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Efficacy of Ridomil against *Fusarium solani* causing rhizome rot diseases of *Zingiber officinale* Rosc

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Abstract
The present study was undertaken to study the effect of Ridomil against *Fusarium solani* causing rhizome rot of *Zingiber officinale* Rosc. This disease causes heavy economic loss of ginger, to control this disease Ridomil fungicide was tested against *Fusarium solani* and was found effective against *Fusarium solani* causing rhizome rot of Ginger. The fungicide Ridomil 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 Ridomil was most effective in controlling the growth of *Fusarium solani* causing rhizome rot of ginger.

Keywords: Rhizome rot, Ridomil, *Fusarium solani* and *Zingiber officinale*

1. Introduction
The plant *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) [10]. It is an important crop that earns a sizeable amount of foreign exchange for the country (Tarafdar and Saha, 2007) [12]. 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 disease of ginger can be controlled by the application of fungicides. Many researchers worked on the chemical control of the disease and they found very promising effect of different chemicals against the disease Stirling *et al.*, 2006 [11] Usman, 2006 [14] Meena and Mathur, 2005 [5]. 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) [9]. Thus, the present study was undertaken to find out the efficacy of Ridomil fungicide to control rhizome rot of ginger.

2. 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) [13] Wang and Wen (1997) [15], 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 *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) [7] and Nasreen *et al.*, (2010) [6]. 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 Ridomil 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 was carried out as per the procedure given by Panse and Sukhatme (1967). 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.

3. Results and Discussion
The fungicide Ridomil was tested to study the effect on growth of the *Fusarium solani*. The results shows that at 0.025% concentrations of fungicide, the growth was 5mm on 1st day, while it increases up to 70.00 mm at 7th day of incubation period. This was the highest growth after control (0.0 %) as 90.00 mm at 7th day of incubation period. From 0.05 to 0.1% concentrations of fungicide, the growth of the *Fusarium solani* was intermediate i.e., 54.46 mm to 38.66 mm at different concentrations of fungicide. It was also noted that 0.15% and

0.2% concentrations of fungicides were very effective to inhibit the growth of the *Fusarium solani* viz. 15.33mm and 5.00 mm at 7th day of incubation period. It was concluded that, the fungicide Ridomil with concentration of 0.2% significantly control the growth of the pathogen. The above data is noted in Table.1, Fig. 1. The result is in association with the report of Chauhan *et al.*, (1990) [3] annd Ramachandran *et al.* (1989) in which Ridomil was most effective against the growth of *Fusarium solani.*

Table 1: Effect of Ridomil against growth of *Fusarium solani*

Incubation period (Days)	Growth (mm)					
	Conc. of fungicide (%)					
	0(Control)	0.025	0.05	0.1	0.15	0.2
1	5.00	5.00	5.00	5.00	5.00	5.00
2	13.33	14.00	11.33	6.66	5.00	5.00
3	25.00	20.00	18.00	13.33	5.00	5.00
4	35.66	28.66	23.33	17.33	6.66	5.00
5	52.33	42.66	33.00	24.00	10.33	5.00
6	75.00	55.66	44.00	31.66	13.33	5.00
7	90.00	70.00	54.46	38.66	15.33	5.00
SE ±	1.257	0.928	0.863	0.783	0.527	0
CD @ 5%	3.869	2.857	2.657	2.412	1.621	0

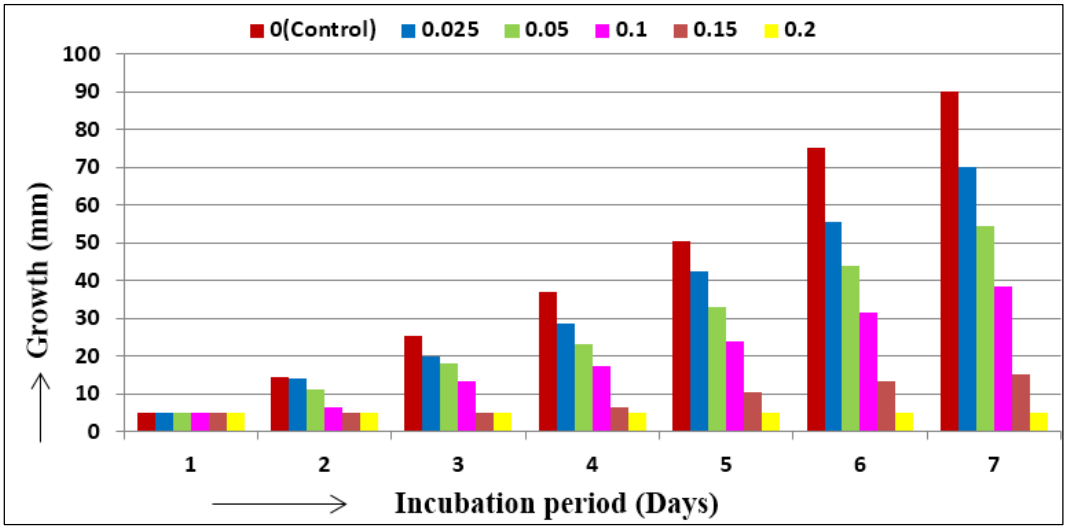

Fig 1: Effect of Ridomil against growth of *Fusarium solani*

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