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YIELD LOSS ASSESSMENT IN MUNGBEAN [*VIGNA RADIATA* (L.) WILCZEK] CAUSED BY ANTHRACNOSE [*COLLETOTRICHUM TRUNCATUM* (SCHW.) ANDRUS AND MOORE]

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ABSTRACT
Mungbean anthracnose caused by *Colletotrichum truncatum* (Schw.) Andrus and Moore is the most important seed-borne fungal disease which also infects seedlings, stems, petioles, leaves and pods. Investigation on yield loss assessment in mungbean due to anthracnose was conducted under field condition at NDUAT, Faizabad (U.P.) during Kharif 2012-13 using a susceptible variety NDM-1, a moderate susceptible variety (Pusa Vishal) and a resistant variety (UPM-98). Field experiment revealed that maximum disease in terms of incidence and severity (70.11 %) occurs on highly susceptible cultivar NDM-1. It causes considerable damage by reducing seed quality and yield. The observations revealed that comparatively lower disease index (8.74 %) with increase in grain (10.9 q/ha) and stalk yield (14.7 q/ha) and also maximum number of pods/plant (20.5) and test weight (37.5 g) of grain was recorded in plots receiving two sprays of carbendazim (0.1%) than untreated plots of resistant cultivars. The losses in yield due to anthracnose have been estimated up to 24-67 per cent. The yield losses are proportional to disease severity and very remarkably depending on the stage of infection, genotype and environmental conditions.

INTRODUCTION

Mungbean [*Vigna radiata* (L.) Wilczek] is an important pulse crop of India. Besides India it is widely cultivated throughout the South Asia including Pakistan, Bangladesh, Sri Lanka, Thailand, Cambodia, Vietnam, Indonesia, Malaysia and South China. . The major mungbean growing states of India are Rajasthan, Maharashtra, Orissa, Karnataka, Bihar, Madhya Pradesh, Uttar Pradesh, Tamilnadu, Punjab, West Bengal and Haryana. Mungbean [*Vigna radiata* (L.) Wilczek] is annual autogamous diploid ($2x = 2n = 22$) grain legume crop belonging to *Fabaceae* family. Pulses are the principal source of protein in diet and are an integral part of daily diet because of their high protein content and good amino acid balance in several forms worldwide (Kumar *et al.*, 2013). In India, mungbean is grown on 3.43 m ha and total production of 1.71 m tonnes of grains with productivity of 4.98 q/ha (Anonymous, 2012). In U.P. it is cultivated on 78000 ha area with total production and productivity of 45000 tonnes and 577 kg/ha, respectively (Anonymous, 2011).

Mungbean anthracnose caused by *Colletotricum truncatum* (Schw.) Andrus and Moore is the most important seed-borne fungal disease of mungbean causes heavy reduction in seed quality and yield every year in varying intensity. The disease causes qualitative as well as quantitative losses (Sharma *et al.*, 1971). Losses in yield due to anthracnose have been estimated to be in the range of 24 to 67 per cent (Deeksha and Tripathi, 2002). The yield losses caused by mungbean anthracnose are proportional to the disease severity and vary remarkably depending on the stage of infection, genotypes and environmental conditions. The disease is characterized by serious leaf spotting ultimately resulting in 'shot hole' symptoms and finally defoliation which affects the yield greatly. Infection of pods directly damages the seeds and reduces its germinability. Pod infection may result in complete loss in yield. Therefore, the present investigation was undertaken to know their effect on disease development in mungbean crop.

MATERIALS AND METHODS

Three mungbean varieties *viz*. a susceptible variety (NDM-1), a moderately resistant variety (Pusa Vishal) and a resistant variety (UPM-98) were sown during 2012 at Main Experiment Station (MES) of N.D. University of Agriculture and Technology, Kumarganj, Faizabad (U.P.). The crop was raised in small plots having rows of four meter long with inter and intra row spacing of 30 cm and 10 cm respectively. All the recommended agronomic practices were followed to raise a good crop. The trial was conducted in randomized block design with three replications. The crop was protected (seed treatment with carbendazim (0.05%) followed by two foliar spray of carbendazim (0.1%). The first spray of carbendazim

Table 1: Yield loss assessment due to anthracnose of mungbean caused by *Colletotrichum truncatum*

S.N.	Varieties	% disease Intensity		% reduction over control	Seed yield(q/ha)		Stalk yield (q/ha)		No. of pods/plant		%increase Unprotected	Test weight(g)		Loss(%)		Loss(%) Test weight
		Unprotected	Protected		Unprotected	Protected	Unprotected	Protected	Protected	over control		Protected	Grain yield	Stalk yield	Test weight	
1	UPM-98 (R)	25.33	8.74	65.49	9.25	10.9	9.8	14.7	17.3	20.5	15.6	32.1	37.5	15.13	33.33	14.4
2	Pusa Vishal (MR)	42.12	15.58	63.01	7.4	8.7	8.02	12.33	13.25	16.75	20.89	31.15	36.6	14.94	34.95	14.89
3	NDM-1 (S)	70.11	21.22	69.73	6.25	7.75	7.23	10.24	11.6	14.6	20.54	27.35	35.9	19.35	29.39	23.81
SEm±		0.33		0.015	0.003	0.014	0.015	0.015	0.015		0.015	0.015				
CD at 5 %		0.134		0.059	0.013	0.058	0.059	0.062	0.059		0.062	0.059				

was given as soon as the symptoms of disease appeared and second spray after 15 days of the first spray. Disease severity was calculated by grading of randomly selected 50 leaves from ten plants randomly selected from different sites of individual plants and disease severity was recorded in 1-9 scale (Mayee and Datar, 1986) at 7 days interval. Per cent disease intensity was calculated as follows:

$$PDI = \frac{\text{Sum of individual disease rating}}{\text{No. of observation assesed}} X \frac{100}{\text{Maximum disease rating}}$$

Plot yield (q/ha) and test weight (g) were recorded and loss in yield was calculated as follows:

$$\text{Loss in yield (\%)} = \frac{\text{Yield in protected plot-yield in unprotected plot}}{\text{Yield in protected plot}} X\ 100$$

RESULTS AND DISCUSSION

The disease appeared after 25-28 days of sowing of crop. Unprotected plots of mungbean varieties showed high intensity of anthracnose symptoms. The maximum disease intensity was recorded in unprotected plots of NDM-1 (69.43%) followed by 42.12% in Pusa Vishal and 25.33% in UPM-98. Whereas, disease intensity was less in protected plots. 8.74, 15.58 and 21.22 per cent disease intensity were recorded in UPM-98, Pusa Vishal and NDM-1 protected plots, respectively. The PDI were differed significantly in all the varieties of protected and unprotected plots. Similarly the incidence ranged from 23.51% to 82.14% with disease intensity ranging from 8.75 to 33.38% reported in case of anthracnose of beans (Junaid *et al.*, 2014). The grain yields recorded in unprotected plots in different varieties were on par to each other. However, the yield varied from 7.75 to 10.9 q/ha in protected plots of these varieties. The stalk yields in protected plots ranged 10.24 to 14.7 q/ha and were also on par to each other. The disease intensity was also low in plots receiving two sprays of fungicide. These findings are in accordance with the reports of Bharadwaj and Thakur (1991), Madhusudhan (2002), Deeksha and Tripathi (2002), Laxman (2006) and Sharma *et al.* (2008).

Number of pods per plant recorded in different varieties were on par each other. However, it was varied from 14.6 to 20.5 pods/plant in protected plots of these varieties. The test weight was significantly higher in protected plots i.e. 37.5, 36.6 and 35.9 g in UPM-98, Pusa vishal and NDM-1, respectively than untreated plots (32.1, 31.15 and 27.35 g, respectively) and also disease intensity was low in two sprays of fungicide. These findings are in accordance with the reports of Bharadwaj and Thakur (1991), Madhusudhan (2002), Deeksha and Tripathi (2002a), Laxman (2006) and Sharma *et al.* (2008).

The losses in grain and stalk yield ranged from 14.94 to 19.35 % and 29.39 to 34.95 %, respectively. The maximum loss (23.81 percent) in test weight of mungbean seed due to anthracnose disease was recorded in untreated plots of NDM-1, whereas it was 14.89 and 14.4 per cent in Pusa Vishal and

UPM-98, respectively over treatment with two time sprays of carbendazim (0.1%) (Table 1).

Therefore, the results of field studies proved that, two sprays of carbendazim are sufficient to manage the disease and realize the economic yields.

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REFERENCES

Anonymous 2011. Project Co-ordinator's report AICRP on MULLaRP crops, IIPR, Kanpur.

Anonymous 2012. Project Co-ordinator's report AICRP on MULLaRP crops, IIPR, Kanpur.

Bharadwaj, C. L. and Thakur, D. R. 1991. Efficacy and economics of fungicide spray schedules for control of leaf spots and pod blights in urdbean. *Indian Phytopath.* **44(4):** 470-475.

Deeksha, J. and Tripathi, H. S. 2002. Cultural, biological and chemical control of anthracnose of urdbean. *J. Mycol. Pl. Path.* **32(1):** 52-55.

Junaid, J. M., Shah, T. A., Bhat, A. H., Bhat, N. A., Dar, N. A. and Ambardar, V. K. 2014. Morphology and status of occurrence of anthracnose of bean (*Phaseolus vulgaris* L.) caused by *Colletotrichum lindemuthianum* (sacc. and magn.) scrib. in kashmir valley. *The Bioscan.* **9(1):** 235-241.

Kumar, K., Prasad, Y., Mishra, S. B., Pandey, S. S. and Kumar, R. 2013. Study on genetic variability, correlation and path analysis with grain yield and yield attributing traits in green gram. *The Bioscan.* **8(4):** 1551-1555.

Laxman, R. 2006. Studies on leaf spot of greengram caused by *Colletotrichum truncatum* (Schw.) Andrus and Moore. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Dharwad, Karnataka, India.

Madhusudhan, B. S. 2002. Studies on soybean anthracnose caused by *Colletotrichum truncatum* (Schw.) Andrus and Moore. *M. Sc. (Agri.) Thesis*, Univ. Agric. Sci., Bangalore, Karnataka, India.

Mayee, C. D. and Datar, V. V. 1986. "*Phytopathometry*". Technical Bulletin-I, Marathawad Agricultural University, Parbhani, India. p. 146.

Sharma, H. C., Khare, M. N., Joshi, L. K. and Kumar, S. M. 1971. Efficacy of fungicides in the control of diseases of *kharif* pulses mung and urid. *All India Workshop on Kharif Pulses*. p. 2.