FUNGICIDAL ACTIVITY OF BUFFALO
(Bubalus 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 compounds 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 amongst the pathogens against such fungicides. Animal products have been found to possess antifungal (Sundarraj et al., 1996) and antiviral (Kuruchev, 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 Kuruchev 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 inhibition.

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

<table>
<thead>
<tr>
<th>Source</th>
<th>Cold water extract (mm)</th>
<th>Hot water extract (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.5% 5% 10%</td>
<td>2.5% 5% 10%</td>
</tr>
<tr>
<td>DUNG (Dried)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td>90 90 90</td>
<td>90 90 90</td>
</tr>
<tr>
<td>Cow</td>
<td>90 86 81</td>
<td>90 87 83</td>
</tr>
<tr>
<td>Goat</td>
<td>88 82 72.33</td>
<td>84 80 70.33</td>
</tr>
<tr>
<td>URINE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buffalo</td>
<td>26.66 18 9</td>
<td>18 14 9</td>
</tr>
<tr>
<td>Cow</td>
<td>90 86 76.66</td>
<td>90 84 73</td>
</tr>
<tr>
<td>Carbendazim (0.1%)</td>
<td>9 9 9</td>
<td>9 9 9</td>
</tr>
<tr>
<td>Control</td>
<td>90 90 90</td>
<td>90 90 90</td>
</tr>
</tbody>
</table>

*Mean of three replications

S.E.  C.D.  S.E.  C.D. at 5% 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 0.30 1.12
Table 1. Effect of water extract of buffalo urine against *F. oxysporum* f.sp. lycopersici growth in liquid medium.

<table>
<thead>
<tr>
<th>Source</th>
<th>Cold water extract (mg/50 ml broth)</th>
<th>Hot water extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo urine (10%)</td>
<td>1.87</td>
<td>1.87</td>
</tr>
<tr>
<td>Carbendazim (0.1%)</td>
<td>1.81</td>
<td>1.81</td>
</tr>
<tr>
<td>Control</td>
<td>5.30</td>
<td>5.30</td>
</tr>
</tbody>
</table>

*Mean of three replications.

S.E 1.10 1.02
C.D at 5% 3.13 2.89

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

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

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

<table>
<thead>
<tr>
<th>Source</th>
<th>Inhibition area (mm)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buffalo urine (10%)</td>
<td>75.25</td>
</tr>
<tr>
<td>Carbendazim (0.1%)</td>
<td>57.12</td>
</tr>
<tr>
<td>Control</td>
<td>528.76</td>
</tr>
</tbody>
</table>

* Mean of three replications.

S.E 0.64
C.D at 5% 1.81

The physical properties like autoclaving and temperature did not alter the toxicity thus, proving its thermostability (Table 3). The fungitoxicity declined gradually after extraction. Sundarraj and Kuruchev (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 *Garcinia indica* Schult (Gentianaceae) completely prevented the fusaric acid production by *F. oxysporum* f.sp. carthami. Cellulolytic and pectinolytic enzyme
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. Buffalo 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.

**REFERENCES**
