been reported up to 23% due to *cercospora* leaf spot in mung bean (Quebral and Cagampang, 1970). Maximum loss of 61% was observed in case of grain yield (Iqbal *et al.*, 1995). The disease starts appearing about 30 days after sowing (Grewal *et al.*, 1980).

MATERIALS & METHODS

In-situ experiment

In situ experiment (field) was laid out in randomized block design (RBD) with six treatments *Viz.* Neem leaf extract @ 10%, Arjun leaf extract @ 10%, Alovera leaf extract @ 10%, Aswagandha leaf extract @ 10%, Dhatura leaf extract @ 10%, Garlic clove extract @ 10% and three replications including inoculated check in the experimental field of SHIATS, Allahabad in *zaid* season (Feb. 2015 to May 2015). Each replication consisted of 21 plots of 2x1m² each. The seeds cv. "Pant mung-1" was sown in February with a spacing of 10 x 45cm. Botanicals were sprayed just after initiation of disease and repeated three at 15 days interval. Plots without sprays server as check the Observations were recorded in five selected tagged plants 3 days after last sprays of botanicals using 0 to 9 grade scale (Kapadiya and Dhruj, 1999). The data was subjected to the statistical analysis.

TABLE No. 1. Treatment details

Treatments	Common name	Concentration	References
T ₀	Control (untreated)	Plain water	–
T ₁	Neem leaf extract	10 %	Tunwari and Nahunnaro (2014a)
T ₂	Garlic clove extract	10%	Tunwari, and Nahunnaro (2014b)
T ₃	Arjun leaf extract	10%	Uddin <i>et. al.</i> , (2013)
T ₄	Dhatura leaf extract	10%	Hossain and Hossain (2013)
T ₅	Aswagandha leaf extract	10%	Didvania <i>et. al.</i> , (2012)
T ₆	Alovera leaf extract	10%	Devi <i>et.al.</i> , (2013)

FS = Foliage Spray

Plant extracts preparation-

The plants *viz.*, Neem, Garlic, Alovera, Dhatura, Arjun leaf extract and Aswagandha were selected for the study. Healthy non infected leaves of the six plants were collected from the local area. Leaves/ rhizomes of the test botanicals were washed first in tap water, then in distilled water. Then 100 g of plant tissues + 100 ml distilled water were crushed (1:1 w/v) in mortar and pestle. The extract

was filtered through double layered muslin cloth. The filtrate thus obtained was centrifuged at 5000 rpm for 15 min. The supernatant was collected and pellet was discarded. The supernatant obtained was strained through whatman No.1 filter paper and filtrate thus obtained was used as stock solution (100% conc.) Nene and Thapliyal, (1993).

Disease intensity (%) was calculated by using the following formula:-

$$\text{Disease intensity (\%)} = \frac{\text{Sum of all disease ratings}}{\text{Total number of leaves plants} \times \text{Maximum disease grade}} \times 100$$

RESULTS & DISCUSSION

The result presented in table 2 revealed that all the treatments were statistically significant and minimum disease intensity as compared to control. Among the botanicals used the minimum disease intensity per cent was recorded in T₁–Neem leaf extract @ 10% (25.69%) as compared to untreated control (44.24%). Neem leaf extract @10% treatment was followed by T₃. Arjun leaf extract @10% (29.37%), T₆. Alovera leaf extract @10% (30.39%), T₅. Aswagandha leaf extract @ 10% (31.87%), T₄. Dhatura leaf extract @ 10% (33.69%) and T₂.Garlic clove extract @ 10% (35.03%). Among the treatments lowest percent disease intensity was recorded in Neem leaf extract @ 10% (25.69%).

The botanicals used the maximum no. of pod per plant was recorded in in T₁–Neem leaf extract @ 10% (7.49%) as compared to untreated control (4.52%). Neem leaf

extract @ 10% treatment was followed by T₃. Arjun leaf extract @ 10% (7.16%), T₆. Alovera leaf extract @ 10% (6.15%), T₅. Aswagandha leaf extract @ 10% (6.05%), T₄. Dhatura leaf extract @ 10% (5.80%) and T₂. Garlic clove extract @ 10% (5.34%). Among the treatments No of pod per plant of mung bean was recorded in Neem leaf extract @ 10% (7.49%).

The botanicals used the maximum Weight of pod (g) was recorded in in T₁–Neem leaf extract @ 10% (4.92g) as compared to untreated control (2.47g). Neem leaf extract @ 10% treatment was followed by T₃. Arjun leaf extract @ 10% (4.76g), T₆. Alovera leaf extract @ 10% (4.12g), T₅. Aswagandha leaf extract @ 10% (3.97g), T₄. Dhatura leaf extract @ 10% (3.63g) and T₂. Garlic clove extract @ 10% (3.12g). Among the treatments maximum Weight of pod (g) was recorded in Neem leaf extract @ 10% (4.92g).

TABLE 2: Percent disease intensity of Cercospora leaf spot No of pod/plant weight of pod and Yield as affected by different treatments

Treatments	Disease intensity	No. of pod per Plant	Weight of pod per plant	Yield q/ha	C:B ratio
T ₀ – control (untreated)	44.24	4.52	2.47	3.69	1:1.14
T ₁ – Neem leaf extract	25.69	7.49	4.92	7.32	1:2.23
T ₂ –Garlic leaf extract	35.03	5.34	3.12	5.13	1:1.51
T ₃ – Arjun leaf extract	29.37	7.16	4.76	7.01	1:2.13
T ₄ – Dhatura leaf extract	33.69	5.80	3.63	5.93	1:1.80
T ₅ – Aswagandha leaf extract	31.87	6.05	3.97	6.12	1:1.85
T ₆ – Alovera leaf extract	30.39	6.15	4.12	6.87	1:2.08
F-test	S	S	S	S	
S. Ed. (±)	1.60	0.81	0.18	0.42	
C. D. (P = 0.05)	3.49	1.76	0.08	0.91	

The treatments the maximum grain yield (q/ha) was recorded in T₁–Neem leaf extract @ 10% (7.32q/ha) as compared to untreated control (3.69q/ha). Neem leaf extract @ 10% treatment was followed by T₃. Arjun leaf extract @ 10% (7.01q/ha), T₆. Alovera leaf extract @ 10%

(6.87q/ha), T₅.Aswagandha leaf extract @ 10% (6.12q/ha), T₄. Dhatura leaf extract @ 10% (5.93q/ha) and T₂. Garlic clove extract @ 10% (5.13q/ha). Among the treatments maximum grain yield (q/ha) was recorded in Neem leaf extract @ 10% (7.32q/ha). The best and most economical

treatment was T₁ –Neem leaf extract @ 10% (1:2.23) as compared to untreated control (1: 1.14). Neem leaf extract @ 10% treatment was followed by T₃-Arjun leaf extract @ 10% (1:2.13), T₆-Alovera leaf extract @ 10 (1:2.08), T₅-Aswagandha leaf extract @ 10% (1: 1.85), T₄-Dhatura leaf extract @ 10% (1:1.80) and T₂- Garlic clove extract @ 10% (1: 1.51).

All the treatments were found statistically significant over control. The results of the present study are in accordance to the findings of the (Glove *et al.*, 2014; Singh *et al.*, 2010). They reported that *Cercospora canescens* by neem leaf extract could probably be due to the botanicals inducers which have direct antimicrobial effect and showing minimum disease intensity, maximum No. of pod per plant, maximum weight of pod(g), maximum yield (q/ha), *Cercospora canescens* due to neem leaf extract may have been due to secretion of extracellular cell degrading enzymes such as tannin, limonoid, triterpenoid, azadiractin, which may have helped mycoparasites in the colonization of their host.

CONCLUSION

Foliar spray with Neem leaf extract @10% (botanical) proved to be most effective against cercospora leaf spot showing minimum disease intensity, maximum No. of pod per plant, maximum weight of pod (g), maximum yield (q/ha) and B:C ratio. The results of present experiments are limited to one season under Allahabad agro climatic conditions as such more trials should be carried out in future to validate the findings.

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