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## Effect of animal excreta on mycelial growth of *Pyricularia oryzae*

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### Abstract

Rice, *Oryza sativa*, which is the most widely consumed staple food among world's human population. Rice blast disease caused by the fungus known as *Pyricularia oryzae*, has become an important and serious disease worldwide. Combination of animal excrements showed increased fungicidal activity against pathogens of several crops. Combination of cow urine with sheep, goat and buffalo urine gave complete inhibition of the mycelial growth of *P. oryzae*. The combination of dung and urine of buffalo and goat recorded total inhibition of the mycelial growth of *P. oryzae*. Combination of animal excrements showed no loss in the fungitoxic nature. Hence sheep, buffalo, goat, cow urine and hen litter shows effective control against *P. oryzae* in this experiment.

**Keywords:** Animals urine, animals excreta, rice blast

### Introduction

Rice is the seed of the grass species *Oryza sativa* (Asian rice) or *Oryza glaberrima* (African rice). As a cereal grain, it is the most widely consumed staple food for a large part of the world's human population, especially in Asia. It is the agricultural commodity with the third highest worldwide production. Rice blast disease caused by the fungus known as *Pyricularia oryzae*, has become an important and serious disease of rice worldwide. Around 50% of production may be lost in afield moderately affected by infection and each year the fungus destroys rice, which is enough to feed an estimated 60 million people. Blast affects the crop in all stages of its growth from seedling to about 3 weeks before harvest. The disease appeared on the leaves as isolated water soaked lesions, which were bluish green in colour. The leaf spots are typically elliptical with more or less pointed ends. The centre of the spot is usually grayish or whitish and the margins become reddish brown. Combination of animal excrements showed increased fungicidal activity against pathogens of several crops. Combination of cow urine with sheep, goat and buffalo urine gave complete inhibition of *S. oryzae* (Rajendraprasad and Kurucheve, 2002) [5]. Hen litter extract combined with cow, buffalo and goat urine showed complete inhibition of the mycelial growth of *C. capsici* (Krishnakumar *et al.*, 2002) [2]. The combination of dung and urine of buffalo and goat recorded total inhibition of the mycelial growth of *P. aphanidermatum* (Purushothaman *et al.*, 2003) [3]. Combination of animal excrements showed no loss in the fungitoxic nature (Resmy and Kurucheve, 2003) [7]. Hence, the present studies were undertaken to investigate the effect of animal excreta and their combination against rice blast pathogen.

### Materials and Methods

#### *In vitro* evaluation of different combinations of animal excreta against *P. oryzae*

Selected animal urine, dung and hen litter extract were combined @ 1:1 (v/v) and incorporated in to PDA medium at desired conc. viz. 2.5, 5.0, 10.0, 20.0, 40.0 and 60.0%. The combined effect of animal excreta on the mycelial growth in solid medium was studied as described earlier (Raja and Kurucheve 1997) [4]. The experiment was replicated five times.

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## Results and Discussions

**Table 1:** Effect of combination (1:1 v/v) of animal excreta on mycelial growth of *P. oryzae* in solid medium

T. No.	Treatments	*Diameter of mycelial growth (mm)					
		2.5 %	5 %	10 %	20 %	40 %	60 %
1	Buffalo (bull) urine + Cow (bullock) urine	21.50	0.00	0.00	0.00	0.00	0.00
2	Buffalo (bull) urine + Goat (buck) urine	27.00	21.50	11.00	0.00	0.00	0.00
3	Buffalo (bull) urine + Sheep (ram) urine	11.00	0.00	0.00	0.00	0.00	0.00
4	Buffalo (bull) urine + Hen litter	29.00	17.50	14.50	0.00	0.00	0.00
5	Cow (bullock) urine + Goat (buck) urine	24.00	18.50	13.00	0.00	0.00	0.00
6	Cow (bullock) urine + Sheep (ram) urine	11.00	0.00	0.00	0.00	0.00	0.00
7	Cow (bullock) urine + Hen litter	27.50	19.00	14.50	0.00	0.00	0.00
8	Goat (buck) urine + Sheep (ram) urine	13.00	0.00	0.00	0.00	0.00	0.00
9	Goat (buck) urine + Hen litter	29.50	23.00	17.50	11.00	0.00	0.00
10	Sheep (ram) urine + Hen litter	22.50	16.00	11.50	0.00	0.00	0.00
11	Sheep (ram) urine + Sheep (ram) dung	24.50	20.00	17.50	11.00	0.00	0.00
12	Goat (buck) urine + Goat (buck) dung	37.50	25.00	13.50	11.00	0.00	0.00
13	Carbendazim (0.2 %)	0.00					
14	Hinosan (0.2 %)	0.00					
15	Control	90.00					
<b>Factors</b>		<b>S.E</b>	<b>CD (p=0.05)</b>				
Main treatment		0.1791	0.3669				
Sub treatment		0.0437	0.0863				
ST×MT interaction		0.2365	0.4772				
MT×ST interaction		0.1692	0.3344				

\*Mean of five replications.

**Table 2:** Effect of combination (1:1 v/v) of animal excreta on mycelial growth of *P. oryzae* in liquid medium

T. No.	Treatments	*Mycelial dry weight (mg/50 ml of broth)					
		2.5 %	5 %	10 %	20 %	40 %	60 %
1	Buffalo (bull) urine + Cow (bullock) urine	248	0.00	0.00	0.00	0.00	0.00
2	Buffalo (bull) urine + Goat (buck) urine	456	388	262	0.00	0.00	0.00
3	Buffalo (bull) urine + Sheep (ram) urine	261	0.00	0.00	0.00	0.00	0.00
4	Buffalo (bull) urine + Hen litter	451	426	234	0.00	0.00	0.00
5	Cow (bullock) urine + Goat (buck) urine	454	382	238	0.00	0.00	0.00
6	Cow (bullock) urine + Sheep (ram) urine	226	0.00	0.00	0.00	0.00	0.00
7	Cow (bullock) urine + Hen litter	468	335	282	0.00	0.00	0.00
8	Goat (buck) urine + Sheep (ram) urine	234	0.00	0.00	0.00	0.00	0.00
9	Goat (buck) urine + Hen litter	456	412	336	218	0.00	0.00
10	Sheep (ram) urine + Hen litter	460	438	232	0.00	0.00	0.00
11	Sheep (ram) urine + Sheep (ram) dung	459	324	309	223	0.00	0.00
12	Goat (buck) urine + Goat (buck) dung	482	431	318	208	0.00	0.00
13	Carbendazim (0.2 %)	0.00					
14	Hinosan (0.2 %)	0.00					
15	Control	487.00					
<b>Factors</b>		<b>S.E</b>	<b>CD (p=0.05)</b>				
Main treatment		28.8032	59.0022				
Sub treatment		6.5784	12.9987				
ST×MT interaction		37.0212	74.7771				
MT×ST interaction		25.4782	50.3437				

\*Mean of five replications

**In vitro evaluation of combination of animal excreta against *P. oryzae***

The results on the effect of combinations of animal excrements at 1:1 ratio (v/v) on the fungitoxicity against *P. oryzae* (both solid and liquid medium) are given in tables 1 and 2. Sheep urine combined with buffalo urine, cow and goat urine (5%), hen litter (20%), sheep dung (40%) and buffalo urine combined with cow urine (5%) were highly effective in inhibiting the mycelial growth of *P. oryzae* when compared to individual animal excreta treatments. The inhibited discs upon re-inoculation in to fresh media did not revive their viability, thus proving the fungicidal nature of animal excreta combinations. Similar such enhanced fungitoxicity of the combined animal excreta products have been reported earlier. Combination of cow urine with sheep, goat and buffalo urine gave complete inhibition of the mycelial growth of *S. oryzae*

at lower concentration when compared to individual treatments (Rajendraprasad and Kurucheve, 2002) [5]. According to Resmy and Kurucheve (2003) [7] combination of animal excrements showed no loss in fungitoxicity. The production antibiotics by biocontrol agents present in the animal excreta might have played a decisive role in suppressing the growth of the pathogens. Also a kind of synergism might have existed in the combination treatments of animal excrements which might be the reason for the enhanced fungitoxic activity at lower concentrations than the individual animal excreta treatments.

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