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In-vitro Evaluation of Fungicides against Myrothecium Leaf Blight Disease of Cotton

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A B S T R A C T

Myrothecium leaf blight disease caused by *Myrothecium roridum* causes loss in seed cotton up to 15-20 per cent. The disease appears in the form of minute spots, which get enlarged and coalesce to form irregular spots. Later the necrotic area dry and withers giving rise to shot hole. Considering the importance of the disease, management studies have been conducted for the control of Myrothecium leaf blight of Cotton. Among the eleven fungicides evaluated under *in-vitro* by poison food technique cent per cent inhibition of mycelial growth was recorded in Carbendazim 12% + Mancozeb 63% WP and Hexaconazole 4% + Zineb 68% WP by 100% followed by Carbendazim 50% WP with 98.2% and Tebuconazole 25.9% EC with 97.9%. The minimum inhibition was recorded in Azoxystrobin 23% SC with 13.6%.

Introduction

Cotton is one of the most important fibre crops in India, It sustains the Indian cotton textile industry, which constitutes the single largest segment of organized industries in the country. The production potential of the crop has not been fully exploited due to biotic and abiotic factors. The crop suffers from various diseases i.e. bacterial blight, grey mildew, alternaria leaf spot, myrothecium leaf spot, collar rot and wilt etc., of which foliar diseases take a heavy toll (Hosagaudar *et al.*, 2008). Among all the foliar diseases the incidence of Myrothecium leaf blight is growing consistently throughout the country. The infection on leaves and petioles leads to defoliation while on bolls results in damage of the lint by way of staining the fibres, thus reducing the economic value of the lint (Shrivastava and Singh, 1973). Sinha and Narain (1993) tested seven fungicides during 1990 and 1991 and have observed carbendazim to be most effective against *Myrothecium roridum* on soyabean. Dighule *et al.*, (2011) studied the efficacy of chemical fungicides against the fungal foliar diseases of cotton and observed that, the chemical fungicides Mancozeb (0.3%), Propiconazole (0.1%), Propineb (0.3%) and Copper oxychloride (0.25%) proved their efficacy against Alternaria leaf blight, Myrothecium and Helminthosporium leaf spot diseases of cotton with increase in the yield of seed cotton. Amongst seven fungicides tested under *in-vitro* condition against *M. roridum*,

Benomyl, Saaf and Vitavax power were proved to be most effective in inhibiting the mycelial growth of the fungus (Talukdar *et al.,* 2013).

Materials and Methods

The experiment was carried out in the laboratory, Department of Plant Pathology, College of Agriculture, Orissa University of Agriculture and Technology, Bhubaneswar and AICRP on cotton, Bhawanipatna. Myrothecium infected cotton leaf samples were collected from AICRP on Cotton, Bhawanipatna and Central Research Farm, Orissa University of Agriculture and Technology, Bhubaneswar.

The affected portion of the leaves were cut into small pieces and surface sterilized with (0.1%) mercuric chloride ($HgCl_2$) solution for 30 seconds and then washed properly with sterile water for four times and transferred to the petriplates (4 bits per petriplate) containing Potato dextrose agar medium (PDA).

The plates were incubated at room temperature (27±1°C) and the growth was observed periodically. The culture thus obtained was purified with single spore and hyphal tip methods. The isolated fungus was identified using standard manuals (Subramanian, 1971) and the pathogenicity was proved on *Gossypium hirsutum* (Var.BS-30).

The efficacy of different chemicals was tested on PDA medium against against *Myrothecium roridum* by poison food technique. Eleven fungicides viz. Difenoconazole 25% SC (Score), Azoxystrobin 23% SC (Onestar), Tebuconazole 25.9% EC(Folicur), Azoxystrobin 11% +Tebuconazole 18.3% SC (Custodia), Hexaconazole 5% SC (Contaf), Zineb 80% WP (Dithane Z-78), Hexaconazole 4% +Zineb 68% WP (Avtar), Thiophanate methyl 50% WP (Topsin-M), Mancozeb 75% WP (Dithane M-45), Carbendazim 50% WP (Bavistin) and Carbendazim 12% + Mancozeb63% WP (Saaf) were prepared in required concentrations by dissolving known quantity of fungicides in sterile distilled water separately under aseptic conditions. The poisoned medium was equally distributed into three Petri plates, which were treated as three replications. The pathogen was cut into 5 mm discs from the periphery of actively growing colony with sterilized cork borer and transferred to the centre of each plate containing poisoned medium. Control was maintained by placing fungal discs in plates containing untreated (not poisoned) medium. All the inoculated Petri plates were incubated at 28±2ºC in BOD incubator. The observation was recorded after fifteen days of inoculation. Per cent inhibition in the growth of the organism in different chemical treatments over the control was calculated. The percentage inhibition of radial growth was calculated using the formula given by Vincent (1927).

$$I = \frac{C - T}{C} X\,100$$

Where,

I = per cent inhibition.
C = growth of pathogen in control
T = growth of pathogen in treatment

Results and Discussion

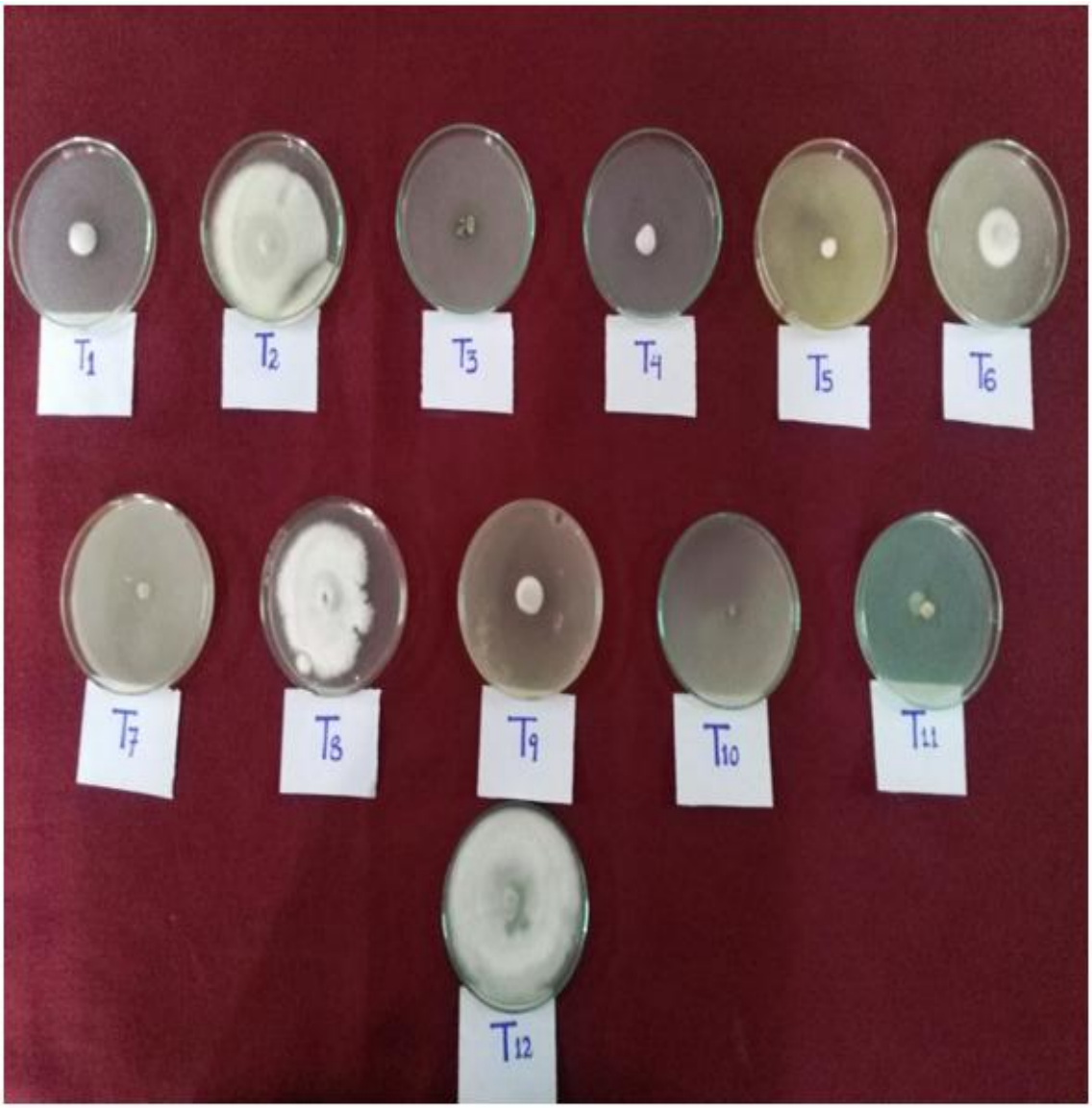
Poisoned food technique was employed for the evaluation of eleven fungicides under in-vitro conditions against *M. roridum*. The results in Table 1 revealed that all the fungicides were capable of inhibiting the mycelial growth of test fungus at recommended dosage in comparison to control. Per cent growth inhibition of *M. roridum* by various fungicides tested ranged from 100% to 13.60% 15DAI (Fig. 1).

Table.1 Evaluation of fungicides against growth of *M.roridum in-vitro*

T. No	Chemical Name	Dosage	Radial growth (mm)	% inhibition
T1	Difenoconazole 25% SC	0.05%	13.96*	84.5 (66.81)
T2	Azoxystrobin 23% SC	0.1%	77.76	13.6 (21.64)
T3	Tebuconazole 25.9% EC	0.05%	1.9	97.9 (81.67)
T4	Azoxystrobin 11% +Tebuconazole 18.3% SC	0.1%	21.26	76.4 (60.94)
T5	Hexaconazole 5% SC	0.1%	7.83	91.3 (72.84)
T6	Zineb 80% WP	0.25%	28.93	67.9 (55.49)
T7	Hexaconazole 4% +Zineb 68% WP	0.2%	0.00	100 (90.00)
T8	Thiophanate methyl 50% WP	0.15%	57.06	36.6 (37.29)
T9	Mancozeb 75% WP	0.2%	15.43	82.9 (65.57)
T10	Carbendazim 50% WP (**STANDARD**)	0.2%	1.66	98.2 (82.29)
T11	Carbendazim12%+ Mancozeb 63% WP	0.2%	0.00	100 (90.00)
T12	Control		90.00	
	SE(m)±		**0.239**	
	CD (0.05)		**0.702**	

*Mean of three replication
Figures in the parenthesis are arc sin transformed value

Fig.1 *In-vitro* bioassay of fungicides against *Myrothecium roridum*



T1 – Difenoconazole
T_2- Azoxystrobin
T_3- Tebuconazole
T_4- Azoxystrobin+Tebuconazole
T_5-Hexaconazole
T_6 - Zineb
T_7 – Hexaconazole + Zineb
T_8 – Thiophanate methyl
T_9 - Mancozeb
T_{10} - Carbendazim
T_{11}–Carbendazim + Mancozeb

Complete inhibition of mycelial growth was recorded in Carbendazim 12% + Mancozeb 63% WP and Hexaconazole 4% + Zineb 68% WP by 100% followed by Carbendazim 50% WP with 98.2% and Tebuconazole 25.9% EC with 97.9%. The least inhibition was recorded in Azoxystrobin 23% SC with 13.6%.

Similar results have been reported by Tomar and Shastry (2006) who studied the efficacy of five fungicides viz. Carbendazim (0.1%), Carboxin (0.2%), Chlorothalonil (0.2%), Triademefon (0.2%) and Propineb (0.2%) in suppressing seed- borne *M. roridum.* and observed that Carbendazim was the most

effective fungicide, which decreased the recovery by 100% over the control. Ingole and Ingle (2011) tested the efficiency of fungicides viz., carbendazim, mancozeb, chlorothalonil, penconazole and difenoconazole at different concentrations (i.e. 50, 125, 250 and 500 ppm) against *Myrotheciumroridum in-vitro*. They observed that maximum inhibition was recorded in carbendazim, penconazole and difenoconazole in all concentrations followed by chlorothalonil and mancozeb.

The present study on evaluation of fungicides against *Myrothecium roridum* under in-vitro condition showed Carbendazim 12% + Mancozeb 63% WP and Hexaconazole 4% + Zineb 68% WP to be most effective with cent per cent inhibition.

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