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SCREENING OF ORGANIC PREPARATIONS ON GROWTH AND VIABILITY OF THE SCLEROTIA OF *Rhizoctonia solani Kuhn* INVITRO AND IN SOIL

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ABSTRACT
The study was undertaken to screen the selected organic preparations under in vitro on mycelia growth and on the viability of the sclerotia of Rhizoctonia solani Kuhn causing sheath blight in rice soil. Among the five *viz*., cow urine, panchagavya, modified panchagavya, jeevamrutham and beejamrutham tested against sclerotial viability panchagavya and beejamrutham were found to be effective in inhibiting sclerotial germination even at lower incubation period of 6 h. While jeevamrutham and modified panchagavya inhibited sclerotial germination at higher incubation periods *i.* e., 18 h and 24 h. Panchagavya and jeevamrutham are found to be effective in inhibiting sclerotial germination in soil. Maximum mycelial growth inhibition by 100 percent was recorded with jeevamrutham and beejamrutham.

INTRODUCTION

Sheath blight disease caused by Rhizoctonia solani Kuhn (teleomorph: Thanatephorus cucumeris (Frank) Donk) is a major threat in rice cultivation (Khan and Sinha, 2006). The activities of soil borne pathogens and their antagonists are markedly influenced by the presence of various plant and animal products present in soil. These products not only change the physio-chemical characteristics of the soil and improve the plant health but also increase the inoculum density of antagonists by serving as substrate media for their growth (Neelamgam and Govindarajulu, 2002; Champawat and Sharma, 2003). This increase in inoculum density helps in overall reduction in disease. Reddy and Padmodaya (1996) reported modified panchagavya an organic product made by mixing five products of cow was highly effective in controlling wilt of tomato. Sugha (2005) found modified panchagavya to be toxic to five soil borne fungi in vitro and effective in reducing damping-off of cauliflower seedlings caused by R. solani. Cow urine has inhibitory effect against several plant pathogens such as Sclerotinia sclerotiorum, Fusarium solani f.sp. cucurbitae, Bipolaris sorokiniana and Xanthomonas oryzae pv. oryzae (Basak *et al*., 2002a, Basak *et al*., 2002b, Akhter *et al*., 2006, Murugan *et al*., 2012). Beejamrutha as seed treatment and foliar spray of jevamrutha recorded higher seed yield (Yogananda *et al*., 2018). Panchagavya is an organic product recommended for crop improvement in organic agriculture (Sangeetha and Thevanathan, 2010). It is used in integrated nutrient management (Anand *et al*., 2016).It is used as a foliar spray, soil application along with irrigation, as well as seed treatment (Natarajan, 2002). Panchagavya, an organic product has the potential to play the role of promoting growth and providing immunity in plant system and it is also used as fertilizer and pesticide in agricultural operations (Galindo *et al*., 2007). Hence, in the present study natural preparations were used to evaluate their effect in controlling the germination of sclerotia.

MATERIALS AND METHODS

The present experiments were carried out in the Department of Plant Pathology, S.V. Agricultural College, Tirupati.

Effect of organic preparations on the mycelial growth of R. solani in vitro

Each one was screened at three different concentrations for its efficacy by poisoned food technique (Nene and Thapliyal, 1986) by measuring the radial growth of the fungus. The list of organic preparations with their concentrations used in the study are presented in the Table 1.

The Petri plate containing PDA medium inoculated with R. solani alone served as control. The Petri plates were incubated at room temperature ($27 \pm 1^{\circ}$ C). Three replications were maintained for each treatment. The inhibition of growth of the fungi was calculated by using the formula given below by Vincent (1927):

$$I = \frac{C - T}{C} X100$$

Where, I = Per cent reduction in growth of test pathogen, C = Radial growth (cm) in control, T = Radial growth (cm) in treatments.

Effect of organic preparations on the sclerotial viability of R. solani in vitro

For each treatment, organic preparation was prepared according to the concentrations given in the Table2 using distilled water. Ten sclerotia of the test pathogen were taken for each replication and dipped into the respective preparation for 30 min, 6 h, 18 h, 24 h. Control was maintained by dipping sclerotial bodies in distilled water. Then the sclerotia were retrieved and placed on the PDA medium for testing their viability.

Experimental design used was CRD and three replications were maintained per treatment.

Effect of organic preparations on the viability of sclerotia of R. Solani mixed with the soil.

Dry soil of paddy field was used in this experiment. 10 g of soil was taken into plastic cups and ten sclerotia of the sheath blight pathogen were mixed with the soil. This is a unit representing a replication of a treatment. The organic preparations which were found effective in the previous experiments were chosen for evaluation. The respective herbicidal solution was added to the plastic cup containing sclerotia and soil mixture upto saturation and incubated for 10 days. In control distilled water was added to the plastic cup containing sclerotia and soil mixture upto saturation. After 10 days the sclerotia were retrieved and placed on PDA medium for testing their viability. Per cent inhibition of sclerotial germination was calculated (Harikrishnan and Yang, 2001).

RESULTS AND DISCUSSION

Effect of natural preparations on growth of R. solani in vitro.

All the natural preparations significantly inhibited the growth of R. solani compared to control. Jeevamrutham and beejamrutham recorded (100%) inhibition in the growth of R. solani.

When jeevamrutham tested against R. solani the highest percentage inhibition (100%) was observed with 5 per cent concentration followed by (61.48 and 37.7%) at 2 and 0.5 per cent concentrations respectively.

When beejamrutham tested against R. solani the highest percentage inhibition (100%) was observed with 5 per cent concentration followed by (56.29 and 36.29%) at 3 and 1 per cent concentrations respectively.

Table 1: List of the organic preparations and their concentrations tested

S. No.	Organic preparation	Concentration used(%)
1	Jeevamrutham	0.5, 2, 5
2	Panchagavya	0.3, 1, 2
3	Modified panchagavya	0.3, 1, 3
4	Bheejamrutham	1,3,5
5	Cow urine	5,10,15
6	Untreated control	

Table 2 : In vitro evaluation of natural preparations on the mycelial growth of R.solani

S. No.	Natural preparations	Concentration	Radial growth (cm)*	Percent inhibition
1	Cow urine	5%	1.88	58.14 (49.66)
		10%	1.03	77.03 (61.36)
		15%	0.83	81.48 (64.49)
2	Jeevamrutham	0.50%	2.98	33.7 (35.47)
		2%	1.73	61.48 (51.62)
		5%	0	100 (90)
3	Beejamrutham	1%	2.86	36.29 (37.02)
		3%	1.96	56.29 (48.59)
		5%	0	100 (90)
4	Panchagavya	0.30%	3.26	42.22 (40.5)
		1%	2.33	50.37 (45.19)
		2%	1.73	77.77 (61.84)
5	Modified panchagavya	0.50%	2.6	31.85 (34.33)
		1%	2.23	48.14 (43.91)
		3%	1	61.48 (51.61)
6	Control	-	4.5	0 0
	CD			1.56
	SEm±			0.54
	CV%			1.67

Effect of organic preparations on the sclerotial viability of R. solani in vitro.

In order to find out the effect of organic preparations on the survival and viability of sclerotia, ten sclerotia of the fungus were taken for each replication and soaked in the respective solution for 30 min, 6 h, 18 h and 24 h. Control was maintained by soaking sclerotial bodies in distilled water. Sclerotia were retrieved and subjected to germination test on PDA.

When per cent inhibition in scelrotial germination was observed after 30 minutes of soaking in respective concentrations of different organic preparations highest per cent inhibition in sclerotial germination (30.00 %) was observed with panchagavya followed by jeevamrutham (27.00%) which was at par. Modified panchagavya, cow urine and beejamrutham are ineffective in inhibiting germination of sclerotia.

When per cent inhibition in sclerotial germination was observed after 6 hours of soaking sclerotia in different organic preparations, the highest per cent inhibition in sclerotial germination (56.70%) was observed with panchagavya followed by beejamrutham (53.33%) which was at par. Modified panchagavya showed 40 per cent inhibition and it

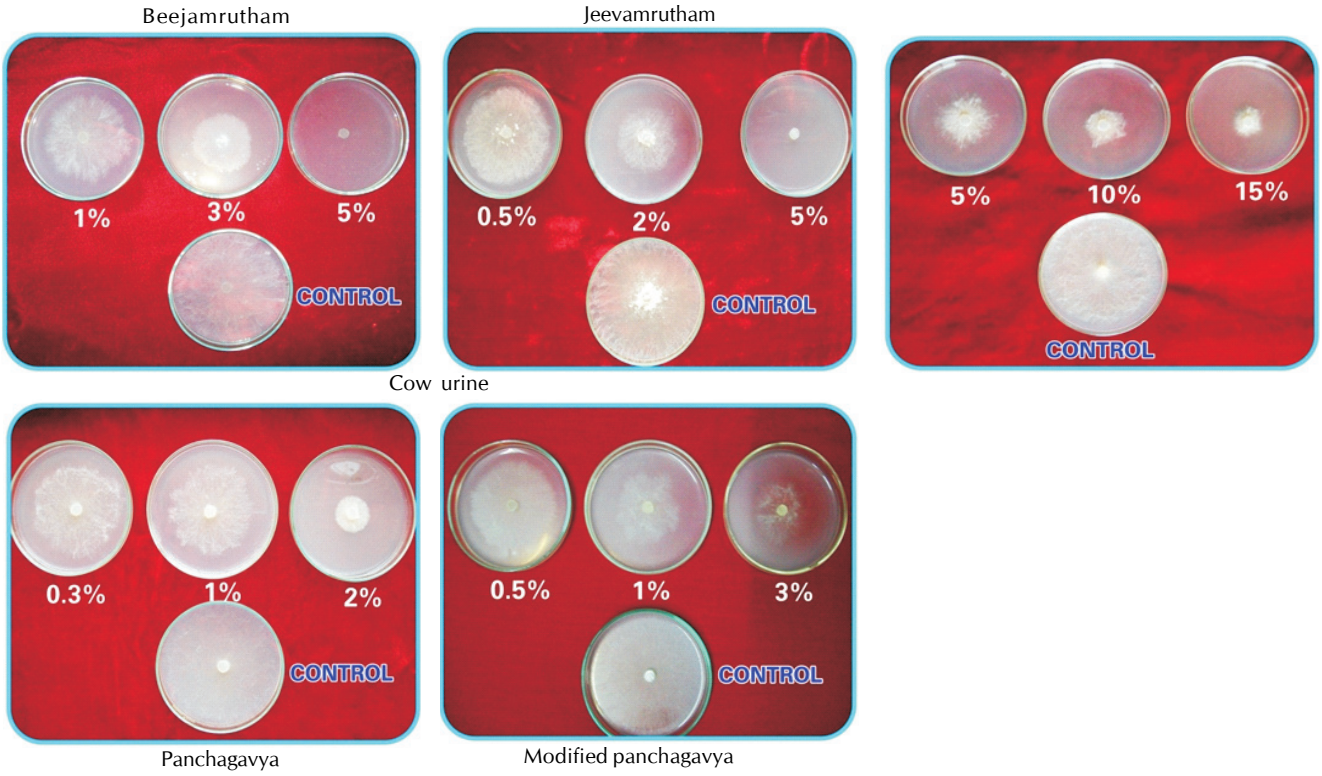

Figure1: In vitro efficacy of organic preparartions on the mycelial growth of R.solani

Table 3 : In vitro efficacy of organic preparations on the sclerotial viability of Rhizoctonia solani

S.No.	Organic preparations	Conc.	Per cent inhibition of sclerotia			
			30 min	6 h	18 h	24 h
1	Cow urine	15%	0	23.33	13.33	43.33
			0	-28.76	-21.13	-41.13
2	Jeevamrutham	5%	27	30	76.7	100
			-30.98	-33.19	-61.69	-90
3	Beejamrutham	5%	7	53.33	90	100
			-12.28	-46.9	-71.53	-90
4	Panchagavya	2%	30	56.7	100	100
			-33.19	-48.82	-90	-90
5	Modified panchagavya	3%	0	40	36.7	73.33
			0	-39.21	-37.21	-58.98
6	Control	-	0	0	0	0
			0	0	0	0
	CD		8.3	4.45	7.58	3.72
	SEm ±		2.66	1.43	2.43	1.19
	CV%		10.22	7.55	8.99	3.36

was at par with beejamrutham.

When per cent inhibition in sclerotial germination was observed after 18 hours of soaking sclerotia in different organic preparations, the highest per cent inhibition in sclerotial germination (100.00%) was observed with panchagavya followed by modified panchagavya (90.00%), jeevamrutham (76.70%), beejamrutham (36.70%) and cow urine (13.33%). Panchagavya was significantly superior to all other treatments.

When per cent inhibition in sclerotia germination was observed after 24 hours of soaking sclerotia in different organic preparations, (100%) inhibition in sclerotia germination was observed with panchagavya, beejamrutham and jeevamrutham followed by modified panchagavya (73.33%) and cow urine (43.33%).

Karthika *et al*. (2017) reported that the mycelilal regeneration from sclerotia was completely inhibited by soaking of sclerotia at 24 hours in 5 per cent of panchagavya. The findings pertaining to panchagavya on inhibition of sclerotial germination was in agreement with the present results.

Effect of different organic preparations on the sclerotial viability of R. solani in soil

The organic preparations found effective in the previous experiment *i.e.*, cow urine, jeevamrutham, beejamrutham, panchagavya and modified panchagavya were used in this experiment. Dried paddy soil was taken in plastic cups and ten sclerotia of R. solani were mixed in the soil, natural

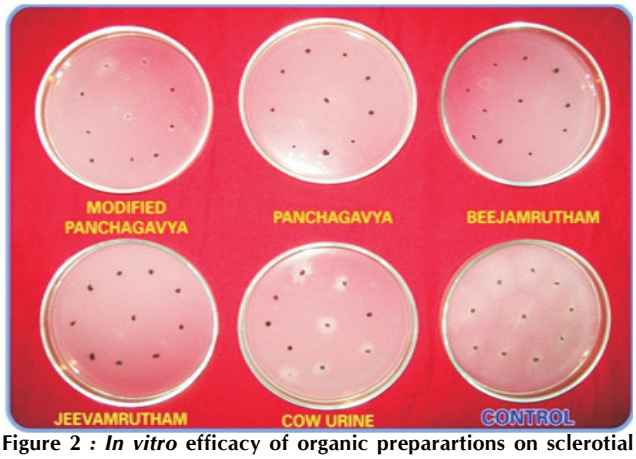

Figure 2 : *In vitro* efficacy of organic preparartions on sclerotial viability at 24 h incubation period

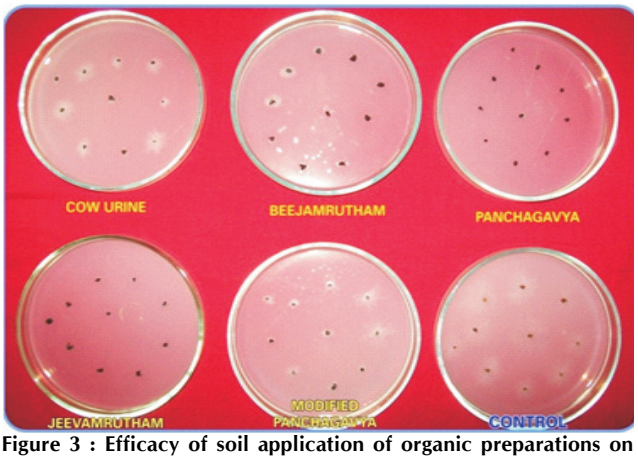

Figure 3 : Efficacy of soil application of organic preparations on sclerotial viability at 10 days incubation period

Table 4: Efficacy of organic preparations on the sclerotial viability of Rhizoctonia solani in soil.

S. No.	Organic preparations	Conc entration	Per cent germinati on of sclerotia	Per cent in hibition of sclerotia
1	Cow urine	15%	70 -56.76	30 -33.19
2	Jeevamrutham	5%	0 0	100 -90
3	Beejamrutham	5%	26.66 -30.98	73.33 -58.98
4	Panchagavya	2%	0 0	100 -90
5	Modified panchagavya	3%	60 -50.74	40 -39.21
6	Control	-	100 -90	0 0
	CD SEm± CV%		2.81 0.9 4.11	2.81 0.9 3.01

preparation was added to the soil upto saturation. After ten days the sclerotia were retrieved and subjected to germination test on PDA.

All the treatments were significantly superior over control in recording low germination percentage of sclerotia of R. solani in soil. Panchagavya and jeevamrutham were significantly superior to all other treatments by recording the lowest sclerotial germination (0.00%) followed by beejamrutham (26.66%), modified panchagavya (60%) and cow urine (70%).

Per cent inhibition of sclerotial germination was recorded in the following order.

T6 < T1 < T5 < T3 < T2,4

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