

# STUDIES ON GROWTH AND MORPHOLOGICAL CHARACTERS OF *COLLETOTRICHUM MUSAE* ON DIFFERENT SOLID MEDIA

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## ABSTRACT

The growth and morphological characters of *Colletotrichum musae* were observed in thirteen different solid media. Among the different solid media tested for the growth and sporulation, the fungus produced maximum radial growth (90.00mm) on potato dextrose agar and oat meal agar. Different colony colour of *Colletotrichum musae* was observed in different solid media. Sporulation was found to be maximum in all the thirteen solid media

## INTRODUCTION

Banana (*Musa* sp.) belongs to the family *Musaceae* is one of the most important crops in tropical and subtropical countries. Banana is susceptible to several diseases resulting in massive and extensive postharvest losses during transportation and storage (Basel *et al.*, 2002). Anthracnose caused by the fungus *Colletotrichum musae* (Berk. & M.A. Curtis) Arx, is the most important postharvest disease of banana that can result in 30 to 40% losses of marketable fruit (Ranasinghe *et al.*, 2002). Anthracnose is a latent infection where fungal spores infect immature banana in the field but symptoms occur as peel blemishes as black or brown sunken spots of various sizes on fruit that may bear masses of salmon-colored acervuli with their associated conidia on the fruit peel after ripening (Ranasinghe *et al.*, 2005).

Jinyoung Lim *et al.*, 2002 studied the cultural morphological characters of *C. musae*. They observed the fungal colonies with white aerial mycelium, which later became orange in color. Several black, acervulus-like masses developed on the culture plates after incubation for 10 days at 25°C with dark-orange drops of conidia. Conidia were aseptate, hyaline, mostly ellipsoid, ranging from 10-18 µm and 5-9 µm (average of 14.5-6.9 µm) in size. The growth characters of different isolates of *Colletotrichum* spp. varied on different solid media. The growth and sporulation of the *C. capsici* infecting chilli was maximum on PDA and Das Gupta's standard medium (Patil *et al.*, 1973)

Hence the present investigation was taken under *in vitro*

conditions to know the growth and morphological characteristics of the pathogen using different solid media

## MATERIALS AND METHODS

An experiment was carried out during 2013 at K. R. C. College of Horticulture, Arabhavi to study growth and morphological characters of *Colletotrichum musae* on different solid media viz., Brown agar, Corn meal agar, Czapek's agar, Elliotts media, Glucose asparagine agar, Host leaf extract agar, Malt extract agar, Oat meal agar, Potato dextrose agar, Richards's agar, Sabouraud's agar, Sachs media and Toichinals. All the media were sterilized at 1.1 kg/cm<sup>2</sup> pressure for 15 minutes. To carry out the study, twenty ml of each of the medium was poured to each Petriplate separately. Such Petriplates were aseptically inoculated with 5 mm disc cut-outs from periphery of actively growing culture and incubated at 28°C for a period of seven days. Each treatment was replicated thrice. Observations were taken with respect of colony size at 2, 4, 6 and 8 days after inoculation. The mycelial colour, substrate colour, margin of the colony, topography, centre of the colony, sporulation and spore size were recorded at 8 days after inoculation. The data on radial growth was analyzed statistically. All the above mentioned media were dissolved in 400 ml distilled water and agar-agar is dissolved in 400 ml distilled water separately. Both the solutions were mixed thoroughly and the volume was made up to 1000 ml with distilled water and sterilized at 15 lbs for 15 minutes.

## RESULTS AND DISCUSSION

The result of the present study on cultural and morphological studies of *Colletotrichum musae* in different solid media has been presented under following sub heads

### Cultural studies on various solid media

The cultural characters of *Colletotrichum musae* were studied on thirteen solid media as described in material and methods. Observations on radial growth, mycelial colour, substrate colour, margin of the colony, topography, center of the colony and sporulation on different media were recorded at 2, 4, 6 and 8 days after inoculation. The data on radial growth was analysed statistically and are presented in Table 1 and Plate 1.

Effect of different media on the growth and sporulation of *Colletotrichum musae* was significant. The radial growth of *Colletotrichum musae* was maximum (87.17 mm) on Potato dextrose agar followed by Oat meal agar (85.67 mm), Sabouraud's agar (83.54 mm), Corn meal agar (80.24 mm), Brown agar (72.33 mm), Czapek's agar (72.00 mm), Glucose asparagine agar (71.99 mm), Richards agar (68.00 mm), Sachs media (62.32 mm), Malt extract agar (61.66 mm), Toichinals agar (50.66 mm), Host leaf extract agar (34.87 mm) and the least growth of 18.11 mm was seen in Elliott's agar media after six days of inoculation. At 8<sup>th</sup> day of inoculation, the maximum growth (90.00 mm) was recorded in potato dextrose agar and oat meal agar followed by corn meal agar (89.16 mm), Sabouraud's agar (89.00 mm), Browns agar (81.33 mm), Glucose asparagine agar (81.12 mm) Czapek's agar (80.33 mm), Richards agar (80.13 mm), Sachs media (70.33 mm), Malt extract agar (67.12 mm), Toichinals agar (52.77 mm), Host leaf extract agar (38.12 mm) and the least growth was observed in Elliott's agar medium (24.11 mm). Present study it was concluded that the culture media also influenced the growth of *Colletotrichum musae*. It was previously proved in same genera of respective pathogen by several workers (Sattar and Malik, 1939; Ahmed, 1985; Zhang *et al.*, 1996; Reddy, 2000; Sudhakar, 2000; Saxena, 2002; Ashoka, 2005; Thangamani *et al.*, 2011; Mishra *et al.*, 2015 in *Colletotrichum* sp, and Lal *et al.*, 2014 in *Culvularia* sp.) Sattar and Malik (1939) studied the growth of *Colletotrichum gloeosporioides*, the anthracnose pathogen of mango on different semi synthetic and synthetic

media. Richards agar followed by Oat meal agar was the best with respect to the growth and sporulation of the fungus. Ahmed (1985) noticed that *Colletotrichum gloeosporioides* which caused anthracnose of many tropical and subtropical fruits, grew and sporulated on Potato dextrose agar and host fruit. The anthracnose pathogen grew on several common culture media among them Sabouraud's and PDA were found to be the best (Zhang *et al.* (1996). Reddy (2000) reported that Potato dextrose agar was the best medium for fast growth and good sporulation of *Colletotrichum gloeosporioides* of annona, ber, citrus, pomegranate and strawberry. The maximum radial growth of *Colletotrichum gloeosporioides* was recorded in five media (Sabouraud's agar, Richard's agar, Brown's agar, Potato dextrose agar and Oat meal agar). The least colony growth was recorded in Asthana and Hawker's 'A' medium (Sudhakar (2000). Saxena (2002) reported that *Colletotrichum gloeosporioides* isolated from pomegranate put forth better growth on potato dextrose agar. Ashoka (2005) reported maximum radial growth of *Colletotrichum gloeosporioides* was on potato dextrose agar (90.00 mm) and Richard's agar (90.00 mm) and it was on par with oat meal agar (89.50 mm). They were superior to all other media. Minimum radial growth of fungus was obtained in Ellitto's agar (40.00 mm) and Asthana's and Hawker's agar (44.50 mm).

Thangamani *et al.* (2011) reported that all the seven media tested supported the mycelial growth of all the isolates of *C. musae*. The highest mean colony diameter of 87.47 mm was recorded on PDA followed by oat meal agar (81.65 mm), Richards's agar (80.00 mm) and Walksman's agar (78.37 mm). The lowest mycelial growth of 8.95 mm was recorded on water agar. Mishra *et al.* (2015) reported Richard's medium exhibited comparatively higher mycelial growth and sporulation of *Colletotrichum gloeosporioides*. Similarly, Lal *et al.* (2014) evaluated different media to determine optimal conditions for mycelial growth and sporulation of *Curvularia lunata* causing curvularia leaf spot of blackgram. *In vitro* studies found that amongst solid media, Potato dextrose agar (7.60 cm) and Host extract agar (6.73 cm) were the best for fungus growth and sporulation followed by Conn's agar and Czapek (Dox) agar. Whereas, in liquid media, Richard's

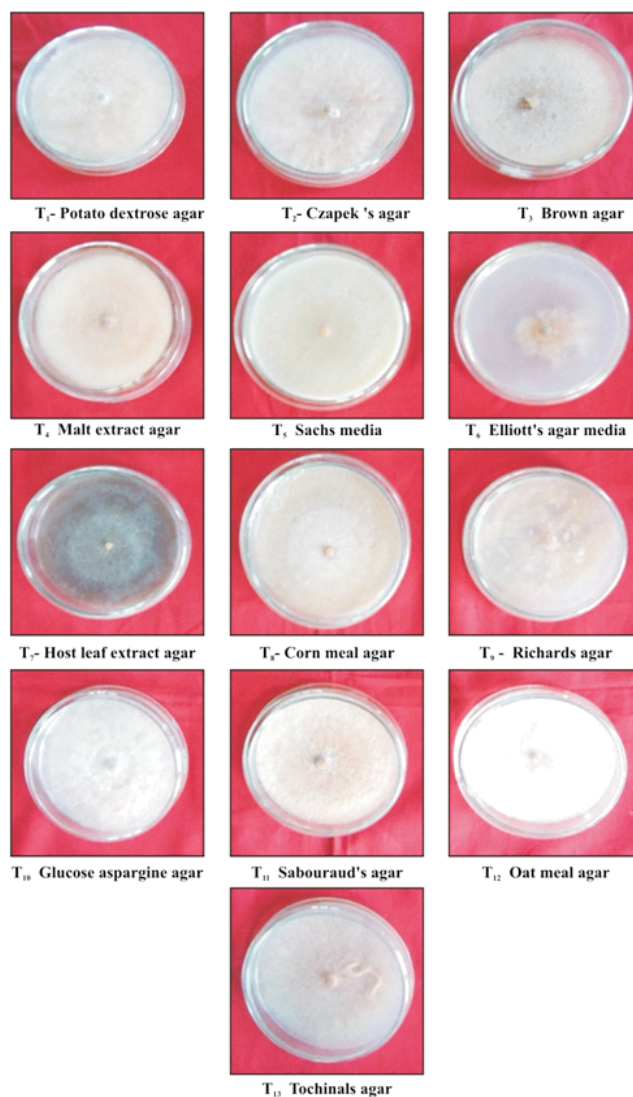
**Table 1: Effect of different solid media on growth of *Colletotrichum musae***

Media	Colony diameter (mm)			
	2 <sup>nd</sup> day	4 <sup>th</sup> day	6 <sup>th</sup> day	8 <sup>th</sup> day
Potato dextrose agar	42.22	68.00	87.17	90.00
Czapek's agar	27.16	54.98	72.00	80.33
Brown agar	31.00	57.33	72.33	81.33
Malt extract agar	26.40	52.66	61.66	67.12
Sachs media	19.73	37.00	62.32	70.33
Elliott's agar media	4.13	11.66	18.11	24.11
Host leaf extract agar	11.13	21.83	34.87	38.12
Corn meal agar	36.33	61.33	80.24	89.16
Richards agar	27.10	51.97	68.00	80.13
Glucose asparagine agar	29.00	56.89	71.99	81.12
Sabouraud's agar	34.54	72.22	83.54	89.00
Oat meal agar	35.89	67.16	85.67	90.00
Toichinals agar	21.66	41.00	50.66	52.77
S.Em ±	0.88	0.55	0.56	0.50
CD @ 1%	3.49	2.18	2.24	1.99

Table 2: Morphological characters of *Colletotrichum musae* on different solid media

Media	Mycelial colour	Substrate colour	Margin of the colony	Topography	Center of the colony	Spore size ( $\mu\text{m}$ )	Sporulation
Potato dextrose agar	Whitish-pale red	Pinkish red	Irregular	Aerial mycelium	Pale red – white	14.11 x 6.10	+
Czapek's agar	Whitish-pale red	Greyish white	Irregular	Aerial mycelium	Greyish brown	10.17 x 6.30	+
Brown agar	Whitish-pale red	Whitish pale red	Irregular	Aerial mycelium	White	10.16 x 5.30	+
Malt extract agar	Whitish-pale red	Greyish pale red	Regular	Submerged mycelium	Pale red	14.18 x 5.72	+
Sachs media	Whitish-pale red	White	Irregular	Submerged mycelium	White	13.27 x 6.36	+
Elliott's agar media	Whitish-pink	Greyish-pink	Irregular	Aerial mycelium	Greyish white	11.25 x 5.30	+
Host leaf extract agar	Greyish brown	Brown	Irregular	Submerged mycelium	Greyish brown (Flattened growth)	13.28 x 5.17	+
Corn meal agar	Whitish-pale red	Greyish white	Irregular	Submerged mycelium	Greyish brown (Flattened growth)	14.17 x 6.30	+
Richard's agar	Greyish white-pale red	Whitish – pink	Irregular	Aerial mycelium	Greyish white	13.40 x 6.87	+
Glucose asparagine agar	Whitish-pale red	Pinkish- white	Irregular	Aerial mycelium	Whitish-pale red	10.23 x 5.31	+
Sabourad's agar	Pinkish-grey	Pinkish-white	Irregular	Aerial mycelium	Pinkish red	11.25 x 7.00	+
Oat meal agar	Greyish-pink	Greyish white-pink	Irregular	Aerial mycelium	Greyish brown –pale red	14.11 x 6.00	+
Tochinals agar	Whitish-pale red	Pale red –white	Irregular	Aerial mycelium	Whitish-pale red	10.23 x 5.21	+

++++ = > 75 conidia per microscopic field; +++ = 50-75 conidia per microscopic field; ++ = 25-50 conidia per microscopic field; + = 1-25 conidia per microscopic field

Plate 1: Growth of *Colletotrichum musae* on different solid media

(834.33mg), Czapek (Dox) (830.00mg), supported best growth of the fungus and sporulation.

#### Morphological characters of *Colletotrichum musae* on different media

*Colletotrichum musae* produced whitish to pale red colonies on Potato dextrose agar, Czapek's agar, Brown agar, Malt extract agar, Sachs media, Corn meal agar, Glucose asparagine agar and Tochinals agar. On Oat meal agar, the fungus produced greyish to pink colonies. On Elliott's agar media the fungus produced whitish to pink colonies. The fungus produced greyish brown, Greyish white to pale red, pinkish to grey colonies on host leaf extract agar, Richard's agar, Sabourad's agar respectively. The fungus showed aerial fashion mycelial growth on Potato dextrose agar, Czapek's agar, Brown agar, Elliott's agar media, Richard's agar, Glucose asparagine agar, Sabourad's agar, Oat meal agar, Tochinals agar. Sporulation was found to be maximum in the entire medium. These results were supported by Thangamani *et al.* (2011) reported that the isolates of *C. musae* exhibited

variations in respect of colony colour. The isolates C1, C3, C8 and C13 produced white coloured colonies on water agar; blackish white colour on oat meal agar, Richards agar, PDA, Czapek's Dox agar and Walksman's agar, reddish white on Martin's Rose Bengal. The pathogenic monosporous culture of *Colletotrichum gloeosporioides* made good, white to grayish mycelial growth with abundant sporulation on Czapek's, host leaf extract, two per cent sucrose, oat meal agar and Richard's agar media (Hiremath *et al.*, 1993). Similarly, Manjunath (2009) reported that *C. gloeosporioides* produced black coloured colonies on water agar, white coloured on Richards, oat meal agar, PDA, host leaf extract and Walksman's agar, blackish white colonies on nutrient agar, greyish white on Czapek's Dox agar and dark white on Martin's Rose Bengal agar medium and reddish white on King's B agar medium.

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