

Efficacy of different fungicides in controlling rhizome rot of ginger

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Abstract: An experiment was conducted at Spices Research Centre (SRC), BARI, Shibgonj, Bogra to find out the efficacy of different fungicides on rhizome rot of ginger under field conditions. Ten different fungicides viz. Ridomil, Dithane M-45, Rovral, Folicur, Darsbun + Ridomil, Knowin, Bavistin, Mataril, Furadan and a Control were used in this study. Number of infected plants per bed was found less than those treated with the combined dose of Darsbun and Ridomil used as seed treatment and soil drenching respectively than those treated with other treatments as well as control. It was also found that combined dose of Darsbun and Ridomil gave the highest yield followed by single treatment of Ridomil and Mataril and the lowest yield as well as highest number of infected plants was obtained in control (without application of any fungicides).

Key words: Rhizome rot, Ginger, fungicide

Introduction

Ginger (*Zingiber officinale* Rose) is one of the most important spice and cash crop in Bangladesh. Ginger is used to manufacture different food products like gingerbread, confectionery and drinks like ginger brandy, wine and foodstuff in many western countries. Ginger has basic antiseptic properties and is used as a carminative and stimulant. In Bangladesh, it occupies an area of about 7692 hectares with the production of 43000 metric tons (BBS, 2006). The average yield of this crop is 5.59 t/ha, which is very low as compared to other ginger producing countries of the world. Ginger is attacked by various diseases, such as rhizome rot, bacterial wilt, leaf spot, anthracnose leaf spot, leaf blight, leaf blotch etc. Among all of the diseases, rhizome rot is most damaging one (Chattopadhyaya, 1997). Rhizome rot of ginger caused by *Pythium aphanidermatum* is a very common and widespread disease in ginger growing areas of Bangladesh. The disease causes serious constraint for ginger production in Bangladesh. The disease is very important because it causes economic losses to growers resulting in increased prices of products to consumers. The infected rhizome become rotten and is completely destroyed. The crop is affected in conducive soil for recurrent cultivation. The country depends on import of ginger and hence the trend of price is being increased always. There is no proper method available to control rhizome rot disease in Bangladesh. As the pathogen perpetuates in soil, so it is very difficult job to control. Thus, the present study was undertaken to find out the efficacy of different fungicides to control rhizome rot under field conditions.

Materials and Methods

The experiment was conducted at Spices Research Centre, BARI, Bogra, during the period of April 2006 to February 2007. A local cultivar of ginger (G006), highly susceptible to the rhizome rot, was planted on the 20th April in plots of 3.0 m × 1.5 m with a spacing of 50 cm from row to row and 25 cm from plant to plant. The design was RCBD with three (3) replications. The treatments were as follows: T₁= Ridomil (seed treatment + soil drenching); T₂= Dithane M-45 (seed treatment + soil drenching); T₃= Rovral (seed treatment + soil drenching); T₄= Folicur (seed treatment + soil drenching); T₅= Darsbun+ Ridomil

(seed treatment + soil drenching); T₆= Knowin (seed treatment + soil drenching); T₇= Bavistin (seed treatment + soil drenching); T₈= Mataril (seed treatment + soil drenching); T₉= Furadan (seed treatment + soil drenching) and T₁₀= Control

Rhizomes were dipped for 30 minutes in different fungicidal solution before planting. In case of treatment no. 5 (Darsbun + Ridomil), a solution was made by Darsbun and Ridomil and the rhizomes were dipped for 30 minutes and dried for 2-3 hrs. before planting. Soil was drenched at 90 days after planting up to October 30 at 15 days interval. Cultural practices were done as recommendation. Data were collected on disease incidence when the symptom appeared on the foliage. Harvesting was done in February 2007. The recorded data were statistically analyzed and the means were separated by DMRT for interpretation of the results.

Results

The effects of different fungicides on disease incidence of rhizome rot of ginger are presented in Table 1. The treatments had significant effect on controlling the disease other than plant height. Among the treatments, T₅ (Darsbun + Ridomil) showed the lowest (4.72) number plant infection per plot followed by T₁ (Ridomil) & T₈ (Mataril) and the highest (27.53) infected plant was found with T₁₀ (Control). Maximum plant height (65.35 cm) are found in those plant which are treated with combination of Darsbun and Ridomil followed by treatment Mataril (64.21 cm) and Ridomil (63.72 cm), but there is no significant difference among the treatments. The lowest per cent infected plant (13.11%) found with treatment Darsbun + Ridomil followed by treatment Ridomil (16.94 %) and Mataril (20.55%) but the highest per cent infected plant found with without application of any treatment. The highest rhizome weight (402.70 gm) per plant was found with T₅ (Darsbun + Ridomil) which is statistically similar to T₁ (Ridomil), T₆ (Knowin) & T₈ (Mataril) and the lowest rhizome weight (185.00 gm) per plant was found with T₁₀ (control). The maximum yield (32.20 t/ha) was obtained from the treatment T₅ (Darsbun + Ridomil) followed by T₁, T₈ & T₆ and the lowest yield (14.79 t/ha) was found in control treatment (T₁₀). For per cent yield increase, treatment T₅ (Darsbun + Ridomil) shows the highest (45.93 %) per cent of yield increase over control treatment (Table 2).

Table 1. Effect of different treatments on plant height and number of infected plant/ bed of ginger infected with rhizome rot disease

Treatment	Plant Height (cm)	No. of Infected Plant/ Bed	Per cent Infection
T ₁ = Ridomil	63.72	6.10 i	16.94 i
T ₂ = Dithane M-45	61.89	14.47 f	40.18 f
T ₃ = Rovral	59.98	17.41 e	48.35 e
T ₄ = Folicur	60.06	20.49 d	56.92 d
T ₅ = Darsbun+ Ridomil	65.35	4.72 j	13.11 j
T ₆ = Knowin	61.95	12.31 g	34.19 g
T ₇ = Bavistin	60.36	24.13 b	67.01b
T ₈ = Mataril	64.21	7.40 h	20.55 h
T ₉ = Furadan	60.57	22.53 c	62.57 c
T ₁₀ = Control	58.7	27.53 a	76.46 a
CV %	-	4.24	4.24
Level of Significant	NS	**	**

Treatment means having common letter(s) are not significantly different from each other at 5% level of significance, NS: Non Significant

Table 2. Effect of different treatments on yield and yield contributing characteristics of ginger infected with rhizome rot disease

Treatment	Rhizome Weight/ Plant (g)	Yield/ Plot (Kg)	Yield (t/ha)	Per cent Yield increase over control
T ₁ = Ridomil	386.60 ab	13.91 ab	30.91 ab	51.93
T ₂ = Dithane M-45	344.4 d	12.39 d	27.54 d	46.28
T ₃ = Rovral	317.60 e	11.43 e	25.40 e	41.74
T ₄ = Folicur	284.70 f	10.25 f	22.77 f	35.03
T ₅ = Darsbun+ Ridomil	402.70 a	14.49 a	32.20 a	54.06
T ₆ = Knowin	363.7 c	13.09 c	29.08 c	49.13
T ₇ = Bavistin	293.10 f	10.55 f	23.43 f	36.88
T ₈ = Mataril	379.90 bc	13.67 bc	30.37 bc	51.30
T ₉ = Furadan	301.40 ef	10.84 ef	24.09 ef	38.61
T ₁₀ = Control	185.00 g	6.65 g	14.79 g	-
CV %	3.25	10.46	10.40	-
Level of Significant	**	**	**	-

Treatment means having common letter(s) are not significantly different from each other at 5% level of significance

Discussion

The study revealed that all the fungicides had significant effect in controlling the disease other than plant height. Among the fungicides, the combined use of Darsbun and Ridomil showed the lowest (4.72) number of dead plant per plot followed by Ridomil & Mataril and the highest (27.53) with without treatment. The combined use of Dursbun and Ridomil had most significant effect against rhizome rot disease ensuring minimum number of plant infection followed by use of Ridomil and Metaril singly. The present findings do agree with Ramachandran *et al.* (1989) who tested five systemic fungicides against rhizome rot disease of ginger in the form of soil and seed treatments and reported that Ridomil and Apron 35 WS were the best controlling fungicides. The finding of the study also bears similarity with the findings of Rathaiah (1987), Chauhan and Patel (1990), Choe *et al.* (1996), Kim *et al.* (1998), Ram *et al.* (1999), Kusum *et al.* (2002) and Singh *et al.* (2004) who stated that Ridomil was highly effective against rhizome rot of ginger. Under the study no significant variation among the treatments became pronounced on plant height, this is may be due to no hormonal effect of the fungicides on the plant growth. The highest rhizome weight (402.70 gm) per plant found with Darsbun + Ridomil which is statistically similar to Ridomil, Knowin & Mataril and the lowest rhizome weight (185.00 gm) per plant found with control which is significantly different from the treated plant. The

combined use of Darsbun and Ridomil gave maximum yield (32.20 t/ ha) followed by Ridomil, Metaril & knowin, respectively. Similarly Dursbun and Ridomil combinately increase (45.93 %) per cent of yield over control. Considering the yield, all the treatments significantly increase the yield over control. It is found that Dursbun and Ridomil combinately gave highest yield which is 54.06% higher than control. The treatment Ridomil and Metaril alone increased 51.93% and 51.30% more yield, respectively over control. These findings support the reports of Ghorpade and Ajri (1982), Dohroo and Sharma (1983), Rathaiah (1987), Nath (1993), Ram *et al.* (1999), Jayasekhar *et al.* (2000) and Singh *et al.* (2004) who reported that highest seed germination, lowest disease incidence and more yields through application of Ridomil were found. Considering the weight of rhizome per plan, it is found that the combined use of Dursbun and Ridomil gave the highest weight which is statistically similar to those treated with Ridomil followed by Metaril and these may be due to presence of less inoculum in soil. From the above discussion, it may be mentioned that the combined use of Darsbun, and Ridomil as seed treatment and soil drenching treatments respectively was highly effective in controlling the disease as well as in increasing the rhizome yield followed by singly use of Ridomil. And the combined use of Dursbun and Ridomil or Ridomil alone may also be prescribed to the farmers for controlling rhizome rot of ginger. The findings of the study will be an

encouraging one in the ginger production in our country. However, further studies are necessary for more confirmation of the above findings in different locations of Bangladesh.

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