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Nutritional and cultural characteristics of post harvest rot of banana caused by *Colletotrichum musae*

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Abstract
Banana (*Musa paradisiaca* L.) is considered as the most popular fruit both in ripe and raw condition. It has high starch content and nutritional value. Banana is highly perishable and post harvest rot mostly caused by *Colletotrichum musae* which possesses a great threat to ripe banana after harvest and in transit also causing 35% loss. The growth of the pathogen was tested in 10 different solid media to find out the cultural characteristics. The best solid media which supported the radial growth was found to be Corn meal agar (CMA) having 55.50 mm radial growth followed by oat meal agar (OMA) having 54.34 mm radial growth. Saline agar produced the least growth (15.5 mm) over a period of 7 days. Among the seven nitrogen sources tested against the fungus, L-Asparagine recorded highest growth of fungus with 1496 mg dry mycelial growth followed by Ammonium sulphate (885 mg).

Keywords: Triclosan, TCS, determination, detection, sensor

1. Introduction
Banana (*Musa* spp. L) is one of the cheapest, most plentiful and important fruit crop in India as well as over the world. It has also high calorific and nutritional value. It is highly perishable and suffers severe post harvest losses. One of the main reasons for post harvest losses is anthracnose disease caused by *Colletotrichum musae*. The rotting occurs chiefly at storage and transit periods.

Material and Methods
Cultural studies
Growth characters on solid media
The cultural characters of causal pathogen were studied on following ten solid media.
Corn meal agar (CMA), Host leaf extract agar (HLEA), Malt extract agar (MEA), Nutrient sucrose agar (NSA), Oat meal agar (OMA), Potato carrot agar (PCA), Ripe banana agar (RBA), Richard's agar (RA), Potato dextrose agar (PDA) and Saline agar (SA).
The compositions of the above media were obtained from Dhingra and Sinclair (1995) [2]
After sterilization of these media 250 mg of streptomycin sulphate was added to one liter sterilized media to avoid bacterial contamination. 20 ml of each media was poured into sterilized petridish and solidified under laminar airflow. Eight mm disc from an actively growing culture plate was placed upside down at the centre of the solidified media in petridish. These petridishes were replicated thrice and incubated at 27 ± 1^0C.
The radial growth of the colony was measured when the maximum growth was attained in any one of the media. The colony diameter was measured on both sides different in media and presented in table.

Nutritional studies
Nitrogen utilization
Ammonium carbonate, Potassium nitrate, Sodium nitrate, Glycine, L-asparagine, Ammonium sulphate and urea were used for the study. Richard's broth was taken as base media for study. Only the source of nitrogen was changed in every treatment instead of the original one. The quantity of nitrogen compound used was determined on the basis of their molecular weight so as to provide an equivalent amount of nitrogen as that of potassium nitrate present in the base medium. Three replications were maintained for each treatment. Flasks were inoculated under

aseptic conditions and incubated at 27 ± 1^0 C for 10 days. There after mycelial growth was harvested and dry mycelial weight was recorded and the data were analyzed statistically.

Result and Discussion

Growth characters of different test pathogens in different solid media

The causal pathogen *Colletotrichum musae* was grown in 10 different solid media to find out the growth characteristics and compared with Corn meal agar (CMA). The result revealed that the causal pathogen *Colletotrichum musae* grew significantly higher in corn meal agar (CMA) AND oat meal agar (OMA) than grown in other media. Potato dextrose agar (PDA) supported next best growth of 40.17 mm. Saline agar was found to be less preferred by *Colletotrichum musae* in culture plate with minimum of 15.5mm radial growth 7 days after inoculation.(Table 1).

Growth character of *C. musae* in different sources of Nitrogen

A total of seven nitrogen sources were tested for estimating the growth pattern of the pathogen *Colletotrichum musae*. The data showed significant difference among all the tested nitrogen sources producing fungal mycelia growth of the fungus. L-Asparagine recorded significantly highest growth of the fungus with 1496 mg dry mycelia weight followed by Ammonium sulphate (885.00mg) and Urea (607.7 mg). The fungus could produce only 259.30 mg in absence of nitrogen. Glycine was recorded with least growth of the fungus (392.30mg). Sodium nitrate (592.30mg) and Ammonium carbonate (539.70mg) recorded similar type of growth habit of pathogen (Table 2).

Table 1: Growth behavior of *Colletotrichum musae* in different media 7 days after inoculation

Treatment	Different Solid Media	Mean Colony diameter (mm)	Per cent growth behaviour in comparison to CMA
T_1	Corn Meal Agar (CMA)	55.50	
T_2	Host Leaf Extract Agar (HLEA)	29.17	47.44
T_3	Malt Extract Agar (MEA)	36.34	34.52
T_4	Nutrient Sucrose Agar (NSA)	40	27.93
T_5	Oat Meal Agar (OMA)	54.34	2.09
T_6	Potato Carrot Agar (PCA)	36.00	35.14
T_7	Ripe Banana Agar (RBA)	30.84	44.43
T_8	Richard's Agar (RA)	33.50	39.64
T_9	Saline Agar (SA)	15.50	72.07
T_{10}	Potato dextrose agar (PDA)	40.17	27.62
SE(m) ±		1.90	
CD at 5%		5.67	

Table 2: Growth character of *Colletotrichum musae* in different sources of nitrogen 7 days after inoculation

Treatment	Nitrogen Sources	Mean dry mycelial weight (mg)	Percent increase over control
T_1	Ammonium carbonate	539.7	108.09
T_2	L-asparagine	1496.0	476.86
T_3	Sodium nitrate	592.3	128.40
T_4	Potassium nitrate	485.0	87.01
T_5	Glycine	392.3	51.28
T_6	Ammonium sulphate	885.0	241.26
T_7	Urea	607.7	134.31
T_8	Control(W/O Nitrogen)	259.3	
SE(m) ±		20.31	
CD at 5%		61.21	

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