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Archives of Applied Science Research, 2011, 3 (5):242-244
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Enhancing the bioefficacy of *trichoderma viride* with sodium salts for minimizing rhizome rot of turmeric

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ABSTRACT

Studies were conducted to observe the effect of sodium salts such as sodium carbonate and sodium bicarbonate on enhancing the bio-efficacy of *Trichoderma viride* for minimizing the rhizome rot of turmeric caused by *Sclerotium rolfsii*. Minimum radial growth of *Sclerotium rolfsii* was found with 1.0% concentration on both the sodium salts.

Key words: *Trichoderma viride*, *Sclerotium rolfsii*, Sodium salts, Turmeric.

INTRODUCTION

Turmeric (*Curcuma longa* L.) is an ancient spice in the world. It is used in medicine and religious purposes [1]. During storage, rhizome rot caused by *Sclerotium rolfsii* which causes heavy loss [2]. This disease is controlled by applying the fungicides [3]. However, several reasons, such as the consumers growing health concern and environmental pollution associated with fungicide use, the development of fungicide resistant strains of pathogen have motivated the search for alternative approaches [4]. Biological control of diseases of fruits and vegetables has emerged as a promising alternative for synthetic fungicides [5]. Attempts have been made to study the antagonistic activity of *Trichoderma viride* in combination with sodium salts.

MATERIALS AND METHODS

Procurement of antagonist

Trichoderma viride procured from National Chemical Laboratory, Pune, India. It was grown on Czapeks dox agar medium and stored at 26± 2°C in BOD incubator for further study.

Isolation of pathogen

Sclerotium rolfii was isolated from infected rhizomes of turmeric and maintained on Czapek's dox agar medium (CZA) at $26 \pm 2^\circ\text{C}$ in BOD incubator.

Growth of *Sclerotium rolfii* in presence of sodium salt (*in vitro*)

To test the sensitivity of *S. rolfii* against sodium salts were incorporated in CZA (Czapek's Dox Agar Medium) at concentration of 0.25, 0.50, 0.75, and 1.0%. 20 ml sterilized medium was poured in each petriplate. After solidification of medium 6 mm disc of 7 days old culture of *S. rolfii* was inoculated into the Petri plates in triplicates. The plates were incubated at $26 \pm 2^\circ\text{C}$ in BOD incubator for 7 days. The radial growth of *S. rolfii* was recorded.

Antagonism in dual culture

Antagonistic activity of *Trichoderma viride* was tested by employing dual culture technique [6]. Sodium salts such as sodium carbonate & sodium bicarbonate were incorporated in CZA medium at the concentration of 0.25, 0.50, 0.75 and 1.0%. 20 ml sterilized medium was poured in each plate. After the solidification of the medium 6mm diameter of mycelial disc from actively growing margin were taken from 7 days old culture of *Sclerotium rolfii* and *Trichoderma viride* were placed on the opposite site of plate at equal distance from the periphery and incubated at $26 \pm 2^\circ\text{C}$. The three replications were maintained for each concentration. The radial growth of pathogen was measured and percent inhibition of average radial growth was calculated by using following formula [7].

$$L = [(C-T)/C] \times 100$$

Where, L = Inhibition of radial mycelium growth

C = Radial growth of pathogen in control

T = Radial growth of pathogen in the presence of bioagent

RESULTS AND DISCUSSION

Table-1. Growth of *S. rolfii* in the presence of sodium salts. (*in vitro*)

Sodium salts	Concentrations (%)	Linear growth of <i>S. rolfii</i> (mm)
Sodium carbonate	0.25	78
	0.50	68
	0.75	23
	1.00	16
Sodium bicarbonate	0.25	82
	0.50	69
	0.75	34
	1.00	15
Control	-	83
C.D (0.05)		0.3

Effect of sodium salts on the growth of *Sclerotium rolfii* (*in vitro*)

The growth of *S. rolfii* was suppressed significantly by different concentrations of sodium salts *in vitro*, indicating that both the sodium salts inhibited the growth of test fungus (Table-1). However, maximum inhibition of growth of *S. rolfii* was observed at 1.0% conc. each of sodium

carbonate (16mm) and sodium bicarbonate (15mm) respectively. The inhibition of fungal growth by due to the fungistatic action of sodium salts are reported [8].The direct inhibitory effect of sodium bicarbonate on mycelium growth of *Rhizopus stolonifer*, *Alternaria alternata*, and *Fusarium spp. in vitro*. [9].

Antagonistic activity of *Trichoderma viride* on *Sclerotium rolfsii*.

The maximum growth inhibition of *Sclerotium rolfsii* was observed in the plates containing 1% concentration of both the sodium salts with *Trichoderma viride* (Table-2).

Table-2. Inhibition of growth of *S. rolfsii* by *Trichoderma viride* with sodium salts. (*in vitro*)

Treatments	Concentrations (%)	% inhibition of mycelial growth
Sodium carbonate + <i>Trichoderma viride</i>	0.25	43.00
	0.50	52.00
	0.75	64.50
	1.00	80.00
Sodium bicarbonate + <i>Trichoderma viride</i>	0.25	45.50
	0.50	50.00
	0.75	65.00
	1.00	80.00
C.D (0.05)		0.4

Acknowledgement

The first author is thankful to UGC New Delhi for award of Rajeev Gandhi National Fellowship and UGC- DRS- SAP Meritorious Student Fellowship.

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