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Evaluate *in-vitro* efficacy of different fungicides against the collar rot of elephant foot yam caused by *Sclerotium rolfsii* Sacc.

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Abstract
In the present study, Six fungicides were evaluated *in vitro* against the test fungus (*Sclerotium rolfsii*) by using poisoned food technique (Nene and Thapliyal, 1983) [4]. Potato Dextrose Agar medium was used as basal medium. Three replications per treatment were maintained. Among the fungicides, propiconazole and Metalaxyl + mancozeb at (0.1%), mancozeb (0.25%) totally inhibited mycelial growth and sclerotia formation of pathogen.

Keywords: Elephant foot yam, *Sclerotium rolfsii*, collar rot, fungicides

Introduction
Elephant Foot Yam (*Amorphophallus paeoniifolius)* is important commercial tuberous root crop of tropical and subtropical region of the world mainly grown for its tubers. Elephant foot yam commonly known as Suran or Jimmikand and belongs to the family Araceae. Because of its higher yield potential, culinary properties, medicinal utility and therapeutic values, it is referred to as "King of tuber crops". The collar rot caused by *S. rolfsii* has been considered as one of constraints in successful cultivation of Elephant foot yam crop in India. (Sivapraksam *et al.,* 1982) [12]. The pathogen *S. rolfsii* is distributed in tropical and subtropical regions of the world where high temperature prevails (Sahoo *et al.*, 2016) [9]. Injury to collar region during intercultural operation, poor drainage, water logging, etc. acts as predisposing factors for infection by *S. rolfsii*. The disease is more severe during rainy season, followed by warm dry weather (Sahoo *et al.,* 2016) [9].

Materials and Methods
Six fungicides, Thiophenate methyl 70 % WP, Mancozeb 75 % WP, Copper oxychloride 50 % WP, Propiconazole 25 % WP, Carbendazim 50 % WP, Propiconazole 25 % WP, Carbendazim 50 % WP, Metalaxyl-M + Manocozeb against test pathogen (S. rolfsii) by using poisoned food technique (Nene and Thapliyal, 1983) [4]. Potato Dextrose Agar medium was used as basal medium and distributed in 100 ml aliquots in each 250 ml Erlenmeyer conical flasks, which were sterilized at 1.0545 kg/cm^2 pressure for 20 minutes. The quantity of fungicides for each concentration was calculated for 100 ml medium separately. The weighed quantity of the fungicides added in melted PDA at 40^{0}C mixed thoroughly and poured into sterilized Petri plates and allowed to solidify. The mycelial discs of 5 mm diameter were cut from 7 day old culture with the help of sterile cork borer. Each disc was transferred aseptically to the centre of the already poured plates. The PDA plates without fungicide were also inoculated with fungal culture which served as control. The plates were incubated at 28 ± 1 ^{0}C in incubator. Three replications per treatment were maintained. The observations for colony diameter and sclerotia formation were recorded until whole of the plate in control treatment was fully covered with mycelial growth.
Per cent inhibition of growth was calculated by the following formula (Vincent, 1927) [14].

$$X = \frac{Y - Z}{Y} \times 100$$

Where,

X = Per cent inhibition
Y = Growth of fungus in control (mm)
Z = Growth of fungus in treatment (mm)

Experimental details
Design: Completely Randomized Design (CRD)
Replications: 3
Treatments: 7

Table 1: Treatment details

Tr. No.	Treatments	Conc. %	Tr. No.	Treatments	Conc. %
T_1	Thiophenate methyl 70 % WP	0.1	T_5	Carbendazim 50 % WP	0.1
T_2	Mancozeb 75 % WP	0.25	T_6	Metalaxyl-M + Manocozeb	0.1
T_3	Copper oxychloride 50 % WP	0.25	T_7	Control	-
T_4	Propiconazole 25 % WP	0.1	-	-	-

Six fungicides were screened against *Sclerotium rolfsii* Sacc. by Poisoned Food Technique (PFT). The data on the efficacy of different fungicides and their effect on mycelial growth and sclerotia formation of *Sclerotium rolfsii* were presented in Table 2. The data revealed that all the fungicides inhibited the mycelial growth and sclerotia formation. Metalaxyl M + Mancozeb (0.1 %), Propiconazole (0.1 %), and Mancozeb (0.25 %) completely inhibited (100 %) the growth and sclerotia formation of *S. rolfsii*. Copper Oxychloride (0.2 %) and Carbendazim (0.1%) resulted in 13.7 and 8.5 per cent inhibition of test fungus with 46.33 and 37.33 sclerotia, respectively. Whereas least inhibition (0 %) and more sclerotia formation (56.33 nos.) was recorded in thiophenate methyl (0.1 %).

Table 2: *In vitro* efficacy of various fungicides against *S. rolfsii*

Tr. No.	Treatments	Conc. %	Mean colony diameter (mm)*	Per cent inhibition over control	No. of sclerotia produced/plate
T_1	Thiophenate methyl	0.1	90.00	0	56.33
T_2	Mancozeb	0.25	0.00	100	0
T_3	Copper-oxy-chloride	0.25	82.33	8.5	46.33
T_4	Propiconazole	0.1	0.00	100	0
T_5	Carbendazim	0.1	77.66	13.7	37.00
T_6	Metalaxyl-M + Manocozeb	0.1	0.0	100	0
T_7	Control		90.00	0	82
S. Em			0.77		
C.D at 1%			3.26		

* Mean of three replications

These findings are in concurrence with those reported by Prabhu and Hiremath (2003) [8], Tiwari and Singh (2004) [13], Mundhe (2005) [3], Patil (2007) [7], Haralpatil and Raut (2008) [1], Patel *et al.* (2008) [6], Sawant (2009) [11] and Pandav (2012) [5], Kumar (2012) [2], Salvi (2015) [10]. The results of present study revealed that the fungicides in trizole group are very effective against the soil borne pathogen. The fungicides included in the study found to be effective against the development of sclerotia in plate. The fungicides included in the study found to be effective against the development of Sclerotium in plate.

Summary and Conclusion

Among Six fungicides tested, Propiconazole 25 % WP (0.1 %), Metalaxyl + Mancozeb (0.1 %) and Mancozeb 75 % WP (0.25 %) were the best as they completely inhibited the mycelial growth and development of sclerotia of *S. rolfsii*.

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