J. Mycopathol. Res. ***58(1&2)*** *: 47-50, 2020;* (ISSN 0971-3719)

Cultural and biochemical aspects of *Botryodiplodia theobromae* causing Tip blight of *Draceana fragrans victoriae*

TUSHNIMA CHAUDHURI* AND B.N. PANJA
Department of Plant Pathology, Faculty of Agriculture, Bidhan Chandra Krishi Viswavidyalaya, Mohanpur 741252, West Bengal

Received : 11.03.2020 Accepted : 08.04.2020 Published : 27.07.2020

Draceana, is basically an ornamental houseplant which creates a relaxing atmosphere with various health benefits. The foliage which is considered as the economic part is damaged by various diseases, of which tip blight is an important one. Various carbon containing media *viz*. Potato dextrose agar (PDA), Czepek's Dox Agar (CDA) and Oat meal agar (OMA) was used to study the radial growth of *Botryodiplodia theobromae* from *Draceana*. Among these three carbon media, the most effective medium for its rapid growth was PDA medium followed by OMA and CDA media. Significant differences were not observed in the colony morphology of the fungus using the various carbon containing media. But the data showed that the growth rates differed significantly in all the dates of observations. There were significant differences not only among all the media used but also on a particular medium considered. Bioassay was conducted using four fungicides *viz*. Copper oxychloride, Mancozeb, Chlorothalonil and Difenoconazole with six different concentrations including control. It was found that EC50 value of Difenoconazole was 5.861*µ*g per ml which was found to be most effective followed by Chlorothalonil, which was 129.4 *µ*g per ml and the EC 50 values for Mancozeb and Copper oxychloride was at par. *i.e.* 269.8*µ*g per ml and 267.9*µ*g per ml respectively.

Key words : *Draceana*, *Botryodiplodia theobromae*, Czepek's Dox agar, Oat meal agar

INTRODUCTION

Dracaena fragrans victoriae of family Asparagaceae is an important indoor ornamental which help in air purification and humidity control. The fungus *Botryodiplodia theobromae* causes tip blight disease of the plant. The pathogen produces pycnidia and belongs to the order Sphaeropsidales. The concentration of carbon has a significant effect on the type of cultural growth of fungi on the media. Physical and chemical factors have a pronounced effect on diagnostic characters of fungi. Several workers have recognized the importance of spores as inoculum and studies have been conducted on the effects of various media components along with important physiological parameters that lead to maximum sporulation . Hence, it is necessary to use several media while attempting to identify a fungus in culture since mycelial growth and sporulation on artificial media are important biological characteristics. Also, the effective fungicide for the management of the disease is an important parameter to study.

*Corresponding author- tushnimachaudhuri13@gmail.com

MATERIALS AND METHODS

All the experiments were done in the laboratory of Department of Plant Pathology, BCKV. Three different carbon containing media were used to study the radial growth characteristics of the fungus *viz.* Potato dextrose agar (PDA), Czepek's Dox Agar (CDA) and Oat meal agar (OMA). Four different fungicides were used to test the fungicide sensitivity analysis *viz.* Copper oxychloride, Mancozeb, Chlorothalonil and Difenoconazole with six concentrations along with control. This experiment was done following the poison food technique. Degree of inhibition of mycelial growth by each fungicide was calculated by recording the per cent reduction in mean mycelial radial growth over that of control (Vincent, 1947). Per cent inhibition was measured with the formula, which is given below -

$$\text{Per cent inhibition} = \frac{\text{Radial growth in control(C)} - \text{Radial growth in treatment(T)} \times 100}{\text{Radial growth in control(C)}}$$

RESULTS AND DISCUSSION

Studies on radial growth of the fungi grown on different carbon sources

It is reported that highest mycelial growth and sporulation of *Botryodiplodia theobromae* was observed on PDA media. The pattern of radial growth of *B. theobromae* (Table 1) infecting *Draceana fragrans victorae* in different carbon sources utilisation indicated that full radial growth of the fungus was achieved at 240 hrs of incubation in all three media but the fastest growth was found in OMA medium.

it produced a thick mycelial growth with a cottony and fluffy appearance and this was a slow growing fungus.

Determination of per cent inhibition of the fungi against four different fungicides

The bioassay of the four fungicides against the fungus was done (Fig. 2 a - d).The percent inhibition of all the fungicides *i.e.*Copper oxychloride, Chlorothalonil, Mancozeb and Difenoconazole was calculated against *Botryodiplodia theobromae* . The fungi inhibited to the tune of 91.5% over control by Difenoconazole in 200 ppm (Table 3).

Table 1: Radial growth of *Botryodiplodia theobromae* from *Draceana fragrans victorae* at 24 hours interval on media with different carbon sources

Growth media	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after	Radial growth (cm) after
	24 hrs	48 hrs	72 hrs	96 hrs	120 hrs	144 hrs	168 hrs	192 hrs	216 hrs	240 hrs
PDA	0	1.1	2.1	3.2	4.4	5.3	6.2	7.4	8.1	9.0
CDA	0	1.1	2.2	3.1	4.3	5.2	6.1	7.2	8.1	9.0
OMA	0	1.1	2.1	3.1	4.2	5.3	6.2	7.4	8.4	9.0
SEm±	-	NS	NS	NS	NS	0.04	0.04	0.05	0.04	-
CD(0.05)	-	-	-	-	-	0.14	0.13	0.17	0.12	-

PDA = Potato dextrose agar, CDASWS=Czepek Dox agar supplemented with sucrose, CDASWL Czepek Dox agar supplemented with lactose, CDA= Czepek Dox agar, PSA=peptone salt agar ,OMA=oat meal agar

The rate of growth of *B. theobromae* **(**Table 2) infecting *Draceana fragrans victoriae* has been figured out at eight different dates of observations with an interval of 24 hrs in three different carbon containing media. The data showed that the growth rates differed significantly in all the dates of observations. There were significant differences not only among all the media used but also on a particular medium considered. It was found that the growth rate was highest in OMA. But at 168 - 192 hrs of incubation, the growth rate was highest in PDA and OMA medium. However, it was highest in CDA medium at 24 - 48 hrs of incubation. The radial growth rate averaged over on all dates of observations indicated that it was highest in CDA followed by OMA.

Studies on colony morphology of four fungi grown in different carbon sources

Botryodiplodia theobromae (Fig.1 a –c) grown in different carbon containing medium showed that

Studies on effective concentration at 50% growth inhibition i.e. EC 50

For *Botryodiplodia theobromae,* EC 50 value of Difenoconazole was 5.861*µ*g per ml which was found to be most effective followed by Chlorothalonil, which was 129.4 *µ*g per ml and the EC 50 values for Mancozeb and Copper oxychloride was at par. *i.e.* 269.8*µ*g per ml and 267.9*µ*g per ml respectively.

ACKNOWLEDGEMENT

I owe my deepest gratitude and regards to my honourable Chairman Prof. Birendranath Panja, Department of Plant Pathology. Words and deeds are really insufficient to repay the unending support, help, cooperation and inspiration from my seniors and friends without their help it would not have been possible for me to complete my work. Finally, my deep and sincere gratitude to my family for their continuous and unparalleled love, help and support.

Fig. 1 a: PDA medium **b:** CDA medium **c :** OMA medium

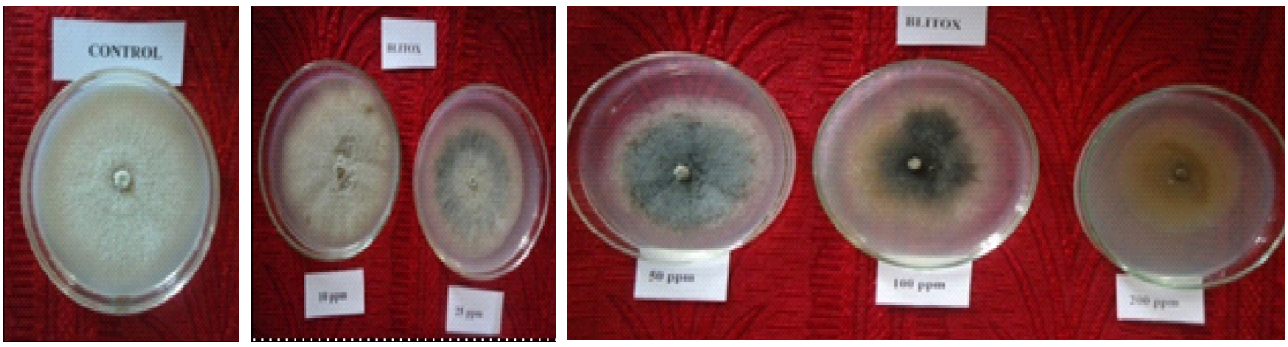

Fig. 2a : Copper oxychloride

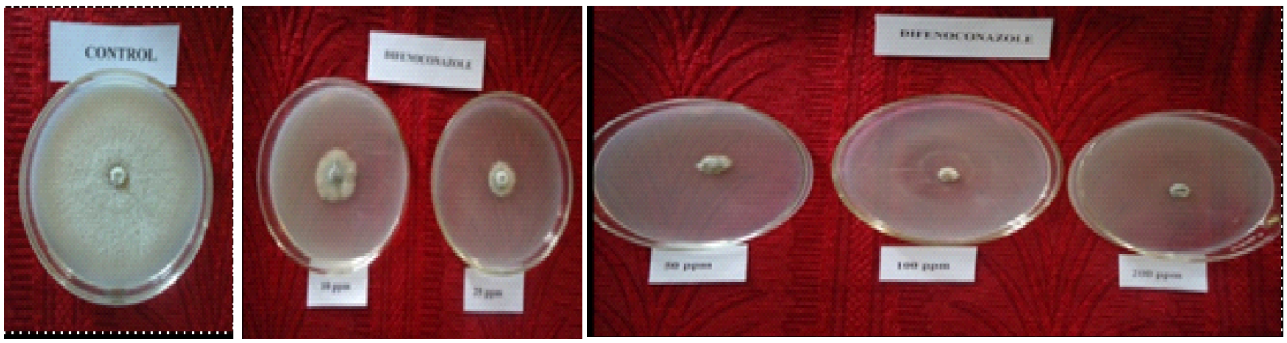

Fig.2b: Difenoconazole

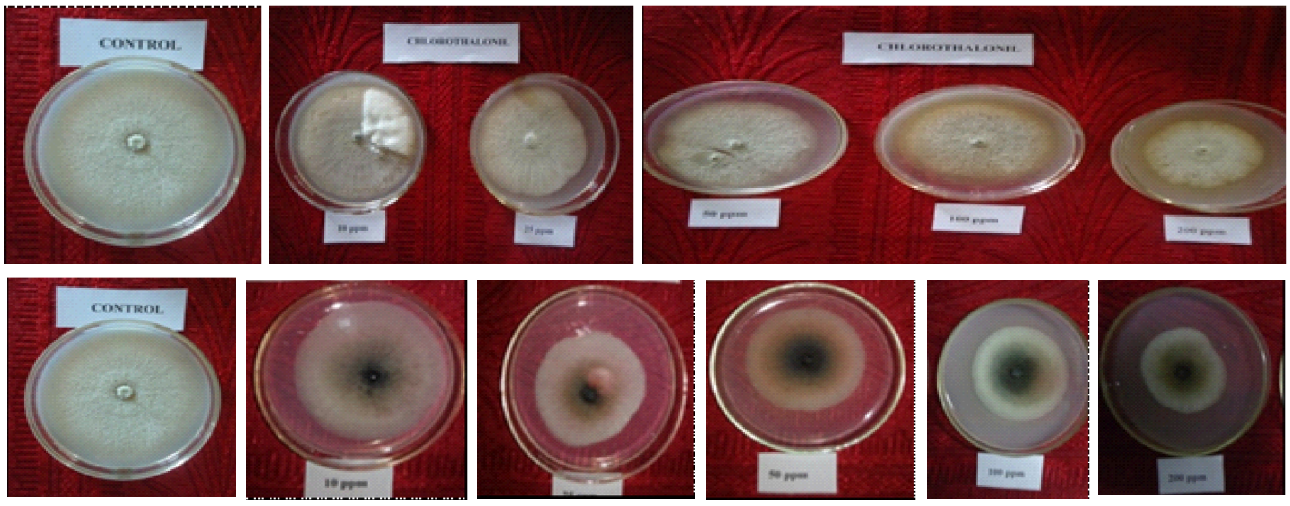

Fig. 2d: Mancozeb

Fig. 2: Effect of various fungicides on *Botryodiplodia theobromae*

Fig. 2 : Rate of growth of *Botryodiplodia theobromae* (cm/ hr) from *Dracaena fragrans victoriae* at 24 hrs interval in media with different carbon sources

Radial growth rate (cm/hr) between (24 -48) hrs	Radial growth rate (cm/hr) between (48-72) hrs	Radial growth rate (cm/hr) between (72-96)hrs	Radial growth rate (cm/hr) between (96-120)hrs	Radial growth rate (cm/hrs) between (120-144) hrs	Radial growth rate (cm/hr) between (144-168)hrs	Radial growth rate (cm/hr) between (168-192) hrs	Radial growth rate (cm/hr) between (192-216) hrs	Mean
0.045	0.044	0.044	0.050	0.035	0.038	0.052	0.028	0.042
0.048	0.039	0.047	0.047	0.040	0.038	0.045	0.038	0.044
0.048	0.041	0.038	0.051	0.044	0.038	0.050	0.041	0.043
0.001	0.002	0.002	0.001	0.002	0.002	0.002	0.002	
0.005	0.005	0.006	0.003	0.006	0.003	0.056	0.008	

PDA = Potato dextrose agar, CDASWS=Czepek Dox agar supplemented with sucrose, CDASWL Czepek Dox agar supplemented with lactose, CDA= Czepek Dox agar, PSA=peptone salt agar ,OMA=oat meal agar

Fig.3 : Per cent inhibition of four fungicides over control of Botryodiplodia theobromae

Fungicide	0 ppm (% inhibition over control)	10 ppm (% inhibition over control)	25 ppm (% inhibition over control)	50 ppm (% inhibition over control)	100 ppm (% inhibition over control)	200 ppm (% inhibition over control)
Copper oxychloride	0	4.9	10.4	20.4	31.9	43.0
Difenoconazole	0	65.2	71.5	73.0	88.9	91.5
Mancozeb	0	1.9	11.1	13.0	27.1	40.8
Chlorothalonil	0	3.0	21.8	29.3	43.7	50.4

REFERENCES

Vincent, J.M. 1947. Distribution of fungal hyphae in the presence of certain inhibitors. *Nature*. **159**:850