



## **Field evaluation of blackgram genotypes for resistance to powdery mildew**

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### **ABSTRACT**

*Blackgram genotypes were evaluated to identify the sources of resistance to powdery mildew disease caused by *Erysiphe polygoni*. Screening was under natural field conditions at Agricultural College Farm, Bapatla, Guntur, Andhra Pradesh during rabi, 2016-17. The experimented material consisted sixteen genotypes along with a check. Of the sixteen blackgram genotypes, ten genotypes were moderately resistant (PU 31, LBG 20, LBG 791, LBG 685, LBG 790, LBG 787, LBG 645, KU-15-13, LBG 792, and T 9), three were moderately susceptible (KU-15-11, KU-15-6, KU-15-16) and three were susceptible (KU-15-3, LBG 709, LBG 752) to powdery mildew disease.*

**Key words:** Blackgram, Powdery mildew disease, Resistance, Screening

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### **INTRODUCTION**

Blackgram (*Vigna mungo* (L.) Hepper) is one of the most important cultivated pulse crops of the 'Vigna' group. It is a staple pulse crop in India occupying an area of 3.06 M ha with 1.96 M t production and 555 kg ha<sup>-1</sup> productivity (Directorate of Economics and Statistics, Government of India, 2014-15). In Andhra Pradesh, blackgram is extensively cultivated in rice fallows during *rabi* and a limited extent in *khari*. It is grown in an area of 3.15 lakh ha with 2.99 lakh t production and 946 kg ha<sup>-1</sup> (Directorate of Economics and Statistics, Government of A.P, 2014-15). The crop is of special significance in A.P as a relay crop and it fits well in rice - pulse cropping system particularly in Krishna - Godavari and North Coastal zones. However, the yields have not been consistently good and some seasons showed a marked decline due to its susceptibility to several fungal and viral diseases. Out of different constraints, fungal diseases mainly powdery mildew incited by *Erysiphe polygoni*.

Powdery mildew has long been known as important disease of plants in all parts of world. Linnaeus (1767) established a genus *Erysiphe*. De Condolle (1802) described many species of the genus. The disease has world-wide importance, occurring wherever blackgram is grown, particularly in the Indian sub-continent and Southeast-Asian countries (Butler, 1918). In India, the disease is present in almost all states of the country (Prakash and Raoof, 1994) and becomes severe in dry season causing 9.0-50.0 per cent yield loss (Reddy *et al*, 2008; Pandey *et al*, 2009).

Numerous attempts have been made on the identification of resistant sources against the disease (Akhtar *et al*, 2014; Basandrai *et al*, 2011; Reddy *et al*, 2008). It is an important source of nutrition so it is not advisable to manage the disease by fungicides alone. Cultivation of resistant genotypes is an effective and cheaper method to combat the disease. Hence several genotypes were screened to identify the sources of resistance against the blackgram powdery mildew disease.

### **MATERIALS AND METHODS**

The experiment was conducted during *rabi* 2016-17 at the Agricultural College Farm, Bapatla, Guntur district to evaluate the blackgram genotypes against powdery mildew disease. The trial was laid out in Randomized Block Design with two replications. Each genotype was sown in two rows of five meter length with a susceptible check LBG 752 sown as infector row technique method. Sowing was done on 26th October during year 2016 at a spacing of 30 cm and 10 cm between rows and plants respectively.

The crop was protected from the pest damage through sprays of selective insecticides in all the experimental plots uniformly to avoid the yield losses due to insect pests.

The disease severity of powdery mildew was recorded at weekly interval from 10 DAS to 14 days before harvesting by using standard disease rating 1-9 scale (Alice and Nadarajan., 2007) given in Table 1 and PDI was calculated as per the formula given by Wheeler (1969). The data were subjected to statistical analysis after using transformations such as arc sine transformation for per cent disease index.

$$\text{PDI} = \frac{\text{Sum of all the numerical ratings}}{\text{Number of observations} \times \text{maximum disease grade}} \times 100$$

**Table 1. Disease rating scale for Powdery mildew (0-5 scale)**

Grade	Description	Reaction
0	Plants free from infection	Free (F)
1	Plants showing traces to 10% infection on leaves, stem free from disease	Resistant (HR)
2	Slight infection with thin coating of powdery growth on leaves covering 10.1 - 25% area. Slight infection on stem, pods visually free	Moderately resistant (MR)
3	Dense powdery coating covering 25.1 to 50% leaf area. Moderate infection on stem, slight infection pods	Moderately susceptible (MS)
4	Dense powdery coating covering 50.1 to 75% leaf area, stem heavily infected, on pods moderate infection. Infected portion turns greyish	Susceptible (S)
5	Severe infection with dense powdery growth covering more than 75% area of the whole plant including pods, plants resulting in premature defoliation and drying	Highly Susceptible (HS)

## RESULTS AND DISCUSSION

Results revealed that The severity index of powdery mildew disease on blackgram genotypes ranged from 27.00 to 78.00 per cent, whereas, susceptible check, LBG 752, had severity index of 79.00 per cent during *rabi* 2016-17, respectively. Data revealed that the lowest average disease severity index (27.00 per cent) was recorded on genotype, LBG 790 and the highest average disease severity index (78.00 per cent) was recorded on genotype KU-15-3. Out of all 16 genotypes including check screened for resistance to powdery mildew disease, none of the genotypes found to be resistant. Ten genotypes PU31, LBG 20, LBG 791, LBG 685, LBG 645, LBG 787, LBG 790, KU-15-13, LBG 792, T9 were founded moderately resistant. Three genotypes KU-15-11, KU-15-6, KU-15-16 were showed moderately susceptible reaction. Three genotype KU-15-3, LBG 709, LBG 752 were showed susceptible reaction (Table 2) to powdery mildew disease.

Basandrai *et al.* (2003) evaluated 250 genotypes of blackgram against multiple diseases including powdery mildew disease and found three genotypes as highly resistant and seven genotypes as resistant and six as moderately resistant to powdery mildew disease. Akhtar *et al.* (2014) evaluated 17 genotypes of blackgram against multiple diseases and found five genotypes, showed highly resistant reaction, five genotypes found resistant and five genotypes showed moderately resistant reaction against powdery mildew disease. Channaveeresh *et al.* (2014) screened 12 genotypes against powdery mildew. However, none of them was found to be immune whereas, one genotype LBG-17 was found to be resistant. Four genotypes VBN-4, VBN-5, LBG-685 and T-9 were found moderately resistant. Out of eleven blackgram genotypes only four entries *viz.*, PU 31, MASH 338, LBG 752 and MBG 1050 were found moderately resistant and remaining entries susceptible to powdery mildew disease (Bhaskar, 2017).

**Table 2. Field screening of blackgram genotypes against powdery mildew disease during *rabi* 2016-17**

S. No.	Genotype	Per cent Disease Index (PDI)					Average disease score mean	Reaction
		39 DAS	46 DAS	53 DAS	60 DAS	67 DAS		
1	KU-15-3	12.00 (25.06)	19.00 (25.76)	29.00 (32.57)	58.00 (49.58)	78.00 (62.03)	3.90	S
2	LBG 709	14.00 (21.96)	21.00 (27.26)	30.00 (33.20)	50.00 (44.98)	69.00 (56.15)	3.45	S
3	KU-15-11	15.50 (23.17)	19.00 (25.82)	28.00 (31.94)	38.00 (38.04)	56.00 (48.43)	2.95	MS
4	KU-15-6	4.00 (11.53)	15.00 (22.77)	22.00 (27.96)	35.00 (36.25)	42.00 (40.38)	2.20	MS
5	KU-15-13	7.00 (15.30)	12.00 (20.26)	22.00 (27.96)	33.00 (35.96)	45.00 (42.11)	1.65	MR
6	LBG 20	7.00 (15.30)	11.00 (19.34)	17.00 (24.33)	24.00 (35.96)	38.00 (38.04)	2.00	MR

7	LBG 791	4.00 (11.44)	9.50 (17.94)	13.00 (21.11)	21.00 (27.26)	29.00 (32.54)	1.60	MR
8	KU-15-16	8.00 (16.39)	11.00 (19.34)	15.00 (22.77)	24.00 (29.32)	43.00 (40.94)	2.30	MS
9	LBG 685	2.00 (8.13)	6.00 (14.17)	12.00 (20.20)	20.00 (26.55)	28.00 (31.93)	1.60	MR
10	LBG 790	3.00 (9.97)	9.00 (17.43)	13.00 (21.11)	18.00 (25.09)	27.00 (31.93)	1.50	MR
11	LBG 787	7.00 (15.30)	11.00 (19.34)	18.00 (25.09)	24.00 (29.24)	36.00 (36.85)	1.78	MR
12	PU31	4.00 (11.53)	7.00 (15.30)	13.00 (21.11)	21.00 (27.21)	31.00 (33.82)	1.67	MR
13	LBG 792	12.00 (20.24)	18.00 (25.09)	27.00 (31.29)	39.00 (38.63)	56.00 (48.43)	1.80	MR
14	T9	8.00 (16.42)	12.00 (20.20)	17.00 (24.33)	24.00 (29.30)	48.00 (43.84)	2.00	MR
15	LBG 645	4.00 (11.53)	8.00 (16.42)	12.00 (20.26)	21.00 (27.21)	34.00 (395.65)	1.65	MR
16	LBG 752	18.00 (25.06)	23.00 (28.64)	33.00 (35.05)	60.00 (50.75)	79.00 (62.71)	3.95	S
<b>SEm±</b>		0.90	0.10	0.80	1.10	1.30		
<b>CD (P ≤ 0.05)</b>		2.71	3.00	2.17	3.32	3.93		
<b>CV (%)</b>		7.87	6.73	3.87	4.55	4.31		

\*Figures in parentheses are arcsine transformed values

\*DAS: Days after sowing. \*PDI calculated based on disease scoring on 0-5 scale.

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