Screening of Mungbean[*Vignaradiata* (L.)Wilczek] genotypesagainst web blight caused by (*Rhizoctoniasolani*Kühn) for disease resistance

Abstract

Mungbean[*Vignaradiata* (L.)Wilczek] is the important source of proteins, minerals, and vitamins of the predominantly vegetarian Indian diet. Web blight caused by *Rhizoctoniasolani* (Kuhn) is one of the most important fungal diseases which appear every year in varying intensity and causes heavy reduction in yield. The present investigations were carried out at the Student's Instructional Farm (S.I.F.) A.N.D.U.A. &T.,Kumarganj, Ayodhya to test the resistance of 100 genotypes against *Rhizoctoniasolani*Kühn under natural conditions (*In vivo*).Genotypes were placed in different grades according to the rating scale which is based on disease severity. Out of total test entriesnine genotypes viz., DGGV-2, OUM11-5, RMG1030, IPM9901-8, DGG1, SML10-82, MH2-15, LGG450 and CGG945 were found free from infection, twelve genotypes viz., RMG-975, CGG-973, AKM -8802, IPM -02-3, MH-4, Pusa -0672, AKM-4, CO-5 Check, Bbara S. check, Asha, BPMR 145 and IPM 02-14 were recorded highly resistant,twenty four genotypes were noticed susceptible and only nine genotypes were found highly susceptible.

Keywords: Screening, *Vignaradiata*, *Rhizoctoniasolani***,** web blight

Introduction

Mungbean [*Vignaradiata* (L.)Wilczek] is the important source of protein in vegetarian Indian diet. It belongs to the family Leguminaceae. Among the pulses mungbean also called as green gram or golden gram. Mungbean is primarily a rainy-season crop, but with the development of early maturing varieties, it has also proved to be an ideal crop for the spring and summer seasons. It is mainly grown in Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, Orissa, Bihar, Tamil Nadu, Madhya Pradesh, and Uttar Pradesh (Anonymous, 2019). Mung bean is native to Asia particularly North Eastern Indo Burma region. The progenitor of mung bean is *Vignaradiata* var. sublobata (Roxb), which can be seen growing wild in wasteland in Central India.In Uttar Pradesh, it is cultivated on 93000 ha, with a production of 9480 tonnes. Compared, the productivity of mung bean in India and the U.P. is 567 kg/ha and 536 kg/ha, respectively, which is very low compared to the genetic potential of 1500–2000 kg/ha (Anonymous, 2019). The main factors that limit its low productivity are the attack of various

biotic and abiotic stresses.Among them, diseases caused by fungi, bacteria, and viruses are major potential threats that damage green bean productivity. In 1924, leaf blight was first reported in Philippine green beans (Nacien, 1924).In India, Dwivedi and Saksena (1974) first reported this disease in green beans in Kanpur, Uttar Pradesh.Additionally, it has also been reported from Assam (Saikia, 1976), Punjab (Bains*et al*., 1988), Madhya Pradesh (Tiwari and Khare, 1998), Bihar, Rajasthan, Haryana, Himachal Pradesh and Jammu and Kashmir (Anonymous , 2004).Web blight caused by *Rhizoctoniasolani* (Kuhn) is one of the most important fungal diseases which appear every year in varying intensity and causes heavy reduction in yield. The losses in grain yield is more when the plants get infected earlier i.e. after 25 days after sowing (DAS) than 35 and 40 DAS. Gupta *et al*. (2010) yield and weight loss of 33.40 to 37.80% and 23.12 to 28.60%, respectively, in different green bean varieties K 851, T44 and PusaBaisakhi.Although leaf blight can be overcome using fungicides, problems such as environmental pollution, residual effects on grains and destruction of non-target organisms arise.Therefore, the use of this medicine is not recommended.Therefore, to minimize losses caused by blight disease, low-cost and environmentally friendly management measures are needed.Many genotypes have been found resistant against web blight disease of mungbean and urdbean for effective management of different crops caused by *Rhizoctoniasolani*, therefore keeping in view the importance of the crop and seriousness of diseases present research work carried to find out resistant genotypes against web blight disease.

Materials and Method

The experiment was carried out at Student's Instructional Farm (S.I.F.) A.N.D.U.A. &T., Kumarganj, Ayodhya (located at 26^0 4''N, 81^0 28''E) to test the resistance of 100 genotypes against *Rhizoctoniasolani*Kühn under natural conditions (*In vivo*). The Indian Institute of Pulses Research in Kanpur and the Pulse Section department of Genetics and Plant Breeding at the A.N.D.U.A. &T,KumarganjAyodhya provided the mungbean genotypes. During Kharif in 2022, a total of 100 genotypes were assessed in two rows of 4 m length, 45 cm between rows, and 15 cm between plants. To ensure uniform disease spread, K-851 (a highly susceptible variety of mungbean) as a check was planted in two rows around the experimental plot and one row after each genotype. Observations regarding disease severity were recordedaccording to 1-9 rating scale of Mayee and Datar (1986) on 05 randomly selected plantsin each genotypes on the basis of per cent infected leaf area**.** Beginning with the first appearance of symptoms and ending with crop maturity, observations on disease severity was made every 15 days and recorded using a 1-9 rating scale.

Table-1: Varietal screening of mungbean genotypes against *Rhizoctoniasolani* name of genotypes.

DGGV-2, Kopergaon, DGG-5, COGG912, OUM11-5, Selection-4, Pant M6, RMG1030, IPM9901-8, DGG1, SML10-82, MH2-15, LGG450, SGC-20, KM 23-42, NVL516, IGKM 0 -26-30, DDG3, GM04-02, IPM 410-3, IPM 2K15-4, VGG 05-006, TRAM 1, PM 09-11, GM 11-02, MH 810, Pusa 1472, HUM 27, DGG 6, COGG 10-10, LGG 460, IPM 2-3, HUM-1, MH 2-15, TMB -17, RMG -976, MH-729, AKM -4, NDM -10-30, GM -06-08, IPM-302-2, IPM-2K14-9, IPM-0209-3, RMG-989, NDM 10-35, RMG-977, MH-709, NDM-9-18, RMG-975, CGG-975, CGG-973, AKM -8802, IPM -02-3, MH-2-15, MH-4, HUM -1, ML -131, M 2 -818, Pusa -0672, AKM-4, CO-5 Check, K-851, Bbara S. check, Asha , Basanti, BM 2002-1, BM 2003-2, BPMR 145, IPM 02-14, TMB -36, CO -6, BMU, LBG 407, MH 805, MH 2-15, MH 421, MVSKAN, PairyMoong, Pusa 0672,PusaBaisakhi, PusaRatna, Pusa Vishal, Pusa 9531, RMG 268, RMG 344, RMG 492, RMG 62, RMG 991, SML 1082, LGG 450, LBB 623, CO -5, LGB 450, ML -818, ML -1628, ML -1666, ML -1464, K -851, DGGS -4, ML -1907

Table-2: Disease rating scale for Web blight (Mayee and Datar, 1986).

S.N.	Grade	% Foliage affected	Reaction
1	1	0	Healthy Plants
2	2	1.1-5	Highly Resistant
3	3	5-10	Resistant
4	4	11-15	Moderately Resistant
5	5-6	16-30	Moderately Susceptible
6	7-8	31-75	Susceptible
7	9	Above 75	Highly Susceptible

The Per cent Disease Index (PDI) was calculated by using formulas as described below:

$$\% \text{ disease index} = \frac{Sum\ of\ all\ numerical\ \ ratings}{Total\ \text{no. of leaves examined x Maximum grade}} \times 100$$

Results and Discussion

The use of resistant cultivars is beneficial in preventing all plant diseases including web blight. To assess the disease reaction against web blight of mung bean caused by *Rhizoctoniasolani***.**One hundred genotypes were screened for their reaction against web blight (*Rhizoctoniasolani*) in field condition. It is clear from table (3) that out of total test entries, nine genotypes viz., DGGV-2, OUM11-5, RMG1030, IPM9901-8, DGG1, SML10-82, MH2-15, LGG450 and CGG945 were found free from infection, twelve genotypes viz., RMG-975, CGG-973, AKM -8802, IPM -02-3, MH-4, Pusa -0672, AKM-4, CO-5 Check, Bbara S. check, Asha, BPMR 145 and IPM 02-14 were recorded highly resistant, twelve viz., BM 2002-1, BM 2003-2, PairyMoong, RMG268, DGGS -4, RMG 991, LBB 623, CO -5, LGB 450, ML -1628, ML -1666 and ML -1907 were noticed resistant, while only nine genotypes K -851, NDM -10-30, IPM-302-2, NDM 10-35, MH-709, NDM-9-18, MH-2-15, ML -818 and ML -1464 found highly susceptible. Similar findings were reported by Singh *et al.*, (2021).

1a.Healthy plant leaf	1b.Moderately infected leaf	1c.Highly infected leaf	1d.Severely infected leaf	1e.Infected leaf with sclerotial formation

Fig 1(a-e): **Healthy plant leaf and infected leaf with various aspects.**

Table-3: Reaction of mungbean genotypes against *Rhizoctoniasolani.*

Rating scale	Reaction	No. of germplasm	Name of germplasm
1	Healthy Plant	09	DGGV-2, OUM11-5, RMG1030, IPM9901-8, DGG1, SML10-82, MH2- 15, LGG450, CGG945
2	Highly Resistant	12	RMG-975, CGG-973, AKM -8802, IPM -02-3, MH-4, Pusa -0672, AKM-4, CO5 Check, Bbara S. check, Asha, BPMR 145, IPM 02-14
3	Resistant	12	BM 2002-1, BM 2003-2, PairyMoong, RMG268,

			DGGS -4, RMG 991, LBB 623, CO -5, LGB 450, ML -1628, ML - 1666, ML -1907
4	Moderately Resistant	14	Kopergaon, COGG912, HUM 27, COGG 10-10, LGG 460, RMG-977, ML -131, M 2 -818, Basanti, LBG 407, Pusha Vishal, RMG 492, SML 1082, LGG 450
5-6	Moderately Susceptible	20	PM 09-11, GM 11-02, CGG-975, HUM -1, KM 23-42, IGKM 05-26-30, DDG3, VGG 05-006, TRAM 1, DGG 6, MH 810, IPM 2-3, HUM-1, TMB -17, RMG -976, AKM -4, GM-06-08, IPM-2K14- 9, IPM-0209-3, RMG-989
7-8	Susceptible	24	DGG-5, Selection-4, Pant M6, SGC-20, NVL516, GM04-02, IPM 410-3, IPM 2K15-4, Pusa 1472, MH 2-15, MH-729, TMB -36, CO -6, BMU, MH 805, MH 2-15, MH 421, MVSKAN, Pusa 0672, PusaBaisakhi, PusaRatna, Pusa 9531, RMG 344, RMG 62
9	Highly Susceptible	09	K -851, NDM -10-30, IPM-302-2, NDM 10-35, MH-709, NDM-9-18, MH2-15, ML -818, ML -1464

Conclusion

Our study very well demonstrated the screening of mungbean genotypes against web blight disease. From our result we found that 12 genotypes were highly resistant, farmer can use these genotypes to get rid from web blight of mungbean , instead of the chemical management which is highly toxic to environment.

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