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# Screening of cluster bean genotypes against Alternaria blight (*Alternaria Cucumerina* var. *cyamopsidis*) in field condition

**Satish Sharma, Reeti Singh and Ajay Kumar**

**Abstract**
Cluster bean has become popular not only for consumption as vegetable but also as good source of useful industrial "Guar gum". Cluster bean commonly recognized as a summer, annual, drought-tolerant, well adapted to arid and semi-arid climates with hot temperatures legume crop. It can grow in sub humid conditions, Total twenty four genotypes were screened. Among different genotypes, 18 were found moderately resistant whereas 6 were moderately susceptible towards A. blight of Cluster bean. No genotype was found immune, HR, S and HS against disease. The maximum yield (14.58 q/ha) of guar crop was obtained with the genotype HG 563. The resistant varieties are cheapest source to manage this disease so that more entries should be screened out to find out resistant or immune lines of Cluster bean.

**Keywords:** Cluster bean, Alternaria blight *Alternaria Cucumerina* var. *cyamopsidis*

## Introduction
Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.] is being grown in India since ancient time. Although believed to be of African origin (Vavilov, 1951) [25], it was domesticated centuries ago in the north-western region of the Indo Pakistan sub-continent (Hymowitz, 1972) [4]. Tender green guar pods are important source of nutrition to human being and animals. Primary methods of controlling Alternaria leaf blight include preventing long periods of wetness on the leaf surface, cultural scouting, sanitation, and development of the host plant resistant with the application of fungicides (Kirk *et al*., 2001 and Namanda *et al*., 2004) [8, 15]. In recent years, an increasing consciousness about environmental pollution due to pesticides and development of fungicide-resistant strain in plant pathogens has challenged the plant pathologists to search for non-toxic fungicides for substituting the recommended chemicals. This is the most cost effective and eco-friendly management strategy selecting the genotypes possessing the resistant/tolerant reaction against the disease. Studies conducted on Blight of guar and its various aspects indicated that there are lot of gaps in the understanding of the disease, the pathogen and the control aspects and very meagre information is available on these aspects. Hence, a thorough investigation is required. Therefore,

## Materials and Methods
The experiment was conducted in *Kharif* 2016 and 2017 in the experimental field of Department of Plant Pathology. Five plants from each genotype were tagged for taking the observations. The intensity of the disease was recorded 45 days after sowing using 0-5 scale (Table 1, Plate 1).

Cluster bean materials consisting of 24 lines were evaluated against Alternaria blight under artificial inoculated conditions by adopting a field screening technique (Mc. Kinney 1923) [10]. The experiment was laid out in RBD with two replications. In the experiment the spacing between row to row was 45 cm and plant to plant 10 cm. The nitrogen and phosphorous was applied @ 25:50 kg/ha respectively.

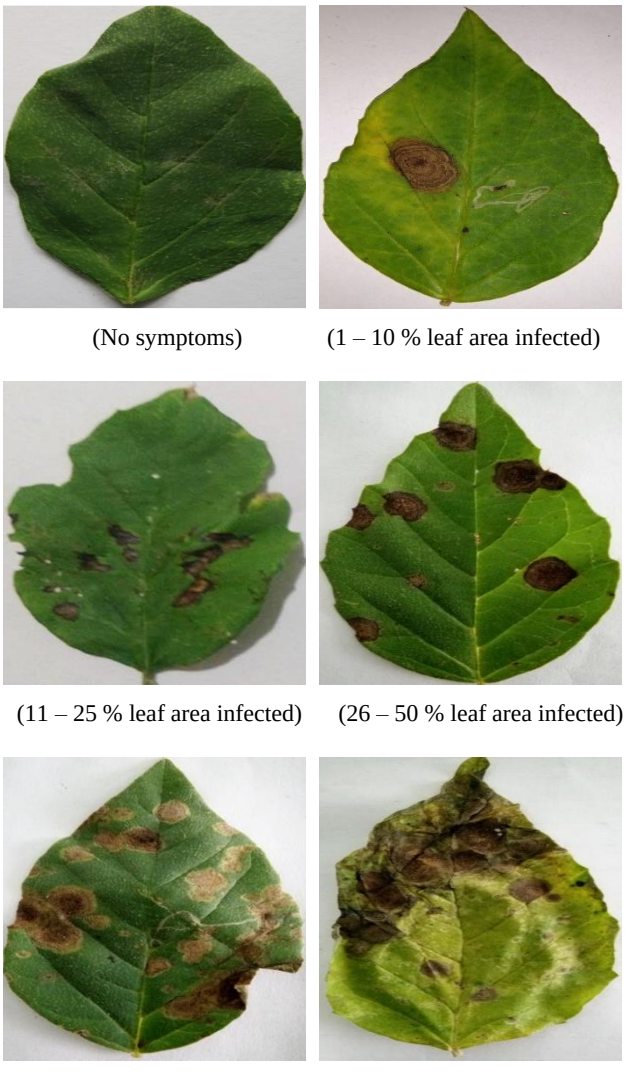
After germination, the crop was regularly watched for first appearance of disease. The observation on disease intensity was recorded using a progressive 0-5 scale, (McKinney, 1923) [10] in the Table 1. Numerical rating grade was given on the basis of percentage of area covered by pathogen on the leaves.

$$PDI = \frac{\text{Sum of all individual rating}}{\text{Total no. of leaf assessed x Maximum rating}} \times 100$$

**Table 1:** Disease rating scale for Alternaria blight

| Rating Scale | Disease Reaction | Per cent Disease Intensity | Description |
|---|---|---|---|
| 0 | Near immune/ Resistant reaction (I) | 0 | No symptoms |
| 1 | Resistant (R) | 1-10 | 1 - 10 % leaf area infected |
| 2 | Moderately Resistant (MR) | 11-25 | 11 – 25 % leaf area infected |
| 3 | Moderately Susceptible (MS) | 26-50 | 26 - 50 % leaf area infected |
| 4 | Susceptible (S) | 51-75 | 51 – 75 % leaf area infected |
| 5 | Highly Susceptible (HS) | 76-100 | 76 % above leaf area Infected |

**Symptomology;** Disease rating for alternaria blight



(No symptoms) (1 – 10 % leaf area infected)

(11 – 25 % leaf area infected) (26 – 50 % leaf area infected)

(51 – 75 % leaf area infected) (75 % above leaf area infected)

**Plate 1:** Alternaria blight disease rating scale on Cluster bean


**Plate 2:** Screening of the cluster bean genotypes against Alternaria blight under artificial inoculation conditions.

## Results and Discussion

Twenty four genotypes of Cluster bean were screened under artificial inoculation field conditions against Alternaria blight disease. The observations on disease intensity on various genotypes were recorded and were categorized as per their reaction. The rating scale 0-5 was used for recording the observation on leaf. Table 16 and Figure 7 revealed that none of Cluster bean entries were found completely free from the disease. Among different genotypes, 18 were found moderately resistant RGC1033, HG2-20, RGr16-2, CAZG-15-7, GAUG1304, RGr16 -7, RGr-17-2, RGR16-10, x-10, HG2-20, GC1033, RGR16-4, CAZG15-3, GC1066, RGr16-3, AUG1305, HG563, GAUG1304 whereas 6 were moderately susceptible GAUG-1501, CAZG-15-5, RGr-17-4, GAUG-1502, CAZG15-4, M-83 (control). None of the genotypes were found immune. The moderately resistant variety HG563 showed the highest yield 14.58 q/ha with 21.48 per cent disease intensity of 21.48 whereas the variety GAUG-1502 showed the minimum yield 6.18 q/ha with 28.88 per cent disease intensity.

**Table 2:** Field evaluation of Cluster bean genotypes against Alternaria blight on leaf during 2016 and 2017.

| S.N. | Genotypes | Per cent Disease Intensity | | Mean | Disease Reaction | Yield (q/ha) |
|---|---|---|---|---|---|---|
| | | 2016 | 2017 | | | |
| 1. | RGC 1066 | 16.3 (23.8) | 21.10 (27.4) | 18.75 | MR | 11.2 |
| 2. | X-10 | 15.55 (23.2) | 20.20 (26.7) | 17.93 | MR | 11.55 |
| 3. | RGC 1033 | 20.2 (26.6) | 23.60 (28.9) | 21.85 | MR | 10.45 |
| 4. | HG2-20 | 18.65 (25.5) | 24.20 (29.5) | 21.50 | MR | 9.76 |
| 5. | RGr16-2 | 21.15 (27.3) | 25.10 (30.2) | 23.25 | MR | 10.25 |
| 6. | CAZG 15-7 | 20.6 (26.9) | 24.30 (29.4) | 22.40 | MR | 11.22 |
| 7. | GAUG1304 | 23.4 (28.9) | 26.50 (30.9) | 24.90 | MR | 8.80 |
| 8. | GAUG-1501 | 24.65 (29.7) | 26.10 (30.8) | 25.45 | MS | 7.95 |
| 9. | RGr16 -7 | 21.7 (27.7) | 26.50 (30.9) | 24.05 | MR | 8.25 |
| 10. | RGr-17-2 | 24.25 (29.4) | 25.40 (30.2) | 24.80 | MR | 8.54 |
| 11. | CAZG-15-5 | 25.55 (30.3) | 27.10 (31.4) | 26.43 | MS | 7.86 |
| 12. | RGr-17-4 | 25.45 (30.2) | 26.30 (30.7) | 25.83 | MS | 8.2 |
| 13. | GAUG- 1502 | 28.45 (32.2) | 29.40 (32.7) | 28.88 | MS | 6.18 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 14. | RGr16-10 | 20.2 (26.6) | 24.30 (29.5) | 22.30 | MR | 10.96 |
| 15. | HG2-20 | 22.3 (28.1) | 25.30 (30.2) | 23.83 | MR | 11.56 |
| 16. | CAZG15-4 | 24.3 (29.5) | 26.50 (30.9) | 25.38 | MS | 9.12 |
| 17. | RGC1033 | 17.6 (24.7) | 26.80 (31.0) | 22.13 | MR | 10.32 |
| 18. | RGr16-4 | 20.5 (26.9) | 29.30 (32.7) | 24.93 | MR | 11.34 |
| 19. | CAZG15-3 | 21.15 (27.3) | 26.40 (30.8) | 23.73 | MR | 12.56 |
| 20. | GC1066 | 20.55 (26.9) | 25.1 (30.1) | 22.88 | MR | 9.33 |
| 21. | RGr16-3 | 18.5 (25.4) | 24.5 (29.5) | 21.45 | MR | 9.88 |
| 22. | GAUG1305 | 19.45 (26.1) | 22.4 (28.3) | 20.98 | MR | 8.56 |
| 23. | HG563 | 18.3 (25.3) | 24.7 (29.7) | 21.48 | MR | 14.58 |
| 24. | M-83 (Control) | 34.35 (35.8) | 44.1 (41.6) | 39.28 | MS | 7.96 |
| SE (m) ± | | 0.12 | 0.32 | | | |
| CD at 5% | | 0.35 | 0.94 | | | |

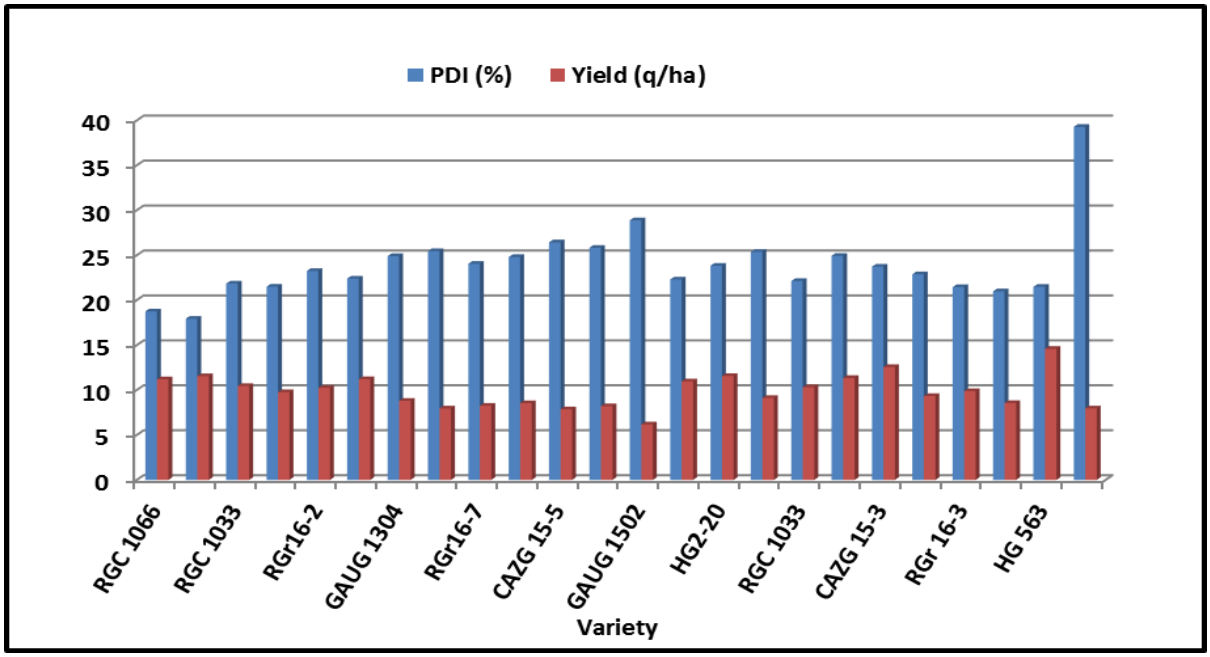



**Fig 1:** Field evaluation of Cluster bean genotypes against Alternaria blight on leaf.

The use of resistant cultivars is the cheapest, easiest, safest and most effective means of controlling plant diseases in crops for which such cultivars are available. Cultivation of resistant cultivars not only eliminates losses from diseases but also eliminates expenses for sprays and for other ways of disease control thus avoid the contamination of environment with toxic chemicals.

Total 24 genotypes of Cluster bean were evaluated against Alternaria blight (*A. cucumerina* var. *cyamopsidis*) under artificial inoculation conditions. The rating scale 0-5 was used for recording observation on leaf. Among different genotypes, 18 were fond moderately resistant whereas 6 were moderately susceptible. None of the genotypes of Alternaria blight were found immune, HR, S and HS against disease.

The limited information is available on the reaction of cluster bean varieties to infection by *Alternaria cyamopsidis* (Saini and Paroda, 1983) [17]. RGC-619, RGC-677 and RGC-679 were reported to be least susceptible by Guar and Ahmed (1983) [3]. Shivanna and Shetty (1991) [18] reported HG-812 to be least susceptible to blight in Mysore. Few genotypes of guar viz., HFG-14, HFG-516, HFG-516, HFG-522, HFG-530, HFG-554 (Gandhi *et al.*, 1978) [2] and Guar-279-6, Guar-47 and Gawarani short (Jagtap, 1975) [5] have shown resistance against this disease. Guar-279-6, Guar-47 and Gawarani short (Jagtap, 1975) [5] have shown resistance against this disease. Yejenrappa and Padaganur (1993) [26] showed that Guar plants of all ages were susceptible to infection by leaf blight pathogen.

The possibilities of exploiting cultivars resistant in controlling guar disease are limited. The commercial cultivars either do not exhibit sufficient degree of resistant or the resistant is turned down by new physiological races.

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