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Effect of Mancozeb on *Fusarium solani* causing rhizome rot of *Zingiber Officinale* Roscoe.

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Abstract

The present study was undertaken to study the effect of Mancozeb on *Fusarium solani* causing rhizome rot of Ginger. Due to this disease development heavy economic loss occurs therefore; to control this disease different fungicides were tested against *Fusarium solani* and the fungicide Mancozeb was found effective against fungal growth causing rhizome rot of Ginger. The fungicide Mancozeb was tested at five concentrations i.e., 0.025, 0.05, 0.1, 0.15 and 0.2% *in vitro* against *Fusarium solani.* The result showed that 0.2% concentration of Mancozeb was most effective in controlling the growth of *Fusarium solani* causing rhizome rot of ginger.

Keywords: *Rhizome rot, Mancozeb, Fusarium solani and Zingiber Officinale*

Introduction

Zingiber officinale Rosc. is one of the earliest known spices and is being cultivated as rhizome in India for vegetable and spice, since time immemorial. This plant belongs to family Zingiberaceae which is a tropical group, especially abundant in Indo-Malaysian region, consisting of more than 1200 plant species with 53 genera. The area under cultivation in India is 1.06 lakh ha and the total production is 3.70 lakh tones in 2009 (Spices Board, 2009). It is an important crop that earns a sizeable amount of foreign exchange for the country (Tarafdar and Saha, 2007) [13]. Among the major constraints for growing ginger is the rhizome rot. Even though important foliar diseases do exist, rhizome rot is very important in view of severe crop losses. It occurs in several parts of India wherever these crops are grown. The term rhizome rot is loosely used for all the diseases affecting the rhizome irrespective of pathogens involved, since the ultimate result is the partial or total loss of rhizome.

Rhizome rot of ginger can be controlled by the application of fungicides. Many researchers worked on the chemical control of the disease and they found very

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promising effect of different chemicals against the disease Stirling et al., 2006 [12] Usman, 2006 [15] Meena and Mathur, 2005 [6]; systemic and contact fungicides like Bavistin 50WP, Ridomil Gold MZ-72, Captan, Dithane M-¬45, Copper Oxychloride and Bordeaux mixture etc. were reported effective against the disease (Sagar, 2006) [10]. Thus, the present study was undertaken to find out the efficacy of Mancozeb fungicide to control rhizome rot of ginger.

Material and Method

Samples of infected and healthy rhizomes along with the soil were collected from different regions 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) [14] Wang and Wen (1997) [16], Kareppa et.al., (1998) [5] and Choi et.al., (1999) [4].

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 identification of pathogen i.e., Fusarium solani (Mart.) Sacc. was confirmed by referring the standard literature of 'Illustrated genera of Imperfect fungi" (Barnett and Hunter, 1972) [2], Alexopoulos et al. (1996) [1].

The in vitro study was carried out by poisoned food technique as used by Nene and Thapliyal, (1993) [8] and Nasreen et. al., (2010) [7]. The required concentrations of fungicide was prepared and incorporated into sterilized, cooled potato dextrose agar. 20 ml of medium 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. Control was maintained without adding any fungicide to the medium. Three replications were maintained for each concentration and radial growth was measured in the form of millimeter (mm). The fungicide Mancozeb was tested at five concentrations i.e., 0.025, 0.05, 0.1, 0.15 and 0.2% 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) [9]. Data in percentage were transformed to arc sine and square route values and analysis was (CRD) and M-Stat C from Vasantrao Naik Marathwada University, Parbhani.

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Results and Discussion

The fungicide Mancozeb was tested against Fusarium solani causing rhizome rot of ginger. The different concentrations of fungicide used for the treatment were from 0.025 to 0.2%, 0.0% was treated as control and incubated for seven days.

Mancozeb fungicide was used to study against rhizome rot of ginger caused by *Fusarium solani* at different incubation period i.e., for seven days with different concentrations from 0.0 to 0.3% as shown in Table 1and Fig. 1. The 0.0% was treated as control to study the growth of the *Fusarium solani* which shows 5.00 mm growth at 1st day and 90.00 mm at 7th day of incubation period. As the concentration of fungicide increases from 0.1 to 0.3%, the growth of the pathogen was inhibited i.e., on 7th day of incubation period, the growth was 69.00 mm at 0.1%, 45.33 mm at 0.15%, 26.33 mm at 0.2%, 5.00 mm at 0.25% and also at 0.3% concentrations of fungicide. From above results, it can be inferred that 0.25 and 0.3% concentrations of fungicide were most effective to control the growth of *Fusarium solani* causing rhizome rot of ginger.

Similar results were observed by Nasreen and Ghaffar (2010) [7] who observed the effect of different fungicides for the control of Fusarium solani causing seedling, seed rot and root infection of bitter gourd, bottle gourd and cucumber. There observation showed that fungicides Mancozeb @ 100 ppm completely inhibit seed-borne infection of F. solani. Whereas Mancozeb and Carbendazim + Mancozeb gave 100 % inhibition of mycelial growth of F. solani at 0.2 and 0.3% concentrations (Chavan et al., 2009) [3]

Table 1: Effect of Mancozeb 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	11.66	11.33	7.00	5.00	5.00
3	25.00	23.00	14.66	10.33	5.00	5.00
4	35.66	34.33	21.00	14.66	5.00	5.00
5	52.33	46.66	27.33	18.00	5.00	5.00
6	75.00	58.33	39.66	21.66	5.00	5.00
7	90.00	69.00	45.33	26.33	5.00	5.00
SE ±	1.257	1.122	1.011	0.788	0	0
CD @ 5%	3.869	3.452	3.228	2.425	0	0

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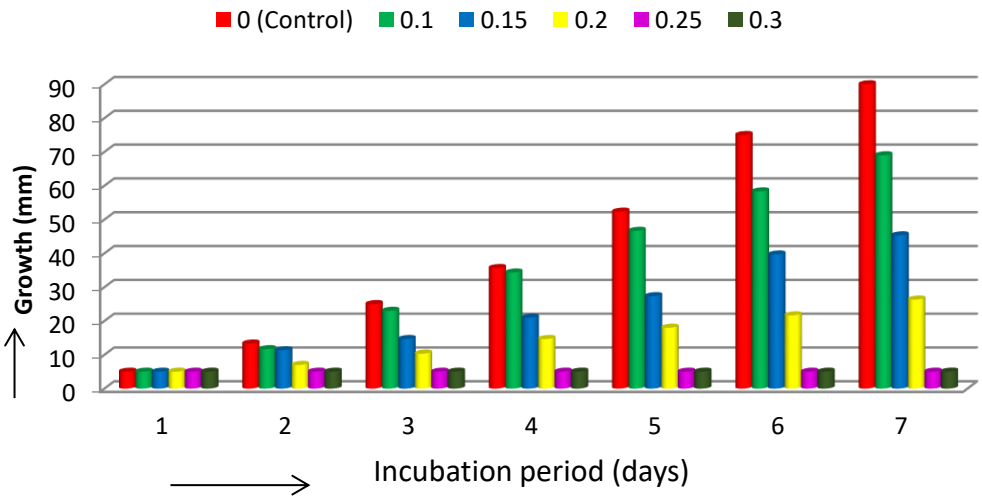
Fig.1: Effect of Mancozeb against growth of *Fusarium solani*



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