

## RESEARCH ARTICLE

# Evaluation of fungicides against *Botryodiplodia theobromae* causing collar rot in *Jatropha curcas*

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## ABSTRACT

*Jatropha curcas* is gaining importance as a biodiesel crop. Among the different diseases affecting *Jatropha*, collar rot caused by *Botryodiplodia theobromae* is an important one. Very little information is available on the management aspects of this disease. Therefore, different contact, systemic and combi product fungicides were evaluated against *Botryodiplodia theobromae*. Among the different fungicides tested, mancozeb and propineb (contact), propiconazole and carbendazim (systemic) and Quintal and Saaf (combi product) were found to be effective to manage the pathogen under *in vitro* conditions.

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## INTRODUCTION

Physic nut (*Jatropha curcas* L.) globally known as *Jatropha* belongs to the family Euphorbiaceae. It is a large shrub or small tropical tree widely distributed in arid and semiarid areas. It is a multipurpose crop of significant economic importance as a biofuel. Moreover, parts of the shrub are used in traditional medicine and as raw material for pharmaceutical and cosmetic industries (Paramathma *et al.*, 2006). Collar rot of *Jatropha curcas* caused by *Botryodiplodia theobromae* is becoming a major biotic constraint in the cultivation of this biodiesel crop. It is also called root rot disease. Symptoms can be observed at the collar portion or on stem as black discoloration in the beginning. Later extend in both directions resulting in drying of the twigs. In severe cases, drying spreads to the entire tree resulting in death of the tree. Symptoms can be observed in seedling stage also. Latha *et al.* (2009) reported this disease on *J. curcas* in India during 2007 from Tamil Nadu. Reports on chemical management of this disease are not much. *In vitro* evaluation of fungicides helps to identify effective fungicide for application in fields. Hence, an attempt was made to identify the effective fungicide to manage *B. theobromae*.

## MATERIALS AND METHODS

***In vitro* evaluation of fungicides against *Botryodiplodia theobromae* :**

Contact, systemic and combi product fungicides were evaluated against *B. theobromae* by employing poisoned technique (Nene and Thapliyal, 1982) at three concentrations. The calculated quantity of fungicide was added to Potato dextrose agar (PDA), mixed thoroughly and poured into sterilized Petri plates and allowed to solidify. After solidification each plate was inoculated with a 5 mm diameter disc obtained from an actively growing margin of *B. theobromae* colony on PDA. There were 3 replicates of each treatment. The Petri dishes were incubated at 27±1°C in BOD incubator. The observations on colony diameter were recorded when control plate was completely covered with the test fungus. Per cent inhibition of mycelial growth of test fungus was calculated by using the following formula the results were analysed statistically :

$$I = \frac{C - T}{C} \times 100$$

where,

I: Per cent inhibition

C: Radial growth in control  
T: Radial growth in treatment

## RESULTS AND DISCUSSION

The experimental findings obtained from the present study have been discussed in following heads:

### *In vitro* evaluation of contact fungicides against *Botryodiplodia theobromae* :

Results from Table 1 indicate that among the contact fungicides evaluated, mancozeb was the best in inhibiting the mycelial growth of *B. theobromae* (82.15%) followed by

propineb (76.17%). Both mancozeb and propineb completely inhibited the mycelial growth completely at 0.3 per cent. Copperoxychloride was found to be least effective (8.85%). Shelar *et al.* (1997) also reported that mancozeb (0.25%) was highly effective against *B. theobromae* in both solid and liquid media under *in vitro* conditions. Copperoxychloride was least effective among the tested fungicides against *B. theobromae* (Mahmood and Gill, 2002).

### *In vitro* evaluation of systemic fungicides against *Botryodiplodia theobromae* :

Among the systemic fungicides tested, results of Table 2 indicate that propiconazole was best in inhibiting the

**Table 1: Effect of contact fungicides on mycelial growth of *Botryodiplodia theobromae***

Fungicide	Per cent inhibition over control			Mean
	0.1%	0.2%	0.3%	
Propineb	61.85 (51.87)*	66.66 (54.73)	100.00 (90.00)	76.17
Copperoxychloride	5.85 (13.80)	7.21 (15.47)	13.51 (21.47)	8.85
Chlorothalonil	47.96 (43.80)	64.99 (53.77)	76.84 (58.57)	63.26
Captan	30.00 (33.17)	41.47 (40.07)	60.49 (51.07)	43.98
Mancozeb	68.70 (56.00)	77.77 (61.87)	100.00 (90.00)	82.15
	F	C	FC	
S.E.±	0.87	0.68	1.51	
C.D. @ 1%	3.38	2.64	5.86	

\*Figures in the parenthesis indicate arc sine transformed values

**Table 2: Effect of systemic fungicides on mycelial growth of *Botryodiplodia theobromae***

Fungicides	Per cent inhibition over control			Mean
	0.025%	0.05%	0.1%	
Triademefon	57.40 (49.28)*	83.51 (66.05)	85.92 (67.97)	75.61
Carbendazim	92.77 (74.41)	93.88 (75.69)	95.00 (69.19)	93.88
Difenoconazole	66.85 (56.71)	73.14 (59.91)	77.22 (62.16)	72.40
Hexaconazole	78.15 (62.71)	82.22 (67.13)	87.59 (68.87)	82.65
Propiconazole	82.96 (73.33)	100.00 (90.00)	100.00 (90.00)	94.32
Tebuconazole	82.77 (65.64)	91.85 (73.42)	92.96 (74.61)	89.19
	F	C	FC	
S.E.±	1.68	1.19	2.91	
C.D. @ 1%	6.45	4.57	11.17	

\*Figures in the parenthesis indicate arc sine transformed values

**Table 3: Effect of combiproducs on mycelial growth of *Botryodiplodia theobromae***

Fungicide	Per cent inhibition over control			Mean
	0.1%	0.2%	0.3%	
Avatar	87.40 (69.21)*	89.07 (70.71)	89.44 (71.07)	88.64 (70.30)
Merger	91.66 (73.23)	93.14 (74.82)	100.00 (90.00)	94.93 (76.99)
Quintal	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)
Saaf	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)	100.00 (90.00)
Taqat	90.18 (71.76)	90.92 (72.49)	91.85 (73.39)	90.98 (72.52)
Vitavax power	93.33 (75.06)	94.25 (76.13)	100.00 (90.00)	95.56 (77.84)
	F	C	FC	
S.E.±	0.23	0.16	0.39	
C.D. @ 1%	0.88	0.61	1.50	

\*Figures in the parentheses indicate arc sine transformed values

mycelial growth (94.32%) followed by carbendazim (93.88%). Propiconazole inhibited mycelial growth completely at 0.1 and 0.2 per cent. Difenoconazole was found to be least effective (72.40%) in inhibiting mycelial growth of *B. theobromae*. The results are in accordance with Mitra and Pan (2008) who observed complete inhibition of *B. theobromae* infecting guava with propiconazole and carbendazim.

#### ***In vitro* evaluation of combiproducs against *Botryodiplodia theobromae* :**

Among the combiproducs tested against *B. theobromae*, Quintal and Saaf completely inhibited the mycelial growth of *B. theobromae* (100%) at all concentrations tested. This was followed by Vitavax power (95.56%) and Merger (94.93%). Avatar was found to be least effective (88.64%) (Table 3). Mesta *et al.* (2009) reported that Quintal was most effective that inhibited 58.39 per cent spore germination and 65.18 per cent mycelial growth in *Alternaria helianthii*. Kishore (2007) reported complete inhibition of *Fusarium oxysporum* f.sp. *gerberae* with Saaf at 500, 1000, 1500 and 2000 ppm.

Knowledge about the effective fungicides in managing collar rot of *Jatropha curcas* will help in effective management of the disease in field conditions.

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