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Studies on Alternaria blight disease caused by *Alternaria solani* on brinjal

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Abstract
Alternaria blight, caused by the necrotrophic fungal pathogen *Alternaria solani*, stands as a major limiting factor in Southern Rajasthan. The present investigation was meticulously designed to assess the natural incidence and severity of this disease through a comprehensive roving survey conducted during the Kharif/Rabi cropping season of 2024-25. The survey covered three geographically distinct and major brinjal-growing clusters in the Udaipur district: Dabok, Menar, and Kaladwas. Data were recorded from five randomly selected fields in each locality, focusing on three key parameters: Leaf Blight Incidence (%), Percent Disease Index (PDI) on leaves, and Fruit Rot Incidence (%). Kaladwas was identified as a disease hotspot, recording the maximum leaf blight incidence of 44.32%, a peak PDI of 16.95%, and a high fruit rot incidence of 27.07%. In contrast, the Dabok region showed moderate disease pressure (31.22% incidence and 11.18% PDI), while the lowest intensity was observed in Menar (21.55% incidence and 7.53% PDI). These results underscore the urgent need for implementing integrated disease management (IDM) practices and educating local farmers on timely fungicidal interventions to mitigate economic losses in the Udaipur region.

Keywords: *Alternaria solani,* roving survey, disease severity, fruit Rot etc

Introduction
Brinjal (*Solanum melongena L.*), also known as eggplant, is a premier vegetable crop in India, valued for its year-round availability and high nutritional content. India is the second-largest producer of brinjal globally (FAO, 2023); yet its average productivity is often compromised by various biotic stresses, with fungal diseases being a major limiting factor. Among these, Alternaria blight, caused by the fungus *Alternaria solani,* is one of the most destructive diseases (Pandey and Vishwakarma, 1998) [8]. It affects the crop at all growth stages, from the nursery to harvest. The disease is characterized by small, brown spots with concentric rings on the leaves, known as the "target board" appearance. Severe infection leads to premature defoliation and a reduction in photosynthetic activity, which ultimately impacts yield (Dutta *et al*., 2015) [2]. Furthermore, the pathogen causes fruit rot, characterized by dark, leathery lesions that make the produce unmarketable, leading to significant economic losses for farmers. In Rajasthan, particularly in the Southern humid plain zone like Udaipur, climatic conditions often favor the rapid development of Alternaria species. Continuous monitoring of the disease is essential because environmental changes and local farming practices directly influence its severity. A roving survey is a fundamental tool for identifying disease hotspots and understanding the current status of the pathogen in specific agricultural clusters. This study was undertaken during the 2024-25 season to assess the incidence and severity of Alternaria leaf blight and fruit rot in three major locations: Dabok, Menar, and Kaladwas. The data generated from this survey provides a critical baseline for developing region-specific integrated disease management (IDM) strategies and helping farmers mitigate losses in the Udaipur region.

Material and Methods
The present investigation was carried out during the cropping season of 2024-25 at the Department of Plant Pathology, School of Agricultural Sciences, Janardan Rai Nagar Rajasthan Vidyapeeth University, Udaipur. The methodology adopted for the survey and disease assessment is described below:

Survey Sites and Sampling

A roving survey was conducted in three major brinjal-growing localities of the Udaipur district: Dabok, Menar, and Kaladwas. In each locality, five fields were randomly selected to ensure a representative assessment of the disease status in the region. In each field, ten plants were selected at random for detailed observation of leaf blight and fruit rot.

Assessment of Disease Incidence: Disease incidence was calculated by counting the number of infected plants and fruits out of the total plants and fruits observed. The following formula was used (Mayee and Datar, 1986) [6]:

$$\text{Disease Incidence (\%)} = \frac{No.of\ infected\ units}{\text{Total no.of units observed}} \times 100$$

Assessment of Disease Severity (PDI)

To determine the Percent Disease Index (PDI), the severity of leaf blight was recorded based on a visual 0-4 numerical rating scale (Mayee and Datar, 1986) [6].

Table 1: Rating scale of per cent leaf infected area

Grade	Per cent leaf area infected
0	No infection (healthy)
1	1- 25% leaf area infected
2	25.1-50% leaf area infected
3	50.1-75% leaf area infected
4	More than 75% leaf area infected

The per cent disease severity will be calculated according to McKinney (1923)

$$\text{(\%) Disease severity} = \frac{\text{Sum of all disease ratings}}{Total\ no.of\ rating \times Maximum\ disease\ grade} \times 100$$

Assessment of Fruit Rot

Fruit rot incidence was assessed by observing the symptoms such as dark, sunken lesions on the fruits. The percentage of infected fruits per plant was recorded using the incidence formula mentioned in section 2.2

Results and Discussion

Field Survey Observations

The survey data revealed a significant variation in disease prevalence across the three localities of Udaipur. The environment in Southern Rajasthan during the cropping season proved conducive for *A. solani.*

Table 2: Survey of Alternaria leaf blight severity and fruit rot incidence of brinjal in different localities of Udaipur, Rajasthan

Location	Leaf blight incidence (%)	Leaf blight severity (% PDI)	Fruit rot incidence (%)
Dabok	31.22	11.18	17.02
Menar	21.55	7.53	11.72
Kaladwas	44.32	16.95	27.07
S.E.(m)±	1.32	0.49	0.74
C.D. at 5%	5.18	1.93	2.93
C.D. at 1%	8.60	3.20	4.86
C.V.	7.07	7.16	6.95

Note: Data are average of 5 replications

Leaf Blight Incidence and Severity

Among the surveyed localities, Kaladwas emerged as the most affected area, recording the highest leaf blight incidence of 44.32% and a PDI of 16.95%. This was followed by Dabok, which showed an incidence of 31.22% and a PDI of 11.18%. The lowest disease pressure was recorded in Menar (21.55% incidence and 7.53% PDI). The overall mean leaf blight incidence for the surveyed region was 32.36%, with a mean PDI of 11.89%.The higher severity in Kaladwas could be attributed to higher humidity, continuous cropping of solanaceous crops, and the use of susceptible local varieties. These results align with the findings of Abhishek *et al*. (2024) [1], who reported similar disease patterns in Southern Rajasthan. Further supporting this study, Raina *et al*. (2018) [9] observed that the variation in Alternaria blight severity across different locations is primarily governed by the micro-climatic conditions and the amount of primary inoculum present in the soil. Similarly, the high incidence of fruit rot recorded in our study (up to 27.07%) is in close agreement with the findings of Jakatimath (2016) [5], who reported that fruit infection is a direct consequence of severe foliar blight, as conidia are easily dispersed to the fruits. Furthermore, Sharma *et al*. (2023) [10] highlighted that intensive cultivation of brinjal without proper crop rotation leads to a significant build-up of *Alternaria solani*, supporting our observations in the Kaladwas region. The strong correlation between leaf blight and fruit rot incidence indicates that early foliar protection is essential to prevent subsequent fruit damage.

Fruit Rot Incidence

The fruit rot incidence followed a similar pattern as foliar infection. Kaladwas recorded the maximum fruit rot (27.07%), followed by Dabok (17.02%) and Menar (11.72%). The mean fruit rot incidence was 18.60%. The study confirms a positive correlation between leaf blight severity and subsequent fruit rot development.

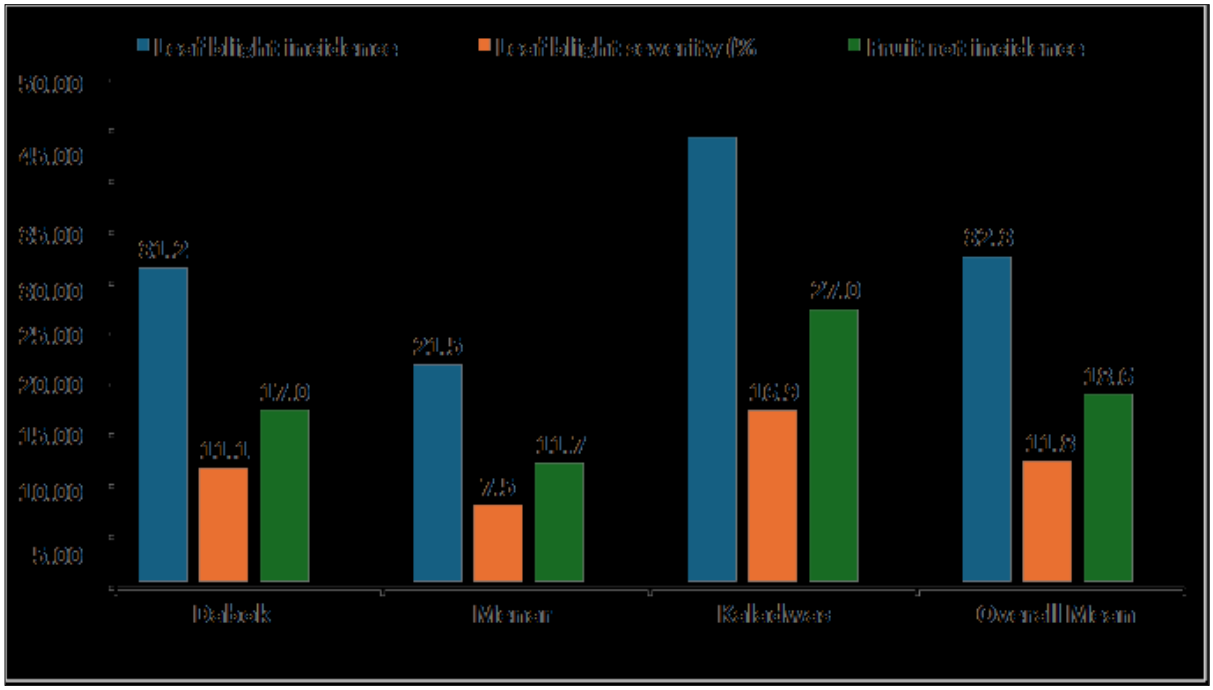

Fig 1: Survey of Alternaria leaf blight severity and fruit rot incidence of brinjal in different localities of Udaipur, Rajasthan

Conclusion

The roving survey clearly demonstrates that Alternaria blight (leaf blight and fruit rot) is widely prevalent in Udaipur, Rajasthan. The high PDI and fruit rot incidence in areas like Kaladwas indicate a serious threat to the livelihood of brinjal growers. This data provides a crucial baseline for the development of integrated disease management (IDM) strategies, emphasizing the need for timely fungicidal applications and resistant varieties.

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