Plant Archives Vol. 25, Supplement 2, 2025 pp. 1592-1597 e-ISSN:2581-6063 (online), ISSN:0972-5210

Plant Archives

Journal homepage: http://www.plantarchives.org
DOI Url : https://doi.org/10.51470/PLANTARCHIVES.2025.v25.supplement-2.199

EXPLORING HOST PLANT RESISTANCE OF BRINJAL AS FOR *ALTERNARIA ALTERNATA* (FR. KEISSLER) CAUSING ALTERNARIA BLIGHT UNDER NATURAL INOCULATION CONDITION

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(Date of Receiving : 04-05-2025; Date of Acceptance : 07-07-2025)

ABSTRACT

Brinjal (*Solanum melongena* L.) also known as eggplant or aubergines or garden egg member of Solanaceae family is a popular vegetable crop grown almost all over the world. Brinjal is grown in China, India, Bangladesh, Pakistan and Philippines. Brinjal described as "king of vegetables" due to its wide usage in Indian foods. Major brinjal growing states in India are Orissa, Bihar, Punjab, West Bengal, Karnataka, Maharashtra, Andra Pradesh and Uttar Pradesh. None of the hybrids were comes under highly resistant class. Among 35 genotypes one genotype *viz.,* Uttra (9.34 %) belong to resistant class, ten genotypes *viz.,* Mukta Moti,(11.67 %), Banarsi Gol (13.67%), NBH-459 (15.34%), Jaipur local long (15.67), Pusa Kaushal-1 (16.00%), Pusa Ankur (16.33), Pusa oiski (16.67), Green Pearl (19.34%), Pant Rituraj (23.00%) and Jaipur Local round (23.33%) belong to moderately resistant class, twenty two genotypes *viz.,* Neelam (26.34 %), Pusa Uttam (27.00 %), Pusa Upkar (27.34 %), Pusa Halo began (28.34 %), Mukta Round (29.33 %), Ram Nagar giant (30.67 %), Kashi Sundesh (31.17 %), Pusa Safed began (31.67 %), NBH-386 (34.00 %), Brinjal Beema (34.00 %), Pusa Bindu (35.16 %), Kashi Prakash (37.00 %), NBH-21 (38.00 %), Navneet (38.83 %), ADM-190 (40.34 %), Pusa Kaushal (41.00 %), PPL (41.34 %), Pusa Bhargav (42.67 %), PPR (43.67 %), Neel Kanti (44.33 %) Pusa P K and Mahi Neelam (45.34 %) were belong to moderately susceptible class, whereas one genotype belong to Susceptible class Pusa Shymala (52.00 %), while one genotype BR-112 belong to highly susceptible category.
Keywords: Brinjal, Alternaria blight**,** *A. alternata,* Screening.

Introduction

Brinjal (*Solanum melongena* L.) also known as eggplant or aubergines or garden egg member of Solanaceae family is a popular vegetable crop grown almost all over the world. In India, it is one of the most common vegetable crops grown throughout the country except higher altitudes. Brinjal is grown in China, India, Bangladesh, Pakistan and Philippines. Brinjal described as "king of vegetables" due to its wide usage in Indian foods (Choudhary and Gaur, 2009; Singh *et al.,* 2014). India is considered to be the centre of origin of cultivated brinjal from where it spread to the other parts of the world (Choudhary and Kalda, 1968). Major brinjal growing states in India are Orissa, Bihar, Punjab, West Bengal, Karnataka, Maharashtra, Andra Pradesh and Uttar Pradesh. With a yield of 34.91 tonnes per hectare, the global area of eggplant is roughly 2.67 million hectares, and production is close to 93.21 million tonnes (Anon, 2024). Brinjal is grown on 0.73 million hectares in India, where it produces 12.78 million tonnes and yields 17.36 tonnes per

hectare (Anon, 2024). *Alternaria solani* is a major destructive species of the Alternaria genus which cause early blight on solanaceous crops, more scientific studies are found on *A. solani* in literature but nowadays *A. alternata, A. tenuissima* and other species of genus also show increase destruction of crops. This disease is severe and appears regularly, causing heavy losses in yield. Balai and Ahir (2013) reported upto 25% yield losses from Jaipur district due to leaf spot of brinjal.

Method and Material

Thirty-five brinjal cultivars/genotypes from widely diverse origin source and also from different agro climatic zone were screened at the Department of Plant Pathology, College of Agriculture, Gwalior for resistance against *A. alternata* during *Rabi* 2021-2022 and 2022-23 under natural conditions. Seedlings of all 35 brinjal genotypes were raised in nursery and 30 days old seedlings were shifted to fields. The seedlings were planted in three meter long row with row to row spacing 30 cm and plant to plant spacing of 10 cm. The experiment was replicated thrice. The response to *A. alternata* was recorded as described by rating scale. The observations were recorded on ten randomly selected tagged plants of each cultivar. The per-cent disease intensity of leaf spot will be recorded by applying 0-5 rating scale given by (Rahmatzai *et al.,* 2017) and presented in Table-1.

$$\text{PDI} = \frac{\text{Sum of all numerical ratings}}{\text{Total number of observations}} \times 100 \times \text{highest grade in the scale}$$

Table 1: Rating scale for Alternaria leaf spot (Rahmatzai *et al.,* 2017)

Per-cent area infection	Description Scale	Reaction
No infection	0	HR
1-10 % surface area of leaf covering	1	R
11 -25 % infection on leaf	2	MR
26-50% infection on leaf	3	MS
51-75% infection on leaf	4	S
More than 75 % infection on leaf	5	HS

Results and Discussion

Percent incidence of Alternaria blight on different genotypes of Brinjal.

Prevalence of disease intensity among brinjal genotypes

During the year 2021-22 minimum percent disease intensity was recorded in brinjal genotypes Uttra (10.00 %), followed by Mukta Moti (12.00 %) Banarsi Gol (14.67 %), Jaipur local long (15.33 %), NBH-459 and Pusa oiski (16.00 %), Pusa Kaushal-1 (16.67 %), Pusa ankur (18.00 %), Green Pearl (20.00 %), Pant Rituraj (24.00 %), Jaipur local round (25.33 %), Pusa Uttam (26.00 %), Pusa Upkar (28.00 %), Neelam and Pusa Halo began (30.00 %), Pusa Safed began (30.67 %), Ram Nagar giant (32.00 %) Kashi Sundesh (32.67 %), Mukta Round (33.33 %), NBH-386 (35.33 %), Brinjal Beema (36.67 %), Kashi Prakash (38.00 %), Pusa Bindu (38.33 %), ADM-190 (40.67 %), NBH-21 (42.00 %), Pusa Kaushal (42.67%), Navneet (43.33 %), PPL (44.00 %), Pusa Bhargav (44.67 %), Neel Kanti (45.33 %), Mahi Neelam (46.00 %), PPR (46.67 %), Pusa P K (48.00 %) and Pusa Shymala (51.33 %), while maximum percent disease intensity was recorded in BR-112 (78.00 %). During the year 2022-23 minimum percent disease intensity was recorded in brinjal genotypes Uttra (8.67 %), followed by Mukta Moti (11.33 %), Banarsi Gol (12.67 %), Pusa Ankur (14.33 %), NBH-459 (14.67 %) Pusa Kaushal-1 (15.33 %), Jaipur local long (16.00 %), Pusa oiski (17.33 %), Green Pearl (18.67 %), Jaipur Local round (21.33 %), Pant Rituraj (22.00 %), Neelam (22.67 %), Mukta Round (25.33 %), Pusa Upkar and Pusa halo began (26.67%), Pusa Uttam (28.00 %), Ram Nagar giant (29.33 %), Kashi Sundesh (29.67%), Brinjal Beema (31.33 %), Pusa Bindu (32.00 %), Pusa Safed began and NBH-386 (32.67 %), NBH-21 (34.00 %), Navneet (34.33 %), Kashi prakash (36.00 %), PPL (38.67 %), Pusa Kaushal (39.33 %), ADM-190 (40.00 %), Pusa Bhargav (40.67 %), PPR (42.00 %), Pusa P K (42.67 %), Neel Kanti (43.33 %), Mahi Neelam (44.67 %), and Pusa Shymala (52.67 %), while maximum percent disease intensity was recorded in BR-112 (76.00 %). Two year mean data clearly indicates that the minimum percent disease intensity was recorded in Uttra (9.34 %) exhibiting resistant reaction followed by Mukta Moti (11.67 %), Banarsi Gol (13.67 %), NBH-459 (15.34 %) Jaipur Local long (15.67 %), Pusa Ankur and Pusa Kaushal-1 (16.00 %), Pusa oiski (16.67 %), Green Pearl (19.34 %), Jaipur local round and Pant Rituraj (23.00 %), showing moderately resistant reaction. In rest of the genotypes, the disease intensity ranged from 26.34 to 77% exhibiting high disease severity and reaction to disease ranged from susceptible to highly susceptible reaction.

Table 2 : Screening of brinjal genotypes against *A. alternata* under natural condition.

S. No.	Genotypes	Percent disease intensity				
		2021-22	2022-23	Mean	Disease score	Reaction
1	Pusa Kaushal-1	16.67	15.33	16.00	2	MR
2	Pusa Upkar	28.00	26.67	27.34	3	MS
3	ADM-190	40.67	40.00	40.34	3	MS
4	Uttra	10.00	8.67	9.34	1	R
5	Ram Nagar giant	32.00	29.33	30.67	3	MS
6	Pant Rituraj	24.00	22.00	23.00	2	MR
7	Kashi Sundesh	32.67	29.67	31.17	3	MS
8	Kashi Prakash	38.00	36.00	37.00	3	MS
9	Pusa Oiski	16.00	17.33	16.67	2	MR
10	Pusa Uttam	26.00	28.00	27.00	3	MS
11	Pusa Bindu	38.33	32.00	35.16	3	MS
12	Pusa Shymala	51.33	52.67	52.00	4	S
13	Pusa Kaushal	42.67	39.33	41.00	3	MS
14	Pusa Ankur	18.00	14.33	16.33	2	MR
15	Pusa Safed began	30.67	32.67	31.67	3	MS
16	Pusa Bhargav	44.67	40.67	42.67	3	MS
17	Pusa Halo began	30.00	26.67	28.34	3	MS
18	PPR	46.67	42.00	43.67	3	MS
19	Pusa P K	48.00	42.67	45.34	3	MS
20	PPL	44.00	38.67	41.34	3	MS
21	BR-112	78.00	76.00	77.00	5	HS
22	Brinjal Beema	36.67	31.33	34.00	3	MS
23	Navneet	43.33	34.33	38.83	3	MS
24	Neel Kanti	45.33	43.33	44.33	3	MS
25	Green Pearl	20.00	18.67	19.34	2	MR
26	Mahi Neelam	46.00	44.67	45.34	3	MS
27	NBH-21	42.00	34.00	38.00	3	MS
28	Mukta Moti	12.00	11.33	11.67	2	MR
29	NBH-459	16.00	14.67	15.34	2	MR
30	NBH-386	35.33	32.67	34.00	3	MS
31	Mukta Round	33.33	25.33	29.33	3	MS
32	Neelam	30.00	22.67	26.34	3	MS
33	Banarsi Gol	14.67	12.67	13.67	2	MR
34	Jaipur Local long	15.33	16.00	15.67	2	MR
35	Jaipur Local round	25.33	21.33	23.33	2	MR
SEm±		**2.18**	**1.19**	**1.40**	**NS**	**NS**
CD at 5%		**6.18**	**3.37**	**4.04**	**NS**	**NS**

***** Mean of three replications

*M.R- Moderately Resistant, *M.S–Moderately susceptible, *S- Susceptible, *H.S-Highly susceptible

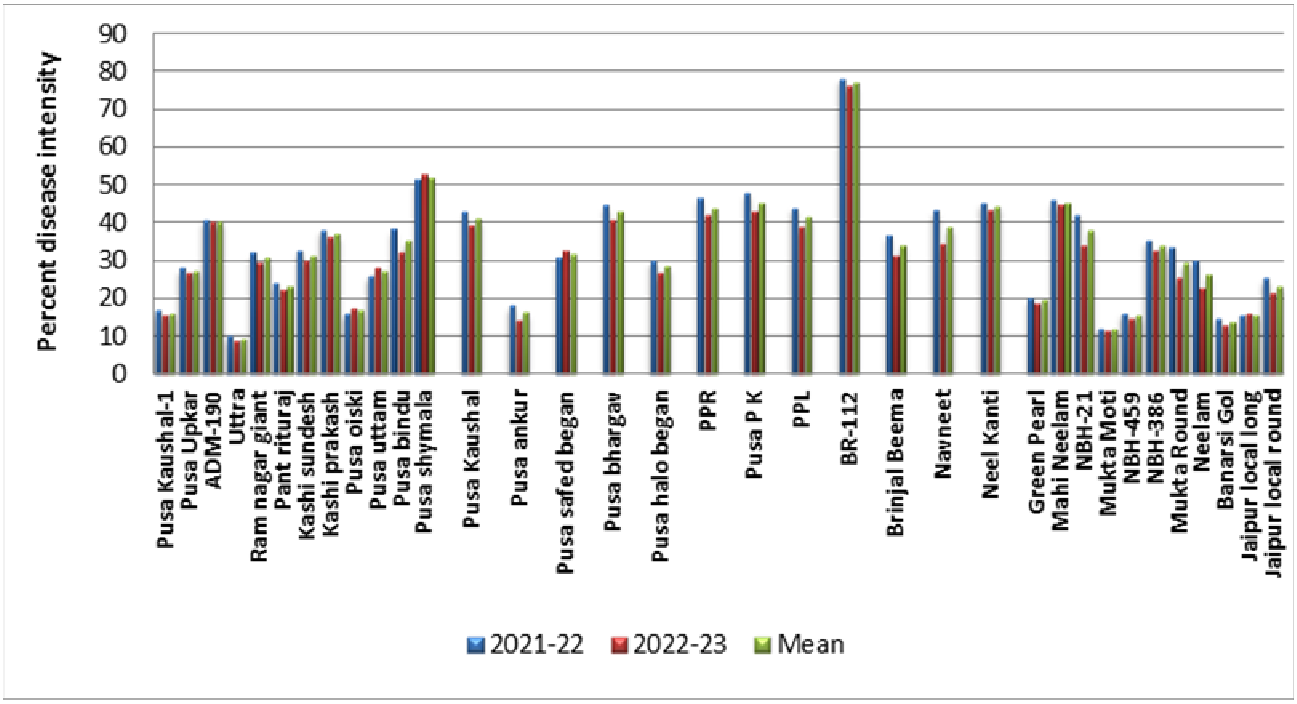

Fig.1 : Screening of different brinjal genotypes against Alternaria leaf spot of brinjal.

Data presented in table-03 and fig-02. As per disease score none of the genotypes were highly resistant to Aletrnaria leaf spot of Brinjal. One genotypes *viz.,* Uttra (9.34 %) showed resistant reaction, ten genotypes *viz.,* Mukta Moti,(11.67 %), Banarsi Gol (13.67%), NBH-459 (15.34%), Jaipur Local long (15.67), Pusa Kaushal-1 (16.00%), Pusa Ankur (16.33), Pusa oiski (16.67), Green Pearl (19.34%), Pant Rituraj (23.00%) and Jaipur local round (23.33%) belong to Moderately resistant class, twenty two genotypes *viz.,* Neelam (26.34 %), Pusa Uttam (27.00 %), Pusa Upkar (27.34 %), Pusa halo began (28.34 %), Mukta Round (29.33 %), Ram Nagar giant (30.67 %), Kashi Sundesh (31.17 %), Pusa Safed began (31.67 %), NBH-386 (34.00 %), Brinjal Beema (34.00 %), Pusa Bindu (35.16 %), Kashi Prakash (37.00 %), NBH-21 (38.00 %), Navneet (38.83 %), ADM-190 (40.34 %), Pusa Kaushal (41.00 %), PPL (41.34 %), Pusa Bhargav (42.67 %), PPR (43.67 %), Neel Kanti (44.33 %) Pusa P K and Mahi Neelam (45.34 %) were belong to Moderately susceptible class, whereas one genotype Pusa Shymala belong to Susceptible class (52.00 %), while one genotype BR-112 belong to highly susceptible.

Table 3: Reaction of brinjal genotypes to Alternaria leaf spot caused by *A. alternata.*

Reaction	Genotypes	Entries
Resistant	01	Uttra
Moderately resistant	10	Pusa Kaushal-1, Pant rituraj, Pusa oiski, Pusa ankur, Green Pearl, Mukta Moti, NBH-459, Banarsi Gol, Jaipur local long and Jaipur local round
Moderately susceptible	22	Pusa Upkar, ADM-190, Ram nagar giant, Kashi sundesh, Kashi prakash, Pusa uttam, Pusa bindu, Pusa Kaushal, Pusa safed began, Pusa bhargav, Pusa halo began, PPR, Pusa P K, PPL, Brinjal Beema, Navneet, Neel Kanti, Mahi Neelam, NBH-21, NBH-386, Mukta Round and Neelam
Susceptible	01	Pusa shymala
Highly susceptible	01	BR-112

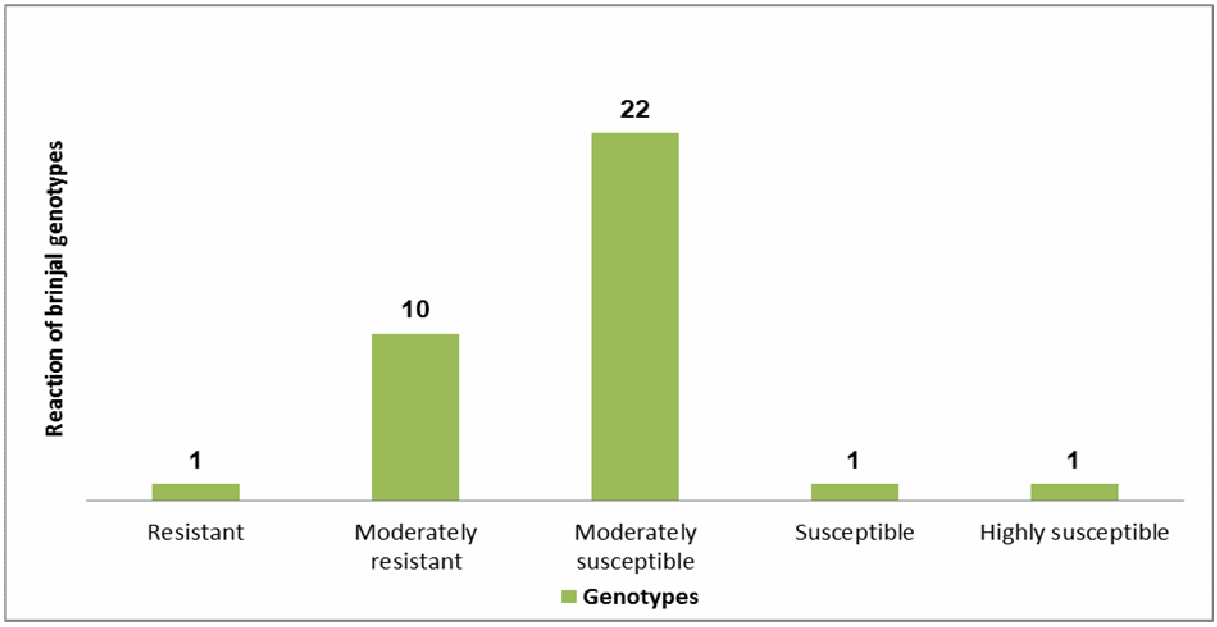

Fig. 2 : Reaction of brinjal genotypes in respect of disease reaction against *A. alternata.*

Plate 1 : Experimental view of Research

Under field evaluation of brinjal genotypes, only one genotype *i.e.* Uttra (9.34 %) was found to be resistant in two years trial which can be suitably used in breeding programme. These findings are in consonance with earlier reports of many workers Balai *et.al.* (2013) find out the host resistance of 14 varieties/ genotypes and none of varieties were found resistant: Three varieties *viz.,* Pant Rituraj, Pusa Ankar and Pant Samrat were grouped as moderately resistant (MR), nine varieties viz., Phule Hybrid, Maha Beej, VNR BR-35, VNR BR-33, DB HSR- 66, Ajeet-111, EPH-612, MEBH-39 and Aruna were found moderately susceptible (MS) and two genotypes *viz.,*Vijay and Pusa Purple Long were categorized as susceptible (S). Singh and Shukla (1985) worked on 30 brinjal cultivars tested under conditions of artificial epiphytotic infection by *A. alternata* only 5 were resistant and 7 moderately resistant. Thuvelavan *et al.* (1999) screened 48 genotypes and 42 hybrids of brinjal for resistance to Alternaria leaf spot in a field experiment and found that none of the hybrids or genotypes showed high resistance against disease. Seven cultivars (SM-8, SM-195, BSSR-1, Co-1, Co-2, MDU-1 and KS-326) showed moderately resistance (MR) to Alternaria leaf spot. Sugha *et al.* (2002) evaluated eighty four genotypes of Brinjal screened against leaf blight 7, 34, 33 and 10 were resistant (R), moderately susceptible (MS), susceptible (S) and highly susceptible (HS) reaction to the pathogen, respectively. Haider, (2020) work done in ten Brinjal varieties / cultivars assessed against Alternaria leaf spot. Kalash black and HBR-330 showed a resistance response with disease incidence of 8.6% and 10.6% respectively, whereas HBR-321 was highly susceptible, HBR-331, HBR-312 moderately resistant, Global round and HBR-320 moderately susceptible.

Conclusion

This research presented that the restricted evaluation of natural inoculation technique with thirty-five brinjal genotypes in Northern Madhya Pradesh. Intensity and varied significant brinjal cropping season. Among all the brinjal genotypes used in present investigation diseases intensity none of the entry was found free from Alternaria blight, however One genotypes *viz.,* Uttra (9.34 %) belong to resistant class ten genotypes belongs to moderately resistant class, whereas one genotype belongs to Susceptible class, while one genotype belongs to highly susceptible.

Recommendation

Molecular evaluation of the *Alternaria alternata* will help to identify the variation within the causal agent of the disease. It also enhances the selection and recognition of suitable resistant brinjal genotypes. Resistant source may be useful in the breeding programme for the identification of high yielding and disease resistance genotypes.

Acknowledgement

The authors express thanks to Head, Department of Plant Pathology, College of Agriculture, RVSKVV, Gwalior (M. P.) for providing all the facilities to conduct work.

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