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Indopiptadenia oudhensis (Endangered Plant): A New Host of Foliar Pathogen *Alternaria alternata* from Uttar Pradesh, India

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Abstract

A severe leaf spot disease of *Indopiptadenia oudhensis* (Mimosaceae) caused by *Alternaria alternata* (Fr.) Keissler was observed for the first time in Lucknow, Uttar Pradesh province of India between 2012-2013 based on morphological characteristics and pathogenicity. This is the first report as new host for foliar pathogen *Alternaria alternata* for science.

Keywords: Foliar disease, *Indopiptadenia oudhensis*, *Alternaria alternata*, New host record

Introduction

Indopiptadenia oudhensis (Brandis) Brenan is a monotypic angiosperm plant belongs to family Mimosaceae. The plant is medium sized tree having bi-pinnate leaves with long stalks. Presently the plant standing at the verge of extinction as notified by the Central Government of India, in consultation with the Govt. of Uttar Pradesh vide its notification no. S.O.998 E, dated 15-04-2009 and has prohibited and regulated its collection in order to conserve the species. It is found naturally in U.P., India in the Sohela Wildlife Forest Division, Balrampur and now cultivated in garden. The plant is commonly known as Gainti, Hath Paula and the rapid depletion of the lovely species from the planet earth's flora in the recent years from various meetings, seminars and from the friend and well-wishers, who are seriously concerned about the tree.

Objectives

The main purpose of this study was to identify the fungus causing leaf spot disease on this endangered plant in our garden and to confirm its pathogenicity on the host.

Materials and Methods

The diseased plant was regularly observed between September 2012-2013 (i.e. the fungal disease observed in season in 2012 and reobserved again in 2013) and infected leaf samples were collected from BSIP Garden, Lucknow (26.8656° N, 80.9364° E). The fungal specimens carried to the laboratory and processed in the form of dried herbaria by the standard techniques. Photographs of infection spots on the host leaf were taken by using a Sony DSC-5730 camera. Specimens for microscopic observation were prepared by hand, cut section and scraps from the infected part and the slides were mounted in water and lacto-phenol mount mixture. Observations were made with an Olympus BX-51 light microscope by using the Syntek USB camera. Morphotaxonomic determinations have been made by comparing with the closely related taxa in question and by consulting the current literature pertaining to the taxonomy of *Alternaria*. The dried specimen of *Alternaria alternata* has been deposited in the Ajrekar Mycological Herbarium, (AMH-MACS-ARI), Agharkar Research Institute, Pune, India (Accession No. AMH-9640) and a part of the same was retained in BSIP Herbarium (BSIPMH-28), Lucknow, India.

Observation and Discussion

The host symptoms, sporulation pattern, conidiophores and

conidial morphology were examined and upon morphological observation the fungus shows following characteristics as:

The symptoms of disease initially began from the margin of the leaves as small light brown circular to sub circular spots (Figure 1A-1C). In severe infection leaves several spots coalesced to form larger necrotic areas, resulting leading to drying and falling of the leaves.

Anamorphic fungus, Foliicolous, Infection spots amphigenous, circular, sub circular to irregular, brown, up to 5mm μ m in diam. *Colonies* amphiphylous, effuse, brown. *Mycelium* internal. *Stromata* present, 15 μ m in diam. *Conidiophores* macronematous, fasciculatus, 2-7 in a fascicle, straight to flexuous, simple, cylindrical, unbranched, thick walled, smooth, 1-3 septate, brown, 10-53 \times 3-5 μ m. Conidiogenous cells integrated, terminal, polytretic, scars thickened. *Conidia* simple, acropleurogenous, solitary to catenate, dry, obclavate to ellipsoidal to ovoid, rostrum present, 2-4 transversely septate and 2-3 obliquely septate, brown, base obtuse, 20-50 \times 10-20 μ m, hilum thickened (Figure 2).

Material Examined

India, (U.P.), Lucknow, BSIP Garden, on living leaves of *Indopiptadenia oudhensis* (Mimosaceae), 2nd September, 2012, coll. Shambhu Kumar, AMH-9640, BSIPMH-28.

The distinct diseased leaves were cut into little fragments, surface sterilized in 1% sodium hypochlorite for 2 minutes, washed three times in sterile distilled water, and plated on potato dextrose agar (PDA), and then incubated at 25°C for 5-7 days under a 12 h light and dark conditions. Hyphal tips from the margin of each developing colony were sub-cultured on PDA. Fungal colonies were initially white, becoming olivaceous, and turning brown with age.

For determination of pathogenicity test, inoculations were performed on detached, surface sterilized, healthy leaves following by

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Figure 1: Leaf spot symptoms on endangered plant (*Indoptadenia oudhensis*). A: Host plant habitat; B and C: on the underside of the leaf, many brown colour circular, sub-circular to irregular leaf spot appears, A, B, C=20 mm.

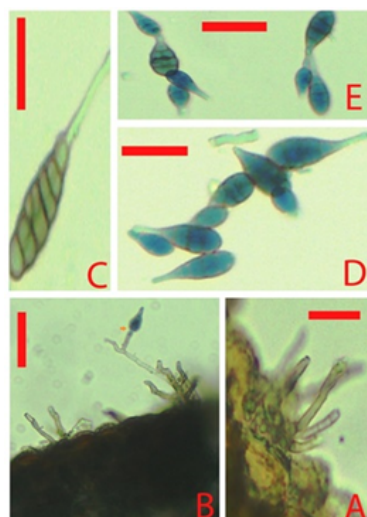


Figure 2: *Alternaria alternata* (causal agent) of leaf spot disease on endangered plant (*Indoptadenia oudhensis*). A: host-pathogen interaction showing conidium attached on conidiophore (arrow indicating) formed on host epidermis; B: tufts of conidiophores and stroma on sub-epidermal position; C: Single conidium; D, E: Chains of conidia; Scale bars A, B, C, D, E=20 µm.

the Belisario method [1]. 10 leaves per isolates were used to experiment. A 5-µl drop of conidial suspension containing 1×10^5 CFU/ml was placed on each leaf. The leaves were incubated in a growth chamber (90% relative humidity and a 12-h photoperiod). After 5-7 days, leaf spots similar to the original symptoms developed on all inoculated

leaves and the pathogen *A. alternata* was consistently re-isolated from symptomatic tissue, fulfilling Koch's postulates. The Control leaves, however inoculated with sterile distilled water remained asymptomatic (symptomless) or without infection.

On the basis of external symptomatology, fungus morphological characteristics, and pathogenicity the pathogen was identified as *Alternaria alternata* (Fr.) Keissler [2,3], an ubiquitous fungal pathogen reported globally on different hosts, but according to the current literatures, no any fungus has been reported to cause leaf spot diseases on *Indoptadenia oudhensis* from all over the world particularly from India [4-12]. To the best of our knowledge, the leaf spot disease of *Indoptadenia oudhensis* caused by *A. alternata* is the first report from India as well as for science and the occurrence of present leaf spot disease on endangered plant is very interesting and significant to control measures.

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