



REGULAR ARTICLE

MANAGEMENT OF RHIZOME ROT DISEASE OF GINGER (*ZINGIBER OFFICINALE* ROSE L.)

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SUMMARY

Ginger (*Zingiber officinale* rose L.) is an important spice crop belonging to family *Zingiberaceae*. Rhizome rot of ginger, caused by *Pythium aphanidermatum* (Edson) Fitz, is a major constraint for the production of healthy rhizome, sometimes causing total failure of crop. Chemical control of this pathogen is not economical because of high cost of chemicals, break down of resistance, environmental pollution, deleterious effect to non target beneficial soil micro-organism and ultimately the choice of the consumer for a organic product. Thus the treatment with plant products (*Boerhaavia diffusa* root extract) may offer a practical and economical alternative for eco-friendly management of this disease. Rhizomes dipped overnight in the suspension of 10.00 per cent crude root extract followed by 3 foliar sprays of the same proved quite effective in the management of the disease. Results indicated a gradual decrease in disease incidence with the corresponding increase in number of sprays and rhizome treatment with *B. diffusa* root extract.

Key words: Ginger, *Pythium aphanidermatum*, rot of ginger

A. K. Pandey et al. Management of Rhizome Rot Disease of Ginger (*Zingiber officinale* rose L.). J Phytol 2/9 (2010) 18-20.

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1. Introduction

Ginger (*Zingiber officinale* rose L.) is an important spice crop belonging to family *Zingiberaceae*. Rhizome rot of ginger caused by *Pythium aphanidermatum* (Edson) Fitz is a major constraint for the production of healthy rhizome, some times causing total failure of crop (Fagaria *et al.* 2006). Chemical control of this pathogen is not economical because of high cost of chemicals, break down of resistance, environmental pollution, deleterious effect to non target beneficial soil micro-organism and ultimately the choice of the consumer for a organic product. Thus the plant products treatment with (*Boerhaavia diffusa* root extract) may offer a practical and economical alternative for ecofriendly management of this disease. Rhizome dipped for overnight in the suspension of 10.00 per cent root extract of crude followed by 3 foliar sprays of the same concentration proved quite effective in the management of the disease as well as improved quality and enhanced quantity.

2. Materials and Methods

The present research was carried out at Main Experiment Station, Department of Vegetable Science, Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Faizabad (U.P.) India during *Kharif*, 2009. The rhizomes were planted in field at 25 x 15 cm spacing with three replications in randomized block design. The six treatments were applied in treated plots alongwith control (water soaked/sprayed).

Preparation of plant root extract

The roots of *B. diffusa* (B.D.) were cut into small pieces and allowed to dry under shade at room temperature. Root was powdered in a grinder and stored at low temperature for further use. The crude extract was prepared by making the suspension of root powder in sterile water @ 1 g/10 ml (w/v). The pulp was squeezed through two folds of cheese cloth and the homogenate was clarified by centrifugation at 3000 rpm for 15 minutes. The supernatant was used for seed treatment and foliar sprays (Verma and Awasthi, 1979).

Rhizome treatment

Rhizomes of ginger were soaked in *B. diffusa* root extract (10%) for over night. In control, rhizomes was soaked in water instead of B.D. root extract. The treated and untreated rhizomes were sown separately in the experimental plots as well in plastic pots filled with sterilized sand being used for seed quality traits assessment.

Three foliar sprays of 5.0 and 10.00 per cent B.D. root extracts were done at weekly interval starting just after apparent symptom appeared in the field for the first time. The symptomatology and disease incidence was recorded by the formula given as earlier (Verma and Awasthi, 1979.)

3. Results and Discussion

Results indicated a gradual decrease in disease incidence with the corresponding increase in number of sprays and rhizome treatment with *B. diffusa* root extract.

Minimum disease incidence (25.04) per cent was recorded in T₅ (rhizome treatment + 3 foliar sprays with (10%) *B. diffusa* root extracts) followed by T₄ (29.49) per cent (rhizome treatment + 3 foliar sprays with *B. diffusa* @ 5%), T₁ (32.16) per cent (rhizome treatment with 10% *B. diffusa* root extract), T₃ (39.60%), (three foliar spray with B.D.@10%) and T₂ (41.94) per cent (three foliar spray with B.D.@5%).

Results pertaining to the efficacy of rhizome treatment and foliar sprays with *B. diffusa* root extract indicated the superiority of rhizome treatment plus 3 foliar sprays of *B. diffusa* @10 % resulting into minimum disease incidence (25.04) per cent (T₅) followed by T₄ (29.49) having rhizome treatment integrated with 3 foliar sprays of 5% concentration of same plant. The maximum disease incidence (68.44) per cent was recorded in T₆ which was raised with out any rhizome treatment and foliar sprays, served as control.

Table-1: Effect of rhizome treatment and foliar spray with *B. diffusa* root extract on rhizome rot disease of ginger

S. No.	Treatments	Disease incidence (%)	Disease reduction (%)
1.	T ₁ -Rhizome treatment with B.D. root extract @ 10%	28.33 (32.16)	(54.85) 67.08
2.	T ₂ -Foliar spray of B.D. @ 5%	44.67 (41.94)	48.14 (43.93)
3.	T ₃ - Foliar spray of B.D. @ 10%	40.67 (39.60)	52.96 (46.70)
4.	T ₄ - (T ₁ +T ₂)	24.33 (29.49)	71.84 (58.00)
5.	T ₅ -(T ₁ +T ₃)	18.00 (25.04)	79.19 (62.92)
6.	T ₆ -Control (Water spray)	86.33 (68.44)	0.00 (02.87)
7.	CD (0.05)	4.122	4.270

On the other hand, maximum (62.92) reduction in disease incidence was recorded in plots where rhizome treatment was supplemented with 3 foliar sprays of B.D. root extract @ 10% followed by rhizome treatment and 3 foliar spray with B.D. root extract @ 5% (58.00%), rhizome treatment with B.D. root extract @ 10% (54.85%), three foliar spray with B.D. root extract@10% (46.70%), and three foliar spray with B.D. root extract @5% (43.93%).

Earlier, it was reported by Awasthi and Singh (2007) that the foliar sprays of *B. diffusa* root extract induced the disease resistance exhibiting minimum disease incidence under field conditions which corroborated the present findings. Rhizome treatment supplemented with three foliar sprays at weekly interval improved the yield contributory characters resulting into production of good quality /quantity rhizomes of ginger, mode of action and ingredient present in the root extract of

B.diffusa has been discussed by Verma and Awasthi (1979), where they reported the antiviral activity of the product. Likewise the antifungal properties of natural plant based products like Neem (*Azadirachta indica*), Datura (*Datura festilosa*), Marigold (*Tagets erecta*) and a phytochemical organic formulation (MATW-2) against different soil borne fungal pathogens was also reported by Srivastva et al (2010) in case of low volume high volue vegetable crops like tomato, chillies and brinjal.

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