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Screening of Blackgram Genotypes for Resistance against Corynespora Leaf Spot and Cercospora Leaf Spot

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A B S T R A C T

Field screening was done under natural field conditions during *rabi* 2016-17 to identify the sources of resistance in blackgram genotypes against leaf spot diseases caused by *Corynespora cassiicola*, *Cercospora canascens.* Out of sixteen blackgram genotypes evaluated only one genotype LBG 645 was moderately resistant, seven genotypes were moderately susceptible (KU-15-6, KU-15-13, LBG 790, LBG 787, PU31, LBG 792, LBG 791) and three genotypes were susceptible (LBG 709, KU-15-11, LBG 752) to both Corynespora leaf spot and Cercospora leaf spot.

Introduction

Blackgram (*Vigna mungo* (L.) Hepper) is one of the most important cultivated pulse crops of the '*Vigna*' group. The crop is cultivated in all the seasons throughout India. In Andhra Pradesh, blackgram is extensively cultivated in rice fallows during *rabi* and a limited extent in *kharif*. 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 susceptible. Out of different constraints, fungal diseases mainly leaf spots caused by *Corynespora cassiicola*, *Cercospora canascens* are important yield constraints in blackgram cultivation. Fungal foliar diseases cause yield loss up to 50% or more in blackgram (Singh *et al*., 2010).

Numerous attempts have been made on the identification of resistant sources against the disease (Akhtar *et al*., 2014). 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 Corynespora leaf spot and Cercospora leaf spot.

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 leaf spot diseases. 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 disease severity of Corynespora leaf spot and Cercospora leaf spot 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.

$$PDI = \frac{\text{Sum of individual disease ratings}}{\text{No. of observations assessed X maximum disease rating}} \times 100$$

Results and Discussion

In order to find out resistant sources against leaf spot diseases of blackgram field screening was conducted and observations of Corynespora leaf spot and Cercospora leaf spot diseases in blackgram presented in Table 2 and 3 revealed that the amount of diseases produced on genotypes differed significantly. The severity index of Corynespora leaf spot disease on blackgram genotypes ranged from 43.89 to 68.33 per cent, whereas, susceptible check, LBG 752, had severity index of 73.89 per cent during *rabi* 2016-17, respectively. Data revealed that the lowest average disease severity index (43.89 per cent) was recorded on genotype, T9 and the highest average disease severity index (68.33 per cent) was recorded on genotype KU-15-3. Out of all 16 genotypes including check screened for resistance to Corynespora leaf spot disease, none of the genotypes found to be resistant. Two genotypes T9, LBG 645 were categorized as moderately resistant. Seven genotypes KU-15-6, KU-15-13, LBG 790, LBG 787, PU31, LBG 792, LBG 791 were rated as moderately susceptible. Seven genotypes KU-15-3, LBG 709, KU-15-11, LBG 20, KU-15-16, LBG 685, LBG 752 were rated as susceptible (Table 2) to Corynespora leaf spot disease.

Table.1 Disease rating scale for leaf spot (1-9 scale)

Grade	Percentage infection	Reaction
1	No infection on leaves	Resistant (R)
2	0.1% to 5% infection on the leaf surface	Moderately resistant (MR)
3	5.1% to 10% infection on the leaf surface	Moderately resistant (MR)
4	10.1% to 15% infection on the leaf surface	Moderately susceptible MS)
5	15.1% to 30% infection on the leaf surface	Moderately susceptible (MS)
6	30.1% to 40% infection on the leaf surface	Susceptible (S)
7	40.1% to 50% infection on the leaf surface	Highly susceptible (HS)
8	50.1% to 75% infection on the leaf surface	Highly susceptible (HS)
9	Above 75% infection on the leaf surface	Highly susceptible (HS)

Table.2 Field screening of blackgram genotypes against Corynespora leaf spot 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	16.11 *(23.65)	29.44 *(32.84)	49.22 *(43.70)	57.66 *(49.38)	68.33 *(55.73)	5.50	S
2	LBG 709	15.00 (22.77)	33.33 (35.25)	47.77 (43.38)	58.55 (49.90)	66.11 (54.37)	5.65	S
3	KU-15-11	18.33 (25.33)	28.89 (32.48)	42.00 (40.37)	50.94 (45.52)	60.56 (51.07)	5.45	S
4	KU-15-6	16.11 (23.65)	28.33 (32.14)	39.05 (38.66)	47.66 (43.64)	59.44 (50.42)	4.90	MS
5	KU-15-13	13.33 (21.39)	17.61 (24.79)	22.22 (28.11)	31.66 (34.21)	45.55 (42.43)	3.25	MS
6	LBG 20	12.78 (20.93)	26.66 (31.07)	37.11 (37.51)	50.05 (45.01)	62.61 (52.31)	5.30	S
7	LBG 791	12.78 (20.93)	28.33 (32.14)	37.05 (37.48)	48.66 (44.21)	57.77 (49.45)	3.40	MS
8	KU-15-16	12.22 (20.45)	23.33 (28.86)	38.16 (38.14)	46.66 (43.07)	57.22 (49.13)	5.20	S
9	LBG 685	13.89 (21.86)	28.66 (32.35)	46.11 (42.75)	55.00 (47.85)	64.44 (53.37)	5.70	S
10	LBG 790	12.22 (20.45)	17.77 (24.91)	22.22 (28.09)	31.39 (34.06)	44.44 (41.79)	3.40	MS
11	LBG 787	13.89 (21.86)	18.16 (25.21)	25.00 (29.97)	35.55 (36.58)	53.89 (47.21)	3.45	MS
12	PU31	12.78 (20.93)	17.66 (25.21)	23.89 (29.24)	39.44 (38.88)	56.66 (48.81)	3.40	MS
13	LBG 792	15.00 (22.77)	19.72 (26.34)	24.44 (29.59)	41.66 (40.18)	63.33 (52.73)	3.40	MS
14	T9	12.22 (20.45)	16.11 (23.65)	22.78 (28.49)	33.33 (35.25)	43.89 (41.47)	2.40	MR
15	LBG 645	12.22 (20.45)	17.77 (24.92)	25.55 (30.35)	35.55 (36.58)	44.44 (41.79)	2.00	MR
16	LBG 752	17.77 (24.91)	35.55 (36.58)	56.11 (48.49)	63.33 (52.71)	73.89 (59.25)	6.00	S
SEm±		0.49	0.60	0.83	0.88	0.89		
CD ($P \leq 0.05$)		1.47	1.80	2.51	2.66	2.68		
CV (%)		3.13	2.88	3.27	2.95	2.54		

*Figures in parentheses are arcsine transformed values

*DAS: Days after sowing. *PDI calculated based on disease scoring on 1-9 scale.

Table.3 Field screening of blackgram genotypes against Cercospora leaf spot 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	16.66 *(24.07)	18.16 *(25.21)	25.55 *(30.33)	42.22 *(40.50)	54.44 *(47.53)	4.45	MS
2	LBG 709	15.55 (23.22)	22.22 (28.09)	38.05 (38.07)	55.00 (47.85)	60.33 (50.94)	5.45	S
3	KU-15-11	15.55 (23.16)	18.89 (25.74)	29.55 (32.92)	44.44 (41.79)	62.78 (52.38)	5.00	S
4	KU-15-6	15.55 (23.22)	18.16 (25.21)	27.61 (31.68)	35.55 (36.59)	48.89 (44.34)	3.85	MS
5	KU-15-13	13.33 (21.41)	17.66 (24.84)	25.55 (30.35)	31.67 (34.22)	46.66 (43.07)	3.60	MS
6	LBG 20	14.44 (22.31)	21.11 (27.33)	35.00 (36.25)	45.00 (42.11)	63.89 (43.07)	3.60	MS
7	LBG 791	17.77 (24.92)	23.89 (29.24)	31.11 (33.88)	43.89 (41.47)	56.66 (48.81)	3.65	MS
8	KU-15-16	13.33 (21.41)	16.66 (24.08)	24.44 (29.62)	36.66 (37.25)	47.22 (48.81)	3.55	MS
9	LBG 685	14.44 (22.31)	21.67 (27.73)	32.50 (34.73)	43.00 (41.47)	53.33 (46.89)	3.60	MS
10	LBG 790	14.44 (22.31)	17.22 (24.50)	25.55 (30.35)	32.22 (34.57)	41.67 (46.89)	3.35	MS
11	LBG 787	14.44 (22.31)	17.05 (24.36)	22.22 (28.11)	36.11 (36.90)	47.50 (43.54)	3.50	MS
12	PU31	13.33 (21.41)	21.66 (27.71)	33.33 (35.25)	42.22 (40.50)	62.77 (52.39)	3.60	MS
13	LBG 792	14.44 (22.31)	20.94 (27.19)	33.88 (35.55)	41.66 (40.17)	57.77 (49.45)	3.55	MS
14	T9	13.33 (21.41)	15.55 (23.22)	21.11 (27.33)	32.22 (34.56)	39.44 (38.89)	3.10	MS
15	LBG 645	13.33 (21.41)	16.66 (24.08)	22.22 (28.09)	32.22 (34.56)	37.77 (38.89)	2.60	MR
16	LBG 752	18.89 (25.74)	31.67 (34.22)	45.55 (42.43)	57.77 (49.45)	62.22 (38.89)	6.00	S
SEm±		0.75	0.84	0.98	1.05	1.03		
CD ($P \leq 0.05$)		2.27	2.55	2.95	3.17	3.13		
CV (%)		4.70	4.52	4.22	3.76	3.16		

*Figures in parentheses are arcsine transformed values

*DAS: Days after sowing. *PDI calculated based on disease scoring on 1-9 scale.

The severity index of Cercospora leaf spot ranged from 37.77 to 63.89 per cent, whereas, susceptible check, LBG 752, had severity index of 62.22 per cent during *rabi* 2016-17, respectively. Data revealed that the lowest average disease severity index (37.77 per cent) was recorded on genotype, LBG 645 and the highest average disease severity index (63.89 per cent) was recorded on genotype PU31. Out of all 16 genotypes including check screened for resistance to Cercospora leaf spot disease, none of the genotypes found to be resistant. Genotype LBG 645 was moderately resistant. Twelve genotypes KU-15-6, KU-15-13, KU-15-3, LBG 20, LBG 791, KU-15-16, LBG 685, LBG 790, LBG 787, PU31, LBG 792, T9 were moderately susceptible. Three genotypes LBG 709, KU-15-11, LBG 752 were rated as susceptible (Table 3) to Cercospora leaf spot disease.

Singh *et al.,* (2010) reported LBG-703, LBG-708, LBG-713, LBG-707, LBG 648 as resistant sources to Corynespora leaf spot on blackgram. Kaushal and Singh (1989) evaluated forty eight varieties and two accessions of blackgram during rainy seasons at the seedling stage, none of the varieties was resistant to Cercospora leaf spot, HPU 51 showed resistance between two accessions. Raguchander *et al*., (1990) evaluated 108 *Vigna mungo* genotypes under natural condition, 15 cultivars were grouped as resistant to *C. canescens*, 41 were moderately resistant and the remainder were moderately to highly susceptible.

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