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PYTHIUM DELIENSE, A NEW RECORD FROM PAKISTAN

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Abstract

Pythium deliense which is characterized by having simple filamentous inflated sporangia, smooth oogonia, highly aplerotic oospores, broad apical intercalary antheridia and bending of oogonial stalks towards the antheridia has been recorded for the first time from betelvine rhizosphere in Pakistan.

Introduction

Pythium deliense Meurs was first isolated by C.J. Jochems from diseased tobacco plant in Sumatra which he designated as *P. aphanidermatum* (Edson) Fitzp., (Jochems, 1926) and *P. debaryanum* Hesse (Jochems, 1927). However, in 1929-32 Meurs again isolated the same species along with *P. aphanidermatum* and *P. myriotylum* from the same host and described it as *P. deliense* (Meurs, 1934). *P. deliense* is mostly restricted to warmer regions of the world. It was also recorded in Nicaragua and Papua-New Guinea from tobacco (Drechsler, 1960; Stamps *et al*., 1972); in India from tomato (Singh & Srivastava, 1953), *Phaseolus aureus* (Ragunathan, 1968), *Tephrosia vogelii* (Pandotra *et al*., 1971) and ginger (Haware & Joshi, 1974); in Malaysia from *Carica papaya*, *Lactuca indica*, *Momordica charantia* and *Vigna sinensis* (Liu, 1977a,b).

During the present investigation on Oomycetous fungi of Sindh, *P. deliense* was isolated from the soil collected from the betelvine farm at MirpurSakro, district Thatta, Sindh, Pakistan. The culture has been deposited at the Karachi University Culture Collection (KUCC) as KUCC-OOP-03027. It appeared to be the first report of *P. deliense* from Pakistan (Sultan *et al*., 1997), which is described and illustrated herein.

Materials and Methods

Soil samples were collected from a betelvine field at MirpurSakro, district Thatta in Sindh province of Pakistan. *Pythium* species were isolated using baiting technique (Harvey, 1925). With the help of sterilized teaspoon, the soil was placed at one side of sterilized Petri plates and 10-15 ml sterilized water was added. Two grass blades (3 cm long) were placed in each Petri plate, one near the soil and the other away from the soil. After 4 days of incubation, the baits colonized by *Pythium* species were transferred on the corn-meal agar (CMA) medium for purification.

Water culture of fungi were prepared by adding a 1 cm^2 inoculum block and grass blades to sterile water in a Petri plate and incubating it at 25ºC for the production of sporangia, zoospore and sexual structures. Identification up to species level was made after reference to Sparrow (1960), Plaats-Niterink (1981) and Dick (1990).

Biometric values viz., aplerotic index, ooplast index and wall index were determined after Shahzad *et al*., (1990). Growth pattern and radial growth rate were observed on corm meal agar (CMA), potato carrot agar (PCA), potato dextrose agar (PDA) (Plaats-Niterink, 1981) and CMA containing 20 g Dextrose L^{-1} (CMDA) at 25 °C (Lodhi *et al*., 2004).

Taxonomic Description

Morphological characteristics: Main hyphae up to 6 µm wide. Sporangia consist of filamentous inflated structures, mostly terminal, forming simple toruloid structures. Zoospores discharge occurs at room temperature through discharge tubes of varying length. Encysted zoospores 9-11 µm in diam. Oogonia smooth, globose, terminal, 16-24 (av. 21.3) µm. Oospores highly aplerotic (12-) 16-18 (-19) (av. 16.9) µm. Ooplast 9-10 µm in diam. Antheridia monoclinous, intercalary 5-6 µm in width and 6-9 µm in length, making broad apical contact with the oogonia. Oogonial stalks mostly curved towards the antheridium. Oospore wall thickness 1-2(av. 1.8) µm (Fig. 1). Biometric values: Aplerotic Index 50.4%; Wall Index 51.5% and Ooplast Index 33.9%.

Colony characteristics: *P. deliense* produces indistinct rosette pattern with aerial mycelium on PDA and on CMDA. It showed submerged growth with radial pattern on CMA and submerged growth without any special pattern on PCA. Daily growth rate at 25ºC: 6.1mm on PDA; 6.5 mm on PCA; 5.9 mm on CMA and 6.8 mm on CMDA.

Discussion

There are three species of *Pythium* viz., *P. aphanidermatum*, *P. deliense* and *P. indigoferae* that are characterized by the presence of toruloid sporangia, aplerotic oospores and intercalary antheridia. Our isolate differs from *P. aphanidermatum* by its simple and less complicated sporangia as well as bending of oogonial stalks towards the antheridium. *P. indigoferae* differs from our isolate in having close connection of the oogonia with sporangial structures.

Dick (1990) distinguished *P. aphanidermatum* and *P. deliense* on the basis of straight oogonial hyphae of the former and recurved oogonial hyphae to antheridia of the later. He also classified both of these species on the basis of oospore wall thickness where oospore wall in *P. aphanidermatum* is thin (wall index <35%) but thick in *P. deliense* (wall index >40%). The wall index of our isolate is 51.5%. Therefore, the wall index, presence of simple toruloid sporangia, aplerotic oospores, intercalary antheridia and bending of oogonial stalks towards the antheridia clearly designate our isolate as *P. deliense*.

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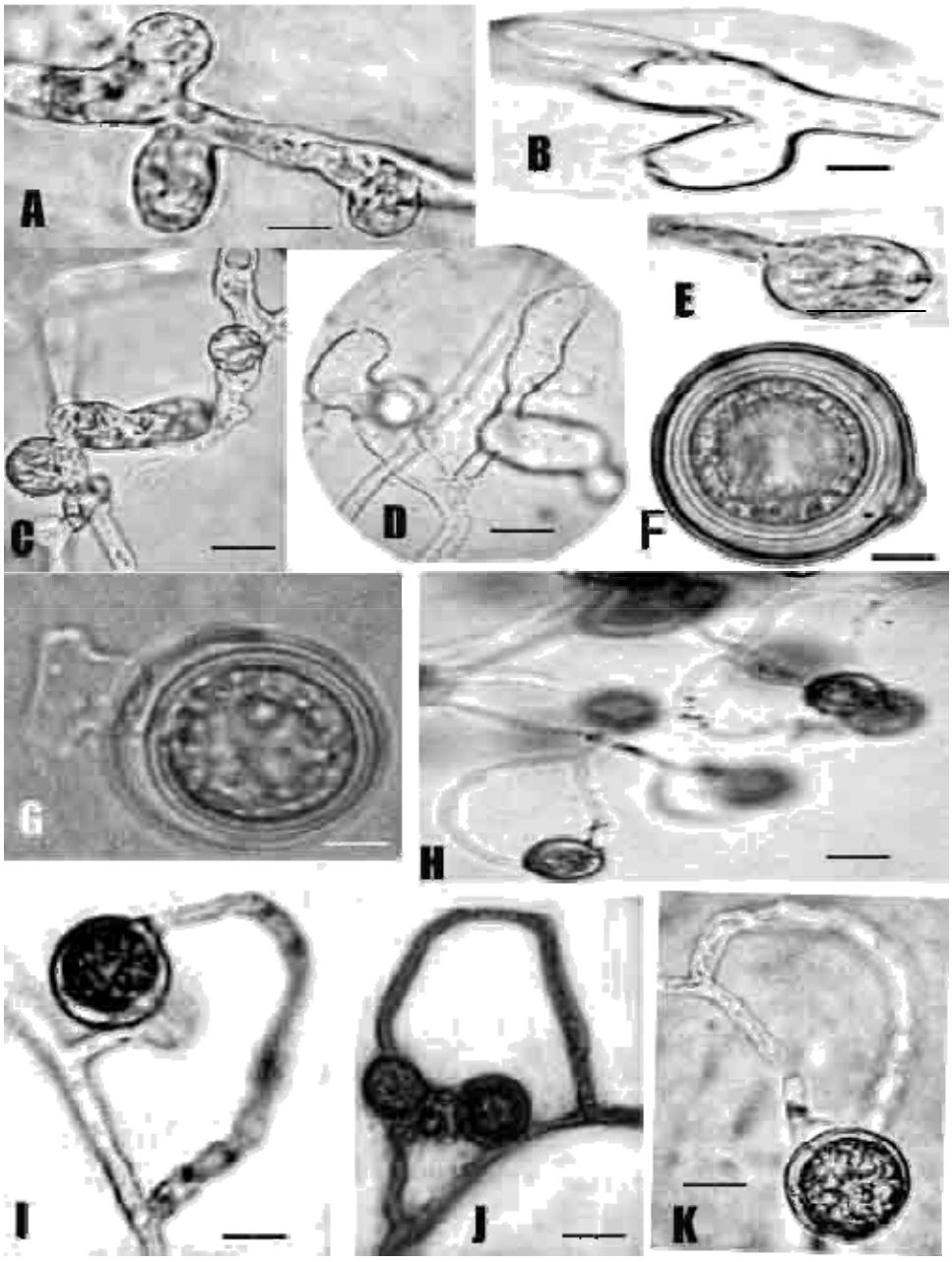

Fig. 1. Asexual and sexual structures of *P. deliense*. A-D, Filled and empty simple toruloid sporangia,; E, Germinating zoospore cyst; F, Smooth oogonia with highly aplerotic oospore; G, Oogonia with intercalary antheridia; H-K, Bending of oogonial stalks towards the antheridia.

Scale bar: A-E = 10 µm; F-G = 5 µm; H = 20 µm; I-K = 10 µm.

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