I J T A
© Serials Publications
National Academy of Agricultural Science (NAAS) Rating : 3.03

Screening of blackgram genotypes under natural epiphytotic condition for powdery mildew disease resistance *Eryshipe polygoni* DC.

Asif Hadimani*, Konda.C. R, Sunil A Kulkarni, Rajendragouda Patil, Guru P N and Manjunath Burud

ABSTRACT: *The experiment was carried out at Agriculture Research Station, Bidar, University of Agricultural Sciences, Raichur, Karnatak (India), to screen blackgram [Vigna mungo (L.) Hepper] genotypes against powdery mildew during late kharif-2014 season under natural epiphytotic condition. The experimentation comprised of 64 blackgram genotypes including checks. Out of 64 genotypes none of the genotypes showed immune or resistant, 15 were showed moderately resistant, remaining all genotypes showed moderately resistant to moderately susceptible reaction to the powdery mildew disease. The moderately resistant genotypes can be exploited in breeding programme to develop moderately resistant, with yielding variety of blackgram.*

Key words*: Germplasm evaluation, powdery mildew resistance, urd bean*

INTRODUCTION

Black gram (*Vigna mungo* (L.) Hepper) is one of the most ancient and important pulse crop of Asia, due to its nutritional quality and the suitability to cropping system. It is known as "poor man's meat" and constitutes a major source of dietary protein of the large section of vegetarian population of the world. The lower productivity of black gram is mainly attributed to low genetic yield potentiality, indeterminate growth habit, canopy architecture, low partitioning efficiency, cultivation in marginal land and due to biotic and abiotic stresses. Among biotic stresses powdery mildew, cercospora leaf spot, anthracnose and mungbean yellow mosaic virus (MYMV) are the major diseases of black gram. The powdery mildew occurs throughout the year under favorable conditions and it is more severe in the late sown *kharif* crop [1]. Powdery mildew disease will occur during cool-dry months and the disease epidemic form covers the upper surface of the leaf forming white hyphae which gives a white floury patches appearance. Parts of the leaves later changes in to brown colour. Yield losses due to the disease were reported to be 20-40% at the reproductive stages [2], but the damage can be more serious when the epidemic starts at the reproductive stages [3].

During the winter/spring season it is a severe constraint in the production of bean crops. It is common foliar disease of urd bean particularly in the cool dry season. Major powdery mildew control strategies include usage of chemicals. But due to the cost of chemicals famers rarely practice such control measures and the usage of such fungicides will negatively affect environment and especially human health [4].

Therefore the most effective way to control powdery mildew is the use of resistant varieties. Keeping this in view, disease screening studies were made to understand the development of powdery mildew disease. Since powdery mildew may inflict heavy losses to the crop in the country and the present cultivars are susceptible to this disease, therefore, this study was initiated to evaluate available urd bean germplasm for identification of resistance sources to breed disease resistance cultivars.

MATERIAL AND METHODS

Field experiment was conducted to identify resistant sources and to evaluate breeding materials against powdery mildew. The available genotypes and breeding lines were screened in simple lattice design with two replication under field condition during *kharif* 2014 at Agricultural Research Station, Bidar.

* Department of Genetics and Plant Breeding,University of Agricultural Sciences, Raichur - 584104, India, *E-mail: adh4992@gmail.com*

Totally 64 genotypes were screened under natural condition in ARS Bidar. All the genotypes in the germplasm collection are from different research stations of India. The experimental material obtained from ARS Bidar, Lam, IIPR Kanpur, BARC Trombay, GPBD Dharwad, MULLaRPs Scheme dharwad, Vamban Tamil Nadu and National Bureau of Plant Genetic Resoures, New Delhi. The test entries were planted during mid august and harvested during the last week of October.

The disease severity on each genotypes was recorded on 40 days after sowing, 50 days after sowing and at the time of harvesting. The powdery mildew was scored on 0-9 scale by randomly selecting five plants. Based on their reaction, genotypes categorised into immune, resistant, moderately resistant, susceptible and highly susceptible, using 0 to 9 scale presented in table 1 [5].

The recorded grade value were then converted into Per cent Disease Index (PDI) by using following formula [6].

$$\text{Per cent Disease Index (PDI)} = \frac{\text{Sum of the individual disease ratings}}{\text{Number of leaves observed X Maximum disease observed grade}} \times 100$$

RESULTS AND DISCUSSION

A total of 64 blackgram genotypes were screened for their reaction against powdery mildew disease and depending upon their genetic makeup of each genotype responded differently to powdery mildew disease. The list of genotypes and disease reaction are presented in table 2. Out of 64 genotypes screened, none of them were found to be immune and resistant, however sixteen genotypes *viz*., BDU 3-22, OBG-647, BDU 3-23, BDU 3-2, KU-5-527, BDU 3-21, BDU-5, BDU-7, BDU-9, BDU-12, LBG-645, LBG-465, LBG-685 and LBG-20. The resistant disease grade ranged between 3 to 5. However, rest of all genotypes showed moderatlty susceptible reaction to powdery mildew disease.

The management of the disease through host plant resistance has been the best and cheapest choice in all the crops. Utilisation of resistant cultivars in farming systems is the most simple, effective and economical method in the management of disease. Besides this, these resistant cultivars conserve natural resources and reduce the cost, time and energy compared to the other methods of disease management.

Previously several workers reported that there is variation in resistance among the genotypes against powdery mildew of blackgram [7, 8, 9]. Though the germplasm lines are resistance source to the breeders, they have to be used in breeding programme for the development of new verities for the benefit of farmers.

From the present study, concluded that moderately resistant genotypes can be exploited in breeding programme to develop moderately resistant, with yielding variety of blackgram.

Table 1
Percent of leaf area and disease reaction

Scale	*Percent Leaf area Infection*	*Category*
0	No symptoms on leaves	Highly Resistant (HR)
1	Small pin-head size lesions covering 1% or less leaf area	Resistant (R)
3	Small pin-head size lesions covering 1-10% of leaf area	Moderately Resistant (MR)
5	Lesions big but not coalescing, covering 11-25% of the leaf area	Moderately Susceptible (MS)
7	Lesions on leaves covering 26-50% of leaf area.	Susceptible (S)
9	Lesions on leaves covering 51% or more of leaf area.	Highly Susceptible (HS)

Table 2
Screening of black gram genotypes against powdery mildew under natural condition during *Kharif* 2014 at ARS Bidar

	Disease	*Name of the genotypes Category*	*No of the genotypes*
Grade	Reaction		
0	Highly Resistant (HR)		0
1	Resistant (R)		0
3	Moderately Resistant (MR)	BDU 3-22, OBG-647, BDU 3-23, BDU 3-2, KU-5-527, BDU 3-21, BDU-5, BDU-7, BDU-9, BDU-12, LBG-645, LBG-465, LBG-685 and LBG-20	16
5	Moderately Susceptible (MS)		48
7	Susceptible (S)		0
9	Highly Susceptible (HS)		0

Table 3
Monthly mean of weather parameters and weekly total rainfall for the experimental period (July – Dec, 2014).

Month	*Temperature (°C)*		*Relative Humidity (%)*		*Total Rainfall (mm)*
	2014				
	Maximum	*Minimum*	*Maximum*	*Minimum*	
June	36.4	23.8	59.5	46.5	22
July	30.1	21.8	63.9	62.7	69.8
Aug	30.6	28.4	62.8	64.8	145.8
Sept	29.3	20.9	63.9	62.5	139.2
Oct	31.1	19.2	66.5	64.3	22
Nov	30.8	16.4	63.9	61.7	0.00
Dec	26.7	13.0	67.6	63.4	12.4
		Total			**411.2**

REFERENCES

Channaveeresh, T. S., Kulkarni, S. and Vijaykumar, A. G., (2014), Evaluation of black gram genotypes for resistance to powdery mildew caused by *Erysiphe polygoni* DC. *Karnatak. J. Agric. Sci.,* 27(1): 85-87.

Fernandez, G. C. J and Shanmugasundaram S. (1988), The AVRDC mungbeans improvement programme: The past, present and future. In: McLean BT (ed.) Mungbean: Proceeding of the second international symposium. *Asian Vegetable Research and Development Center, Taiwan*. 58–70.

Poehlman, J. M. (1991), The Mungbean. Boulder, Co, U.S.A. Westview Press. 262-229.

Divya Ramkrishnana, C. K. and Savithramma, D. L., (2014), Screening of mungbean germplasm for powdery mildew resistance. *Int. J. Agro. Agric. Res.*, 4(6): 16-21.

Mayee, C. D. and Datar, V. V., (1986), "Phytopathometry" Technical Bulletin-I. *Marathwad Agric. Univ., Parbhani*, India, p. 146.

Wheeler, B. E. J., (1969), An Introduction to Plant Disease. John Wiley and Sons Ltd., London, p. 301.

Anonymous, (2002), Annu. Rep. (2001-02), Indian Institute of Pulse Research, Kanpur, p. 24-26.

Prasanthi, L., Reddy, B. V. B., Rani, K. R., Rajeswari, T., Sivaprasad, Y. and Reddy, K. R., (2010), Screening of blackgram genotypes under artificially inoculated conditions and based on molecular markers for powdery mildew resistance. *Legume Res.,* 33(1): 17-22.

Nandrajan, N. and Nandgupta., (2010), Resistant cultivars of different pulse crops in India. *Electronic J. Pl. Breeding,* 1(4): 1099-1106.