

Antifungal Activity of Cow Urine Extracts of Selected Plants Against Phytopathogenic Fungi

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Abstract: The present study was performed to determine inhibitory effect of cow urine extract of 14 plants (belonging to 7 families) against the mycelial growth of two phytopathogenic fungi viz., *Colletotrichum capsici* (isolate from anthracnose of chilli) and *Fusarium oxysporum* f. sp. *zingiberi* (isolate from rhizome rot of ginger) by poisoned food technique. The extracts inhibited the mycelial growth of test fungi to a varied extent. Among fungi, *C. capsici* was susceptible to maximum extent when compared to *F. oxysporum*. All extracts were effective in inhibiting *C. capsici* while 10 out of 14 extracts inhibited *F. oxysporum*. Extent of inhibition of *C. capsici* and *F. oxysporum* ranged between 12.50 to 90% and 0.0 to 47.61% respectively. These extracts appear to be useful as antimycotic agents with activity against test fungi especially *C. capsici*. The cow urine extracts may be used in the management of anthracnose of chilli and rhizome rot of ginger. Further studies in field conditions are to be carried out to justify the observations of this *in vitro* study.

Keywords: Cow urine extract, Antifungal activity, *Colletotrichum capsici*, *Fusarium oxysporum*, Poisoned food technique

INTRODUCTION

Fungi are one among the important aetiological agents of plant diseases. Fungi cause diseases in plants both in field and storage. The fungal infection of plants results in poor yield of crop and hence results in considerable economic loss. In severe cases, crop losses exceeding >50% can occur due to fungal infections. The management of mycotic diseases of plants mainly focuses the use of chemical agents. The use of synthetic fungicides appears promising but suffers from several drawbacks such as high cost, environmental pollution, adverse effects on non-target organisms and the emergence of resistant strains of pathogenic fungi. Natural products including cow urine and cow urine based formulations have been investigated for antifungal activity and the results appeared promising [1-5]. Cow urine is shown to exhibit potent inhibitory activity against a wide range of pathogenic microbes including phytopathogenic fungi [3, 4, 6-11]. Similarly, formulations based on cow urine and plants have shown to possess inhibitory effect against various pathogenic microorganisms [12-17]. The present study was carried out to investigate antifungal potential of cow urine extract of 14 plants collected from different places of Karnataka against two phytopathogenic fungi namely *Colletotrichum capsici* and *Fusarium oxysporum* f. sp. *zingiberi*.

MATERIALS AND METHODS

Collection of cow urine and preparation of cow urine extracts

The urine was collected in the morning from an indigenous variety of cow in a sterile container, brought to the laboratory immediately and the urine was filtered aseptically. The plant materials were dried under shade and powdered in a blender. Cow urine extraction of selected plants was carried out by using the method of Rakesh *et al*, [15]. with slight modification. A known quantity (10g) of each powder was immersed in 100ml of cow urine taken in a clean conical flask. The flasks were plugged and left for 7 days with occasional stirrings. The contents of flasks were filtered through sterile muslin cloth and the filtrates (cow urine extracts) were stored in refrigerator until use.

Collection and identification of plants

The plants used in this study (Table 1) were collected from different parts of Karnataka namely Guddekeri, Lakkavalli, Sagara and Mullayanagiri. Authentication of plants was carried out by referring standard flora along with the help of taxonomists [18, 19].

Table 1: Plants selected in this study

Plant name	Family	Part used
<i>Vanda roxburghii</i> R.Br.	Orchidaceae	Whole plant
<i>Pholidota imbriacata</i> Lindl.	Orchidaceae	Whole plant
<i>Luisia macrantha</i> Blatt. McCann.	Orchidaceae	Whole plant
<i>Acampe praemorsa</i> (Roxb.) Blatter & McCann	Orchidaceae	Whole plant
<i>Coelogyne nervosa</i> A.Rich.	Orchidaceae	Whole plant
<i>Emilia sanchifolia</i> DC. ex DC.	Compositae	Whole plant
<i>Blepharis asperrima</i> Nees	Acanthaceae	Whole plant
<i>Crotalaria filipes</i> Benth.	Leguminosae	Whole plant
<i>Hypericum mysorense</i> B.Heyne ex Wight & Arn.	Hypericaceae	Leaf
<i>Atylosia lineata</i> Wt. & Arn.	Leguminosae	Leaf
<i>Conyza stricta</i> Willd	Compositae	Whole plant
<i>Peristrophe bicalyculata</i> (Retz.) Nees	Acanthaceae	Leaf
<i>Syzygium laetum</i> (Buch.-Ham.) Gandhi	Myrtaceae	Leaf
<i>Gloriosa superba</i> L.	Colchicaceae	Leaf

Antifungal activity of cow urine extract of selected plants

To assess the antifungal activity of cow urine extracts, poisoned food technique was used. In brief, the control and poisoned (10% extract) potato dextrose agar plates were inoculated at the centre with the well sporulated culture of test fungi viz., *Colletotrichum capsici* (causal agent of anthracnose of chilli) and *Fusarium oxysporum* f.sp. *zingiberi* (causal agent of rhizome rot of ginger) by point inoculation. The plates were incubated aerobically at 28°C for 5 days in upright position. The diameter of fungal colonies was measured after incubation. Antifungal effect in terms of inhibition of mycelial growth was determined using the formula:

Inhibition of mycelial growth (%) = $(C - T / C) \times 100$, where C and T refers to colony diameter in control and poisoned plates respectively [15].

RESULTS AND DISCUSSION

Cow is considered to be akin to mother in the Indian tradition and the urine of cow is widely used for several purposes owing to its wide therapeutic applications. Cow urine has immense applications in agriculture, for example antifungal and insecticidal, as revealed by several literatures [8, 20-24]. Formulations containing cow urine and plants have been shown to display mycelial growth inhibitory activity against a range of phytopathogenic fungi. The study of Akhter et al, [6] showed the inhibitory effect of different concentrations of plant extracts in combination with cow urine against conidial germination of *Bipolaris sorokiniana*. Cow urine extract of leaf of *Pongamia pinnata* was effective in inhibiting *Xanthomonas oryzae*, the causal agent of bacterial leaf blight of paddy [14]. Distillates obtained on boiling botanicals and cow urine were shown to suppress the growth of fungal pathogens of bell pepper [2]. Combination of tobacco leaf and cow urine was found to suppress the mycelial growth and formation of sclerotia of *Sclerotium rolfsii*, causal agent of foot and root rot of betel vine [25]. Rakesh et al. [15] found antifungal activity being

displayed by cow urine extract of certain plants against *F. oxysporum* f.sp. *zingiberi* and *Pythium aphanidermatum* which cause rhizome rot disease in ginger. The study of Kekuda et al. [17] revealed the marked inhibitory effect of *Alpinia galanga* and *Pimenta dioica* against mycelial growth of *C. capsici*. Formulations containing crude extracts from four plants with cow urine were shown to exhibit antimycotic activity against *Sclerotium rolfsii* [16]. In the present study, we screened the effect of cow urine extract of selected plants against the mycelial growth of test fungi by poisoned food technique and the result is shown in Table 2 and Figure 1. The extracts were effective in inhibiting the radial growth of test fungi to a varied extent. Among fungi, marked susceptibility was observed in case of *C. capsici* when compared with *F. oxysporum*. All extracts were able to inhibit *C. capsici*. Extract of all plants except *S. laetum* inhibited *C. capsici* to 50% and higher. Inhibitory activity against *C. capsici* was highest (90% inhibition) in case of extract of *P. bicalyculata* and *C. filipes* while least (12.5% inhibition) in case of *S. laetum*. Next to *P. bicalyculata* and *C. filipes*, extract of *V. roxburghii*, *A. lineata* and *C. stricta* inhibited *C. capsici* to an appreciable extent (85% inhibition). Out of 14 plants selected, 11 plants caused an inhibition of >50% of *C. capsici*. *F. oxysporum* was not so susceptible to extracts when compared to *C. capsici* as none of the extracts were able to inhibit the radial growth of *F. oxysporum* to 50%. Among extracts, marked inhibition (47% inhibition) of *F. oxysporum* was displayed by *L. macrantha* and *P. bicalyculata*. However, *F. oxysporum* was not inhibited by extract of *S. laetum*, *E. sanchifolia*, *H. mysorense* and *G. superba*. Cow urine exhibited marked inhibition of test fungi. Here also, *C. capsici* was suppressed to higher extent when compared to *F. oxysporum*. The extent of inhibition of *F. oxysporum* by cow urine was high when compared to cow urine extracts. However, in case of inhibition of *C. capsici*, some cow urine extracts exhibited similar or higher inhibitory activity when compared to cow urine alone.

Table 2: Antifungal activity of cow urine extracts of selected plants

Cow urine extracts	Inhibition of fungi (%)	
	<i>C. capsici</i>	<i>F. oxysporum</i>
<i>V. roxburghii</i>	85.00	28.57
<i>P. imbricata</i>	55.00	23.80
<i>L. macrantha</i>	75.00	47.61
<i>A. praemorsa</i>	50.00	11.90
<i>C. nervosa</i>	57.50	07.14
<i>E. sanchifolia</i>	80.00	00.00
<i>B. asperrima</i>	67.50	04.76
<i>C. filipes</i>	90.00	26.19
<i>H. mysorensis</i>	37.50	00.00
<i>A. lineata</i>	85.00	33.33
<i>C. stricta</i>	85.00	28.57
<i>P. bicalyculata</i>	90.00	47.61
<i>S. laetum</i>	12.50	00.00
<i>G. superba</i>	55.00	00.00
Cow urine (control)	85.00	64.28

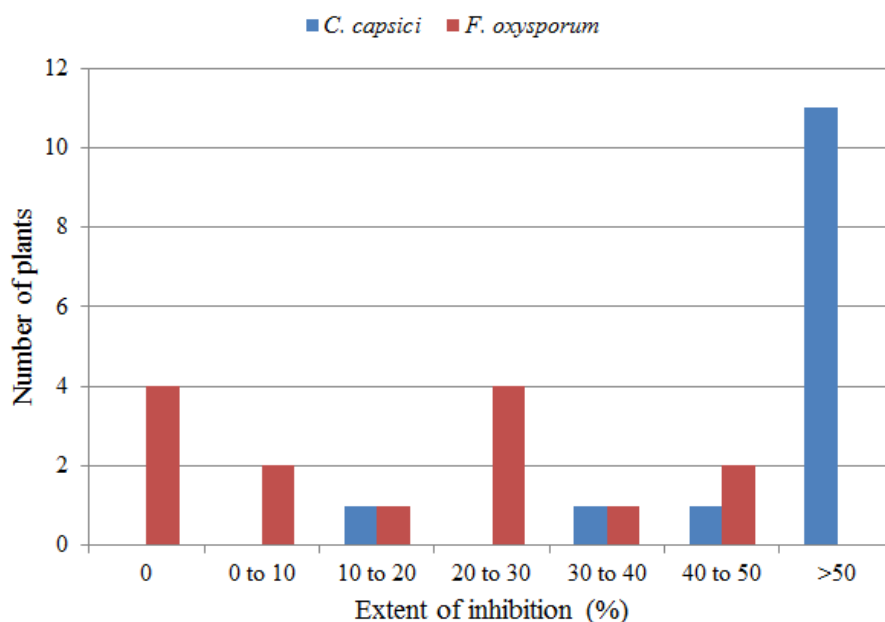


Fig-1: Extent of inhibition (%) of test fungi by cow urine extracts of plants

CONCLUSION

Cow urine extract of selected plants have shown varied inhibitory activity against test fungi with promising activity against *C. capsici* when compared to *F. oxysporum*. Most of these extracts appear promising antifungal agents that can be used against fungal infections of plants. Further studies in field conditions are to be conducted to determine the antifungal effect of these cow urine extracts.

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