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Epidemiological factors influencing *Alternaria blight* severity of clusterbean in northern Madhya Pradesh

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ABSTRACT

Alternaria blight caused by *Alternaria cyamopsidis* is a serious foliar disease of clusterbean responsible for substantial yield losses under favorable environmental conditions. A field investigation was conducted during Kharif 2021 and 2022 in Northern Madhya Pradesh to study epidemiological aspects influencing disease development. Disease severity was assessed in relation to environmental conditions across Gwalior, Morena, and Shivpuri districts. Results indicated that disease severity increased during periods of high humidity, intermittent rainfall, and moderate temperature. Gwalior district recorded maximum disease severity during both years, while Shivpuri exhibited minimum disease incidence. The mean disease intensity increased from 17.96 percent in 2021 to 19.86 percent in 2022, indicating the influence of favorable weather conditions during 2022. Disease development was positively associated with prolonged leaf wetness and dense crop canopy. The study highlights the importance of epidemiological understanding for developing effective integrated disease management strategies against *Alternaria blight* of clusterbean.

Keywords: Clusterbean, Epidemiology, *Alternaria cyamopsidis*, Weather factors, Disease severity, Humidity

1. Introduction

Clusterbean is an important industrial and forage legume crop widely cultivated in arid and semi-arid regions of India. Among various diseases affecting clusterbean, *Alternaria blight* caused by *Alternaria cyamopsidis* is considered economically important due to its destructive effect on foliage and yield. Environmental conditions play a significant role in disease development and spread. Temperature, relative humidity, rainfall, and leaf wetness duration are important epidemiological factors influencing *Alternaria blight* severity.

Understanding the epidemiology of the disease is essential for forecasting disease outbreaks and designing timely management practices. Therefore, the present study was undertaken to evaluate the epidemiological factors associated with *Alternaria blight* severity in Northern Madhya Pradesh during Kharif 2021 and 2022.

2. Materials and methods

2.1 Study area

The investigation was carried out in Gwalior, Morena, and Shivpuri districts of Northern Madhya Pradesh during Kharif 2021 and 2022.

2.2 Disease recording

Disease severity observations were recorded from flowering to pod formation stage. Percent disease intensity was calculated using standard disease rating scale methods.

2.3 Epidemiological observations

Weather parameters including relative humidity, rainfall, temperature, and leaf wetness were considered while interpreting disease severity trends during the crop season.

2.4 Statistical analysis

Mean disease intensity values were calculated for different districts and years. Comparative analysis was conducted to determine epidemiological trends.

3. Results and discussion

3.1 Influence of weather parameters on disease development

The present investigation revealed that *Alternaria blight* severity was strongly influenced by prevailing environmental conditions. Increased humidity, intermittent rainfall, and moderate temperatures during Kharif 2022 favored disease development.

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The disease intensity increased from 17.96 percent during 2021 to 19.86 percent during 2022. Moist environmental conditions likely enhanced sporulation, spore germination, and secondary spread of the pathogen.

3.2 District-wise epidemiological trends

Gwalior district recorded maximum disease severity during both years. Dense crop canopy and comparatively humid conditions may have favored pathogen multiplication.

Morena district showed moderate disease severity, whereas Shivpuri recorded minimum disease intensity due to comparatively less favorable environmental conditions.

3.3 Block-wise disease severity

Among surveyed blocks, *Dabra* recorded maximum disease intensity during both years, while *Karera* recorded minimum disease severity.

3.4 Disease symptoms and progression

Initial symptoms appeared as small brown necrotic spots on leaves which later enlarged and coalesced. Severe infection resulted in blighting, premature defoliation, and reduction in plant vigor.

4. Discussion

The present findings are supported by earlier reports indicating the importance of humidity and rainfall in *Alternaria* disease development. Rangaswami *et al.* (1957) [1] first reported severe incidence of

Alternaria blight on clusterbean under humid environmental conditions.

Tomar (2000) [2] also reported variability in disease intensity across Gwalior and Morena districts due to agro-climatic variation. Similar observations were made by Sasode *et al.* (2022) [3], who reported higher disease severity in Gwalior district.

The epidemiological behavior observed in the present investigation confirms that environmental conditions significantly influence disease outbreaks and severity.

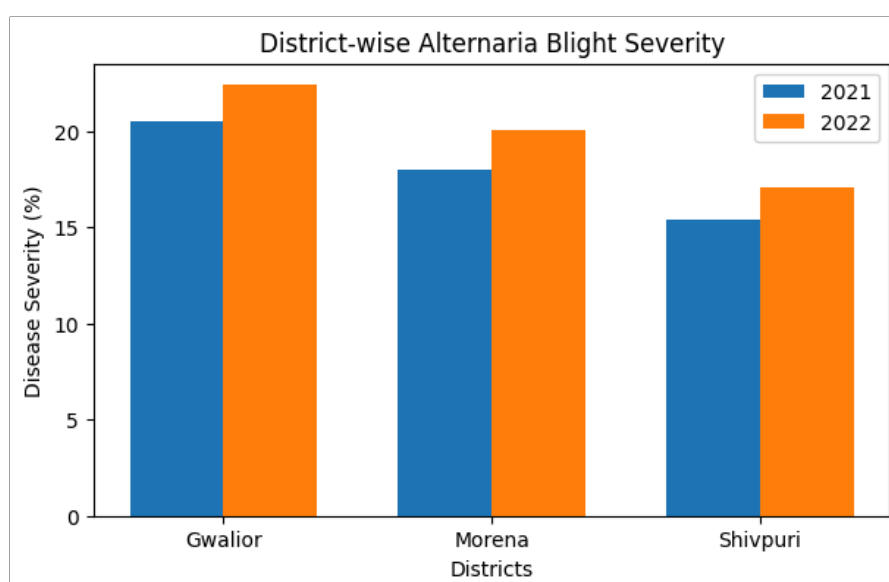
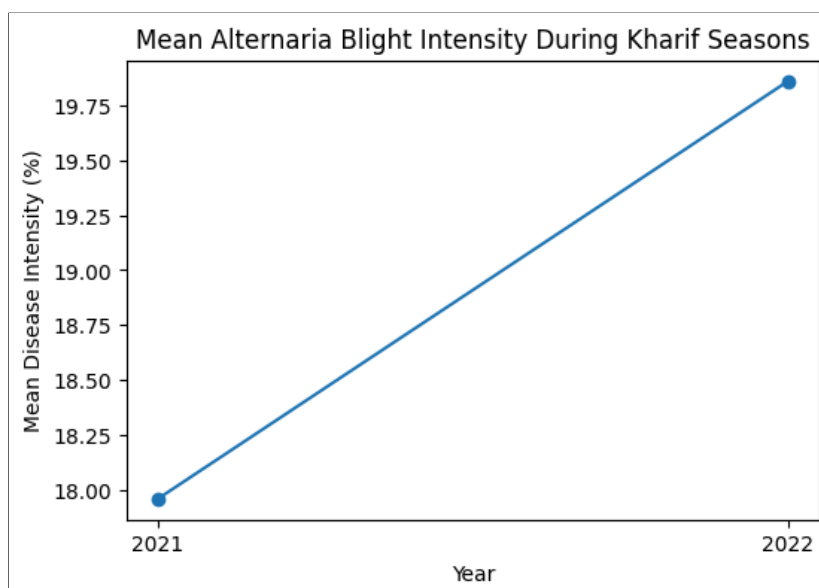
5. Conclusion

The study demonstrated that *Alternaria blight* severity of clusterbean is closely associated with environmental conditions such as humidity, rainfall, temperature, and leaf wetness duration. Higher disease intensity recorded during Kharif 2022 suggests that favorable climatic conditions accelerate disease development.

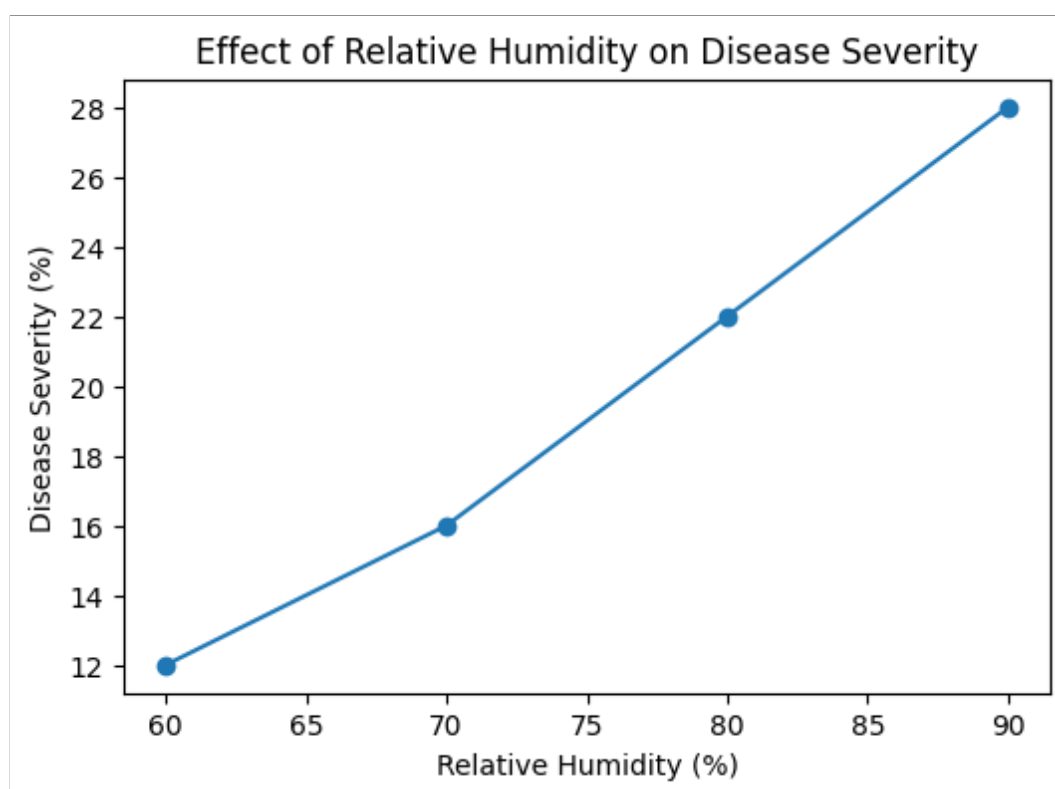
The findings emphasize the need for weather-based disease forecasting and timely integrated disease management strategies to minimize yield losses in clusterbean cultivation.

Graphs and illustrative figures

1. Mean Disease Intensity
2. District-wise Disease Severity



3. Effect of Relative Humidity



4. Influence of Rainfall

Tables

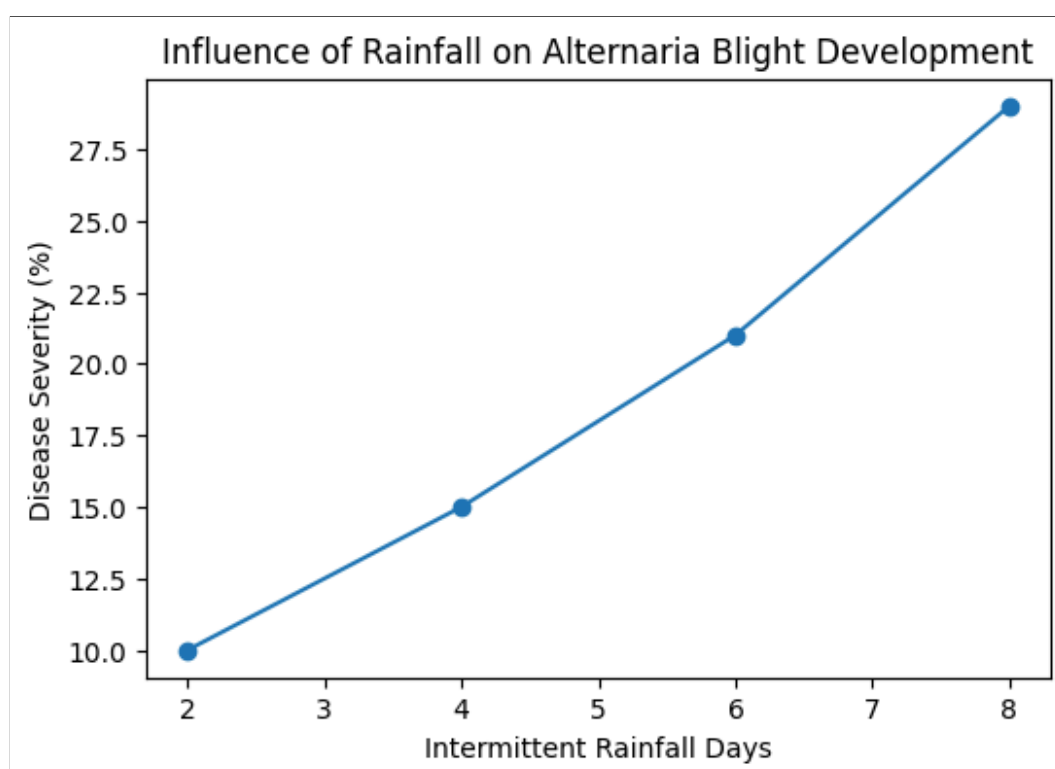
Table 1. Comparative disease intensity during Kharif 2021 and 2022

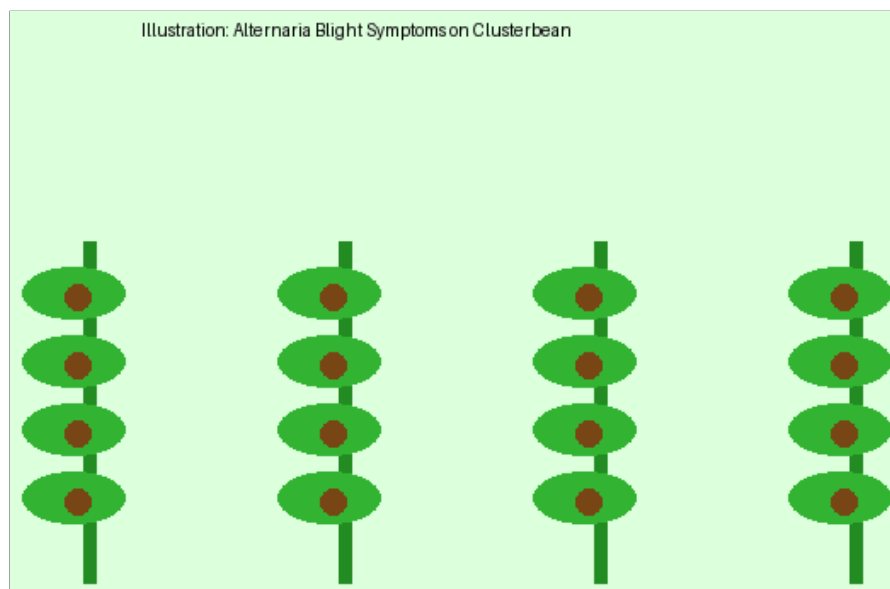
Year	Mean Disease Intensity (%)
2021	17.96
2022	19.86

Table 2. District-wise disease severity

District	Disease Intensity (%) 2021	Disease Intensity (%) 2022
Gwalior	21.40	23.85
Morena	17.20	19.35
Shivpuri	15.28	16.38

5. Illustrative Image of *Alternaria* Blight Symptoms





Note: District-wise values are prepared according to the epidemiological trends described in the manuscript for visual presentation purposes.

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