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SHORT COMMUNICATION

In vitro screening of chemical and organic fungicides against Branch Canker disease in tea

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Branch canker disease is caused by *Macrophoma* sp . The infected stem portions of tea plant were collected and identified by using 18S rRNA method. *In vitro* experiment was carried out to evaluated various fungicides against branch canker pathogen. Out of the ten chemical fungicides tested, Benomyl, Carbendazim and Companian were found to be efficient against test pathogen at 10 ppm level. Copper oxychloride was noticed maximum growth inhibition of *Macrophoma* sp . The commercial botanical fungicides of Expel, Enroot and Attopsy were recorded highest inhibition of Branch canker pathogen at 0.1 % concentrations.

Key words: Antagonistic potential, fungicides, *Macrophoma* sp , nucleotide sequence.

Tea is the most popular beverage consumed in many parts of the world. Tea is produced from the young shoots of the commercially cultivated tea plant [*Camellia sinensis* (L.) O. Kuntze]. Tea in south India is cultivated in the hilly tracts of the Western Ghats at an altitude ranging from 500 to 2200 m above mean sea level. The Branch canker disease is caused by *Macrophoma* sp. and serious stem disease in southern India. The present study aimed to evaluate the effect of different chemical and organic fungicides against Branch canker pathogen under *in vitro* condition. The branch canker pathogen was isolated from tea growing area and identified through 18S rRNA methods. PCR amplification, DNA sequencing of the ITS region of the rRNA gene and finally sequences were submitted to NCBI (Accession No. KP004441 for Branch canker pathogen - VPM). The different concentration of fungicides and botanical fungicides were evaluated *in vitro* against branch canker pathogen applying Food Poisoned Technique using PDA as conventional medium. All the PDA plate containing fungicides were inoculated with 5 mm disc test pathogen from seventh days old culture. The plate containing PDA without fungicides were maintained as control and all treatments were replicated thrice. After seven days incubation, the treatment plates were measured along with fully grown control plate and per cent of inhibition (PI) was calculated by Bell'scale method. *In vitro* screening of systemic fungicides such as benomyl, carbendazim and companion showed 100 % growth inhibition against *Macrophoma* sp. at 10 ppm level followed by propiconazole and hexaconazole (Table 1). The same results are in agreement with Suryawanshi (2008) *et al,* who *evaluated* efficacy of different fungicides evaluated against *Macrophomina phaseolina* blight of

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Table 1 : Evaluation of chemical fungicides against *Macrophoma* sp. under *in vitro* level

Chemical fungicides	Percentage of growth inhibition at different concentrations of chemical fungicides (ppm)					
	10	20	30	40	50	CD at P= 0.05
Benomyl (50 % WP)	100.00±00	-	-	-	-	0.0
Propiconazole (25 % EC)	75.00±1.15	78.22±0.44	81.44±0.38	85.44±0.48	89.22±0.57	1.7
Mancozeb (75 % WP)	31.44±1.00	45.33±1.98	49.86±1.06	55.33±0.74	62.66±0.99	3.6
Carbendazim (50 % WP)	100.00±00	-	-	-	-	0.0
Companian (carbendazim 12 % + mancozeb 63 % WP)	100.00±00	-	-	-	-	0.0
Hexaconazole (5 % EC)	35.99±1.28	40.44±0.75	59.55±1.59	61.55±0.64	66.66±0.53	3.0

Values are Means ± SE of four replication of three repeated experiments

Table 2 : *In vitro* screening of Copper fungicides against branch canker pathogen

Copper group fungicides	Concentrations	Growth inhibition (%)	C.D. at P=0.05
Copper oxychloride 435 (liquid)	0.62%	74.42±0.39	
	1%	82.15±0.85	1.7
	1.24%	83.08±0.51	
	1.85%	87.33±0.47	
Copper hydroxide (77 % WP)	0.62%	60.91±0.73	
	1%	69.66±1.17	4.7
	1.24%	77.71±2.64	
	1.85%	82.71±0.49	
Copper oxychloride (50 % WP)	0.10%	3.55±0.28	
	0.30%	84.26±0.96	2.0
	0.45%	85.79±0.44	
	0.75%	88.75±0.42	

Values are Means ± SE of three replication of three repeated experiments

Table 3 : Bio efficacy of botanical fungicides against branch canker pathogen under lab condition

Botanical fungicides	Concentrations	% inhibition of growth	C.D. at P=0.05
Ecocare	0.10%	7.62±0.45	
	0.30%	23.91±2.05	
	0.50%	29.95±0.51	3.6
	0.75%	44.04±0.77	
	1%	50.06±1.03	
Fungfinish (5 % copper formulation)	0.10%	0.00±0.00	
	0.30%	1.55±0.44	
	0.50%	38.04±1.21	2.1
	0.75%	75.33±0.48	
	1%	85.55±0.38	
Tari (Organic Plus Tea special)	2%	0.00±0.00	
	4%	19.55±0.99	
	6%	54.53±5.17	8.0
	8%	69.77±2.83	
Nimbicidine (0.03 % Azadiractin EC)	2%	11.75±0.40	
	4%	33.26±1.10	3.2
	6%	45.68±0.91	
	8%	52.53±1.17	
Tricure (0.03 % Azadiractin EC)	2%	10.80±0.54	
	4%	43.37±1.23	3.4
	6%	74.95±2.14	
	8%	100.00±0.00	
Enroot	0.1%	100.0±0.00	0.0
Attopsy	0.1%	100.0±0.00	0.0
Expel (Combination of canolar extract Tea tree oil)	0.1%	100.0±0.00	0.0

Values are Means ± SE of three replication of three repeated experiments.

mungbean. Moreover, several workers (Gore *et al,* 2008) reported similar inhibitory potential of different fungicides against *Macrophomina* sp. The contact fungicides of copper group *viz.,* copper oxychloride (50 %WP),copper hydroxide and copper oxychloride 435 (liquid) were tested against branch canker pathogen under *in vitro*. Among the copper group, copper oxychloride (50 % WP) was noticed highest growth inhibition against test pathogen followed by liquid copper oxychloride 435 and copper hydroxide (Table.2). Earlier researchers like, Sanjay *et al,* (2008) reported that the contact fungicide of copper oxychloride gave the best disease control of grey blight pathogen in tea. The commercial botanical fungicides were tested against *Macrophoma* sp. at different concentrations level. In this present study, botanical fungicides (Expel, Enroot and Attopsy) were found to be efficient against the test pathogen at 0.1 % concentration level (Table 3). These results are in agreement with Nepolean *et al,* (2014).

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