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Screening of Brinjal Varieties for Resistance Against Blight Disease Caused by *Alternaria alternata* (Fr.) Keissler in Konkan Region of Maharashtra, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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ABSTRACT

Brinjal (*Solanum melongena* L.) belonging to family solanaceae, is widely recognized around the globe as “eggplant” due to it’s resemblance to the shape of a chicken egg. The field experiment was carried out during *Rabi*, 2022-23 and 2023-24 at Central Experiment Station, Wakawali, Dr. Balasaheb sawant Konkan Krishi Vidyapeeth, Dapoli under natural epiphytotic conditions. Sixty six varieties / cultivars and germplasm lines of brinjal were screened to test their resistance reactions against blight disease of brinjal caused by *Alternaria alternata*. The results revealed that, all the entries of brinjal screened showed varied degree of per cent disease intensity. The highest per cent disease intensity was recorded in Konkan Prabha (41.92%) and was followed by NB-746 (37.91%), Dapoli local-1 (34.62%) and Dapoli local-3 (33.42%). Among 66 entries screened, three entries *viz*., D-79-19, RCMB-3 and Dapoli pandharivangi sel. were found highly resistant, seven entries *viz*., Khed local-41, DPL-BR-19, NBH-106, Suwarna Pratibha, DPL-BR-20, N-1007 and NBH-104 resistant, thirty eight entries moderately resistant and eighteen entries of brinjal were moderately susceptible to *A*. *alternata* incitant of brinjal blight disease.

Keywords: Resistance; blight; field; cultivars; germplasm; brinjal; eggplant; Alternaria alternata etc.

1. INTRODUCTION

Brinjal (*Solanummelongena* L.) is a member of the Solanaceae family, commonly called "eggplant" worldwide because of its similarity in shape to a chicken egg. According to Sekara et al., (2007), brinjal is thought to have originated in South Asia, especially in the regions of Pakistan and India, around the 3rd century. Brinjal is a bushy herb that stands upright, distinguished by its broad, fuzzy leaves and strong, upright stems, anchored by a fibrous root network. The brinjal fruit is a pendulous, juicy berry that comes in a range of colors, such as green, white, yellow, pink, violet and deep purple (Bhaskar & Kumar, 2015). Unripe brinjal fruits are esteemed for their incorporation into various culinary preparations, including curries. They serve as a significant source of essential vitamins and minerals, notably phosphorus, calcium and iron. A 100 g serving of brinjal generally contains approximately 25 calories, 1 g of protein, 6 g of carbohydrates and 3 g of dietary fiber. Additionally, it provides moderate quantities of vitamins C, K and B complex, along with minerals such as potassium, magnesium and folate (Bajaj et al., 1981). As an important cash crop, brinjal not only provides income but also generates employment opportunities across its entire production and distribution chain, from farming and harvesting to transportation and marketing. Various factors impact its production and productivity, contributing to low crop yields, with biotic factors being the most significant. The crop is susceptible to a range of diseases caused by fungi, bacteria, viruses and phytoplasmas. Among the various fungal diseases affecting brinjal, leaf blight caused by *Alternaria alternata* (Fr.) Keissler is the most prevalent and destructive, impacting a wide range of hosts and resulting in both quantitative and qualitative losses. According to Pandey & Vishwakarma (1998), *Alternaria* species responsible for leaf spot and fruit rot in brinjal contribute to significant yield losses. Pandey & Vishwakarma (1998) noted that *Alternaria* species *Alternaria alternata, Alternaria solani* (Rajkar et al., 2021) responsible for leaf spot and fruit rot in brinjal contribute to significant yield reductions. The alternate host crop for brinjal leaf spot pathogen (*Alternaria alternata*, *Alternaria solani*) is tomato (Khaire et al., 2021). Balai & Ahir, (2013) documented yield reductions of up to 25% in the Jaipur district of Rajasthan due to leaf spot disease caused by *Alternariaalternata* (Fr.) Keissler. *Alternaria* leaf blight of brinjal is an important emerging disease in Konkan region of Maharashtra causing considerable yield losses. Varietal screening is a valuable approach for identifying sustainable sources of disease resistance against blight disease in brinjal. By evaluating different cultivars for their resistance to *Alternariaalternata*, researchers can select varieties that maintain higher yields and quality despite the presence of disease. This method not only contributes to the stability of production but also supports

integrated disease management strategies. Furthermore, incorporating resistant varieties into cultivation practices can reduce reliance on chemical fungicides, promoting more environmentally friendly agricultural practices and enhancing the overall sustainability of brinjal farming. In light of the significant impact of diseases, efforts were undertaken to evaluate various varieties / cultivars / germplasm lines under field conditions for their resistance reactions to *Alternaria alternata*.

2. MATERIALS AND METHODS

The field experiment was carried out at Central Experiment Station, Wakawali, Dr. BSKKV., Dapoli during *Rabi*, 2022-23 and 2023-24 under natural epiphytotic conditions. Sixty six varieties / cultivars and germplasm lines of brinjal were screened to test their reactions against blight disease of brinjal caused by *A. alternata*. Observations on blight disease intensity were recorded on five randomly selected plants / entry by using 0-9 disease rating scale (Mayee & Datar, 1986) at 15 days interval starting first observation at initiation of the disease.

Table 1. Disease rating scale

Rating/ Scale	Leaf covered with the spots
0	Healthy (Without spots)
1	< 1% leaf area covered with spots
3	1-10% leaf area covered with spots
5	11-25% leaf area covered with spots
7	26-50% leaf area covered with spots
9	> 50% leaf area covered with spots

Further, the data was averaged and per cent disease intensity was calculated using the formula given by Wheeler, (1969).

$$\text{PDI} = \frac{\text{Sum of individual disease ratings}}{\text{No. of leaves assessed x Maximum disease grade value}} \text{x } 100$$

Based on terminal per cent disease intensity, the brinjal entries screened were categorized (Pandey et al., 2003) as follows.

Table 2. Disease intensity categories

Disease intensity (%)	**Disease Reactions**
No disease	Highly resistant (HR)
1 to 10	Resistant (R)
11 to 25	Moderately resistant (MR)
26 to 50	Moderately susceptible (MS)
51 to 75	Susceptible (S)
76 to 100	Highly susceptible (HS)

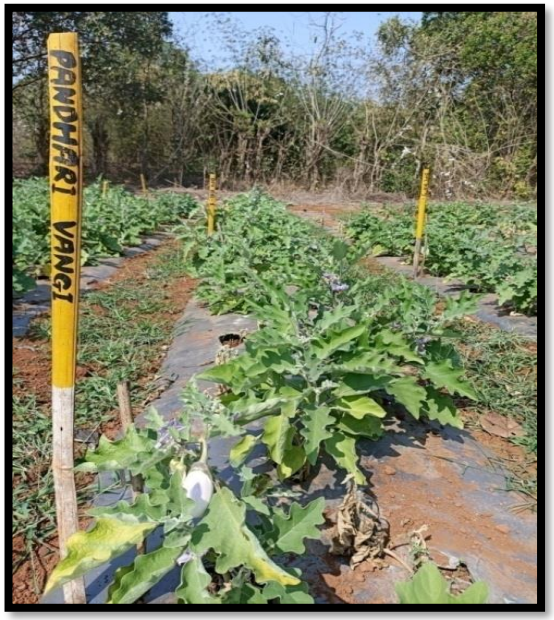
3. RESULTS AND DISCUSSION

Pooled analysis of data obtained on screening of varieties / cultivars / germplasm lines with respect to terminal disease intensity (%) of blight disease (Table 3) revealed that all the entries of brinjal screened showed varied degree of per cent disease intensity. Disease intensity of blight disease in screened entries was ranged between 0.00 to 41.92 per cent. The highest per cent disease intensity was recorded in Konkan Prabha (41.92%) and was followed by NB-746 (37.91%), Dapoli local-1 (34.62%) and apoli local-3 (33.42%). Three entries of brinjal*viz*., D-79-19, RCMB-3 and Dapoli pandhari vangi sel. were found highly resistant to *Alternaria* blight disease where no disease incidence was recorded. Seven entries of brinjal*viz*., Khed local-41 (6.58%), DPL-BR-19 (6.62%), NBH-106 (6.97%), Suwarna Pratibha (7.89%), DPL-BR-20 (8.67%), N-1007 (8.72%) and NBH-104 (9.02%) were found resistant to blight disease with disease intensity in the range of 6.58 to 9.02 per cent. Thirty eight entries of brinjal *viz*., DPL-BR-12 (10.02%), BB-64 (10.13%), DPL-BR-2 (10.40%), DPL-BR-13 (11.12%), DPL-BR-1 (11.23%), DPL-BR-17 (11.51%), BRBW-5 (12.68%), Arka Nilkanth (13.13%), Lanja local (13.57%), Singanath (15.30%), DPL-BR-5 (15.39%), DPL-BR-23 (15.54%),

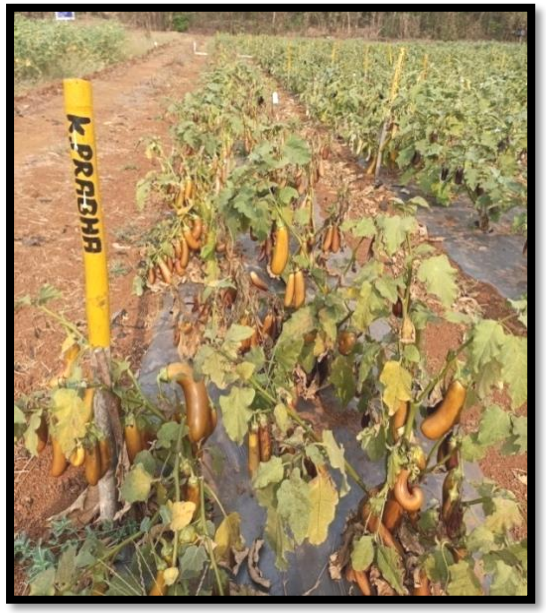
DPL-BR-10 (15.83%), DPL-BR-22 (15.89%), DPL-BR-8 (16.19%), Harita (16.54%), DPL-BR-6 (16.66%), DPL-BR-14 (16.71%), DPL-BR-4 (17.97%), Arka Nidhi (18.19%), NBH-101 (18.70%), DPL-BR-9 (18.74%), Asond local (18.84%), Bantiware local (18.85%), DPL-BR-3 (19.04%), Mulde local (19.10%), BGTP-1 (19.63%), DPL-BR-16 (19.84%), BB-54 (20.14%), Bholenath (20.16%), BB-60C (20.61%), Kali Rawai (20.63%), Panhalekazi local (21.65%), BGTP-2 (22.48%), DPL-BR-18 (22.88%), PPC (23.20%), Sadave local (23.86%) and Kasral local (24.86%) were found moderately resistant to blight disease with disease intensity in the range of 10.02 to 24.86 per cent. Eighteen entries of brinjal*viz*., Surya (25.17%), SM-66 (25.33%), DPL-BR-11 (26.61%), Sushivare local (26.62%), Dapoli local-4 (26.67%), DPL-BR-7 (26.91%), CHES-249 (27.34%), DPL-BR-25 (28.06%), DPL-BR-21 (28.07%), Dapoli local-5 (28.64%), DPL-BR-15 (29.38%), Manja local (29.62%), Dapoli local-2 (30.08%), DPL-BR-24 (31.63%), Dapoli local-3 (33.42%), Dapoli local-1 (34.62%), NB-746 (37.91%) and Konkan Prabha (41.92%) were found moderately susceptible to blight disease with disease intensity in the range of 25.17 to 41.92 per cent. Among the screened entries of brinjal, none of the variety/ germplasm/ cultivar was found susceptible or highly susceptible to the blight disease.

Fig. 1. General view of experimental plot

D-79-19



Dapoli pandhari vangi sel.



Konkan Prabha (Susceptible)

Fig. 2. Different Brinjal varieties

Table 3. Screening of brinjal varieties, cultivars and germplasm lines against *Alternaria alternata* causing blight disease

Sr. No.	Variety / Germplasm / Cultivars	Per cent Disease Intensity (PDI)			
		***Rabi*, 2022-23**	***Rabi*, 2023-24**	**Pooled**	**Reaction**
1.	Konkan Prabha	38.34 (38.25) *	45.50 (42.41)	41.92 (40.35)	MS
2.	Suwarna Pratibha	8.35 (16.79)	7.44 (15.82)	7.89 (16.31)	R
3.	Bholenath	22.13 (28.06)	18.20 (25.25)	20.16 (26.67)	MR
4.	PPC	26.15 (30.75)	20.25 (26.74)	23.20 (28.79)	MR
5.	BB-60C	18.62 (25.56)	22.60 (28.38)	20.61 (26.99)	MR
6.	BB-64	11.14 (19.49)	9.12 (17.57)	10.13 (18.55)	MR
7.	BB-54	18.19 (25.24)	22.10 (28.04)	20.14 (26.66)	MR
8.	Kali Rawai	23.07 (28.70)	18.20 (25.25)	20.63 (27.01)	MR
9.	Arka Nilkanth	15.86 (23.46)	10.40 (18.81)	13.13 (21.24)	MR
10.	Singanath	16.67 (24.09)	13.93 (21.91)	15.30 (23.02)	MR
11.	Lanja local	15.05 (22.82)	12.10 (20.35)	13.57 (21.61)	MR
12.	Sadave local	29.07 (32.62)	18.65 (25.58)	23.86 (29.23)	MR
13.	D-79-19	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	HR
14.	Manja local	28.56 (32.30)	30.68 (33.63)	29.62 (32.97)	MS
15.	Sushivare local	24.85 (29.90)	28.40 (32.20)	26.62 (31.06)	MS
16.	Panhalekazi local	23.68 (29.11)	19.60 (26.27)	21.65 (27.72)	MR
17.	Asond local	17.56 (24.77)	20.13 (26.65)	18.84 (25.72)	MR
18.	BGTP-1	22.67 (28.43)	16.60 (24.04)	19.63 (26.29)	MR
19.	CHES-249	29.58 (32.94)	25.10 (30.06)	27.34 (31.52)	MS
20.	SM-66	28.13 (32.03)	22.53 (28.33)	25.33 (30.21)	MS
21.	BGTP-2	21.36 (27.52)	23.60 (29.06)	22.48 (28.30)	MR
22.	Kasral local	27.85 (31.85)	21.87 (27.88)	24.86 (29.90)	MR
23.	RCMB-3	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	HR
24.	NB-746	39.03 (38.66)	36.80 (37.34)	37.91 (38.00)	MS
25.	Dapoli local-1	36.56 (37.20)	32.68 (34.86)	34.62 (36.04)	MS
26.	Dapoli local-2	28.49 (32.25)	31.68 (34.25)	30.08 (33.26)	MS

Sr. No.	Variety / Germplasm / Cultivars	Per cent Disease Intensity (PDI)			
		Rabi, 2022-23	*Rabi*, 2023-24	Pooled	Reaction
27.	Dapoli local-3	38.49 (38.34)	28.36 (32.17)	33.42 (35.31)	MS
28.	Dapoli local-4	29.16 (32.68)	24.18 (29.45)	26.67 (31.09)	MS
29.	Dapoli local-5	25.49 (30.32)	31.79 (34.32)	28.64 (32.35)	MS
30.	NBH-101	19.17 (25.96)	18.24 (25.28)	18.70 (25.62)	MR
31.	NBH-104	8.89 (17.34)	9.15 (17.60)	9.02 (17.47)	R
32.	NBH-106	7.56 (15.95)	6.39 (14.64)	6.97 (15.30)	R
33.	N-1007	9.64 (18.08)	7.80 (16.61)	8.72 (17.17)	R
34.	Khed local	8.56 (17.01)	4.60 (12.38)	6.58 (14.86)	R
35.	Arka Nidhi	19.52 (26.21)	16.86 (24.24)	18.19 (25.24)	MR
36.	Bantiware local	18.33 (25.34)	19.39 (26.12)	18.85 (25.73)	MR
37.	Harita	19.48 (26.19)	13.60 (21.64)	16.54 (23.99)	MR
38.	Surya	28.00 (31.94)	22.34 (28.20)	25.17 (30.11)	MS
39.	Mulde local	18.90 (25.76)	19.31 (26.06)	19.10 (25.91)	MR
40.	BRBW-5	10.12 (18.54)	15.24 (22.97)	12.68 (20.86)	MR
42.	DapoliPandharivangi sel.	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	HR
43.	DPL-BR-1	9.62 (18.06)	12.85 (21.00)	11.23 (19.57)	MR
43.	DPL-BR-2	12.48 (20.68)	8.32 (16.76)	10.40 (18.81)	MR
44.	DPL-BR-3	21.32 (27.49)	16.76 (24.16)	19.04 (25.87)	MR
45.	DPL-BR-4	16.54 (23.99)	19.40 (26.13)	17.97 (25.08)	MR
46.	DPL-BR-5	14.32 (22.23)	16.47 (23.94)	15.39 (23.09)	MR
47.	DPL-BR-6	17.78 (24.93)	15.54 (23.21)	16.66 (24.08)	MR
48.	DPL-BR-7	31.33 (34.03)	22.49 (28.30)	26.91 (31.24)	MS
49.	DPL-BR-8	18.62 (25.56)	13.76 (21.77)	16.19 (23.72)	MR
50.	DPL-BR-9	22.48 (28.30)	15.01 (22.79)	18.74 (25.65)	MR
51.	DPL-BR-10	18.90 (25.76)	12.76 (20.92)	15.83 (23.44)	MR
52.	DPL-BR-11	22.36 (28.22)	30.86 (33.74)	26.61 (31.05)	MS
53.	DPL-BR-12	8.69 (17.74)	11.36 (19.69)	10.02 (18.45)	MR
54.	DPL-BR-13	12.45	9.80	11.12	MR

Sr. No.	Variety / Germplasm / Cultivars	Per cent Disease Intensity (PDI)			
		***Rabi*, 2022-23**	***Rabi*, 2023-24**	**Pooled**	**Reaction**
		(20.66)	(18.24)	(19.47)	
55.	DPL-BR-14	18.75	14.68	16.71	MR
		(25.65)	(22.52)	(24.12)	
56.	DPL-BR-15	28.60	30.16	29.38	MS
		(32.32)	(33.31)	(33.01)	
57.	DPL-BR-16	22.18	17.51	19.84	MR
		(28.09)	(24.73)	(26.45)	
58.	DPL-BR-17	9.47	13.56	11.51	MR
		(17.92)	(21.60)	(19.83)	
59.	DPL-BR-18	22.01	23.75	22.88	MR
		(27.97)	(29.16)	(28.57)	
60.	DPL-BR-19	4.56	8.69	6.62	R
		(12.32)	(17.14)	(14.90)	
61.	DPL-BR-20	7.12	10.23	8.67	R
		(15.47)	(18.65)	(17.12)	
62.	DPL-BR-21	26.56	29.58	28.07	MS
		(31.02)	(32.94)	(31.99)	
63.	DPL-BR-22	13.47	18.32	15.89	MR
		(21.53)	(25.34)	(23.49)	
64.	DPL-BR-23	11.62	19.46	15.54	MR
		(19.93)	(26.17)	(23.21)	
65.	DPL-BR-24	33.14	30.13	31.63	MS
		(35.14)	(33.29)	(34.22)	
66.	DPL-BR-25	27.20	28.92	28.06	MS
		(31.43)	(32.53)	(31.98)	

The results of present study are on the same line with the findings of several earlier workers. Balai et al., (2013a) evaluated 14 varieties of brinjal against *A. alternata*. Three varieties *viz*., PusaRiturai, PusaAnkar and Pant Samrat exhibited moderately resistant reaction, remaining showed moderately susceptible and susceptible reaction against disease. Jakatimath, (2016) evaluated brinjal genotypes against fruit rot disease caused by *A*. *alternata* and reported among the tested entries two genotypes *viz*., CBB-3 and CBB-26 were exhibited resistant reaction. Sudani, (2023) screened 11 genotypes of brinjal against leaf spot disease incited by *A*.*alternata*. Among them, 2 genotypes *viz.,* JBL-21-05 and JBL-21-04 showed moderately resistant reaction, 6 genotypes *viz.,* JBL-21-09, JBL-21-12, JBL-21-03, JBR-21-02, JBL-21-11 and JBL-21-06 exhibited moderately susceptible reaction and 3 genotypes *viz.,* JBL-21-08, JBL-21-07 and JBR-21-01 were found susceptible against leaf spot disease of brinjal.

4. CONCLUSION

From two consecutive years of screening trial, it is concluded that among sixty six brinjal varieties/ germplasm lines and cultivars evaluated against blight disease of brinjal under natural epiphytotic conditions, namely D-79-19, RCMB-3 and Dapolipandharivangi sel. are resistant to blight disease of brinjal incited by *A*. *alternata*.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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