Host resistance against bacterial blight disease of clusterbean

ABSTRACT

Host plant resistance is an ultimate tool to keep away the disease from the crop. It is a simple, cheap and ecofriendly approach for the management of disease. Therefore, one hundred clusterbean germplasm were screened against bacterial blight disease (*Xanthomonas axonopodis* pv. *cyamopsidis*) under artifical epiphytotic condition to find out the source of resistance. Per cent disease index (PDI) of each genotype was recorded at pre-flowering and maturity stage by visual scoring as per the standard continuous rating 0-5 scale (Rathore, 2006). On the basis of pooled data of 2018 and 2019, among the total one hundred germplasm, only two germplasm namely RGr-16-2 (RGC-936×RGC-1055) and RGr-16-11-5 (RGC-1025×RGC-197) were found resistant with minimum PDI 7.77 & 9.44 and 9.44 & 10.00 at pre flowering and maturity stages respectively, thirty germplasm showed moderate resistant (MR), sixty seven germplasm found moderately susceptible (MS), one germplasm namely RGr-17-16-2 (GG-1×RGC-936) found susceptible (S) with maximum PDI 51.11 & 52.22 at pre flowering and maturity stage, respectively. None of the germplasm was found completely free from the disease and highly susceptible (HS) against bacterial blight disease.

Key words: Clusterbean, Bacterial blight, Germplasm, Resistance and One hundred.

Commented [A1]: Per cent Disease Intensity

Commented [A2]: *Xanthomonas axonopodis* pv. *cyamopsidis*

INTRODUCTION

In India, clusterbean is commonly known as guar means ″cow's food″ and mainly cultivated in the arid regions of Rajasthan, Haryana, Gujarat, Uttar Pradesh, Punjab and Madhya Pradesh for gum purpose. Guar is known as various names in India such as Gorani (Sanskrit), Guarki Phalli, Gower (Hindi), Bavachi, Guwar, Gavari (Marathi), Gover (Gujarati), Guara, Guwar (Panjabi), Kothaverai (Malyalam). Clusterbean gum is a naturally occurring hydrocolloid present in the endosperm of seed and recognize as the most important biologically produced which is non-toxic, eco-friendly, cost effective, natural thickener, binder, stabilizer and safe agrochemical (Muftuoglu *et al.*, 2019). The gum possess unique abilities with multiple commercial applications in a wide

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range of industries like textile, printing, paper, petroleum, pharmaceuticals, food processing, cosmetics, mining, natural gas, well drilling, oil industries, explosive oil drilling and photography *etc*. Clusterbean suffers from a number of diseases caused by fungal, bacterial and viral pathogens, which adversely affect its quality and yield resulting in huge economic losses to the country as the crop have high foreign exchange earning potential. The major diseases of clusterbean are bacterial blight (*Xanthomonas axonopodis* pv. *cyamopsidis*), alternaria leaf spot (*Alternaria cyamopsidis*), powdery mildew (*Oidiospisis taurica*), anthracnose (*Colletotrichum capsici* f.sp. *cyamopsidis*), dry root rot (*Rhizoctonia solani*), cercospora leaf spot (*Cercospora psoraleae*), curvularia leaf spot (*Curvularia lunata*), wilt (*Fusarium caeruleum*) and damping off (*Pythium myriotylum*) (Kumhar *et al*., 2018). Among these diseases, the bacterial blight caused by *Xanthomonas axonopodis* pv. *cyamopsidis* is the most destructive disease of clusterbean causing tremendous losses in yield and quality under severe conditions (Patel *et al*., 1953). In India, the disease was first reported from Patna (Bihar) and Khopoli (Bombay) as bacterial leaf spot and later reported as bacterial blight by Patel and Patel (1958). Host plant resistance is an ultimate tool to keep away the disease from the crop. It is a simple, cheap and ecofriendly approach for the management of disease

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MATERIAL AND METHODS

One hundred clusterbean germplasm were screened for identification sources of resistance against *X. axonopodis* pv. *cyamopsidis*. The experiments were conducted at RARI farm, Durgapura during the *kharif* seasons of 2018 and 2019. The test entries were planted during mid July and harvested during the last week of October.

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The seeds of different cultivars were artificially inoculated with *X. axonopodis* pv. *cyamopsidis* by soaking in bacterial cell suspension ($2.5x10^8$ cfu/ml) for 30 min and dried under shade. Seeds were sown in a paired row of two-meter length with 30 cm apart and a susceptible check was planted before and after a set of ten test.

Commented [A11]: Cultivars or germplasm

Observations for disease severity were recorded by visual scoring as per the standard rating 0-5 scale (Rathore, 2006) at pre-flowering and maturity stage for each test line. On the basis of disease severity data, per cent disease index was calculated using formula described earlier and germplam were categorized on basis of PDI range.

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Table 1 Category of varieties/lines based on per cent disease index

S.No.	PDI	Category
1.	0 or less than 1.0	Free from disease
2.	1.10-10.0	Resistant (R)
3.	10.1-25.0	Moderately resistant (MR)
4.	25.1-50.0	Moderately susceptible (MS)
5.	50.1-75.0	Susceptible (S)
6.	More than 75	Highly susceptible (HS)

RESULT AND DISCUSSION:

Host plant resistance is an ultimate tool to keep away the disease from the crop. It is a simple, cheap and ecofriendly approach for the management of disease. Therefore, one hundred clusterbean germplasm were screened against bacterial blight disease under artifical epiphytotic condition to find out the source of resistance. The two years pooled data on disease score was given in table 1 and 2 revealed that among the total one hundred germplasm screened, only two germplasm namely RGr-16-2 & RGr-16-11-5 were found to be resistant against bacterial blight with minimum PDI 7.77 & 9.44 and 9.44 & 10.00 at pre flowering and maturity stages respectively.

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Whereas, thirty germplasm *i.e.*, RGr-16-1, RGr-16-2-1, RGr-16-3, RGr-16-3-1, RGr-16-3-2, RGr-16-3-5, RGr-16-3-6, RGr-16-3-7, RGr-16-5-2, RGr-16-5-3, RGr-16-5-5, RGr-16-5-6, RGr-16-5-7, RGr-16-5-8, RGr-16-6-1, RGr-16-8, RGr-16-7-6, RGr-16-7-10, RGr-16-9-1, RGr-16-9-4, RGr-17-3, RGr-17-4, RGr-17-4-1, RGr-17-8, RGr-17-9, RGr-17-11, RGr-17-15, RGr-17-16-4, RGr-17-17-6 and RGr-17-17-8 were categorized as moderately resistant (MR) to bacterial blight with per cent disease index ranging from 10.1 to 25.00.

While, sixty seven germplasm *i.e.*, RGr-16-3-3, RGr-16-3-4, RGr-16-4, RGr-16-5, RGr-16-5-1, RGr-16-5-4, RGr-16-6-2, RGr-16-6-3, RGr-16-7, RGr-16-8-1, RGr-16-8-2, RGr-16-8-3, RGr-16-10, RGr-16-10-1, RGr-16-11-2, RGr-16-11-3, RGr-16-11-4, RGr-16-11-6, RGr-16-11-7,

RGr-16-11-8, RGr-16-7-1, RGr-16-7-2, RGr-16-7-3, RGr-16-7-4, RGr-16-7-5, RGr-16-7-7, RGr-16-7-8, RGr-16-7-9, RGr-16-8, RGr-16-9, RGr-16-9-2, RGr-16-9-3, RGr-16-9-5, RGr-16-9-6, RGr-16-11, RGr-16-11-1, RGr-16-11-2, RGr-16-11-3, RGr-17-1, RGr-17-2, RGr-17-5, RGr-17-5-1, RGr-17-5-2, RGr-17-6, RGr-17-10, RGr-17-12, RGr-17-13, RGr-17-14, RGr-17-16, RGr-17-16-1, RGr-17-16-3 ,RGr-17-16-5, RGr-17-16-6, RGr-17-16-7, RGr-17-16-8, RGr-17-16-9, RGr-17-16-10, RGr-17-16-11, RGr-17-16-12, RGr-17-17-1, RGr-17-17-2, RGr-17-17-3, RGr-17-17-4, RGr-17-17-5, RGr-17-17-7, RGr-17-17-9 and RGr-17-17-10 were found moderately susceptible (MS) against bacterial blight disease with PDI ranging from 25.1 to 50.00 and only one germplasm namely RGr-17-16-2 was found susceptible (S) to disease with highest PDI 51.11 and 52.22 at pre flowering and maturity stage, respectively. None of the germplasm was found completely free from the disease and highly susceptible against bacterial blight disease.

These results are in accordance with the result of Stafford *et al.* (1983) that *Cyamopsis tetragonoloba* lines (reg.Nos, GP1 to GP5) possess resistance to *X. campestris.* Lodha (1984) reported IC 9065, HFG 75, G 40-23 and Hagle appeared moderately resistant to bacterial blight under artificial inoculation. Gandhi and Chand (1987) reported the absence of immune of resistance source against bacterial blight in clusterbean lines.

Gupta *et al*. (1993) screened clusterbean genotypes against *X. campestris* pv. *cyamopsidis* and HG-75, HG-258, RGC-990, HGC-365, HGS-502 and HGS-504 entries were found moderately resistant. Sindhan *et al.* (1996) screened 85 guar genotypes against *X. campestris* pv. c*yamopsidis* and found only ten entries as moderately resistant and the rest were susceptible or highly susceptible. The HG-75 was found to be highly resistant, whereas Pusa Navbahar was the most susceptible genotype (Kaur *et al*. 2004). The results was also accordance with the results of Chaudhari *et al.* (2014) who screened thirteen different genotypes of clusterbean against bacterial blight under pot condition for varietal resistance. The genotypes GR 101, GR 103 and GR 108 were found resistant to bacterial blight disease of clusterbean. The genotypes *viz*., GR 102, GR 105, GR 106, GR 107, GR 109, GR 110 and GR 111 showed moderately resistant reaction while HG 75 found susceptible to bacterial blight disease. Rest two entries Pusa Navabahar and GG 1 recorded highly susceptible reaction to bacterial blight disease of clusterbean.

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CONCLUSION:

Among the total one hundred germplasm screened under artificial disease inoculation condition, only two germplasm namely RGr-16-2 & RGr-16-11-5 were found resistant, thirty germplasm showed moderate resistant (MR), sixty seven germplasm found moderately susceptible (MS), one germplasm, RGr-17-16-2 found susceptible (S). None of the germplasm was found completely free from the disease and highly susceptible (HS) against bacterial blight disease

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