



## Emerging Threat of *Colletotrichum siamense* Causing Leaf Blight in *Plectranthus vettiveroides*

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### ABSTRACT

Leaf blight disease emerges as the most prevalent disease affecting *Plectranthus vettiveroides*. The onset of leaf blight symptoms manifested initially as water-soaked lesions appearing at the edges of the leaves. Over time, these lesions transformed into ash-brown color with irregular margins. As the disease advanced, the lesions expanded to encompass the entire leaf lamina. On PDA media, the pathogen exhibits robust growth, producing white, aerial, floccoid mycelia. The hyaline, branched and septate hyphae bear bullet shaped conidia with an average size of  $7.73 \times 2.9 \mu\text{m}$ . Molecular characterization using ITS primers (ITS-1F/ITS-4R), followed by sequence analysis in the NCBI database, conclusively identifies the pathogen as *Colletotrichum siamense*. Hence, this study is the first report of *Colletotrichum siamense* causing leaf blight in *Plectranthus vettiveroides*.

Key Words: Leaf blight, *Plectranthus vettiveroides*, *Colletotrichum siamense*, first report.

### INTRODUCTION

*Plectranthus vettiveroides* formerly known as *Coleus zeylanicus* is a sturdy, densely branched annual herb that reaches a height of 1.5 metres belonging to the family Lamiaceae (Nisheeda *et al*, 2016). Cherian Jacob first classified it as *Coleus vettiveroides* in 1942; subsequently, it was transferred to the genus *Plectranthus* (Murugan *et al*, 2015). The plant has long been utilised in indigenous and ayurvedic medicine as an active ingredient in various herbal formulations or as a single agent. Ethnomedical evidence supports the use of *P. vettiveroides* leaves for ulcers, dyspepsia, and dysentery (Athikkavil *et al*, 2023). Only a few diseases have been documented, despite the fact that several diseases pose challenges to its production (Nisheeda *et al*, 2016). However, Varma (1991) reported leaf blight disease of *Plectranthus vettiveroides* in Kerala.

### MATERIALS AND METHODS

The experiment was carried out at the Department of Plant Pathology, College of Agriculture, Kerala Agricultural University, Vellanikkara during the period 2022-23.

### Survey and collection of diseased samples

Sampling surveys were carried out in Thrissur, Ernakulam and Palakkad districts of Kerala. Per cent disease incidence (PDI) and Per cent disease severity (PDS) of the symptoms collected were note.

### Isolation of pathogens and pathogenicity studies

Tissue segmentation methodology was employed to isolate fungal pathogens from diseased plant samples (Rangaswamy, 1958). The mycelial bit inoculation method (Rocha *et al*, 1998) was utilized to establish the confirmation of Koch's postulates for the fungal isolate. A mycelial disc of approximately 7 or 8 mm, obtained from a culture aged seven to eight days, was placed on a healthy plant section after making two to three punctures using a sterile needle. As a control, a plant part was inoculated with sterile water. Moistening the bits with sterilized cotton, they were then incubated in a humid chamber. Once the symptoms appeared, re-isolation was carried out to confirm the validity of Koch's postulates.

### Characterisation of pathogens

The cultural characters of the pathogen in terms of growth, including texture, colour, growth rate,

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sporulation, pigmentation, reverse side colour on Petri plates, and the presence of a fruiting body, were observed. Morphological features such as hyphal colour, branching, hyphal septation, conidia presence, conidial septation, spore type, size, and form, as well as sexual structure prevalence, were examined. Tentative genus-level identification relied on comparing physical and cultural traits to descriptions from the Commonwealth Mycological Institute. Molecular characterization involved sequencing and amplifying the ITS region using ITS-1F/ITS-4R primers, and the obtained sequence was analysed in the NCBI database.

## RESULTS AND DISCUSSION

### Survey and occurrence of the disease

Maximum incidence of the disease was noticed in Thrissur district of Kerala with 55.0 per cent PDI and 37.5 per cent PDS. Leaf blight sample from Ernakulam district showed 33.33 per cent PDI and 25.0 per cent PDS. Likewise, the intensity and severity of the disease in Palakkad district were 33.33 per cent and 20 per cent disease respectively. The incidence of leaf blight of the plant was reported by Varma (1991).

### Symptomatology

Leaf blight symptoms were initially seen as water soaked lesions from the periphery of the leaves. The lesions turned to ash brown in colour with irregular margins. The lesions covered the entire leaf lamina as the disease progressed.

Symptoms under artificial inoculation were similar to the naturally inoculated symptoms. Russet brown colour lesions surrounded by yellow halo was noticed at the infected area which covered the entire leaf lamina upon later stages of infection. Symptom expression from 3 DAI.

### Characterisation of pathogens

The pathogen produced white, floccose, aerial mycelia on PDA medium. The reverse side of Petri

plates showed concentric zonations of grey and cream coloured mycelia. The fungus attained full growth 7 days after incubation. The hyphae was hyaline, septate and branched. Conidia produced were ovoid, hyaline, single celled having an oil globule at the center. The average length and breadth of the conidia were  $7.73 \times 2.9 \mu\text{m}$ . Based on the cultural and morphological characters the pathogen was tentatively identified as *Colletotrichum* sp. The cultural and morphological characters were similar with *Colletotrichum siamense* from *Kadsura coccinea* (Jiang *et al*, 2022).

Molecular characterisation of pathogens were carried out for species level identification of the pathogen. The leaf blight pathogen was identified by sequencing and amplification of ITS region using ITS primers ITS-1F/ITS-4R. The isolate showed sequence similarities with the existing sequence in NCBI database with *Colletotrichum siamense* (accession number KT582185.1) having 99.81 per cent identity and 96 per cent query cover. Hence the pathogen was identified as *Colletotrichum siamense*. No records of *Colletotrichum siamense* causing leaf blight in *Plectranthus vettiveroides* have been recorded till date. Hence this can be considered the first report of *Colletotrichum siamense* causing leaf blight in *Plectranthus vettiveroides*.

### CONCLUSION

Leaf blight can be considered the most frequent disease of *Plectranthus vettiveroides* according to the disease incidence and severity data. The cultural, morphological and molecular characteristics of the pathogen associated with the disease was identical to *Colletotrichum siamense*. Until now, there have been no recorded instances of *Colletotrichum siamense* causing leaf blight in *Plectranthus vettiveroides*. Thus, this serves as the first report of *Colletotrichum siamense* causing leaf blight in *Plectranthus vettiveroides*.



Fig 1. Symptom under natural conditions



Fig 2. Symptom under artificial condition

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Fig 3. Growth of *Colletotrichum siamense* on PDA medium

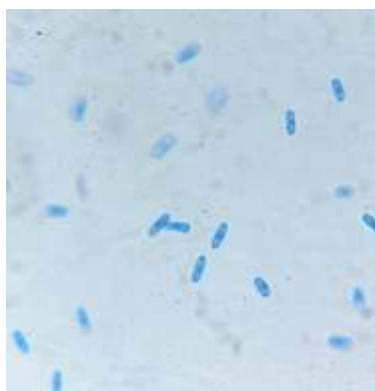


Fig 4. Conidia of *Colletotrichum siamense*

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Received on 15/1/2024 Accepted on 20/2/2024