



Cultural and Morphological Variability in isolates of red rot pathogen (*Colletotrichum falcatum*) from Pilibhit District of Uttar Pradesh

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Short Communication Received on April 12, 2017 Accepted on May 15, 2017 Article Authors Vikash Pandey, Ram Ji Lal, Rashmi Nigam Corresponding Author Email lalramji054@gmail.com	Sugarcane is an important cash crop and used as the chief source of sugar grown in tropical and subtropical regions in India. Sugarcane production is challenged by various biotic and abiotic stresses; among the biotic factors, red rot disease caused by <i>Colletotrichum falcatum</i> is a major disease leading to severe reduction in sugarcane production. Five isolates of <i>C. falcatum</i> were established from red rot infected cane varieties collected from different areas of Uttar Pradesh. Cultural and morphological studies of the isolates were conducted <i>in vitro</i> on oat meal agar (OMA). Variations in their conidial and colony characters of the five isolates were recorded and summarized in this paper.
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Sugarcane (*Saccharum officinarum* L.), belonging to the family Poaceae, is an economically important crop grown in the tropical and sub-tropical regions of India. Red rot caused by the fungus *Colletotrichum falcatum* Went, is considered one of the major constraints in the profitable cultivation of sugarcane in India (Viswanathan and Samiyappan, 2008). The first documented epidemic of red rot in India, occurred in 1895-1901 and in subsequent years a number of major outbreaks were recorded (Satyavir, 2003). This disease causes losses in form of poor germination which ultimately translates in lower non millable canes (NMC) and cane yield, lower sugar recovery, poor juice quality. The use of resistant varieties is the most important method for management of this disease. However, the emergence of new virulent strains of *C. falcatum* results in frequent breakdown of resistance necessitating the continuous replacement of older varieties with new ones. The present study was carried out to conduct surveys of various cane growing regions of Uttar Pradesh and establish *C. falcatum* isolates from diseased varieties and to assess the cultural and morphological variability of the isolates

MATERIALS AND METHODS

Survey and Collection of Disease Samples

An extensive survey of sugarcane growing areas (Majhola, Pilibhit, Barkheda, Bisalpur and Puranpur in Pilibhit districts of Uttar Pradesh) was conducted during July-August months of 2012-13. Cane stalks of sugarcane varieties viz., CoS 91269, CoS 8432, CoS 8436, CoS 767 and Co Pant 84212 exhibiting red rot symptoms were collected and pure cultures of the pathogen were obtained for further cultural and morphological studies.

Isolation of *Colletotrichum falcatum* Went.

C. falcatum was isolated from diseased cane tissues of above varieties on oat meal agar medium. Three 5 mm pieces of tissues were cut from infected cane stalks of above varieties and surface sterilized by dipping in 0.1% sodium hypochlorite for 1 min. Thereafter, the tissues were immersed in 70% ethanol for 1 min followed by rinsing thrice with sterilized distilled water and dried on sterilized filter paper. After 7 days of incubation, tissues in the Petri plates were observed for *C. falcatum* growth and the fungus was purified by sub-culturing. The isolates were further purified by single spore culturing.

Table 1. Isolates with cultivars and their place of collection

Districts	Place of Location	Variety	Isolate
Pilibhit	Pilibhit	CoS 91269	CFPILPI
Pilibhit	Majhola	CoS 8436	CFPILMA
Pilibhit	Bisalpur	CoS 8432	CFPILBI
Pilibhit	Puranpur	CoS 767	CFPILPU
Pilibhit	Barkhera	CoPant 84212	CFPILBA

Table 2. Conidial characteristic of isolates

Isolate	Conidial Characteristics			
	Length (μm)	Width (μm)	Colour	Shape
CFPIPI	25.4	4.2	Hyaline	Falcate
CFPIBI	24.9	4.7	Hyaline	Falcate
CFPIBA	26.8	4.7	Hyaline	Falcate
CFPIPU	25.3	4.4	Hyaline	Falcate
CFPIMA	24.2	4.6	Hyaline	Falcate

Table 3. Colony characteristics of isolates

Isolate	Colony Characteristic					
	Colony color	Substrate color	Margin	Topography	Colony Diameter (mm)	Sporulation
CFPIPI	White	Black	Smooth	Mycelium flat Growth	86.9	++
CFPIBI	White	Black	Irregular	Raised Fluffy	89.1	+++
CFPIBA	White Orange	Black	Smooth	Mycelium Flat Growth	89.0	+++
CFPIPU	Greyish White	Dark Greyish	Smooth	Raised Fluffy	85.8	++
CFPIMA	White	Black	Smooth	Raised Fluffy	88.5	+++

Note: +Poor sporulation: 1-10 spores/microscopic field (100X); ++ Moderate sporulation: 11-50 spores/ microscopic field (100X), +++ Good sporulation: More than 100 spores/ microscopic field (100X).

The purity of the fungal culture was further ascertained microscopically and was maintained on oat meal agar (OMA) slants at 4°C for further studies.

MORPHOLOGICAL STUDIES

Morphological characters of the colony *viz.*, colony colour, substrate colour, margin of colony etc. were recorded in seven days of incubation. Spore characteristics *viz.*, size, colour and shape of the conidia were observed microscopically. Data was recorded in three replicates and mean values were determined.

RESULTS AND DISCUSSION

Five isolates of *C. falcatum* were established (Table 1) and their morphological characteristics were studied. The length of conidia ranged from 24.2-26.8 μm among the isolates. Highest length of conidia was observed in CFPIBA isolate (26.8 μm) followed by CFPIPI, isolate (25.4 μm), CFPIPU (25.3 μm), CFPIBI (24.9 μm) and shortest conidia was recorded in CFPIMA isolates (24.2 μm). Width of the conidia ranged from 4.2 to 4.7 μm . Conidia of all the isolates were falcate/sickle shaped with a round apical end tapering towards the base (Table 2). The isolates exhibited variation with respect to colony, substrate colour, margin, colour, topography, colony diameter and sporulation (Table 3). Different colony colours *viz.*, white, greyish white, whitish orange, light grey, black were observed. Isolates *viz.*, CFPIPI, CFPIBI, and CFPIMA exhibited white colour; while other isolates CFPIBA, and CFPIPU were white orange and greyish white in colour, respectively. The isolates CFPIPI, CFPIBI, CFPIBA and CFPIMA were black; and CFPIPU showed the dark greyish substrate colour. Isolates CFPIPI CFPIBA, CFPIPU, CFPIMA showed smooth colony margin while CFPIBI had irregular margin. Isolates, CFPIPI, CFPIBA had mycelium with flat growth and CFPIBI, CFPIPU, CFPIMA showed fluffy topography. Morphological and colony characters have been used previously to characterize *C. falcatum* isolates. Abbott (1938) distinguished two races a light one producing white to light-grey, cottony mycelia, and a dark one with compact, velvety, dark-grey mycelia, on the basis of cultural characters of *C. falcatum*. Abbas *et al.* (2010) also observed morphological diversity among four isolates of *C. falcatum*. Malathi *et al.* (2011) had observed correlation between the growth of isolates and pathogenicity.

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