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FUNGICIDAL ACTIVITY OF BUFFALO (*Babulus bubalis*) URINE: A NEW RECORD

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ABSTRACT

Different animal excrements were assayed for fungitoxicity against *Fusarium oxysporum f.sp. lycopersici*, the causal agent of tomato wilt. Among them, cold and hot water extract of buffalo urine at 10 per cent concentration recorded complete inhibition of the mycelial growth. Physical properties like autoclaving at temperature 90°C for 10 minutes did not alter the toxicity. Toxin and hydrolytic enzyme production was also inhibited by buffalo urine. Seed treatment with buffalo urine enhanced the seed germination, growth and vigour of tomato seedlings.

KEY WORDS: Buffalo urine, Fungicidal activity, *Fusarium oxysporum f.sp. lycopersici*

In recent years, search for various naturally occurring componds with antimicrobial activity has become quite intense due to the growing concern about polluting effect of some of the synthetic fungicides and development of resistance amongest the pathogens against such fungicides. Animal products have been found to possess antifungal (Sundarraj *et al.*, 1996) and antiviral (Kurucheve, 1989) properties. So, in the present study, some animal excrements were screened for the fungitoxicity against the test fungus *Fusarium oxysporum f.sp. lycopersici* causing wilt disease of tomato.

MATERIALS AND METHODS

For the extraction of animal dung and urine and evaluation of antifungal effect of animal products, the method suggested by Sundarraj *et al.* (1996) was followed, for studying the effect of physical factors (autoclaving, temperature and storage) on the fungitoxicity of animal product, the method of Kurucheve *et al.* (1997) was followed. Effect of animal product on enzyme and toxin production (Mahadevan and Sridhar, 1986) and seed treatment (ISTA, 1976) was also studied.

RESULTS AND DISCUSSION

Cold and hot water extract of buffalo urine at 10 per cent concentration completely inhibited the mycelial growth of *F. oxysporum f.sp.lycopersici* and they were found to be at par with Carbendazim (0.1%). All other treatments recorded little or no

Table 1. Effect of water extract of different animal excrements against F. oxysporum f.sp. *lycopersici* growth

Source	Mycelial inhibition (mm)*					
	Cold water extract			Hot water extract		
	2.5%	5%	10%	2.5%	5%	10%
DUNG (Dried)						
Buffalo	90	90	90	90	90	90
Cow	90	86	81	90	87	83
Goat	89	82	72.33	84	80	70.33
URINE						
Buffalo	26.66	18	9	18	14	9
Cow	90	86	76.66	90	84	73
Carbendazim (0.1%)	9	9	9	9	9	9
Control	90	90	90	90	90	90

*Mean of three replications

	S.E	C.D at 5%	S.E	CD at 5%
Main treatment (MT)	0.18	0.51	0.24	0.70
Sub treatment (ST)	0.19	0.56	0.14	0.41
ST x MT interaction	0.52	1.49	0.38	1.07
MT x ST interaction	0.46	1.32	0.39	1.12

Table 2. Effect of water extract of buffalo urine against *F. oxysporum* f.sp. *lycopersici* growth in liquid medium

Source	Mycelial dry weight (mg/50 ml broth)*	
	Cold water extract	Hot water extract
Buffalo urine (10%)	187	187
Carbendazim (0.1%)	181	181
Control	530	530
*Mean of three replications.		
S.E	1.10	1.02
C.D at 5%	3.13	2.89

Table 4. Effect of buffalo urine on the toxin production by *F. oxysporum f.sp. lycopersici*

Source	Inhibition area (mm^2)*
Buffalo urine (10%)	75.25
Carbendazim (0.1%)	57.12
Control	528.76
* Mean of three replications.	
S.E	0.64
C.D at 5%	1.81

effect (Table 1). In the liquid medium it has recorded 63.5 per cent inhibition of mycelial growth (Table 2). Earlier from this laboratory, Gerard Ezhilan and Kurucheve (1994) and Sundarraj *et al.* (1996) reported that sheep urine and hen litter at 10 per cent concentration completely inhibited the mycelial growth of *Rhizoctonia solani*. The fungitoxicity of buffalo urine against wilt pathogen is reported for the first time.

The physical properties like autoclaving and temperature did not alter the toxicity thus, proving its thermostability (Table3). The fungitoxicity declined gradually after extraction. Sundarraj and Kurucheve (1995) reported that the various temperature treatments and autoclaving had no adverse effect on the fungitoxicity of the hen litter. The percent inhibition of toxin production by buffalo urine and carbendazim was 85.8 and 89.2 respectively (Table 4). The toxin may upset the energy balances of cells as it inhibits the electron transport in mitochondria. Ghosal *et al.* (1977) reported that mangiferin, a naturally occurring xanthone-c-glucoside from *Canscora decussata* Schult (Gentianaceae) completely prevented the fusaric acid production by *F. oxysporum f.sp. carthami*. Celluloytic and pectinolytic enzyme

Table 3. Effect of some physical factors on the fungitoxicity of buffalo urine against *F. oxysporum* f.sp. *lycopersici*

Source	Mycelial inhibition (mm)*										
	Autoclaved extract	Temperature(°C)						Storage (days)			
		40	50	60	70	80	90	1	3	5	7	9
Buffalo urine (10%)	15	9	9	9	9	9	11	12	19	27	36	49
Carbendazim (0.1%)	9	9	9	9	9	9	9	9	9	9	9	9
Control	90	90	90	90	90	90	90	90	90	90	90	90

* Mean of three replications.

	S.E	C.D at 5%	S.E	C.D at 5%	S.E	C.D at 5%
Main treatment (MT)	0.49	1.41	0.90	0.26	0.11	0.32
Sub treatment(ST)			0.18	0.51	0.19	0.54
ST x MT interaction			0.48	1.34	0.51	1.44
MT x ST interaction			0.45	1.25	0.47	1.33

Table 5. Effect of buffalo urine on the cellulolytic and pectinolytic enzyme production by *F. oxysporum* f.sp. lycopersici

Source	Enzyme activity (Units)*				
	Pectinolytic		Cellulolytic		
	C_1	C_x	PG	PTE	PGTE
Buffalo urine (10%)	0.36	9.20	9.00	8.40	9.12
Carben dazim (0.1%)	0.18	5.20	6.11	5.93	6.18
Control	2.30	60.60	72.20	74.40	71.03
*Mean of three replications.					
S.E	0.06	0.08	0.05	0.05	0.04
C.D at 5%	0.12	0.11	0.14	0.13	0.13

Table 6. Effect of seed treatment with buffalo urine on germination and growth of tomato seeds

Source	Parameters *			
	Seed germination (%)	Shoot length (cm)	Root length (cm)	Vigour index
Buffalo urine (10%)	91.1	6.4	5.8	1118.8
Carband azim (0.1%)	94.3	6.9	6.4	1254.5
Control	80.0	4.6	4.4	720.0
* Mean of three replications				
S.E	0.66	0.05	0.06	13.24
C.D at 5%	0.19	0.16	0.18	37.64

production was also inhibited by buffalo urine and Carbendazim treatments (Table 5). Goodman *et al.* (1967) reported that the ability of a pathogen to produce hydrolytic enzyme determines the degradation of cell walls during pathogenesis and thereby inhibiting the disease development. Baffalo urine or Carbendazim-treated tomato seeds recorded significant increase in seed germination percentage, growth and vigour of seedlings when compared to control (Table 6) and it is in confirmation with the findings of Sundarraj and Kurucheve (1995). Thus, buffalo urine may prove useful fungitoxicant for the control of *F. oxysporum f.sp. lycopersici.* Further studies are necessary to identify the antifungal principle.

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