Screening of Mungbean [*Vigna radiata* (L.) Wilczek] Genotypes against Cercospora leaf spot Caused by (*Cercospora canescens*) for Disease Resistance.

Abstract :

In India, where vegetarianism is the norm, mungbean [*Vigna radiata* (L.) Wilczek] is a significant source of proteins, minerals, and vitamins. One of the most significant fungal diseases, Cercospora leaf spot caused by *Cercospora canescens*, appears every year with varying intensity and significantly reduces yield. The objective of the current studies was to test 100 genotypes for resistance to Cercospora canescens *in vivo* under natural conditions at the Student's Instructional Farm (S.I.F.) A.N.D.U.A. &T., Kumarganj, Ayodhya. According to the rating system, which is based on the severity of the disease, different genotypes were assigned to different grades. Out of total test entries 13 genotypes LGG 607, PM 14- 3, AKM 12-28, VGG 16- 036, Pusa 171, Pusa 172, RMG 1092, RMG 1097, JLM 302-46, IPM 312-19, IPM 312-20, MGG 387 were found free from infection, 18 genotypes SKNM 1502, COGG 13-39 , PM 1511, Type 44, , DDG3, VGG 05-006, TRAM 1, Asha ,BPMR 145, IPM 02-14, TMB -36, CO -6, BMU, MH 805, MH 2-15, MH 421, MVSKAN, Pusa 0672, were recorded highly resistant 14 genotypes were noticed susceptible and only 3 genotypes were found highly susceptible.

Keywords: Screening; *Vigna radiata*; *Cercospora canescens*; Leaf spot .

1.Introduction:

Comment [S1]: Too long and there unnessary sentences

The mungbean, sometimes called the green gram or mudga in Sanskrit, is a plant species in the legume family. Its scientific name is *Vigna radiata* L., R. Wilczek. One species that was recently removed from the genus Phaseolus to Vigna is mungbean. East Asia, Southeast Asia, and the Indian subcontinent are where the mungbean is primarily grown. Both savoury and sweet meals can use it as an ingredient. Rajasthan, Maharashtra, Karnataka, Andhra Pradesh, Orissa, Bihar, Tamil Nadu, Madhya Pradesh, and Uttar Pradesh are the primary regions where it is grown.

The Indian subcontinent is where the mungbean is believed to have come from, where it was domesticated as early as 1500 BC. Southern and eastern Asia, Africa, Austronesia, the Americas, and the West Indies all received cultivation of mungbean. It is currently common across the Tropics and may be found anywhere from sea level to the

Himalayas, where it reaches an elevation of 1850 m. (Fuller, et al (2011). Warm-season legume with a rapid growth rate is the mungbean. Under tropical and subtropical environments, where ideal temperatures are around 28–30°C and constantly over 15°C, it matures quite quickly. It can be sown in the summer or the fall. It tolerates drought and doesn't need much water (600–1000 mm of rainfall annually). The seeds that may sprout before to harvest tend to become spoiled by high moisture levels during maturity. The mungbean may grow in a soil types, but well-drained loams a pH of 5 to 8. It can tolerate some saline soils. The world's greatest producer of mungbean, India, accounts for more than half of global production but consumes almost all of it. Mungbean production is concentrated in Asia (90%): India is the region's top producer. Mungbean account for 19% of China's total production of legumes, and the country produces a lot of them. Due to its high nutritional value, simple digestion, and adaptability to various farming methods, mungbean is widely used. In addition to Asia (India, South East Asia, and East Asia), southern Europe, and the Southern United States all use this important edible legume seed It also contains 26% protein, 51% carbohydrate, 4% minerals and 3% vitamins. (Khan,1981). Many food products, including flour, soups, porridge, snacks, bread, noodles, and ice cream, include mungbean. After being boiled whole or after breaking, its seeds are eaten as "daal." Green immature pods and seeds can be boiled and consumed. In salads, sprouted seeds are utilized. In addition to being used to make vermicelli, which is a high protein meal made from wheat flour fortified with additional nutrients, flour is also used to make cakes, pastries, noodles, and a variety of other foods. A great source of high-quality protein is green gram. In many different ways, mungbean is eaten in homes as daal, sprouted form, and whole grains. The crop is also utilized as a green manure. Even the husk of the mungbean seed can be utilized as cattle fodder after being soaked in water. These crops are grown in India during the three distinct seasons of kharif, and summer. After the harvest of pea, gramme, potato, mustard, and linseed, summer mungbean can be produced. In regions where paddy-wheat crop rotation is practiced, zaid Moong cultivation is crucial to boosting soil fertility. Mungbean cultivation spanned 43.0 lakh ha in Uttar Pradesh, producing 28.2 million tons at a yield of 671 kg/ha (Anonymous 2022). Numerous pathogens, including fungi, bacteria, viruses, and nematodes, damage the mungbean crop, and mungbean Cercospora leaf spot is one of the most devastating diseases. In various regions of the country, many diseases harm the mungbean crop. Depending on the temperature throughout the day and night and the relative humidity, the

disease begins to evident around 30 days after sowing. These diseases primary symptom is the development of angular lesions on leaves with reddish - coloured margins that range in colour from grey to brown. On branches and pods, similar dots can be seen as well. When compared to *Cercosporacruenta*, *Cercosporacanescens* has more but smaller leaf dots. In extreme cases, the patches cluster and take on a burnt appearance. At the time of flowering and pod production, the fungus severely spots and defoliates leaves. Disease also reduces the size of the pods and the production of the grain. The disease was first noted in India, specifically in Delhi and Karnal, in 1941. Mungbean Cercospora Leaf Spot, which is more commonly caused by *Cercosporacanescens* than by *Cercosporacruenta*, is a significant disease in the country's mungbeangrowing regions. It has been reported that this disease alone causes annual yield losses of 10-15 per cent.

2.MATERIALS AND METHODS :

At Student's Instructional Farm (S.I.F.) A.N.D.U.A. &T., Kumarganj, Ayodhya (260 4"N, 810 28"E), the experiment was conducted to evaluate 100 genotypes' resistance to *Cercospora canescens* in an in vivo condition. The mungbean genotypes were provided by 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, Kumarganj, Ayodhya. One hundred genotypes in two rows of four metres in length, with 45 centimetres between rows and 15 centimetres between plants, were evaluated during Kharif in 2022. Kopergoan, a highly susceptible variety of mungbean, was planted as a check in two rows surrounding the experimental plot and one row after each genotype to guarantee uniform disease spread. On the basis of the percentage of infected leaf area, observations concerning the severity of the disease were documented on five randomly selected plants in each genotype using the Mayee and Datar [9] 1–9 rating system. Every 15 days, the severity of the disease was observed and recorded using a 1–9 rating scale, starting with the onset of symptoms and ending with crop maturity.

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

$$\text{Per cent disease index} = \frac{\text{sum of all numerical rating}}{\text{Total no.of leaves examined x Maximum grade}} \times 100$$

Table 1. Varietal screening of mungbean genotypes against *Cercosporacanescens*name of genotypes

Comment [S2]: What's mean

Comment [S3]: Months???? Only 2022, one season???

Comment [S4]: No indication about previous crop, fertilization and irrigation,?Humidity and favourable conditions Toinfection??? Is-it artificial or natural infection??

Comment [S5]: WE NEED MORE INFORMATIONS ABOUT used genotypes as productitivity and susceptibility characterization…

PKVAKM 4, Pusa M1871, Pusa 1872, SKAU M-365, LGG 607, PM 14- 3, AKM 12-28, VGG 16-036, Pusa 171, Pusa 172, RMG 1092, RMG 1097, JLM 302-46, IPM 312-19, IPM 312-20, MGG 387, IGKM 5-6-27, IPM 02-14, IPM 410-9, JLM 707-5, K 851, KM 2241,KM 2355, LGG 450, LGG 630, MGG 399, MH 2- 15, ML 818, OBGG 101, Pusa 171, VGG – 17009, VGG 16-055, SVM 6133, NMK 15-08, JAUM 0936, IPM 14-7, SKNM 1502, COGG 13-39 , PM 1511, Type 44, DDG3, VGG 05-006, TRAM 1, MH 805, MH 2-15, MH 421, MVSKAN, Pusa 0672, AKM 12-24, IPM 02-3, IPM 04-1, PM 14-11, IGKM 2016-1, MDGGV 18, AKM 1604, AKM 8802, IGKM 06-18-3, MH 1142, OBGG 102, Pant M-4, RMB 12-07, SKNM 1514, SKNM 1516, T 44, TMB 126, LBG 450, DGG 7 , RMG 1087, COGG 912, DGGV 59, IPM 512-1, JAUM 936, Asha ,BPMR 145, IPM 02-14, TMB -36, CO -6, BMU, LGG 450, MH 1323, MH 1344, ML 2479, ML 2483, NDMK 16-324, NVL 855, OBGG 56, OBGG 58, Pant M-6, SKNM 1504, SML 1808, SML 1901, SVM 6262, TRCM 171-B-B-12-6, VG 17002, VGG 16-036, Barabanki Local, Kopergaon, PM 1522, Pusa 0672.

Table 2. Disease rating scale for Cercospora canescens [9]

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

3.RESULTS AND DISCUSSION:

The use of resistant cultivars is beneficial in preventing all plant diseases including Cercospora leaf spot. To assess the disease reaction against Cercospora leaf spot of mung bean caused by *Cercosporacanescens*.One hundred genotypes were screened for their

Comment [S6]: Whereis the DISCUSSION ?? omparaison to other international varieties??? Why this resistance?? Lacks references..

Comment [S7]: how did you know that is espece? May be Cercosporacruenta. BASED ON SYMPTOMS IS not enough to identify causal agent..did you isolate it from infected plants???)

reaction against Cercospora leaf spot (*Cercospora canescens*) in field condition. It is clear from table (3) that out One hundred genotypes were screened for their reaction against Cercospora leaf spot of mungbean in the field. Out of hundred genotypes where 13 genotypes viz. LGG 607, PM 14- 3, AKM 12-28, VGG 16-036, Pusa 171, Pusa 172, RMG 1092, RMG 1097, JLM 302-46, IPM 312-19, IPM 312-20, MGG 387 were found free from infection, 18 genotypes viz SKNM 1502, COGG 13-39 , PM 1511, Type 44, , DDG3, VGG 05-006, TRAM 1, Asha ,BPMR 145, IPM 02-14, TMB -36, CO -6, BMU, MH 805, MH 2-15, MH 421, MVSKAN, Pusa 0672, were recorded highly resistant, 6 genotypes viz. AKM 12-24, IPM 02-3, IPM 04-1, PM 14-11, IGKM 2016-1, MDGGV noticed resistant, 20 genotypes viz. IGKM 5-6-27, IPM 02-14, IPM 410-9, JLM 707-5, K 851, KM 2241,KM 2355, LGG 450, LGG 630, MGG 399, MH 2- 15, ML 818, OBGG 101, Pusa 171, VGG – 17009, VGG 16-055, SVM 6133, NMK 15-08, JAUM 0936, IPM 14-7 were found moderately resistant, 26 genotypes viz. COGG 912, DGGV 59, IPM 512-1, JAUM 936, LGG 450, MH 1323, MH 1344, ML 2479, ML 2483, NDMK 16-324, NVL 855, OBGG 56, OBGG 58, Pant M-6, PKVAKM 4, Pusa M1871, Pusa 1872, SKAU M-365, SKNM 1504, SML 1808, SML 1901, SVM 6262, TRCM 171-B-B-12-6, VG 17002, VGG 16-036, Barabanki Local were noticed moderately susceptible, 14 genotypes viz. AKM 1604, AKM 8802, IGKM 06-18-3, MH 1142, OBGG 102, Pant M-4, RMB 12-07, SKNM 1514, SKNM 1516, T 44, TMB 126, LBG 450, DGG 7, RMG 1087 were recorded susceptible and 3 genotype kopergoan, PM 1522, and Pusa 0672 recorded highly susceptible.

1. Healthy plant leaf **2.** Moderately infected leaf **3.** Highly infected leaf

4. Severely infected leaf

Plate 1: Healthy plant leaf and infected leaf with various aspects

Table 3. Reaction of mungbean genotypes against *Cercosporacanescens*

Comment [S8]: where is the Statistical analysis??? CLUSTERING????

Ratingscale	Reaction	No. ofgermplasm	Name of germplasm
1	Healthy Plant	13	LGG 607, PM 14- 3, AKM 12-28, VGG 16- 036, Pusa 171, Pusa 172, RMG 1092, RMG 1097, JLM 302-46, IPM 312-19, IPM 312-20, MGG 387.
2	Highly Resistant	18	SKNM 1502, COGG 13-39 , PM 1511, Type 44, , DDG3, VGG 05-006, TRAM 1, Asha ,BPMR 145, IPM 02-14, TMB -36, CO -6, BMU, MH 805, MH 2-15, MH 421, MVSKAN, Pusa 0672.
3	Resistant	06	AKM 12-24, IPM 02-3, IPM 04-1, PM 14-11, IGKM 2016-1, MDGGV 18.
4	Moderately resistant	20	IGKM 5-6-27, IPM 02-14, IPM 410-9, JLM 707-5, K 851, KM 2241,KM 2355, LGG 450, LGG 630, MGG 399, MH 2- 15, ML 818, OBGG 101, Pusa 171, VGG – 17009, VGG 16- 055, SVM 6133, NMK 15-08, JAUM 0936, IPM 14-7.
5-6	Moderately susceptible	26	COGG 912, DGGV 59, IPM 512-1, JAUM 936, LGG 450, MH 1323, MH 1344, ML 2479, ML 2483, NDMK 16-324, NVL 855, OBGG 56, OBGG 58, Pant M-6,

			PKVAKM 4, Pusa M1871, Pusa 1872, SKAU M-365, SKNM 1504, SML 1808, SML 1901, SVM 6262, TRCM 171-B-B-12-6, VG 17002, VGG 16- 036, Barabanki Local.
7-8	Susceptible	14	AKM 1604, AKM 8802, IGKM 06-18-3, MH 1142, OBGG 102, Pant M-4, RMB 12-07, SKNM 1514, SKNM 1516, T 44, TMB 126, LBG 450, DGG 7 , RMG 1087.
9	Highly Susceptible	03	Kopergaon, PM 1522, Pusa 0672.

4. CONCLUSION:

Comment [S9]: improve this part

Our study very well demonstrated the screening of mungbean genotypes against *Cercospora leaf spot* disease. From our result we found that 18 genotypes were highly resistant, farmer can use these genotypes to get rid from *Cercospora leaf spot* of mungbean, instead of the chemical management which is highly toxic to environment..

Comment [S10]: The results showed more, verify..

Comment [S11]: Improve this idea

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