Journal of Advance Agricultural Research
April, 2025
e-ISSN No. 3049-320X (Online)

Research Article

Epidemic Threats of Alternaria Spot of *Aloe vera* In South 24 Parganas

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Abstract: The fungal pathogen *Alternaria alternata* is the cause of Alternaria leaf spot of *Aloe vera*, a serious disease that impairs the growth and yield of *Aloe vera* plants all over the world. This study looks into this fungal disease's symptoms, pathogen identification, and prevention techniques. Small, dark brown to black lesions with concentric rings on the leaves are characteristic symptoms. These lesions can cause tissue necrosis, a decrease in the plant's ability to photosynthesise, and in extreme situations, plant death. *Alternaria alternata* was identified as the causative agent by molecular and morphological studies. The development of disease is significantly influenced by environmental factors including temperature and humidity. Lesion size and sporulation were reduced with modest success using a variety of fungicides that were tested for effective control. Farmers are interested in cultivating *Aloe vera* for high income and this article shows about the basic problems to *Aloe vera* cultivation in South 24 Parganas, West Bengal for this Leaf spot disease.

Keywords: *Aloe vera, Alternaria alternata, Fungicide, Pathogenecity studies, Leaf spot*

Received: 21/04/2025
Revised: 18/06/2025
Accepted: 11/07/2025
Published: 25/07/2025

Citation: Mondal. 2025. Epidemic Threats of Alternaria Spot of Aloe vera In South 24 Parganas . *J.Adv. Agri. Res. 1(2):* 24-28.

1. Introduction

Aloe vera, also known as *Aloe barbadensis Miller*, is a member of the Xanthorrhoeaceae family, which is also known as the Aloaceae and Asphodelaceae. Aloe vera is the most widely used homoeopathic plant in the world and plays a significant part in medicinal and cosmetic methods. Around the world, *aloe vera* is susceptible to a variety of illnesses. *Alternaria alternata*-caused leaf spot disease was initially identified in Pakistan and India. In 2006, a leaf spot infection severely damaged this crucial Indian pharmaceutical plant during the harvesting stages. Small, round to oval, dark brown necrotic sunken patches, typically 1-3 mm in diameter, were the

symptoms seen. These spots were primarily located on the leaf's end tip. After being isolated, the fungal pathogen was identified as *A. alternata*, and its pathogenicity was demonstrated.

2. Description of Pathogen

The conidiophores were golden brown, branching, and straight, with dimensions of 15 μm for length and 2–6 μm for thickness. The conidia had a short conical flask, were obclavate in shape, and were golden brown in colour (Kamalakannan *et al.*, 2008). The conidiophores had a single conidial scar and were branching, straight, golden-brown, and smooth-walled, with a maximum length of 60 μm and a width of 3 μm (Fig 1). The conidia had a small, pale beak, were obpyriform, golden-brown, smooth-walled, and formed in long, branching chains. During four to seven days, pathogenicity testing on healthy planted aloe plants in the greenhouse revealed the usual symptoms of leaf spots. The *Alternaria alternata* was shown to be greater between 27 and 28 oC with a relative humidity of 65 to 90% and regular rains, according to Sharma *et al.* (2016).

Figure1: Microscopic view of *Alternaria alternata*

3. Major Symptoms

- On aloe vera plants, Alternaria disease of the leaves results in tiny, dark brown, round to oval dots with brown edges and grey centres. The dimension of the dots might vary between less than 1 mm up to 3 mm.
- Other signs that an aloe vera plant is unhealthy include: Wilting, Discoloration, and Stunted growth.
- In the severe cases drastic reduction of yield occurs.

4. Disease Incidence Survey And Sample Collection:

To determine the prevalence of Alternaria leaf spots in *Aloe vera*, a survey was carried out at many local nurseries in South 24 Parganas' metropolitan areas. To calculate the occurrence of black leaf spot disease using this formula, several observations were made in each nursery (Table 1).

Disease incidence (%) = (Infected plant in a nursery/Total No. of Plants) × 100

Table 1. Disease severity index of aloe vera

GRADE	% OF DISEASE INCIDENCE	DISEASE SEVERITY
0	0	leaves that are not infected
1	1-10	Covering less than 5% of the leaf area
2	11-25	Spots that cover 5.1–10% of the leaf area
3	26-50	Rings that cover 10.1% to 25% of the leaf area
4	51-75	Signs of Alternaria affecting 25.1–50% of the leaf area
5	75 and above	Over 50% of the leaf area is covered in symptoms.

We collected the data of affected plants from some areas of South 24 Parganas like Lakshmikantpur and Diamond Harbour. There are so many marginal farmers who cultivate these *Aloe vera* year after year. In 5 Katha lands, 8500-9000 plants are cultivated. After 2.5-3 months later, from the area of Diamond Harbour more than 55% plants are affected by this *Alternaria alternata.* From the area of Lakshmikantapur, more than 75% plants show the dark brown necrotic patches of the leaves (Fig 2).

Figure 2: Alternaria Leaf Spots of Aloe vera (*Alternaria alternata*)

5. Management Strategies for *Alternaria*

- *Aloe vera* should be planted with adequate air space between each other.
- Watering from the soil will reduce the amount of moist leaves.
- Champion (Copper hydrochloride) can be used. It disrupts proteins in cells and has a strong contact effect.
- Hexaconazole,Tebuconazole, Daconil and other zole group fungicides can be used.
- Netivo(Trifloxystrobin + tebuconazole) inhibits the fungus's capacity to form a cell wall. It stops the fungus from proliferating and spreading (Shi *et al.,* 2020).
- Amistar Top (Azoxystrobin+ difenconazole) inhibits the mycelial growth and helps to prevent sporulation.
- Cabrio Top (Pyraclostrobin) helps to reduce the spreading of fungal plant parts.

6. Conclusions

An integrated strategy integrating cultural, chemical, and biological control approaches is necessary for the efficient management of Alternaria leaf spot in aloe vera. Disease transmission can be decreased by employing techniques including appropriate spacing, removing diseased leaves, and avoiding overhead irrigation. When required, chemical fungicides can aid in infection control when applied at the suggested intervals. Furthermore, biological agents such as *Trichoderma* and *Bacillus subtilis* are viable environmentally acceptable options for disease management. To reduce the effects of Alternaria leaf spot and maintain the productive and healthy growth of *Aloe vera* plants, routine monitoring and early identification are crucial.

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