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Management on red rot: The cancer of sugarcane

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Abstract
Colletotrichum falcatum has been tested in *in-vitro* for various fungicides and essential oils. In the essential oil tests, a maximum inhibition of mycelia growth (48%) in peppermint oil, and a minimum inhibition of mycelia growth in peppermint were found at 10µl concentration. Chlorothalonil was shown to have fully inhibited mycelia growth of test-fungus from five fungicides, accompanied by chlorothalonil (80.0%), whereas bayleton (75.71%) was less inhibitive.

Keywords: *Colletotrichum falcatum*, fungicides, essential oils and sugarcane

Introduction
Sugarcane is one of the country's largest crop production for agriculture and the industrial economy. In India, sugarcane and sugar are regarded as their original habitat. Red rot is one of the essential and damaging *Colletotrichum falcatum* sugarcane disease Went. Studies at SBI Coimbatore showed that pathogenic infections reduced significantly sucrose, purity, and CCS in diseased canes, and in their studies at Vishwanathan and samiyappan (1999). Reduced the amount of saccharine from good canes. Satyavir *et al*. (2002) [3] have found that red rot, red rot infection decreases in extraction by 7.1-32.5%; polarity by 7.4-38.7%; purity-coefficient by 7.8-39% and CCS-reduction by 19.2-40.95%. The Indian sugar demand for 2030 is estimated to be 36 million tons, with a sugar recovery of 11 percent, and an average cane yield of 100 t / ha which either by increasing productivity can be achieved. The studies presented in these studies consist of those of kzl, s *et al*. (2005) [1] who have reported essential oils Viz *Cymbopogon citrate*, *Mentha piperita* and three plant pathogens at 2µl, 6µl and 10 µl concentrations, Colletotrichum capsici and *C. acutatum*, *C. falcatum*. The prevalence of this disease is most significant for many reasons. Red rot is one of the major diseases responsible not only for decreasing production but also for reducing the cane quality and sugar content. In order to evaluate the effect of different fungicides, essential oils so that disease can be managed effectively were presented to assess the importance of sugar cane and its economic value as well as to visualize the seriousness of the disease.

Materials and Methods food: On radial growth of test funguses through poisoning techniques, theefficacy of various essential oils and fungicides at different conctrations was assessed.

***In- vitro* Screening of essential oils:** During this analysis, Lemongrass (*Cymbopogon citrate*) was used with two main oils, Peppermint oil (*Mentha piperita*). Four 2µl, 6µl and 10µl concentrations have been used. At first, the discs were autoclaved and inserted into the sterilized Petri plate with the help of a separate conc. micropipette. Put on the Petri platform of potato dextrose agar media and placed on the center of each Petri platform oil i.e. 2, 6 and 10µl and a 5 mm fungal disk. Then the three replicate Petri plate for 7 days was incubated at 25 ± 1ºC. After seven days of incubation, pathogen growth was assessed.

***In-vitro* Screening of fungicide against the pathogen:** The efficacy of various *C. falcatum* fungicides was tested in vitro using poisoned food techniques (Sharvelle, 1960) [4]. At concentrations of 100, 200 and 300 ppm, fungicides Viz, Carbendazim, Tebuconazole, Difenoconazole, Triadimefon and Chlorothalinil were tested in test fungi. The scale of the colony was measured. In distilled water in the test tube, a 10 ml solution with a concentration of 10000 ppm each fungicide was prepared. In 250 ml containing 60 ml of the melted potato dextrose agar was added the necessary solution to achieve the correct final concentrations of 100,200 and 300 ppm. A solution was needed. Prior to plating, the medium was thoroughly mixed. Through fungicide toxic media was poured onto three plates of Petri. Non-toxicatedmediums were poured onto regulated Petri plates.

The sterile cork borer was cut off after solidification of themedium and positioned in thecenter of any plate by a 5 mmmyceliadisc of the 6 day old culture for the test pathogen. Included at 25 ± 1ºC were Petri-plates.The radial growth was measured after 7 days of incubation. The percent growth inhibition was based on the average colony diameter and measured using the Mckinneymethod (1923) [2].

Result and Discussion

Effect of essential oils on growth of the test fungus: In order to monitor the effectiveness of the test fungus, two essential oils were screened with poisoned food technique, namely, peppermint oil (*Mentha piperita*). Mycelia growth inhibition differed considerably in various concentrations with various essential oils, i.e. 2µl, 6µl and 10µl. Results revealed that in peppermint oils (24.29%) with a concentration of 2 µl, maximum mycelia Growth Inhibition was reported followed by lemon grass oils (14.29%) while minimum mycelia growth inhibition in peppermint oils was observed.

The peppermint (32.86 percent) and lemon grass (28.43 percent) have reported maximum inhibition of mycelia growth at a concentration of 6µl. Most inhibitions were observed in peppermint oil in mycelia development. Peppermint oil and lemongrass oil have been reported with the concentration of 10µl for complete inhibition of mycelia development. The above findings also show that peppermint oil displays maximum inhibition above 6µl. Test fungus is the most effective against fungus. The results show that further tests of these oils against the pathogen are required, which may lead to a betterpathogen control alternative. The mycelium growth of several fungi mentioned by Kzl is inhibited by higher levels of certain essential oils (2005). They also documented that fungal pathogen maximum inhibition is higher in the peppermint oil in line with bisht *et al*. (2013).

***In-vitro* screening of fungicide against the pathogen**

Efficacy of various *C. falcatum* fungicides was studied in vitro by poisoned food methods (Sharvelle, 1960) [4]. Viz, the fungicides are Carbendazim, Tebuconazole, Difenoconazole, Trailimefon and chlorothalonilConcentrations of 100,200 and 300 ppm were assessed against test fungus. The colony diameter was measured in the distilled water ofa test tube with a stock solution of 10000 ppm of each fungicide. In the required 250 ml flask of sterilized melted potato dextrose agar 60% was added the correct amount of the solution to achieve the final concentrations needed before plating. Every media was poured onto three Petri plates toxic to fungicide. Non-toxicated media were poured onto regulated Petri plates. The 5 mm mycelia disk of the 6 days old test pathogens was cut with sterile cork borers and placed at the center of each Petri plate after solidification. Around 25 ± 1 ºC were the Petri plates incubated. Radial growth was measured after 7 days of incubation. A medium colony diameter was used in evaluating the percent inhibition of growth and measured with Mckinney (1923) [2] formula(s).

Table1: Efficacy of different essential oils on the growth of *C. falcatum*at 2, 6 and 10µl concentrations

Essential oils	Radial growth of fungus(mm)				Growth inhibition (%)				CD	S.E(m)	CV
	2µl	6µl	10µl	Control	2µl	6µl	10µl	Control	1.7	0.5	1.6
Peppermint oil	60	55	47	70	14.29	32.86	100	70			
Lemon grass oil	57	55	48	70	18.57	22.86	100	70	4.8	1.3	4.5

Table 2: Efficacy of different fungicides on the growth of*C.falcatum* at 100, 200 and 300 ppm concentration:

Treatments	Chemicals	Radial growth of fungus(mm)			Growth inhibition (%)		
		100ppm	200ppm	300ppm	100ppm	200ppm	300ppm
T1	Kavach (Cholorthalonil)	42.00	23.002	14.00	40.00	64.28	74.28
T2	Bayleton (Triadimefon)	25.00	20.00	17	64.28	71.42	75.71
T3	Bavistin (carbendazim)	0.0	0.0	0.0	100	100	100
T4	Score (Difenconzole)	0.0	0.0	0.0	100	100	100
T5	Azoxistrobin (Tebuconazole)	0.0	0.0	0.0	100	100	100
	Control	70	70	70	0.0	0.0	0.0

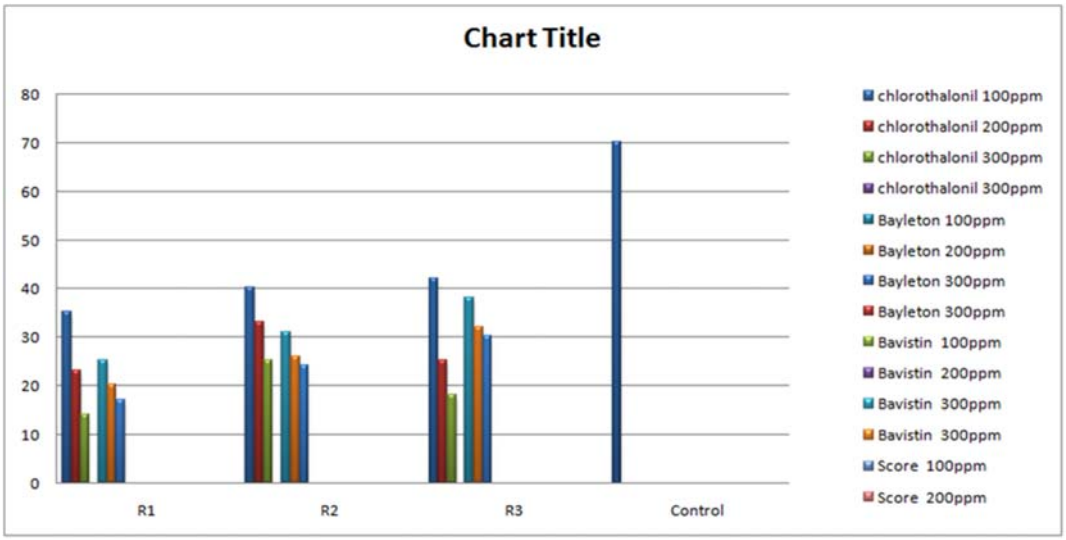

Fig 1: Represents the efficacy of different fungicides on the growth of C. falcatum

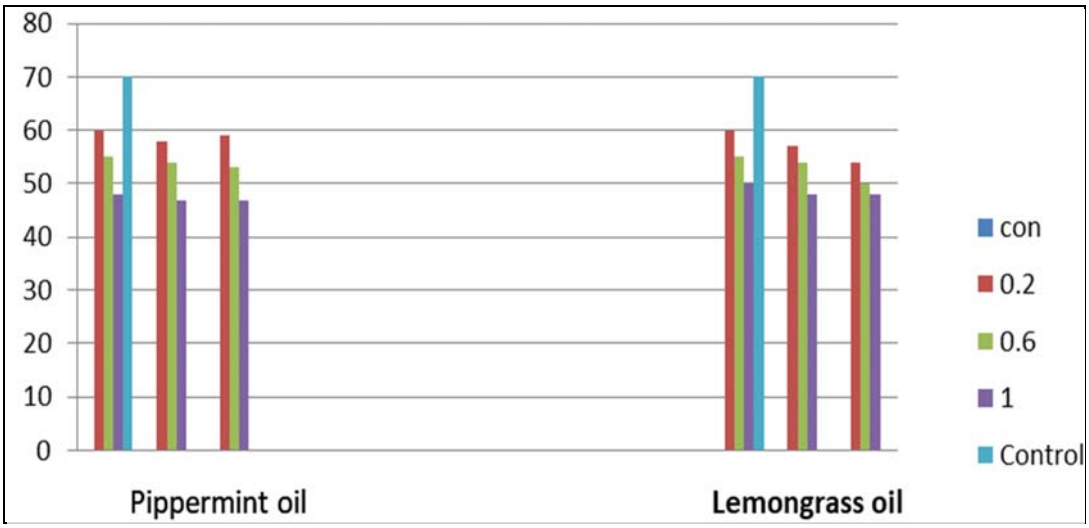

Fig 2: Represents the efficacy of different essential oils on the growth of C. falcatum

Discussion

The results from virulence comparison tests certainly indicate that *Colletotrichum falcatum* isolates vary in virulence as measured by their spread rate in a resistant and a sensitive host and confirms to some degree that these differences in all the variances tested so far are correlated with various morphological variations in this respect by the authors of previous preliminary evidence.

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