

LABORATORY EVALUATION OF BIOACT-T FOR THE CONTROL OF RHIZOCTONIA SOLANI FROM TURF

- 1 Objective :

To evaluate the fungicidal or inhibitory efficacy of BIOACT-T against *Rhizoctonia solani*, a causal fungi of Brown Patch Disease in Bermuda grass, *Cynodon dactylon*.
- 2 Materials and Methods

The Poison Food Technique was used in the laboratory testing for fungicidal and inhibitory effects of the test chemicals and their derived concentrations.

 - a) Test micro-organisms : *Rhizoctonia solani*, a fungal pathogen isolated from Bermuda grass from golf courses.
 - b) Treatments are the recommended dosage of BIOACT-T at concentrations 1:100 and 1:200 for both replicated 4 times along with 4 replicates of untreated control and the commonly used pesticide treatment eg. Benomyl and metalaxyl at 1.0 g/L as benchmark chemicals.
 - c) The inoculum of *Rhizoctonia solani* was cultured in pure cultures. Growth media (potato dextrose agar) was prepared in flasks and sterilized in autoclave at 121°C for 15 minutes at 15 psi. When sufficiently cooled the prepared BIOACT-T stock solutions were each pipetted into the media flasks, swirled to mix and dispensed into petri plates with a dispenser and allowed to set. A similar set for fungicides benomyl and metalaxyl were prepared. The untreated control contains no chemical infusion.

Innoculum plugs of 1 cm diameter of the *Rhizoctonia solani* were cut with a sterilized cork borer at the peripheral edge of the cultures. Each plug was transferred to the center of the treatment plates, sealed, labeled, inverted and incubated at 25°C following sterile techniques. The foregoing operation was carried out in a laminar flow hood and transferred to an incubator for culture growth.
- 3 Assessments

Evaluation was done daily after inoculation by measuring the growth diameter of the fungal cultures for the treatments, control, metalaxyl and benomyl plates and recorded. Each plate was measured (growth diameter) twice, each measurement at right angles to each other (a&b).

Experiments ended when the cultures in the control plates were fully grown (5~10 days). The difference in culture sizes for the treatments were calculated and statistically analyzed. When no growth occurs, the chemicals is deemed to be fungicidal. Inhibitory or abnormal growth is deemed as fungistatic.
- 4 Results and Evaluation

- l) Pathogen : *Rhizoctonia solani* from Bermuda grass, *Cynodon dactylon*
 Date of inoculation : 22 Oct 1998 (Test 1)
 Replicates : 4
 Treatments : 6 treatments with 1 control (no chemical)
 Size of inoculum : 11 mm diameter
 Length of full growth on plate : 84 mm

Results :

CONTROL

Date	Day 2 (mm)	Day 4 (mm)		% of control / plate
Plate 1a	27	84		0
b	27	84		
Plate 2a	26	84		0
b	26	84		
Plate 3a	28	84		0
b	28	84		
Plate 4a	28	84		0
b	28	84		
Mean	27.25	84.0		0 %

BENOMYL 1.0 g/L

Date	Day 2 (mm)	Day 4 (mm)	Day 6 (mm)	% of control / plate
Plate 1a	12	40	65	22.6
b	12	40	65	
Plate 2a	11	38	63	25.0
b	11	38	63	
Plate 3a	11	38	64	23.8
b	11	38	64	
Plate 4a	11	38	64	23.8
b	11	38	64	
Mean	11.25	38.5	64.0	23.8 %

METALAXYL 1.0 g/L

Date	Day 2 (mm)	Day 4 (mm)		% of control / plate
Plate 1a	25	84		0
b	25	84		
Plate 2a	25	84		0
b	25	84		
Plate 3a	25	84		0
b	25	84		
Plate 4a	25	84		0
b	25	84		
Mean	25	84.0		0 %

BIOACT-T (1:200)

Date	Day 2 (mm)	Day 4 (mm)	Day 6 (mm)	% of control / plate
Plate 1a	11	19	30	64.3
b	11	19	30	
Plate 2a	11	18	27	67.9
b	11	18	27	
Plate 3a	11	19	28	67.3
b	11	19	27	
Plate 4a	11	18	29	65.5
b	11	18	29	
Mean	11.0	18.5	28.38	66.25 %

BIOACT-T (1:100)

Date	Day 2 (mm)	Day 4 (mm)	Day 6 (mm)	% of control / plate
Plate 1a	13	18	24	71.4
b	13	18	24	
Plate 2a	13	17	21	75.0
b	13	17	21	
Plate 3a	13	17	25	70.2
b	13	17	25	
Plate 4a	13	17	23	72.6
b	13	17	23	
Mean	13.0	17.25	23.25	72.30

- II) Pathogen : *Rhizoctonia solani* from Turf
Date of inoculation : 15 Jan 1999 (Test 2 / Repeat Trial)
Replicates : 4
Treatments : 5 treatments with 1 control
Size of inoculum : 11 mm diameter
Length of full growth on plate : 84 mm

Results :

CONTROL

Date	Day 1 (mm)	Day 3 (mm)		% of control / plate
Plate 1a	35	84		0
b	35	84		
Plate 2a	34	84		0
b	34	84		
Plate 3a	35	84		0
b	35	84		
Plate 4a	34	84		0
b	34	84		
Mean	34.5	84.0		0 %

BENOMYL 1.0 g/L

Date	Day 1 (mm)	Day 3 (mm)	Day 5 (mm)	% of control / plate
Plate 1a	28	67	84	0
b	28	67	84	
Plate 2a	28	71	84	0
b	28	71	84	
Plate 3a	23	67	84	0
b	23	67	84	
Plate 4a	23	74	84	0
b	25	72	84	
Mean	25.75	69.5	84.0	0 %

METALAXYL 1.0 g/L

Date	Day 1 (mm)	Day 3 (mm)	Day 5 (mm)	% of control / plate
Plate 1a	27	80	84	0
b	27	80	84	
Plate 2a	25	78	84	0
b	26	78	84	
Plate 3a	26	80	84	0
b	27	80	84	
Plate 4a	26	80	84	0
b	26	80	84	
Mean	26.25	79.5	84.0	0 %

BIOACT-T (1:200)

Date	Day 1 (mm)	Day 3 (mm)	Day 5 (mm)	% of control / plate
Plate 1a	14	37	52	38.1
b	15	37	52	
Plate 2a	15	32	48	42.9
b	15	32	48	
Plate 3a	15	32	48	42.9
b	15	32	48	
Plate 4a	14	32	46	45.2
b	14	32	46	
Mean	14.63	33.25	48.5	42.28 %

BIOACT-T (1:100)

Date	Day 1 (mm)	Day 3 (mm)	Day 5 (mm)	% of control / plate
Plate 1a	17	23	32	61.9
b	17	23	32	
Plate 2a	17	25	34	59.5
b	17	25	34	
Plate 3a	17	24	33	60.7
b	17	24	33	
Plate 4a	17	25	34	59.5
b	17	25	34	
Mean	17.0	24.25	33.25	60.4 %

5 Summary Results

Treatment	% Control	
	Test 1	Test 2
Control	0.0	0.0
Benomyl 1.0 g/L	23.80	0.0
Metalaxyl 1.0 g/L	0.0	0.0
BIOACT-T (1:100)	72.30	60.40
BIOACT-T (1:200)	66.25	42.28

6 Discussion & Conclusion

Benomyl and metalaxyl are the currently recommended fungicides for the control of the brown patch disease caused by the fungi, *Rhizoctonia solani* for disease management in turf and fairway greens of the golf courses in Singapore. Brown patch is the major disease encountered in turf especially during the rainy season besides the root rot disease caused by *Phytophthora spp.*

Two tests were conducted at different times to assess the fungicidal activities of BIOACT-T as compared to the recommended pesticides. A summary of the above results was presented above. Highly significant differences were observed between all BIOACT-T treatments and their dilution rates.

Results showed that BIOACT-T was more effective (highly significant) than the benchmark fungicides which at times had exhibited no control against the pathogen. BIOACT-T is a fungal growth inhibitor. The higher concentration (1:100) for BIOACT-T was significantly better than the more diluted (1:200). BIOACT-T (1:100) was able to slow fungal growth by 60~72 % emerging as the most effective among the treatments.

BIOACT-T has potential for introduction into golf courses for the management of brown patch diseases on turfgrass. While these have the potential to reduce and

slow down *Rhizoctonia solani* invasion they however do not eradicate the pathogen which could possibly be achieved when used in combination with other fungicides in a disease management programme.

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