

In-vitro efficacy of Copper oxychloride against *Fusarium solani* causing rhizome rot of Ginger.

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ABSTRACT

The present study was undertaken to study the effect of copper oxychloride on *Fusarium solani* causing rhizome rot of Ginger. The production is affected by heavy economic loss by rhizome rot therefore; to control this disease different fungicides were tested against *Fusarium solani* and the fungicide Copper oxychloride was found effective against fungal growth causing rhizome rot of Ginger. The fungicide Copper oxychloride was tested at different concentrations i.e., 0.0, 0.1, 0.15, 0.2, 0.25 and 0.3% *in vitro* against *Fusarium solani*. The growth was 5.00 mm on 1st day and 74.00 mm at 7th day incubation period at 0.1% conc. of fungicide. At 0.15% growth was 61.00 mm, 38.00 mm at 0.2%, 27.00 mm at 0.25% and 5.00 mm at 0.3 % on 7th day of incubation period. In the present finding it was observed that 0.3% concentration of Copper oxychloride was most effective in controlling the growth of *Fusarium solani* causing rhizome rot of ginger.

Keywords: Ginger Rhizome rot, Copper oxychloride and *Fusarium solani*.

INTRODUCTION

Zingiber officinale Rosc. Rhizomes are cultivated as spices and is being used as vegetable and spice, since long time. This plant belongs to family Zingiberaceae consisting of more than 1200 plant species with 53 genera which is a tropical plant, especially abundant in Indo-Malaysian region. The estimated production is 3.70 lakh tones and the cultivated area in India is about 1.06 lakh ha and in 2009 (Spices Board, 2004-05). It is one of the spices crops that produce a large amount of foreign exchange for the country (Tarafdar and Saha, 2007). The major factor affecting the production of ginger is the rhizome rot in spite of other foliar diseases exist but rhizome rot is one of the major causes of crop losses. Rhizome rot occurs in many parts of India where ginger crops are grown. Rhizome rot are diseases affecting the rhizome irrespective of pathogens involved which result is the partial or total loss of ginger rhizome. The disease of rhizome rot of ginger can be controlled by the application of fungicides like Copper oxychloride.

Similar research were carried to study chemical control of the disease and they found effective against the rhizome rot (Usman, 2006; Meena and Mathur, 2005) systemic and contact fungicides like Bavistin 50WP, Dithane M-45, Captan, Ridomil Gold MZ-72, Copper Oxychloride and Bordeaux mixture etc. were reported effective against the disease (Sagar, 2006). Therefore, in the present study the efficacy of Copper oxychloride fungicide was studied to control rhizome rot of ginger.

MATERIAL METHODS

The infected and healthy rhizomes along with the soil were collected from different parts of Marathwada i.e., Parbhani, Hingoli, Nanded, Latur, Beed, Jalna and Aurangabad. The isolation of pathogen was made by taking 1 x 1 cm pieces of surface sterilized infected rhizome and inoculated aseptically on potato dextrose agar medium. The purification of pathogen was carried out by culturing on PDA medium by hyphal tip method for three times and maintained on PDA slants by using single spore and hyphal tip methods given by Tuite, (1969) Wang and Wen (1997), Kareppa *et al.* (1998) and Choi *et al.* (1999).

The isolated fungal pathogens were identified by preparing slides by mounting in cotton blue stain. The pathogen was identified on the basis of growth and characteristic features of the mycelium as well as reproductive structures and was further identified by sequencing. The morphological identification and characterization of isolated pathogen *Fusarium solani* (Mart.) Sacc. was confirmed by using the standard literature of 'Illustrated genera of Imperfect fungi' (Barnett and Hunter, 1972), Alexopoulos *et al.* (1996).

The present *invitro* study was done by poisoned food technique as carried by Nene and Thapliyal, (1993). In this method sterilized, cooled potato dextrose agar medium was prepared and incorporated with required concentrations of fungicide. This 20 ml media was poured into 90 mm sterilized petri plates and all plates were inoculated with actively growing 5 mm mycelial disc in the centre of media and incubated at room temperature for 7 days. A control plate was maintained without adding any fungicide to the medium. To study the results 3 replicates were maintained for each concentration and their radial growth was measured in the form of millimeter (mm). The fungicide Copper oxychloride was tested at five concentrations i.e., 0.0, 0.1, 0.15, 0.2, 0.25 and 0.3% *in vitro* against *Fusarium solani*. The observations were recorded until the control plate was full of growth of the pathogen and recorded the growth in millimeter (mm).

Statistical Analysis:

Statistical analysis was carried out as per the procedure given by Panse and Sukhatme (1967). Data in percentage were transformed to arc sine and square root values and analysis was (CRD) and M-Stat C from Vasant Rao Naik Marathwada University, Parbhani.

RESULTS & DISCUSSION

The fungicide copper oxychloride was also used to study sensitivity of rhizome rot of ginger caused by *Fusarium solani*. For this experiment, different concentrations of fungicide used were from 0.0, 0.1, 0.15, 0.2, 0.25 and 0.3%.

Table 1: Effect of Copper oxychloride against growth of *Fusarium solani*

Incubation period (Days)	Growth (mm)					
	Conc. of fungicide (%)					
	0(Control)	0.1	0.15	0.2	0.25	0.3
1	5.00	5.00	5.00	5.00	5.00	5.00
2	13.33	13.33	11.66	8.33	7.66	5.00
3	25.00	23.00	16.33	12.66	10.66	5.00
4	35.66	36.00	25.00	20.66	14.33	5.00
5	52.33	45.00	35.66	26.66	19.00	5.00
6	75.00	57.00	49.00	35.00	22.66	5.00
7	90.00	74.00	61.00	38.00	27.00	5.00
SE ±	1.257	1.201	1.105	0.761	0.742	0
CD @ 5%	3.869	3.697	3.401	2.341	2.276	0

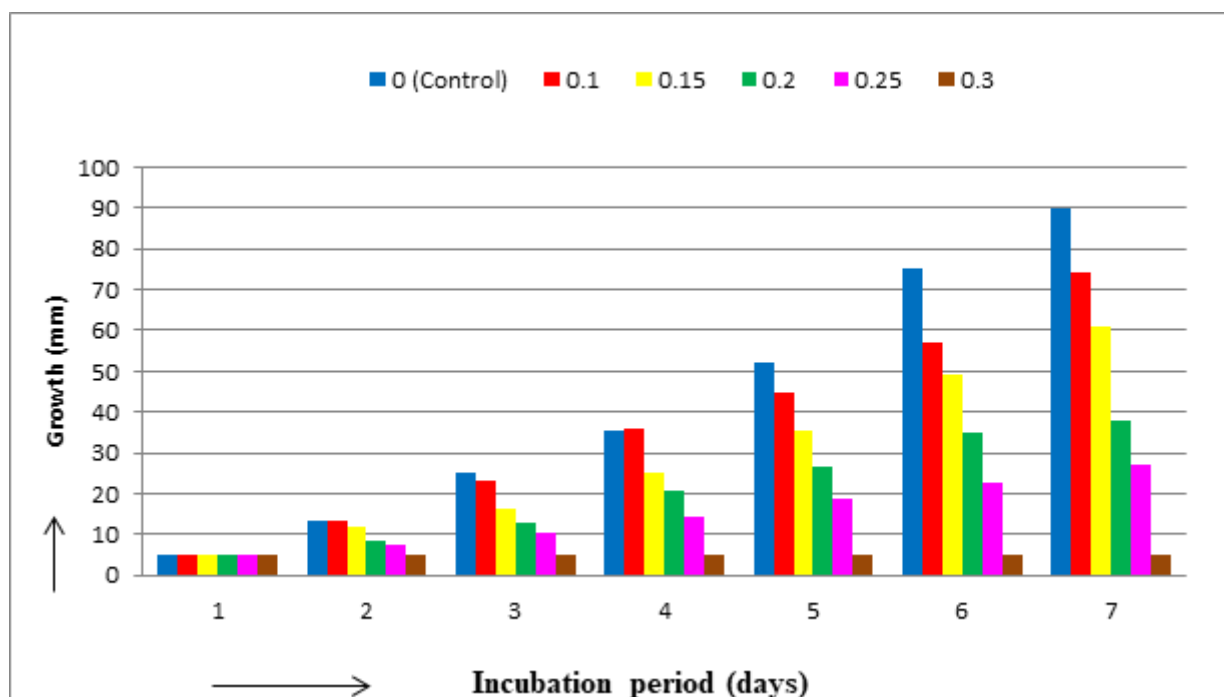


Fig. 1: Effect of copper oxychloride against growth of *Fusarium solani*

The experiment is conducted at different incubation period i.e., for seven days. The growth of the *Fusarium solani* was highest at 0.1% after control or 0.0%, while 0.3% conc. Of fungicide was very significant which suppressed the growth of the pathogen.

The growth was 5.00 mm on 1st day and 74.00 mm at 7th day incubation period at 0.1% conc. of fungicide. At 0.15% growth was 61.00 mm, 38.00 mm at 0.2%, 27.00 mm at 0.25% and 5.00 mm at 0.3 % on 7th day of incubation period as given in Table 1, Fig. 1. It was also noted that, as the conc. of Copper oxychloride increases, the growth level decreases at 0.25% conc. Therefore it can be concluded that 0.3% concentration of Copper oxychloride is most effective in controlling the growth of *Fusarium solani* causing rhizome rot of ginger. There were several reports regarding in-vitro evaluation of chemical fungicides against *F. oxysporum*. The results are in conformity with those reported by Ilyas *et al.*, (1992), poddar *et al.*, (2004), Singh *et al.* (2000) and Dar *et al.* (2013).

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